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WATER STRESS EFFECTS ON FRUIT DOUBLING OF PEACHES

Kim Patten, Gary Nimr, and Elizabeth Neuendorff

INTRODUCTION

Several *Prunus* species are noted for their propensity to have doubled fruit. Doubled fruit are unmarketable and although selective hand thinning and sorting can be used to remove these fruit, the increase in thinning cost with some cultivars may be considerable. This phenomenon is the result of multiple ovary formation during flower bud initiation period. The extra cell division(s) during initiation is both genetically and environmentally controlled. Some cultivars of peaches may have up to 50 to 80% doubled fruit, whereas other cultivars may have none. There is a lack of information on factors causing multiple ovary formation. In sweet cherries, doubling has been associated with the occurrence of high temperatures during flower bud formation (FBF). Dr. W. Sherman (personal communication, 1988) has noted a relation between water stress and doubling of peaches at several locations around the world. Much of the world's peach culture is dry land. Water stress during FBF is therefore likely to be a common occurrence. A study was initiated in 1987 to determine the influence of water stress during FBF on the formation of double ovaries of two cultivars of peaches.

MATERIALS AND METHODS

Three-year-old 'Harvester' and 'Loring' peach trees on a loamy sand soil were subjected to either stress or non-stress conditions during the growing season. Drought stress was imposed by withholding water. Total rainfall from June to September was 10 in. Potential evapotranspiration (Penman) for that time period was 35.5 in. Average daily potential evapotranspiration in August was 0.3 in. Non-stressed plants were drip irrigated 16 gallons/tree/day. There were 10 whole tree replications per treatment for each cultivar. During anthesis, two scaffold limbs per tree were selected and the percentage of double ovaries determined. The number and percentage of double and triple fruit per tree were determined after fruit set for 'Harvester'. Frost precluded collection of this data for 'Loring'.

RESULTS

Water stress increased the incidence of double ovaries during anthesis and the percentage of double and triple fruit compared to non-stressed conditions (Table 1).

There was a nonsignificant trend for increased number of fruit per tree for the water stress treatment compared to the non-stressed treatment. There was no difference between cultivars in the percentage of double ovaries and no cultivar by water treatment interaction.

DISCUSSION

Based on these preliminary results, it appears that water stress during FBF is at least an associative factor in fruit doubling of peaches. This effect appeared to be independent of cultivar. Subsequent work will be done to determine specific levels of water stress needed to induce doubling and the susceptibility at different stages of flower bud initiation and differentiation. It would be interesting to note if any stress to the plant, other than water, during a susceptible phase would enhance double formation. It is well documented that drought, high temperature, low light intensity and heavy crop load can either delay or hasten of flower bud initiation of fruit crops. However, none of these stress factors have been investigated as to their effect on doubling.

Table 1. Effect of water stress on the formation of double fruit on 'Harvester' and 'Loring' peach trees

Cultivar	Water Stress	Double ovaries (%)	Double Fruit (%)	Triple Fruit (%)	Total Fruit ----- no. per tree
Harvester	Yes	9.4	14.2	0.5	375
	No	19.4	21.9	1.5	289
Loring	Yes	9.2	- ²	-	-
	No	21.3	-	-	-
LSD @ 0.5		6.2	4.2	0.9	90

²Signifies no data.