Celebrating
A Century of Success

1906 ~ 2006
by the
Horticultural Experiment Station, Vineland and the University of Guelph.
Front Cover Collage

*Clockwise from top right:*

Moses Rittenhouse, sunshine recorder, main administration building (1957), Ollie Bradt, plum (2006), original administration building (1907).
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Foreword

THE EDITORS:
ARTHUR LOUGHTON, RICHARD CHUDYK & JUDY WANNE

We ask our readers to forgive us for a little legalese at the beginning of this Centennial Report, but we thought that the following paragraph was warranted here:

The Indenture conveying the property which became the Horticultural Experiment Station, Vineland Station, Ontario, Canada between "Moses F. Rittenhouse, of the City of Chicago in the State of Illinois, Lumber Merchant, of the First part, Emma S. Rittenhouse, of the same place, his wife, of the second part, and His Majesty the King as represented by the Honorable the Minister of Agriculture for the Province of Ontario, of the third part" is dated "the twenty-seventh day of December, in the year of our Lord, one thousand nine hundred and six (1906)."

For the "....consideration of One Dollar of lawful money of Canada" the transaction granted the property ".....unto the said party of the Third Part, his successors and assigns, FOREVER ......" (the document's capital letters).

Now one hundred years later, we celebrate the magnanimous gesture of the Rittenhouses in providing the people of Ontario with an incredible bargain and a challenging opportunity. We salute the Rittenhouse family and hope that this Centennial Report will do justice to their foresight and generosity.

The first fifty years of the Station's existence were well documented in a 76 page publication entitled just that: "The First Fifty Years" chronicling the period from 1906 to 1956. We understand that that publication had a limited circulation and therefore we have deemed it to be valuable and interesting to reproduce the first few pages from "The First Fifty Years" as an introduction to the current Report. We hope we may be forgiven for some inevitable duplication of the old record but as we have found in compiling this sequel, memories fade, old documents get mis-placed and in any case the actual wording of a fifty year old report indeed makes fascinating reading.

As for the individual articles that follow, the editors have imposed few rules, restrictions and guidelines on the authors. We have obviously relied heavily on the senior members of the Vineland alumni whose memories go back the furthest and we
know it was a challenge for them to dig into their mental filing systems to record their experiences here. Few of them ever thought they would be asked to write such a paper after having been retired in some cases over 20 years! Individual personal writing styles were encouraged and, we hope, preserved through the editing process. We thank them all collectively for rising to the challenge.

This document does not claim to be an example of a peer-reviewed scientific journal. Over the past century, the Vineland research staff has produced countless refereed scientific papers which can now be found in the international literature and via data-bases that were unheard of in 1906 and even in 1956. Early on in the editing process we were asked to consider publishing in this Report a complete list of all the scientific papers from Vineland over the 100 year life of the Station. The idea was quickly abandoned since today's search engines can do that equally well. In the meantime, here is the history of the first century of research, development and other activities at the Horticultural Experiment Station, Vineland Station, Ontario. It is quite a story!
The Silver Chord
Reproduced from
"The First Fifty Years" 1906 - 1956

Author Unknown
Service to the grower, to the horticultural industry, whether direct or indirect. That has been the objective of "Station" effort down through the years, the first fifty years.

To serve its purpose the Horticultural Experiment Station is, in its true sense, a "laboratory", equipped and maintained by the Province of Ontario to investigate horticultural problems, whether of fruits, or vegetables, or of ornamentals. These problems may be such that they are of direct interest to the grower—varieties, planting, pruning, soils and soil management, fruit maturity, pest control, and the like, or of indirect, but equal interest and value—studies in processing, in transportation and marketing. All such research work becomes increasingly important as the problems of production and marketing become more complex.

As well, the Station is a clearing-house for horticultural information, a place to which the grower turns naturally for new ideas and research results whatever their origin, whether elsewhere in Ontario or Canada, from the United States, or beyond.

All this is service, the reason for the establishment of the Station. It is service which, in the nature of things, the grower cannot do privately. It is costly, increasingly requires personnel with specialized training, and extensive and expensive laboratory equipment. And it requires the research worker's dedication to the idea that he is one of a team, that the true objectives are the solution of problems, the origination of new and better varieties, the manufacture of new or better products from horticultural material, the quick dissemination of useful information.
A Message from the Minister of Agriculture, Food and Rural Affairs for the Province of Ontario

HON. LEONA DOMBROWSKY

On behalf of the Ontario Ministry of Agriculture, Food and Rural Affairs, I congratulate the staff, former staff and friends of the Horticultural Experiment Station in Vineland on 100 years of contributing to the advancement of horticulture in Ontario.

The Horticultural Experiment Station has been a part of the Ontario Ministry of Agriculture, Food and Rural Affairs for over 90 years, and our staff continue to have a close relationship. We work cooperatively through the ministry/University of Guelph contract and participate in other events to transfer research results to the industry.

The research conducted at the Horticulture Research Institute of Ontario, as the Horticultural Experiment Station was renamed in 1966, has supported the development of a vibrant and internationally recognized agri-food industry in the Niagara region. Thanks to the close collaboration between station researchers and the horticultural growers and processors who have put research results into practice, the discoveries made in Vineland have provided significant benefits to Ontario consumers.

We have seen many changes at Vineland over the past century. As the station enters its second century, it must continue to evolve to meet the changing needs of the industry. I know your commitment to communication and collaboration with industry will ensure that the station meets the challenges of the future of agriculture.

One hundred years after the original Horticultural Experiment Station was founded on the Rittenhouse family property, the province continues to value the importance of research and innovation. In April 2006, ownership of the station, which is now known as the Department of Plant Agriculture - Vineland Campus, will be transferred from the Ontario government to the Agricultural Research Institute of Ontario. I believe this change will further facilitate partnerships and collaboration between government, academia and industry, and contribute to future development at Vineland.

Congratulations, once again, as you celebrate your centennial. I wish you a bright and successful future.
A Message from the Deputy Minister,
Ontario Ministry of Agriculture,
Food and Rural Affairs

BRUCE A. ARCHIBALD

The Horticultural Experiment Station
and a Lifetime of Reflection.

When I was born in 1956, my father was a research scientist at the Horticultural Experiment Station in Vineland Station, so I guess I can say I have had an association with this institution all of my life. When I was very young, staff at the station worked half days on Saturdays. On rare occasions, Dad would let my brother Fred and me go with him on Saturday mornings and we would explore the various halls and laboratories of the station. We always made a trip to the greenhouses and looked at the goldfish that lived in an indoor pond in the boiler room during the winter. And when we thought no one would notice, we would wheel my Dad’s office chair out of his office and push each other up and down the hall. Although I was too young to understand the research that was being conducted, even at this young age I knew the work being carried out was exciting and important to farmers and to agriculture.

I attended Rittenhouse Public School, which was situated next to the station, and learned about the generous gifts that Mr. Moses Franklin Rittenhouse had given back to the community where he had grown up - a school, a community hall, a library and, in 1906, part of the original 90 acres that would become the Horticultural Experiment Station (HES). The vision for HES was clear: to establish a publicly-managed research station to assist Ontario fruit growers in the production of their commodities and to help establish a strong and viable fruit industry. Much has changed in the past 100 years, but the community and industry still benefit from Mr. Rittenhouse’s generosity and foresight.

In 1966, my father became the Director of the station. Over the next decade, the station changed its name to the Horticultural Research Institute of Ontario (HRIO) and developed a strong cadre of research scientists, technical experts and extension specialists. The people working there were dedicated professionals who developed strong relationships with the growers and the industry.
Their work was recognized internationally, and the outputs helped the industry grow and adjust to changing production and marketing challenges. But they were also community members, who lived, worked and raised their families in the region. I went to school, attended church and played on sports teams with many other kids whose parents worked or were associated with the HRIO - the Andersens, Bradts, Beeeners, Clines, Loughtons and Wiebes to name a few. And regardless of what our parent did, we all felt a strong connection and pride in our association to the station.

In 1995, I had a rare life experience. Dr. Frank Eady, the then-director of HRIO, was on a temporary assignment and there was an opportunity for an acting director for six months. I was the successful applicant. I remember my new boss, Mr. Norris Hoag, driving me to the station to meet the staff. Many of them remembered me from days gone by and, to be honest, probably thought I was still ten years old. As I walked into Frank's office (also my Dad's former office) and looked at the old oak desk and well-worn chair, I was overcome with memories and excitement. What an opportunity it was for me - if only for a few months - to help lead this institution. I quickly came to understand that the professionalism and commitment to serving the industry I had remembered growing up was still alive and well at HRIO.

In August 2005, I was given the rare privilege of being asked to serve as the Deputy Minister of the Ontario Ministry of Agriculture, Food and Rural Affairs. As I look at the future of the province's agri-food industry and the future of the Horticultural Experiment Station, I believe we are at a point of new beginnings. The production and marketing of food in this province is very different today than even a few years ago. Global competition, rapid technological advancements, increasing regulatory requirements, and a more demanding consumer are just some of today's realities. So as we look back and celebrate the first 100 years, we should also look forward, and begin in earnest the task of forming new partnerships and considering new models to begin to transform the station in a way that helps us stay true to the original vision of Mr. Rittenhouse's gift.
A Message from the President and Vice-Chancellor of the University of Guelph

ALASTAIR J. S. SUMMERLEE

In keeping with the motivating sentiments of Moses Rittenhouse who deeded the property now known as the Vineland Campus of the University of Guelph's Department of Plant Agriculture, this publication offers the reader "a pleasant place to enjoy horticulture".

The University of Guelph is tremendously proud of the contributions of its Vineland Campus and its ability to provide learning and research opportunities for a wide variety of individuals related to floriculture, ornamental, vegetable, fruit and protected crops. Just as Mr. Rittenhouse had dreamed 100 years ago, this campus of the University provides a wonderful place to enjoy horticulture and, even better than this, a place which inspires people to explore the future of horticulture and carry this knowledge to others beyond Vineland's acreage on the southern shores of Lake Ontario.

Congratulations are due to all those who have nurtured the Vineland Campus to this centenary celebration and who have ensured that its achievements and the value it brings to horticulture are known throughout Ontario and beyond.
A Message from the Dean of the Ontario Agricultural College

Craig Pearson

Welcome, and I hope you enjoy reading this account of Vineland's contribution, on our 100th birthday.

I am pleased that the authors have chosen to highlight Vineland's contributions in research and education.

Research speaks for itself: whether it is fundamental, such as the discovery of the molecular structure of DNA (in England) which took almost forty years to transform the way we think of, and go about, breeding horticultural crops, or applied research, in which Vineland has specialised, which stimulates innovation within the industry within a few years or even months. We are proud of Vineland's record of achievement in applied research, particularly in support of the treefruit and grape industries. Its success as a centre for plant breeding has been outstanding: the release of over 50 varieties of peaches, apricots, cherries and plums, and also 18 varieties of vegetables, for fresh and processing markets. The "Vineland" series of dwarfing and cold tolerant apple rootstocks were developed here. The Bailey rootstock, a standard for propagation of peach trees in Ontario, was introduced first and evaluated at Vineland. Researchers have made significant contributions to the agronomy of treefruits and vines too, including the development of the central leader training system for peaches and nectarines, leaf analysis technology, and pioneering the use of trickle irrigation for efficient water management within Ontario.

Education is less tangible, but no less important economically: who can grasp the value which Vineland's staff has created, through field days, advice to individual growers, or through the inspiration and training of students?

On Vineland's Centenary, please join me in saluting the past, and looking forward to its future.
There are those who claim that stress can be a good thing in our lives because it challenges us to enhance our performance. Hence, it is a basis for change. In many ways good research in itself is challenging and stressful, but it too is a basis for positive change. This article is intended to provide some thoughts on both the future direction for agricultural and particularly horticultural research as well as opportunities for societal support for that research.

The research conducted at the Horticultural Research Institute of Ontario over the past 100 years has resulted in an international reputation for excellence, primarily in the area of genetics and crop management. Breeding lines with cold hardiness, disease resistance, enhanced flavour and productivity traits have been shared around the world. Whether it is a new improved fruit or vegetable variety, Vineland's research reputation is known by the international company it keeps. But what of the future?

Most prognosticators talk of new technologies, of developing new and improved characteristics and even more importantly the ability to transfer single genes across genus and species to create improved designer plants. Whether this is good or bad is the subject of ongoing debate, but from a purely technical viewpoint, there is the potential for being truly transformative. Consider as scientists un-wrap the genetic code for a multitude of species including ourselves, we will have the ability to address genetic flaws or mismatches that exist throughout nature. This provides us with the ability to cure diseases that have plagued mankind for centuries. An immediate reaction may be that this is the stuff of research labs at internationally renowned cancer clinics but it goes beyond those labs to the food that we eat.
As our knowledge continues to grow, it is entirely possible that we can gain the ability to incorporate specific genes into food commodities which can prevent or potentially cure illnesses. An apple a day could truly keep the doctor away. How does this relate to the pragmatic, traditional plant breeding methods of the past? Knowing and understanding the genetic markers, species compatibility and other inheritable traits can form the basis of the design of improved foods. These improved foods not only provide nutrition but also have the potential for delivering so much more on the preventative medicine side. Most forecasters will agree that the escalating costs of medicinal cures can only be stemmed by a health, lifestyle and food system that achieves prevention. Eating a food product that directly impacts and regulates blood sugars is a far more desirable outcome than daily drug injections. Because so many horticultural crops are directly ingested in their raw or minimally processed form, they become ideal candidates as vectors for these preventative mechanisms. Combined with taste and nutrition this is an unbeatable combination. The examples and the potential are limitless; suffice it to say that the future for genetic enhancements of horticultural crops will continue to drive considerable research effort.

In addition to food and health there is a second area of focus with just as great a potential for expanded crop production. The bioindustrial sector stands on the brink of rapid expansion. Ontario is particularity well positioned to take advantage of this new industrial revolution. A combination of world class research institutions, a significant manufacturing sector and a vibrant agricultural/bioproducts industry is the basis for that potential. We have the people, the infrastructure and the natural resources to fuel the new bioeconomy. The opportunities are diverse and enormous. Whether it is the inclusion of bioproducts to make up significant portions of automobiles or biofuels or building materials constructed from plant material, all of these are within the range of possibility. Research will be at the heart of these changes but multidisciplinary and multijurisdictional collaboration will be essential.

Perhaps less transformational but no less essential is research which focuses on diversification. Considering our "developed country" economy, climate and land base, it is unlikely that we will be able to compete "heads up" in the growing of many staple food commodities with other developing nations. We will always have a share of the domestic market but being a bread basket
to the world is no longer the future for Ontario and Canadian agriculture. However, the demand for new, innovative and culturally diverse food products continues to drive market growth. Again research is essential in achieving that diversity.

Support for developing and maintaining a culture of innovation is and has always been an area of controversy. When economic cycles are in a down turn or business cycles are bottoming out, it is difficult for government or industry to continue to financially support research that has long term potential but not putting bread on the table today. It may appear difficult, but it is not impossible. There are tangible signs within the provincial and federal governments that there is strong recognition of the value of this type of innovation. The critical commitment to research as a pillar of the Agricultural Policy Framework, the creation of the new Ministry of Research and Innovation are specific indicators that there will be a focus on this type of research in the future. How the research file or portfolio will be managed will likely continue to change. It is not possible for government or industry to support every good idea, or conduct replications of the same work in multiple geographic locations or permit unconnected projects to march to their own drummer. Research needs to be pursued in priority areas with multidisciplinary teams solving the complex issues of today and tomorrow.

For reasons given at the outset of this article, agriculture and food is an obvious priority area for innovation. Whether the teams can be effectively focussed and brought together will be critical to ongoing financial support. Priorities cannot be established independently by the research community. However essential their expertise and involvement, the prioritization process needs to be informed by input and direction from industry. Industry includes not only producers but also manufacturers and end users. All of these sources not only need to be at the table for the discussions on priorities but also for financial support. Much research achieves "public good" and is logically supported by the public purse. Innovation fuels competitiveness and profitability for industry and clearly an element of "beneficiary pays" is just as logical. Industry support for applied research, that which delivers near term results and benefits, will be critical to this form of activity. Government institutions need to be able to sustain effective systems which allow for the efficient involvement of these funding sources. Our structures should not prevent the willing partnerships from forming.
The future requires a system where all of these pieces come together to achieve the best collective outcome. To paraphrase John Milton - where there is much debate and fulmination among people of good will, there is a better idea in the making. The better idea is research and innovation. The Horticultural Research Institute of Ontario is unique from two perspectives. Firstly, it is strategically situated in one of Canada's unique horticultural crop areas. Secondly, because of its applied approach to research it has been the home for innovation for the past 100 years. Those 100 years are building for tomorrow.
No shade, no shine, no butterflies, no bees, No fruits, no flowers, no leaves, no birds. November.

*Thomas Hood - No.*
"The First Fifty Years" 1906 - 1956

E. F. Palmer
Page 24 – Moses F. Rittenhouse, donor of the original Station land
GENESIS

Fruit Experiment Stations

In The Twelfth Annual Report of the Fruit Experiment Stations of Ontario (noted as being under the joint control of the Ontario Agricultural College and the Fruit Growers' Association of Ontario) for 1905, there are several paragraphs (pp. 13-14) of particular interest written by the Inspector of the Fruit Experiment Stations, Prof. H. L. Hutt, O.A.C., Guelph.

"The Fruit Experiment Stations were established eleven years ago, primarily for the purpose of determining what varieties of the various kinds of fruits were best adapted to the different sections of the Province. At that time the fruit industry had not anything like the commercial importance it has to-day. Planters were more or less at a loss to know what was best to plant. Many of the older varieties were proving unsatisfactory, and the hosts of new ones being introduced from year to year only added to the general confusion of the planter. During the eleven years that the stations have been established, our experimenters have been testing and comparing the new with the old, with the result that the greater number of the much-lauded new varieties have been found worthless, some have been recommended for further trial, and a few have proved worthy of more general planting. In most cases the experimenters are now in a position to speak with authority in recommending the varieties most desirable for planting in their particular sections.

"In so doing the Experiment Stations have brought order out of confusion, and because they have done so it might appear that they had accomplished their purpose, and the work might now be dropped. The result of such a course would not be hard to foresee; in a very few years we would be as far behind the times as we were when the work began. Our aim must be progress, and our policy should be to adapt the work of the stations to meet the requirements of the times. Inasmuch as variety testing is concerned, this must necessarily be continued as a prominent feature of the work. Our report should now give annually a list of the varieties recommended for general planting from each of the stations, indicating those most desirable for commercial planting, and those specially adapted for home use. Lists should also be given of those varieties which have been fully tested and are not recommended, stating why they should be discarded. Lists might also be given of those varieties which are deemed worthy of further trial before placing them on either of the foregoing lists. . . ."
... "In the Niagara district a strong effort has been made during the past year (1905) to impress upon the Government the necessity for establishing a large Central Fruit Experiment Station for that district—one owned by the Government and managed entirely for the good of the public, where more of the problems confronting the fruit-grower might be worked out than can be attempted under the plan of privately owned stations. This matter may be outside the jurisdiction of our Board, yet an expression of opinion on the subject by this Board would not be without weight. The growing importance of the fruit interests and the multiplicity of the unsolved problems connected with it, well warrant the careful consideration of the Government and the united efforts of the growers. Unfortunately for the majority of fruit-growers, the Dominion Central Experimental Farm and the Provincial Experimental Farm are both too far away from the tender fruit belt to render as much assistance as they otherwise might. So that a third Experimental Farm, or even a Branch Fruit Experiment Farm, in the tender fruit district, might be made of great service to fruit-growers of that section."

Additionally, in the Twelfth Annual Report of the Fruit Experiment Stations, and under the heading "A New Experiment Station" this item appears (p. 13): "In view of the changing conditions affecting the work of the Ontario Fruit Stations, the Board of Control passed a resolution expressing their views to the effect that the time has now come for a further enlargement of our work, and for taking up other lines of experimental work, such for example as the production of new and more valuable varieties of fruits; the Board therein recommended to the favorable consideration of the Hon. Minister of Agriculture, the establishment of an Experimental Farm in the Niagara district, in charge of a suitable person, who would devote his whole time to the work."

Rittenhouse Gift

Events moved quickly. The 1906 Report of the Fruit Growers' Association for Ontario (Dept. of Agr. 1906, Vol. II) contains this item from its resolutions committee—

"That we desire to show our unbounded gratification at the splendid public spirit shown by Mr. Rittenhouse of Chicago, in giving a farm for experimental work in tender fruits, and in the prompt action of the Ontario Department of Agriculture in providing for the equipment of the same."

Establishment of the Station

Thus the Horticultural Experiment Station, "Jordan Harbour", became a physical reality in 1906. Part of the original 90 acres was presented to the Ontario Government by M. F. Rittenhouse, of Chicago; the balance was purchased by the Ontario Government.

This original property was described in these terms by the first Director, Harvey S. Peart, in the Report of the Ontario Fruit Growers' Association for 1907.

... "It is situated on the township line between Louth and Clinton in Lincoln County, on the lake shore, 11 miles west of St. Catharines, and six miles east of Beamsville, and contains 90 acres extending south 1/4 of a mile from the lake front, being about 1,200 feet wide. The soil varies greatly. At the southern end there is a block of light sand with heavy clay subsoil at a depth of eighteen inches to three feet. To the north of that there is a ravine running through the property, where there is heavy black soil, but not one that is at all retentive of moisture, being easily drained by a natural water course. Up this ravine on either side we have some land that is rather broken—part sand, part gravel, and part loam—three or four acres altogether. There is a belt running diagonally across
the farm, consisting of 20 to 25 acres of rather heavy red clay. Beyond that we have clay loam and a considerable block of sandy soil. Clay subsoil underlies the whole at a depth varying from eighteen inches to the red clay that appears right at the surface.

"When I went to the Station in June, (1907) the wood lot had been cleaned up ready for some work in forestry, and practically all the land that had been cleaned up last season was sown with oats and seeded with red clover. Near the Rittenhouse public school on the southeast corner of the farm nothing had been sown, and there I conducted some vegetable tests.

"The first work undertaken was underdraining. Mr. W. H. Day of the Department of Physics of the Ontario Agricultural College, made a complete survey of the whole farm, drawing plans for the drainage system, and a complete system of drainage was undertaken. We have since laid about 10½ miles of tile drain, and practically the whole farm is underdrained. . . .

. . . "After concluding the drainage, we laid out one or two service roads and divided the farm into blocks according to soil. The farm is now in very good shape to lay out in whatever way may be deemed advisable another season.

"At the north end of the farm on the lake there is an apple orchard of about eight acres, consisting of what are generally looked upon as standard varieties of winter apples. These trees are 20 to 25 years old, and are in fairly thrifty condition, although the orchard has been in sod for some little time. In this orchard I commenced a test of cultural methods. One-third of the orchard was plowed last autumn, one-third spring plowed, and the balance is still in sod. Even this year, which was a very trying one, the trees in sod appeared sickly compared to the others.

"The lake road along the front of the farm is crooked and in many places very narrow, owing to the continual breaking down of the lake bank. A reservation of 66 feet along the shore was made to improve this road, and $19.00 was expended on it, irrespective of culverts. In an effort to preserve the lake bank, we are constructing a number of concrete groynes which will be toppled over the bank and used as breakwaters. Between these it is believed that the sand will build up and thus form a beach. . . .

. . . "I should like also to refer to the work Mr. Rittenhouse has done during the past year. At the base of the town line is a little grove of which he intends to make a picnic ground for the use of visitors. When the work is completed it will add very much to the appearance of the neighborhood. The town line is to be macadamized for three or four miles; three-quarters of a mile has been done this year, and a handsome concrete bridge is now being completed over the stream that runs through our land and crosses the roadway at this point. The road and bridge work is being done under the direction of the Public Works Department."

Additionally, the 1907 report, quoted above, contains an excellent discussion of the aims of the Station work, and hoped-for results. Contributing to the discussion were Messrs. A. E. Sherrington, Murray Petit, E. D. Smith, M.P., F. H. Pattison, Wm. Armstrong, and Dr. Wm. Saunders.

The Ontario Fruit Branch was formed in March of 1908, with P. W. Hodgetts as first Director. The Horticultural Experiment Station became part of the Fruit Branch, and the Station annual reports for some years thereafter were included in the reports of the Fruit Branch rather than in the reports of the Ontario Fruit Growers' Association.

The Fruit Branch relationship continued, although with gradually diminishing supervision, until 1945. In that year the Horticultural Experiment Station officially became a separate branch of the Department of Agriculture, with separate appropriations and with responsibility direct to the Minister of Agriculture. Practically, insofar as administration and supervision were concerned, separation had become a physical reality some 12 or 13 years earlier. In the Report of the Minister of Agriculture for 1931 the Horticultural Experiment Station Report is included with that of the Fruit Branch. In the Minister's Report for 1933 the Experiment Station Report appears separately. The 1932 Report? Somewhere it got lost in the shuffle since it does not appear either separately or in the Fruit Branch Report.
Consolidation of Research

Prior to the establishing of the Horticultural Experiment Station, there were 15 Fruit Experiment Stations, serving the various fruit areas of the province. These stations grew out of the report of a standing committee of the Ontario Fruit Growers' Association "appointed for the purpose of formulating a feasible scheme for fruit experimental work". In 1894, five stations were established, assisted by Provincial funds and working in co-operation with the Ontario Fruit Growers' Association.

The President of the Ontario Agricultural College (then Dr. James Mills), Prof. Hurt, Horticulturist at the O.A.C., Mr. D. Nichol, Mr. A. M. Smith, and Mr. A. H. Pettit, and the Secretary of the Association, Mr. L. Woolverton, made up the first Board of Control. The first meeting is recorded as having been held in the President's office, O.A.C., Guelph, April 5, 1894.

The Fruit Experiment Stations were not provincially owned, but were established largely for variety testing and with the intention of making use of the special training and expert knowledge of some members of the Ontario Fruit Growers' Association working in co-operation with the Association, the Agricultural College, and the Department of Agriculture. The reports are published in the Department of Agriculture Reports beginning 1894. In 1895, five more stations and two sub-stations were established, making in all twelve. Various other stations were established until by 1901 there were fifteen, situated as given in Table 1.

<table>
<thead>
<tr>
<th>Name</th>
<th>Specialty</th>
<th>Experimenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southwestern</td>
<td>Peaches</td>
<td>W. W. Hilborn, Leamington</td>
</tr>
<tr>
<td>Niagara</td>
<td>Tender fruits</td>
<td>Martin Burrell, St. Catharines</td>
</tr>
<tr>
<td>Wentworth</td>
<td>Grapes</td>
<td>Murray Pettit, Winona</td>
</tr>
<tr>
<td>Burlington</td>
<td>Blackberries and currants</td>
<td>A. W. Peart, Freeman</td>
</tr>
<tr>
<td>Lake Huron</td>
<td>Raspberries</td>
<td>A. E. Sherrington, Walkerton</td>
</tr>
<tr>
<td>Georgian Bay</td>
<td>Plums</td>
<td>J. G. Mitchell, Clarksburg</td>
</tr>
<tr>
<td>Simcoe</td>
<td>Hardy apples and hardy cherries</td>
<td>G. C. Cason, Craighurst</td>
</tr>
<tr>
<td>East Central</td>
<td>Pears and commercial apples</td>
<td>R. L. Huggard, Whitby</td>
</tr>
<tr>
<td>Bay of Quinte</td>
<td>Apples</td>
<td>W. H. Dempsey, Trenton</td>
</tr>
<tr>
<td>St. Lawrence</td>
<td>Hardy plums and hardy pears</td>
<td>Harold Jones, Maitland</td>
</tr>
<tr>
<td>Strawberry Station</td>
<td></td>
<td>E. B. Stevenson, Jordan Station</td>
</tr>
<tr>
<td>Gooseberry Station</td>
<td></td>
<td>Stanley Spillett, Nantyr</td>
</tr>
<tr>
<td>Maplehurst</td>
<td>General collection of all kinds of fruits for descriptive work for &quot;Fruits of Ontario&quot;</td>
<td>L. Woolverton, Grimsby</td>
</tr>
<tr>
<td>Algoma</td>
<td>Hardy fruits</td>
<td>C. Young, Richard's Landing</td>
</tr>
<tr>
<td>Wabigoon</td>
<td>Hardy fruits</td>
<td>A. E. Annis, Dryden</td>
</tr>
</tbody>
</table>

* Adapted from the Report of the Horticultural Experiment Station 1906-1915-6.

The policy of the Department of Agriculture, with the Horticultural Experiment Station a physically established fact, was to concentrate the work there with full-time, trained personnel. Gradually the 15 stations that for years had been working in co-operation with the Ontario Fruit Growers' Association and the Department of Agriculture, would be discontinued. There was a need for more advanced experimental work than was possible on grower-owned and operated "variety-test" plots. It was reasonable to assume that a horticultural station, government owned and staffed, would provide needed expansion from variety testing mainly, to controlled investigations of cultural problems, pollination, soil management, pruning, propagation, pest control, etc.; and the actual breeding of new varieties suited to Ontario conditions and markets. As well, there would be similar work with vegetable crops.
Early Work, Plantings

In his first annual report* Director Peart wrote as follows—

"On acquiring the property in 1906 a foreman was placed in charge and much preparatory work in cleaning up the land and the removing of unnecessary fences done, but no attempt was made at experimental work.

"In the spring of 1907 most of the land was sown to oats, the balance being in sod and summerfallow. Soon after my appointment in June, the work of underdraining was started, following plans prepared by Mr. W. H. Day, of the Ontario Agricultural College and before winter a complete system of drainage with a total length of nearly eleven miles was laid. The land was fall plowed, worked and ribbed before winter and a considerable portion was treated with a dressing of manure preparatory to spring planting.

"At a meeting of the newly appointed Advisory Board held in Toronto in February, 1908, a draft of the proposed experimental work was submitted, revised and approved. The necessary stock and seed were ordered and plots laid out. . . .

. . . "It is the purpose of the station to test all classes of crops of interest to horticulturists in Ontario, paying special attention to the tender fruit districts and to co-operate with other experiment stations to generally further the results of all. With this object in view, a few varieties of known merits were planted as checks and new and less widely-known sorts set for comparative testing."

In the spring of 1908 quite substantial plantings of fruit trees were made, both for variety test purposes, and for later use in experimental work such as topworking, pruning, fertilizing, systems of training (grapes). Kinds of fruit and number of varieties are shown in Table 2.

**Table 2. First Fruit Variety Plantings, Vineland, 1908 and 1909**

<table>
<thead>
<tr>
<th>Kind of fruit</th>
<th>First (1908) plantings</th>
<th>Additional (1909) plantings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of varieties</td>
<td>No. of varieties</td>
</tr>
<tr>
<td>Apple (+ crab)</td>
<td>100</td>
<td>3</td>
</tr>
<tr>
<td>Apricot</td>
<td>6</td>
<td>—</td>
</tr>
<tr>
<td>Cherry</td>
<td>32</td>
<td>32</td>
</tr>
<tr>
<td>Peach</td>
<td>101</td>
<td>37</td>
</tr>
<tr>
<td>Pear</td>
<td>91</td>
<td>44</td>
</tr>
<tr>
<td>Plum</td>
<td>94</td>
<td>31</td>
</tr>
<tr>
<td>Quince</td>
<td>7</td>
<td>—</td>
</tr>
<tr>
<td>Grape</td>
<td>32</td>
<td>31</td>
</tr>
<tr>
<td>Currant</td>
<td>223</td>
<td>10</td>
</tr>
<tr>
<td>Gooseberry</td>
<td>34</td>
<td>21</td>
</tr>
<tr>
<td>Raspberry and Blackberry</td>
<td>00*</td>
<td>43</td>
</tr>
<tr>
<td>Strawberry</td>
<td>—</td>
<td>29</td>
</tr>
</tbody>
</table>

* Small plantation set out, but too late, and most died. New plantation made in 1909.

The vegetable variety test work recorded in the 1908 report is formidable as to numbers, and suggests that the seedsmen of that day were having a field day in re-naming old varieties, using descriptive terms as Extra Early, Stringless, Round head, Long standing, etc.

* Department of Agriculture, 1908, Vol. 11, Report of Fruit Branch.
Table 3. Vegetable Variety Trials, 1908.

<table>
<thead>
<tr>
<th>Kind</th>
<th>No. of varieties</th>
<th>Kind</th>
<th>No. of varieties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beet</td>
<td>55</td>
<td>Onion</td>
<td>53</td>
</tr>
<tr>
<td>Cabbage</td>
<td>89</td>
<td>Cauliflower</td>
<td>34</td>
</tr>
<tr>
<td>Cucumber</td>
<td>54</td>
<td>Pepper (6 rec.)</td>
<td>7</td>
</tr>
<tr>
<td>Watermelon</td>
<td>42</td>
<td>Tomato</td>
<td>77</td>
</tr>
<tr>
<td>Muskmelon</td>
<td>97</td>
<td>Potato</td>
<td>94</td>
</tr>
<tr>
<td>Pumpkin and Squash</td>
<td>64</td>
<td>Peanut</td>
<td>4</td>
</tr>
<tr>
<td>Bean</td>
<td>104</td>
<td>Chard</td>
<td>6</td>
</tr>
<tr>
<td>Pea</td>
<td>109</td>
<td>Eggplant</td>
<td>14</td>
</tr>
<tr>
<td>Sweet Corn</td>
<td>74</td>
<td>Lima Bean</td>
<td>19</td>
</tr>
<tr>
<td>Pop Corn</td>
<td>7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

That's over 1000 varieties. And no asparagus, carrot, celery, lettuce, parsnips, radish, spinach, turnip, and such lesser things as endive, leeks, parsley and herbs.

Early Staff Changes

In 1910, the illness and death of the Director, Mr. H. S. Peart, forced curtailment of the work of the Station, particularly the extension of the variety orchards, and other plantings for experimental purposes. Mr. Logsdail acted as Director until the appointment of Mr. A. D. Harkness in December.

With the changes in staff, the Minister of Agriculture, the Hon. James S. Duff, made some change in the supervision of the work. Mr. Harkness as superintendent, and Mr. Logsdail as hybridist, were both made directly responsible to the Director of the Fruit Branch. "This change was decided upon to keep the Department at Toronto in closer touch with the work and expenditure on the farm."

Development of Research Work

There are occasional references to the type of experimental and plant breeding work being conducted, or to be conducted, in the Reports of the Minister of Agriculture (Fruit Branch) 1908, 1909, 1910 and 1911. The first comprehensive list of projects, including variety tests, is given in the Minister's Report for 1912.
The 1942 Report of the Station constitutes a complete survey of Station activities up to that time—research, variety testing, breeding, extension, publications, etc. Subsequent Biennial Reports cover the period 1943 to 1956. These reports note projects completed and discontinued, and new ones started.

**Board of Control**

At the time of the establishment of the Horticultural Experiment Station a "Board of Control" was named as follows—

President of the O.A.C. (then Dr. James Mills)
Professor H. L. Hutt, O.A.C.
Mr. D. Nichol
Mr. A. M. Smith
Mr. A. H. Pettit
Mr. L. Woolverton, Secretary, Ontario Fruit Growers’ Association

In 1912 it was noted as an Advisory Board, with these members—

Dr. G. C. Creelman, President, O.A.C.
Mr. P. W. Hodgetts, Director, Fruit Branch
Mr. A. D. Harkness, Superintendent
Mr. W. T. Macoun, C.E.F., Ottawa
Mr. E. D. Smith, Winona
Mr. John McKee, Duntroon
Mr. Earl Weese, Albury
Mr. Henry Robertson, Iroquois

The Advisory Board gradually ceased to function as such. It saw the Station safely through the early, formative years until such time as the available land had been planted, experimental work initiated, and necessary buildings erected. The last Advisory Board on record was as follows—

Dr. G. C. Creelman, President, O.A.C.
Mr. P. W. Hodgetts, Director, Fruit Branch
Professor J. W. Crow, O.A.C.
Mr. W. T. Macoun, C.E.F., Ottawa
Mr. John McKee, Duntroon
Mr. D. Johnson, Forest
Mr. Erland Lee, Stoney Creek
Mr. D. Allan, Grimsby
Mr. F. G. Stewart, St. Catharines
Mr. C. M. Honsberger, Jordan Station
Mr. F. F. Reeves, Humber Bay
Moses Franklin Rittenhouse  
A Profile

EMIL T. ANDERSEN

"The First Fifty Years" report of the Horticultural Experiment Station and Products Laboratory commends Moses Rittenhouse with the following item: "That we desire to show our unbounded gratification at the splendid public spirit shown by Mr. Rittenhouse of Chicago in giving a farm for experimental work in tender fruit". The Ontario Government was the recipient.

Although Moses Rittenhouse passed away long before this 100 year current account of the Horticultural Experiment Station was written, his many benevolent gifts have ensured that his name will be remembered relative to the Station area.

In 1869, Moses, at the age of 18, had developed a keen interest in trees and tree products. Because of these interests he left his farm home in Vineland and traveled to seek his fortune in the lumber market. His energetic business abilities resulted in great success and he soon became wealthy. Though Chicago became his home, he never forgot the Niagara area where he grew up and his overwhelming desire to help the development of the Niagara area became highly important to him. Among many of his financial donations was the purchase of land in 1906 for the establishment of the Horticultural Experiment Station at Jordan
Harbour, Vineland. The Provincial Government having already considered acquiring land for an experimental station, was quick to accept the donation. As a result the HES was established, located on 90 acres of land bordering on Lake Ontario to the north and the roadway, now the Queen Elizabeth Way, to the south.

He funded and endowed many other developments, some of which are listed below. Though not part of Experiment Station, they have relationships of value to the Station and to the immediate local area.

1: The Rittenhouse Library, 1886
2: Rittenhouse Public School, 1890 and 1912
3: Victoria Hall, Vineland Station, a large building that served as a community meeting hall with a stage and seats. Mr. Rittenhouse officially opened this hall on Christmas Eve in 1904. It still serves in an active capacity as a general meeting place.
4: Funds for the paving of Victoria Avenue which, at that time, was a muddy, rutted road from the Lake to the Town of Vineland.

Just before his death in 1915, he completed the organization and purchase for the expansion of the Vineland Cemetery. Included with the expansion, were moneys to ensure that the cemetery would be maintained and developed as an area of beautiful surroundings. Moses and his wife, his brother William and his wife are all buried in the expanded area of the cemetery.

Though Moses Rittenhouse will mostly be remembered for his contributions to developing aspects of the Vineland area, Moses and his gifts have had extensive influence far beyond Vineland. Of these, his purchase of the land for the Horticultural Station may be recognized as having the greatest impact. Research in the field of horticultural crops carried out at the Station has had far reaching benefits to the producers of fruits, vegetables and ornamental plants in much of Ontario and in other parts of Canada and the world. Thus the foresight and generosity of this man, born and raised on a farm near the Horticultural Experiment Station was influential in developing an outstanding research facility, namely The Horticultural Experimental Station of Vineland, Ontario.

The following is a significant quote by Mabel Burkholder, published in the Hamilton Spectator in 1951 in reference to Moses Rittenhouse:

"What will keep his name in fragrant memory in the Niagara District, is the fact that he never forgot the place where he was born."
The sun, with all those planets revolving around it and dependent upon it, can still ripen a bunch of grapes as if it had nothing else in the universe to do

Galileo
EVOLUTION:
THE SECOND FIFTY YEARS
Page 29 - Staff of the Horticultural Products Laboratory in the 1960s. Front (left to right) Angus Adams, research scientist - microbiology, Ed Zubeckis, research scientist - biochemistry, Lloyd Truscott - HPL Chief Scientist

Page 33 - Aerial photo of Horticultural Experiment Station, Vineland (1990s)

Page 36 - Main Building at Muck Crops Research Station, Bradford

Page 40 - Main Building at Horticultural Experiment Station, Simcoe

Page 44 - Main Building at Horticultural Experiment Station, Vineland
The Middle Years

JOHN WIEBE

From the agricultural research point of view, the period immediately following WW2 and until the late 1970s was one of most liberal funding and perhaps greatest activity. At HES Vineland Station, budgets and salaries went up dramatically and new staff positions were created. Most of the new staff had advanced university degrees or obtained them while on staff. The scope of the research took on a whole new dimension. The well trained young researcher opened up many new approaches to solving agricultural problems, as they related to horticultural production in Ontario.

This post-war period was a time with new opportunities:
• easier funding for research projects
• greater world wide access to scientific literature
• the beginnings of the computer revolution
• a wide range of new scientific equipment and funds to purchase it
• better opportunities to travel to scientific meetings
Prior to this period almost all agricultural research was conducted by public (government) institutions. Canada tends to follow USA patterns and this was certainly the case in agricultural research and extension activities. The whole agricultural sector in all of North America was undergoing rapid change. During the middle years of the century farms became larger, more highly mechanized, and generally were operated more as businesses. There was a massive shift of farmers and farm workers away from the farm into industry. The whole agricultural industry became much more an "industry" rather than a "way of life".

The progress of this science-based agriculture became more attractive to private industry as a customer for their products and technology. Chemical, machinery, seed and many other types of businesses organized R & D units for this newly lucrative market. Large international corporations bought out many small corporations. The new "agribusinesses" became major players in agricultural business development. There was a gradual shift toward the private sector in supplying this new technology. A striking example was the emergence of very large seed companies. The introduction of hybridization allowed the companies to, in effect, patent their new varieties of certain crop species and recover their costs of R & D. The prime example of this was the development of hybrid corn. The new hybrid varieties were clearly superior to open pollinated varieties, and they could not be reproduced by the farmer, so the hybrids became an excellent, continuing source of income to the seed company.

During the war years, there was little improvement in machinery in general and particularly in farm machines. By the 1960s many mechanical innovations became available to farmers. The widespread introduction of hydraulic systems on tractors, sprayers and cultivation equipment greatly increased the efficiency of farm labour. The days of the horse had gone.

Somewhat later, machines were designed to reduce the cost of harvest labor. Crops that were destined for processing and did not need the careful touch of the human hand such as sour cherries, grapes for juice or wine making, and tomatoes for various processed products were targeted. Machines were built that substantially reduced the labor cost of picking, and these crops are now harvested almost exclusively mechanically.

Tender fruit for the fresh market did not lend itself to mechanization, and still requires much hand labor. The Niagara fruit belt is in a densely populated and highly industrialized part of Canada. Farmers are in direct competition with the likes of
General Motors for workers. In general, farmers took two approaches. First many small farms are run by the families of full time factory workers who are also farmers, and whose family provides part of the labor. The other approach was to lobby the government for legislation to allow the temporary importation of farm laborers from Caribbean countries and Mexico. This off-shore labour program continues to be the salvation of the Ontario horticultural industry.

During the war, new organic chemicals were introduced for the control of pests of humans. The companies who made these new organic chemicals quickly adapted them for civilian non-military use, especially in agriculture. Some of the new pesticides were spectacularly effective in killing problem insects, mites, fungi and bacteria. The early flush of success was soon overtaken by concerns about the effect of these chemicals on humans and other non-target species. Some of the chemicals had serious effects on many non-mammalian species. Also many of these wonder chemicals were wide spectrum killers of both pest organisms and the many beneficial organisms in the environment. Some of the pests developed resistance to the chemicals and often increasing levels of pesticide were needed to maintain control. The public outcry resulted in some of the worst chemicals being banned outright or their use severely restricted. This led to a much more acceptable and intelligent approach called "integrated pest management", (IPM) in which pesticide use was kept to a minimum and the pesticides used were the ones with the less harmful side effects. Pathogen population dynamics were studied intensively so that the most vulnerable life history stage might be targeted with pesticide and with minimum detrimental effect on beneficial organisms. Generally, Agriculture Canada and university researchers took the lead in this but HRIO staff were the ground troops to do the field testing and promotion to farmers. IPM, this new branch of agricultural science rapidly became very successful and the Vineland station played its full part in development.

