

Ontario Tomato Research and Services Committee Meeting  
1999 Report

**PACLOBUTRAZOL POST-EMERGENCE WITH TOMATO PLUG TRANSPLANTS  
FOR ENHANCED FIELD ESTABLISHMENT AND HARVEST EARLINESS**

V. Souza-Machado, R. Pitblado, A. Ali and P. May  
University of Guelph  
H.J. Heinz Co. of Canada      Leamington  
P. Keller                              Ruthven

Funding support: OMAFRA, Ontario Tomato Research Institute, Agricultural Adaptation Council, H.J. Heinz Co. of Canada (kind), Keller Farms (kind).

**REPORT**

Paclobutrazol as a seed treatment was evaluated in field programs with growers over a four year period from 1995 to 1998. Seedling quality and field establishment vigor proved to be significant improved over this period, though earlier harvest was recorded during only some of the seasons. No significant yield increases were recorded. However, with this protocol involving Paclobutrazol as a seed treatment, emergence rates were consistently reduced in some cultivars. In order to overcome this negative aspect of Paclobutrazol as a seed treatment, a post-emergence application protocol was developed and tested in the greenhouse at Guelph.

The objective of the program in 1999 was therefore to evaluate the quality and field response of tomato seedling plugs to **Paclobutrazol post-emergence**, in terms of field establishment vigour and early harvest maturity. Seedling plugs in 288 trays were grown at the Keller Greenhouses in Ruthven under grower conditions and at the University of Guelph, for seedling quality evaluation. Subsequently, the seedling plugs from Kellers of the cvs H9230, H9478 and Peto 696 were 'early' field transplanted at Ridgetown and Leamington on 11.05.99 and 'late' transplanted at Ridgetown on 27.05.99, in replicated field trials.

**SEEDLING QUALITY (Guelph). Fig. Ia**

Earlier work in 1998 to develop the Paclobutrazol post-emergence protocol, tested several concentrations of Paclobutrazol and application at different stages of tomato transplant growth. The above three cultivars at the early 2-leaf stage were either sprayed with Paclobutrazol to 'leaf runoff' or treated as checks. These main plots were subsequently split for nutrient loading with NPK 20/20/20 foliar fertilizer applied either once or twice per week to the 5 week stage. The Paclo/high nutrient loaded seedlings were 10% shorter in height and 51% heavier in shoot fresh weight than the check seedlings (non-Paclo/low nutrient loaded).

**SEEDLING QUALITY (Kellers). Fig. Ib**

Growing of the 'early' seeded experimental plug trays coincided with the rush in commercial

greenhouse Spring workload, and unfortunately were not maintained under optimal conditions. As a result all the seedlings were stunted with atypical growth, as compared to the consistent results of the previous four years under commercial conditions. The 'late' seeded plug trays were better maintained and the Paclo/nutrient loaded seedlings were similar in height to the checks, with 27% thicker stem diameter, 61% heavier shoot freshweight and 57% heavier root freshweight.

### **FIELD PERFORMANCE Figs II & III**

In the 'early' transplanted field trials (11.05.99) at Leamington and Ridgetown, the improved stand count and vigor ratings of the Paclo-treated plants, were more evident at Ridgetown than at Leamington. At this latter site, irrigation was more regular. Flower counts taken prior to harvest on the 11.06.99 confirmed a higher percentage of earlier flowering in the Paclo-treated plots than the checks. Red/breaker fruit counts prior to harvest maturity showed a higher count with Paclo-treated plants, but the cultivar response was not consistent between sites. Similar trends in favor of Paclo treatments were recorded at harvest relating to earliness, expressed as percentages of red/breaker fruits to total yield, which included greens. Total yields in the Paclo plots were also higher. However, with most of these parameters the treatment differences were not statistically significant, but only indicated trends in favor of the post-emergence Paclobutrazol treatment. Data from the 'late' transplanted trial (27.05.99) at Ridgetown, indicated similar trends though not to the same extent as the 'early' transplanted trials.

