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Thinning 'Loring' Peaches with CGA 15281

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Abstract. **Adequate fruit thinning of 'Loring' peach [*Prunus persia* (L.) Batsch] was achieved with single applications of (2-chloroethyl)-methylbis (phenylmethoxy) silane (CGA 15281) at concentrations of 240, 360, and 480 ppm applied at seed length of 8.8 mm and 2 applications at 240 and 360 ppm applied 7 days apart at 8.8 and 10.8 mm seed lengths in 1978. Additional hand thinning following treatment was required. In 1979 adequate thinning was achieved with 1 application of 240 ppm applied at seed length of 13.9 mm or 480 ppm applied at an 8.5-mm seed length. Yields from these treatments were reduced but did not differ from the control treatment. Multiple applications and higher rates resulted in over-thinning and reduced yields. The sensitivity of fruit to thinning appeared to increase with increased seed length. In 1978, foliage injury occurred at all rates and the severity of injury increased at higher concentrations and multiple applications. However, no foliage injury was observed in 1979.**

Peach trees with a heavy fruit set must be selectively-thinned while the fruit is small to ensure adequate fruit size of good quality at harvest. Hand thinning is expensive, time consuming, and difficult to achieve due to the lack of available labor. Severe reductions in fruit size on poorly thinned trees will occur in extremely dry seasons. Numerous materials have been used for chemical thinning of peaches but none have provided consistent, acceptable results on all cultivars (2,4,5,6,7,8,9,10). Byers (3) found that the thinning response with CGA 15281 varied with cultivar, timing, concentration, and year.

Thinning was achieved with bloom sprays of N-1-naphthylphthalamic acid (NPA) on only 2 of 3 peach cultivars (1). The danger of late spring frost injury discourages peach growers in the Southeast from using thinning sprays during bloom. Therefore, there is a critical need for a chemical thinner that will consistently thin peaches after the threat of spring frost has passed. The objective of these experiments was to determine the rate and application time of CGA 15281 required to thin 'Loring' peaches adequately.

In 1978, CGA 15281 was applied to 7-year-old 'Loring' peach trees on 'Lovell' rootstock at 240, 360, or 480 ppm. Treatments consisted of 1, 2, or 3 applications of the 240 and and 360 ppm sprays and 1 or 2 applications of the 480 ppm sprays at 7 day intervals. Control treatments were hand thinned. Sprays were applied with air blast sprayer at 2817 liters of solution per ha on April 21, 28, and May 5 at seed lengths of 8.8, 10.8, and 15 mm, respectively. Treatments were replicated 4 times on whole tree plots in a randomized complete block design.

In 1979, CGA 15281 was applied to 4-year-old 'Loring' peach trees on Lovell rootstock at rates of 240, 360, or 480 ppm. The 240, 360, or 480 ppm single application treatments were applied on April 28 at a seed length of 13.9 mm. A 480-ppm single application treatment was also applied on April 20 at 1 seed length of 8.5 mm. Control treatments were hand thinned. Double applications of 240 or 360 ppm treatments were applied on April 20 and May 4 at seed lengths of 8.5 and 17.5 mm, respectively. The treatments were applied with a hand gun to the point of runoff (7.6 liters/tree). Treatments were replicated 7 times on whole tree plots in a randomized complete block design.

Three applications of 240 or 360 ppm CGA 15281 applied at weekly intervals in 1978 overthinned and reduced yields on 7-year-old 'Loring' trees (Table 1). One and 2 applications of 240, 360, or 480 ppm adequately thinned the fruit without reducing yields. The single application left sufficient fruit that could be spaced better and clusters that could be reduced by supplemental hand thinning. Two applications removed too many fruit to permit proper spacing with supplemental hand thinning. The weight per individual fruit was not different from the hand-thinned check.

In 1979, 2 applications of 240 or 360 ppm applied at two-week intervals at seed lengths of 8.5 and 17.5 mm, respectively, and one application of 360 or 480 ppm applied at a seed length of 13.9 mm, overthinned and reduced yields on 4-year-old 'Loring' trees (Table 2). A single application of 480 ppm applied a week earlier at a seed length of 8.5 mm did not thin as much fruit or reduce the yield. A greater percentage of the thinning achieved by the double applications of 240 or 360 ppm treatments was observed to occur following the second application. The single applications of 240 ppm applied at a seed length of 13.9 mm and 480 ppm applied at a seed length of 8.5 mm did not reduce yields; furthermore, sufficient fruit was removed and a minimum of follow-up hand thinning was required. Most of the fruit was removed from the trees that received a double application of either the 240 or 360 ppm treatments. This excessive thinning resulted in fewer and larger fruit.

Foliage injury was evident in 1978 but not in 1979 on the 4-year-old vigorous trees (Table 1). Foliage injury consisted of leaf yellowing and abscission of the basal leaves. Injury increased with concentration and number of applications. The

Table 1. Response of 'Loring' peaches to chemical thinning with CGA 15281, 1978.