A unique group of organic chemicals that found their way into wide use were the herbicides, or weed killers. Much of agricultural cultivation involves control of weeds. The new herbicides were either selective or general killers. In vegetable production most of the herbicides were selective and killed the weeds but not the crop plants. In grape or tree fruit production the need is usually to remove weeds near the tree trunk or in the grape row without the need to do damaging cultivation. By the careful use of relatively small amounts of herbicide, farmers almost completely eliminated
the need to cultivate near the tree trunks. This not only reduced the work but actually resulted in healthier crop plants.

Politics is always at work in our country. When Canada became a partner in the North American Free Trade Agreement we had to make some concessions. One that had a very specific effect in Niagara was the agreement to open Canadian markets to US wine products. Since it seemed that there was no way to compete against imports, the Ontario government offered grape growers an attractive incentive to remove their old vineyards, which were mostly of the labrusca type. The fear was that the Ontario wine industry would disappear. As a further concession Ontario changed its regulations about who could be a wine maker. Many small "cottage industry" wineries soon emerged. In many cases the government money obtained to remove the old varieties of grapes was used to plant the new hybrid and vinifera types. The estate winery growth is evidence that farmers are good economists if the governments give them the needed legislative encouragement. HES Vineland played a vital part in this wine industry expansion.

The Niagara area has always had a vegetable production component for both fresh market and processing. The processing of vegetables locally has disappeared in part because of labor costs and the high value of land. In fresh market vegetables the trend over the last few decades has been towards supplying local market outlets and pick-your-own. New varieties, often hybrids, were bred to grow rapidly, with genetic disease resistance and requiring closer spacing and higher plant nutrient levels. Consequently, more research emphasis was placed on testing plant spacing and fertilizer regimes. Again the private seed companies were most interested in working on crops where their research and breeding would result in their maintaining control of the varieties.
Building and Land Developments on the Vineland Campus

Peter M. Proctor

The early development of the buildings on the Vineland Station campus is well documented in "The First Fifty Years" which chronicled the period 1906 to 1956.

In the mid-1960s as a project to commemorate Canada's Centennial in 1967, all the streets on the campus were given names starting with the letter "V" following the lead of the plant breeders in using "V" names on their new variety selections. The streets were given names such as Valentine, Veteran, Vedette, etc.

One unique feature of the Station's early history was the availability of on-campus housing for many staff members. This continued up to the late 1970s and was particularly welcomed by newly appointed staff especially those joining the Vineland family from many different countries around the globe. This feature made the campus a small village community with lots of after-hours interaction, and a place where children grew up and played together safely. The street with most of the homes on it came to be known as Incubation Row, which no doubt had something to do with the number of children born and raised there!
Major changes in the appearance of the housing area began in the late 60s and early 70s as the Ministry decided to get out of the housing business. Residents of the government homes on the campus were encouraged to look for accommodation off the station and as the homes became empty they were demolished or moved. Even the Honeymoon Cottage, which was a starting home for several employees, had to go.

As the area on the north side of Valentine Street became vacant, plans were made for a new potting shed and a new range of energy efficient greenhouses and solar heated greenhouses. This new construction soon occupied the area where the old greenhouses and the homes had stood. The old potting shed was converted to accommodate three modern hot water boilers for greenhouse heating, with enough room left to house three seed germinators. All the office buildings on the campus were provided with hot water boilers for heating, and the old central steam boilers in the greenhouse block were no longer used.

As the homes on the south side of Valentine Street were disposed of, an area was left large enough to accommodate a modern building to replace the old packing shed, barn and other buildings that dated back to the horse era. This modern Research Services Building was more efficient but lacked the sentimental stories attached to the old buildings. One such old building was the huge rambling packing shed in the middle of the Home Farm which was a farmerette camp during WWII and had quite an attraction to young unattached males in the area! This building still contained murals painted on the walls from that era. When the Research Services building was complete the old barn, root house and packing shed were demolished.

The Lodge was another building to undergo change from a residence for summer students and staff to an office building housing other government agencies. Unfortunately this building became the victim of a fire in 1994 and remains vacant today.

Two surplus buildings from a military airfield were added in the late 60s. One became the machine shop. The other was used as a rhubarb forcing shed, later to be converted into the first mushroom research unit. In 1990 a new 'top-of-the-line' mushroom research unit was constructed complete with composting facilities.

The Victoria Farm, being a short distance away from the main campus area and across the Queen Elizabeth Way, did not get much attention until 1996 when changes to the highway interchange and service roads made travel to and from the home
farm more difficult. The old Boothman barn was replaced with a more modern building with cold storage facilities. The Grape Research Station, a 14 hectare plot with no buildings, away from the main campus on Cherry Avenue, was purchased in 1946 from H.M. Rittenhouse. In 1959 a home and implement storage building were added. The home was occupied by the grape station foreman, first Vern Kirk, followed by Noel Pye. A cold storage and laboratory building was added to the property in 1973.

In 1968, Agriculture Canada combined their Vineland entomology facilities and other local research units into a new research headquarters building and greenhouses immediately north of the HRIO Administration building. This led to the demolition of the old entomology building and storage garages in the HRIO main home area, and the sale of the Agriculture Canada facility on Niagara Street, St. Catharines. This major development on the Vineland campus enhanced the very close and fruitful relationship between the local research arms of the federal and the provincial governments. Many harmonious research partnerships were forged over the next three decades to the benefit of the Ontario horticultural industry in general.

The Extension Building housing the various crop specialists was given a major overhaul and renovation in the early 90s. One valuable outcome of this was the construction in the basement part of the building of a much needed and well equipped meeting room. In keeping with the heritage aspects of the campus, this meeting room was appropriately named Rittenhouse Hall. Opened in 1992, it has been well-used by many different kinds of groups and has become a real asset to the local community.

In the last few years, the land mass of both the home farm and Victoria farm has been reduced largely because of highway expansions. On the north end of the Victoria Farm changes to the Victoria Avenue/QEW interchange removed close to 10 hectares. Also on the south end of the Home Farm a service road through the ornamental wood lot removed several hectares. However, the present land base and buildings on the home campus and at the grape station appear to be adequate for the maintenance of meaningful research programs well into the future.
The 'Muck Station' has been called many things, including the 'World's Smallest Research Station'. Researchers and extension staff have corresponded with people from around the world, and we have seen many permutations of the station name. The one we like the best is the 'Much Research Station'!

The original plan to develop the Holland Marsh (about 50 km. north of Toronto) for agriculture came from a Bradford, Ontario grocer, Dave Watson. Around 1910, he contacted University of Guelph Professor William H. Day for recommendations on drainage, and convinced him to become involved. By 1927 the first crops were harvested from a drained portion of the Marsh and the area became a region of intensive vegetable production. The Experiment Station for Organic Soils in the Holland Marsh, now the Muck Crops Research Station, was established in 1946 as a field station of the Dept. of Horticulture, University of Guelph. The first crop was harvested in 1947 and a small, wood frame building was built on the 4 ha triangle of land in 1948. Professor C.C. (Conny) Filman was hired as the manager of the station and later Tom Lowndes became technician.

In 1970, the station became part of the Horticultural Research Institute of the Ontario Ministry of Agriculture and Food (OMAF).
When Conny Filman passed away in 1973, Matthew Valk was asked to take over as Office in Charge and Senior Muck Crops Specialist. Matt had been employed as an Extension Horticulturalist with OMAF, but had also worked at the Station as a research assistant from 1952-1954. In fact, Matt met his wife, Jane, when she was working on research at the Muck Station. Edo Knibbe was hired by Matt in 1974 to be the research technician and farm manager. Over the years several contract technicians assisted with the research projects, including Holly Burbidge, A. McCreary, Trish Morton, Cindy Bradley-Macmillan and Jeff House. Several agricultural workers have also assisted farm managers over the years including Marnie Slavnik, Laura Byleveld and Derk Hovius.

The building was added to and changed several times, and was partially flooded during Hurricane Hazel, Oct. 15, 1954. It was increased in size to provide sleeping quarters for the summer students, and later became a year-round facility. Cold storages were added, including a new 'Filacel' storage for high humidity storage of carrots. A greenhouse was added to study the production of greenhouse cucumbers, and allow the production of vegetable transplants for trials. The greenhouses were renovated and updated in 1989 with ebb and flow benches and computer control of watering, lights and ventilation.

In the spring of 1989, both Matt and Edo Knibbe retired. By the first of June, Mary Ruth McDonald was hired as the Officer in Charge. Mary Ruth had been working for OMAF at the Muck Station as the Pest Management Specialist since 1983, but first came to the Marsh as an M.Sc. student, and then as a pest management scout, and eventually scout supervisor for the muck crops IPM program.

As Matt and Mary Ruth freely admit, it was the technicians who did the bulk of the work on the research trials. Edo made his mark on the Station for many years and was followed by Holly Burbidge, who worked as a contract technician from 1985 to 1989. When Holly decided to stay home with her young family, Sid Hovius was hired in 1990, and left to work for Sun Seeds in the fall of 1991. Sid was followed by Dennis Fenik, who was hired on contract, as a result of government hiring restrictions at the time. In 1994, Shawn Janse became farm manager and technician. Shawn Janse started his career at the Muck Station as a summer student working for Prof. Vince Machado in 1988. In 1990 he was hired on contract as an Ag. Worker. In 1998, following the merger with the University of Guelph, Shawn was reclassified
as Station Manager. In the spring of 2004 the Muck Crops Research Station was moved from the Dept. of Plant Agriculture and came under the wing of the Office of Research.

With the merger with the University of Guelph, Dr. McDonald became part of the faculty in the Department of Plant Agriculture. Shawn maintained his interest in research and contacts with the seed industry by taking responsibility for the cultivar trials, but the rest of his time was fully occupied managing the farm and station. Kevin Vander Kooi started at the Muck Station in 1993 as a summer student, and was hired as an Ag Worker in 1996, after graduating from the Diploma in Agriculture program at U of Guelph. In 1998 with the University of Guelph merger, he became a full time research technician with Mary Ruth's research program.

Several people have worked on various research contracts with responsibilities to various research projects including Theo Lewis, Caroline Sirjusingh, Marilyn Hovius and Lorie Roberts.

Over the years many other people have worked in different capacities at the Muck Station. In 1983, after a three year pilot project, integrated pest management of muck vegetables was introduced to the area, with Mary Ruth as the full time IPM specialist, and several summer students working as IPM scouts. To house this influx of people, a portable was attached to the south east side of the station. In 1990 there were three staff with Plant Industry Branch of OMAF based at the Muck Station: Jim Chaput, Eugenia Banks and Susan Delafield. Others who worked at the Muck Station for Plant Industry Branch were Kevin Schooley, Bernie Solymar and Tom Clarke.

The Muck Station was completely renovated in the fall of 1995 and winter of 1996. Many changes were needed, including a completely new heating system, better insulation overall, and a new plant pathology lab, since the original lab was set up in the old potting room. The staff at the Station moved across the street and worked out of a rented house while the building was stripped down to the supporting studs, rearranged and rebuilt. Only the cold storage area and greenhouses were left in the same place, but the storages were upgraded and renovated as well.

The Annual Muck Vegetable Growers' Conference has been an important event in the yearly cycle of the Marsh since 1951. In 1973, Matt Valk changed it from a half day update to a two day conference, which continues to be well attended to this day. Matt was also editor and major contributor to the Muck Crops Newsletter, which was continued by Mary Ruth until cancelled as
a result of the reorganization of extension services by OMAF and the changed emphasis of the Muck Station programs under the University of Guelph.

Many other support staff have contributed to the Muck Station over the years. Eleanor Wall was secretary until retirement in 1984. Patricia Flinn held the position of secretary and office administrator until downsized in 2002, as a result of University cutbacks. Over the years, several others assisted in the office, including Trudy Roberts, Veronica Horlings, Margaret West and Gail Duncan.

The Muck Station, with the addition of rented land, continues to be a vibrant centre for applied research on muck vegetables. Mary Ruth's research program, which includes several graduate students, occupies the most space and focuses on crop protection and integrated crop management. Projects involve developing and testing integrated pest management programs, investigating the relationship between crop nutrition and plant disease, biological control, registration of reduced risk materials, and evaluating plant resistance to insects and diseases. Several other researchers from the University of Guelph and the seed industry have trials at the Station, and seed companies continue to support the variety trials. The work is summarized in the Muck Vegetable Cultivar Trial and Research Report, and trials are on display in the field at the annual Open House each year.
In the mid 1950s, pressure from fruit growers in Norfolk County and the Ontario Fruit and Vegetable Growers’ Association (OFVGA) was directed to the federal government to locate a horticultural research station in the county. OFVGA resolutions also called for the establishment of an early potato station in the mid-Erie Counties. At this same time, the Horticultural Experiment Station at Vineland was running out of land to conduct field research.

The Ontario government’s interest in a Norfolk Station was prompted by the loss of lands traditionally used for fruit and vegetable production in the Toronto, Hamilton and Niagara regions. There was also concern about the future of the tobacco industry even in the late 1950s.

The Ontario Treasury Board approved the purchase of the 166 acre Alway Farm just east of the town of Simcoe on April 4, 1960. At its takeover, the Station was an under-developed property with a large rundown three-storey wooden farmhouse, a scattering of farm sheds and a small implement shed. In May 1960, the Vineland Director Dr. Harry Upshall received $2700 for a Simcoe Station Advanced Account as its first budget. The first on-site
activity was the mapping of the property for soil types by a soil survey team. In July, Dr. Upshall was instructed to plan for buildings in the 1961 budget, including a foreman’s house, implement shed with an attached repair garage, and some tile drainage.

A porta-green plastic greenhouse was installed in April 1961. Blocks were surveyed and the first apple, peach, sweet corn, tomato, pepper, potato and sweet potato trials were planted. The first trials were conducted by Vineland researchers and technicians who had to travel two or three times a week from the parent campus.

The Simcoe Station was officially opened on 8 August, 1961 by the Hon. James Allan, local MPP and Provincial Treasurer at the first twilight meeting to tour the research plots. A total of 105 farmers attended plus the Minister of Agriculture for Ontario, Hon. William Goodfellow.

The implement shed construction started in November. Dr. George Collin moved to Simcoe from Vineland in April 1964 and was the first occupant of the newly constructed residence on the Station as resident research scientist. The Collin family occupied the main floor and the basement was converted into two offices and a large work area. When the Collin family moved into Simcoe in 1967, the residence was renovated into offices, laboratories and a meeting room as a temporary Administrative Building.

The plan to build permanent offices, laboratories, storages and greenhouses took six years. In 1967, the Ontario Department of Public Works appointed the Simcoe architect, Bud Smale to design the building. The building was completed and occupied in the fall of 1969 and officially opened in August 1970 by Hon. James Allan. The Extension wing was completed in 1978 and included an auditorium, pest management laboratory and an administrative/office complex that brought research and extension staff under one roof. This integration of science and extension provided the local horticultural industry with access to services in one-stop shopping.

The first employees, Don Miller and his partner Jemima who lived in a two-room cabin on the farm, were approved for work at an hourly rate of 75 and 65 cents respectively in 1960. They found the picking crews to harvest the existing strawberry and asparagus crops and paid for piece work. The first foreman, Gil Williams, was hired in early 1961 and resigned in April 1964. Don Miller was named foreman in May 1964 and retired in 1980. Wally Andres was appointed farm foreman in March 1981.
Keith Brown was the first technician hired for Simcoe in 1963 and was relocated to work at Vineland for the winter. The arrangement was difficult and Brown resigned in January 1964. Milutin Mucalov was moved to the Simcoe Station in 1965 as Technician.

Collin was named the first Director of the Simcoe Horticultural Experiment Station in 1972. He reported to Dr. John Archibald, who was by then Director of the Horticultural Research Institute of Ontario (HRIO).

As the new Administration Building at Simcoe was being completed in late 1969, approval was granted to search for two vegetable scientists and one pomologist to be located at Simcoe, all to be supported by technicians. Dr. Sharad Phatak was hired in late 1969 to conduct the vegetable herbicide program. Dr. John Proctor was appointed in 1970 to conduct apple production research and Dr. Dan Cantliffe joined the staff in early 1971 to conduct nutrition and plant density trials in vegetables. Collin continued trials on potatoes, sweet potatoes and peppers. In 1972, Dr. Ernie Kerr and his tomato breeding programs were transferred from Vineland to Simcoe where additional greenhouses were built to support Kerr's projects. Field vegetable research was largely discontinued at Vineland as a consequence. Vineland fruit scientists continued their research in rootstock and varietal testing in the Simcoe orchards and the small fruit program continued with major projects at both Vineland and Simcoe.

The original four resident scientists at Simcoe, Collin, Cantliffe, Phatak and Proctor, all moved on to new challenges at other research and teaching facilities between 1974 and 1978, and this precipitated a virtual complete changing of the guard.

In 1975, Arthur Loughton, formerly on the Vineland Station staff, became the second HES Director at Simcoe and lead the Station for the next two decades until his retirement in 1996. By 1985, when the 25th anniversary of the Simcoe Station was celebrated, the research had been effectively streamlined into six research programs, four in vegetable crops and two in fruit crops. From Sept. 1986 to April 1991, Loughton was seconded as Manager of the Transition Crop Team for OMAF, working from the Simcoe Station. During that time, Dr. John O'Sullivan was acting Director of the HES.

The HES Simcoe is now well into its second quarter century and the following are some of the major developments at the Station in recent years:
• new glass greenhouses constructed in two stages, 1974 and 1986,
• a range of small efficient cold storages was added,
• new buildings were constructed, in stages, to provide improved machinery storage, workshops, crop grading facilities, seed storage, agri-chemical storage,
• extension of irrigation mains,
• closure of the disused railway line that bisected the Station property,
• consolidation of all berry crops research at Simcoe from Vineland in 1983,
• termination of all vegetable breeding research projects by 1985,
• an additional 10 hectares of land adjacent to and south west of the main farm was acquired in 1986, and helped reduce the intense pressure on land rotation for a huge program of annual vegetable crops.
• establishment of a new and much-needed research program in vegetable pathology in Aug. 1986 under Dr. Ron Brammall until his resignation in 1996 when that program was terminated.
• closure of the weather station by Environment Canada in Dec. 1987.

Other research scientists on the Simcoe staff have included: Brian Ure, vegetables, March 1976 to Dec. 1978, Dr. George Chu, storage, 1978 until he was transferred to HPL, Vineland in June 1982, Dr. Don C. Elfving, apples, 1977 until he was transferred to Vineland on promotion to Manager, Research Programs in 1991, Dr. Ido Schechter, apples, 1992 to 1993, Dr. W. H. (Mike) Courtney, tomato breeding, Aug. 1982 to Oct. 1985.

The current research programs at Simcoe as the centennial of the parent Institute at Vineland approaches are:

1: Berry crops, 1 ppy (Dr. Adam Dale 1983 - )
2: Vegetables, inc. herbicides, pickling cucumbers and peppers, 1 ppy (Dr. John O'Sullivan 1974 - )
3: Vegetables, inc non-traditional and minor crops, 1 ppy (Dr. Alan McKeown 1981 - )
4: Apples, 0.5 ppy (Dr. John Cline 1994 - )

Since the amalgamation with the Univ. of Guelph in 1997, all the current professional staff have faculty positions and teaching responsibilities at Guelph.
Development of the Horticultural Research Institute of Ontario

J. CLARE RENNIE

December 1, 1966 marked the time when a very significant change began to take place in the way that research and extension services, in the broad field of horticulture were organized, coordinated and delivered throughout Ontario. On that date the Horticultural Experiment Station at Vineland was given a new name, the Horticultural Research Institute of Ontario (HRIO). With the new title came new and broader responsibilities for the staff. The new Institute was charged with the responsibility of integrating all horticultural research in Ontario that was financed by the then Ontario Department of Agriculture and Food. In addition to the Horticultural Experiment Station at Vineland the new Institute included the Horticultural Experiment Station at Simcoe, the Horticultural Products Laboratory at Vineland and the integrated research projects and program underway at Guelph, Ridgetown and Kemptville.

As the focal point for horticultural research, the HRIO at Vineland was well situated in the heart of Ontario’s largest fruit producing area. An additional desirable feature of the Vineland location for the headquarters of the HRIO was the adjacent Research Station of the Canada Department of Agriculture that
specialized in disease and insect problems associated with fruit and vegetable production. The headquarters of the Fruit and Vegetable Extension Service of the Ontario Department of Agriculture and Food was already well established on the Vineland campus so with the creation of the new Institute, the fruit and vegetable industries now had a centralized source of new technology to service their needs from seed through to consumer products.

The new Horticultural Research Institute of Ontario operated, as did the experimental stations previously, under the Agricultural Research Institute of Ontario (ARIO) through the Director at that time, Dr. D. N. Huntley. The formation of the new Institute and the Vineland complex coincided with the appointment of Dr. J. A. Archibald as its new Director. The former Experiment Station Director, Dr. W. H. Upshall, retired on November 30, 1966, after 43 years of dedicated service and strong leadership, 10 of them as Station Director.

Although the name change from HES to HRIO and with that the coordinated approach to research on a province wide basis were very significant, an equally important change which happened was the thinking and attitudes of growers, processors, researchers and extension specialists. The creation of the HRIO under the strong leadership of the new Director, Dr. Archibald stimulated cooperation amongst groups to work as teams to solve some of the more complex problems facing the fruit and vegetable growers and the processors. Opportunities were provided for planning meetings and workshops to disseminate new technology bringing together the best expertise available from across the Province. The environment was conducive to the development of jointly funded research projects involving growers, their Associations and the researchers at the Vineland complex and the other locations where similar studies were being conducted. Coordinated research programs between the Canada Department of Agriculture and the Ontario Department of Agriculture and Food, through the HRIO flourished resulting in better service to growers and processors.

The 30 year period following the establishment of the HRIO in 1966 was one of growth, positive development and excellence in total team effort for horticultural research and advisory services in Ontario. The administrative structure established at that time, through the Agricultural Research Institute of Ontario allowed this to happen, but it was the quality of the people involved that really made it successful.
Amalgamation with the University of Guelph, 1997

CLARENCE SWANTON

On June 4, 1996, the Honourable Noble A. Villeneuve, Minister of Agriculture, Food and Rural Affairs for the Province of Ontario and Dr. Mordechai Rozanski, President and Vice-Chancellor of the University of Guelph signed a Memorandum of Understanding (MOU) which formalized the discussions leading to the amalgamation of the agriculture and food research, education and laboratory services provided by the Ontario Ministry of Agriculture, Food and Rural Affairs with the University of Guelph. In signing this MOU, the University of Guelph and OMAFRA agreed in principle to develop a partnership to deliver education, research and laboratory services. The specific objectives of this MOU were:

1: to facilitate an integrated responsive management structure to deliver research, education and laboratory programs,
2: to be more cost-effective through a centralized administration and aggressive marketing services,
3: to improve revenue generation through increased volume and enhanced quality of programs,
4: to provide an organizational structure that could respond effectively to the changing needs of the agricultural industry,
5: to enable education, research and laboratory services to achieve a critical mass under one administration in order to enhance the effectiveness of these programs, and
6: to further develop linkages between OMAFRA, Agriculture and Agri-Food Canada and the University of Guelph.

On April 1, 1997, OMAFRA transferred the operation of three colleges (Alfred, Kemptville and Ridgetown) and their research stations, its laboratory services and the Horticultural Research Institute of Ontario (HRIO) to the University of Guelph. The Horticultural Experimental Station, Vineland, the Simcoe Horticultural Experimental Station and the Muck Crops Research Station located in Kettleby then became part of the University of Guelph.

Dr. Rob McLaughlin, Dean of the Ontario Agricultural College, directed HRIO to be part of the on-going dialogue on academic restructuring between the Departments of Crop Science and Horticulture Science, which had been proposed on May 14, 1996 by a multi-department Strategic Steering Committee. In February, 1998, the Senate of the University of Guelph approved a motion put forward by Drs. Alan Sullivan (Department of Horticulture) and Gerald Manning (Department of English) that Senate "approve the amalgamation of Crop Science, Horticultural Science and the Horticultural Research Institute of Ontario into the Department of Plant Agriculture, effective February 1, 1998." This motion was carried.

The Department was comprised initially of four Divisions: Horticultural Science, Crop Science, Plant Biotechnology and the Horticultural Research Institute of Ontario. The Divisions were to provide and maintain disciplinary identity, to serve as a common interest group for enhancing research and teaching and to provide a unit through which outreach could be coordinated. HRIO scientists were to be merged into the University faculty ranks in accordance with their research achievements and faculty policy. Other staff members were transferred directly to the University.

The Department was to be led by a Chair, selected by the faculty of the Department. In the fall of 1998, six candidates ran for the position of Chair. They were Drs. Adam Dale, Frank Eady, Brian McKersie, Alan Sullivan, Clarence Swanton and David Wolyn. On November 1st, 1998 Clarence Swanton was appointed the first Chair of the Department of Plant Agriculture.
On March 9, 1999 the Department's Advisory Executive Committee met for the first time. This Committee was formed to assist the Chair with the administration of the Department. A representative from each of the Divisions was elected to serve on this Committee. This Executive consisted of: Dave Wolyn (Biotechnology), Mike Dixon (Horticulture), Matthijs Tollenaar (Crop Science) and Adam Dale (HRIO). In addition, Jenny Van de Kamer was appointed to the Committee in her role as the Executive Officer of the Department. This Committee faced several immediate challenges.

These challenges included the management of a Department scattered in eight different locations, the need to develop a shared strategic vision for research, teaching and service and the necessity to develop understanding and trust among all members within the Department. For example, the culture of the University and HRIO were very different. The staff and research scientists within HRIO were affected more by the amalgamation with the University, compared to those on the main campus. As leader of the HRIO Division, Dr. Adam Dale was instrumental in facilitating this change from HRIO to the University. His leadership was the bridge that allowed for the exchange of ideas, the expression of concerns and the establishment of linkages with faculty in the Department.

From this foundation, the Department of Plant Agriculture began to function as a Department. Its mission is "to discover, apply and impart knowledge that promotes a viable agricultural industry and enhances understanding of agricultural production and related technologies". Research and service at Vineland is an integral part of this mission. The Station is different today; it has evolved over the past 100 years in response to change. The outcome of this change is a tribute to the creativity and vision of the people who have contributed so much to the rich history of the Vineland Horticultural Research Station.

Congratulations on 100 years!

Editors' Note:

When the Horticultural Research Institute of Ontario was amalgamated with the University of Guelph, as previously described, it was necessary to have a position to promote the newly created Department of Plant Agriculture to industry, growers, potential students, and the general public. It was imperative that industry and the public knew that HRIO, along with the Departments of Crop Science and Horticultural Science, still existed but under a new name. This new position, of Department Liaison Officer, has now evolved into that of the Administrative and Liaison Officer currently held by Deborah Hilborn, and is located at Vineland but servicing the entire Department.

ARTHUR LOUGHTON

Based on values at the farm-gate, Ontario is Canada's most productive horticultural province, accounting for approximately 40% of the national horticultural output. Horticultural crops are produced widely across the province. However, there are recognised major production zones which owe their importance to specific factors: distinct soil and climate conditions, proximity of markets including processing plants, availability of labour and the local reputations for efficient producer-organisations and marketing infrastructure.

The establishment of the Research Station at Vineland a hundred years ago recognised the unique combination of soils and climate in the Niagara Peninsula, the narrow strip of land between Lake Ontario to the north and Lake Erie to the south, which makes it possible to grow tender fruits and grapes in the middle of a huge continental land-mass. Such unique circumstances do not occur anywhere else in Canada and therefore the Niagara region is a highly favoured area for horticulture.
Major fruit crops in Niagara have traditionally been grapes and the tender fruits, predominantly peaches. Recent statistics show that the area produces about 96% and 89% of the total provincial output of these two crops respectively. Farm gate values for Niagara grapes and tender fruits are of the order of $50 million and $42 million respectively. Total farm gate sales of all fruit in Ontario are of the order of $200 million annually and it might be extrapolated from the statistics that Niagara produces about 50% of Ontario's total value of all fruit (approx. $100 million).

A significant feature in the Niagara horticultural industry within the past twenty years or so has been the proliferation of small wineries. From just a handful in the 1980s, there are now over 60 wineries in the province, most of which are in the Niagara Peninsula. This expansion has materialised from a more intelligent exploitation of the many favourable microclimates throughout the peninsula and other geographic areas in southern Ontario whereby grapes grown on specific local sites are made into indistinguishable wines of a very high standard of quality, including the internationally renowned ice-wines. Some wineries have added restaurants with upscale cuisine which has brought a new and successful component to the local tourist and hospitality industry, and its own demand for other high quality food products of local origin.

A dramatic shift in the type of horticultural production in Niagara is also seen in the huge expansion of greenhouses in the last two or three decades plus the considerable new investment in hardy tree and shrub nurseries. Accurate data are difficult to acquire but reasonable estimates suggest that Niagara now has about 35% of all the greenhouses in Ontario. The major proportion of this involves the floriculture group of crops and the special feature of this is the high volume of sales that go south to the US, a very favourable effect of the North American Free Trade Agreement and the exchange rate. Estimated farm gate sales values of Niagara greenhouse floriculture, nursery and sod are of the order of $250 million a year, with greenhouse vegetables (tomatoes, seedless cucumbers and peppers) adding another $23 million. Proximity of major markets is certainly an important factor with these highly perishable commodities and the Niagara area is in a unique and favoured position of being within one day's truck drive of over 90 million people in Canada and the US.

The mushroom industry is scattered throughout Ontario and Niagara and the provincial value at the farm-gate exceeds $160 million. This rates the crop consistently as the second or third most valuable vegetable in the province.
Large scale field vegetable production has virtually disappeared from Niagara apart from some small operations supplying roadside markets, pick-your-own or other specialised outlets. Niagara now accounts for only 1% of Ontario's total field vegetables.

ACKNOWLEDGEMENTS

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"Overview of the Canadian Horticultural Industry 2002/03". Agriculture and Agri-Food Canada.


Ontario Tender Fruit Producers' Marketing Board (via Ken Slingerland).


Richard V. Chudyk, Consultant, Agri-Food Technology.

Danny Lee Rinker, Associate Professor, Mushroom Specialist, Dept. of Plant Agriculture, Univ. of Guelph.

Wayne Brown, Greenhouse Floriculture Specialist, OMAFRA.

William A. Straver, Straver and Associates, Consultants and Translators.
And he gave it for his opinion, that whoever could make two ears of corn or two blades of grass to grow upon a spot of ground where only one grew before, would deserve better of mankind and do more essential service to his country than the whole race of politicians put together.

Jonathan Swift - Gulliver's Travels
Vineland Staff
PHOTOGRAPH CAPTION LISTING

Page 55 - Dr. Harry H. Upshall (1961) and Dr. John Archibald (1969)

Page 60 - Bill Harper, Executive Officer (late 1970s) and Betty Erskine, director’s secretary (1970s-1990s)

Page 62 - Deborah Hilborn, Administrative & Liaison Officer (centre) and office support staff. Sylvana Lagrotteria (bottom left), Donna Hill (top left), Carol Friesen (top right) and Erika Ankersmit (bottom right) (late 1990s)


Page 68 - Technicians (from left to right) Andy Vandenberg, Bill Lay, Bob Hamersma and Bill Straver (1990s)

Page 72 - Peter Proctor, Farm Foreman (2nd from left) with agricultural workers (from left to right) Abe Weir, Peter Proctor, Don Moyer, Noel Pye, Paul Kowalik, Bill Trelford and Larry Blain (early 1990s)

Page 75 - Portrait sketches from citations in the Ontario Agricultural Hall of Fame. E.F. Palmer, E.A. Kerr and O.A. Bradt

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Evolution of Station Directors
The Second Fifty Years

STAN J. LEUTY

As it was in the beginning........

On 27 December, 1906, Mr. Moses F. Rittenhouse and his wife Emma donated a portion of land for experimental work with tender fruits. A grateful Ontario government purchased the balance of that land making up the first 90 acres and agreed to provide equipment. The new farm was born. Leaders over the first fifty years were:

H. S. Peart 1907 - 1910
A. D. Harkness 1910 - 1914
F. M. Clement 1914 - 1916
E. F. Palmer 1916 - 1956

H. S. Peart was responsible for arranging for almost 11 miles of farm underdrainage, the laying out and construction of farm roads, preparation of land for spring planting, and organizing the first experimental plantings of both fruits and vegetables beginning in the spring of 1908. By 1909 his plantings listed over 1000 varieties. A. D. Harkness was appointed following the illness and untimely death of Mr. Peart in 1910. Within three and one
half years F. M. Clement was appointed to continue the work Mr. Peart had begun. The appointment in 1916 of E. Frank Palmer, a man whose first interest was in plant breeding, led to 40 years of growth, development and expansion of the new Experiment Station.

Dr. Palmer, in his introduction to "The First Fifty Years", stressed that HES and the recently (1950) opened HPL were established to provide a SERVICE to the horticultural industry....service in the form of solving a multitude of problems, developing new and better varieties, the manufacture of new or better products from horticultural material, and the quick dissemination of useful information. A researcher must be dedicated to the idea that he (she) is one of a team, a vision shared by all subsequent Directors.

And so it continued.......

W. H. Upshall 1956 - 1966  
J. A. Archibald 1966 - 1981  
G. H. Collin 1981 - 1982  
S. J. Leuty 1982 - 1983  
C. Swanton 1998 - 2004  
G. Ablett 2004 - 

Dr. W. Harry Upshall led the two Vineland units through the first decade of the second 50 years. He and his staff moved into their new Administration and Laboratory building in January 1957 soon after his appointment as Director. Under his leadership a third unit was established (1960) at Simcoe and subsequently staffed. Most of the vegetable crop, small fruit and apple research work was moved to Simcoe over the next two decades, a story that is told elsewhere in this publication. There were many achievements by those working under Dr. Upshall's watch, accomplishments such as the release of the eighth new leaf-mold resistant greenhouse tomato, of peach, cherry, plum, apricot, strawberry and ornamental cultivars, of new information regarding cultural and management techniques for these and other crops. One should not select a single achievement over all others, but special attention should perhaps be drawn to the establishment of a Leaf Analysis service as a basis for fertilizer recommendations for certain tree fruits. Dr. Upshall retired November 30th, 1966 following 43 years of dedicated and distinguished service.
On December 1, 1966 Dr. John A. Archibald was appointed Director and the name of the facility was changed to the Horticultural Research Institute of Ontario. All horticultural research in the Province supported by Ontario Department of Agriculture and Food funds was now the responsibility of the Director. Subsequently, on April 1, 1968 the Institute assumed responsibility for a fourth unit, the Muck Research Station (MRS) on the Bradford Marsh. Prior to that date the MRS was operated by the University of Guelph. The only mushroom research facility in Canada was constructed in 1972 to provide much needed information to an extremely important segment of the Canadian horticulture industry. Greenhouse vegetable research continued at Vineland, as did an ambitious program in various aspects of floriculture research (both greenhouse and home garden), and ornamental plant research and extension.

Dr. Archibald was a strong believer in Dr. Palmer's vision of teamwork. Under his direction, Research Teams were formed for the major crops. A Grape and Wine Research Team for example, was established to coordinate all work being done on that commodity and to prioritize work needing to be done. Growers, nurserymen, extension personnel, members of the wine and juice industry, University, Federal and Provincial researchers involved in grape and wine research, crop economists, and inspectors all came together to integrate and coordinate work. All played a role, and all knew that each was important to overall success. Other Teams (pome fruit, peach, small fruit) were formed to similarly advance work on specific crops.

Dr. Archibald died in June 1981 following a lengthy illness. He was 53 years of age.

Dr. George H. Collin was raised in British Columbia and after graduating from UBC worked briefly for Agriculture Canada, then completed graduate studies at Cornell University in 1961. He worked for 16 years at both the Vineland and Simcoe Stations in vegetable research and administration before moving to direct the Irrigation Research Station at Brooks, Alberta. He returned to Toronto in 1976 as Chairman of the Ontario Farm Products Marketing Board and was later promoted to Executive Director of the Production and Rural Development Division of OMAF.

Dr. Collin was appointed HRIO Director in 1981. While he served only until 1982 in that capacity, he was largely responsible for the planning and construction of a state-of-the-art storage research facility associated with HPL. Subsequently, Dr. Collin was appointed Executive Director, Education and Research Division, and later Assistant Deputy Minister, Marketing and Standards, OMAF.
Dr. Stan J. Leuty was an Ontario native. He graduated in 1958 from what is now the University of Guelph, and worked as a Fruit and Vegetable Extension Specialist in Elgin and Middlesex counties. In September 1960 he pursued graduate studies at Michigan State University, completing his MSc. and PhD degrees. In March 1964 he joined the University of Wisconsin as Assistant Professor of Horticulture, then returned to Canada in late 1965 joining Agriculture Canada at the Smithfield Research Station. In June 1974, he joined the HRIO primarily to work on a program to significantly expand the ripening season for canning clingstone peaches. As well, he established a Team approach to peach research involving all stakeholders, an approach that had proven so successful with promoting apple research.

Dr. Leuty was appointed Director in 1982. Direction of research continued much as it had under the previous two Directors. An opportunity in the private sector proved irresistible, and he resigned in 1983 following 25 years in horticultural research.

Dr. Frank C. Eady was also a native of BC and graduated from UBC with a BSA in 1968 and a PhD in Plant Science in 1971. Following that he held a New Zealand National Advisory Council Post Doctoral Fellowship, worked in New Zealand on aquatic weed problems from 1971 to 1974, taught at Melbourne State College and joined Monsanto Australia Limited in 1974. In 1978 Dr. Eady returned to Canada as Monsanto's Manager of Product Development. He joined HRIO as Director in 1983, and served in that capacity until mid-1998.

Direction of research under Dr. Eady's guidance was maintained much as in the past with ongoing modifications to meet the requirements of a dynamic horticulture industry. An expanded effort in post-harvest storage and physiology studies, a greenhouse program emphasizing energy efficiency in plant culture, and the opening in 1995 of a newly constructed mushroom research facility were just three of the areas receiving strengthened emphasis. Release of new cultivars continued. Several new canning clingstone peach cultivars to lengthen the processing season were released and welcomed by the industry. As well, new cultivars of plum, sweet cherry, and strawberry were released for the fresh market and, among the ornamentals introduced were several rhododendrons. Of the many studies ongoing at the MRS, one of tremendous importance demonstrated that muck soil subsidence could be slowed significantly by careful management of the water table. Such management will double the productive life of the Marsh.
In 1997 Dr. Eady facilitated the HRIO transition from OMAFRA amalgamating with the Departments of Crop Science and Horticultural Science at the University of Guelph, forming the University's first Department of Plant Agriculture. Dr. Eady became director of international development at the University's Ontario Agricultural College (O.A.C.). He subsequently took a leave of absence and assumed the position of deputy executive director of The Micronutrient Initiative with the International Development Research Centre in Ottawa.

Dr. Clarence Swanton became the first Chair of the Plant Agriculture Department of the University of Guelph on 1 Nov. 1998. He was succeeded in 2004 by acting chair Dr. Gary Ablett.

And so it stands, part now of a Plant Agriculture Department that is reportedly third largest in North America, and on the threshold of the Third Fifty Years. Yet, the facilities of the two units at Vineland sit largely idle. HPL and its new storage research facility are locked. New storage research facilities are needed at the university only 80 km away.

Most of Canada's grape and tender fruit industries are located in the Niagara Peninsula: HES Vineland is centred in that district. Parts of that complex include the new $1.5 million mushroom research facility, the greenhouse research facilities, the grape sub-station, the acres of beautiful research farmlands, and the almost vacant laboratory and office building. Important too, is the proximity to the Federal research facilities and research colleagues, also located on the Vineland campus.

It may be useful to consider remarks made by Professor H. L. Hutt, O.A.C. Guelph, writing in the Twelfth Annual Report of the Fruit Stations of Ontario 1905, as quoted by Dr. E. F. Palmer in "The First Fifty Years":

".....the Experiment Stations have brought order out of confusion and because they have done so it might appear that they had accomplished their purpose and the work might now be dropped. The results of such a course would not be hard to foresee; in a very few years we would be as far behind the times as we were when the work began. Our aim must be progress, and our policy should be to adapt the work of the stations to meet the requirements of the times." Are we so doing?

Editors' Note: Acting Director:

During periods of illness and/or secondments to other duties of the incumbent Station Director, the following served as Acting Director for various lengths of time during the 1980s and 1990s: Dr. Emil T. Andersen, parts of 1980 and 1981. Dr. Frank J. Ingratta, part of 1988. Dr. Bruce A. Archibald, part of 1995.
The Executive Officer

Bill Straver, Bob Kalbfleisch
and Jessie Reid

The position of Executive Officer (EO) always played an important role at Vineland and its duties were many and varied. Over the years, these duties changed and evolved depending on the external and internal organizational structure, and the qualifications and interests of the incumbents. From 1923 until 1942, J.R. van Haarlem was Executive Officer and combined this responsibility with the duties of fruit breeder in peaches and grapes. After a number of years in soils research, he resumed his duties as Executive Officer. It did not become a full-time position until 1965.

The position implemented and maintained financial, administrative and operational procedures and was often the link between research staff and administration, other ministries and agencies. The EO managed the financial resources in conjunction with the Director and the managers of the various units of HRIO, and from 1997 on with the Chair and the Executive Officer of the Department of Plant Agriculture in Guelph. At one time, all purchases were approved by this position which also involved obtaining quotes or tenders for larger items with a purchase price above a certain limit. This is now done in conjunction with the central University of Guelph Purchasing Department. The work of the EO has always been very busy, especially close to the end of the fiscal year.
In addition to financial management, the EO was responsible for screening, interviewing, hiring, training and supervising the office support and accounting staff. In the early 80s, the EO was accountable and provided supervision for six staff members, four office support and two accounting positions. Following the merger of HRIO to become part of the Department of Plant Agriculture in 1997, more of these support functions moved to Guelph, and consequently the number of support staff has steadily decreased.

At one time, new contacts from other government agencies and the public were often initially referred to the EO. This could be a request from another ministry or a regulatory agency, or a query from a member of the public. Tours of the grounds and orchards were very popular with schools and other organizations and these were coordinated from the EO's office.

The EO was also a member of in-house committees, often taking on the responsibility of secretary and ensuring action on decisions. In the 60s and 70s, the Staff Development Committee was very active and organized educational tours and meetings for staff. In the 80s and 90s, the EO was a member of the Health and Safety Committee (joint management/union) and at one time was responsible for recording the minutes and for dealing with the recommendations emanating from the meetings.

Until the early 70s, in addition to the administrative offices, farm buildings and greenhouses, the Station property included several residences for staff members and their families, and the "Lodge", a building to accommodate single staff and summer students. These buildings required repair and maintenance on a regular basis. It was the role of the EO to assess priorities, coordinate whatever needed to be done as well as to be responsible for the leasing of the remaining residences and individual offices to University, Ministry and private businesses. Many hours were spent in meetings with representatives from the Department of Public Works (which became the Ministry of Government Services, then the Ontario Realty Corporation and now ProFac) to discuss and negotiate the needs of the research stations. In addition to using strong negotiating skills, incumbents had to exercise 'horse-trading' skills in order to ensure that Vineland, as well as the other horticulture research stations, was treated fairly. The EO was also heavily involved with new construction projects, such as the farm services building, the new HPL wing, the mushroom research unit, the new greenhouses at Vineland and the expanded research facility at the Bradford Station.
The administration area has grown and changed dramatically since the Horticultural Experiment Station was established in 1906. The volume of paper involved with administration became large enough to warrant the employment of a stenographer in December 1908. Alma Werner was brought in as the first administrative support staff member in the position of Stenographer.