The warmer Spring temperatures of the 1999 season in May, with the absence of late frosts and low temperatures, may explain the lack of statistically significant Paclobutrazol responses. This resulted in only **positive trends** in favor of post-emergence Paclobutrazol seedling treatments.

Fig I-a : SEEDLING QUALITY ( Guelph )

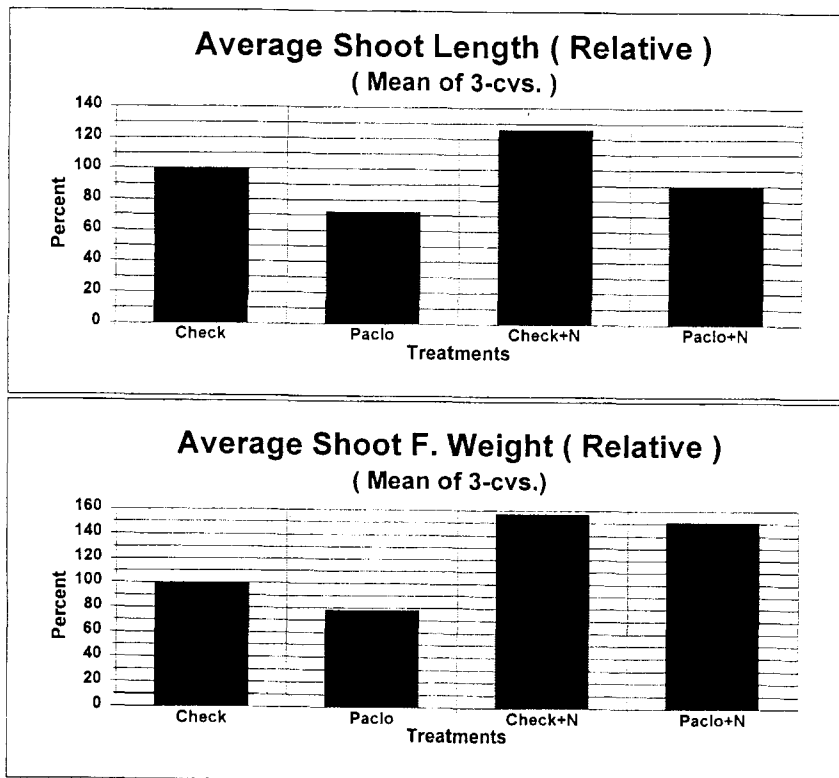


Fig I-b : SEEDLING QUALITY ( Keller's )