Treatment CGA 15281 (ppm)	No.[z] applications	Fruit per tree: Chemical[y] thinning rating	Fruit per tree: No. removed by hand thinning	Fruit per tree: No. harvested	Fruit wt/tree (kg)	Wt per fruit (g)	Foliage[x] injury rating
0	–	0.0[w]	789 a	470 a	51.3 a	113 ab	0.0 d
240	1	2.3 c	174 b	542 a	54.5 a	99 b	1.8 c
360	1	2.8 c	106 b	461 a	46.3 a	103 b	1.9 c
480	1	5.5 b	111 b	463 a	45.0 a	96 b	2.4 bc
240	2	4.9 b	36 b	435 a	43.6 a	110 ab	2.6 bc
360	2	5.1 b	14 b	387 a	41.8 a	111 ab	3.4 b
480	2	6.1 b	0 b	349 ab	40.0 a	115 ab	3.3 b
240	3	9.7 a	0 b	67 c	9.1 b	139 a	4.5 a
360	3	9.5 a	0 b	160 bc	2.0 b	138 a	5.0 a

[z]First application applied April 21 with an average ovule length of 8.8 mm. Second application applied April 28 with an average ovule length of 10.8 mm. Third application applied May 5 with an average ovule length of 15.0 mm. The temperature was 20°, 25°, and 24°C at the time of the 1, 2, and 3 treatments respectively.
[y]0 (no fruit removed) to 10 (all fruits removed).
[x]0 (no injury) to 5 (severe yellowing and drop)
[w]Mean separation, within columns, by Duncan's multiple range test, 5% level.

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Table 2. Reponse of 'Loring' Peach to chemical thinning with CGA 15281, 1979

Treatment CGA-15281 (ppm)	Application[z] date	No. fruit per tree: Removed by chemical thinning[y]	Removed by hand thinning	Harvested	Yield per tree (kg)	Wt per fruit (g)
0	–	0 c	77 a[x]	349 a	57.2 a	170 c
240	Apr. 20, May 4	233 a	1 c	66 c	13.6 c	210 ab
240	Apr. 28	51 bc	43 b	293 ab	52.2 ab	187 bc
360	Apr. 20, May 4	257 a	1 c	35 c	7.7 c	217 a
360	Apr. 28	92 b	31 bc	239 b	45.4 b	191 abc
480	Apr. 20	50 bc	29 bc	294 ab	51.8 ab	177 c
480	Apr. 28	185 a	25 bc	252 b	44.5 b	180 c

[z] First application applied April 20 with an average ovule length of 8.5 mm. Second application applied April 28 with an average ovule length of 13.9 mm. Third application applied May 4 with an average ovule length of 17.5 mm. The temperature was 26.5⁰, 20.5⁰, and 20.5⁰C at the time of application of the 1, 2, and 3 treatments, respectively.

[y] Fruit removed chemically were determined by counting fruit on each tree before and after treatment application as well as the dropped fruit.

[x] Mean separation, within columns, by Duncan's multiple range test, 5% level.

remaining leaves developed normal coloration following an application of nitrogen.

We conclude that CGA 15281 will adequately thin peaches. The sensitivity of the fruit to CGA 15281 appears to increase with increased fruit size.

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Ethylene and Ethane Production and Electrolyte Leakage of Water-stressed 'Pixy' Plum Leaves[1]

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Abstract. **Ethylene and ethane production and electrolyte leakage were determined during water stress of leaves of ascepticaly-cultured plum (*Prunus insititia* L. cv. Pixy). Ethylene production increased to a maximum at about 50% leaf water loss and decreased as water deficit increased. Ethane production and electrolyte leakage were highly correlated, increasing only after 50% water loss to a maximum at about 72% water loss, indicating an increase in cell injury and death.**

Ethylene production has been used extensively as a measure of stress in plants caused by a number of environmental factors, including water stress (4,18). Other work has shown that stressed and dying tissue produce ethane in certain situations (6,11,19). Because of the importance of water stress in plants and the lack of any specific information, this study was initiated to examine the effects of water stress on ethylene and ethane production, using leakage measurements to assess the point at which the stress results in cell damage.

Ethylene production has been successfully used to measure tissue stress produced by disease (12), sulfur dioxide (6,19), bisulfate ion (6), and freezing temperatures (11). Water stress of cotton petioles (18) and citrus leaves (4) has also been measured by ethylene. Stressed living tissues produced ethylene (1,2), and dead tissues did not (2,6,11).

Ethane production has been used to measure tissue injury by sulfur dioxide (6,19), bisulfate ion (6), and freezing temperatures (11). Ethane production increased with the amount of dead tissue (6,11).

The conductivity of electrolytes leaking from injured tissues was used to measure cold injury in many plants (22). Leakage increased when cell injury and death increased cell membrane permeability.

The conductivity of electrolytes leaking from injured tissues was used to measure cold injury in many plants (22). Leakage increased when cell injury and death increased cell membrane permeability.

Aseptically-cultured plantlets of 'Pixy' plum were propagated as described by Cheng (9). After growing the plantlets in the rooting medium for 2 weeks, the first fully expanded leaf of 21 plantlets was removed, placed in a preweighed 10-ml vial, sealed with a rubber serum stopper, and weighed. After weighing (average fresh weight of leaves was 13.3 mg), the leaves were placed in uncovered petri dishes with their abaxial surface up. The leaves were air dried under 237 mW/cm^2 coolwhite fluorescent lights at 23 ± 2°C. The leaves were dried for 0, 15, 30, 45,

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