Between 1908 and 2006, the research station employed many dedicated administrative staff members. As the station and its research programs grew, so did the number of administrative staff. It is these people whom we wish to remember and whose contributions we wish to record briefly. Their support of all the professional and technical staff who have worked at the station is invaluable and their names are too numerous to mention.

In addition to full-time employees, many people worked as casuals and summer students in the Administration area of the research station. Most enjoyed this experience and respected it as part of their growth and development in better serving their community. It was a good experience and helped those who worked here develop an appreciation of agriculture and research. Many went on to take senior positions in local businesses and industries.
Even though the computer was finding its way into the workplace in the 1950s, it was quite some time before the computer became a standard part of the office environment at Vineland. The first computer for the administration area arrived in the early 1980s. It was an outdated hand-me-down from the Ontario Ministry of Agriculture and Food head office. It was quickly replaced with more up-to-date computers that were also hand-me-downs and also somewhat out-of-date but better than the lone computer that was currently there. The office environment truly became part of the modern age in the late 1980s with every person in possession of a desktop computer.

A manual switching board that allowed many phones to be connected through a single exchange served the reception area of the research station well into the 1970s. Even though the 1940s and 1950s was a time of innovation and the 1960s saw the first communications satellites launched into space, the old "octopus" switchboard was still in use at Vineland. Times finally changed with the introduction of electronic telephone equipment and multiple telephone exchanges all going to one person sitting at the switchboard. As with the introduction of the computer to the research station, the introduction of new telephone technology was the beginning of continual change and advancement to better serve the station and community.

At one time it was a requirement that many of the office staff know Pitman shorthand. It was an elegant system of taking rapid notes, but this skill faded away with the advent of pocket tape recorders (Dictaphones) which could faithfully record speech. As the years passed it was only the Secretary to the Director who used shorthand. The last Director of the station to have shorthand taken of meetings was Dr. J.A. Archibald but when he passed away in 1981, the Dictaphone then became the way minutes and notes were taken. Over the years as the number of administrative staff was reduced and jobs changed, the professionals were now required, for instance, to take minutes of their own meetings and prepare them for distribution.

With the continuing introduction of newer and more modern equipment, there was a need for more highly trained administrative staff, as happened in all facets of modern industry. Office personnel were required to be computer-literate and familiar with several related software programs. They had to download new programs onto their computer hard drives, store data on disks, tapes and CDs and sometimes try to fix small computer problems that always seemed to occur. The receptionist had to do more than just
answer the switchboard. She also needed to know how to program the electronic switchboard, answer several incoming lines and distribute those calls to over 100 extensions while entering data into a computer and handling people walking in the door looking for information. The station had truly entered the modern age and office personnel were highly trained and able to multitask. Familiarity with late 20th century jargon was also a requirement!

The Vineland location served as the head office of the Horticultural Research Institute of Ontario, now part of the University of Guelph, and consequently most of the administrative staff were located in Vineland. The typical office personnel component of the late 20th century consisted of:

- Office Services Coordinator
- Receptionist
- Word Processing Operators and Clerks
- Part-time, temporary and student placements
- Accounting Services Coordinator
- Accounting Clerk
- Secretary to the Director

Today, with the inception of the personal desktop computer, e-mails, voicemails, and automated telephone attendants, and the movement of some programs to Guelph, there is not the need for the number of administrative support staff that were once located in Vineland. We have now come around full circle from the situation in 1908 and are back to one person working in the office as the Administrative and Liaison Officer. This position has 60% of the time dedicated to Vineland administrative duties and 40% dedicated to the Department as the liaison officer.
The Vineland Research Station Library and photo collection began with the establishment of the Station in 1906. It grew from personal materials collected by the research staff, government reports, and gifts. Barbara Lounsbery, the first professional librarian at the Station, began work in 1970 and provided the transition from a small collection recorded in a three-ring binder to a formally organized research library. Judy Wanner, librarian from 1979 to 2002 when the collection was moved to Guelph, succeeded Barbara.

Dr. Angus Adams, who was chairman of the library committee for many years and instrumental in creating the librarian position, supported Barbara and Judy in their efforts to expand the collection and provide information services to the Station staff, local growers and horticultural students. In the early 80s, the collection contained over 2000 books and 260 journals organized with a traditional card catalogue. By 2002 the collection had grown to more than 6000 computer catalogued items.

The growth of the collection paralleled the growth of information technology from the 70s to the millennium. Providing access to the world's scientific literature in agriculture and food technology
through database searching, especially searching for references related to horticulture, was an important service of the library. Starting with a telephone acoustic coupler linked to the U.S. Department of Agriculture and Commonwealth Agricultural research databases, continuing with references on compact disks, and moving to online Internet accessed agricultural literature and development of the Station's web site, the Vineland Station Library was constantly upgrading its reference and current awareness services and working to better serve the agricultural community.

The physical facilities of the library expanded with the Station, and the collections reflected the varied research and geographical divisions. The primary collection in the main administration building supported work in fruit culture, floriculture, ornamental breeding and production, protected crops and energy conservation. The library office was also in this location. A second collection and reading room was developed in the Horticultural Products Laboratory building to support wine technology, post harvest physiology and fruit and vegetable evaluation, and product development. When the Simcoe Research Station was built, a third collection and reading room was created in that location to support fruit, vegetable, and weed research work being done by Simcoe staff.

Throughout the years the Vineland librarians developed good relationships and exchanged information with libraries whose collection focus emphasized horticulture, agriculture, and botany. The Vineland Agriculture Canada Library's collection of entomology and plant pathology materials was particularly useful to have so close at hand. Other institutions such as the Royal Botanical Gardens in Hamilton, the Niagara Parks Commission School of Horticulture, Niagara College, Brock University, and the University of Guelph were excellent complimentary resources.

In 1996 when the Vineland Research Station came under the management of the University of Guelph and the Department of Plant Agriculture, the Vineland Library gained greater access to the resources of the University Library and initial plans were made to include the catalogue records of Vineland and the Ontario Ministry of Agriculture agricultural colleges in the University Library's online catalogue. This merging of library records enhanced an already comprehensive agricultural collection held by the University Library and provided better public access to the information held by the former Ministry libraries. This project was completed in the summer of 2005.
In 2002 many Vineland research staff, including the librarian, were relocated to Guelph. This relocation combined with ever increasing technical efficiencies in accessing information online from the University Library resulted in the closure of the Vineland libraries. Vineland library materials were dispersed to the University of Guelph Library and if found to be duplicates offered to other libraries. A small reading room containing basic horticultural reference materials was organized in the Station administration building for the use of remaining staff whose reference needs were then provided for by the University Library.

THE VINELAND PHOTOGRAPHY SERVICES AND ARCHIVES

For over two decades in the latter half of the "Vineland Century", the Station was fortunate to have the exclusive services of its own on-staff photographer, Fred Edwards. Prior to 1961 the HES Vineland had not had any in-house services providing visual aids and each research team was responsible for producing its own which was a drain on research time and resources and led to variation in quality of product. Fred occupied the newly established photographer position from the summer of 1961 until his untimely early death in Oct. 1981. He built up his darkroom facilities and other requirements from scratch and his service was a very valuable asset to the total program of the Research Station.

Fred Edwards was a real professional both behind the camera and in the darkroom. The quality of his photographs and other material for publication was high class and he also provided superior slides for staff to illustrate lectures, whether it was in talks to farmers at local extension meetings or to fellow scientists at international conferences. One item that Fred was responsible for over several years was to devise and produce the cover artwork for some annual extension-type publications of the Ontario Ministry of Agriculture and Food. One such specific was the OMAF Publication 363, "Vegetable Production Recommendations", the cover illustration of which in 1969 was submitted to the Royal Photographic Society in England for their annual competition. That particular cover artwork won Fred a "Highly Commended" award of which he was very proud, as he also was of his continuing designation as Associate of the Royal Photographic Society.

Fred Edwards's photographs were archived in the HES Vineland library along with an extensive collection of older photographs and glass slides that documented the early work of the Station. The complete collection is now under the management of the University of Guelph Library.
The technicians have always been an integral part of life and work at HES Vineland. Since the expansionist days of the 1960s, virtually every research scientist had his/her own technician. But it was not always like this. The 1956 publication "The First Fifty Years" lists in "Present (1956) Technical Staff" for HES only one technician: "Helen R. Valko, Lab. Tech. 1954 - (Lab. Asst. 1952-53), nursery and rootstock investigations, records". In the same publication but in the HPL section, again only one name is listed: "Sheila Head, Laboratory Technician 1956 - assistant in processing". These two were the only technicians in position in 1956. Furthermore, in an accompanying table of "Technical Staff, Past" eight names are shown who had been assistants of some kind for various periods from 1915 to 1954, but some of these were only in post for a few months. They included W.J.Strong, appointed May 1921, Hybridist, assistant in research, retired 1948. All this suggests that during the first 50 years of the Station's existence, there were usually no more than two technicians (or assistants) in post at any one time, with the first one appointed in May 1915 (A.G.Harris "ass't. pomology") and another in July 1915 (P.E.Culverhouse "ass't. by-prod.").
The primary role of the technician was to assist the scientist in research projects and a typical list of duties would include:

- Preparing the layout of field plots and giving instructions or guidance to workers in doing field work
- Applying experimental treatments, (cultural, nutritional, chemical, etc.)
- Harvesting or supervising the harvest of experimental plots
- Collecting data by weighing, measuring, or making visual observations
- Performing calculations on raw data and statistical analyses to determine the results of trials and
- Assisting in determining feasibility and logistics of experiments.

For most technicians at HES, there were two seasons: field work during the growing season and office work in the wintertime. It was always busy in the summer and extremely hectic during the main harvest season. University students were hired to assist scientists and technicians and the technicians worked very closely with the students and in fact supervised them. Technicians used to be on a shorter workweek than the students and farm workers but often worked overtime in the busy season to be on the same work schedule. Compensating time-off could be taken during the quiet times.

The role of technicians at HPL was in essence similar: each technician was teamed with a scientist to assist in a research program. A laboratory or storage room was the work site instead of a field or orchard. The HPL technicians required a different skills set, depending on the program they were involved in. Formal training in chemistry or microbiology was needed for those working in analysis of juices, winemaking or maintenance and identification of yeasts, moulds and bacteria. Technicians with home-economics training were involved with processing of fruit and vegetable cultivars developed or tested at one of the other three units of HRIO. Because of the different nature of the work, most technicians at HPL were classified as Chemical Technician. During their peak season, the fall, the technicians were assisted by university students, usually from a co-op program.

Not all technicians were directly involved with a research program. Sharon (Kerr) Stevenson was in charge of collecting weather data and assisted in statistical analysis for many years before being assigned to research programs. Lucy Reynolds, formerly a Simcoe Ag. Technician, was re-trained as an Information Technology Technician to service the IT needs within
the whole of HRIO. Bob Hamersma was latterly the technician in charge of grounds maintenance and worked under the supervision of initially Bob Fleming and later Calvin Chong.

The minimum educational requirement for an Agricultural Technician was graduation from an Agricultural College or equivalent. In fact, persons with a university degree were deemed overqualified. It was only during the later years, from the mid or late 80s, that all newly hired technicians had a BSc or MSc. The role of the technician changed accordingly by becoming more involved with experimental design, preparing visual aids and writing final reports.

For many technicians, the position at Vineland was the start of their career in horticulture. It was quite common that new hires came straight from college or were hired within a few years of graduating. During the first years they were on a steep learning curve; in fact, their real education had just begun. As a technician gained experience and became more skilled, he/she had the opportunity to expand his role by taking on more responsibilities. Doing extension work, co-authoring reports, attending meetings or conferences and giving presentations at such occasions certainly made the job very rewarding.

The research scientist and technician were a true team. They often worked together in the field, and then worked hand in hand in analysing raw data to prepare reports. They also occupied adjacent offices and even had to share a phone during the early years. In the process, the technician learned much from the scientist about the crops, data analysis, report writing and so on. By working so closely together, a very close bond would develop between the two, a bond of friendship and trust - the stronger the bond, the stronger and more productive the team. Many technicians stayed a long time; some spent their entire working life at HRIO. Longevity would also make the team stronger. Some examples of strong teams during the 60s and 70s were: Ricketson/Vandenberg, Bradt/Van Vliet, Loughton/Straver, Tehrani/Lay, Leuty/Slingerland.

A more experienced technician could also act for the scientist in the latter's absence. An experienced technician would be able to continue the program, even for years, when the scientist retired or left or was on an extended leave. This was essential for a breeding program in particular.

Technicians also had the opportunity and received support from management to improve their education by taking courses. For a few, this led to new opportunities in other branches of the Ministry.
Technicians were not only one half of a research team. They were also a clearly identifiable group of employees with common responsibilities, views and concerns. They sought each other's company to discuss work related issues and to socialize. Executive positions on the local branch of the Civil Service Association of Ontario (CSAO) and later the Ontario Public Service Employees Union (OPSEU) were often filled by technicians. Andrew Vandenberg was the local 'Union Steward' for many years and served the employees very capably and with much compassion. Bill Lay played an instrumental role in the Health and Safety Committee from its inception. Significant social activities were the soccer and baseball games. When Al Smith arrived on the scene as technician in the outdoor ornamentals program, playing Euchre at lunch was sometimes the highlight of the day (some scientists were allowed to play too!).

The technical positions were the most interesting positions at HRIO. The work was hands on, constantly changing and gave the satisfaction of seeing crops and experiments from start to finish. Technicians often had the feeling of being in charge, but did not have the pressure of publishing and dealing with funding and other administrative issues. It seemed the best of both worlds, and a position valued and capably filled by those who held it.
The report published in 1956 entitled "The First Fifty Years" contained a comprehensive review of the history of the Station from its inception to 1956 including details of the team of farm workers who were employed at Vineland during that early time. Several old staff-related documents have now been lost and of course the oldest memories are no longer with us. Consequently, this article will concentrate on the "farm crew" from the mid-century to the present.

With the exception of the first few formative years, 1906 to 1915, the Station has been served by only five foremen: S. M. Wylie, 1915 to 1943; C. S. Peacock, 1943 to 1946; W. B. Gee, 1946 to 1967; P.M.Proctor, 1967 to 1994, and R. Kaczmarski 1994 to the present.

I joined the farm crew in 1962 at HES Vineland Station, or the Experimental Farm as it was commonly called. The working horse was no longer around but the horse era facilities were still in use. Our crew room was better known as the Harness Room and the farm truck was housed in the drive-shed.
Before the workday began the workers would meet at the barn in the harness room as early as 7:30 a.m. and discuss interesting items from sports or news from the previous day. Everyone had their special place to sit around the room. Earl Hisey had an easy chair in the corner and was always the first to arrive, which was a carry over from the time when he tended the horses. The rest of us sat on wooden benches. The crew included Bern Gee who was then farm foreman, Peter Hill, Ed Reeser, Stan Prior, who died in the carpenter's shop the first winter I was there, Jack Ashwood, who was always congenial unless the Montreal Canadiens had lost, then watch out, Ken Moyer, the truck driver responsible for produce distribution who always had a story to tell, Dave Unrau, who had interesting stories of his escape from Russia, Alf Lewis, who was the nursery foreman in the summer and spent most of the winter months painting and wall papering in the staff homes, Grant Hisey, who had spent the previous evening under the hood of a vehicle replacing the valves or some other components, Jim Moses, who was most often the last in. We would hear him put his pipe on the window ledge outside as even in those early days, this barn building was a no smoking area!

Back in those days the maintenance of the homes and buildings was the responsibility of Lloyd Crown, Len Good and for electrical concerns, Andy Hambleton. Greenhouse foreman Dirk Mechelse, and Vern Kirk who looked after the Grape Station were part of the crew but did not meet with us in the mornings. As time progressed, several new faces joined the farm crew when the older ones retired. Fred Ferbrache, who was hired straight from high school to later become truck driver and delivery person, Ralph Hamm, a young man with strong interest in helping to keep the ornamental grounds attractive to the public, Jim Sano, who had been right hand man for local fruit grower Ernest Culp and brought his fruit growing skills to HES in 1963. Lloyd Robertson brought equipment maintenance skills and spent winters in the machine shop and summers on the farm. Nick Primak and Fred Fedorkiw were new Canadians from central Europe and working the Christmas statutory holiday was acceptable to them and very much appreciated by others. When the mushroom research facility became operational in 1972, Nick took over the ag. worker duties that were required there.

In 1974 Lloyd Robertson left to be replaced by Jim Juhlke, who became a full time equipment maintenance mechanic in the shop. When Jim retired, Bill Trelford was hired and brought with him automotive repair skills as he was a licensed mechanic.
Other new appointees were Brian Steel, Ted Warner, Jim Russ, Don Moyer, Don Troup, Abe Weier, Noel Pye and John Jansen. They all brought their various skills and talents to the crew. Noel Pye eventually became Grape Station foreman after Vern Kirk retired.

In 1987 Ray Kaczmarski, who was a graduate of Ridgetown College of Agricultural Technology, was hired. Ray brought considerable practical experience from his parents' farm and with his formal College training, he became Farm Manager in 1994 but his title was to change to Research Station Manager when the amalgamation with the University of Guelph took place in 1997.

As the dwelling houses on the station were demolished, maintenance time requirements were reduced so Lloyd Crown was moved over to service the needs of HPL. Andy Hambleton took early retirement and Len Good was transferred to the Ontario Ministry of Government Services making room for newcomer Larry Blain who had to wear many hats to perform a multitude of maintenance duties.

The greenhouses were under the care of Dick Mechelse, who with the help of George Delvecchio followed by Sandy Baggot, the first female agricultural worker to be hired, and Geoff Dover, gave excellent support to the large research program in greenhouse vegetables and floriculture. When Dick retired, Marty Hendrickson became greenhouse foreman for a short time.

Following the retirement of Bob Fleming from the research staff, his responsibility for supervising grounds maintenance became part of the farm crew's duties. Jim Lounsbery was groundsman for several years followed by Mic Frank.

Although the station has undergone many changes over the past decade resulting from the amalgamation with the University of Guelph, the farm crew is still vital to the delivery of programs. The present full-time farm crew consists of Mic Frank - grounds, Cathy Gray - greenhouse and farm, Rocco Guarnaccia - mushrooms and farm, John Jansen - grape station, Don Moyer - maintenance, Kevin Smith - farm and transportation, and Ray Kaczmarski - Station Manager.
Three former members of the staff of the Horticultural Experiment Station at Vineland Station have been inducted into the Ontario Agricultural of Fame at Milton, Ontario. The citations from the Hall are reproduced below and acknowledgement is made to the OAHF for permission to use this material.

**EDMUND FRANK PALMER**

*1891 - 1973*

For 40 years, Frank Palmer was the Director of the Horticultural Experiment Station at Vineland Station, Ontario and for 12 of those years he was Head of the Department of Horticulture, Ontario Agricultural College in Guelph.

He became world renowned as a plant breeder and experimental station administrator. He played a major role in the development of the "V" peaches and new cultivars of sweet cherries, raspberries, grapes, vegetables and flowers. Dr. Palmer created some 80 cultivars of gladioli and his 1931 introduction, Picardy, was considered the finest cultivar introduced to that date. His work with other ornamentals such as rhododendron brought many new garden plants to Ontario.

Dr. Palmer's work has been widely recognized. He was named a Fellow of the Agricultural Institute of Canada, of the American Association for the Advancement of Science, and of the Royal
Horticultural Society (England). He received an Honourary Doctorate in 1948 from the University of Toronto and in 1956 was awarded the Wilder Medal by the American Pomological Society for "outstanding service to agriculture."

Sponsor: Horticultural Research Institute of Ontario
Inducted: 1986

**ERNEST ANDREW KERR**

1917-

Ernest Andrew Kerr, Wellington County native, is arguably the most successful Canadian vegetable breeder that Canada has produced. This skilled plant geneticist developed a commercially valuable assortment of vegetable and fruit cultivars that have impacted the horticultural industry locally and internationally. Ernie Kerr made major contributions at the Horticultural Research Institute of Ontario over his first 38 year career. His advancements in tomato, sweet corn and other crop germ plasm development are unequalled. Use of that material by breeders the world over is equally impressive.

Dr. Kerr was a genius at identifying deficiencies in plant species, finding genes to correct them and incorporating those factors into improved cultivars for release to the industry. The impact of his work is found in the worldwide use of genetic materials he developed and the benefits they provide to the processing industry, the fresh market, growers and consumers.

The Canadian Seed Trade Association recognized his contributions in 1980 by naming Dr. Kerr "Man of the Year" - the first horticulturist so named.

Dr. Kerr's contributions leaned more to commercial application in his second scientific career, that of Director of Research for Stokes Seeds, where he concentrated on consumer acceptance through improved taste in cultivars of tomato, sweet corn, and sweet peppers as well as cold tolerant and insect repelling cultivars. In 1994, he was awarded the H.R. MacMillan Laureate in Agriculture for such work.

In retirement, Ernie continued his career in a third phase, developing a blue colored trillium, the provincial flower. Genetics associated with this long-term project now provides a basis for species improvement at the University of Guelph's Simcoe Research Station.

Dr. Kerr received many honors and awards, among them the Rotary Club Paul Harris Fellowship, several awards of merit and listings in several Who's Who publications. As an outstanding
scientist, he has produced a host of scientific papers and contributed to many professional organizations. He also is a well-respected community contributor, through church, service club, and family activities.

Sponsor: Ontario Institute of Agrologists and Long Point Branch, Ontario Institute of Agrologists
Inducted: 2001

OLIVER AUGUSTINE BRADT
1913 - 2004

Over the course of forty years since serving in the Army during World War II, "Ollie" Bradt was known both locally and internationally as an exceptional breeder of grapes, peaches, nectarines and apricots. He introduced and evaluated numerous cultivars from around the world for their suitability to Ontario and Canadian conditions. He took a proactive role in service to the horticultural industry through his work with the Ontario Department of Agriculture and latterly with the Horticultural Research Institute of Ontario. He spent countless hours in planning educational programs, promoting superior varieties, working closely with producer and trade organizations, establishing long range breeding strategies and reaching out to international resources for technical knowledge to improve the horticultural industry.

Early in his career, Mr. Bradt's work focussed on improving dessert grapes but as the wine industry expanded in the Niagara Peninsula he began to introduce and evaluate V. vinifera varieties from around the world. The French hybrids and vinifera varieties have transformed the grape and wine industry in Ontario into what is now a world-renowned wine producing region. He also developed the cultural practices of production that made these new varieties so responsive to Ontario conditions.

"Ollie" Bradt carried his breeding expertise into the development of fresh peach and processing varieties. His breeding program developed peach varieties that matured much earlier and extended the growing season. He is also credited with developing the clingstone processing industry in Ontario. The province's fruit processing industry would not enjoy its leadership position if it had not been for Mr. Bradt's hard work, dedication and expert mind and hand in developing these new varieties.

"Ollie" also introduced several varieties of apricots to the horticultural community through his initial breeding program and has followed that up by selecting several promising varieties that are currently being evaluated.
Oliver Bradt was a prolific writer having published many scientific papers on plant breeding and cultivation. These have been invaluable for growers and the scientific community.

In 1974 he was awarded the prestigious American Wilder Medal given to individuals who have contributed the most to the improvement of cultivars of various kinds of fruit. In 1979 he was named Fellow of the Agriculture Institute of Canada, the highest honour given by the organization. He also received awards of merit from the Ontario Fruit and Vegetable Growers' Association, the Canadian Horticultural Council and the Niagara Fruit and Vegetable Growers' Association.

"Ollie's" community service was exemplary in church, school, lodge, sports and family life.

Oliver Bradt's many contributions to plant breeding, education, and his ability to work with people and bring them together have contributed to the advancement of Ontario's agriculture industry in a significant way.

*Inducted: 2002*

*Sponsor: The Ontario Grape Growers' Marketing Board and the Niagara Branch of the Ontario Institute of Agrologists*
Research Programs
PHOTOGRAPH CAPTION LISTING

Page 81 - Aleck Hutchinson, research scientist - apples

Page 84 - C. Lewis Ricketson, research scientist - berry crops

Page 90 - Gus Tehrani, research scientist - cherries / plums
        with Bill Lay, technician

Page 93 - Helen Fisher, research scientist - viticulture with
        grad. student Dave Percival (early 1990s)

Page 97 - Neil Miles, research scientist - peaches

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Page 108 - John Wiebe, research scientist - viticulture,
        conducting photosynthetic studies on grapes

Page 111 - Bob Cline, research scientist - plant nutrition

Page 116 - Arthur Loughton, research scientist - greenhouse vegetables

Page 121 - Danny Rinker (right), research scientist - mushrooms
        and Glen Alm, technician.

Page 124 - Ernie Kerr, research scientist - vegetables

Page 128 - Theo Blom, research scientist - greenhouse floriculture

Page 132 - Calvin Chong (right), research scientist
        - outdoor ornamentals with Bob Hamersma (left) technician

Page 136 - Bob Fleming, research scientist - ornamentals

Page 139 - E.F. Palmer (left), Director and research scientist,
        Roy Forster (centre), technician - ornamentals and Bob Fleming (right),
        research scientist - ornamentals
Though apples are not a major crop in the Niagara area, research on apples was centered largely at the Vineland Experiment Station during the first fifty years of the Station's existence. When the substation at Simcoe was established in the early 1960s, most of the apple research was transferred to that location since apples in Ontario were a more important horticultural crop in the Lake Erie counties and Georgian Bay. However, some important apple research was continued at Vineland.

Apple rootstock studies were implemented in the late 1950s and early 1960s. Leading work on the development of tree size-controlling cultivars in Britain indicated that rootstocks could be used to control tree size and to bring trees into production much earlier. Cost of harvesting large trees and lengthy periods of waiting for orchards to come into effective production were significant problems facing growers in all parts of Ontario. Extensive studies at Vineland and grower locations provided much useful information leading to the recommendation of dwarfing and semi-dwarfing rootstocks. M.9, M.7, MM.106 and M.26 came into general use along with others as a result of these studies. This work led the way to more efficient operation of apple orchards, not only in
Ontario but apple orchards in general. In addition to the experiments in Vineland, four test orchards were located in apple growing areas of Ontario as follows.

1: above the escarpment near Grimsby, Ont.
2: above the escarpment near Meaford in the Georgian Bay area
3: at the Federal Government Experimental Farm at Smithfield, eastern Ontario
4: a farm orchard at Kemptville near Ottawa.

Except for the one at Vineland, these all represented major apple-growing areas. These orchards served to demonstrate in a practical way the advantage of size controlling rootstocks, orchard spacing and design for small trees.

An intensive rootstock experiment was organized in cooperation with Oregon University in 1979. Trials included several locations in apple growing areas in the U.S. and Canada. Twenty-one rootstock selections were included of which five were selections from HES Vineland, called the Vineland rootstock series.

The Vineland ('V.') series of apple rootstocks originated as open-pollinated hybrids of 'Kerr' crabapple and 'M.9' rootstock developed in 1958 by Dr. Aleck Hutchinson, Pomologist at HRIO, Vineland. The 'Kerr' crab apple was chosen as the maternal parent because of its exceptional winter hardiness, excellent rooting ability, and resistance to fireblight. A total of seven selections ('V.1'- 'V.7') were made based on their desirable characteristics including dwarf growth habit, cold hardiness, ease of propagation, and disease and insect resistance. In 1979 rooted plants of 'V.1', 'V.2', 'V.3', 'V.4', 'V.7' were made available to the rootstock research committee of the International Dwarf Fruit Tree Association. In 1986 research plots of these rootstocks with various scion cultivars were established in Washington State and Ohio. After eight years of testing in these trials, it was concluded that 'V.1' and 'V.3' were found to be in the 'M.9' size class, 'V.2' in the 'M.26' size class, and 'V.4' and 'V.7' were in the 'M.7' size class. It also was observed that the V. rootstock, in comparison with most notably 'M.26', were less susceptible to fireblight.

Interest in the V. series rootstock increased and in 1994 the USDA NC-140 Technical Committee initiated testing of more than seventeen new and advanced rootstocks in over 25 locations throughout Canada and the USA; the scion cultivar was 'Royal Gala'. Three of the V. rootstocks ('V.1', 'V.2', and 'V.3') were included in this experiment which has provided excellent performance information from regions with vastly contrasting growing conditions.
In addition, it provided the ability to compare yield and growth performance against the benchmark industry standards, 'M.26' and 'M.9'. The vigour of the rootstocks range from dwarfing (V.3, V.5, V.6) to semi-dwarfing (V.1, V.2) to semi-vigorous (V.4, V.7). The rootstocks have also demonstrated varying degrees of fireblight and cold hardiness resistance. Dr. John A. Cline is continuing the evaluation and development of the Vineland series apple rootstocks at the Simcoe station, now operated by the University of Guelph.

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*The whole of science is nothing more than a refinement of everyday thinking.*

*Albert Einstein*
Berry Crops Research

C. Lewis Ricketson

1948-1956

Work in this period was directed by Dr. John F. Brown. He resigned in 1956 to become Secretary of the Ontario Fruit and Vegetable Growers' Association. Coverage of berry crops research in "The First Fifty Years" is quite meagre and therefore some expanded detail of the earlier work is included here.

In this period many new developments occurred. Inorganic spray materials such as lead, copper, lime sulphur and Bordeaux were being rapidly replaced with the new "organic" pesticides such as DDT, parathion, malathion and captan. Selective herbicides such as 2,4-D were being introduced. Production was being mechanized with the introduction of plant diggers, mulchers and power hoes. Portable aluminum irrigation systems were becoming affordable. Cardboard flats replaced wooden crates as shipping containers. The meadow nematode was identified as a significant pest in some strawberry plantings raising concern over possible spread on nursery plants. HES personnel collaborated in helping growers evaluate these new developments.
A fledgling strawberry plant production industry was emerging as growers decided to buy plants rather than dig their own. Research indicated most of the commercial strawberry stock was infected with a symptomless virus complex with the potential of reducing yields and infecting nearby clean stock. Concerns expressed by growers over plant quality led to a survey of existing practices. This showed that plants were being hand dug to order, in the spring, often after growth had started. Cleaning, counting and bundling were done in the field, often in full sun and dry air. Plants were shipped in unlined bushel hampers with no refrigeration.

Research at various places showed that plants dug by machine, while fully dormant, and moved immediately to cold storage for cleaning etc. could safely be stored for several weeks if packed in lined containers and held at 30-31 degrees F. Further, research showed that fully dormant plants could be dug in the fall and safely stored all winter at 26 to 28 degrees F in containers lined with a 2 mil polyethylene bag. Adoption of these practices meant that plant growers could reliably fill orders from storage with plants of higher, more uniform quality than before.

1958 -1980

Research from 1958 came under the direction of Dr. C. Lewis Ricketson assisted by technician Andrew Vandenberg and ably supported financially by the Ontario Berry Growers Assoc. Ricketson resigned in 1980 to head the vegetable research team at Agriculture Canada, Kentville, NS. In 1988 he received the "Award of Merit" from the Ontario Berry Growers Assoc. for his outstanding service.

Industry Trends

New cultivars, use of certified plants, irrigation, improved cultural practices and pest control resulted in higher yields of strawberries and raspberries. Strawberry plantings were routinely kept for two or three crops instead of only one. U-pick operations, pioneered by Gilbert Whittamore, Markham, Ontario rapidly expanded throughout the Province and picking for fresh market sales decreased. As a result, berry production became less centralized in the Niagara and Norfolk areas. In the early '60s about one-third of the strawberry crop was processed but production for this market decreased markedly during the latter '60s.
Interest in highbush blueberry production developed in the mid '70s, initially stimulated by Martin Weber from the Norfolk area. Soil acidification, mulching, irrigation, bird control and mechanical harvesting became important areas for research. Also in the Bancroft, New Liskeard and other northern Ontario areas, interest developed in cultivating lowbush blueberries using techniques studied at Agriculture Canada, Kentville, NS.

Currants and gooseberries remained relatively minor crops.

**Breeding**

With strawberries, initial objectives were to breed cultivars superior to Premier and Redcoat, with emphasis on productivity, earliness, firmness and high quality for fresh market and for freezing. Crosses made in 1958 resulted in the introduction of Veestar and Vibrant in 1967. Veestar is still a major cultivar in U-pick operations and received the "Outstanding Cultivar" award of the Canadian Society for Horticultural Science in 1983. Resistance to verticillium became a major focus and seedlings were inoculated with isolates from across Ontario prepared by Dr. Z.A. Patrick, University of Toronto. Veegem, Veeglow and Vantage were introduced in 1980. Vantage had excellent verticillium resistance and frozen quality. With renewed interest in processing, suitability for mechanical harvesting and hulling became priorities. Selection criteria included frozen quality, productivity, firmness, necked berries and easy hull removal.

Selections were routinely tested for frozen quality and, to some extent, for canning and jam by staff at the H.P.L. Also, seedlings were grown with recommended herbicides and susceptible ones discarded. The volunteer work of Dorothy Ricketson must be recognized. On evenings and weekends she recorded notes on seedlings for her husband and protected Hungarian partridge, killdeer and pheasant nests! A number of selections made by Ricketson were later named by Dr. Adam Dale.

Raspberry crosses were made in 1968 and selections made in 1971 and 1972. Raspberry breeding was later focussed at the University of Guelph, so selections were transferred there.
Cultivar Evaluation

Strawberry and raspberry cultivars and promising selections were evaluated at Simcoe, Vineland and the HPL. Close contacts with other breeding programs in Canada and eastern USA were maintained. Viking raspberry, a 1924 Vineland introduction, was replaced by superior cultivars.

Cultivars of highbush blueberries were evaluated at Vineland and Simcoe, and red and black currants and gooseberries at Vineland. Evaluation included harvesting berries with a hand-held electric vibrator supplied by Tubbs Mfg., NY, and a more robust vibrator from Blueberry Equipment Ltd, South Haven, Mich. Berries were collected in a frame placed under the bush and leaf material blown away. Results were good for blueberries and some black currant cultivars. Red currants tended to be too tender and gooseberries were difficult to remove.

Weed Control

In the late '50s, weeds were a major problem in strawberry production. In the Niagara area, chickweed often overran plantings. Geese gave some control but the registration of Tenoran was a real boon. Tenoran and Dacthal gave a major boost to strawberry weed control. However, it was the registration of Sinbar in the early '70s that allowed growers to get excellent control of broadleaf and grass weeds and to carry over plantings for several crops. Herbicide research was a major part of the production research at HRIO, leading to registration of new materials and played an important role in formulating weed control recommendations for Ontario.

Mechanical Harvesting

Shortage of pickers and high costs of hand harvesting stimulated interest by growers and processors in mechanical harvesting. Ricketson co-operated with several engineers in developing mechanical harvesters for strawberries, including Harold Hughes, Univ. of Guelph, Clarence Hanson and Dick Ledebrur, MSU and Blueberry Equipment Ltd, South Haven, Mich. The early season in Vineland relative to northern Michigan expanded the season for evaluation and modification. Machines worked on the principle of a once-over harvest. This led to evaluating cultural methods at HRIO to increase yields and developing suitable cultivars. Solid-bed plantings were developed at HRIO in which strawberry plants were not confined to rows. This increased yields nearly two-
fold and gave good yields in once-over hand harvests. Lifting berries so tines could remove them and eliminating waste material were challenges.

Prototype raspberry harvesters were built by engineers at Univ. of Guelph and Bob Genge and Eugene Lauro at HRIO. Berries were shaken off and collected on belts at the base of canes. Training methods for this application were developed and tested at HRIO. Work was discontinued before a commercial model was developed. Commercial machines were developed by West Coast and Michigan companies in this period.

**Mechanical Strawberry Hulling**

Coupled with mechanical harvesting was the need to develop strawberry hulling machines. The type used earlier in Ontario did not work efficiently with cultivars in use. It relied on rubbing off hulls with a series of rollers. One of these machines was supplied to HRIO by St. Williams Frozen Foods, Simcoe for evaluating selections. Canners Machinery Ltd. in Simcoe with Michigan engineers, worked on developing a machine that cut off the hulls. Berries with necks were desired and HRIO selections with this feature were identified and tested.

Other production research included:

- Relationship between foliar levels of N, P, K at harvest and strawberry fruit characteristics (Ricketson's Ph.D. dissertation, 1965). Levels were established for a potential leaf analysis program.
- Plastic row tunnels to advance strawberry maturity.
- Strawberry production in matted-row, hill and solid-bed systems.
- Soil fumigation for nematode and black root rot control in strawberries.
- Growth regulator control of strawberry runners.
- Training systems in raspberries. Systems were designed to increase yields, reduce hand labor in pruning, make hand harvesting easier and for potential use in mechanical harvesting. They included a one-sided trellis, a two-sided or V-trellis, a basket-weave with poly twine, and alternating between having only fruiting canes one year and only suckers the next.
- Evaluating soil amendments and irrigation for highbush blueberries in a study started in 1978 with Dr. R.A. Cline.
In 1976, Ricketson was assigned responsibility for cherry and plum breeding after the resignation of Dr. G. Tehrani. The technical assistance of Bill Lay was invaluable in this additional load. This extra work, however, greatly reduced the input into berry crops research.

In 1980, following the departure of Ricketson for Nova Scotia, the HRIO berry crops research programs were taken over by Dr. Neil Miles. Within a few years, this work was fully transferred to the HES Simcoe under the direction of Dr. Adam Dale.
Sweet cherries have been grown in Ontario for well over 100 years, mostly in the Niagara peninsula, although there is also limited production in Kent and Essex counties in the SW of the province. A number of cultivars have been developed and released for commercial cultivation from the breeding program at Vineland Station and breeding is continuing to meet the needs of the growers. Although the objectives of the program keep changing reflecting the demands of the growers, the tradition of this historic research station is to develop cultivars that are suited to Ontario climate and markets.

Sweet cherry breeding began here in 1915. At that time, the major objective was to develop cultivars with a range of maturities throughout the season, typically the first three weeks of July. Since the Niagara region endures a wet growing season, breeding has been aimed at developing large sized, firm and crack-resistant cultivars. The earliest crosses were made in 1917 using the
parents 'Black Tartarian', 'Napolean', 'Olivet', 'Windsor' and 'Rockport'. In those early years, 1330 open pollinated seedlings and 1079 'hybrids' from controlled crosses were evaluated in comparison with standards like 'Bing' in test orchards.

The first cultivar, 'Victor' was introduced in 1925 and since then a total of 13 sweet cherry cultivars have been released (Table 1). Current goals are to extend the existing cherry season through development of cultivars that crop earlier or later than existing varieties.

The evolution of the self fertile variety 'Stella' changed the breeding objective in the late 1960s. The first crosses between Van and Stella, to impart self fertility in Ontario cherries were made in 1969 and since then self fertility has become an important objective in the program. To date, close to 50 self fertile selections that span the original season and beyond have been made. Among these, two selections V690618 and V690620 were released for commercial cultivation as 'Vandalay' and 'Tehranivee' respectively.

PLUM BREEDING

The plum breeding program started around the same time as work with cherries. Focus was more on European plums (blue plums) rather than Japanese/Asian Plums, since it was thought that the climate is too cold for Japanese plums. However, breeding attempts to improve Japanese plums were renewed in the 1970s and currently a small population is under test.

The first controlled hybridizations of blue plums were made in 1913, using cultivars such as Grand Duke, Green Gage and Reine Cloude as parents. The focus was on developing cultivars with a maturity date in August as blue plums were not available in the local market until about the first week of September. Flavor, firmness and size were given importance in the early breeding programs. Being a slower grower than other stone fruits, naturally it took longer to develop cultivars to meet the demands. In 1967 three cultivars, Valor, Verity and Vision were released. So far eight cultivars of blue plums have been released (Table 1) and two more will be released during the Centennial year, 2006. Currently, the breeding objectives include characters such as freestone and postharvest shelf life. Vineland Station has perhaps one of the richest blue plum germplasm collections in the world. Several selections made here are being sought as breeding lines as well as being grown in Europe and Australia.
The Japanese plum breeding program resulted in the development of Vanier in 1983 and another advanced selection, a red-fleshed plum will be released for cultivation in 2006. Several other selections and seedlings are in the pipeline. Four breeders, G.H. Dickson, G.W. Eaton, C.D. Whitty and G. Tehrani, have contributed to the development and release of these cherry and plum varieties. Jay Subramanian took over the breeding of these fruit crops in addition to peaches and nectarines in 2002, with a long term vision of making Vineland Station into a tree fruit centre of excellence. We gratefully acknowledge the support of the growers and the Ontario Tender Fruit Marketing Board and are confident that we will receive continued support for us to reach that lofty goal.

Table 1. Sweet Cherry and Plum Cultivars
Released from Vineland Station

<table>
<thead>
<tr>
<th>Crop</th>
<th>Year of Release</th>
<th>Type</th>
<th>Season</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweet Cherry</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Victor</td>
<td>1925</td>
<td>White</td>
<td>Mid season</td>
</tr>
<tr>
<td>Velvet</td>
<td>1937</td>
<td>Red</td>
<td>Late mid-season</td>
</tr>
<tr>
<td>Vernon</td>
<td>1937</td>
<td>Red</td>
<td>Early mid-season</td>
</tr>
<tr>
<td>Venus</td>
<td>1958</td>
<td>Red</td>
<td>Early</td>
</tr>
<tr>
<td>Vic</td>
<td>1958</td>
<td>Red</td>
<td>Late mid-season</td>
</tr>
<tr>
<td>Vista</td>
<td>1958</td>
<td>Red</td>
<td>Early</td>
</tr>
<tr>
<td>Vega</td>
<td>1967</td>
<td>White</td>
<td>Mid season</td>
</tr>
<tr>
<td>Valera</td>
<td>1967</td>
<td>Red</td>
<td>Early</td>
</tr>
<tr>
<td>Viva</td>
<td>1972</td>
<td>Red</td>
<td>Early</td>
</tr>
<tr>
<td>Vogue</td>
<td>1974</td>
<td>Red</td>
<td>Mid season</td>
</tr>
<tr>
<td>Viscount</td>
<td>1984</td>
<td>Red</td>
<td>Mid season</td>
</tr>
<tr>
<td>Vandalay</td>
<td>1996</td>
<td>Red</td>
<td>Early mid-season</td>
</tr>
<tr>
<td>Self Fruitful</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tehranivee</td>
<td>1996</td>
<td>Red</td>
<td>Late mid season</td>
</tr>
<tr>
<td>Self Fruitful</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>European Plums</td>
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<td></td>
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<tr>
<td>Valor</td>
<td>1967</td>
<td></td>
<td></td>
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<tr>
<td>Verity</td>
<td>1967</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vision</td>
<td>1967</td>
<td></td>
<td></td>
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<tr>
<td>Veeblue</td>
<td>1981</td>
<td></td>
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<tr>
<td>Voyageur</td>
<td>1987</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Victory</td>
<td>1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Valerie</td>
<td>1999</td>
<td></td>
<td></td>
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<tr>
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<td>1999</td>
<td></td>
<td></td>
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<tr>
<td>Japanese Plum</td>
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<td></td>
</tr>
<tr>
<td>Vanier</td>
<td>1983</td>
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</tbody>
</table>
Grape Breeding and Production Research

K. Helen Fisher

Under the able leadership of Mr. Ollie Bradt since 1943, the Vineland grape program served as a focal point of the Niagara grape and wine industry. The early phase, in co-operation with Bright's Wines, imported a large collection of material directly from some very innovative breeders in the south of France. This importation in 1947 was the basis for much of the next 60 years of breeding and variety introduction.