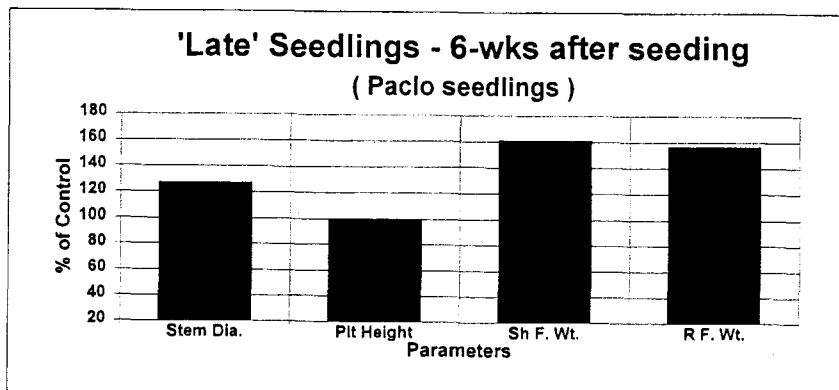
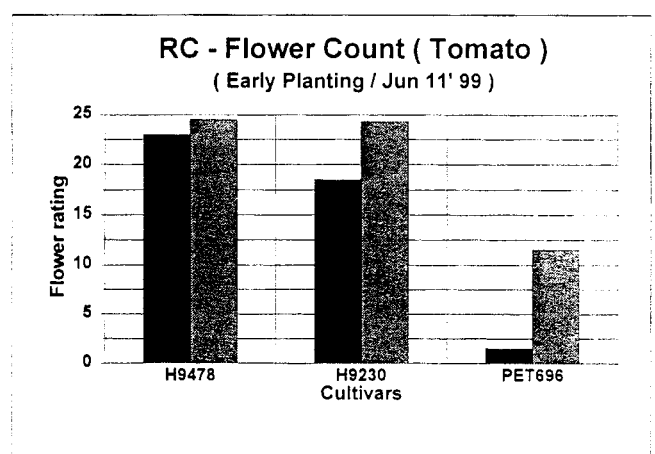
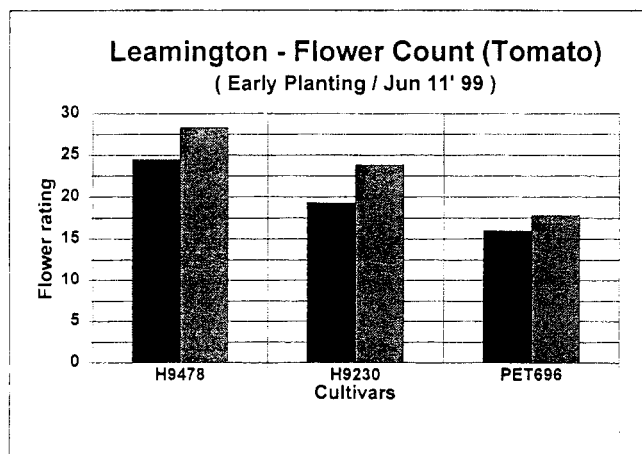
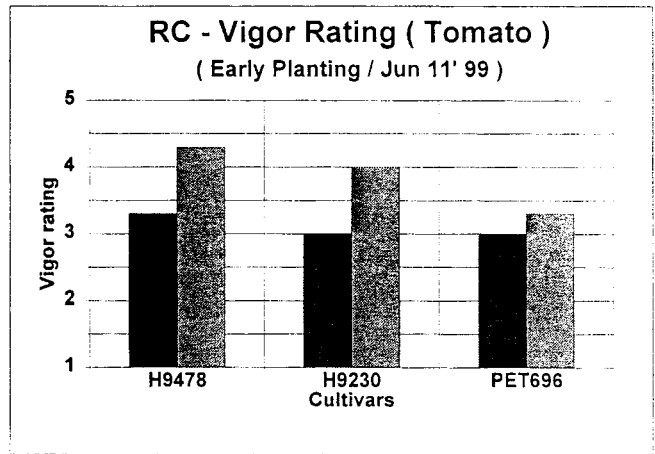
