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# CGA-15281 INDUCED ABSCISSION ZONE FORMATION IN PEACH FRUIT[1]

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*Abstract.* **Initial stages of chemically-induced fruit abscission from application of CGA-15281 in peach,** Prunus persica **(L.) Batsch, are described. Salient features that differ from modes of separation in other stone fruits include simultaneous production of 2 abscission zones along the fruit pedicel and the centripetal development from cortex to pith of the separation layers.**

Fruit thinning compounds are normally applied to the fruit surface where the release of ethylene as a decomposition product within the plant tissue (7) either directly or indirectly elicits the formation of an abscission zone. High ethylene concentrations in the abscission zone at the base of the pedicel are believed to stimulate rapid growth of proximal cells and the formation of polysaccharide hydrolyzing enzymes (4). This model suggests that ethylene promotes fruit abscission by stimulating both unequal cell growth and digestion of the middle lamella in the abscission zone.

CGA-15281, an ethylene releasing compound, has been under investigation as a peach fruit abscission agent for several years. These studies, though not conclusive, have been instrumental in determining the range of useful concentrations (1), the effectiveness at various stages of fruit maturation (2), the response to different methods of application (3), and other general horticultural information.

This study was undertaken to monitor the development of abscission zone formation in peach following application of CGA-15281 to the entire tree.

## Materials and Methods

Treatments of aqueous solutions of 600 or 720 ppm CGA-15281 were applied to 6-year-old 'Harvester' peach trees at the end of the "shuck off" stage (abscission of the floral cup) of fruit development (ovule length 4-6 mm) on April 5, 1980 and were compared to suitable controls. An airblast speed sprayer delivered 2 gal/tree at 100 psi through 4 nozzles.

Samples included adjacent stem, pedicel, and proximal portion of the fruit. Collections were from treated and untreated trees before and at various intervals after application. The samples were fixed, dehydrated, imbedded in paraplast, sectioned at 12 $\mu$, mounted, and stained in safrauin and fast green.

## Results and Discussion

Abscission zone development was not detected in pedicels

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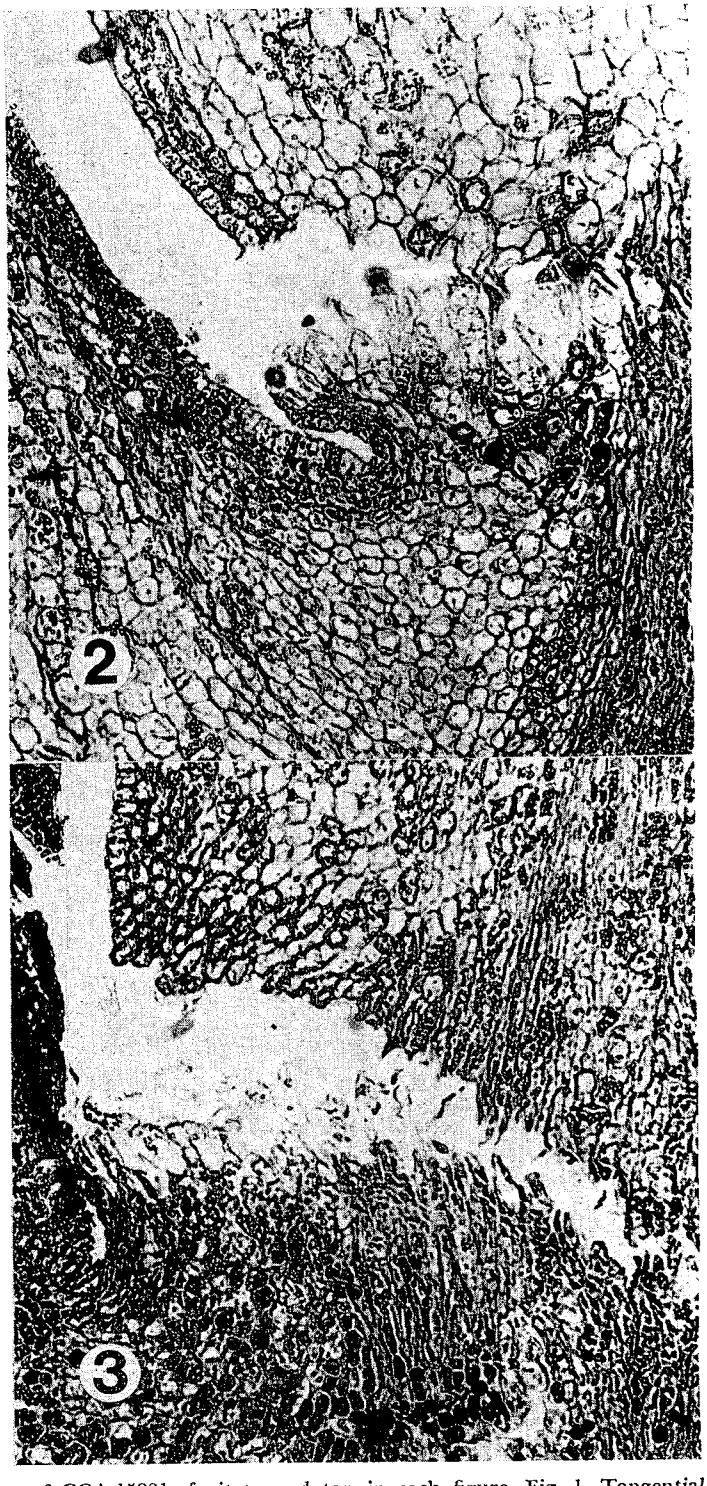
of untreated samples up to 7 days beyond treatment. Some, but not all, fruit from trees treated with CGA-15281 showed evidence of abscission layer development in those samples taken 7 days after treatment.