Although the breeding program started in 1913, very little early progress was made in selecting useful material that would directly improve the spectrum of wine varieties. Beginning in 1948, new crosses combined the sturdiness and winter hardiness of the local North American labrusca varieties with the desirable flavour components of these new "French hybrids". These seedlings were rigorously observed for winter hardiness, disease resistance and more controllable cropping levels. The laboratory based work was done by a team of scientists at the HPL.

Many of the promising selections were readily shared within the North American wine industry. There was an active exchange between Vineland and Geneva, NY, where germplasm and breeding goals were similar. Plant material was also sent regularly to
Virginia, North Carolina, Missouri and Arkansas. Unfortunately, more stringent plant quarantine requirements and the implementation of plant breeders' rights and patent protection have severely curtailed this very useful exchange, preventing simultaneous testing under multiple management and climatic conditions.

The first introduction was VEEPORT in 1961, a labrusca based variety suitable for port. Then came VINCENT in 1967, the first of the French hybrid crosses, with much better colour stability upon aging and a very 'clean', non-labrusca flavour profile, suitable for the drier tables wines. VENTURA was named in 1974, an extremely winter hardy vine and useful for expansion in the colder areas above the escarpment. In 1977, VEEBLANC was named, a productive, reliable vine with a better flavour profile for table wine than Ventura. In 1983, VIVANT was named, again with a considerable wine flavour improvement over both Ventura and Veeblanc. In 1993, L'ACADIE was named in Nova Scotia, in conjunction with the fledgling Nova Scotia industry. In 1999, VINTINTO was introduced as an interesting teinturier (coloured flesh) useful for genetic studies, but never formally propagated for the commercial wine industry.

Although not a formal part of the breeding program, anything suitable for the dessert or table grape industry was also retained. In 1964, VINERED was introduced because of its success in Virginia and North Carolina. Later, FESTIVEE was introduced in 1976, first of the large berried, firm fleshed introductions. This was followed by VANESSA, a seedless, firm fleshed variety. Many of the later breeding families created since 1980 have been targeted to the table grape industry.

Further industrial testing took place through cooperation with Bright's, Jordan and Parkdale Wines, and many of the early French hybrids were selected for winter hardiness, cropping stability and suitability within the commercial wine industry. This co-operation also included annual wine tasting events with participation from the local industrial representatives, along with research colleagues from Geneva, NY and some New York wineries. Several New York introductions (New York Muscat, Canada Muscat) became part of the variety recommendations for Niagara as a result of these co-operative testing and tasting sessions. Also, when a number of new selections were acquired from Agriculture Canada, Summerland, BC in the 1980s, SOVEREIGN CORONATION was selected as the most promising for the table grape industry. It is now the predominant variety in the Ontario table grape industry.
In recent years, the Ontario wine industry has undergone great upheaval. Although the HRIO breeding program continued to produce selections with very clean flavour profiles suitable for the modern public, the industry turned to recognized European vinifera varieties to rebuild their premium wine labels. The development of suitable wine material today depends on vinifera parents for fruit quality, since the Ontario consumer is very critical of non-vinifera flavours in table wine. There is some loss of winter hardiness, but vines are now scrutinized more closely for this trait including the more distant parts of the traditional wine industry where consistent vinifera production is severely curtailed by winter weather.

In addition to breeding, a comprehensive production research program was underway at the Rittenhouse Grape Research Station with much industry participation. Regular, well attended openhouse evenings where these and many other production trials were discussed, made an efficient vehicle for the dissemination of new information throughout the grower community. Bradt was a pioneer in determining the pruning and thinning strategies required for accurate crop control in French hybrids. This was the key to improving winter hardiness and reliable cropping for good quality, non-labrusca dry table wines in Niagara, well ahead of our neighbours in New York.

Bradt, in co-operation with Dr. Aleck Hutchison of the HRIO, also looked into the best rootstocks for these varieties, as not all were vigorous enough to tolerate the phylloxera infested soils of Niagara. Although the breeding program goals were to develop selections not requiring grafting and/or thinning for crop control, it was recognized that some very useful varieties would require grafting to be commercially viable.

In the early 1970s, Dr. John Archibald, created a multidisciplinary research group "The Grape Team" and brought many scientists into the viticulture program. At this time, Dr. John Wiebe joined the group bringing his experience with vegetable research. He developed a research program that addressed vineyard geometry, light interception and general grapevine physiology. He also spearheaded the novel remote sensing survey of the Niagara Peninsula to determine areas of greater or lesser risk of frost damage in order to make recommendations for vineyard expansion, a critical issue in the very busy 1970s. This, co-authored with Dr. Emil Andersen became the Grape Climatic Zone map that has been used extensively since publication in 1974 and is perhaps the most important publication to come from the grape program.
Dr. Helen Fisher joined the program after the retirement of Dr. Wiebe in 1977 and Mr. Bradt in 1978. At this point the program changed direction to consolidate both the breeding program and the vineyard production and physiology programs. Detailed spacing, trellising, rootstock and mechanization studies were undertaken with the new Vineland varieties as well as important hybrids, then at the forefront of the table wine industry. Subsequent to initial surpluses in the early 1980s, the North American Free Trade Agreement came about in 1988 and the wine industry had to re-think itself to retain a competitive advantage in this far more rigorous marketplace. Data from HRIO trials was instrumental in developing compensation packages for the growers as a pull-out program helped rebuild the wine industry.

The grape program at HRIO rose to the research challenge for this new vinifera based industry and in 1994 planted three hectares of European varieties. Under the guidance of the Ontario Grape and Wine Adjustment Program, large semi-commercial trials were set out to identify appropriate trellising systems, spacing dimensions and rootstocks for these winter tender wine varieties.

In 1997, HRIO became part of the University of Guelph. The wine program was de-emphasized and the grape program has turned more to soil management and vineyard environmental stewardship. Programs are presently being developed to utilize winery waste as well as local industrial wastes for organic matter management in vineyards. On-farm composting is becoming an important issue. Introduction of pest and cold tolerant varieties are still a goal of the breeding program, but reduction of pesticides, the use of native flora to encourage beneficial insects and mites, and the development of organic vineyards and wineries have become the issues of the future.
The Quest for Excellence through Peach and Nectarine Breeding Programs

Neil Miles and Jayasankar Subramanian

At the inception of the Horticultural Experiment Station a century ago, "advanced variety testing" plots were established to provide growers with improved information about the varieties that could be used for establishing new orchards. By 1909, 137 varieties of peach and 26 varieties of apricots had been planted at the station. A logical expansion of this work was the actual breeding of new varieties suited to Ontario conditions and markets, and this started in 1911. This tradition remained throughout the life of the station and continues as an important objective today.

Breeding objectives traditionally emphasized the development of varieties that would satisfy the needs of Ontario producers and consumers alike. Thus adaptability to climatic conditions (specifically winter hardiness), productivity, market adaptability (especially quality, nutrition and appearance), orchard performance and disease resistance have been important criteria for varietal introductions. Because Ontario summers are short when compared to other peach growing areas, considerable emphasis has been placed on extending the harvest season to include varieties that
mature their crop early in the season. Resistance to peach canker
(Leucostoma spp.) was a major objective during the period 1985
to 1999. The breeding program emphasized fresh market varieties
from 1911 through 1958. Since 1958, strong emphasis was
placed on the development of non-melting yellow-fleshed cling-
stone peach varieties suitable for processing. (Note that from 1960
to 1995 breeding of fresh market peaches and nectarines was
accomplished at Agriculture and Agri-Food Canada's Harrow
Research Centre in south western Ontario). Today, breeding objec-
tives include both fresh market and processing peach varieties as
well as fresh market nectarines.

Procedures used for developing new varieties are standard for
other world tree fruit breeding programs:

1: germplasm is assembled from which parents can be selected;
2: crosses are made and seeds are collected which contain the
genetic information for a possible new variety;
3: orchards of "seedlings" derived from these crosses are evaluated
so trees with desired tree and fruit characteristics can be
selected;
4: trees selected from "seedling" orchards are grafted onto root
stocks and tested within "second test orchards" under
commercial orchard conditions;
5: selections found to have superior characteristics are compared
to commercial varieties in grower orchards; and
6: proven winners are propagated in commercial nurseries for
sale to growers as new varieties.

To obtain seedling trees that mature fruits in the early season,
it was necessary to adapt the technique of embryo culture in
which the developing embryo (seed) is aseptically plucked from
the pit weeks before normal fruit maturity. Such embryos are cul-
tured in test tubes on special nutrient agar and later planted in
the greenhouse to develop into small trees suitable for field plant-
ing in the "seedling" orchard. Otherwise left on the tree, seeds
within these early maturing fruits will not fully develop before the
fruit ripens and thus, the seed, with the new genetic information,
will not germinate.
Throughout the program, 23 varieties have been introduced (Table 1). Some had little impact upon the industry while others were of major importance within and outside Ontario. The value of early maturing varieties with high quality was recognized with the introduction of the "V" peaches Valiant, Veteran and Vedette - which became the standard for quality among North American peaches at the time of their introduction. Vivid has become a standard mid-season variety due to its large fruit size, bright skin colour, fruit firmness and tree productivity. Veecling provided the processing industry with a suitable variety for processing that matured two weeks earlier than the standard Babygold 5 variety. Equally important, Veecling was tolerant to bacterial spot disease (Xanthomonas campestris pv. pruni) which allowed it to be cultivated in areas where this disease is prevalent. Vulcan, Vinegold and Virgil provided the industry with even earlier varieties so that the harvesting season for today's processing peaches has been extended nearly four weeks earlier than Babygold 5. Currently, Babygold 5 has been displaced by Venture™ as a processing peach because Venture™ is much more tolerant to bacterial spot disease.

No nectarine varieties have been introduced from the Horticultural Experiment Station, Vineland. Until 1995, nectarine breeding was accomplished primarily at AAFC, Harrow. Since the termination of this successful breeding program and considering the recent increased importance of the nectarine to the tender fruit industry, breeding nectarines has been added as an important objective of the tree fruit breeding program at Vineland. Promising selections are being evaluated in second test orchards for imminent future introductions.

The Vineland peach and nectarine breeding program is now incorporated within the total tree fruit breeding program of the University of Guelph's Department of Plant Agriculture. Although basic objectives and procedures remain the same, modern genetic technologies are being utilized. Enhancement of health promoting compounds within these fruits will be an added objective for the continued program.
<table>
<thead>
<tr>
<th>Variety</th>
<th>Type</th>
<th>Year Introduced</th>
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(1) Originated at New Brunswick, New Jersey by M. A. Blake
(2) Originated at the Horticulture Experiment Station, Vineland, introduced for British Columbia Growers
Pear Research at Vineland

David M. Hunter and J. William Lay

Pear research was initiated immediately after the establishment of the research station at Vineland. Early work, as reported in the report on the first fifty years of the station, focused on the following areas of concern to growers in the early 1900s, most of which are still a concern 100 years later.

1: Blight experiments
2: Dwarfs vs standards for commercial orchards
3: Variety tests
4: Culture tests
5: Fall vs spring planting

Pear breeding and variety testing

Pear breeding was conducted from 1913 through to the early 1960s, although controlled hybridizations were somewhat sporadic. Many seedlings from open-pollinated seed sources, included seedling selections submitted by growers, were also evaluated. Between 1913 and 1956, crosses of 176 parentages resulted in ~6500 seedlings in the field, and 34 selections were made from these populations. However, during this period, there was only one introduction from the program, namely 'Russett Bartlett'
(a bud sport of 'Bartlett') in 1927. Most of this material has now been discarded, although a few numbered selections are still available in various collections.

With the establishment of a pear breeding program by the Canada Department of Agriculture at the Harrow Research Station, Ontario, the Vineland pear breeding program was terminated and, following the arrival of Dr. Gus Tehrani in 1967, the Vineland pear program emphasized cultural management practices. Pear breeding was reintroduced to the Vineland facility under a 2001 research agreement between the University of Guelph and Agriculture and Agri-Food Canada that resulted in the AAFC pear breeding program and its personnel becoming affiliated with the University of Guelph. Breeding methods included both traditional (i.e. controlled hybridizations between selected parents) and biotechnological (marker-assisted selection, gene transformation) methods. By 2005, about 2000 pear seedlings from controlled hybridizations were planted out at the HES Victoria Farm. Breeding objectives in 2005 included: development of fire-blight tolerant selections for both the fresh and processing markets; resistance or tolerance to other biotic stresses [insects (e.g. pear psylla), diseases (e.g. scab)].

Variety testing has continued since the establishment of the research station at Vineland. Selections and introductions from a number of breeding programs, as well as cultivars from different areas of the world, have been evaluated for adaptability to the Niagara area. These selections have also been of value in on-going breeding efforts. The majority of these selections are derived from the European pear (Pyrus communis). There have also been evaluations of several cultivars of Asian pear or nashi, but these do not seem to be well adapted to our growing conditions. The industry is still heavily dependent on a few well-established varieties of European pear, particularly 'Bartlett' (for both fresh market and processing) and 'Bosc' (fresh market only).

PEAR ORCHARD MANAGEMENT

Many orchard management practices have evolved from a concern for fire blight, the major disease of pear. Typically pear orchards have been grown under conditions of low fertility to prevent or minimize fire blight infection. Early work demonstrated the benefits of training, rather than pruning, of young trees. Pruning which invigorates the tree often results in lush growth which is highly susceptible to fire blight. At the same time, pruning delays the onset of flowering and hence fructing.
A number of rootstocks have also been evaluated as part of an overall strategy for improved orchard management. With size-controlling rootstocks, tree density (trees/ha) has been increased with closer tree spacings (both within-row and between-rows), and while per tree yields have been reduced, there has been an overall increase in per hectare productivity.

In the early years, rootstock seeds, mostly *P. communis* but also some *P. nivalis*, were obtained from cannery and perry factories in France, but the mixed source of these rootstocks led to considerable variation in tree growth. Apparent graft incompatibility showed up, particularly with 'Kieffer', but the use of 'Kieffer' seedlings was not beneficial as compared to 'Bartlett' seedling rootstocks. Seedlings of *P. betulaefolia* produced larger trees, probably too large for higher density plantings. However, fruits exhibited black-end, and this rootstock has been implicated in pear decline in the West, so it was soon discarded as a commercial rootstock.

High density orchards require a dwarfing rootstock, and there have been many trials using quince (Quince A, Quince C) with various interstems. It has been determined that the graft unions must be kept above ground level to prevent scion rooting, including rooting of the interstem. The use of compatible Bartlett strains eliminated the need for an interstem. The resulting smaller trees have been planted at much greater densities than trees on seedling rootstock. Trees on quince rootstocks do require support, whether as a tree stake or on a trellis, and have had much greater per hectare productivity. Longevity has been a concern, yet one trellised trial on quince planted in the 1930s survived for over 70 years before it was removed. However, quince rootstocks are not recommended for widespread planting, as they can be damaged by mid-winter temperatures.

For Pyrus rootstocks, several clonal selections from the 'Old Home' x 'Farmingdale' (OHF) series have been included in orchards at Vineland. Collaboration with the NC-140 group has been important in evaluating these rootstocks at a number of geographic areas throughout North America. Some OHF clones may also confer some degree of size-controlling, but this effect has been minimal under Ontario conditions. The most promising selections to date have been OHF69, OHF87 and OHF97, and some commercial orchards are now planted on these rootstocks. OHF333 has provided more control of tree size than other clones, but there have been adverse effects on fruit size, so this selection cannot be recommended. Other OHF clonal selections need further
evaluation before recommendations can be made for their use in Ontario.

Alternative training systems have been evaluated as part of the assessment of high density orchards. Comparisons of free-standing, supported, palmette and tatura trellis systems have shown the economic advantages of the tatura trellis system, which has resulted in very high yields with minimal adverse effect on grade-out. Supported systems, however, do require additional management inputs, and on-going management, especially of the tatura trellis system, can be challenging.
The Niagara fruit belt is an anomaly, in that it is much further north than most tender fruit producing areas in north America. Many explanations are put forward for this, and a sound scientific analysis was needed. HES researchers were encouraged to explore this phenomenon. In interviews with old time fruit growers, a pattern developed in their responses. Some sites were much more prone to cold injury, particularly spring frost damage, than others. Old time growers could tell instinctively where some of the favored sites were, and where the frost danger was greatest. In a study trip to the Rhine and Mossel River regions of northern Germany, it was clear that the extent of winter freezing and spring frost was related to topography and the availability of a “heat source and sink”. In these river valleys, grapes are grown on the steep slopes of the river banks. The German climatologists had measured both temperatures and wind speeds at many locations in the river valleys. It became obvious that tender grapes suffered much less from cold conditions if they were planted on a slope above a river. Cold air flows like water down a slope.
The Niagara fruit belt was somewhat different, but the same principles applied. From the grower information it was already obvious that some of the known favorable sites in Niagara were on the slopes of the Niagara Escarpment, and some of the most frost prone areas were the flat areas north and east of the city of St. Catharines. This needed to be documented and refined. A multi-disciplinary approach was required, neither purely agricultural nor climatological. Services of the Ontario Ministry of the Environment, and the Canada Centre for Remote Sensing agreed to cooperate on this project. The HES staff did the ground work of putting out temperature measuring equipment in a large test area extending from Lake Ontario south to the lip of the Escarpment. This involved erecting towers to measure temperatures at different heights above the ground surface. During several spring frost event nights, the Canada Centre for Remote Sensing flew an aircraft equipped with infra-red sensing equipment to obtain a "temperature picture" of the area. This specialized camera measured the radiation of heat energy from the ground surface during the night. The Ministry of the Environment assisted in interpreting the images and in preparing maps to show the results. The final outcome was a map of the Niagara region showing frost probability zones.

In summary, the results showed convincingly that during a radiation frost night, as the ground cools the cold air drains away down the slope where it can. The beginning of the flow is right on the slope of the Escarpment and the flow is north toward Lake Ontario. This lake is large and deep, so it provides a good "heat sink/source". As the cold night air flows out onto the lake it is warmed, rises and is drawn back southward to the edge of the Escarpment to replace the cold air that has moved down the slope and toward the lake. This convection current was measured at different levels from the ground surface, and followed the thermal patterns as expected. The map became useful for farmers making planting decisions and for city planners.

**Impact on the grape and wine industry**

The new grape varieties being introduced by the grape specialists were in most cases less tolerant of cold than the older labrusca varieties. It was now possible to select the least frost prone areas to plant the most tender types.
Mr. O. (Ollie) A. Bradt was the grape specialist at HES from 1938 to 1980. He realized that the type of grapes grown in Niagara were limited in their ability to produce high quality wines for increasingly discriminating consumers, who had access to the wines from many other countries. The first step was to introduce "hybrid" varieties between the traditional labrusca and the higher quality vinifera types from Europe. These varieties were more cold tolerant than the true vinifera types. There was scepticism from many that the wines from these grapes could compete with the quality of pure vinifera types. Again the private industry in the form of "estate wineries" were the avenue for testing and promoting these new and good quality grapes. Small Canadian wineries began to win international awards with some of their vintages, which turned the tide of opinion.

The next step was to introduce true vinifera varieties to the grape industry in Niagara. Some were simply not tolerant to the local climatic conditions, but a surprising number could be grown successfully. Success involved planting in the areas now known to be less frost prone. These new varieties needed more careful horticultural practices, meaning that they were more difficult to grow well, but the financial returns were also much greater. By the end of the century most of the new plantings for the newly established estate wineries were vinifera or selected hybrid varieties.

In the past, the cultivation of grapes required wide row spacing to allow cultivation. Also a large amount of hand labor was still used to keep vineyards clean of grasses and weeds. Chemical weed control made hand weeding or "grape hoeing" unnecessary. Now it was possible to consider much narrower spacing between rows. Trials showed that the less vigorous, and more upright growing varieties could be profitably placed in narrower rows.

Extensive tests showed that the very vigorous varieties could be induced to produce more and sweeter grapes if the plant canopy was spread out to intercept more sunlight. The "double curtain" and other pruning/training techniques were very successful and became standard practice by grape producers.
Light Interception for Photosynthesis

JOHN WIEBE

The practice of crop production is basically the interception of the sun's energy by green leaves for photosynthesis. This physiological process is the basis of all life on earth. Agriculture is the science and art of creating optimum conditions for plants to perform this function. In intensive crop production, as with horticultural crops there are various ways to increase the rate and efficiency of photosynthesis. Obviously it is critical to keep plants healthy and to provide good plant nutrition. When that has been done there are a number of horticultural practices to enhance photosynthetic activity and efficiency.

A useful concept is to view agriculture as the science and practice of "harvesting the sun". If it is understood that the sun's energy is the basis of all food and fibre production, then techniques can be developed to improve the utilization (harvesting) of solar energy in all crops.

In the Niagara area of Ontario, wild grape plants are commonly seen climbing over fences and up trees. A large tree may be covered by a grape vine which develops a shallow but widespread layer of foliage over the tree. Eventually the host tree that provides the structural support for the grape is literally starved to death
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because its leaves are in the intense shade of the covering canopy of grape leaves. This is a very dramatic example of competition for light energy, but all plants compete for access to the sun's energy. This happens between species, between neighboring plants of the same species and between individual leaves within one plant. The same principles apply to agronomic, horticultural and forestry crops and of course in the mixture of species in natural growing conditions.

New, relatively affordable scientific equipment has become increasingly available so that in 1964, the HES was able to purchase light measuring equipment and an infra-red gas analyzer. With these instruments it was possible to measure the rate of photosynthesis in individual leaves or in whole plants. This was used on a wide range of crops from greenhouse tomatoes to grapes and apples, as well as with some greenhouse flower crops. It provided a better understanding of the effectiveness of leaves in different parts of a plant canopy. By measuring light intensity levels in a plant canopy and simultaneously measuring the photosynthesis rates of those same leaves it was possible to accurately correlate light availability and photosynthetic rates.

It quickly became evident that leaves shaded by other leaves have a lower photosynthetic capability. The leaves with the greatest exposure to sunlight have the greatest productive capacity. Leaves deep in a plant canopy can actually consume more sugar than they produce at certain times of the day, resulting in a net loss of production.

The logical result of this work was to attempt to develop planting, pruning and training techniques to produce plants with a high proportion of leaves with high exposure to sunlight and as few leaves as possible that are shaded severely. To apply the principles to actual agricultural practices became the goal of the "applied researchers" at HES and at many other similar institutions around the world.

Many new cultivars (varieties) of crop plants were being introduced at this time. With the advent of new dwarf or determinate varieties, these needed to be planted closer together to maximize ground cover. This applied to field tomatoes, grapes and apples particularly. In each case new planting recommendations needed to be developed for the new types.

One of the most dramatic examples of this was the introduction of dwarfing rootstocks from the East Malling Research Station in England. Standard apple varieties could be grafted or budded onto the dwarfing rootstocks and the resulting trees grew to only
a fraction of the size of that variety on standard rootstocks. These
trees were very precocious (they fruited very early in their life
cycle) and produced superior quality fruit. The natural canopy
of the dwarf trees was much shallower than that of the huge
standard apple trees. This meant that almost all the leaves had
good access to sunlight and there was much less internal shading
than would occur in the deep canopy of a standard apple tree.

Dwarf apple varieties have now become very widely used in all
apple producing areas of the world. The dwarf trees naturally have
the right kind of canopy so they require only closer spacing and
canopy support with posts or wires, to achieve a well formed
canopy.

Fruit trees can be pruned to form a canopy with optimum
exposure to sunlight. This usually meant either pruning to form
the canopy into a "bowl shape" so there were as few leaves in deep
shade as possible, or forcing the tree to spread its branches wider
than it normally would.

With grapes there were a few additional factors. There is a very
wide variation in plant vigor in different grape species and
varieties. The vigorous growing varieties cannot be crowded or
the internal shading becomes a problem. The canopy of leaves can
be trained to be spread more horizontally. In New York State and
the Niagara peninsula, a "double curtain" system was developed
so the top of the vine consisted of two curtains of foliage some
distance apart. In this way the plant spacing was not changed but
in effect the leaf canopy was doubled. Many of the new grape
varieties, both hybrids and vinifera types are much less vigorous.
These can be planted in higher density than the old labrusca
types. This is now very evident in the new vineyards in Niagara.

In vegetable and field crops many of the new varieties were
bred to be less vegetative and more reproductive. In tomatoes for
example there was an almost total shift to more dwarf types. This
required that there be a greater plant density, but this resulted in
much higher yields and the production was more concentrated,
reducing the number of times a field is picked over. Similar stories
can be told about many agricultural crops.

Even many people involved in agriculture do not realize the
dramatic changes and improvements in both production and
quality that have been achieved with these new varieties and new
horticultural practices.
Proper nutrition of tree fruits and grapes is extremely important for a number of reasons. Ontario is at the northern extremity of tender fruit production. Cold temperature injury is a threat and can be reduced by proper soil management and fertilizer practices. Fruit quality (size, colour, sugar, etc.) is also influenced by nutritional practices and has become more important over the years in an increasingly competitive market.

Soil Testing

J. R. van Haarlem introduced soil testing for fruit crops in the 1940s and a soil testing service was offered and operated at HES, Vineland Station until the mid 1950s. Soil analysis was useful in determining soil pH and the need for lime, but did not accurately predict fertilizer needs of fruit trees. It is difficult to sample the soil to represent where the tree receives its nutrients. Carry over of nutrients within the tree and cultural practices also influence tree or vine nutrition but were not measured by soil analysis. It is difficult to extract nutrients in a way that correlates well with tree uptake and performance.
Leaf Analysis

Research was initiated in 1953 by Dr. J. A. Archibald to establish desired levels of nutrients in the leaves of peaches, apples and petioles of grapes in Ontario. Surveys of commercial orchards and vineyards were made and nutritional data compared to tree and vine performance. Separate studies established the best time of sampling (mid July for fruit leaves and early September for grape leaf petioles) and leaf position (mid current season's growth for trees and opposite bunches for grapes).

In this way, ideal nutrient levels were established and a leaf analysis service was offered for these crops in cooperation with the fruit and vegetable extension specialists. Later, data was collected in the same way for pears and Montmorency cherries and these crops were added to the service. A fee of $5.00 per sample encouraged growers to use the results of analyses.

A detailed questionnaire was completed for each sample by growers outlining previous practices that could influence analytical results and recommendations. Samples were analysed for nitrogen, phosphorus, potassium, calcium, magnesium and boron, initially by Dr. Robert Cline and later by Mr. Joe Reissmann and Mrs. Debbie Norton. Methods of analysis were assessed for accuracy and efficiencies and new methods developed. Standard values of known composition were analysed to determine accuracy of analyses.

The most difficult part of any analytical service is the interpretation of the analyses in terms of specific fertilizer recommendations. Analytical results were rated as being deficient, adequate or excessive for each nutrient. Standard values were varied for area, yearly conditions, variety and rootstock. Pruning practices, tree performance, soil management, weather conditions and other factors were considered. Grower acceptance of this service was good. Many sampled their orchards annually while others sampled different blocks each year. Many reported saving on fertilizer costs.

The Leaf Analyses Service was transferred later to the private sector but OMAF monitored the accuracy of analyses and certified labs that qualified. Growers were required to take their own samples and interpret the results of the analyses. This has resulted in a decrease of grower use which is unfortunate with the present concern for proper nutrient management.
Nutritional Studies with Tree Fruits and Grapes

As outlined previously, much research was directed in establishing the leaf analysis service. At the same time, leaf analysis was used as a tool to measure responses to soil management and fertilizer studies. Many projects were conducted in grower orchards to be sure results were valid under commercial growers' conditions.

Nitrogen Studies

Nitrogen excess was found to be a more serious problem than nitrogen deficiency in Ontario orchards. Excess nitrogen leads to more serious disease and winter injury problems. Fruit colour and keeping quality can be decreased. Low levels of nitrogen were found to lead to small fruit and increased disease problems because of unhealthy trees. Through these studies we are better able to control nitrogen levels in fruit trees and grape vines and thereby reduce the risk of winter injury, disease and improve fruit quality.

Soil management practices such as the use of sod or cover crops, manure and mulches were studied to assist in nitrogen control and improve tree and/or vine performance as well as maintaining the soil organic matter.

Extensive greenhouse and field studies showed that paper mill wastes could safely be used in orchards and vineyards, providing they contain sufficient nitrogen. Only moderate rates can be recommended for grower use. This research was conducted in cooperation with the Ontario Ministry of the Environment and sponsored by local paper mills. Guidelines were developed which were beneficial to both paper mills and fruit growers.

Potassium Studies

Potassium deficiency is a serious problem with grapes grown on clay soils. Methods of reducing potassium fixation were studied. Studies of sources, times and methods of application of potassium fertilizer led to more efficient usage. It was found that applying potassium fertilizer in a band on the surface of the soil gave best results. There was no advantage to fall application. Potassium chloride and sulfate were equal but potassium nitrate less effective. High rates of potassium can cause magnesium deficiency in both vineyards and orchards.
Leaf or petiole analysis is the best way to indicate potassium or magnesium status of trees or vines. Deficient potassium was found even on soils testing high in potassium and resulted in lower fruit sugar in grapes, more peach canker and poorer growth in both tree fruits and grapes. There was also an indication of more serious winter injury when potassium was deficient.

**Magnesium Studies**

Magnesium deficiency was found to be a problem in apple orchards in Eastern Ontario or when excessive potassium fertilizer was previously applied. Foliar application of magnesium sulfate was the most effective method of correction. Soil application of various magnesium fertilizers were found suitable. Repeated soil applications were needed. Premature fruit drop of McIntosh apples was observed when magnesium was deficient.

Dolomitic lime spread in the herbicide strip also corrected low soil pH but movement of calcium and magnesium into the root zone was very slow even on sandy soils.

**Calcium Studies**

Even though Ontario soils have developed from limestone, a shortage of calcium in apple fruit can result in apple bitter pit and rachis necrosis of certain varieties of grapes and plum fruit gumosis. Studies were conducted to effectively correct these fruit disorders and recommendations determined. Apple fruit analysis was also studied as a method of predicting bitter pit development in storage.

**Micronutrient Studies**

Iron, manganese, zinc and boron can be deficient in Ontario. Conditions causing these deficiencies such as high soil pH, excessive drainage, lack of soil moisture, etc. were studied in various grower orchards and methods of correcting these deficiencies evaluated. Excessive manganese was found in young peach and apple trees when low soil pH was encountered.
Soil Moisture and Irrigation Studies

Early studies measured the moisture characteristics and available soil moisture in a number of Ontario soils. This was useful in determining the amount of water to apply and the number of days between sprinkler irrigation for tree fruits.

Peaches grown on Vineland Fine Sandy Loam at Vineland responded to sprinkler irrigation only after three years of irrigation but that response continued the following year even though there was adequate soil moisture. The greatest response to irrigation was with a sod/herbicide system of soil management while a mulch reduced the response to irrigation.

In later experiments, trickle irrigation was found to be effective in preventing moisture stress of peaches and grapes while conserving water. Fertilizers may be supplied through the irrigation system to give better control of the nutrition of the tree or vine. Many experiments were conducted to give a better understanding and use of these techniques.

Editors' Note:

Following Bob Cline's retirement in 1992 the fruit nutrition program continued under the management of research scientist Maria Derkacz. Cline's projects on 1. the effect of nitrogen rates on soil and water nitrate accumulation in mature 'Riesling' vineyards, and 2. the effect of paper mill sludge on soil fertility and leaf/petiole nutrition in orchards/vineyards carried on for another two years, both on commercial vineyard sites.

New research initiated by Derkacz included further investigations on the feasibility of using paper mill sludge (at higher rates) as a soil amendment in vineyards and orchards or in soil rehabilitation for disturbed sites such as quarries. Additional research also focused on nitrogen management for peach orchards advocating split applications, on foliar feeding as a supplement to soil fertilizers for vineyards, orchards and strawberries, and on precision farming in vineyards which included soil moisture monitoring, fertigation, and foliar feeding.

The Station fruit nutrition research program was discontinued in 2003 following the relocation of a number of HES staff and programs to the University of Guelph campus in late 2002.
Greenhouse Vegetables

BILL STRAVER, JOHN WIEBE AND ARTHUR LOUGHTON

Facilities

Until 1980, greenhouse vegetable research at the HES was carried out in three old greenhouses, one dating back to 1918. These houses were shared between the tomato breeding program and vegetable production programs. Much of the early work on developing virus and leaf mold resistance in tomatoes was done in these greenhouses by Dr. Ernest A. Kerr. The earliest tests of seedless cucumbers were also conducted in these old houses. Much smaller trials were done on lettuce and other minor crops.

In 1959, Dr. John Wiebe published the first "Greenhouse Vegetable Production" OMAF Bulletin 526 in Canada. This was widely used and later copied, in part, in other provinces and elsewhere. Greenhouse vegetable and flower production had depended on the personal experience and vigilance of the greenhouse operator. Rarely were the ideal conditions described and published. Also since the control of the greenhouse temperature and humidity depended on manual control of heating and ventilation, the "art" of greenhouse production was as important as the science.
The energy crisis of the early to mid '70s brought a demand for energy conservation research. To study the practicality and economics of solar energy for heating greenhouses, new plastic structures, complete with large solar collectors, were built just west of the old unit. The old greenhouses were replaced in the early 80s by much larger, modern, state-of-the-art greenhouses with computerized climate control.

The contribution of the Vineland greenhouse vegetable research program to the Ontario greenhouse industry has been significant in a number of ways and can lay claim to a number of 'firsts' for N. America.

**Plastic vs Glass Greenhouses**

In the 1950s and 1960s, many new types of synthetic plastics were developed for many different uses. An obvious potential was to use plastic to build greenhouses. HES participated in an extensive trial conducted in many university horticultural departments to test the durability and suitability of various plastic materials. Polyethylene film emerged as the most suitable material because of low cost and ease of use in greenhouse construction. The 1969 "Plastic Greenhouses", OMAF Publication 40 by J. Wiebe and R.E. Barrett, pictured several styles of structures and discussed covering materials. This was widely distributed.

**Seedless Cucumber**

This type of cucumber, also called long English or Dutch or European cucumber, was virtually not known in Canada or the U.S. prior to 1967. Ontario greenhouse growers produced the North American seeded type (e.g., Burpee Hybrid), the same cultivar as was then being grown extensively outdoors in the southern U.S. and Mexico and imported into Canada. This crop depended on bees for fertilization of the flowers before fruit would set. A substantial research project on the seedless parthenocarpic type commenced in the old greenhouses at HRIO in 1967. This was largely the result of the appointment to the Vineland staff of Arthur Loughton from England and Arthur brought with him knowledge of this crop. Within a few months Arthur was joined by a new technician, Bill Straver from Holland, who brought a similar knowledge of the Dutch industry, and equally important the ability to read Dutch, giving the team an easy access to the new technologies rapidly developing in that country. Within ten short years, the seedless type of cucumber had totally displaced the seeded variety in Ontario greenhouses. The research, promotion
and a huge extension input by this greenhouse team in Vineland played a very significant role in this, (albeit at the expense of refereed scientific research papers!). The current farm-gate value of European seedless cucumbers in Ontario is over $100 million, which surely represents a very acceptable return on research investment!

Research efforts were focussed on cultivar and crop management trials. Cultivar trials were a never-ending task because at that time, European seed companies especially in Holland, were very active in breeding new cultivars with improved productivity, better quality or disease resistance. Crop management efforts included work on straw bale culture and later soil heating systems, plant density and pruning systems, etc.

**Hydroponic Production Systems**

The traditional way of growing greenhouse vegetables was in the soil. Poor soil conditions, such as cold and wet soils, or infested with difficult-to-eradicate diseases were often the limiting factor in obtaining satisfactory yields. The first steps to growing crops hydroponically were taken in the mid-seventies, in the small old plastic greenhouse. Initial work was on the Nutrient Film Technique (NFT) followed by examinations of inert substrates such as rockwool in the early 80s. Hydroponic research at HRIO included studies on nutrition, water management, and evaluation of all kinds of media deemed suitable, or in some cases not so suitable. Some examples were rockwool, perlite, Icelandic pumice stone, baked clay pellets, and coco coir.

It is believed that HRIO was one of the first research institutions in N. America to do this kind of work. Now, virtually all commercially produced greenhouse vegetables are grown hydroponically.

**Tomato Crop Management**

Similar to the cucumber program, work on tomatoes comprised cultivar evaluation, studies of cultural practices such as plant density and cluster pruning, and effects of temperature strategies. As noted in the section on "Light Interception" in this report, an extensive trial was done to measure the effectiveness of individual leaves of the plant on total production. A 1969 study, for example, showed that half of the leaves of a tomato plant could be removed without affecting production provided only overlapping leaves were removed. Often growers removed leaves to allow better air movement through the plants. Provided that the leaves were removed systematically, better air movement could be achieved without crop reduction.
Another noteworthy trial was on pollination by bumblebees. The traditional method of pollinating tomato flowers was by vibrating the flowering clusters with an electric pollinator three times per week. Following developments in Europe, an experiment was conducted at Vineland to study whether native bumblebee species could take over this task. The results were very successful and this practice was fully adopted by the industry within a few years.

The traditional greenhouse tomato grown in Ontario was the Beefsteak type. VENDOR, a new Vineland cultivar introduced by E. A. Kerr and J. K. Muehmer in the 1960s, was the leading red-fruited cultivar (only pink tomatoes were grown in Leamington and Ohio at that time) for a number of years. A large number of new introductions of this type have been evaluated over the years. In the 90s, cluster tomatoes were developed in Europe and the greenhouse program played a role in introducing this type to the growers in Ontario.

Alternative Crops

For many years, tomatoes and cucumbers were the only crops of any significance grown commercially in Ontario greenhouses, with lettuce being a distant third. This was a very narrow base and when the profitability of these crops was uncertain, demands came from the growers to start looking at other crops for greenhouses. As a response, colored sweet peppers and eggplant were added to the crops that were studied at HRIO. The program expanded but the facilities had not at that time. To accommodate the need for space, some trials were carried out off-site, in commercial greenhouses. Sweet peppers are now a very important crop in Ontario greenhouses and may even surpass cucumbers. Eggplant is being grown on a very limited scale.

Energy Conservation

Energy conservation was a main focus of the program for a number of years. Plastic greenhouses were built to study the feasibility of harnessing solar energy by storing it as warmed water temporarily under the greenhouse floor for heating the greenhouse at night. Energy efficiency studies continued with the new greenhouses in the 1980s. The effect of double skinned coverings, energy screens, root zone heating and altered temperature strategies were studied.
The expanded facilities allowed for one program to focus fully on greenhouse vegetables. For several years, HRIO had the best greenhouse research facilities in all of North America and the program was highly regarded by growers all over the continent. The researchers at Vineland had a very good reputation and were often invited to participate in greenhouse conferences in many of the provinces and also the United States. It was an opportunity to put HRIO-Vineland 'on the map' and this program certainly brought much credit to the Institute.
Canada's First Publicly Funded Mushroom Research Facility

DANNY LEE RINKER

The Horticultureal Experiment Station in Vineland was well established before mushrooms were first cultivated in Canada in 1912. During the 100-year history of the research station, the Ontario mushroom crop has expanded enormously to become the second most valuable vegetable in Ontario, at the farm gate.

The Vineland Station research campus is the site of Canada's first publicly funded mushroom research facility. In 1970, the Ontario Ministry of Agriculture and Food committed resources to research and extension for the Ontario commercial mushroom industry. Under the leadership of Arthur Loughton, the mushroom research program began. His first responsibility was to oversee the design and construction of the first research facility. The unit was constructed inside an existing building on the campus at Vineland Station, Ontario, and consisted of a miniature tray farm with four production rooms and a pasteurization and conditioning room. The capacity of each room was 50 trays with about 20 square metres of production surface per room. The first mushroom crops were produced in 1972.
In 1975, Loughton left to become the director of the HES, Simcoe. Frank Ingratta assumed the research responsibilities for the next eight years until he became the Chief Scientist for the Production and Breeding Unit at HRIO.

Mushroom extension responsibilities from 1970 to 1984 were served by David Pallett (1970-71), David Sangster (1972-75), Theo Blom (1976-78) and Wayne Brown (1979-84).

In 1984 the responsibilities for both research and extension were consolidated into one position, filled by Dr. Danny Lee Rinker. In addition, the research program was able to expand the technical support staff to a full-time position.

In April 1992, research in the original 1972 mushroom unit was terminated. Construction of a new facility began in November 1992, funded by Jobs Ontario. After numerous delays and setbacks, the facility was ready for research in February 1996.

The overall dimension of the new two-storey research building is 12 by 25 metres. Placed inside the building are six small production rooms, each 3 by 4 metres. There are 36 tubs, providing 10 square metres of mushroom production surface, and two small tunnels that can each hold 3 tonnes of compost. Computers control each production room and tunnel. Data from temperature, relative humidity, carbon dioxide, oxygen or air volume sensors are collected on a centrally located personal computer. Compost handling and spawning utilizes small-scale tunnel filler/puller and tray line equipment.

A separate building, 8 by 8 metres, enables small-scale batches of experimental compost to be prepared. Small 1 x 1 x 2 m bunker-like insulated chambers are also used to prepare compost.

During the first years of the mushroom research program considerable effort was expended on the casing layer. In part through Loughton's efforts, sphagnum peat moss became the casing material of choice in Canada. Ingratta continued the research on the casing layer but at a more fundamental level, determining the role that micro-organisms and volatiles had in the formation of the mushroom fruit body. Dr. Z. A. Patrick from the University of Toronto, who provided regular plant pathology services to the research station during the summers, continued investigations into some of the bacteria that stimulated primordia initiation.

The Vineland program assisted in the development of efficacy, phytotoxicity and residue data toward registration of pest control products. Together with the extension specialist, Wayne Brown, the emphasis on monitoring for insects and the subsequent
physical and horticultural management recommendations to reduce fly infestations has significantly aided in reduced fly problems and decreased pesticide use by Ontario growers.

In the original facility, Rinker evaluated numerous products, added to compost or casing, that might benefit its processes, or enhance yield or quality. In addition to providing phytotoxicity and residue data toward pesticide registration, biological control strategies using nematodes and bacteria were developed as well as a selective medium for detecting Verticillium disease.

Oyster and shiitake mushroom research had its initiation in 1980 at Vineland with Ingratta and Patrick and has been continued by Rinker. Specialty mushroom research has investigated techniques of production, alternative materials and diseases.

Since the completion of the new mushroom research facility in 1996, the research program has concentrated on green mould disease, its identification, management and control, compost ingredients, compost odours, deterioration in post-harvest mushrooms by bacteria and fungi, and pesticide registration.

Collaboration with Agriculture and Agri-Food Canada, Brock University, Laboratory Services Division of University of Guelph and others within the Plant Agriculture Department, graduate students from University of Guelph and Brock University, visiting scholars from China, Korea and Costa Rica and a talented mushroom technician, Glen Alm, have all enriched the mushroom research program.
Although breeding projects at HES were heavily oriented towards fruit crops, particularly those of the local Niagara Peninsula area, the Station had significant effort in tomato breeding also. This program became the life career of Dr. Ernest A. Kerr who joined the Vineland staff in June 1944 with a strong background in plant pathology and genetics, characteristics which are crucial for a successful vegetable breeder. The early accomplishments are detailed in "The First Fifty Years" (pages 36-37) and the following is a brief summary of those results. Quotations cited are from that 1956 Report.