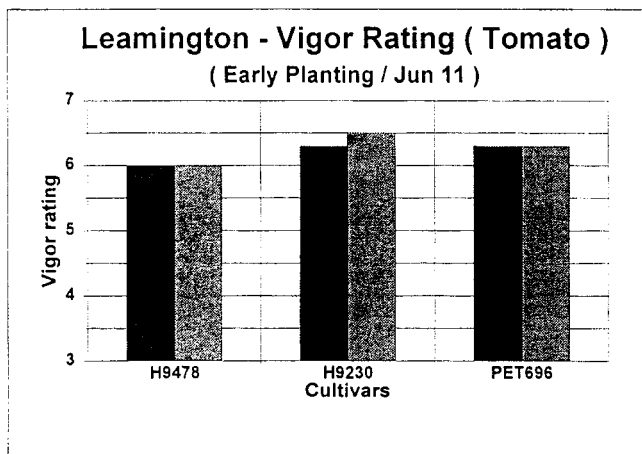
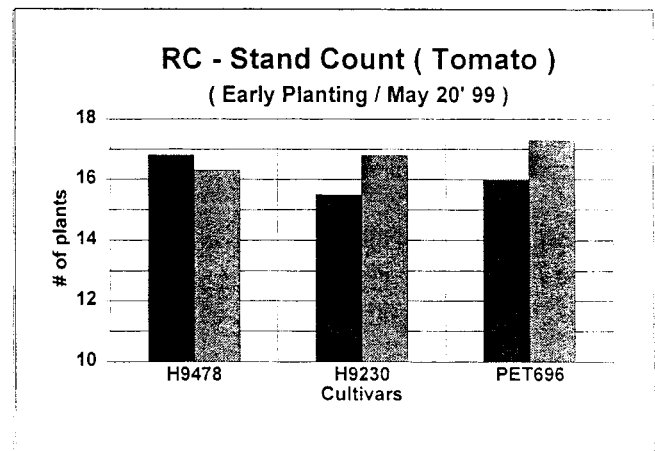
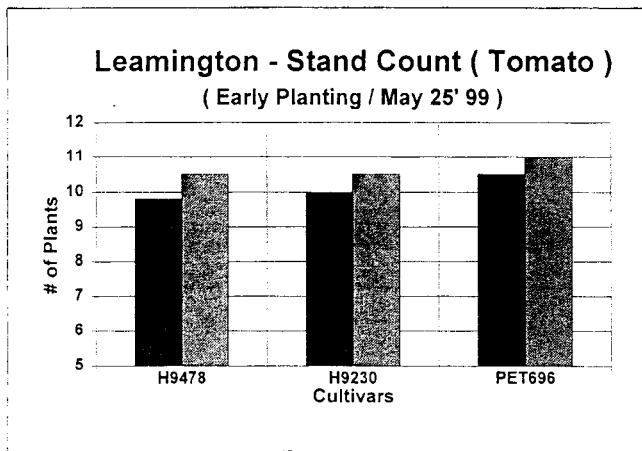
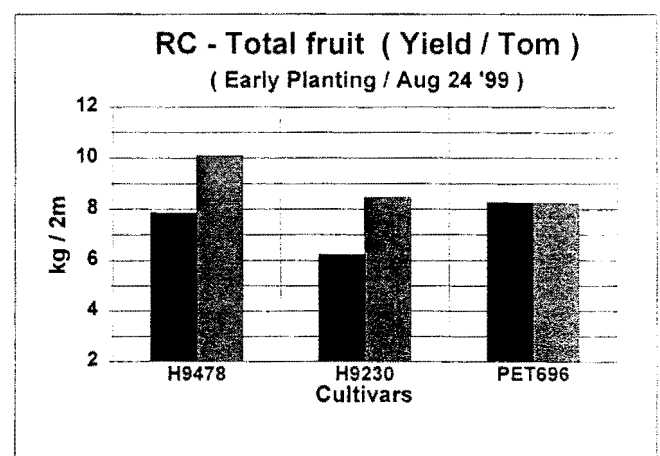
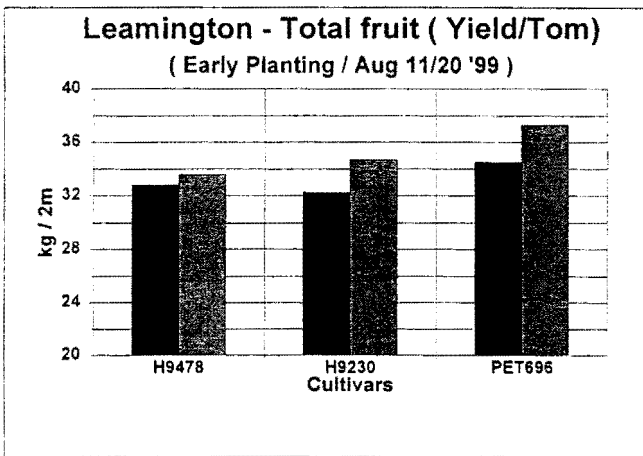
