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# Procarpil Enhances Earliness and Parthenocarpy of Pepino (*Solanum muricatum* Ait.)

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Pepino flowers abundantly in temperate climates, but fruit set and yield are poor. Genetic characteristics and poor pollination as a consequence of unsuitable temperatures, hydric stress, and low light intensity have been cited as causes of the poor fruit set (Grigg et al., 1988). Research in Chile indicated that temperatures below 10 to 12 °C can have a negative effect on flowering and fruit set; fruit development requires a temperature range from 20 to 25 °C (Arenas, 1992).

Auxin compounds are commonly used to improve the earliness of other solanaceous plants (Picken, 1984). Burge (1989) quoted a study in pepino in which fruit set was not improved by auxins. In his own work, pepino fruit set was improved when an auxin transport inhibitor (chlorflurenol) was applied to the whole plant when flowers were at or near anthesis. Fruit, however, were smaller and seedless (Burge, 1989).

In previous work, in a single spring–summer pepino growing season, we found that naphthoxyacetic acid-amide 2.5% + 4-chlorophenoxyacetic acid 0.75% (Procarpil; PCP) improved earliness, increased the number of seedless fruit, and reduced yield (Maroto et al., 1994). Our aim in the present work was to study the effect of PCP applications during three growing periods on yield, total number of fruit, average fruit mass, number of seeds per fruit, and soluble solids of pepino.

Three experiments were carried out in Valencia (Spain) using cuttings from the Chilean line 'SE-22' (La Serena type, ovalate and slightly purple striped fruit). Cuttings were rooted in 0.8-L pots containing 1 peat : 1 perlite (v/v). They were transplanted and cultivated in a sandy loam soil in a tunnel (8 m wide and 3 m maximum height) covered with long-lasting, thermic polythene, 0.0002 m thick, placed in rows 1.20 m apart with 0.5 m between plants in the same line. Plants were cut back to three stems supported with strings. Lateral shoots were periodically removed. Plants were fertigated by drip irrigation with a solution suggested by Sonneveld and Straver (1992) for tomatoes (*Lycopersicon esculentum* Mill.).

Treatments were two applications of PCP to each floral cluster and a nontreated control. The first PCP treatment of the flowers was at anthesis and the second a week later. The concentration of PCP used was 4 mL·L$^{-1}$. Each experiment was in a completely randomized design, with four replications of 15 plants per treatment. Fruit were harvested once a week for 10 weeks.

The treatment dates were: Expt. 1: rooted (R), 10 Aug. 1992; transplanted (T), 29 Sept. 1992; first auxin applications (FAA), 23 Feb. 1993. Air maxima and minima (MM) during FAA week were, respectively, 16 to 20 °C and 5 to 8 °C. Expt. 2: R, 28 Sept. 1992; T, 3 Nov. 1992; FAA, 9 Mar. 1993; MM, 20 to 22 °C and 6 to 10 °C. Expt. 3: R, 5 Aug. 1993; T, 10 Sept. 1993; FAA, 18 Nov. 1993; MM, 22 to 24 °C and 10 to 13 °C.

Similar results were obtained in the three experiments (Table 1). PCP applications enhanced earliness compared to the control plants, but total production was not affected. More early fruit was formed with than without PCP. Neither the total number of fruit produced nor fruit mean mass was affected by PCP. Fruit in Expts. 1 and 2 tended to be heavier (≈300 to ≈425 g) than those of Expt. 3 (≈145 to ≈180 g). The number of seeds per fruit was significantly higher in control fruit than in PCP-treated fruit. Soluble solids concentration (SSC; 5.3% to 6.0%) of harvested fruit, measured with a hand refractometer, was not affected by PCP.

Our results indicate that application of an auxin-type substance enhances earliness of pepino, in agreement with the results of our previous experiments (Maroto et al., 1994). The results partially agree with those obtained by Burge (1989), and by Welles (1992), who stated that the use of 4-chlorophenoxyacetic acid (4-CPA) enhanced fruit set. Auxin application did not result in totally parthenocarpic fruit, but it did significantly reduce seed counts in the cultivar we used, which is desirable.

The low air minima in Expts. 1 and 2, when the first flowers appeared, likely accounted for the low number of fruit harvested.

No clear effect of PCP application on fruit SSC has been established. The clone cultivated and fruit maturity at harvest have a large influence on SSC (Pluda et al., 1993).

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Table 1. Effect of Procarpil (PCP) on fruit characteristics of pepino.

| Expt.[y] no. | PCP | Yield (kg·m$^{-2}$)[z] Early | Yield (kg·m$^{-2}$)[z] Total | No. fruit/m$^2$ Early | No. fruit/m$^2$ Total | Seeds/fruit (no.) Early | Seeds/fruit (no.) Total |
|---|---|---|---|---|---|---|---|
| 1 | + | 0.98 | 2.03 | 2.7 | 5.2 | 17.6 | 14.3 |
| | – | 0.44 | 1.90 | 1.1 | 4.6 | 55.0 | 51.6 |
| Significance | | * | NS | * | NS | ** | ** |
| 2 | + | 0.90 | 1.57 | 2.3 | 4.6 | 16.7 | 22.1 |
| | – | 0.42 | 1.43 | 1.4 | 4.4 | 73.9 | 73.6 |
| Significance | | * | NS | * | NS | ** | ** |
| 3 | + | 0.67 | 4.70 | 4.5 | 26.3 | 9.3 | 20.5 |
| | – | 0.48 | 4.47 | 3.2 | 25.2 | 70.4 | 72.2 |
| Significance | | ** | NS | ** | NS | ** | ** |

[z]Early yield: until 140 days after first auxin treatment.

[y]Treatment dates: Expt. 1, 23 Feb. 1993; Expt. 2, 9 Mar. 1993; Expt. 3, 18 Nov. 1993.

NS, *, **Nonsignificant or significant at $P \leq 0.05$ or 0.01, respectively, by the Newmans–Keuls test.

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