"HARKNESS TOMATO dominated the early staking crop for some years following its introduction in 1936". As at 1956, "Harkness, and Vinedale pepper are the only two Canadian vegetable originations to receive All America awards".

One specific tomato breeding program initiated early in the history of the Station was designed to produce greenhouse lines resistant to Leaf Mold (Cladosporium fulvum). The ability of this pathogen to produce new resistant races itself made this project a continuing one over nearly half a century. The first Station introduction in this program was VETOMOLD (intro. 1939) and although it obviously had a short commercial life, it was used as
a parent in further breeding. "In Australia, Vetomold is being grown as an outdoor staking variety". It was quickly superseded by V 121 which "...... probably constitutes 35 per cent of the spring greenhouse crop in Ontario......"

The 1956 Report also mentions three other early introductions: "VULCAN (intro. 1948) at present is the main variety grown in Ontario for the fall greenhouse crop. VAGABOND (intro. 1950) and VINEQUEEN (intro. 1954), the latter of which "......will probably plant one-quarter of the Ontario greenhouse acreage in the fall of 1957".

1956. "Overall, the Vineland introductions of mold-resistant greenhouse tomatoes constitute about 90 per cent of the fall crop in Ontario and British Columbia......". "Vineland mold-resistant lines, both introduced varieties and breeding lines, are being extensively used in Western Europe and the United States as breeding material".

Subsequent to 1956, tomato breeding continued with various objectives and the following comments are extracted from the Station's Annual Reports of the specific years as shown:

1962. "VANTAGE is the eighth leaf-mold resistant tomato introduced by the Horticultural Experiment Station.....gets its resistance from another green-fruited species L. peruvianum .....immune from all known races of the leaf-mold fungus...." VENTURE resulted from a cross made in 1948 and was released as an outdoor variety for the early fresh market trade. It ".....has consistently been earlier than Fireball......" VISCOUNT is a productive mid-season variety developed mainly for processing.

1964. "The Station is world famous for its work with leaf-mold resistant greenhouse tomatoes. VETOMOLD has been grown in Europe and Australia and is an ancestor of most of the leaf-mold resistant varieties introduced up to 1960. VAGABOND has been used extensively in breeding programs in Holland and many of the varieties now being introduced there obtained their resistance from it".

"VEEGAN is the first hybrid tomato introduced by the Ontario Horticultural Experiment Station. ...... Veegan is immune from all races of leaf-mold known to occur in Ontario. It is completely susceptible, however, to Race 10 which appeared near Cincinnati, Ohio in the fall of 1962."

"The staking tomato variety HARKNESS introduced from this Station in 1936 became important but has now almost disappeared from commercial use".
1966. Progress was reported on evaluating lines for release with superior characteristics for processing, susceptibility to cracking or verticillium wilt, high ascorbic acid content, colour, flavour and internal qualities, and resistance to tobacco mosaic virus.

1967. "VEECROP is an early, high quality, verticillium resistant tomato for processing and fresh market."

VIVID and PINK VOGUE were introduced as early maturing varieties for staking, aimed at the premium market for "pink" tomato fruits.

VENDOR was the first introduction from Vineland of a greenhouse tomato resistant to tobacco mosaic virus in Ontario. ".....susceptible to some races of leaf-mold. A backcross program is currently under way to incorporate leaf-mold resistance equal to that of Vantage." (In 1983, the Canadian Society for Horticultural Science recognised VENDOR with a New Cultivar Award of Merit presented to the originators Dr. E. A. Kerr and J. K. Muehmer)

1968. The Station Annual Report for this year contained an extensive review article by E. A. Kerr and J. K. Muehmer entitled "Twenty-two Years' Evaluation of Greenhouse Tomato Hybrids and Their Parentages". Major conclusions stated "Open pollinated greenhouse cultivars such as Vantage have had as high total production as the best commercial and experimental hybrids .....Twenty-four out of 222 hybrids were considered promising and distributed to growers for trial. One of these was introduced as VEEGAN".

A project entitled "The Use of F1 Hybrid Seed in Tomato Production" had been initiated at Vineland in 1946 in three sections: processing, early market and greenhouse. The processing aspects were terminated in 1958. The last of the fresh market hybrids were discarded in 1966. The greenhouse section of the project terminated in 1968. "The production of hybrids will henceforth be left to commercial seedsmen and others with more extensive facilities".

1969. VISION and VEESET were introduced as varieties for bulk handling for processing. This was based on some of the first field trials conducted at the recently established Horticultural Experiment Station at Simcoe, Ont.

1970. "Most of the space available for greenhouse tomatoes is being used to develop cultivars resistant to new races of leaf-mold. A backcross program is under way to produce a mold-resistant Vendor."
During the long program of work to breed resistance to *C. fulvum*, much detailed research was done on the methodology of dealing with the organism at the laboratory stage, e.g., maintenance of stock fungal cultures, transfer of spore suspensions, inoculation of plants, identification of disease reactions, reading and rating of symptoms, etc. The extreme variation in culture of *C. fulvum* made this a very challenging and difficult pathogen/host relationship to deal with. Cooperation with staff of the Dept. of Botany at the Univ. of Toronto was generous throughout and made eventual successes possible. Some of these cooperative efforts culminated in 1971 in the publication of two major scientific papers on identification of new races of *C. fulvum* in Ontario.

The final introduction of a new tomato variety from this Vineland program was in 1971 when Kerr's breeding line V686E was named VEEBRITE, a cultivar suitable for mechanical harvesting for processing.

In 1972, Dr. Kerr transferred to the Horticultural Experiment Station at Simcoe where the processing tomato breeding component was emphasised in the geographical area closer to the field production of that crop. This record, therefore, ceases at the 1972 mark and reporting after that time will surely be made when the first 50 years' history of the Simcoe station is written in 2010.

*(The assistance of Dr. Ernie and Mrs. Olive Kerr in the compilation of this article is gratefully acknowledged).*
Floriculture Research

Theo Blom

The first-ever research scientist position in greenhouse floriculture at Vineland was created in March, 1979, with the appointment of Dr. Theo J. Blom, who remained at the Vineland campus until 2004, when the program was moved to the main campus of the University of Guelph. Funding for the research was provided by OMAF, as well as Flowers Canada, Canadapt, the Cecil Delworth Foundation, International Cut Flower Growers, etc. The research would not have been possible without the valued help of a technician: Brian Piott (1979-1994), Leslie Dodd (1994-1996) and David Kerec (1997-present). Wayne Brown who was extension specialist with OMAF during this period, was also involved in many of the projects. Some of the key projects of this 25 years are highlighted below.

Energy

In 1979-1982, the floriculture industry was hit by oil prices peaking at US$ 90 / barrel, and the greenhouse industry's main concern was energy. Although new double inflated greenhouses were built, energy conservation methods were rudimentary for existing structures. The initial research focused primarily on alternative techniques for heating greenhouses as well as methods
to conserve energy in existing greenhouses. New research greenhouses were built at Vineland to study the feasibility of active and passive solar collection for greenhouses as well as low intensity infra-red heating. From these studies, neither passive nor active solar collection appeared to be a feasible alternative for heating greenhouses. Research showed that a solar collection surface of about 10 times the surface area covered by the greenhouses would be needed, while the solar collectors needed twice the land space to accommodate them. This was and is not a realistic solution for growers. Low intensity infra-red (IR) heating, which was at that time not used anywhere in the world for greenhouse heating, was examined as an alternative heating system. Although IR-heating was very efficient in the conversion of fuel (natural gas or propane) into sensible heat, the heat distribution within the greenhouse remained a major concern, especially for crops with a relatively high heat demand. In the mid 1980s, the research focus changed to more production related issues.

Environment

Sub-irrigation. Growers started to consider sub-irrigation with the possibility of recirculating the fertilizer solution, as an alternative to the high volume drip irrigation ('spaghetti') system for irrigation of potted crops. Concerns were raised about the effects of water and nutrients being supplied from the bottom in terms of salt accumulation, capillary activity of the growing medium and the quality of the plants. Studies focused on the nutrition status of the plants before placement on a sub-irrigation system, watering frequency, and the effect of the salt accumulation at the substrate surface. Interestingly, it was shown that: (i) top irrigation produced more vigorous plants than sub-irrigation; (ii) sufficient nutrient level in the substrate before placement to sub-irrigation is critical; (iii) watering frequency should be increased with sub-irrigation watering to maintain capillarity; and (iv) salt accumulation does occur, but is generally not a problem except for long-term crops.

Non-chemical Height Control Techniques for Potted Plants

Twilight. It was known that the red/far-red ratio of light affects plant elongation, but the effect of twilight at the end of day and the beginning of the day was not known. It was shown that twilight at the end-of-day (sunset) increased plant height more than twilight at the beginning of the day (sunrise). Growers have implemented this technique by using black-out for the production
of Easter lilies. Shorter plants (15-20%) are obtained compared to ambient light. Natural twilight is also additive to another height controlling strategy, named DIF (or temperature difference between day and night). This means that both techniques can be used at the same time.

**Cold water.** Cold water applied overhead to the growing point of plants such as Easter lilies has shown to be a very effective technique to control plant height. There is a linear relationship between water temperature and plant height of Easter lilies, while the timing of application did not matter. Easter lilies, which are irrigated overhead with cold water are 50-60% shorter than control plants (irrigated on the soil substrate), but show a slight delay in flowering.

**Movable High Pressure Sodium Lighting**

Supplemental lighting is used by many segments in the industry (roses, alstroemeria, seed germination, stockplants) but is expensive. In order to reduce costs, high pressure sodium lighting in a fixed setting was compared with a movable system, while providing the same daily light integral. This was studied on both campanula (*C. haylodgensis*) and pot gerbera during the winter. The moving light regime did not improve growth (fresh or dry weight) and/or growth habit but increased forcing time by one week for potted *C. haylodgensis* compared to the stationary lighting regime.

**Crops**

*Alstroemeria (Alstroemeria xhybrida).* The use of soil-cooling during the summer for Alstroemeria showed that production during the fall was increased and that of the spring decreased. Also, supplemental lighting for 24-h/day was beneficial for Alstroemerias without affecting the shelf life of the cut flowers.

*Calla lilies (Zantedeschia spp.).* The biggest problem in forcing field grown calla tubers is the soft rot caused by the bacterium *Erwinia carotovora*. Vineland research results formed the basis of the current commercial practice of adding a copper compound to the pre-plant treatment solution before forcing calla tubers in the greenhouse. Initial research in the use of bacteriophages (viruses that attack bacteria) has shown promise as a biological control of *Erwinia*.

*Gerbera (Gerbera jamesonii).* Trials with cut gerberas grown with supplemental lighting (high pressure sodium lamps) in a greenhouse as well as extended photoperiods using compact fluorescent lamps during the winter showed that productivity (stems/plant) decreased but stem length increased with photoperiod.
Easter lilies (*Lilium longiflorum*) is one of the main crops grown for Easter. The effect of bulb size on performance as well as the development of interrupted cooling (IC) as an alternative technique to case-cooling (CC) or controlling temperature cooling (CTF) have provided much insight into the physiology of the species. Interrupted cooling, which involves case-cooling the lily bulbs for 2 to 3 weeks, followed by planting and rooting for 1-3 weeks and then pot-cooling the plants for the remainder of the 6-week cooling period, has been adopted successfully by many local growers.

*Poinsettia (Euphorbia pulcherrima Willd.)* bract necrosis. In the early 90s, bract necrosis became an issue with growers. The problem can be described as the development of marginal necrosis on the bracts of the poinsettia during or shortly after shipping. Although there are no definite conclusions, the problem can be avoided with regular (weekly) calcium sprays on the crop.

Roses. Cut roses have been the most important cut flower crop in Ontario. Research focus was directed at substrate production (expanded clay, rockwool, coco coir); recirculation vs. non-recirculation; as well as the effect of arching (=bending of certain shoots) on productivity and stem quality. The use of coco coir showed a very strong initial growth during the first year compared to rockwool or expanded clay. However, no difference in production between coco coir and rockwool was shown in the second or third year. Recirculation of the nutrient solution (without sterilization) showed no apparent negative effect on production except that micro nutrient levels had to be adjusted (esp. Mn and Cu) in the recirculation solution during the winter period. Arching the roses resulted in longer stems but a decrease in production compared to the more conventional hedgerow production system.
Outdoor Ornamentals Research

CALVIN CHONG

Outdoor ornamentals have been part of the research program at the Horticultural Experiment Station, Vineland, since 1907. A brief review of the early activity was published in "The First Fifty Years" in 1956

Breeding, Evaluation and Landscaping Focus

Between 1951 and 1983, when Research Scientist Robert (Bob) Fleming was in charge of the program, breeding and evaluation of outdoor ornamentals were the primary research focus. The thrust of the program was geared mostly to home gardeners. Several technicians worked with Fleming: Roy Forster, Kenneth Begg, Albert (Al) Smith, and Bob Hamersma.

Breeding

Woody plants including junipers, hollies, lilacs, rhododendrons and azaleas were bred. Some notable examples of early varieties introduced were 'Vinespire' juniper and 'Vesper' lilac. The rhododendron and azalea breeding program (1958-1987) continued several years beyond Fleming's retirement. The program left a legacy of 32 new varieties, most of them registered by
Smith before his retirement in 1987. Unlike other azaleas currently being marketed at that time, the new Vineland selections were mildew resistant. In 1986, 'Vinecrest' rhododendron won three separate awards at the National Convention of the American Rhododendron Society held at Cleveland, Ohio. Prior to that, various superior hardy forms were introduced, including one cultivar "Vivacious" which received wide acclaim in the U.S.

Evaluation

A wide range of plants were evaluated for hardiness, adaptability, and ornamental value. Woody plants included roses, flowering shrubs, and other advanced selections from breeding projects such as Agriculture Canada, the United States National Arboretum, and the plant introduction station at Beltsville, Maryland. There was also a small station planting of nut trees, including Persian (English) walnuts and edible sweet chestnuts (hybrids and Chinese selections).

New introductions of flowering annual bedding plants and herbaceous perennials from nurseries, botanic gardens, arboreta, private plant breeders and the 'All America Selections' were evaluated annually. Records indicate that in 1981, 120 entries were tested. In 1985, just before termination of this program, there were 300 entries.

An accompanying chapter in this Report written by Emil Andersen provides a more detailed account of the outdoor ornamental program prior to the 1980s.

Cultural Practices

Other research examined propagation methods for woody plants using mist systems, plant growth regulators and other chemical aids, and different types of propagation media. As far back as 1971, byproducts of the lumber industry were examined as supplements to, or substitutes for peat, in substrates for nursery container production, and overwintering of container nursery stock.

Environmentally-Friendly Nursery Focus

In 1984, Dr. Calvin Chong took over as Research Scientist in charge of this program. Prompted by the Ontario nursery industry, the focus of the new Nursery Ornamental Research Program was changed to deal with the needs of this industry. Al Smith continued to work as technician until his retirement in 1987, as well as Bob Hamersma until 1997, when he was superceded by Peter Purvis.
Industry Support

In 1985, with joint funding from industry and government, research facilities were added to existing ones. Starting with propagation and cultural aspects of container growing, environmental concerns soon became the major recurring theme of the program. The program soon became highly successful and, to a large extent, self-supporting through long-term partnerships with key industry clientele including Landscape Ontario, various individual nurseries, and allied companies and corporations. Industry grants and in-kind support helped to lever additional support from governments and other granting agencies, particularly the National Research Council of Canada, Industrial Research Assistant Program (IRAP) and the Natural Sciences and Engineering Research Council (NSERC). This support, together with the assistance of University of Guelph scientists particularly Professors Glen Lumis and Paul Voroney since the 1980s, and industry scientists such as Drs. Bruce Holbein and Hua-Wu Liu since the 1990s, allowed the program to expand and function at a very high level by hiring and training graduate students.

Propagation

Early propagation studies dealt with rooting of difficult species using growth hormones and use of plastic plug trays to facilitate rooting and small plant handling. Later on, novel and inexpensive rooting solutions were developed and formulated using plumbing, radiator, and automobile windshield antifreeze, and organic wastes and composts were evaluated in rooting media.

Container Culture and Recycling

The program conducted a large number of projects to recycle composted or raw (uncomposted) organic wastes, developing these as innovative and novel potting mixes for growing shrubs and shade trees in containers. In the 1980s, mixes were evaluated derived from wastes such as spent mushroom compost, paper mill sludge, apple pomace, and various types of bark. Later on, the scope of the project was expanded to include composting and use of a wider assortment of individual wastes or their combinations, including waxed corrugated cardboard, municipal waste composts, food wastes, wood chips from pallets and furniture demolition wastes, pulverized broken glass, other industrial wastes, and animal manures.
In the late 1980s, new trickle fertigation techniques were introduced to reduce water and fertilizer use. Tests began in the 1990s on a new Canadian-patented innovative computerized fertigation technology which allowed 100% recycling of the run-off from container nurseries, thereby reducing fertilizer use by 83% and water use by 72%. In the 2000s, research was started on water and nutrient conservation strategies in response to Ontario's anticipated nutrient management legislation, which eventually became law in 2002.

Other container production research included evaluation of in-ground and above-ground container methods of shade tree culture, such as the "pot-in-pot" and inexpensively-lined wire baskets, respectively; non-chemical strategies for weed control in containers such as weed discs and weed bags (plastic sleeves wrapped around containers); and evaluation of controlled-release fertilizers and methods of application.

**Field Projects**

Paper mill sludge was evaluated as field soil amendment for growing nursery shade trees, grapes, sorghum, and other crops, and also for rehabilitating marginal, non-agricultural land. Organic fertilizers manufactured from meat by-products were also evaluated as nitrogen sources for growing field nursery stock, and pond-collected compost leachate as supplemental fertilizer source for growing field nursery trees and grasses.

**Enhanced Partnership**

In 1997, HRIO was merged with the University of Guelph, and further re-organized in 1998 as part of the Department of Plant Agriculture. In 2002, the Nursery Ornamental Research Program was relocated to the University of Guelph main campus and consolidated with existing nursery growing facilities previously used by Professor Glen Lumis at the University.

Since inception of the nursery-focused program in 1984, over 400 scientific and technical publications have been released and nine M.Sc. and two Ph.D. students have been trained.
Breeding of Outdoor Ornamental Plants

Emil T. Andersen

Starting in 1951, the Station was involved in an extensive and effective research program in breeding outdoor ornamentals. In addition, cultivar trials of large numbers of annual and perennial flowers were carried out for many years and results reported annually. These were a valuable source of information for home gardeners and nurserymen. The Rose Garden became famous for its beauty and helped rose growers in the difficult selection of hardy and showy hybrid tea rose types.

Special reference should be made to the rhododendron and azalea trials and breeding. An exceptionally fine development of rhododendron plantings was accomplished in the woodland area to the south of the service road at the HES. Many good parental cultivar types were included in that selection. Starting in 1974 an extensive hybridizing and selection program was carried out. Several selections were named and some are currently listed in the trade. All are relatively hardy and certainly suitable for culture in the Niagara area and beyond. The Rhododendron Society of Canada listed, as below, all the cultivars introduced from the HES.
EVERGREEN CULTIVARS OF RHODODENDRONS

<table>
<thead>
<tr>
<th>Cultivar Name</th>
<th>Flower Form</th>
<th>Hardy to deg. C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vineland Flame</td>
<td>Red fragrant</td>
<td>-26</td>
</tr>
<tr>
<td>Vineland Flare</td>
<td>Yellow orange</td>
<td>-26</td>
</tr>
<tr>
<td>Vineland Fragrance</td>
<td>Very fragrant, light purplish pink</td>
<td>-26</td>
</tr>
<tr>
<td>Vineland Glow</td>
<td>Orange red, mid season</td>
<td>-26</td>
</tr>
<tr>
<td>Vinebelle</td>
<td>Purplish pink</td>
<td>-24</td>
</tr>
<tr>
<td>Vinecrest</td>
<td>Greenish yellow</td>
<td>-27</td>
</tr>
<tr>
<td></td>
<td>with red brown rays in throat</td>
<td></td>
</tr>
<tr>
<td>Vinemark</td>
<td>Light purple</td>
<td>-27</td>
</tr>
<tr>
<td>Vinemount</td>
<td>Vivid reddish purple</td>
<td>-27</td>
</tr>
<tr>
<td>Vinemount</td>
<td>Vivid reddish purple</td>
<td>-27</td>
</tr>
<tr>
<td>Vivestar</td>
<td>Canary yellow</td>
<td>-18</td>
</tr>
<tr>
<td></td>
<td>with orange flecks in throat</td>
<td></td>
</tr>
<tr>
<td>Vinewood</td>
<td>Moderate to deep purple pink</td>
<td>-27</td>
</tr>
<tr>
<td>Vivacious</td>
<td>Large red flower trusses.</td>
<td>-21</td>
</tr>
<tr>
<td>Vinemount</td>
<td>Deep red.</td>
<td>-27</td>
</tr>
<tr>
<td>Veepsprite</td>
<td>Persian rose, large flowers,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>terminal clusters of 3 to 5 blooms</td>
<td></td>
</tr>
<tr>
<td>Vinebrook</td>
<td>White flower</td>
<td>-27</td>
</tr>
<tr>
<td></td>
<td>with purplish red flares in throat</td>
<td></td>
</tr>
</tbody>
</table>

DECIDUOUS AZALEA TYPES

<table>
<thead>
<tr>
<th>Cultivar Name</th>
<th>Flower Form</th>
<th>Hardy to deg. C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vinecourt Troubadour</td>
<td>Red</td>
<td>-26</td>
</tr>
<tr>
<td>Vineland Carousel</td>
<td>Blended orange &amp; pink shades</td>
<td>-27</td>
</tr>
<tr>
<td>Vineland Dream</td>
<td>Strong pink</td>
<td>-26</td>
</tr>
<tr>
<td></td>
<td>with strong orange dorsal blotch</td>
<td></td>
</tr>
<tr>
<td>Vinecourt Duchess</td>
<td>Peach yellow buds open to vivid yellow</td>
<td>-26</td>
</tr>
<tr>
<td>Vineland Duke</td>
<td>Deep pink, large flower clusters</td>
<td>-26</td>
</tr>
<tr>
<td>Vineland Gold</td>
<td>Brilliant orange yellow</td>
<td>-27</td>
</tr>
<tr>
<td>Vinecourt Jester</td>
<td>Creamy yellow fading to white</td>
<td>-27</td>
</tr>
<tr>
<td>Vinecourt Moonlight</td>
<td>Brilliant yellow in bud, fading to light greenish yellow</td>
<td>-27</td>
</tr>
<tr>
<td>Vinecourt Queen</td>
<td>Deep yellowish pink</td>
<td>-26</td>
</tr>
<tr>
<td>Vineland Sensation</td>
<td>Medium pink with pale orange blotch.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hardy in Toronto area.</td>
<td></td>
</tr>
</tbody>
</table>

These cultivars have added greatly to the variety and beauty of the rhododendron gardens here and in the U.S. They also form the base for additional breeding programs.

Roy Forster was primarily responsible for the exceptionally fine development of rhododendron plantings in the wood lot area to the south of the service road at HES. Much development work and good parental materials were collected and were well advanced when Al Smith took over the program in 1974. Al Smith is recorded as being responsible for the development of the Niagara Branch of the now flourishing Rhododendron Society of
Canada. In 1969, Ken Begg, a Niagara Parks Commission graduate, succeeded Roy Forster. In general, this program has been very successful.

The development of hardy HOLLIES must also be included in this ornamentals discussion. Hybridizing high quality cultivars from England with the hardy species (*Ilex crenata*) from Ohio has resulted in many selections that are hardy in southern Ontario. Some of these have developed good-sized trees over 20 feet high. They are outstanding ornamentals with superior hardiness and decorative qualities when compared with established cultivars. They deserve much more general planting. The following holly cultivars were named and introduced: Viking, Valiant, Vinedale and Vanguard.

Other important ornamentals were also developed and introduced. These included Vesper CHRYSANTHEMUM and Vesper LILAC (an outstanding Vulgaris deep purple variety).

The overall direction and promotion of the extensive ornamentals breeding program as described here was in the capable hands of the late Robert Fleming, Research Scientist in charge of ornamentals. His expertise in the field of ornamentals also provided the background for his popular weekly newspaper columns and radio talk shows, a service that he provided for many years.

In connection with ornamentals, the outstanding work carried out by Dr. E.F. Palmer, Director of the Station until he retired in 1957, must be recognized. Though not recorded as a program of the Experiment Station, Dr. Palmer was heavily involved with the breeding and improvement of GLADIOLUS and LILIES and certainly much of his efforts in their breeding was carried out at the Station. He was known as one of the top gladiolus breeders in Canada and nationally. Only a few of his better varieties, still widely grown, are listed here along with their descriptive color.

Picardy – *Light salmon pink.*
   Very important for the gladiolus cut flower industry
Bagdad – *Smoky old rose*
Pirate – *Deep red*
Spray of Gold – *Deep clear yellow*
Wasaga – *Clear apricot buff*
Coronation – *Soft light salmon*
Debonair – *Light pink; strong plant*
Golden Cup – *Clear, very deep yellow*
Rapture – *Light salmon; strong tall grower.*
Dating back to the beginning of the development of the Station's grounds in 1907, many interesting trees and shrubs have been planted. These are located largely alongside the small creek that runs through the southeast corner of the home farm. Others were placed where they would enhance the beauty and architecture of new buildings as they were constructed. Though many of the early plantings have died off or have been removed to make space for new buildings and other developments, some still remain.

Throughout the last century, they have served as a valuable source of tree and shrub species for student study and have provided much interest and beauty around the campus. Countless wedding parties have been photographed on the grounds using the unique trees and ornamental shrubs as a colourful background, along with the rustic stone bridge. Many of the landscape subjects were, of course, the common tree and shrub types but the following deserve special mention here as representing the more unique specimens and/or Carolinian types.

The Caucasian Wingnut has grown to a remarkably large size. In trunk diameter and branch spread, it may be one of Ontario's
largest trees and attracts much public attention. Other interesting
trees are the Turkish Filbert or Hazelnut, Paperbark Maple,
Metasequoia (close relative of the Giant Redwoods of California),
Blue Ash, Kentucky Coffee Tree, White Fir, Sycamore and mature
Rhododendrons alongside the creek, now very large and all still
very attractive.

After the appointment of staff in the early 1950s to conduct
research in ornamentals, expansion of the plantings occurred as
part of this initiative and created a setting for the various admin-
istration and laboratory buildings.

In 1945, the Palmer family created The Richard Blake Palmer
Horticultural Trust in memory of their only son killed while on
active service in Burma during WWII, with the income to be used
for the improvement of ornamental plant material. Initially, the
trust supported gladiolus and lily breeding, a long-time personal
hobby of Dr. Palmer.

In the late 50s, the rhododendron and holly performance
and breeding projects began through support of the Palmer Trust.
Many species and cultivars from Europe and USA were planted as
breeding material and to enhance the landscape development. A
peat and rock garden was created along the banks of the creek in
front of the current-day Advisory Services building and named the
Richard Blake Palmer Memorial Garden. During the 60s, Roy
Forster was instrumental in developing the Woodlot as a test
garden for the progeny of the rhododendron breeding.

Hundreds of trees and shrubs developed by nurseries, arbore-
ta and botanic gardens throughout NA and Europe have been
tested for hardiness, ornamental value and ease of propagation
since 1952. Compatibility and performance of different rootstocks
for many species including flowering crabs, Japanese cherries
and European mountain ash were also conducted. Herbaceous
annuals were evaluated annually as part of the All American
testing program.

For more than 30 years beginning in the early 1950s a
large test rose garden of hybrid tea, floribunda and grandiflora
roses was maintained and used to evaluate new and All-American
selections for performance and hardiness.

The Millennium Forest at the north end of the campus grounds
is a new and distinct feature which adds another perspective to
the landscape and brings yet more horticultural and botanical
interest. A complete account of the development of the Forest is
included elsewhere in this Report.
HORTICULTURAL PRODUCTS LABORATORY (HPL)
Page 143 - Staff and summer students of the Horticultural Products Laboratory (HPL) in the early 1970s. Front row seated (l. to r.) T. Ribski (student), M. Burman (student), Rudy Palabay; Second row seated (l. to r.) unknown student, Pam Gadd, Dick Smith; Standing (l. to r.) Richard Chudyk, Frances Cook, Ralph Crowther, Tibor Fuleki, Angus Adams (Chief Research Scientist)

Page 148 - Dick Smith, research scientist - post harvest physiology

Page 152 - George Chu, research scientist - post harvest physiology


Page 159 - Frances Cook (left), research scientist - processing and Vicki Gray (right), research scientist - processing/sensory evaluation.

Page 163 - Ralph Crowther, research scientist - oenology

Page 165 - Tibor Fuleki, research scientist - biochemistry.

Page 169 - Pam Gadd, technician - microbiology.

Page 171 - Vicki Gray conducting Wine Standards tasting.

Page 173 - Horticultural Experiment Station vineyard and experimental wine.

Page 175 - Gene Lauro, research engineer - agriculture/food.
In the early years of the Experiment Station at Vineland, only sporadic attention was given to work involving processing or storage aspect of fruits and vegetables. Archival records show that some cider making trials were conducted in 1912. Later, funding provided by the Federal and Provincial governments supported joint work in processing for a short period. This early processing work was conducted in the basement of the original administration building.

Fruit and vegetable growers through their associations saw the need for research support as did organizations representing the canning and wine industry. Thus, in the 1920s and 1930s, these groups lobbied government for such assistance. However, it wasn't till after WW2 that the Ontario Department of Agriculture approved the construction of a processing research facility at the Experiment Station at Vineland. The major responsibility for designing the new facility and directing its research programs was given to Dr. J.H. Lloyd Truscott, a professor of horticulture at the Ontario Agricultural College (OAC). Construction work began
during 1947 and the laboratory was officially opened in the summer of 1950. On opening day, staff consisted of Dr. Truscott, Margaret Simpson, J. R. van Haarlem and Dr. A. M. Adams.

Early research emphasis was on storage problems of fruits and vegetables as well as evaluation of new varieties produced by the Station's fruit breeders. Microbiological assistance and advice on modem fermentation methods, including the use of pure wine yeast cultures, was made available to wineries. Also, problems peculiar to the canning and processing industry such as spoilage and preservation and utilization of wastes were studied.

In 1951 Ralph Crowther joined the staff of HPL and became responsible for testing the suitability of grape varieties for wine production and the very successful promotion of the amateur wine culture in the province. In 1953 Dr. Elizabeth Gullett from the University of Guelph joined the staff to undertake processing and nutritional studies and upon her resignation in 1965 she was replaced by Frances Cook, a dietician with both industrial and teaching experience.

In 1955, Dr. Ed Zubeckis a European-trained food scientist joined the staff to conduct studies on fruit juices and concentrates as well as special biochemical problems. In 1967 Dr. Zubeckis retired and Dr. Tibor Fuleki, at the time the only university trained enologist in Canada, a graduate of the University of Budapest, was appointed as research biochemist.

In 1969 Dr. Richard B. Smith, was appointed as a physiologist involved with cold storage and related studies. Dr. Smith had been awarded the first Ph.D. in horticulture by the University of Guelph prior to his appointment. Early in 1971, James Lounsbery, a professional horticulturalist, was appointed to assist with storage work.

Under Dr. Truscott's leadership, the laboratory gained an outstanding reputation for its research excellence and assistance to the fruit and vegetable industry in Ontario. Dr. Truscott retired in 1969. His contributions to the horticultural industry were outstanding in practical terms and research excellence. For his contributions to scientific research and the betterment of the horticultural industry in Ontario, Brock University awarded him an honorary Doctor of Science degree.

Responsibility for initiating and guiding HPL research programs was assumed by Dr. Adams's in January 1970 until the fall of 1981 as Head of the Laboratory and Chief Research Scientist. Under Dr. Adams's tenure, staff was encouraged to explore innovative ideas, and to conduct applied research that would benefit industry.
In 1971, having received his Ph.D. from Nottingham University, Dr. Richard Chudyk was appointed as microbiologist. Pamela Gadd, a graduate of the Bristol Institute of Technology in the UK joined the staff in 1960 and assisted with microbiological and other studies. Joining the staff in 1972 as a technician, Victoria Gray was promoted to assist Mrs. Cook in processing and sensory evaluation of commodities upon completing her studies at Brock University. In 1970, Rudy Palabay was appointed as assistant to Dr. Tibor Fuleki in the biochemistry section.

Dr. Adams retired in 1981 and Dr. Emil Andersen became head of HPL and chief research scientist for two years before he retired. Dr. Richard Chudyk became chief research scientist for the period 1983-1997 when he retired. In 1998 HPL, along with the whole research station at Vineland, became part of the University of Guelph under a divestment and partnership agreement between the university and OMAFRA.

The 1980s were a time of change for the agri-food industry. Consumers were looking for quality, freshness and variety. Ontario's fruit and vegetable industry at the time was producing over fifty commodities destined for fresh market, processing or both. Regardless of end use, each crop required some form of post-harvest handling to maintain quality and shelf-life.

In view of this the Ontario government introduced various programs to stimulate the construction of commercial storage facilities for Ontario-grown produce. As part of this initiative, a $1 million state-of-the-art storage research facility was constructed at the HPL in 1982. The new facility occupied over 1000 square meters. Three storage scientists staffed the new facility. Dr. Richard Smith focused on storage of various fruit, vegetable crops as well as flowers. Dr. George Chu transferred to HPL from HRIO's Simcoe station to focus on storage of apples and other crops. Gene Lauro transferred to HPL from production research at HRIO and focused on engineering aspects of storage research. Lisa Skog and David Jennings joined HPL as storage and post-harvest physiology technicians. An engineering technician, Dave Wismer, joined the storage program to assist in technical aspects of engineering research as well as operational aspects. HPL developed and maintained a broad base of storage research programs involving several Ontario grown commodities.

In the 1980s, the government also started to focus more research resources towards processing and a new pilot plant processing area was built with two new walk-in coolers for storing wines, juices and minimally processed products. A new enology
lab was built for the wine program. The new processing area was equipped with modified atmosphere packaging equipment. The pilot plant was equipped with a pilot scale juice press and bottling equipment was acquired for experimental winemaking and juice production. Also a pilot scale pasteurizer was developed in-house by HPL's engineering research team.

After the retirement of Ralph Crowther in the wine lab, Dr. Bill Edinger from the US, joined the HPL wine program for several years as research enologist. Throughout the years, HPL staff were ardent workers in the creation of the Canadian Society of Oenologists assisting with membership matters, hosting periodic meetings and submitting scientific contributions.

Another key position was left open after the retirement of Francis Cook in the processing section but eventually Dr. Sam Wang, a researcher from the US processing industry, joined the HPL team as a food scientist. Isabelle Rodrick joined the laboratory as food processing technician.

The period from the mid 1980s witnessed a broad based program in processing by all the units in HPL (processing, enology, biochemistry, microbiology). The following pages contain a more complete review of the various projects conducted at the HPL from its establishment to address the government's research priorities based on industry and consumer trends.

From its inception in 1950 through to the 1990s the HPL was in a gradual incremental growth mode as far as resources and operating funds were concerned. In the early days, clients provided mostly 'in-kind assistance' in support of processing or storage research. However, in the 1980s and 1990s clients started to provide more direct dollar funding towards R&D projects. There were several reasons for this. In some instances grower and industry associations developed their own research budgets which they could deploy at their own discretion. In other instances client associations were able to leverage various provincial and/or federal agri-food funds and apply them to dedicated projects at HPL. To some extent this system worked in that clients became used to sharing the responsibility for funding projects and prioritizing research needs.

However, in the late 1990s government research funds started to dwindle on a number of fronts and as a result some reorganization and consolidation occurred that affected HPL. In 1998 OMAFRA divested its HRIO research facilities at Vineland, Simcoe and Bradford and developed a partnership arrangement with the University of Guelph. Under this partnership the university was
funded by OMAFRA to operate HRIO, including HPL. Concomitant with this arrangement there was a dwindling of government research funding and as a result a steady attrition of staff and programs occurred. Because of this, processing research was terminated by the end of the 1990s. Storage research also underwent attrition and remaining programs were eventually transferred to the University of Guelph main campus. In 2003, after fifty three years of operation, the HPL including the modern storage research facility was closed and equipment dismantled.
The postharvest section of the HPL conducted investigations into the postharvest handling and storage of vegetables, fruits, nursery stock and flowers. Until the late sixties, postharvest and processing functioned as one unit. Space for storage research was limited until a modern storage facility was constructed in the early eighties.

Research on various aspects of the storage and processing of cabbage was an ongoing project for 27 years. At the start of the program, a good cultivar could be stored for three to four months before excessive deterioration. New cultivars introduced on a yearly basis pushed storage life up to seven to eight months. This allowed Canadian processors of coleslaw a quality Canadian grown cabbage throughout the year. Had better quality cultivars not been introduced then a controlled atmosphere (CA) storage industry may have developed for cabbage. Results from trials at the HPL showed that cabbage responded well to controlled atmosphere storage.
Research on coleslaw quality became part of the program when processors found that some slaws darkened too quickly and some cultivars produced slaws that were moderately pungent. Cultivars were found which darkened relatively slowly when made into coleslaw. Also, some cultivars produced considerably less pungent coleslaw. Research conducted by a graduate student at the HPL and staff from HES Simcoe showed that fertilizer programs during the growth of the crop, could also affect pungency. Cabbages grown under a low nitrogen regime were more pungent (had a higher glucosinolate content) than similar ones grown under a higher nitrogen regime.

Underwax darkening was and still is a problem in rutabagas. Two post-wash pre-wax procedures helped mitigate this problem. These included a rinse or a spray of hypochlorite solution right after washing followed by rapid drying. These procedures reduced the population of microorganisms and provided a poor environment for bacterial regrowth. Anti desiccants other than paraffin wax were not effective in controlling moisture loss in rutabagas or greenhouse cucumbers.

Celery, subject to deterioration from several microorganisms, can be held in cold storage for only a few weeks. Prolonging the storage life of the crop by a few weeks was not accomplished through the use of antimicrobial dips. Also, post storage quality was extremely variable from year to year. Storage in controlled atmospheres resulted in lower rot losses and much greener celery. However, the controlled atmospheres caused the development of a disorder with an appearance very similar to Blackheart. The new problem, therefore, outweighed any benefit.

Detachment from the parent plant and improper handling causing wounding and bruising, often leaves asparagus stalks with open wounds. Asparagus, cut below ground, is harvested with soil and microorganisms attached. When transported, the sand acts as an abrasive causing surface injury. Under these conditions, soft rot organisms have easy access to cut asparagus and have caused the asparagus industry much grief. An evaluation of the postharvest handling procedures revealed some problem areas. The containers used to transport the asparagus were contaminated, as were grading and handling lines. In some instances cooling facilities were inadequate. The washing of containers and grading lines followed by a rinse with chlorine reduced soft rot counts many fold. This followed by rapid cooling virtually eliminated the problem.
Carrot loss during storage was an issue in the 1980s. It was found that washing before storage only served to increase loss from decay. The use of fungicidal dips lessened the problem but the "benefit to cost ratio" did not really justify this procedure. Storage in controlled atmospheres reduced the problems to some degree, but the cost of CA storage was greater than the wholesale value of the carrots stored.

Studies at the HPL proved that Spanish onions could be forced-air dried by pulling warm air through the bulk bins. Rate of drying was affected by air volume and the temperature and relative humidity of the air. Forced-air dried onions were stored for up to five months with little loss of quality. When processed into onion rings, quality was acceptable.

Sour cherries, harvested mechanically, have to be cooled rapidly in iced water to prevent darkening of the flesh at bruise points. For payment purposes, a relationship between volume of cherries in water and their weight was determined at the HPL. The established figure for Ontario cherries was very similar to those calculated for sour cherry producing areas of the US.

Storage research programs were conducted for several years on strawberries. These included an evaluation of field applied fungicides to determine if there was an effect on quality after harvest and storage. Also an evaluation of storage characteristics of mechanically harvested strawberries for processing and an evaluation of storage treatments on different cultivars was conducted. It was found that preharvest fungicide sprays could extend post harvest shelf life and mechanically harvested strawberries could be stored for several days without a significant loss of quality. Forced-air cooling, drawing cold air through the strawberries, and cooling rapidly to temperatures near 0°C improved the quality and shelf life significantly. When strawberries were stored under modified atmospheres there were two benefits: the fruit could be held in storage for longer intervals and the fruit actually became significantly firmer than at time of harvest.

The optimum time to pick some fruit has always been a vexing problem. Variation can occur due to growers and orchard management practices. Orchard site and climatic differences among locations and between seasons can affect the physical characteristics of the fruit. This was found to be the case with peaches and plums. The firmness of the peach in conjunction with background colour can be used as a rough guide of when to pick. Some laboratory tests such as onset of ethylene production can be used as a guide, but in general these tests are not practical in the orchard.
To compete with imported peaches, Ontario growers requested that defuzzing and waxing (applying an anti desiccant with a fungicide) be evaluated as a means of enhancing fruit appeal. In surveys at a retail outlet, consumers indicated that they would purchase untreated peaches over defuzzed and waxed peaches. However, when presented with clearly marked displays of each type of fruit, side by side, the consumer chose the defuzzed treated peaches over 75% of the time. Defuzzing peaches without the application of a fungicide and an edible wax resulted in an increased incidence of rot and higher levels of moisture loss when compared to fresh peaches.

Cranberries, a minor crop in Ontario, were evaluated both under field conditions and in the laboratory. Two of the better cultivars were Stevens and Beckwith. Ben Lear, with lower yields than Beckwith and Stevens, provided for earliness and intense red colour. None of the cultivars had a long storage life.

Hydrangeas, for greenhouse forcing in the winter, need to be defoliated before cold storage. Ethylene, sourced from apples, was used as the defoliating hormone. Apples produce variable amounts of ethylene and present a disposal problem when defoliation is complete. Research staff from the HPL and the Vineland greenhouse program evaluated bottled ethylene gas for effectiveness as a defoliant. This process was cheaper and more convenient than using apples as an ethylene source and the leaves were removed efficiently and quickly.
Apple storage research was started in 1980 at HRIO's station in Simcoe. The mandate was to assist in the technology transfer of the newly developed low-oxygen storage technologies to the apple storage industry in Ontario. In the fall of 1980, the Norfolk Fruit Growers' Association at Simcoe started their first commercial operation using this technology on McIntosh apples. With joint research support from Agriculture Canada, the University of Guelph and HRIO, the results were very impressive and attracted significant international attention from both the apple industry and the research community.

In early 1982, the Ontario government announced $1.0 million financial support to build a new state-of-the-art postharvest research facility at HRIO Vineland. The apple storage research program at Simcoe was transferred to Vineland in 1982. The new facility was considered one of the top post harvest research laboratories in North America. Researchers were able to investigate new controlled atmosphere (CA) and related technologies on a larger scale so that testing would resemble commercial conditions. From 1981-2003 the apple storage program maintained a broad spectrum of industry-supported projects. The main focus was on apples but other crops were involved. The following are some key research highlights:
Fruit maturity determination has always been a problem to the apple industry since growers need to harvest at the right time in order to get better fruit quality and longer storage life. The starch-iodine test has been a traditional maturity indicator throughout the world and each region and apple variety has its own maturity development pattern. Through testing over a number of years, HPL has expanded the starch-iodine test to include most of the major commercial apple varieties grown in Ontario: McIntosh, Empire, Delicious, Spartan, Idared and Northern Spy. An official starch-iodine test chart recommended in OMAFRA extension bulletins was developed at HPL.

