LeBoeuf

PLUG PLANT PROJECT

The 1987 Ultra high density tray (plug plant) for the processing tomato transplant project had three major objectives.

1. Commercial Adoption:

   a.) shelf like tray density and planting period.

   b.) field testing tray types.

   c.) tray plant density vs. media volume.

   d.) commercial adoption.

2. Field studies on current commercial transplanting operation. Secondly, the potential of new plug transplant plants.

3. The economic feasibility of producing processing tomato transplants in Ontario using plug plant technology.

Detailed reports on all three objectives make up the final 1987 report.

Summary of Results

1. Commercial Adoption:

   a.) Tray plants shelf life depends on previous greenhouse management and storage management. Observations based on commercial operations indicated that tray plants could be easily held for one week. This period could be extended by a co-ordinated system comprising of greenhouse culture, proper plant conditioning prior to delivery to growers and proper plant holding techniques.

   b.) Tray type testing was limited. The 288 cell tray was most commonly used. Greenhouse growers are changing to this tray type. In 1988, 406 cell trays will be tested at greater length.

   c.) Since the results in 1986 indicated satisfactory performance with the 288 cell tray, this test was found to be irrelevant.

   d.) Plug plants out performed southern bare-root in 13 of 15 test sites in side-by-side comparison. Plant stands were slightly better with plugs. Refer to Table I.

2. Transplanting Studies:

a.) The planting rate with conventional bare-root transplanters averaged 61 plants/min/row with two operators per row, or an average rate of 30.5 plants/min/person. Planting tray plants with a cup-type machine intended for such plants produced an average rate of nearly 70 plants/min/person, or an increase of 2.3 times in operator productivity.

b.) Conventional transplanters using bare-root seedlings were found to spend 61% of their field time actually planting. Much of the remaining time (34%) was spent sorting and loading the seedlings. By contrast, the cup-type machine using tray plants handled on racks required only 19% of the time for loading, achieving 73.5% actual planting time. For both systems, minor amounts of time were used for turning at row ends and down-time.

c.) It was found that the planters all placed the plants accurately in the soil at expected spacings.

d.) Tray-plants survived well after being transplanted. Measurements 3 weeks after planting showed a loss of 4.6% compared to 13.7% for bare-root plants.

e.) The seedlings themselves represent the greatest direct cost of transplanting processing tomatoes at $629/ha for bare-root plants and $704/ha for tray-plants. Labour costs amounted to $156/hour for bare-root transplanting, and $83/ha for tray plants transplanting with a cup-style transplanter.

f.) Exporatory trials with two European machines and one automatic transplanter showed that the tomato transplants used in Ontario were too large to be compatible with any of these mechanisms. This indicates a need to evaluate the ability of smaller transplants to survive in the field.

g.) Some sample measurements were made of tray-plant characteristics. Plant size varied with plug size, with stem heights averaging 155mm for 288 square to 182mm for 200 square trays. Average tray fill was 88-96%, although some trays were poorer at 63-76%. Removal force was higher for round cell plugs than square cell plugs.

3. Economic Feasibility Study:

This study indicated that various scale operations can be economically viable. The larger the scale the more economically viable the operations were.

Current Situation

In 1987, nearly 341 million tomato plants were imported from the southern United States. This figure includes fresh market as well as processing. But processing plants make-up most of the volume

Plug plant production in Ontario greenhouses was estimated at nearly 17 million plants or 5% of the transplant requirements in 1987.

Plug Plant Usage in Ontario (Processing) (*Million)

1985	1986	1987	1988 (projection)
*0	*2	*17	*30

Grower Re-action

Field growers are impressed with better field stand, smooth transplanting operations and very good yield performance when commenting about plug plants.

Growers are very successful with plug plants if they have adjusted their cultural practices to them. The greater the volume, the greater the commitment and therefore, the greater the satisfaction with the system.

Results and Discussion

Twenty-four fields initially monitored. Fifteen provided good side-by-side comparison. These are reported in Table I.

All data collected was replicated four times. Yield data is based on hand harvested plots within treatments, also replicated four times. Hand harvesting of plots simulated a once over machine harvest system.

Co-operators were located throughout Essex and Kent counties (over 80 miles between some locations. Information was compiled and analyzed by computer at Ridgetown College.

Conclusions

1. The 288 cell light tray is the industry standard for plug production.

2. Plant stands were compariable.

3. Yields for plug plants again were compariable to southern bare-root plants.

4. The majority of growers using plugs, found them to be a more convenient type of plant to work with.

5. The efficiency of tray plant production can still be improved. Greenhouse growers are only averaging an 86% stand per tray. Cost effectiveness would improve greatly with improved tray plant recovery.