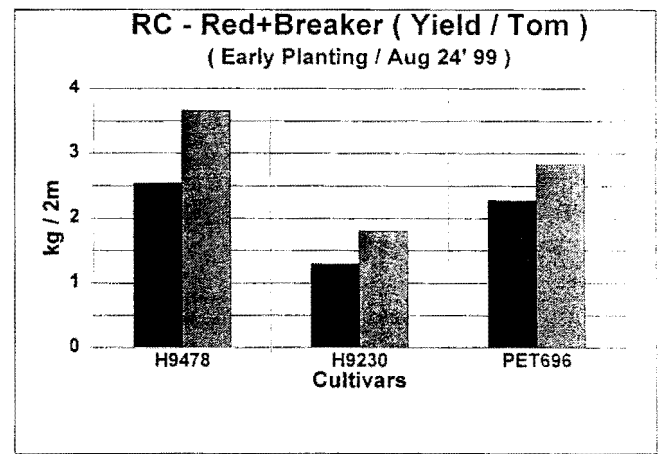
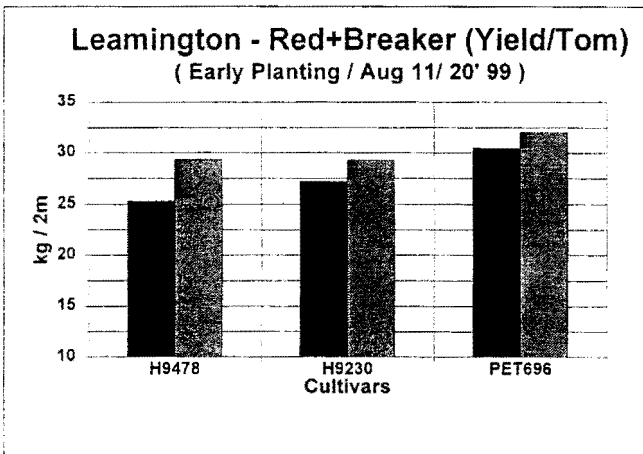
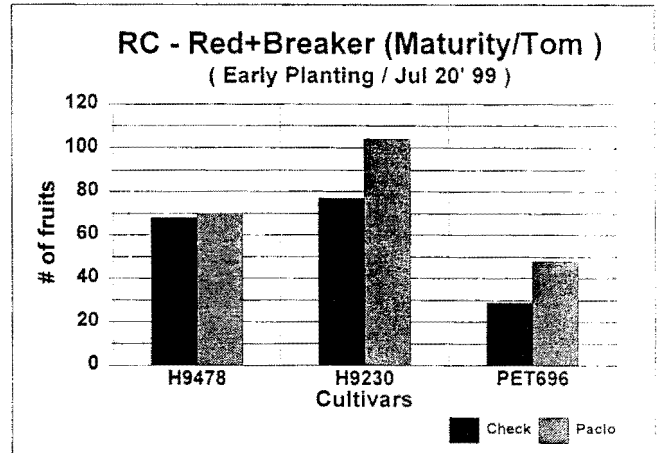
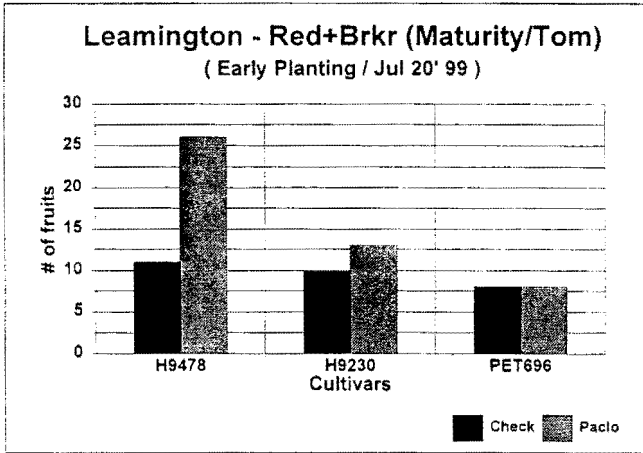