As the Ontario industry moved towards low-oxygen CA storage technology, it was recognized that apple maturity indexes were complex and needed refinement. These indexes had to be geared not only to the apple variety and growing region, but also to the type of storage technology being used. HPL maturity testing was then expanded to determine the appropriate harvest maturity for low-oxygen apple storage in Ontario for McIntosh, Empire and Delicious.

The storage program did some innovative work to refine apple maturity testing a little further. Growers needed a more accurate maturity index. Research showed that ethylene concentration within the apple fruit itself is a more accurate index of maturity. A testing method involving sampling with a syringe and GC analysis for ethylene (the fruit ripening hormone) was developed. This maturity test index is used by larger commercial storage operations.

CA apple storage at the commercial level presents practical challenges. In the early days, CA storages were large and required a long time to fill with apples and 'pulldown' to proper temperature and to set CA gas conditions. Research on Empire apples indicated that if proper temperature and CA conditions could be established early enough, storage operators could save on energy costs by storing at 3 deg.C rather than at 0-1 deg.C. As a result Ontario storage operators built smaller CA apple storage units. This approach coupled with slightly higher holding temperatures during CA storage resulted in significant energy savings without affecting fruit quality or storage life.

Conventional cold storage facilities also needed to extend the storage life of their apples and asked for assistance. A joint HRIO/Agriculture Canada project involving production and postharvest researchers, found that field application of a growth regulator such as aminoethoxy-vinylglycine (AVG) or certain other gibberellins could prolong apple storage life (McIntosh, Empire,
Delicious) in regular storage operations. The critical issue was the timing of the field application.

A common problem in Canada and USA has been the condition referred to as apple scald disorder. This has caused economic losses in both countries. HPL was part of a long-term cooperative Canadian/US research effort to monitor this problem. As a result practical guidelines were developed on forecasting the severity of this disorder so that storage operators could decide whether field application of an antioxidant such as diphenolamine (DPA) would be needed to control scald in any particular year.

The HPL apple storage program has worked with production research programs as well as OMAFRA extension staff on in-field practices that affect apple quality, particularly on bitter pit disorder. This cooperative effort demonstrated that field calcium spray application could positively affect apple quality after harvest and storage if the trees were showing calcium deficiency.

Once apples are taken out of commercial CA storage, their shelf life is limited. Testing indicated that post-storage apple coatings (e.g. TAL Prolong) could create a modified atmosphere within the apple itself, thus extending market shelf life. Another approach is to use modified atmosphere packaging (MAP) films. Research showed that semi-permeable film wraps on apple shipping containers extend shelf life. The technology, while not cost effective for local marketing, does present an option for apples exported to overseas markets.

Over the years, the apple storage program extended its efforts to other technologies and crops. Traditionally pears have a conventional storage life of three months and it was demonstrated that CA storage can extend storage life of Bartlett pears to about six months. Also post harvest fumigation research on apples and other fruits (e.g. cherries, plums, apricots) showed that microbiological decay could be minimized. Rather than using synthetic based fumigants it was demonstrated that organic fumigation is possible using an essential oil such as thymol which is a plant extract. The lab also tested ozone for reducing ethylene buildup during fruit and vegetable storage.

In summary, a strong industry-supported apple storage research program was in place at HPL from 1982 to 2003. In January 2003, as part of a reorganization strategy, remaining HPL storage research staff and programs were relocated to the Cold Storage Laboratory at the main campus of the University of Guelph.
Innovative Technology for Maintaining Quality and Shelf-life of Horticultural Products

LISA SKOG

Ethylene is a plant hormone which can cause undesirable effects in horticultural plants and their products. Adverse effects can include accelerated ripening, senescence, yellowing, tissue softening and leaf or flower drop. Ethylene is a volatile gas produced naturally by plants during ripening. Injury or rough handling during distribution and shipping can trigger the production of additional ‘stress ethylene’. Extraneous ethylene is also produced from other sources in the supply chain e.g., other produce, propane forklift exhausts, truck exhausts, and heating equipment. As a result of ethylene exposure, substantial economic losses can occur at the storage, distribution and wholesale/retail level.

In recent years, new technology has been developed and commercialized, which can prevent or minimize the damaging effects of ethylene exposure. This involves the use of 1-methylcyclopropene (MCP) as an ethylene antagonist or blocker. When applied to ethylene sensitive plant material, the MCP chemically attaches
to ethylene binding sites, thus preventing the ethylene from attaching and causing damage. This blocker technology is gradually being adopted around the world.

In the late 1990s, HPL initiated a major four year multi-crop project to study the benefits of using ethylene antagonists/blockers on various Ontario horticultural crops. The comprehensive $500,000 study (supported by CanAdapt plus the Ontario industry) was based at HPL with Lisa Skog as lead investigator. The collaborative project involved input from the Ontario horticultural industry, OMAFRA extension specialists as well as production and postharvest scientists at the University of Guelph. The research was conducted in four phases.

The first phase involved screening Ontario floriculture crops for ethylene sensitivity. Twenty six cut flowers, potted plants and bedding plants were tested. The various crops were tested for sensitivity to ethylene at various concentrations, exposure times and temperatures. As a result, an ethylene sensitivity rating was assigned (high, medium and low) providing industry with a useful guideline as to which flower crops were susceptible to ethylene damage during storage, distribution and handling. Ethylene production and sensitivity information for fruits and vegetables was already well documented and therefore was not included in this phase of the trials.

The second phase of the project involved a survey to determine where ethylene gas was present in the commercial production and distribution chain. OMAFRA extension specialists conducted extensive ethylene testing and over 1700 air samples were taken from 20 commercial sites over a one year period. Companies ranged in size from mid-sized grower operations to multi-million dollar wholesalers, retailers and processors. The key finding was that, in each of these commercial settings and depending on the crop and time of year, ethylene could be present in levels capable of damaging ethylene sensitive products. Personnel at the various commercial locations were educated about sources of ethylene and how to reduce concentrations to acceptable levels. As a result, companies have developed in-house procedures to control ethylene build up.

The third phase of the project involved testing application methodology to ensure that the material could be applied effectively and economically by the various industries. Commercial MCP comes in a powder form which is converted to a gas when a liquid buffer is added. Although the tests indicated that any enclosed, relatively airtight, space was suitable, it was
determined that the material was best applied in loaded and sealed trucks for the floriculture industry and in controlled atmosphere storages for the apple industry.

The final and main phase of the study was the actual efficacy trials on ethylene sensitive crops. Various Ontario horticultural crops were treated with different MCP concentrations and held at various temperatures and time intervals. The following are some key findings:

**Greenhouse Flowers**

Results clearly indicated that MCP can prevent ethylene damage (yellowing, leaf and flower drop) in a wide range of ethylene sensitive greenhouse ornamentals. MCP fully protected 25 of the 27 varieties tested from damage due to external ethylene. Depending on the flower, ethylene protection ranged from 3 days for Impatiens up to 10 days for miniature potted roses. In several cases, MCP also extended product shelf life even in the absence of external ethylene, due to the presence of plant-produced ethylene. Results were particularly pronounced for Begonia, Impatiens and Nicotiana (bedding plants), Streptocarpella (potted plant) and Snapdragon, Gypsophila and Delphinium (cut flowers). The key finding was that optimum concentrations and treatment conditions were required for each type of flower in order that the full protection benefits could be achieved.

**Vegetables**

Ethylene blockers effectively delayed ripening and maintained the quality of greenhouse tomatoes, although efficacy was reduced somewhat as the tomatoes ripened. Non-ethylene producing vegetables (greenhouse cucumbers, carrots, lettuce and cabbage) were protected from external ethylene but the treatments are not considered economically feasible.

**Fruit**

Apples, pears and plums were the fruits most responsive to the use of MCP. In several cases, the treatment prevented undesirable softening while permitting desirable changes in colour and sugar content. The apple industry in particular has adopted this technology. There was a moderate effect on apricots but little or no effect on peaches, strawberries, grapes or cherries.
In summary, the information generated by this multi-crop project on ethylene blocker technology has been very useful to the Ontario industry. It is the first major evaluation work done in Canada on flowers and the research efficacy results have been submitted as part of the application process to have MCP approved for the floriculture industry. The technology has been approved for use on apples in Canada and is currently being used widely by the Ontario apple industry. This technology is very important to the Ontario industry since major export markets for both the flower and apple industries now require imports to be treated with this product.
The Horticultural Products Laboratory when built in 1951 contained a small processing laboratory equipped with small-scale versions of commercial processing equipment. The lab was used for the preparation and processing of fruits and vegetables and their products. Various sizes of steam-jacketed kettles were used for preparation of processed products such as pie fillings, jams and jellies and cranberry sauce. They were also used for hot water blanching prior to peeling or freezing fruits and vegetables or for lye solutions used for peeling peaches and tomatoes. Other equipment included steam cabinets used for steaming fruit such as freestone peaches before peeling and steam tables for processing canned products. Also available were small can closers, cherry pitters, apple peelers, peach pitters, a tomato juice finisher for making tomato juice and a fruit dehydrator. An autoclave was used for products requiring pressure canning. The HPL also had several walk-in refrigeration and freezing units. In the early 80s, a six-booth, pass-through taste testing facility was added to the lab for the sensory evaluation of various products.

One of the major undertakings of the processing laboratory was the Varietal Testing Program. Every year, as part of the plant breeding program, fruits and vegetables were processed using
commercial methods. These tests included canned and frozen freestone peaches as well as canned clingstone peaches, canned pears, canned plums, canned apricots, frozen strawberries and strawberry jam, frozen raspberries and raspberry jam, frozen blueberries, canned sweet cherries, canned apple sauce and apple pie filling, sour cherry pie filling, canned whole tomatoes and canned tomato juice, and frozen whole corn on the cob and frozen kernel corn.

New seedlings were tested alongside well-established varieties to determine their potential in the commercial market. An internal tasting panel evaluated the processed products for the attributes of appearance, color, texture, flavor and overall acceptability. Those products showing the most promise were further tested by a taste panel including representatives of the processing industry, growers and HRIO/HPL personnel.

The research conducted on processed tomatoes was the most extensive of all products tested. Upwards of 100 cultivars and seedlings were processed annually. As well as subjective testing, objective testing for whole canned tomatoes included ease of peeling and number of fruit per can. Tomato juice samples were not only taste-tested but also analyzed for pH, citric acid content, soluble solids, thickness and color as measured by spectrophotometer. All these tests were indicative of suitability for tomato paste. Cooperative testing was also done with the Agriculture Canada Research Stations in Prince Edward County and Harrow.

The varietal testing program was an integral part of the complete breeding program. Cultivars which performed well in the field and also exhibited favorable processing quality were introduced to growers and subsequently to commercial processors. Many of the canned or frozen products available today had their beginnings in this testing program at HRIO/HPL.

The processing laboratory also carried out joint projects with other sections of HRIO. Each year, stored apples were tested for starch content, water core and other internal damage. Apples treated to produce a redder product for the retail market were processed and samples were provided for testing of residual chemicals.

In research by the engineering program to study the effect of mechanical harvesting and handling of fruit, in particular peaches and apples, intentionally bruised fruit was processed and later evaluated to determine the extent of damage to the canned products.
In the 1980s, one large project involving the processing lab was the mechanical harvesting of strawberries. The once-over harvested berries were mechanically hulled and subsequently frozen. Comparisons were made of cultivars used, harvesting and hulling methods on various end products such as frozen whole berries, strawberry puree used for ice cream and yogurt and pie fillings.

With the decrease in production of tobacco in the 1980s, many farmers started to grow asparagus as an alternative crop. Experiments were conducted to find the best method of storing/retailing asparagus to prolong shelf life and retain optimum flavor once cooked. As an extension of this research, samples were chemically analyzed and subjectively tasted to determine length of blanching before freezing.

With the advent of cranberry production in the Muskoka area of Ontario in the late 1970s, work was conducted on developing processing and ingredient formulae for cranberry sauce, jelly and other products such as cran-apple pie filling on once-over harvested berries. Comparisons were made with imported products. Similarly, studies were done to compare wild rice from Ontario and with rice from the U.S. in both dry form and processed product. Based on this research, recommendations were made for best soaking and cooking times.

When consumer demand came for lighter or no sugar syrups in canned fruit, the processing lab worked with industry to develop acceptable 'light syrup' packs or canned fruit packed in fruit juice. The canned products on the market today reflect the success of these joint efforts.

Many small 'cottage' industries have been assisted by researchers at the HPL. Examples are farm-gate jam and jelly producers, pick-your-own fruit markets selling pies and other baked and processed products. Dried fruit products sold in the supermarket, particularly fruit leathers, are another example of products developed at the processing lab.

HPL also worked with emerging specialty food industries. For example, the lab helped Ontario organic vegetable processors to develop quality control procedures and organic processing guidelines. Growers of oriental vegetables were also assisted in the development of oriental radish and pickle products.

In the late 1980s and into the 1990s, marketplace preferences were shifting towards freshness, convenience and variety. As a result, HPL worked on new processing approaches involving modified atmosphere packaging (MAP) as a means of extending the shelf-life of fresh fruit and vegetable products.
The lab. pioneered research on the development of ready-to-use (RTU) fresh vegetables not only for the retail trade but for the institutional trade as well. A thorough technical understanding was developed with respect to packaging, film selection as well as quality assessment and handling procedures.

The processing lab. also worked cooperatively with the OMAF Extension services providing information to the consumer. A set of slides on home canning was produced for distribution through the Home Economists.

Often HPL was called upon by industry to develop new or improved processing methods. One such example was maraschino cherry manufacturing changes required when one food coloring was eliminated as an acceptable ingredient.

The sensory evaluation facility and taste panel were used not only for the varietal testing program but extensively for subjective evaluations and comparative testing. At the request of the LCBO and wine industry, research was done on taste comparisons between wines fortified with grain spirits versus grape spirits. Market acceptability of products grown in Ontario compared with imports was often based on results of taste testing. The introduction of Ontario grown kiwifruit and wild rice are examples.

Over the years, the Horticultural Products Laboratory provided a service to industry through research in processing technology and analysis. Commercial processors ranging from the small 'Ma and Pa' operations to huge multinational companies alike have benefited. Through the combined efforts of plant breeders and food scientists, fruit and vegetables varieties for commercial processing have been developed and introduced to the grower and processor and ultimately the consumer. New products and processing development through cooperative research between HPL and other sections of HRIO has resulted in the continued and increased use of horticultural products grown in the province of Ontario.
The Wine Lab.

Richard V. Chudyk and K. Helen Fisher

The wine lab. was established in the early 1950s when the HPL was first opened. A committee within the Ontario Ministry of Agriculture had determined that on-going research should be conducted on uses of Ontario grapes for winemaking purposes and to determine best procedures for improving the quality of wines produced. Ralph Crowther ran the wine lab. for many years until his retirement in the 1980s. Dr. Bill Edinger late joined the lab. as research enologist after Ralph Crowther's retirement. Dr. Edinger developed an enology newsletter to keep the industry abreast of technical developments. The newsletter was well received by industry.

The main activity of the lab. over the years was to evaluate the suitability of Ontario grape varieties for winemaking. The lab. was closely tied to the grape breeding and new variety trials at the research station. During each harvest, juices were analyzed and small quantities of wines were made from the various breeding lines and varietal introductions. The lab. worked closely with the grape and wine industry and every year industry representatives were invited to meetings in order to taste the various wines. Results of these tastings were used to determine which varieties warranted expanded field trials by the growers. This whole

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process was in place for many years and lead to the introduction of improved wine grape varieties in the province. The key issue was that a new variety had to be suitable from the winemaking as well as the viticultural perspective. Tom Challen and later Linda (Holman) Barkovic were winemakers at HPL during the latter years at the lab. They explored the vinification of Veeblanc and Ventura in larger quantities so that industry could have a better idea of how these crosses could perform. Other promising selections such as V64035 and V50154 were also evaluated.

Over the years the lab. conducted preharvest checks on all major commercial grape varieties. Starting in late August of every year, grapes from the station's research vineyard were sampled weekly and tested for key characteristics such as Brix, acidity and pH. Results were sent out to growers and wineries. This testing continued until the end of harvest usually in October. Overall the preharvest checks served as a reference standard for the industry and provided a basis for developing a harvesting strategy. The preharvest checks and small quantity winemaking for variety and seedling testing continued even after the closing of the HPL building in the early 2000s.

The wine lab. under Ralph Crowther, also played a key role in fostering the development of amateur winemaking clubs in Ontario. Over the years, the publication 'Winemaking in Small Quantities' was in constant demand. As a result, amateur winemakers purchased significant amounts of Ontario grapes through various clubs.

The wine lab. interfaced with the wine industry throughout its history. An integrated research approach was encouraged by HES senior management in the early 1970s. A closer integration of the Station's viticulture and enology programs was brought about through the development of the Grape and Wine Research Team. This team concept worked well and was eventually extended into the provincial research committee system with the establishment of the Grape and Wine Research Committee. The latter brought together key technical players from industry and government (provincial & federal) to set research priorities for provincially funded grape and wine research programs. The committee was unique in that it brought both growers and processors together at the same table to identify priorities. This research priority setting system worked well over the years.
Biochemistry research at HPL started in 1953 with the appointment of Dr. Ed Zubeckis as research associate of the Ontario Research Council and research scientist afterwards, until his retirement in December 1967. His research was assisted by Alex Emodi (1957) and George Siran (1953-1968) as laboratory technicians. Dr. Tibor Fuleki filled the biochemistry scientist position in April 1968 until his retirement in 1996. The laboratory technicians assisting his work were G. Siran (1968), Frank Ratz (1968-1969) and Rudy Palabay (1970-1996). Occasionally there were opportunities to hire an additional technician for a specific project on contract. Outstanding among them was Estela Pelayo, who worked at the Biochemistry Laboratory for four years. Industry was another source of technical help. Rieder Distillery hired Bob Summerville and Dave Ondrusek to work at the Biochemistry Laboratory on a project of mutual interest. Two graduate students, Andy Reynolds and Ron Giesbrecht, did their thesis research under Dr. Fuleki's supervision at the Biochemistry Laboratory. Dr. Zubeckis conducted a large-scale five-year study involving 14 fruits grown in the Niagara Region to determine their general composition. In the last year the mineral content (K, Na, Ca, Mg, Cu, Fe, Mn, P) of these fruits were also determined.
Particular attention was paid to the vitamin C content of fruits. The ascorbic acid content of 27 apple and two crabapple cultivars/selections before and after three months cold storage was determined comparing two colorimetric methods. Juice was prepared in the laboratory and their general chemical composition and sensory quality were also determined. Veeport, a grape cultivar with exceptionally high ascorbic acid content, was analyzed through ripening and processing to juice and wine. The ascorbic acid content increased during ripening but decreased drastically upon processing. Since tomato juice is considered an important source for vitamin C, its stability in vitaminized juice was determined. Fourteen tomato cultivars were analyzed for ascorbic acid, carotene and lycopene content. The results were compared to those found in 324 commercial tomato juices from nine processors and 36 mixed vegetable juices.

Hydroxymethylfurfural (HMF) is an indicator of heat damage in fruit and vegetable products. Dr. Zubeckis determined the HMF content of apple juice produced in the laboratory from freshly harvested apples and compared them to those found in commercial apple juices. While 0 - 37.5 ppm HMF was present in the commercial products there was none in those prepared in the laboratory. The sensory qualities and chemical composition of strawberry juice prepared in the laboratory were studied. Volatile reducing substances content correlated highly with sensory quality.

Dr. Zubeckis did considerable work developing high quality fruit juices from fruits grown in the Niagara region. Carbonated apple juice, grape, peach and apple, sour cherry and red currant fruit drinks were prepared and methods for their commercial production were suggested. The effect of ion-exchange resin treatment of Muscat grape juice on the vacuum concentrate was also evaluated. Experiments with ion-exchange resins were also carried out on wine.

After joining HPL, Dr. Tibor Fuleki focused on the problem of "foxiness" prevalent in most of the grapes grown in Ontario at the time. The sources of this flavor character, which became undesirable to the wine consuming public, were the volatile esters, two of them identified as methyl and ethyl anthranilate. The accumulation of total volatile esters (TVE) and the anthranilic acid esters (MA) was followed in Concord grapes during maturation and ripening in three seasons. These analyses were extended to hundreds of grape cultivars and selections noting also their flavor character. It was found that above a certain concentration of these compounds, the foxiness flavor character became detectable to the tasters. The
Vineland Grape Flavor Index (VGFI) was developed by combining the TVE and MA values and this was used subsequently to screen the grape breeding stock and selections for labrusca flavor character. To eliminate the inherent foxiness of wines made from labrusca type grapes carbonic masceration was proposed as a possible solution.

Anthocyanins are the pigments responsible for most red and blue colors found in plants. Using paper chromatography, the anthocyanins in strawberries, rhubarb, radishes and red onions were identified. Later, using high performance liquid chromatography the focus shifted to grapes. As a result of the research, two hybrid grape selections (V65115, Brights 12) were identified as being extremely rich in these pigments and containing only monoglucosidic anthocyanins (a characteristic of viniferas). As a result of this research, V65115 was named Vintento and it was suggested that the juice of these grapes could be used directly as natural food colorants. It was found that every red grape cultivar has its characteristic pigment pattern that could serve as "fingerprint" identifying fraud in the fresh grape juice and concentrate trade. Assistance was provided to a local distillery to develop a process for the recovery of natural food colorant from the pomace of Concord grapes, which was marketed under the trade name "Enovit."

Fruit juices became popular in the 1980s and this brought concerns about their "purity." Individual sugars and acids contents were some of the tools used to verify the identity of fruit juices and their concentrates. To learn more about the composition of fruits grown in Ontario and provide database for fraud detection, Dr. Fuleki's group determined the amounts of various sugars, acids, sorbitol, and hydroxymethylfurfural in cultivars of fruits. The nutraceutical components (procyanidins, stilbenes, flavonoids) of grape seed, juice and wine made from 10 cultivars using different pressing and vinification methods were studied. The results showed that the juices and wines, particularly the red ones, produced from Ontario grown grapes contain significant quantities of these nutraceuticals.

Ice wine fermentation was studied on four vintages exploring the fermentation conditions that would result in rapid fermentation and low volatile acidity. The juice and wine was analyzed for alcohol, glycerol and various organic acids and sugars. The results confirmed that volatile acids were produced by yeast operating under osmotic stress and not by spoilage bacteria. Most osmophilic yeast strains performed well except for the production of volatile acids.
A colorimetry laboratory was set up where both instrumental measurements and sensory evaluation of color could be carried out. Through the years, research in this area focused on methodology, developing color standards for canning clingstone peaches and processing tomatoes. Color defects were also studied. Unsightly grayish specks on pickled green asparagus were identified as primarily consisting of mitin, a natural constituent of the spears. The first recipient of the Ontario Grape and Wine Research Fellowship, Ron Giesbrecht, carried out his MS thesis research under Dr. Fuleki’s guidance exploring the potential of ultra filtration/reverse osmosis technology to convert red to white wine.

In the mid 1970s grape growers were troubled by surpluses. To expand the market the juice potential of labrusca type and hybrid grapes was explored. Juices were produced by hot and cold pressing and preserved by heat processing or preservatives. Both still and carbonated juices were produced in our pilot plant. The composition of the juices was measured and their sensory characteristics evaluated. These experiments demonstrated that excellent juices could be produced from most of the examined grape cultivars. As a result of this effort three new grape juice production facilities were set up in the Niagara Region.
Microbiology

Richard V. Chudyk and Angus M. Adams

Microbiology research at the HPL involved the study of microorganisms associated with both fresh and processed horticultural products. There were two different research teams in microbiology over the years: at the outset Angus Adams and Pam Gadd and in the next phase Richard Chudyk and Pam Gadd. Over the years the research focus was on beneficial microorganisms as well as spoilage microorganisms. A major effort was to understand the nature of microorganisms associated with grapes as well as wine production.

Airborne yeasts from vineyards and orchards have been studied. Yeasts belonging to the Genera Saccharomyces, Torulopsis, Kloecckera and Cryptococcus were isolated and most were found to be non-fermentative types. The presence of airborne fermentative yeasts was found to be rare. In general, airborne yeasts were found to more prevalent in vineyard and orchards during or after the harvest period.

In the days before dry wine yeast starters were commercially widespread, the microbiology lab worked on yeast storage techniques. The use of pure cultures was encouraged and techniques were developed to help the industry to maintain cultures of their own favourite in-house wine yeasts. Pure cultures were kept
throughout the year and during season were multiplied up into starter cultures for commercial fermentations. Research showed that it was both possible and practical to store yeasts for several years without loss of viability or essential fermentation characteristics. Over the years a major collection of industrial microorganisms was established at HPL and made available to the industry. Cryobiological and freeze-drying techniques were evaluated as a means of storing yeasts without loss of fermentation characteristics.

Early studies showed that malo-lactic fermentations occurred in Ontario. This phenomenon could be prompted by adjusting acid levels and was brought about by the indigenous bacterial flora in the grapes themselves as well as the winery environment.

As the industry became successful in developing higher quality wine products, the whole issue of extended shelf-life and microbiological stability became important. The microbiology section helped the industry to develop in-house microbiological quality control techniques. Various isolation media were tested for their ability to detect spoilage microorganisms including yeasts and bacteria. Yeast Morphology (YM) agar was identified as being the best medium for detecting yeasts and Micro Assay Culture Agar (MACA) was best for detecting bacterial contaminants.

Shelf-life studies were also conducted to evaluate wine stability at different storage temperatures. The introduction of low alcohol wines in the 1970s presented some shelf life problems because the lower alcohol levels were no longer a microbial inhibitor. Studies were initiated to determine the efficacy of sorbic acid as a stabilizer. Hundreds of sorbated wines were studied and the most prevalent contaminant yeast was found to be *Saccharomyces bailii*. Effective levels of stabilizers were also determined for wine products. The effectiveness of other techniques was also evaluated with respect to microbiological stability including membrane filtration. Overall the microbiology section helped a young and expanding wine and juice industry to develop effective microbiological quality control techniques for bottled products. The approach taken was through the use of appropriate in-bottle stability techniques coupled with a pro-active industrial sanitation program.
In the late 1970s, many new winery licenses were being granted to businesses in the grape growing areas of Ontario. With so many new products being introduced to the market, many made from vinifera grapes or new hybrid varieties, one of the greatest tasks of the industry was to convince the wine drinking public that Ontario wines were at least of comparable quality to imported brands.

The Wine Council of Ontario, the Liquor Control Board of Ontario (LCBO) and HRIO/HPL joined together to establish a wine standards program to test subjectively the sensory qualities of table wines. The initial stages of the project entailed testing the tasting and olfactory senses of potential panel members by determining their ability to recognize the basic tastes and discriminate small differences between samples. A glossary of descriptive wine terms was developed, periodic wine evaluation workshops were held and regular training was given in wine evaluation techniques.

Once a pool of wine tasters was formed, random panels were selected, each made up of six persons, two representing the wineries, two from the LCBO wine consultants and two from the staff of
HRIO. Tastings were held biweekly at HPL. Wines within a certain price range were selected and purchased randomly from an LCBO outlet. The color, clarity, aroma, taste and overall appeal of wines selected were scored in blind tastings. The wines selected were domestic and imported products, both red and white. Results were tabulated and compared and information was passed onto the LCBO and the Wine Council of Ontario. Bottling codes of all wines were recorded and any products having less than acceptable scores were further evaluated by the LCBO laboratory.

Hundreds of wines were continually tested through the Ontario Wine Standards Tasting Committee providing a comparison of quality between Ontario-produced and the more widely sold imported products and assuring an acceptable level of quality to the consumer. This program continued until the end of 1986. After that time, the industry itself developed the Vintners' Quality Alliance (VQA) to govern its own products for content and quality.

The wine standards work at HRIO was the first of its nature to be carried out in Ontario and many of the procedures developed there have been incorporated into the continued tasting programs of the LCBO and the VQA. Similar panel selection methods have been used and/or adapted by the LCBO, industry and wine judging competitions such as Intervin, an international wine competition.
Development of Ontario Grape Standards

RICHARD V. CHUDYK

New plantings of high quality vinifera and hybrid grapes in Ontario in the 1970s led to the production of quality table wines by Ontario wineries. As a result the industry focused attention on grape production practices that would result in high quality grapes for table wine production.

The Ontario Wine Council and the Ontario Grape Growers' Marketing Board, acting through the Ontario Grape Industry Advisory Committee, made a formal recommendation to develop formal standards for Ontario wine grapes. The Horticultural Products Lab (HPL) at Vineland was asked by industry to assist in the technical development of the standards and to recommend grape sampling and testing methods.

Starting in the late 1970s an annual grape crush analysis was conducted on all grapes delivered to Ontario wineries. The purpose was to develop a data base that would be used to establish a grape pricing scale. In order to establish an historical data base every delivery of grapes to a processor was sampled and tested for various parameters. The industry agreed that the grape pricing would be based on grape sugar levels but other factors such as pH and total acidity were tested as well. Once a five year commercial
track record of sugar quality was determined, a sliding payment scale for each major table wine variety was then established based on the running five year sugar average.

The research and testing that went into the development of grape standards had a positive ripple effect throughout the grape and wine industry. The industry had real first hand information on the whole Ontario commercial grape crop showing that high sugar quality could be obtained throughout the Niagara grape growing area. Location and soil type were important factors. However, growers and wineries alike could see first hand how cultural practices had an important influence on grape quality. The overall role that the HPL played in the development of grape pricing based on sugar quality helped the whole grape and wine industry to develop a total quality awareness approach to grape and wine production. These early developments are the precursors of today's wine grape pricing standards in Ontario.
Prior to 1972, mechanization projects at Vineland were done within cooperative programs with the University of Guelph Engineering Department. One such project was mechanical strawberry harvesting. In addition, a strawberry harvesting aid was fabricated at Vineland for use in experimental plots. Starting in 1972, an engineering program was initiated at HES Vineland to develop and evaluate new technologies.

The research station had acquired a specialized over-the-row tractor for high density plantings of grape vineyards and apple orchards, and subsequently developed non-commercial research-oriented implements such as ultra low volume sprayers, cultivators, mowers, and a sickle bar pruning system to work in these narrow spacings. Other new technologies were being evaluated at Vineland such as trickle irrigation, a new method just introduced into North America. Several of these irrigation systems were designed, installed, and evaluated at on-farm locations.

In 1976, additional engineering resources were added at Vineland, specifically to evaluate a shake-catch cherry harvester which was purchased and modified for clingstone peaches and processing grade apples. Several improvements were made over a
few years by adding padded conveyors, a tilting bin filler, and an automated bulk bin weighing system used to accurately measure crop yield. Mechanical and economic feasibility studies were undertaken to evaluate the harvest efficiency. A computer analysis of the physical properties of peach and apple varieties was made to determine what varieties were more suitable for mechanical harvesting, and to select the best padding materials needed to reduce bruising. Extensive mathematical break-even analysis and economic feasibility studies were conducted on mechanical harvesting systems for strawberries, peaches and apples.

Uniform maturity and standardized plantings of fruit crops seemed to be the key factors governing success of mechanized harvesting, handling and processing systems. Evidence of this was the success realized with field crops generally and many vegetable crops, which were already fully mechanized.

In 1982 a project to develop a strawberry processing industry was initiated and a prototype self-propelled combine style harvester, developed for harvesting strawberries in a solid bed planting, was purchased and evaluated together with related processing equipment to separate clusters and de-cap berries. Information was also collected and used in an economic comparison with a harvest aid and conventional hand harvesting. Under this project, a 7 m long self-propelled harvest aid with an automatic pallet unloader was developed at Vineland. It was used to harvest strawberries planted in 5 m wide solid beds. In this study, mechanical harvesting of a standardized solid bed planting of evenly matured fruit showed potential for full mechanization.

New technologies from Europe were also tested at Vineland. One project involved importing a commercial multi-person self-propelled picking platform (Pluk-O-Trak) for use in narrow spaced orchards. These picking aids were closely watched by the grower community for labour saving potential.

In 1982, new multi-room storage research facilities were built at HPL to study improved technologies to help growers extend marketing seasons. A gas sampling system was developed and consisted of automated atmosphere monitoring and control of 20 experimental sized low oxygen sealed rooms (CA rooms). An extensive temperature and dew point humidity monitoring and alarm system was also developed. Projects were undertaken to construct small scale forced air cooling and hydrocooling equipment that quickly removed field heat from recently harvested crops. Other projects, aimed at controlling moisture loss in stored produce, involved moist filament air flow systems, misting systems, and
desiccant humidification technology. Other operational aspects of the storage operation were studied including proper air flow through palletization.

In the greenhouse, technical and energy efficiency projects involved fabrication of an automated curtain shade system, and development of a differential thermostat control system for circulating solar-panel heated water into an underground rock storage used for greenhouse floor heating. To analyze temperature data collected on greenhouse data-loggers, software was developed for use on an early desktop computer system.

The engineering program was involved with installation of an automated weather station as part of an Ontario network involving 12 stations. Information was collected by data-loggers and accessed automatically through telephone lines using a computer. Software developed at Vineland was used to summarize all data, including rainfall, relative humidity, air and soil temperatures, solar radiation, wind speed and direction, into daily weather reports. Information was used for modelling purposes, annual reports, and to supplement manual data collected for national archiving.

At the Vineland Grape Research Station, equipment was developed for the mechanical removal of basal grape shoots using soft flailing tubes mounted on a rotating wheel. This program was also involved with the study of mechanical pruning systems including the use of pruning platforms and aids. Other specialized equipment developed for the wine industry included the design of a grape sampling probe. In the early 1970s, the Vineland Grape Station was the first site in the area to demonstrate a wind machine for frost control in the vineyards. This machine was used to draw a warmer layer of air down to mix with low temperature ground level air.

Specialized processing equipment for experimental use was also developed at the HPL, including the construction of a mobile laboratory sized juice and wine pasteurizer, design of a diverging belt strawberry sizer, flow through dryers for dehydrating fruit, tomato chopper processing aid, and experimental sized chain conveyors for washing and spray waxing of fruit.

The Vineland engineering program was actively involved for nearly 30 years in the development, evaluation and demonstration of agricultural mechanization and new technologies that could be used in the overall effort to lower the cost of our food production. The program was terminated in August 2000.
R. Guy Mercier joined the Vineland staff in May 1952 and was assigned to carry out a number of responsibilities including gamma radiation studies designed to extend the post harvest life of fruits and vegetables. Cobalt 60 was used to provide the radiation. A report by Mercier, R.G. and K. F. MacQueen, (Atomic Energy of Canada, Ltd.) 1965, published in the Annual Report of the HES and HPL for 1965, showed that cobalt 60 gamma radiation had value in extending shelf or storage life of apples, apricots, mushrooms, peaches, pears, strawberries and plums. A 200 Kilorad treatment for mushrooms and strawberries gave the best results. Radiation levels above 200 and less than 200 were not as satisfactory. Irradiation caused some change in fruit quality but not sufficient to make the fruit or products unacceptable.

Commencing in the 1960s, J. R. van Haarlem undertook an extensive study on the marketing problems of Ontario fruit, particularly peaches. His survey of marketing conditions and fruit quality determined that the quality of peaches reaching the markets left a great deal to be desired. Ontario peaches reaching markets suffered from two undesirable conditions. Many were picked early and arrived on the market too green to be eaten as fresh fruit. Others that were picked in more ripe stages were badly
bruised and not saleable. It was obvious that the marketing of fresh peaches needed much improvement. van Haarlem carried out a number of trials with different containers and eating-ripe fruit. His trials proved that peaches packed in smaller containers using the "panta-pak" trays would provide a means of getting eating-ripe peaches to market in good condition. His research showed that panta-pak trays covered with a layer of transparent plastic film over the fruits would ship effectively and the fruits could be presented in the market place in good, ripe condition. Such trays and covers could also be used for other fruits. Changes in handling eating-ripe fruit resulted from these studies.

Mercier also examined the use of various containers, display techniques and transport of fruits and the work of these two Vineland researchers led to considerable improvements in the marketing of Ontario fresh products especially peaches.

van Haarlem retired in Feb. 1965 having worked at Vineland Station for 42 years in various positions. but his services as a Consultant in Marketing were retained for several more years.
I think our governments will remain virtuous for many centuries: as long as they are chiefly agricultural.

*Thomas Jefferson to James Madison, 20 Dec. 1787*
SERVICES AND SPECIAL PROGRAMS
PHOTOGRAPH CAPTION LISTING

Page 183 - Z.A. Patrick, Plant Pathologist, University of Toronto

Page 190 - Weather Station at Horticultural Experiment Station, 2005
Plant Pathology Services

Z. A. Patrick

Dating back to the early days of the Vineland Horticultural Experiment Station, plant pathologists in the Botany Department, University of Toronto, have been closely associated with the Station. When a professor of plant pathology was appointed at the University of Toronto in 1926 a co-operative arrangement was made between the Ontario Department of Agriculture and the University whereby his services were to be shared by both of them. The appointee was to be located at the University during the academic sessions and at Vineland during the four summer months. A laboratory and other facilities were to be provided in which plant pathological research could be conducted by the pathologist and associated graduate students. Professor L.C. Coleman was the first to occupy this position and on his return to India in 1928 he was succeeded by Professor D.L. Bailey. When Professor Bailey retired in 1965 he was succeeded by Professor Z.A. Patrick who held the position until his retirement in 1990, when this unique arrangement was discontinued.

The co-operative arrangement with some modifications and adjustments survived for over sixty years. It contributed enormously to the research and teaching programs and had other
obvious benefits to both institutions. Graduate students in plant pathology had the use of facilities not available in the Botany Department. They had the opportunity to study plant diseases and their economic impacts in the field and gain other valuable practical experiences. At the same time plant pathology related information and advice was available to the research scientists at the station and many joint research programs were undertaken. Plant pathology expertise and diagnostic services were provided to extension personnel and commercial growers and suitable controls were suggested where possible.

The activities of the pathology laboratory in Vineland up to 1956 are summarized in the report of the Horticultural Experiment Station for "The First Fifty Years" and those during the 1965 to 1990 period are listed below. The information includes the graduate students involved, problems studied, years and degrees obtained.

Small Fruit Plant Certification Programs

C. Lewis Ricketson

In the 50s and early 60s, viruses were identified as limiting productivity and longevity of strawberry and raspberry plantings. Consequently, an Ontario strawberry plant production program using indexed stock was started in 1958 and a raspberry program in 1962. Regulations were drafted and enacted by Order-in-Council under the Department of Agriculture Act. Regulations were designed to control viruses, other diseases, insect pests, mites, nematodes and to maintain varietal purity. Indexed Nuclear plants were provided by Agriculture Canada (A.T. Bolton in Ottawa and later by T.R. Davidson, Vineland). These were grown one year in a screenhouse at Vineland Station, and strawberries also in a screenhouse at Dr. John Brown’s farm at Milton, Ont. Elite plants from screenhouses were then grown by Foundation stock growers followed by Certified stock growers. The programs were supervised by Dr. C. Lewis Ricketson with J.V. Shannon and Garnett C. Jackson of the OMAF Farm Products Inspection Service doing much of the inspection.

First Certified plants of strawberries were available the spring of 1961 when three growers produced 800,000 plants. By 1976, over 14 million plants were being produced annually. Early
growers of Foundation and/or Certified plants were: Norfolk Farms (John Cooper), R.I. Freeman, Stanley Brown, McGuigan's Orchards, Albert Cross, Jacobs' Farms. First Certified raspberry plants were available in the fall of 1965. Initially six or seven growers produced Certified plants but, largely because of inability to meet regulations, only two remained by 1972 - Blue Mountain Nurseries and Mrs. Alden May. Production was about 400,000 plants a year. Settlement in 1975 of legal action against OMAF, revolving around the identity of Latham raspberry, showed the vulnerability involved in the Certification Programs. Thus OMAF proceeded to phase them out. Raspberry plants grown in 1974 and strawberry plants in 1976 were the last certified.

New programs were introduced in 1978. Agriculture Canada (Vineland) continued to supply Nuclear plants and HRIO produced Elite plants. The Ontario Fruit and Vegetable Growers' Association accepted applications from Foundation and Certified growers and published lists of plant producers. The Farm Products Inspection Branch of OMAF did the inspection with technical assistance from HRIO, and growers did their own certification and tagging. To provide high quality plants, production guidelines were similar to those of the former programs.

In 1994, the Ontario Berry Growers' Association (OBGA) assumed oversight of the berry plant propagation programs. Agriculture Canada (Harrow) did the indexing of strawberry plants until 2002. Andrew Vandenberg (Berry Crops Technician, HRIO, Vineland Station) was contracted to supervise the programs, produce Elite stock in screenhouses on the campus at Vineland, and inspect plants grown as Foundation and Certified stock. He continued in this capacity until 2002. Average Elite strawberry plant production for the period 1991-1994 was 109,020 plants, and for 1995-2001 was 67,400 plants. The last year that Elite raspberry plants were produced at Vineland was 1996, when production was contracted out to New Liskeard College of Agricultural Technology.

In 2002, the OBGA also contracted with New Liskeard to do the indexing and Elite stock production of strawberry plants. Becky Hughes supervises this work at New Liskeard and inspection is under the supervision of OBGA. In recent years, the following Ontario growers were the main Certified stock producers: John Cooper - strawberries and raspberries; Harry Ghesquiere - strawberries and raspberries; Paul Watson - raspberries. It is interesting that three generations of the Cooper family have been involved in the Certified Strawberry Plant Program since its start: John, Gary and John.
Distribution of Propagation Materials through Superior Stock Program

EMIL T. ANDERSEN

As early as 1935, nursery companies and fruit growers were encouraged to obtain propagating materials from the Vineland Horticulture Experiment Station. The orchards at the Experiment Station were all carefully and correctly labeled and only source trees or plants of healthy appearance were included since a dependable source of propagation materials was vitally important.

The following table gives the accumulated number of true-to-name standard cultivars distributed to nurseries and growers during the period 1935 to 1946.

<table>
<thead>
<tr>
<th>Fruit Type</th>
<th>No. of Varieties</th>
<th>No. of buds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apples</td>
<td>43</td>
<td>252,000</td>
</tr>
<tr>
<td>Pears</td>
<td>10</td>
<td>2,500</td>
</tr>
<tr>
<td>Plums</td>
<td>21</td>
<td>7,500</td>
</tr>
<tr>
<td>Cherries</td>
<td>20</td>
<td>25,000</td>
</tr>
<tr>
<td>Peaches</td>
<td>56</td>
<td>77,000</td>
</tr>
<tr>
<td>Apricots</td>
<td>3</td>
<td>4,000</td>
</tr>
<tr>
<td>Grape (cuttings)</td>
<td>40</td>
<td>23,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>193</strong></td>
<td><strong>391,000</strong></td>
</tr>
</tbody>
</table>
Early in the 1940s, it was recognized that trueness to name was not the only significant requirement of propagation material. In 1945 attempts were made to provide virus clean bud materials for sweet and sour cherries. The federal Department of Agriculture Research Station became involved and virus free (necrotic ringspot and sour cherry yellows) materials were made available to the Provincial Horticulture Experiment Station to provide source material. This move then led to the need for obtaining clean stocks of other tree fruits as well. Since 1968 Agriculture Canada has maintained nuclear stocks of apples which provide virus tested materials that were increased by HRIO and made available for distribution to nurseries and growers. Provision of nuclear stocks for plums and pears by Agriculture Canada began in 1972 and 1975 respectively.

