Peach Thinning with Ethylene

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A resurgence of interest has been focused on the search for a chemical which would evolve ethylene after foliar application and thus induce plant growth responses. One such compound, 2-chloroethyolphosphonic acid (Ethrel), has been under study as a peach thinner at the University of California orchards at Davis. It has been assumed that the peach thinning induced by Ethrel was caused by the ethylene gas which is released after application\(^2\). As an adjunct to the work with Ethrel, we were interested in the thinning action of ethylene gas and the resultant gross effects on the treated tree parts.

Fourteen-year-old ‘Palor’ peach trees were used in our study. Blossom counts were made on three experimental limbs plus one control limb of each tree. There were two trees per treatment. An average of 276 blossoms were involved in each treatment and control limb. Each limb was enclosed securely with a 3' x 6' polyethylene bag (Fig. 1). Ethylene at 5.5 ppm was introduced at a rate of 125 ml per minute into all bags except those on the control limbs, which received air at the same rate. Treatments were started when ovules were 6.2 mm in length. Bags were removed after 4, 16, 24, 48, 72 and 96 hours. The amount of

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fruit thinning caused by the ethylene was determined by comparing the number of fruits remaining after "June drop" with the number remaining on the control limb. Final evaluation of fruit condition was made at harvest.

The results of this work are shown in Fig. 2. Per cent set for the bagged controls coincided with the general set data for 'Paloro' peach at Davis in 1968. The potency of ethylene gas as a peach thinning agent was vividly indicated by treatments of 16 hours or longer. At 72 and 96 hours of ethylene all fruits were removed, and at 96 hours most of the leaves also abscised.

Compared to the control fruits at harvest, the ethylene treatments caused little, if any, differences in seed size, fruit size, number of split pits, or flesh color. Some branch gumming occurred with the 96-hour treatment. Foliar regrowth occurred readily in the heavily defoliated limbs, and three months after treatment they could not be distinguished from the control limbs. All treated limbs fruited well the year following ethylene application. The lack of increased fruit size even where set was only 3% (48 hours, Fig. 2) was likely the result of foliar damage from the treatment. The deleterious side effects caused by high rates of ethylene were similar to those induced in peach by high rates of Ethrel.

The fruit thinning caused by ethylene resulted from abscission between the fruit and receptacle. This is also the major zone of abscission during natural "June drop", and when chemical thinners such as Ethrel or 3-chlorophenoxy-α-propionamide (3-CPA) are applied. Based on our results, ethylene does induce fruit abscission and may do so in a manner which simulates natural fruit abscission. If the latter is true, then ethylene might well be used in studying the mechanism involved in fruit abscission.