6. Plug planters have a potential to reduce labour requirements. Further commercial testing will have to be conducted.

7. Plug plant production will probably increase in 1988.

Acknowledgments

Summer Staff responsible for data:	Janan Kettle, Horticultural data
	Stephane' Burgoyne, Engineering data
Engineering Support:	Gary Hergert, E.S.R.C., Agricultural Canada, Ottawa
Computer Support:	Dr. Ron Pitblado, R.C.A.T., Ridgetown
Horticultural Support:	Ed Tomecek, Plant Industry Branch, O.M.A.F., Ridgetown
Secretarial Support:	Geri Guyitt, Plant Industry Branch, O.M.A.F., Ridgetown
Seedling Board Staff Support:	Gene Woodsitt, Secretary-Manager
	Linda Baird, Secretarial Support

1987 PROCESSING TOMATO PLUG TRANSPLANT FIELD PERFORMANCE TRIAL

Grower	Location	Soil Type	Date of Planting	Source	Plant Stand %	Yield T/A	Yield Change as % T/A
Variety - 2653							
Bicrel	St. Pointe	Clay	May 11	S	73	21.7	+ 9.9
		"	" 06	L	96	31.6	
Gyori	W. Harrow	Sandy Loam	May 15	S	96	21.9	+ 1.5
		"	" 15	L	99	23.4	
Hlavac	Harrow	Sand	May 19	S	95	22.0	+ 1.2
		"	" 18	L	94	23.2	
Schwab	Amherstburg	Clay Loam	May 11	S	95	23.2	+ .7
		"	" 23	L	97	29.9	
Variety - 6203							
Epp	Leamington	Sand	May 23	S	92	29.7	+12.8
		"	" 25	L	98	42.5	
Ford	Harrow	Sand	May 22	S	99	31.9	- 4.6
		"	" 20	L	97	27.3	
Serran	Amherstburg	Sandy Loam	May 13	S	88	31.6	+ 5.9
		"	" 13	L	88	37.5	
Stallaert	W'burg	Clay Loam	May 14	S	96	29.3	+ 2.0
		"	" 14	L	96	31.3	

cont'd.....

Variety - 722

Gyori	Harrow	Sandy Loam	May	23	S	95	18.4
		"	"	30	L	96	19.7
							+ 1.3
Kreuger	Leamington	Sand	May	26	S	88	21.3
			"	29	L	98	22.7
							+ 1.4

Variety - 7814

Schwab	Harrow	Clay Loam	"	11	S	94	26.9
		"	"	23	L	99	20.5
							- 6.4

Variety - 832

Serran	Amherstburg	Clay Loam	May	24	S	82	13.1
		"	"	22	L	94	13.7
							+ .6

Variety - 7101

Poppe	Dresden	Sandy Loam	May	20	S	83	30.5
		"	"	20	L	95	32.7
							+2.2
Richards	Dresden	Sandy Loam	"	20	S	83	33.0
		"	"	19	L	95	35.0
							+2.0
Bednarick	Dresden	Sandy Loam	May	20	S	91	28.4
		"	"	20	L	97	31.8
							+3.4

*Source - S - Southern Bare-Root
L - Ontario Greenhouse Plug

TABLE 2.

SUMMARY OF TRANSPLANT PERFORMANCE
(13 Locations)

	Plant Stand (%)	Yield (t/a)
Local	95	29.0
Southern	92	25.8
Difference	+5	+3.2

TABLE 3.

1987 TRANSPLANT PERFORMANCE

CULTIVAR - 2653

	Plant Stand (%)	Yield (t/a)	% Change In Yield
Local	90	27.0	21
Southern	97	22.2	

CULTIVAR - 6203

	Plant Stand (%)	Yield (t/a)	% Change In Yield
Local	95	34.7	13
Southern	94	30.6	

TABLE 4.

TRANSPLANT PERFORMANCE (13 Sites)

YIELD (T/A)

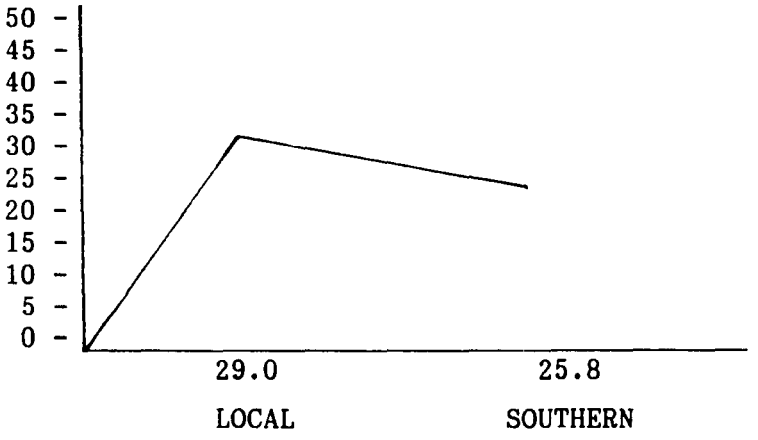

TABLE 5.

AVERAGE PLANT STAND (13 Sites)