Fig II : FIELD PERFORMANCE ' EARLY '





## II PACLOBUTRAZOL RESPONSES WITH PROCESSING TOMATO IN FRANCE\*

Robert Giovinazzo  
SONITO-54, chemin de Bonaventure  
84000 Avignon  
France  
Tel: 04 90 86 64 39  
Fax: 04 90 27 01 48  
Email: sonitomate@aol.com

Vincent Souza-Machado  
Department of Plant Agriculture/Hort. Sci.  
University of Guelph  
Guelph, Ontario  
Canada N1G 2W1  
Tel: (519) 824-4120 Ext. 2585  
Fax: (519) 767-0755  
Email: vmachado@evbhort.uoguelph.ca

**Paclobutrazol as a seed treatment** for raising greenhouse seedling plugs of processing tomatoes, was tested for improved seedling vigor, higher transplanting stress tolerance under low temperature Spring conditions and earlier harvest maturity in **France**, following encouraging reports of this technology in Southern Ontario. Seedlings of the cultivars Fancysset, Pavia and Montégo were raised in a greenhouse in Nîmes and field tested in the cold zone of Marsanne during the 1999 growing season. Paclobutrazol-treated seed was also evaluated to grow vigorous bare root seedlings in mini plastic tunnels, in a field nursery in Pierrelatte.

**Significant differences** were recorded with Paclobutrazol-treated seedlings plugs which at 6 weeks were 43% shorter in seedling height, 8.6% thicker stem diameter and 5.5% higher dry matter. However, reduced seedling emergence with Paclobutrazol-treated seed was evident, ranging from 12% (Fancysset) to 25% (Pavia) reduction, as compared to the non-treated checks. **Significant yield increases** of 13.4% due to the Paclobutrazol treatment were recorded, together with earlier harvest maturity by 6% which equated to 2 days. Bare root seedlings raised in mini plastic tunnels in the field from Paclobutrazol-treated seed were shorter and thicker, measuring 23.4 cm in height as compared to 30.5 cm in the checks, at 10 weeks. Future trials are planned on a larger scale in farmers' fields, in different regions and with other cultivars.

### III LYCOPENE AND $\beta$ -CAROTENE POTENTIAL OF CHERRY TOMATO

V. Souza-Machado, R. Pitblado, A. Ali and P. May  
University of Guelph

Five cultivars of cherry tomato types were field tested in replicated trials at Cambridge Research Station and Ridgetown College for their yield potential of lycopene and  $\beta$  carotene. Fruit analysis were done at Guelph in the lab of G. Paliyath. Poor stand establishment at Ridgetown resulted in the loss of reliable yield data, but harvest samples were collected for lab analysis. The cultivars tested were PX221516, PX222516, Tondino from Peto-Italiana and Sweet 100, Sweet Million from Stokes. The later three cultivars were more representative of the cherry tomato type.

Highest yields per plot were recorded with PX221516. and PX222516. With the typical cherry tomato types, Tondino was the higher yielder. Calculations of lycopene and  $\beta$  carotene yield per plot at CRS indicated higher yields of lycopene with PX221516 and PX222516, but  $\beta$ -carotene yields were higher with Tondino and Sweet Million (Fig. IV). The nutritional functional food value of these cultivars indicated that though the lycopene content was higher in the larger non-cherry tomato lines tested,  $\beta$ -carotene was higher in the cherry tomato types (Table 1). Tondino had the best combination of high lycopene and high  $\beta$ -carotene content.

Table I Lycopene and  $\beta$ -Carotene content

	Lycopene $\mu\text{g/g FW}$	$\beta$ -Carotene $\mu\text{g/g FW}$
PX 221516	65	8
PX 222516	61	6
Tondino	61	15
Sweet 100	47	16
Sweet Million	56	18

Fig IV : Lycopene & B-Carotene Potential of Cherry Tomato in Ontario