As a result of the exceptional work of Agriculture Canada’s station at Vineland, this service program of the Institute became very extensive. Using 1985 as a representative year of this program the following table from that year’s report is included as follows:

<table>
<thead>
<tr>
<th>Crops</th>
<th>Virus-tested</th>
<th>Not virus-tested</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apricot</td>
<td>–</td>
<td>12,760</td>
<td>12,760</td>
</tr>
<tr>
<td>Apple</td>
<td>250,545</td>
<td>4,550</td>
<td>255,095</td>
</tr>
<tr>
<td>Cherry: sweet</td>
<td>65,895</td>
<td>5,190</td>
<td>71,085</td>
</tr>
<tr>
<td>Cherry: tart</td>
<td>95,950</td>
<td>–</td>
<td>95,950</td>
</tr>
<tr>
<td>Nectarine</td>
<td>2,900</td>
<td>7,330</td>
<td>10,230</td>
</tr>
<tr>
<td>Peach</td>
<td>35,480</td>
<td>74,135</td>
<td>109,615</td>
</tr>
<tr>
<td>Pear</td>
<td>75,350</td>
<td>4,820</td>
<td>80,170</td>
</tr>
<tr>
<td>Plum</td>
<td>82,545</td>
<td>9,190</td>
<td>91,735</td>
</tr>
<tr>
<td>Total</td>
<td>608,665</td>
<td>117,975</td>
<td>726,640</td>
</tr>
</tbody>
</table>

In addition to the major effort of the Institute in cooperation with Agriculture Canada to provide high quality propagating materials of tree fruits a strawberry and raspberry program was developed entitled the Ontario Strawberry and Raspberry Plant Propagation Program. A separate article in this Report deals with that specific program.

In 1978 a cooperative effort between Agriculture Canada, the Grape Growers' Marketing Board and the Institute was formalized to provide sufficient quantities of virus-tested elite stock of scion and understock selections of grapes for commercial nurseries, wineries and growers. The plantings for this program were all located at the HRIO for distribution.
The several programs referred to above have been extremely effective in supplying superior stock to the industry. In recent years the outbreak of Plum Pox virus in stone fruits has forced Agriculture Canada to become heavily involved with this disease and therefore to reduce its participation in the regular programs. However, mother block trees and the continued use of high quality stock materials descended from these still provides high quality propagation bud and plant propagation materials yearly to nurseries and growers.

The program has been highly significant in maintaining the production of high quality nursery trees and plants for the industry. Without doubt, nearly all of the bud materials used by nurseries in Ontario comes from the mother block trees of the Institute.
Meteorological Data Collection at Vineland

SHARON (KERR) STEVENSON

Weather data collection began in 1916 as a joint effort between the Horticultural Experiment Station and the Meteorological Service of Canada (MSC), Dept. of Marine and Fisheries, Canada now known as Atmospheric Environment Service (AES), Environment Canada. The MSC provided the needed thermometers and equipment (Campbell Stokes recorder for bright sunshine hours, tipping-bucket rain gauge and manual graduated cylinder for rainfall measurement, anemovane and recorder for wind speed and direction, Nipher gauge for snow measurement and soil thermister probes for soil temperatures) while HES supplied the labour to take the readings twice a day, fill in monthly summary sheets to mail back to MSC for national archiving as well as to maintain our own in-house records.

A variety of people were involved in taking the daily air and soil temperatures, precipitation measurements and changing the wind and sunshine charts. In the early days, the Research Scientists took the readings. Guy Mercier taught me when I started in May, 1965, and eventually I was responsible for preparing instructions for the various staff members who could be conscripted to fill in on weekends and vacation times. Even the
stationary engineers helped by taking the weekend data for a number of years. Fellow agricultural technicians and the occasional summer student also took a stint.

In 1965, the Meteorological Branch of the Canada Dept. of Transport installed another weather station at the Grape Sub-Station, which, at that time was known as Rittenhouse and was labelled as such by AES in all their publications. Vern Kirk took the readings at this site while I wrote up and mailed in the summaries. Later, Noel Pye continued to take the readings when Vern retired.

One major change took place in 1976 when AES replaced all Fahrenheit thermometers with Celsius, which, in turn, required a change in the calculations of temperature averages, heat units, degree days, etc.

In 1988, an automated weather station was installed north of the HPL building as part of an OMAF network of weather stations across Ontario. Eugene Lauro and David Wismer were in charge of setting up this new system and testing it for two years to compare the data for accuracy before it eventually replaced the manual readings. The readings and summaries still had to be handwritten and mailed to AES at the end of each month as they had agreed to accept these readings as 'official'. Relative humidity and barometric pressure readings were added to the list of variables that were recorded and stored every five seconds into a datalogger's temporary memory. At the end of every hour, eight hours and twenty-four hours, the totals, averages, maximum and minimum values were stored on the datalogger's final storage and could be printed out, viewed on a computer screen, or summarized at the end of each day. The biggest challenge came in deciding how best to summarize and print out all the reams of data available into something meaningful and useful for further reference. David Wismer designed a monthly and yearly summary sheet with as much pertinent data as was felt necessary. The wind tower that housed most of the weather recording equipment was struck by lightning within the first year requiring some repairs, replacements and proper grounding of the tower.

Vineland (Grape Sub-Station) also had an automated weather station installed west of the services building (known as HRIO - Cherry Ave) and became one of 12 contributing sites for Niagara's Automated Weather Network (NAWN) established in 1994 to assist farmers in the Niagara region with integrated pest management using computer modelling and improving spray timing. Now this weather site can be accessed through the Ontario Weather
Network at: www.ownweb.ca by going onto the site map - locations, choosing the Niagara Area and specifically selecting Vineland Cherry Ave. It is just one of a total of 13 sites in the Niagara region. This Internet address has been set up by Ian Nichols from Ridgetown College as an aid to farmers and includes both past data (for up to one year) and forecast data for up to 10 days.

Since April 2001, AES has once again taken over the responsibility of providing the equipment and maintenance for an automated weather station at Vineland Station situated NW of the HPL building. Climate Data Online can now be obtained for Vineland Station by logging on to their Internet site at: http://www.climate.weatheroffice.ec.gc.ca.

Also, Canadian Climate Normals and Averages are listed there for both Vineland Station and Vineland Rittenhouse weather stations. After 2001, readings were no longer taken at the Rittenhouse site.
OTHER GOVERNMENT AGENCIES
AT VINELAND
PHOTOGRAPH CAPTION LISTING

Page 195 - Agriculture and Agri-Food Canada building.
Horticultural Experiment Station, Vineland Campus

Page 200 - Original Administration Building constructed in 1908.
Present home of OMAFRA Extension Services

Page 203 - Bob Wilcox (left), fruit extension specialist with growers.
History of Agriculture and Agri-Food Canada at Vineland

JOHN POTTER

To comprehend the early history of Agriculture and Agri-Food Canada (formerly Canada Department of Agriculture) at Vineland, one must look back nearly 95 years and follow twin threads of development, one thread in St. Catharines, the other in Vineland Station.

This is because the Dominion Entomological Laboratory, later known as the Fruit Insect Laboratory, was founded on the Vineland Station campus in 1911, while the Dominion Laboratory of Plant Pathology began operations in 1912 in St. Catharines and functioned there until the two laboratories were physically amalgamated at Vineland Station in 1968.

Mr. R. C. Treherne was the first Officer in Charge of the Dominion Entomological Laboratory in 1911, followed by Mr. William A. Ross from 1911 to 1947. Ross placed special emphasis on the apple maggot, the pear psylla, and several species of aphid pests on fruit crops, although insect pests on greenhouse and vegetable crops were also studied. From 1911 to 1924, the provincial Horticultural Experiment Station provided office space and orchard plots for the federal laboratory staff. In 1925 a two-storey brick building, having just three rooms, was built on the
provincial station grounds to house the Dominion Entomological Laboratory. This building was enlarged in 1934 by adding more offices, a chemistry laboratory and a library. In 1939 a greenhouse and a connecting house were constructed and attached to the provincial station.

A field station of the Dominion Entomological Laboratory was established in 1927 at St. David's, Ont. in a 34 ha peach orchard, after the discovery of a heavy infestation of the oriental fruit moth. This field station functioned until 1934, collaborating closely with the Dominion Parasite Laboratory in Belleville, Ont. The St. David's Station closed when the Vineland building was enlarged.

In 1929, another field station was created at Simcoe, Ont. to study apple insect problems. Research and extension activities were carried out primarily by Mr. J. A. Hall and Mr. A. Hikichi. This Station operated independently until 1958, and was then administered by the Vineland laboratory until 1967, when the Simcoe substation was closed.

Research on the biology and control of fruit pests, as well as the testing of new pesticides, continued through the 1930s - 1950s at the Federal Fruit Insect Laboratory. During this time, spray calendars for growers were developed, and studies on the feasibility of controlling pests with parasites and predators were also pursued. The first studies on the control of plant-feeding insects by DDT were conducted here in the mid-40s, and the scientists quickly recognized the adverse effects of such chemicals on beneficial insects. These results spurred the research on use of biological control in orchards. Through most of the period from 1947 to 1968, this laboratory was supervised by Mr. Gordon Dustan.

The Dominion Laboratory of Plant Pathology began research on plant disease organisms in 1912, in a one-room portable field laboratory on a peach orchard on Carlton Street in St. Catharines. Mr. W. A. McCubbin was the first Director (1912-1917), supervising research on the life cycles of disease pathogens, development of pesticide application schedules, and the evaluation of pesticides against plant disease organisms. This laboratory, operated by the Botany and Plant Pathology Division of the Federal Experimental Farms Branch, was moved in 1913 to larger quarters in the centre of the city, on St. Paul Street. Mr. P. A. Murphy (1917) and Mr. W. A. Rankin (1918-1922) were briefly Officers-in-Charge.

Dr. G. H. Berkeley directed the St. Catharines laboratory from 1923 to 1959. In 1928, a 14.5 ha farm on Niagara Street on the outskirts of the city was purchased from the Buchanan family,
and a new building was inaugurated in 1930. During the pre-war era, classical studies of brown rot and strawberry root rot were conducted. Through the 1940s - 1950s, research emphasis was expanded into plant virus diseases and diseases of ornamentals. Fruit disease research included studies of peach canker, improvement of plant disease pesticide application schedules, and physical/chemical, epidemiological and serological studies of fruit viruses.

The administrative amalgamation of the Dominion Entomological Laboratory at Vineland and the Dominion Laboratory of Plant Pathology at St. Catharines took place in 1960, when one Director, Dr. Donald A. Chant (1960 - 1964), assumed responsibility for both centres. Physically, the two Laboratories continued operation in their respective locations until 1968. In 1958, a 19 ha farm at Jordan Harbour was purchased to replace the farm at the Dominion Laboratory of Plant Pathology at St. Catharines. From about 1958 to 1967, a new office-laboratory-greenhouse complex was constructed on leased land on the provincial campus at Vineland to house all the federal research staff, construction being halted and delayed for various reasons. Staff of the Dominion Entomological Laboratory moved into the new quarters in 1967, followed by the Dominion Laboratory of Plant Pathology staff in early 1968, and the facility was officially opened by Agriculture Minister Joe Green in May, 1968.

Dr. William B. Mountain (1964-1969) was Director during the latter stages of construction of the new complex, having been previously Section Head of Nematology at the Canada Department of Agriculture Research Station at Harrow, Ontario. Under his direction, nematology capability at Vineland was augmented greatly, and a nematode diagnostic service was operated jointly by federal and provincial staff for several years. Pesticide residue chemistry research was stimulated by transfer of a residue chemist from Ottawa, and engineering expertise for pesticide spray application was added. The appointment of a specialist in grape virus diseases proved fortuitous in the early 1970s when tomato ringspot virus threatened the DeChaunac hybrid grape variety. At its peak, the Station housed 18 scientists, plus post-docs and support staff including technicians, farm crew, greenhouse staff and maintenance crew.

Change being inevitable in biology, it is not surprising that the research staff, their mandates, and even the name of the Station at Vineland have changed since the official opening. Dr. Mountain was succeeded by Dr. G. M. Weaver (1970-1971), Dr. A. J.
McGinnis (1972-1980), and Dr. D. R. Menzies (1981-1991); in the interims between Directors, various scientists were temporarily appointed as Officer-in-Charge. The Department changed from 'Canada Department of Agriculture' to 'Agriculture Canada' in the early 1970s, and later to 'Agriculture and Agri-Food Canada'. The staff broadened their outreach to work on crops as diverse as tobacco, ginseng, strawberries, ornamentals, and field legumes and grasses, as well as maintaining research in fruit and vegetable pests and diseases. Diagnostic methods, studies of pathogen life cycles, and efforts at reduction of pesticide use, managing pesticide resistance, and application of hyperparasites and predators to reduce insect pests became the 'new' science. Through all this, the federal staff consistently operated on the principle that the Agriculture Canada role was pest management, which must mesh and fit in with the plant production programs being studied by their provincial counterparts. Federal staff served as experts in their various disciplines on the Provincial Pest and Disease Advisory Committees which produced the annual Advisory Calendars. Close association also with the OMAF Extension Specialists was emphasized. While nematode diagnosis became a function of the Pest Disease Clinic at Guelph, a fungicide resistance diagnostic service was initiated in 1981 by a Vineland plant pathologist in cooperation with OMAF extension specialists.

The 1990s ushered in an era of downsizing, cost reduction and out-sourcing. Federal research stations were encouraged to seek support from private-sector partners and emphasize research that would bring financial returns to the Department; biotechnology and genomics were the 'buzzwords'. In 1992, Dr. C. F. Marks became Director of the Agriculture and Agri-Food Canada facility at London (first named Central Ontario Agri-Food Research Complex, then changed to Pest Management Research Centre [PMRC]). The federal Vineland Research Station, which had been downsizing in all disciplines (chemistry, engineering, nematology, plant pathology, entomology), became a subordinate Research Farm managed by Mr. G. Poushinsky (1992-1995); the former Tobacco Research Station at Delhi also entered the PMRC under supervision by Dr. G. Whitfield.

In 1995 further changes came as research on vegetables was moved to the Harrow AAFC Centre, and entomology studies on ornamentals were discontinued; thus the Vineland mandate was now fruit protection only. From 1995 onward, under the supervision of the Director at London (Dr. C. F. Marks [1992-2000], then Dr. Gilles Saindon [2000 - ]), Vineland functioned as a sub-unit of
what was now called the Southern Crop Protection and Food Research Centre (SCPFRC), with various scientists being given the title 'Officer-in-Charge' for administrative purposes. Currently, the scientific staff at the Vineland Research Farm includes two entomologists, three plant pathologists, one fruit breeder (seconded to U. of Guelph) and one virologist; nematology and engineering have disappeared completely from the research program.
"Supposing we were to take the knowledge we have gained in stock breeding and seed growing and horticulture and send it all over this country, and get the farmers and the farmers' sons to live up to that knowledge, what a wonderful revolution would take place." These were the words of C.D. James, Deputy Minister of Agriculture in an address to the Experimental Union in December of 1907. Thus set in motion actions that resulted in agricultural extension offices across Ontario and the policy of having a representative of the agricultural Minister in every county - the Ag. Rep. as they became known.

The first offices were established in 1907 in the counties of Dundas, Essex, Lanark, Simcoe, Victoria and Waterloo. It should be noted that this was seven years before the Smith Lever Act in the United States that established the Land Grant Colleges and the county extension service south of the border. The office for Lincoln County (later to be called Niagara North) was established in St. Catharines in 1917. The office was moved to Vineland Station in 1955.
The first Agricultural Representative in this area was Mr. D Elliott from July 1917 to Jan. 1919. Ag. Reps to follow were:

- George Wilson: Dec. 1919 to April 1923
- W.S. VanEvery: May 1923 to Oct. 1926
- E.F. Neff: Nov. 1926 to Aug. 1949
- Grant Mitchell: July 1951 to June 1960
- J.W. McCullough: July 1960 to Nov. 1969
- Ralph S. Winslade: Jan. 1970 to June 1973
- Calvin Holden: Jan. 1983 to July 1993
- Dan Carlow: July 1993 to May 1996

The role of the Ag. Rep. and his assistants in Niagara was at first of a general agriculture nature. They served the livestock and field crop businesses primarily south of the escarpment. Separate fruit and vegetable specialists serviced the local horticultural industry with technical support and relevant information on various government programs.

The 4H and Junior Farmer programs were an integral part of the extension program. By working with young people, new ideas were introduced to the farming operations as well as establishing relationships with the farmers of tomorrow that gave credibility to the service.

As time went on the Ag.Rep's. role became centered on farm business management and estate planning. As property values increased, the challenge of inter-generational transfer of the land and business became extremely complicated. Initially the legal and accounting professions, while accustomed to urban business, were unaware of the complications of transferring a farm business and the special regulations and provisions allowed to farmers. Equally, farm families were unaware of the need for forward planning to allow for a transfer that minimized taxes.

The Ag.Rep's. role also included development and training in leadership. As such he served as the secretary treasurer for many organizations. This role was gradually turned over to members of the organizations as both the general education level increased and Reps had been successful in training people to carry out this role. That released time for Reps to concentrate on farm business management.
Over the years, a number of Government programs has been designed to put money in the hands of farmers. Many of these programs were delivered locally by the Ag. Rep staff.

Following down-sizing of several government services, the Ag. Rep. position was eliminated in 2000. Neighbouring county offices were grouped and the former Ag. Rep. duties were then performed by Regional Information Coordinators. Carol Pupo was appointed to this position at Vineland.
Niagara's horticultural industry has traditionally looked to the Horticultural Experiment Station, Vineland Station for advice and leadership. Fieldmen, or Extension Specialists, were appointed over the years to provide this service, initially through the Experiment Station, later through the Agriculture Representative Branch. The Experiment Station appointed J.A. Nielson as the first full time fieldman in 1923. He was followed by J.A. Goldie 1929-1939, C.B. "Chuck" Kelly 1939-1950, and R.R. "Bud" Lipsit 1950-1954. Mr. Lipsit was transferred to the Agriculture Representative Branch in 1951 and Ralph Moore was appointed in 1951 to share the workload with Mr. Lipsit. The Agriculture Representative Branch became the Extension Branch in 1951, and the local office was transferred from St. Catharines to the Experiment Station in 1955, thus bringing the fieldmen together with the Agriculture Representatives into the newly formed Extension Branch.

The fieldmen became known as the Fruit and Vegetable Extension Specialists and became a section of the Extension Branch, under the direction of W.B. "Bill" Fox, as Associate Director of the Branch. Mr. Fox was located in the Extension Building at the Experiment Station in 1955.
Mr. Fox supervised a province wide staff of approximately 10 specialists including two positions located at the Vineland complex to service specifically the Niagara area. Additionally, Lowe Butler, fieldman for vegetable canning crops provincially, was a member of the Research Station staff.

1956 was a year of change as incumbent specialist Ralph Moore was transferred to Norfolk County. George Eaton (1953) left to pursue graduate studies. Stu Carpenter transferred from the Oakville Office and Bob Wilcox joined the Fruit and Vegetable Section. Mr. Carpenter joined the Michigan State Extension program in 1960 and Ian Smith moved from the Canada Department of Agriculture in 1961 as his replacement. The Wilcox/Smith duo remained a fixture until their respective retirements in the 1980s.

With the construction of the current research building, the Extension personnel moved into the old research building which the advisory personnel continue to occupy and, since Dec. 1997, now share with staff of the Ontario Ministry of Natural Resources.

For many years the Vineland office included a "trainee" position. New staff members might spend a year or so before transferring to new or vacant positions in other parts of the province. In the meantime, lobbying by industry groups resulted in an increase in the number of specialist positions throughout the province. This included the establishment of a Processing Vegetable Specialist position, located at Chatham (later RCAT, Ridgetown) replacing the Vineland Station position formerly occupied by the late Lowe Butler.

In 1963 Bill Fox transferred to Guelph in a newly created position at the University and was replaced by Byron Beeler of the Picton office. As part of an increasing interdependence i.e. Research/Extension, Mr. Beeler located to the Horticulture Research Building at Vineland.

More changes came in 1968, when the Fruit and Vegetable Extension section of the Extension Branch amalgamated with the Soils and Crops Branch thus combining all the Provincial Crop specialists under one Branch. Byron Beeler became the Director and was replaced by Jim Rainforth from the Harrow Office, working out of the Agriculture Canada Research building on the Vineland Station campus.

In 1971, the "Direct Producer to Consumer Sales" position was established and located with the Crop Specialists at Vineland. John Vandenberg was first in the position followed in 1974 by Bob Cobbledick, working with Ontario's farmers interested in direct selling through roadside markets and/or pick-your-own businesses. Mr. Cobbledick retired in 1996 and the position was filled by the industry.
Later additions to the Branch positions included Protected Crops - Mushrooms and Flowers with Dr. Theo Blom, and a position largely directed to Integrated Pest Management filled by Wayne Roberts formerly with Agriculture Canada.

Jim Rainforth moved to Toronto as Soils & Crops Branch Director, (1976) and Ralph Shaw from the Alliston office replaced him at Vineland until 1981 when the administration of the Horticulture and Tobacco Advisory Services of the Crops Branch was transferred to Guelph.

The Niagara fruit and vegetable industry has continued to be served by field personnel of the Soils and Crops Branch (later the Crop Technology Branch) providing the all important contact between the farmer and latest technology. Below is a brief chronology of the Crop Specialists at the Vineland Experiment Station during the past 50 years (current specialists*):

- Bob Wilcox 1956-1983
- Ian Smith 1961-1987
- John Vandenberg 1971-1974
- Bob Cobbledick 1975-1996
- Theo Blom 1976-1979
- Wayne Roberts 1976-1984
- Kevin Ker 1983-1997
- Burke McNell 1983-1993
- Gerry Walker 1985-2001
- Maribeth Pitts 1987-2000
- Wayne Brown 1979 - Greenhouse Flower Specialist
- Graham Murphy 1988 - Greenhouse Floriculture IPM Specialist
- Ken Slingerland 1994 - Tender Fruit & Grape Specialist
- Donna Speranzini 1997 - Nutrient Management Specialist
- Hannah Frazer 2000 - Entomology: Horticultural Crops
- Neil Carter 2001 - Tender Fruit IPM Specialist

Over the years, the trainee position has included Andy Ellenberger, Atef Tewfik, Wib Willows, David Sangster, Lloyd Mainprise.

Secretarial services specific to the "Crops" administration included: Della Culp (Cook), Gladys Ann Kineer, Kaye Ashwood, Pam Coyle, Lois Cole, Mary Scobie, Shirley Baranick.

In addition to the crop specialists, Keith Clarke as Extension Engineer and his assistant Ludwig Kerns served the entire Niagara area from Vineland. Tile drainage and building plans have been and still are much in demand. Hugh Fraser has carried on this service following Clarke's retirement. A number of Home
Economists from the Vineland office worked with 4-H Homemaking Clubs and women's groups in the region of Niagara. Community Food Advisors offer this service today. Carol Pupo is the current Regional Information Coordinator and Carolyn Prieur is the Client Service Representative at Vineland.

The objective of the Crop Specialists has remained consistent over the years: to provide advice and guidance on all matters related to crop production. The techniques of meeting the objective have changed with the changes in complexity of the farming industry. The Crop Specialist has gone through numerous name changes, modified administrative structures and experienced an increasingly challenging agriculture industry to serve. Through time and changes the Crop Specialist remains a key person in the delivery of an effective transfer of technology from research establishments to the farm gate.
The Vineland office of the OMAF Economics Branch operated from the HES campus for approximately 40 years beginning in the mid-50s. The name of the Branch changed many times but the mandate of the office changed very little over time. The main responsibility of the office was to supply cost of production and other economic data for the Ontario fruit industry. Working closely with researchers, growers, technical advisors and the Marketing Boards, major studies were completed regularly on all the Ontario fruit crops.

Studies were also undertaken on a one-time basis for such special topics as the tornado-decimated apple orchards in Oxford County in the 1970s and the Vine Removal Program in the 1980s that helped to turn the grape industry of Ontario around. The Branch also supplied horticultural input for the Farm Business Management Handbook that was used regularly by growers, researchers and the advisory services.

Four Economists worked out of the Vineland office over the forty years of service: Max MacCharles (deceased), Bill Dillon (deceased), Harry Walters and Errol McKibbon. The office was closed in 1995 with on-farm collection of financial data from growers replaced by computer-generated crop budgets. The building housing the office (The Lodge) was destroyed by fire shortly after the Economics Branch was eliminated but there does not appear to be any connection between the two events!
Inspection Services and Programs

DAVE STEWART AND PETER VANWEERDEN

Fruit and vegetable inspection programs associated with the HES have a relatively long history dating back to the 1930s. In the early years, provincial fruit and vegetable inspection legislation and inspection programs were managed under the Ontario Department of Agriculture, Fruit Branch. At that time the Vineland Experimental Station was closely linked to the Fruit Branch. A regional inspection office was opened in Grimsby in 1952 with permanent staff. Six years later in 1958 the office was moved to the HES campus. At the station the fruit and vegetable inspection branch staff and offices were located in the director's former residence which was located between the present OMAF advisory services building and the research administration building.

While some inspection programs have a long history in the province some are more recent. Provincial Meat Hygiene/Inspection programs began in Ontario in the 1960s. Dr George Fleming served as the first regional veterinarian and serviced Lincoln County and then additional counties from offices at Vineland Station. Dr. Fleming and a supervising inspector operated out of the director's former residence from 1965 until 1972.
In 1972, The Lodge (the former student residence) became the new home to fruit and vegetable inspection and meat inspection services. These services remained at this location from 1972 until the offices were destroyed by fire in October 1995. After the fire, meat inspection staff, including two area managers and one administrative support staff moved into a new office location in the advisory services building. Since 2001, only the Niagara area district manager continues to have office space at Vineland Station. Other than sharing office space and social interaction, there has been no formal program interaction between meat inspection and the Vineland Station research programs.

Over the years, the fruit and vegetable inspection branch ran numerous province-wide programs from this office. Six permanent staff and numerous part-time employees worked out of the Vineland district office including sub-offices located in Waterloo, Hamilton and Simcoe. Some programs were developed by collaboration between produce marketing boards, Vineland Station research staff, industry partners and the fruit and vegetable inspection branch.

One of the most successful examples of a collaborative program was the wine-grape grading program. The program was developed in the early 1980s by staff from the HPL, the Ontario Grape Growers' Marketing Board and Inspection Branch. The wine-grape grading program involved sampling loads of wine-grapes when they were delivered to Ontario wineries in order to determine price. The program procedures included the sub-sampling of all Ontario grapes delivered to the wineries, the crushing and extraction of grape juice from the loads and the testing of the juice for sugar content or brix determination. Over the years, the program grew to include almost all varieties of domestically grown grapes for wine, ice-wine and grape juice produced by Ontario wineries. Wineries pay the growers prices based on the negotiated price agreements between the marketing board, growers and wineries of the province. The ministry privatized this program and other neutral third party grading programs in 1997.

Examples of other neutral third party grading programs that were conducted while inspection services were at the Vineland Experimental Station included the tomato, potato, asparagus, beet, pickling cucumbers and sour (tart) cherry grading programs.

The branch also conducted a number of fresh market inspection programs for all fruits and vegetables, honey and maple syrup products. These programs were designed to help maintain the orderly marketing of these products in the domestic
market place through established grade standards. Many of these grade standards were created through the work of such organizations as the Ontario Fruit and Vegetable Growers' Association and the Canadian Horticultural Council.

Fruit and Vegetable Inspection Branch staff also conducted field inspections. The first, second and pre-harvest apple maggot inspections were conducted in Niagara, Waterloo, Oxford, Perth, Haldimand-Norfolk and Wentworth counties in cooperation with the Canada Department of Agriculture, now known as the Canadian Food Inspection Agency. Bacterial Ring Rot field inspections for Ontario grown potatoes and Japanese Beetle inspections were conducted by branch staff under the authority of the Plant Diseases Act.

Other programs operated by inspection services from the HES campus include:

- Abandoned Orchards Act passed in 1966.
- In 1960 a regulation governing the operation of controlled atmosphere storage for apples was implemented.
- Strawberry plant certification initiated under the Department of Agriculture Act in 1961.
- In 1963 the branch assumed responsibility for the inspection of the flue-cured tobacco crop.
- A raspberry plant certification program initiated in 1964.

In 1997, fruit and vegetable inspection programs were reorganized, some privatized, others deregulated or considered on a per incident basis. Food safety and the identification, communication and mitigation of food safety risks with foods of plant origin is the focus for the one OMAF inspection staff member now remaining at Vineland.

The present day Ontario Ministry of Agriculture and Food, Food Inspection Branch now is a composite branch within the Food Industry Division of the ministry. The branch includes meat inspection, dairy inspection, and foods of plant origin inspection programs.
Ministry of Natural Resources Comes to Vineland

JOAD DURST AND GREG BELMORE

The Ministry of Natural Resources (MNR) has a vital role to play in protecting the province's abundant natural resources and ensuring their sustainable use. MNR is working to promote healthy, sustainable ecosystems and the resource economies and communities that depend on them. MNR works to conserve biodiversity, protect greenspace, protect source water, ensure sustainable forestry, support renewable energy and enhance opportunities for outdoor recreation.

From 1986 to 1996, the MNR Niagara Area Office was located on the corner of Hwy 20 and Cataract Road at the edge of Fonthill, Ontario. Previously it had been located at the old Timm's estate (the old mansion) in Fonthill. In 1996, MNR co-located with the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) in the Advisory Services Building at the Horticultural Experiment Station in Vineland.

Co-locating with OMAFRA was seen as a natural fit. We both serve many of the same clients (rural landowners) and deal with some of the same issues, e.g. urbanization, development pressure, wildlife issues. The location was also central for a majority of our clients.
With some cross-training, the customer service representatives from both ministries have been able to serve each others' clients at the front counter. We feel that our move to Vineland has been a real success story for the co-location model, our clients and our staff.

The Niagara Area office staff provides leadership to the management of our natural resources including fish and wildlife resources, Crown land, species at risk, and aggregates. This is accomplished through a number of means including allocation of resources, compliance monitoring and enforcement, stewardship activities, partnerships with municipalities, other ministries, land owners, and Six Nations.

Our office consists of 10 full-time employees and upwards of 10 contract staff at any one time. We also have two full-time Stewardship Coordinators located in Welland and York.
TREE COLLECTIONS
PHOTOGRAPH CAPTION LISTING

Page 215 - Heritage Apple Orchard, Horticultural Experiment Station, Vineland

Page 218 - Millennium Forest, Vineland Campus, Horticultural Experiment Station, Vineland

Page 222 - Dedication of Sakura Flowering Cherry Collection at HES Vineland with then counsil-general Takashi Koezuka and wife from the Japanese Consulate and the Hon. Lincoln Alexander (2002).

Page 224 - Vandalay cherry introduced 1996
Heritage Apples

Ray KaczmarSKI

The present Heritage Apple Orchard at the HES Campus is the successor to a planting called the "Canadian Centennial Museum Orchard". This orchard was established in 1967 at Vineland by Dr. Aleck Hutchinson to commemorate the 100th anniversary of Confederation in Canada. The Centennial Orchard contained 194 named cultivars and some strains of specific cultivars. A strain by definition is a specific selection or mutation of a cultivar which exhibits some characteristics different from the cultivar itself.

In 1983, it was decided to replace the Centennial Orchard with a new and smaller "Heritage" orchard which would focus on maintaining apple cultivars having commercial importance in the Ontario apple industry in the past and/or present.

In 1988, the Heritage Orchard was officially dedicated on the occasion of the Centennial Celebration of the founding of the Ontario Ministry of Agriculture and Food. At that time, 85 cultivars and 15 strains of apples were included in the Orchard. The semi-dwarfing Malling 26 rootstock was used as the understock. The tree spacing was 5 m in the row and 6 m between rows producing a tree density of 666 trees per hectare. The system of training was to a modified central leader.
Because the orchard was beginning to show its age, it was removed in the fall of 2003. The University of Guelph, realizing the significance of this orchard, decided to propagate most of the varieties that were previously in the block. Additional heritage cultivars were added, bringing the total to 100 cultivars, to commemorate 100 years of service which HES Vineland has provided to the horticultural industry. The New Heritage Apple Orchard was established at Vineland in the spring 2005 in the same location as its predecessors. A dwarfing rootstock Budagovsky 9 (Bud.9), which is approximately 40% the size of a standard vigorous rootstock, has been used this time as the understock. Of special note in this planting is that two cultivars, Dawnmac and Vinebrite, were introduced by Dr. Aleck Hutchinson in 1965. The oldest cultivar in the collection is White Winter Calville named and introduced from Europe in 1598. The oldest Canadian introduction is Snow (also known as Fameuse), introduced in 1636.

All cultivars are presently maintained at the Canadian Clonal Gene Bank at Harrow, Ontario.

The Heritage Orchard is located on the Vineland Campus, west of the main Administration Building and is open to the public for inspection and viewing. The University does not propagate trees or offer any fruit for sale from the cultivars maintained in this planting.
Varieties contained in this orchard are listed in the table below:

<table>
<thead>
<tr>
<th>Akane</th>
<th>Chenango</th>
<th>Freedom</th>
<th>Idared</th>
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<tbody>
<tr>
<td>Alexander</td>
<td>Colvert</td>
<td>Fuji</td>
<td>Irish Peach</td>
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<tr>
<td>Antonovka</td>
<td>Cortland</td>
<td>Gala</td>
<td>Jonagold</td>
</tr>
<tr>
<td>Baldwin</td>
<td>Cox's Orange Pippin</td>
<td>Gano</td>
<td>Joyce</td>
</tr>
<tr>
<td>Baxter</td>
<td>Cranberry</td>
<td>Golden Delicious</td>
<td>Jerseymac</td>
</tr>
<tr>
<td>Ben Davis</td>
<td>Dawnmac</td>
<td>Golden Russet</td>
<td>Jonathon</td>
</tr>
<tr>
<td>Blenheim</td>
<td>Dutchess</td>
<td>Granny Smith</td>
<td>King</td>
</tr>
<tr>
<td>Blue Pearmain</td>
<td>Early Joe</td>
<td>Gravenstein</td>
<td>Kennedy's Pearshape</td>
</tr>
<tr>
<td>Bottle Greening</td>
<td>Elstar</td>
<td>Grimes</td>
<td>Kentish Fill Basket</td>
</tr>
<tr>
<td>Britegold</td>
<td>Empire</td>
<td>Haas</td>
<td>Lady</td>
</tr>
<tr>
<td>Cabashea</td>
<td>Fallawater</td>
<td>Hubbardston</td>
<td>Leder's Borsdorf</td>
</tr>
<tr>
<td>Canada Red</td>
<td>Fameuse</td>
<td>Hume</td>
<td>Liberty</td>
</tr>
<tr>
<td>Lubsk Queen</td>
<td>Northern Spy</td>
<td>Red Astrachan</td>
<td>Seek No Further</td>
</tr>
<tr>
<td>Lobo</td>
<td>North Star</td>
<td>Red Atlas</td>
<td>Sweet Bough</td>
</tr>
<tr>
<td>Lodi</td>
<td>Northwest Greening</td>
<td>Red Delicious</td>
<td>Tydeman's Red</td>
</tr>
<tr>
<td>Macoun</td>
<td>Ontario</td>
<td>Rescue</td>
<td>Tolman Sweet</td>
</tr>
<tr>
<td>Maiden Blush</td>
<td>Oldenburg</td>
<td>Rome</td>
<td>Vinebrite</td>
</tr>
<tr>
<td>Margaret Pratt</td>
<td>Peargold</td>
<td>Roxbury</td>
<td>Vista Bella</td>
</tr>
<tr>
<td>Mann</td>
<td>Pomme Grise</td>
<td>Scarlet</td>
<td>Wagener</td>
</tr>
<tr>
<td>McIntosh</td>
<td>Primate</td>
<td>Snow</td>
<td>Wealthy</td>
</tr>
<tr>
<td>Milwaukee</td>
<td>Princess Louise</td>
<td>Spartan</td>
<td>Wealthy Double Red</td>
</tr>
<tr>
<td>Moscow Pear</td>
<td>Quaker Beauty</td>
<td>Spitzenburg</td>
<td>White Winter Calville</td>
</tr>
<tr>
<td>Mutsu (Crispin)</td>
<td>Quinte</td>
<td>Stark</td>
<td>Winter Banana</td>
</tr>
<tr>
<td>Newton</td>
<td>Rambo</td>
<td>St. Lawrence</td>
<td>Wolf River</td>
</tr>
<tr>
<td>Yellow Bellflower</td>
<td>Yellow Transparent</td>
<td>York Imperial</td>
<td>20 (Twenty) Ounce</td>
</tr>
</tbody>
</table>
The Millennium Forest

EMIL T. ANDERSEN

The Millennium Forest extends its influence well into the community and beyond. It is essentially a community project fostered by the Horticultural Society of Lincoln and the Rotary Club of Lincoln with the full support of the Town of Lincoln and the University of Guelph. It is largely intended to be a millennium project for the Town of Lincoln. The Town events committee with the help of the Rotary Club and the Horticultural Society provided the original planning and formed a joint committee to carry it forward. Emil Andersen was appointed to Chair the committee.

Since horticulture is highly significant in the immediate local area and trees seemed a natural and suitable medium, the idea of a Millennium Memorial Forest was deemed appropriate. The committee prepared a list of 133 trees to be planted on three acres of good land. Criteria used for selection of trees were mainly as follows:

(a) hardy in the area
(b) attractive or historical
(c) long lived
(d) suitable for park, home or street planting.

Suitable species (or cultivars) from any part of the world would qualify. The project should be called the "Millennium Forest."
The Basic Plan

(a) Trees to be listed, selected and acquired by the Horticultural Society.
(b) A map showing location and spacing of trees provided by Mountainview Landscaping Company as a donation to the project. This was very much appreciated.
(c) Trees to be sold on a first come basis to persons wishing to have a tree in the Forest, cost per tree $200.00. Only one tree to be selected from the list per person.
(d) Stainless steel labels to be provided. Label to include the common name, the botanical name and up to 60 letters providing words of a memorial nature.

After some searching, the University of Guelph offered a three-acre plot of land which seemed ideal in the north-east corner of the Home Farm property of the Research Station. The south half of the site had previously been the homes and gardens for three research scientists working at the Station (the Andersen family was one of them). The north half of the property was the Station dump. The eastern boundary is Victoria Avenue and Lake Ontario is immediately adjacent to the north side. Many existing shrubs and unwanted trees had to be removed. In addition, there was a sizeable dugout in the dump area filled with a great assortment of old pots, wire, discarded fruit-containers and other trash which had to be cleaned up.

Several large trees on the property indicated that the soil was suitable. The University was anxious to have this property utilised as it was of no value for experimental purposes. Location of the lake and proximity to the highway made it ideal and the offer was gratefully accepted.

The University felt that it was an excellent project and gave an assurance that the land would be available as long as the University had control. They also offered and made a commitment to look after the Forest and maintain it in excellent condition. This they have done without cost to the project and all the partners are grateful.

Land Preparation

By spring of the year 2000, the cooperating groups were ready to start. The two clubs, along with several helpers from the Town of Lincoln and the University and many interested non-club members, worked for many days to clear the area of unwanted trees and brush. Jack Hill donated a full day of work with his large
bulldozer. Jack removed many huge trees, stumps, brush and partly filled in the dugout. This was a very significant donation. Twenty eight loads of top soil were hauled from a stock pile located on the Station's Victoria farm to level the dugout area.

**Funding**

(a) The sale of trees at $200.00 per tree provided most of the funds. Trees sold extremely well and publicity by word of mouth and local newspapers proved very effective.

(b) An application to the Ontario Trillium Foundation was generously received and helped greatly. Major items included in their support were fencing, a wheelchair-accessible pathway which winds through the forest, four benches and bulldozing work.

(c) The Town of Lincoln covered most of the costs of a striking stone which is engraved as follows:

**Millennium Forest**  
*A project of*  
*Lincoln Horticultural Society*  
*Rotary Club of Lincoln*  
*University of Guelph*  
*Town of Lincoln*  
*A.D. 2000*

This two metre high granite stone is located in the southeast corner of the Forest and has attracted much favourable comment. A small portion of its cost fell to the two Clubs.

(d) The Town of Lincoln also, through the Mayor's office, arranged to have the Niagara Parks Commission provide several days of free work in removal of tree stumps. This removal cut the stumps to a level below ground surface and did much to make the area level. This was a very generous donation. The Town's wood chipper was also used to convert much of the branch material into useful mulch.

(e) The very attractive logo for our literature and publications was generously and expertly designed by Rotarian Brian Romanogli.

(f) The Mountainview Landscaping Co. and Mark Neufeld installed, free of charge, a water drainage system in the north half of the Forest. Heavy moisture levels in springtime resulted in standing water in parts of that area. The work was done in the fall of 2004 and has proved to be very helpful.
Progress to Date

The Forest now contains 133 different tree species or cultivars. Most were planted in the spring of 2001 so now have four summers of growth. Growth on some has been quite exceptional; a few are weak and a few others have died and have been replaced or will be in the near future. The Forest is visited by many people, including many who do not have a tree in the Forest. Comments are very complimentary and on the whole, the project must be considered an outstanding success.

An additional service has been provided by the Forest. In 2001, the Town of Lincoln was in need of a suitable location for a Time Capsule containing memorabilia covering happenings within the town. An existing large Ginkgo tree located near the centre of the Forest seemed an appropriate location. The Town agreed, and following a brief ceremony, the Capsule was buried under the limbs of the tree. A large engraved stone now rests on top of the burial place and its engraving, in part, affirms that the Capsule will be opened in 2051. This is a significant item in the Forest.

Considering the great diversity of tree species, along with many differences of soil types, the project is doing well. Without the very extensive help from many sources, we would not have been able to achieve the current results. This Forest will continue to increase in value as a source of pleasure, interest and knowledge, not only to persons who have purchased trees, but to countless others who may be students or who have an interest in trees and the local horticulture. Past and present members of staff of the Research Station are proud to have been associated with the project.
Sakura Project: Japanese Flowering Cherries

The Sakura is a symbol of Japan. For centuries, Japanese people have appreciated and praised the beauty of Sakura and expressed their delight for the tree in poems, diaries, essays and stories. Blossoming Sakura show us the real arrival of spring.

As the years stream by
My own life passes from me
Still I am renewed when I see the blossoms
My heart's sorrows disappear

by Fujiwara no Yoshifusa (905 AD)

The University of Guelph began their relationship with the Japanese government in May 2000, when the then Consul-General of Japan Satoshi Hara paid a visit to the Station looking for assistance for the Sakura Project. The dream of the Consul-General was to donate 3,000 Japanese Flowering Cherry trees, or Sakura trees, throughout Ontario as a goodwill gesture between our province and the country of Japan. There was only one detail: the trees. The cost of purchasing all of these trees would be
enormous, and that is where the Station came into play. We would propagate, store and deliver the trees to all Sakura planting destinations.

In May 2002, to acknowledge their appreciation for all the Station has done, then Consul-General Takashi Koezuka donated 40 trees as a gift. In honour of the gift, the trees were used to establish a Sakura Friendship Garden at the site of the old rose garden.

Current Consul-General Hisao Yamaguchi holds the same passion for the Sakura Project as the previous Consul-Generals and is delighted that the University of Guelph at Vineland is still on board to see the Project continue and blossom.

After the petals in my garden have fallen
How shall I miss those
Who came to visit
Only to view the cherry blossom.

by Oshikochi no Mitsune (905 AD)

Editors’ Note:

The article above was provided to the Editors of this Centennial Report by the office of the Consul-General of Japan in Ontario, and is reproduced here as received and in total.

The Sakura Friendship Garden is located on the Vineland Station campus in the area between the main administration building and the Horticultural Products Laboratory. It is available for public viewing at all times, year round.