Two abscission zones were present: one at the fruit-pedicel juncture and one at the pedicel-spur juncture (Fig. 1). Both were fairly well developed by the 7th day after treatment. Progressive development of the abscission zone at both sites was centripetal, i.e., separation started in the outer cortez and progressed toward the pith (Fig. 2 & 3). At the 7th day stage, cells of the cortex abscission zone were completely separated, whereas in the pith the zone was delineated by lightly stained cells that were not yet separated. Advanced areas of abscission (the cortical areas) contained enlarged cells with marked cytoplasmic deterioration. Lysis of some middle lamellae on the proximal side of each cleavage was indicated with many collapsed cells present.

Descriptions of natural abscission in peaches could not be found in the literature. Abscission in cherry and related


Figs. 1-3. Abscission zone development in peach 7 days after application of CGA-15281; fruit toward top in each figure. Fig. 1. Tangential section showing complete abscission through the cortical area of the basal pedicel-spur juncture; the upper fruit-pedicel abscission shows break down of cortical cells and initial deterioration of vascular tissue and pith, X250. Fig. 2. Detail of fruit-pedicel abscission showing enlarged cells with cytoplasmic deterioration, X500. Fig. 3. Median longitudinal view of pedicel-spur (basal) abscission showing progressive centripetal development, X500.

stone fruits varies (6). In sour cherry, abscission layer formation occurs between the fruit and the pedicel but not between the pedicel and spur. In sweet cherry and plum, fruits abscise at either the fruit end or the spur end of the pedicel depending on season of the year. Simultaneous double abscission layers as described here have not been previously reported.

In the sour cherry (6), cells in the abscission zone lacked the cell enlargement reported here. Abscission in sour cherry also differed in its centrifugal development (i.e., from the pith outward) wherein a few rows of cells at the periphery of the axis usually did not separate.

Abscission induced by CGA-15281 in peach fruit is clearly distinctive from separation processes in cherry and plum, but its full meaning can not be interpreted until the histological changes in natural abscission of peaches are better understood. Studies of natural abscission and further investigations of CGA-15281 action on peaches are underway.

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