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Fruit, Vegetable and Ornamental Cultivars Released by the Vineland Horticultural Experiment Station

**Judy Wanner**

### Fruit Varieties

<table>
<thead>
<tr>
<th>Kind and Variety</th>
<th>Parentage</th>
<th>Date of Release by HES or as noted</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>APPLE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V1-7</td>
<td>Vineland apple rootstocks (Kerr crabapple open pollinated) x M.9 rootstock</td>
<td>1979</td>
</tr>
<tr>
<td>Dawnmac</td>
<td>McIntosh open pollinated</td>
<td>1965</td>
</tr>
<tr>
<td>Vinebrite</td>
<td>Red Delicious selection</td>
<td>1965</td>
</tr>
<tr>
<td><strong>APRICOT</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Valleygold</td>
<td>([Reliable open pollinated] open pollinated) x (Geneva x Naramata)</td>
<td>1988</td>
</tr>
<tr>
<td>Velvaglo</td>
<td>Veeicot x Farmingdale</td>
<td>1978</td>
</tr>
<tr>
<td>Vivagold</td>
<td>Veeicot x (Geneva x Gibb)</td>
<td>1978</td>
</tr>
<tr>
<td>Veeicot</td>
<td>(Reliable open-pollinated) open-pollinated</td>
<td>1964</td>
</tr>
<tr>
<td>Viceroy</td>
<td>Geneva x Naramata</td>
<td>1964</td>
</tr>
<tr>
<td><strong>CHERRY (Sweet)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tehranivee</td>
<td>Van x Stella</td>
<td>1996</td>
</tr>
<tr>
<td>Vandalay</td>
<td>Van x Stella</td>
<td>1996</td>
</tr>
<tr>
<td>Viscount</td>
<td>(Hedelfingen x Bing) x (Hedelfingen x Bing)</td>
<td>1983</td>
</tr>
</tbody>
</table>
Vogue  Hedelfingen x Victor  1974
Viva       Hedelfingen x Victor  1972
Valera     Hedelfingen x Windsor  1967
Vega       Bing x Victor  1967
Vic        Bing x Schmidt  1959
Vista      Hedelfingen x Victor  1959
Venus      Hedelfingen x Windsor  1959
Velvet     Windsor open-pollinated  1937
Vernon     Windsor open-pollinated  1937
Victor     Windsor open-pollinated  1925

GRAPE

Vintinto   Lomanto X Seibel 8357  2001
L’Acadie    Cascade X Seyve-Villard 14-287
            introduced for Nova Scotia  1998
Vanessa Seedless   Seneca x (Bath x Interlaken)  1983
Vivant     (Plantet x Seibel 14664) x (NY 10774
            x Muscat Hambourg)  1983
Veeblanc   Cascade x Seyve-Villard 14-287  1977
Festivee   Alden x Verdelet  1976
Ventura    Chelois x Elvira  1974
Vincent    (Lomanto x Seneca) x Chelois  1967
Vinered    Brockton selfed  1964
Veeport    Wilder x Winchell  1961

PEACH

Venture TM  Suncling x New Jersey Cling 81  2000
Virgil     Veecling x New Jersey Cling 95  1997
Vinegold   NJC 95 x Veecling  1994
Vulcan     Veecling x New Jersey Cling 95  1994
Veeglo     Sunhigh x Royalvee  1981
Vivid      Sunhigh x (Early Halehaven x Envoy)  1974
Veecling   Babygold 6  open-pollinated  1974
Velvet     (Halehaven x Vedette) x Vesper  1965
Vanity     (J.H. Hale x Valiant) open-pollinated  1965
Vedoka     J.H. Hale x Vedette  1960
Royalvee   (Halehaven x Vedette) x Veteran  1959
Somervee  Halehaven x Oriole  1950
Vesper     J.H. Hale x Vedette  1949
Erlyvee    Golden Jubilee open-pollinated  1949
Envoy      J.H. Hale x Sunbeam
           Joint intro. NJ Ag. Exp. Stn.  1949
Vanguard   Vaughan x Valiant  1941
Veefreeze  Elberta open-pollinated x Arp  1940
Viceroy    Vaughan x Early Elberta  1929
Vetaran    Vaughan x Early Elberta  1928
Vedette    Elberta open-pollinated  1925
Vaughan    Leamington selfed  1925
Valiant    Elberta open-pollinated  1925
Vimy       Elberta x Arp  1924
PEAR
Russet Bartlett  Bartlett bud sport  1927

PLUM (European)
Vibrant  Valor x California Blue  2006
Violette  Verty x Bluebell  2006
Vanette  Early Rivers x Stanley  1999
Valerie  Valor x California Blue  1999
Victory  Vision x Valor  1992
Voyageur  Ruth Gerstetter open-pollinated  1987
Veeblue  Imperial Epineuse x President  1981
Valor  Imperial Epineuse x Grand Duke  1967
Verity  Imperial Epineuse x Grand Duke  1967
Vision  Pacific x Albion  1967

PLUM (Japanese)
Vanier  Burbank x Wickson  1983

RASPBERRY
Vandyke  Adams 87 x Viking  1947
Viking  Cuthbert x Marlboro  1924

STRAWBERRY
Veegem  Valentine x Fulton  1980
Vantage  Tioga x Veestar  1980
Veeglow  Redglow x Vibrant  1980
Vibrant  Sparkle x Valentine  1967
Vestar  Valentine x Sparkle  1967
Valentine  Howard 17 x Vanguard  1941
Vanrouge  [Admiral x (Dunlap x Early Ozark)] open-pollinated  1938
Vandyke  Dunlap x Early Ozark open-pollinated  1928
Vanguard  Pocomoke x Early Ozark  1924

Vegetable Varieties

<table>
<thead>
<tr>
<th>Kind and Variety</th>
<th>Parentage</th>
<th>Date of Release by HES</th>
</tr>
</thead>
</table>

ASPARAGUS
Viking  Mary Washington selection  1950

CORN (Sweet)
Polarvee  V 642 x V 641  1967
Buttervee  V 631 x V 611  1967
Sunnyvee  VC 13 x V 611  1967
Tastyvee  VC 0105 x V 576  1967
Marketvee  V 664 x V 574  1967
Vinegold  Purdue 39 x VI  1946

226
<table>
<thead>
<tr>
<th>Variety</th>
<th>Cross/Parent Info</th>
<th>Year</th>
</tr>
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<tbody>
<tr>
<td>Inbreds VI, V2, V3</td>
<td>Golden Bantam</td>
<td>1942</td>
</tr>
<tr>
<td>Vinecross B4</td>
<td>V3 x V2</td>
<td>1940</td>
</tr>
<tr>
<td>Vinecross B5</td>
<td>V3 x V1</td>
<td>1940</td>
</tr>
<tr>
<td>Vineland Bantam</td>
<td>Golden Bantam x Black Mexican</td>
<td>1935</td>
</tr>
<tr>
<td>CUCUMBER</td>
<td>Hescrow</td>
<td>1922</td>
</tr>
<tr>
<td></td>
<td>White Spine x Telegraph</td>
<td></td>
</tr>
<tr>
<td>LETTUCE</td>
<td>Velvet</td>
<td>1957</td>
</tr>
<tr>
<td></td>
<td>Butterhead type selection</td>
<td></td>
</tr>
<tr>
<td>PEPPER (Sweet)</td>
<td>Vinette</td>
<td>1967</td>
</tr>
<tr>
<td></td>
<td>Vinedale</td>
<td>1952</td>
</tr>
<tr>
<td></td>
<td>Harris Early Giant x Sunnybrook</td>
<td></td>
</tr>
<tr>
<td>RHUBARB</td>
<td>Valentine</td>
<td>1938</td>
</tr>
<tr>
<td></td>
<td>Macdonald open-pollinated</td>
<td></td>
</tr>
<tr>
<td>TOMATO (Greenhouse)</td>
<td>Vendor</td>
<td>1967</td>
</tr>
<tr>
<td></td>
<td>V 596 x Indian River</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Veegan</td>
<td>1965</td>
</tr>
<tr>
<td></td>
<td>Michigan State Forcing x VT 23A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vantage</td>
<td>1963</td>
</tr>
<tr>
<td></td>
<td>Tuckqueen x (L. pimpinellifolium x L. peruvianum)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V 548</td>
<td>1959</td>
</tr>
<tr>
<td></td>
<td>John Baer, L. hirsutum. Vetomold, etc.</td>
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</tr>
<tr>
<td></td>
<td>Vinequeen</td>
<td>1954</td>
</tr>
<tr>
<td></td>
<td>John Baer, L. hirsutum. Vetomold, etc.</td>
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<tr>
<td></td>
<td>Vagabond</td>
<td>1950</td>
</tr>
<tr>
<td></td>
<td>Vetomold, V 121, L. hirsutum</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vulcan</td>
<td>1948</td>
</tr>
<tr>
<td></td>
<td>V 473 x Vetomold</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V 473</td>
<td>1946</td>
</tr>
<tr>
<td></td>
<td>Vetomold x Stirling Castle</td>
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</tr>
<tr>
<td></td>
<td>V 121</td>
<td>1941</td>
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<tr>
<td></td>
<td>Potentate x L. pimpinellifolium</td>
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<tr>
<td></td>
<td>Vetomold</td>
<td>1939</td>
</tr>
<tr>
<td></td>
<td>Potentate x L. pimpinellifolium</td>
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<tr>
<td>TOMATO (Market and Processing)</td>
<td>Vivid</td>
<td>1968</td>
</tr>
<tr>
<td></td>
<td>Earliest of All x Pink Red Jacket</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Veeecrop</td>
<td>1967</td>
</tr>
<tr>
<td></td>
<td>Glamour x (Early Baltimore x Pritchard)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pink Vogue</td>
<td>1967</td>
</tr>
<tr>
<td></td>
<td>Vogue x Pink Red Jacket</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Venture</td>
<td>1963</td>
</tr>
<tr>
<td></td>
<td>Massachusetts Hybrid x Pritchard</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Viscount</td>
<td>1963</td>
</tr>
<tr>
<td></td>
<td>Ace x Rideau</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vogue</td>
<td>1960</td>
</tr>
<tr>
<td></td>
<td>Massachusetts Hybrid x Red Cloud</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Viceroy</td>
<td>1960</td>
</tr>
<tr>
<td></td>
<td>Bounty x Rutgers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vinered</td>
<td>1960</td>
</tr>
<tr>
<td></td>
<td>Early Chatham x Rutgers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Veeset</td>
<td>1971</td>
</tr>
<tr>
<td></td>
<td>Campbell 1402-2J2B x Coldset</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Veemore [Roma VF x (Heinz 1350 x High Crimson)] x [Glamor x (Early Baltimore x Pritchard)]</td>
<td>1971</td>
</tr>
<tr>
<td></td>
<td>Harkness</td>
<td>1936/37</td>
</tr>
<tr>
<td></td>
<td>Grand Rapids x Earliana or Old English Sim x Earliest of All</td>
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</tbody>
</table>
### Ornamental Varieties

<table>
<thead>
<tr>
<th>Kind and Variety</th>
<th>Parentage</th>
<th>Date of Release by HES</th>
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<tbody>
<tr>
<td><strong>CHRYSANTHEMUM</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vesper</td>
<td>John Furst open-pollinated</td>
<td>1967</td>
</tr>
<tr>
<td><strong>GLADIOLUS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vida</td>
<td>Spic and Span x Unknown Cultivar</td>
<td>1967</td>
</tr>
<tr>
<td><strong>HOLLY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Viking</td>
<td>Open pollinated from K.Meserve</td>
<td>1982</td>
</tr>
<tr>
<td>Valiant</td>
<td>Ilex aquifolium x Ilex crenata</td>
<td></td>
</tr>
<tr>
<td>Vinedale</td>
<td>Ilex aquifolium x Ilex crenata</td>
<td></td>
</tr>
<tr>
<td>Vanguard</td>
<td>Ilex aquifolium x Ilex crenata</td>
<td></td>
</tr>
<tr>
<td><strong>JUNIPER</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vinespire</td>
<td>Juniperus virginiana L. selection</td>
<td>1967</td>
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<tr>
<td><strong>LILAC</strong></td>
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<tr>
<td>Vesper</td>
<td>(Syringa vulgaris open pollinated)</td>
<td>1980</td>
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<tr>
<td><strong>LILY</strong></td>
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<td></td>
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<tr>
<td>Cayuga</td>
<td>Complex hybrid of (L.regale L.sargentiae)</td>
<td>1967</td>
</tr>
<tr>
<td>Oneida</td>
<td>Complex hybrid of (L.regale L.sargentiae)</td>
<td>1967</td>
</tr>
<tr>
<td><strong>RHODODENDRON</strong></td>
<td></td>
<td></td>
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<tr>
<td>(Broadleaf evergreen)</td>
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<td></td>
</tr>
<tr>
<td>Vineblanc</td>
<td>(Scandinavia x LaBar's white) x (Scandinavia x LaBar's white)</td>
<td>1989</td>
</tr>
<tr>
<td>Vinemax</td>
<td>Parentage unknown</td>
<td>1989</td>
</tr>
<tr>
<td>Vinewood</td>
<td>Sham's ruby x R.williamsianus</td>
<td>1988</td>
</tr>
<tr>
<td>Vinebelle</td>
<td>Robert Allison x R.yakushimanum</td>
<td>1986</td>
</tr>
<tr>
<td>Vinecrest</td>
<td>[(R.yakushimanum x R.fortunei) x R.wardii x R.croceum] x R.jutiense</td>
<td>1986</td>
</tr>
<tr>
<td>Vinedale</td>
<td>Scandinavia x (Catalgla x R.fortunei)</td>
<td>1986</td>
</tr>
<tr>
<td>Vinemount</td>
<td>[(Hassan x (R.dichroanthum spp.scypocalax x R.kyawii) x Catalgla] x LaBar's White</td>
<td>1986</td>
</tr>
<tr>
<td>Vinerouge</td>
<td>Mars x America</td>
<td>1986</td>
</tr>
<tr>
<td>Vineblush</td>
<td>America x R.yakushimanum</td>
<td>1986</td>
</tr>
<tr>
<td>Vinebrook</td>
<td>R.smirnovii x Lady Bessborough</td>
<td>1986</td>
</tr>
<tr>
<td>Vinemark</td>
<td>America x R.yakushimanum</td>
<td>1986</td>
</tr>
<tr>
<td>Vineland Flame</td>
<td>Gibraltar x Favor Major</td>
<td>1978</td>
</tr>
<tr>
<td>Vineland Flare</td>
<td>Klondike x George Reynolds</td>
<td>1978</td>
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<tr>
<td>Vineland Fragrance</td>
<td>Scandinavia x (Catalgla x R.fortunei)</td>
<td>1978</td>
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<tr>
<td>Vineland Glow</td>
<td>Gibraltar x Favor Major</td>
<td>1978</td>
</tr>
</tbody>
</table>
Vinestar R.keiskei x R. racemosum 1978
Vivacious America x Dr.Ross 1976
Veesprite R.impeditum x R.racemosum 1966

AZALEAS (Deciduous)
Vineland Delight Homebush x Red seedling of Knap Hill type 1989
Vineland Orange Parentage unknown 1989
Vineland Pimpernel Chelsea Reach x Red seedling 1989
Vineland Peach Chelsea Reach x Red seedling 1989
Vineland Gold Chelsea Reach x Gold Dust 1988
Vinecourt Moonlight Chelsea Reach x Vivienne Waterer 1988
Vinecourt Queen Chelsea Reach x Un-named red seedling 1988
Vineland Sensation Exbury Azalea hybrid 1988
Vinecourt Troubadour Chelsea Reach x Un-named red seedling 1988
Vinecourt Jester Chelsea Reach x Cecile 1986

AZALEAS (Exbury type)
Vinecourt Duke Homebush x Un-named red Brick seedling 1988
Vineland Dream Chelsea Reach x Un-named red Knap Hill seedling 1988
Vinecourt Duchess Chelsea Reach x Watermelon Ice 1986
Vineland Carousel Chelsea Reach x Cecile 1986

In the early 1980s with the departure of Dr. C.L.Ricketson from Vineland, the raspberry breeding program was transferred to the Department of Horticulture at the U. of Guelph. In 1991, two Vineland selections were named and released: Regal and Regency. Similarly, the Vineland strawberry breeding program was transferred to HES Simcoe and six Vineland selections were subsequently named and released by Dr. A. Dale: Secord and Governor Simcoe 1985; Settler 1986: St. Williams, Selkirk and Scotland 1991. Dr. E. A. Kerr transferred from Vineland to HES Simcoe in 1972 and continued the vegetable breeding program there with the release of six sweet corn and 13 tomato cultivars, many of which he had initially developed at Vineland. Pedigrees for all these Vineland/Simcoe selections are on file.
... and the fruit
Of that forbidden tree whose mortal taste
Brought death into the world. and all our woe
With loss of Eden.

John Milton - Paradise Lost.
LIFE ON THE STATION
PHOTOGRAPH CAPTION LISTING

Page 233 - Lodge party 1970s

Page 236 - Station Christmas party 1963

Page 241 - Some of the youngsters who grew up on the Station at Vineland, 1960s
From the early days of the station, accommodation was available for staff, mostly single, technical and students. The Lake Shore boarding house occupied by George Webb, teamster, and privately operated by Mrs. Webb from 1909-1917 was taken over eventually by the Station with Mrs. Webb as housekeeper and cook. The Lodge was then re-located to the second floor of the original Administration Building with Mrs. Webb in charge until 1949.

The “old” Lodge was replaced by a new building in 1949. The new Lodge had dormitory and dining accommodation for at least 20 single staff plus a housekeeping apartment and a guest room for visiting dignitaries. Accommodation was available in the winter months for permanent single staff both federal and provincial and sometimes also local teachers. In April, the summer students moved in until Sept.

All past residents will fondly remember the moveable/locked door in the dormitory depending on the male/female ratio. Regardless, there were great parties, lots of memories, romances and even marriages.

In 1972 the Lodge became office space for the Inspection Services, Economics Branch and Farm Credit Corporation and others, with the apartment on the main floor being retained for visitors. The Lodge was closed down in Oct. 1995 as a result of a fire and remains vacant.
A Personal Reminiscence of the Lodge

SHARON (KERR) STEVENSON

Life at The Lodge started for me in May 1965, just before my 21st. birthday. It was residence life all over again, only with a whole new group of students and regular staff to become acquainted with. That summer, four students agreed collectively to purchase an old clunker of a car, naming it "Sam" after the father of one of the young men. It became a memorable year! Between frequent repairs, the four youths took turns using it to travel home, drive into St. Catharines, or whatever. Others were invited to come along swimming at the beaches on Lake Erie and closer to home on Lake Ontario, going on the rides at the amusement park at Crystal Beach, attending the occasional outdoor movie, hiking at Ball’s Falls (several on one occasion bringing back a good case of poison ivy), etc. In other words, it broadened our horizons that summer. But sometimes we stayed home, and The Lodge was like a real home. There were house-parents living in the suite on the west side of the first floor. Not that we saw them much, but they were there. A few of us tried our hands at making wine from strawberries, apricots, cherries and grapes in the basement just outside the Laundry Room. And then of course, there was the occasional party, nothing special but always impromptu and always fun.
After that special summer, life without "Sam" still continued. Winter activities included tobogganing (I displaced my knee-cap that first winter on the final descent down a slope at Ball's Falls, but by morning the knee-cap was back in place), playing hockey and ice-skating on the nearby creeks, Jordan pond and local arenas, playing basketball at the Vineland school and playing pool downstairs at The Lodge. We played soccer on The Flats in the fall and, of course, there was always television to watch in the common room if there was nothing else to do. I remember fishing for smelts in the spring and learning how to clean them as well. We enjoyed eating them when the cooks on staff fried them up for one of our meals. Yes, we even had cooks and a cleaning lady in those days at The Lodge.

But all good things come to an end and so did The Lodge. I can’t remember what year it closed down as a residence but I do remember Dr. John Archibald asking if I would like to see the record of Lodge expenses and why it was just not cost-effective for the Station to continue running it as in the past. It was a sad but inevitable day when it finally was no longer available to those of us who considered it "home" for a few years.
Social Activities at the Station

Peter M. Proctor

The period of the 60s and 70s in particular saw a great deal of social life within the experimental station community principally because of the number of families who lived on the campus at that time. Staff Christmas parties were held for all the children with gifts from our very own Santa (usually Bern Gee). Adult Christmas parties were also annual events, firstly in various staff homes and later, with the popularity of these parties, local halls were used especially Rockway Community Centre. At several of the Christmas parties, staff of other local OMAF branches and the Federal Research Station joined us in an enjoyable campus-wide event. Festive days of the various ethnic backgrounds of different staff members were also celebrated each with its own distinctive theme and flavor. It really was a case of "any excuse for a party!"

The Annual Summer picnics were held at Queenston Heights park where all the families and summer students were included in the events, tug-of-war, canoe races and baseball to name a few.

Changes in family living all required a party: newly-weds were treated to surprise chivarees, new homes had to have a house-warming, swim parties at lakefront homes, and skating parties at Beamsville arena. These and many more similar events made Vineland a very pleasant place to work. These many years later,
people who were students in earlier times, still stop in the street or supermarket and say how they enjoyed their summer employment at the Experimental Farm. The old place certainly had a wonderful community spirit that ultimately was reflected in the high quality of its research output.
In the middle of May 1955, John and Elsie Wiebe with three small children moved into the "George Dickson House", which was the last one on Victoria Avenue before the lake.

There were no fences or hedges between the homes so the front yards made a wonderful playing field for football or any other games. Then there was a sidewalk on the west side of the road all the way to the main buildings and also to the Rittenhouse School by the Queen Elizabeth Highway. The sidewalk was great for tricycles and wagons and later for bicycles.

There was never a formal meeting of mothers to agree on rules for the children. It was simply understood that there were some rules of conduct that applied to every child. Any parent in the neighborhood saw it as their responsibility to ensure that all the children were safe and that they played in an appropriate way. Soon all the children knew and accepted that all the parents were part of the security and discipline network. It was totally futile to threaten another parent with "I'll tell my Mom", because that was going to happen anyway.

One of the examples was that the little children were absolutely not allowed to go down to the lake. As the "boys" got a bit older
they went to the lake and built rafts from all sorts of scrap wood. The big thrill was to build the rafts, but a few times they actually got out on the water when the temptation was too great and they got caught by someone.

The station had many large and beautiful trees. Immediately north of our house there was a clump of large maple trees and these were a natural place for tree forts and houses. Most of the activity on and around the bush could be seen from our kitchen window without it being too obvious. As the children grew they built increasingly elaborate structures at increasing heights and even with planks from one to the other house. The building materials came from many sources, but the dump was a great source of wood!

Before our time, the Dicksons kept chickens, and had built a hen house. This was cleaned out and with a few modifications became a fort, a hideout, a club meeting house, a ladies' tea house or whatever was needed for that day. A smaller tree house was built right over the chicken house for the girls.

The children all learned that it was not acceptable to go into any of the research plots to take anything or to cause any damage. They seemed to adopt a level of ownership of the station and acted protectively of the research plots. Sometimes even the small children would come into the house to report that someone was in the orchards or plots who was not part of the station family. The roads and open spaces of the station were open for public use and our children used them a great deal. The roads were where almost all the children learned to ride bicycles. There was also an unused area between our house and the lake. This is where boys and fathers built an ice rink for a number of winters. As long as the kids were fairly young they were quite satisfied to have a rather bumpy ice rink that was so close to all our homes.

In the late 60s the station had a sewage treatment lagoon built west of the Horticultural Products Lab. The soil from the lagoon was hauled to the empty field north of our house and was stored there for several years. To our children this became "Wiebe Mountain". Again all the children from the area played on this great big pile of soil. A stake driven into the hill at the top became the anchor for ropes that allowed young and older children to climb the mountain. Somehow when you are young the fact that your clothes get dirty plays no role in the fun.

Two unique people in the community were Rod Sano and Darlene Horsley. Rod was paraplegic and moved about in a wheelchair. Darlene was profoundly deaf. They did not seem to be
considered disabled. Rod was older than most of the other children but he became a local hero. He took part in most activities and was the goalie in street hockey or other games. Since he was older he could also have an air rifle and he led expeditions to the dump to shoot rats. Darlene was a cheerful and very active child. She could keep up with or ahead of most of the others. The fact that she could hear almost nothing did not slow her down. We adults sometimes worried about her furious bicycle rides on Victoria Avenue with summer traffic to the canning factory or the pump house. She seemed to be aware of traffic and avoided any mishaps.

The local Rittenhouse elementary school was located on the north-west corner of Victoria Avenue and the Queen Elizabeth Highway. This meant that the children living on the station could walk to and from school without crossing a major road. The school was a very stable part of the community. Miss Della Culp was the grade 1 & 2 teacher for many years. She taught several generations of some of the community families. She was feared and loved by the students. She tolerated no foolishness, but she loved the children and often the students as adults came back to visit her and she remembered them all.

A small creek meandered through the station and over behind the canning factory. Except during spring runoff the creek was really small, but it was a wonderful place to discover the wonders of nature and to get well soaked. In the spring the smelts came up the creek for their annual run. It was possible to catch many more smelts than any family could possibly use. When the mothers said that no more smelts could be brought into the house the competition shifted to see who could catch the most or biggest smelts with bare hands.

Now many years later we can still spend long evenings reminiscing with our children about those years. The in-laws tend to be left out of the conversation, but even they can see that we lived under wonderful conditions that have molded the characters of our children.
My parents moved to the Vineland Research Station a year and a half before I was born. We lived in a 1920s house near the lake across from the canning factory. There was very little traffic except for the occasional water truck going to the pump house at the lake, and the farm trucks and factory workers in the summer. We all walked or rode our bikes to Rittenhouse school. Everyone came home for lunches. The staff at the office, barns and greenhouses knew everyone’s kids, so we were known and greeted wherever we went.

Our house seemed reasonably-sized for a family of eight, at the time. We had a good sized yard to play in, a huge vegetable garden in the back, and lots of big maple trees for climbing and building tree houses. When I was very young the families all shared a telephone party line, so we had to learn each family’s ring so we didn’t answer others’ calls.

We had a grove of maple trees beside the house. In one of them my older brothers and the neighbor boys built a tree house
about twenty feet off the ground. They then built a bridge over to the next tree, which was taller, so you could climb to the top of that one to look over all the other trees and houses around. You could see to the escarpment and out over the lake from up there. For the younger set they had also built a nice big tree house in another tree only six feet up and easier to get to.

Summers were a great time at the station. There was only one family with a TV so we all spent our summers barefoot and out of doors. We had the lake for swimming in, and exploring the beach for neat shells or rocks and dead fish or birds. We also made a lot of driftwood rafts down there for diving off when we swam. There seemed to be a lot more effort put into building the rafts than actually using them!

One spring, when we were still in school, the canning factory across the road burned down. We were having lunch when huge flames and a dark pall of smoke blotted out the sky. Fire trucks from as far away as St. Catharines arrived to fight the fire as the old wooden structure blazed. All the kids from our neighborhood got the afternoon off school as we "helped" fight the fire by sitting on and helping to move the hoses so the real fire fighters could be freed up to man other equipment.

A few years later the overpass was built at the Queen Elizabeth Way. This resulted in the old Victoria Theatre being moved over to the Prudhomme's property and several houses being removed. The theatre had been the venue for our annual school Christmas concert. Each class would sing or recite in their turn, while the older kids would do some kind of play. Then someone's dad would show up as Santa, to hand out candies to every kid. Invariably some little one would shout out "Hey that's my dad!" to everyone's amusement.

In the mid sixties we got hooked up to town water. This resulted in the street out front being dug up for weeks. This was a great time for the kids with lots of big machinery operating all day, and piles of dirt and ditches to explore after the workers left. Once this project was over, the station's water tower was no longer needed so we all went to watch as the legs were cut through and the whole tower was toppled onto the road. The water in the wooden top was still frozen, so that monster block of ice lay there for days melting as the rest of the tower was cleared away.

Eventually all the houses on the Station were moved off or demolished. Several years ago I took my own children to visit the station to see where their dad grew up. The houses, garages and sidewalks were all gone, along with many of the big old maple trees. Other trees had been added to make the area into a park, the site of the Millennium Forest.
Emilys (Andersen) Morra

Memories of HRIO, middle house at the end of Victoria Avenue, 1967 to 1973.

We were in Canada only one day when Dad came home (we lived at the lodge for the first few days - that was fun!) and said that I was to work the next day at Fred Smith's farm picking cherries. Fred was Dr. Archibald's best friend. I was in shock. I was only 11 years old, just out of grade 6. So off I went to pick sweet cherries on top of a 17 foot ladder in a 100-year-old tree. I met three other kids who I would later know at Rittenhouse Public School in the fall. I picked four eleven-quart baskets a day and ate just as many. The fast pickers were from Toronto and could pick 35 baskets a day. They lived in workers' sheds on Fred's property. I also picked sours which were messy but could not pick peaches as I was too young.

Rittenhouse Public School was a real shock after a big city school - only four classrooms, a small library, two washrooms, the small principal's office, an indoor play area and a great big yard to play in. The original school (the white house) was used for Home Ec. (girls) upstairs while the shop was in the basement (boys) - never mixed that up! Mr. Heier taught shop. Mrs. Evelyn Pond taught Home Ec. We had sewing machines and a kitchen. Mrs. Pond was great. There were only 11 students in my grade 7 and then the same in grade 8 so graduation was a small affair. We all wore the dresses we had made in Home Ec. Mr. Heier, principal and grade 7/8 teacher at Rittenhouse Public School, was an inspiration to us all. He was friendly, charming, fair, a great teacher, lover of grammar (we all bought the book because of him - and loved it).

Moving onto high school, BDSS, Beamsville District Secondary School that is, was a wonderful rural experience by itself. The school was at the centre of a 20 mile diameter region which meant that students came from several towns and farming areas. The Patrick girls introduced me to other summer employment: Prudhomme's Coffee Shop and Tavern. It was close to HRIO and I spent five full summers and winter weekends of my life there waiting on tables.

The Beeler and Ricketson girls introduced me to the joys of hiding under the large mulberry tree and eating mulberries until we were full. I loved dropping in on my Dad at his office frequently - he was so close to home. Summers, Mom and I would stop by The Barn daily and pick up the groceries - almost for free. Our
summers were very busy so that our winter could be full of canned and frozen fruit and vegetables, canned juice (every kind they grew at the farm) and of course, home made wine. I fondly remember the fathers’ wine tastings and get togethers with the neighbours. Living close by to those who my dad worked with made for a close neighbourhood, certainly different than that experienced today.

During my grade 13 we moved off the farm but remained close by. HRIO kids often got university summer jobs at the Canada Dept. of Agriculture. CDA kids got jobs at HRIO. Hmm. I worked there for three summers on peach pests. It was a great experience and certainly financed my higher education.

**David Proctor**

Things I remember of life from ‘67 to ‘72.

Elastic gun fights in the packing shed and being scared to death to go down to the implement storage where the walls were covered in paintings of huge spiders, ghosts, Frankenstein etc.

Spending hours throwing dirt / rocks at the crack at the top of the soil mountain thinking if we hit the fissure at the top, the mountain would split apart and tumble to the ground.

Playing chase on our bikes and cutting through the greenhouses and hiding in the nursery. Riding the trails in the rhododendron gardens.

Scared to go into "The Pit" because it was either a toxic waste dump or full of quick sand.

I remember the joy when the new hay stack arrived, so we could make forts, tunnels and such. I remember having my two wheeler taken away because I jumped off the haystack and had to revert back to my tricycle for a week.

I recall the new tunnel under the service road, prying the washers off the ties because they were a perfect 25 cent slug and playing pinball at Prudhomme’s bowling alley. I remember when it burnt down and we went over there in the middle of the night. I remember picking through the rubble and finding the lucky star medallions from one of the games.

I remember the canning factory lot, chasing killdeers around and finding their nests, jumping across the stacks of skids and log rolling on the empty barrels.

I remember taking our home-made go-cart down the hill beside the barn, and using the circle at the federal building as a race track.
I remember hanging from the bar in the wingnut tree, eating from the mulberries tree, collecting chestnuts that we hammered nails through so we could attach blue poly-tie so we could spin them around and launch them in the air. I remember the bamboo grove and riding around in the little trailer with the guy who took care of the rose gardens with my toy gun.

I remember thinking Freddie Ferbrache was really Dean Martin.

I remember having a favourite apple tree, digging for worms in the straw, fishing in the stream under the tunnel and out where the stream met the lake and off the pier at the pump house.

I remember the tobogganing hill and the disappointment when the North Service road was built and then it was gone.

I remember the old zoo at Prudhomme’s and the open cages with the murals on the walls.

I remember smelt fishing and there being so many under the bridge by the Horsley’s house that you could just stick your hand in and pull them out.

I remember the ice rink we built in the back yard, and skating on the stream by the wood bridge that lead to the flats.

Going to school at Rittenhouse, The Bennamans, Jimmy Archibald, Douglas Penner, The Freisens, Wayne Wall, The Albers, The Cooks, Miss Culp, Mr Heier, playing in the canopy when it rained, not being allowed to go in "the gully". Not knowing a swear word until we moved to Beamsville. Sticking my tongue to the frozen fence pole and getting stuck.

Neil Andersen

The Andersens arrived in Vineland Station during Canada Day weekend of 1967. Prudhomme’s had just recently burnt down, it was hot and sunny, and the sweet cherries were wonderful.

I had grown up a big-city suburban kid in Minneapolis and St. Paul, and so the quiet rural culture of Vineland Station was a culture shock. I attended Brock University, and the long days I spent there removed me to a large extent from the day-to-day Vineland Station culture.

Certainly, one of the great pleasures of living in Vineland Station was the sense of community. Even though the research scientists hailed from Ontario, the Maritimes, the Prairies, Britain, Iran, and the U.S., they still had a common bond in their consuming interest in horticulture.

One fond recollection I have is of coming home from my studies in the late fall evenings and finding a small band of VERY happy
research scientists wandering the darkened neighborhood from basement to basement as they sampled each other's homemade wines.

There was a great sense of camaraderie, good natured competition and genuine affection as I heard phrases such as, "That wine was okay, but wait till you taste mine!"

I remember being conscripted to scoop ice cream at a pie social fund raiser for the local women's study group. This was an experience I don't think I could have had in a large city. It felt strange, quaint and yet comforting to share in a communion marked by homemade fruit pies and ice-cream.

There were also eye-opening experiences for a suburban kid. I picked cherries for a local farmer and had an opportunity to learn about the lives of itinerant farm labourers. I also worked at the Culverhouse Canning factory, located directly across from what is now the Millennium Forest. Because I was the biggest kid on the crew, I took cases of cans off the end of the labeling line and stacked them on skids. When truckloads of potatoes arrived, I was the one stacking the 75 lb. sacks. I finished that summer with a very strong back.

During the Summer of Love, Jefferson Airplane and the Grateful Dead came to Toronto. My brother Ross and I really wanted to go - really. With considerable reluctance and caveats on our parents' parts, we, Fred Archibald, and some of his friends headed off to Toronto one afternoon. It was an amazing experience and helped those of us living in the village feel connected to the larger youth culture of the time.

Some of my fondest memories are of community parties. Whether they were impromptu backyard barbecues in summer or holiday parties in winter, Vineland Station residents were always generous and friendly. Because the residents shared in the bounty produced on the farm, there were always generous amounts of fruit and vegetables - fresh in season or frozen if not. It just didn't get better than that, and it has left me with a continuing enthusiasm for fresh foods and good wines.

Graham Loughton

The Loughton family came to the Station in June 1967, just before Canada's Centennial birthday. We thought all the flags and bunting was to welcome us! Here are some of my memories of those early years:
• playing Major Matt Mason down the stairwell at the Proctors' house.
• the turtles that the Proctors had as pets.
• watching the Beeler girls walk barefooted on stones. I made a vow to myself that I would be able to do this. I never was.
• watching the Beeler girls in general.
• seeing the newly arrived Janet Beeler out in a pram in the sun in front of the Beeler's house. I recall we were on our way to Prudhomme's to go swimming.
• that crazy braying donkey that lived at Prudhomme's.
• skating on Jordan Harbour and 16 Mile Creek.
• watching my first colour TV show at the Andersen's.
• the Andersen's robin's egg blue fridge.
• seeing a slide show at the Andersen's when they came back from their trip to Hawaii.
• being in awe that Neil Andersen was so tall.
• the Gingko tree in our backyard.
• running through the Tehranis' backyard and stealing Ghassem's peas and pretending they were "proton energy pills".
• I remember Kindergarten at Maple Grove and Grade 1 at Rittenhouse.
• really having the run of the Station. Walking past the fishpond, past the banana tree and into the greenhouses.
• I remember when Fred Edwards's garbage cans blew down the hill behind his house and into the creek and then into the lake. He always blamed us for not rescuing them.
• Fred Edwards always had candy.
• I remember HRIO having the first photocopier I had ever seen. I went in one day on the weekend with my dad to take a look at it. It took up an entire room. I remember it just sitting there and the humming of its engines and motors.
• my brother Martin's paper route and Dr. Adams trying to pay for his Toronto Daily Star subscription with a Chargex card.
Centennial Celebration Establishes Student Scholarship

DANNY LEE RINKER

The accomplishments of the Horticultural Experiment Station at Vineland over the past 100 years have been through its dedicated scientists. The Year of Celebration does not only look back but thrusts itself forward into the future. An investment in young scientists will secure HES Vineland's future contributions to the horticultural industry. During 2006, in commemoration of the Centennial Year, friends of the Station are establishing a scholarship to assist MSc or PhD graduate student research that is relevant to the horticultural industry of Ontario. The award will be made to the student conducting research, in-part, at the Vineland Research Campus of the University of Guelph. A portion of every dollar donated to the Celebration goes to the scholarship fund. Anyone wishing to support this scholarship financially should contact the Vineland Research Campus.
In addition to the publication of this Centennial Report and the development of a graduate scholarship, several other events are planned for the year 2006 to commemorate and celebrate the century of service by the Horticultural Experiment Station at Vineland Station. These include:

1. **Seminar Series:** Six seminars will develop the theme “Current Issues in Horticulture”. These will define the cutting edge of horticulture for both industry and academic audiences and will be addressed by world authorities in their specific fields of expertise. The seminars will be published later as a single volume and made available for worldwide readership. This program will be financed by sponsorship of industry organisations, government grants and the University of Guelph.

2. **Grower Education Programs:** In addition to seminars aimed at a grower audience, tours of the Research Station will be conducted taking the form of the familiar twilight meetings or field days that have been such a valuable part of the Station’s extension component in past years. These events will be timed to
coincide with optimum crop development and maturity stages and will be advertised through the network of grower newsletters and similar vehicles of the extension services. Opportunities will be taken to emphasise the centennial theme.

3. A Station Homecoming & Open House: Saturday 26 August 2006 has been established for two major events. The first is aimed particularly at former and present Station staff members and their families. The Station Alumni Homecoming will occur in the morning providing an opportunity to renew friendships and reminisce about "Station" life and ending with lunch on the campus. The general public will then be invited for an Open House in the afternoon that will feature informal self-guided tours of the station buildings, the beautiful grounds including the Millennium Forest, the Heritage Apple Orchard and the Japanese flowering cherry collection. Also featured will be a garden showing a collection of many of the new crop varieties introduced by the Vineland Station plant breeders over the years. A Centennial Time Capsule with a collection of appropriate memorabilia will be interred during the afternoon.

4. The Centennial Celebration Dinner: The Grand Finale to the year will be held on Saturday 27 January 2007 in St. Catharines and will include the final seminar in the series.

Abbreviations

ABBREVIATIONS USED IN THIS REPORT INCLUDE THE FOLLOWING:

AAFC – Agriculture and Agri-Food Canada
AES – Atmospheric Environment Service
BC – British Columbia
CA – Controlled Atmosphere
EO – Executive Officer
HES – Horticultural Experiment Station
HESVS – Horticultural Experiment Station, Vineland Station
HPL – Horticultural Products Laboratory
HRIO – Horticultural Research Institute of Ontario
IPM – Integrated Pest Management
LCBO – Liquor Control Board of Ontario
MNR – Ministry of Natural Resources
MRS – Muck Research Station
MSC – Meteorological Service of Canada
MSU – Michigan State University
NS – Nova Scotia
OAC – Ontario Agricultural College
OAHF – Ontario Agricultural Hall of Fame
OBGA – Ontario Berry Growers’ Association
OF&VGA – Ontario Fruit and Vegetable Growers’ Association
OMAF – Ontario Ministry of Agriculture
OMAFRA – Ontario Ministry of Agriculture, Food and Rural Affairs
QEWS – Queen Elizabeth Way
RCAT – Ridgetown College of Agricultural Technology
UBC – University of British Columbia
UofG – University of Guelph
USDA – United States Department of Agriculture
VQA – Vintners’ Quality Alliance

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We would also like to thank all those
who sponsored this project after the press date.
A Pictorial Glimpse Into Our Past

1 - HES Japanese plum
2 - Apples at harvest
3 - Richard Chudyk in microbiology lab
4 - Wayne Brown with poinsettia demonstration
5 - Bob Hamersma in potting area
6 - HES rhododendron Vivacious
7 - Andy Vandenberg in greenhouse
8 - Ralph Crowther in HPL wine storage
9 - Debbie Norton in the nutrition lab
10 - HES Sour cherry

11 - Roy Forster with Station lilies
12 - Rudy Palabay testing grapes
13 - Ernie Kerr examining corn
14 - European seedless greenhouse cucumbers
15 - Vineyard mechanization
16 - Babygold 7 peach flowers
17 - Horticultural Products Lab
18 - HES fruit varieties
19 - Fruit processing research
20 - Tom Challen HPL enologist
21 - Picking ice wine grapes
22 - Niagara vineyards
23 - Emil Andersen in HES orchard
24 - HES grapes
Niagara Microclimate Zone Map
Horticultural Experiment Station Chronology

1906
Land donated by M.F. Rittenhouse was combined with land purchased by the Ontario Government to establish the 90 acre home farm as part of the Ontario Department of Agriculture, Fruit Branch.

1908-16
Land developed, initial experimental plantings of fruits and vegetables undertaken; administration building, director's residence, barns and storage buildings constructed.

1916-22
Dr. E.F. Palmer appointed as Director in 1916, a post he would hold for 40 years. Power plant and first greenhouses constructed and Victoria Farm land purchased.

1925-45
Federal Entomological Laboratory built on Station grounds in 1925; greenhouses expanded in 1928, and another 85 acres purchased in 1936. In 1945 the Horticultural Experiment Station became a separate Branch of the Ontario Department of Agriculture under the Agricultural Research Institute of Ontario.

1946-58
Grape sub-station created by the purchase of 35 acres on Cherry Avenue. Horticultural Products Laboratory and a new Administration building constructed.

1960-69

1970-83
Canada's first publicly funded mushroom research unit was constructed at the Station in 1970. In 1982 the Horticultural Products Laboratory was expanded with the addition of a new 'state-of-the-art' storage research facility.

1984-1997
In 1997 the Ontario Ministry of Agriculture, Food and Rural Affairs transferred the operation of the Horticultural Research Institute of Ontario to the University of Guelph and the Institute became part of the new Plant Agriculture Department. The Institute's name reverted to Horticultural Experiment Station.

1998-2003
In 2002 the Station's greenhouse, storage, and outdoor ornamentals research programs and staff were relocated to the University of Guelph campus.

2004-2006
Research programs continuing at the Vineland Horticultural Experiment Station include: viticulture, tree fruit breeding and management, and mushroom production. In 2006, the Horticultural Experiment Station celebrates 100 years of horticultural research and service to the Ontario agricultural community.