Deblossoming Stimulates a Second Bloom in ‘Golden Delicious’ Apple Trees

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The inhibitory effect of cropping on return bloom in fruit trees is well-known. Previous work suggests the presence of fruit inhibits vegetative meristems from initiating flowers (2). Root pruning promotes flower formation in fruit trees (4). In 1984, we began a study to investigate the interactions between cropping and root pruning on flowering and other physiological processes in field-grown apple trees. In May 1986, the trees that had been deblossomed for three consecutive years underwent a second flush of bloom. This occurrence has not been documented adequately for apple.

In May 1984, 32 seven-year-old ‘Golden Delicious’ M/9 apple trees were selected for uniformity and assigned the following treatments: a) control, b) root pruned, c) deblossomed, and d) root pruned and deblossomed. All treatments were applied annually at full bloom and were arranged as a split-plot with root pruning as the main plot and deblossoming as the subplot treatment with eight single tree replications.

Root pruning was applied with a tractor-mounted root pruner on two sides of the tree at a distance of 50 cm from the trunk at a depth of 40 cm. Deblossoming was done by clipping the pedicels with hand shears.

On 23 May 1986, 4 weeks after the treatments were applied for the third consecutive year, those trees that had been deblossomed underwent a second flush of uniform, synchronous bloom. The inflorescence occurred mainly at the terminus of a bourse shoot that had been elongating vegetatively at the time of the first bloom. These shoots did not stop elongating during the 4-week interval between the two blossoms. Thus, the inflorescence was an elongated raceme at the end of a leafy shoot (Fig. 1). The flowers on deblossomed trees were perfect, complete, and some set fruit despite the lack of other apple flowers in bloom at this time. Control trees averaged four bourse shoot blossoms per tree, consisting of a solitary flower with pistils fused and lacking a full complement of petals. No late blossoms were observed on fruiting trees that had been root pruned. In comparison, deblossomed trees averaged 128 flower clusters per tree and 6.4 flowers per cluster, with some infloracescences bearing up to 11 flowers each. Deblossomed plus root pruned trees were similar, with 119 clusters per tree averaging 6.0 flowers per cluster.

In deblossomed and deblossomed plus root-pruned trees, the number of nodes to the first flower was counted for five flowering bourse shoots in a second flush of bloom from deblossomed (a) and deblossomed plus root pruned (b) apple trees.

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lack of documented observation of the late bloom, we cannot be certain that this phenomenon existed in previous years; however, small late-formed fruit were observed and removed in each of the previous years of this study.

Although the question of when these flowers were formed cannot be answered from the information in this report, a number of comparisons can be made. The literature suggests that these blossoms were initiated in the previous season. Abbott (1) reported that when flower initiation occurs late in the season, the buds give rise to an elongated inflorescence and flowers with long pedicels. We noted that Quince (Cydonia oblonga) has a similar flowering habit to the one observed on apple, producing a solitary flower at the end of a leafy shoot that subtends the previous season’s fruit scar. Goff (6) found flower primordia in quince buds dissected in late autumn.

Temperate zone fruit crops can be grown successfully in the tropics by the use of hand defoliation after harvest. Four weeks after this treatment, the trees undergo budbreak and anthesis of blossoms formed in the previous season (5). Goff (6) found that removal of all apparent fruit buds from apple and pear trees during the summer stimulated many of the remaining buds to develop flowers by the following March.

Another possibility is that the bourse shoot primordia may have been induced to flower in the previous season, then reverted to vegetative growth as a result of the inhibitory influence of the older, further-developed flower primordia in the bud. This condition may have permitted the bourse shoot to resume reproductive development when the inhibitory influence of the flowers was removed. Fulford (3) previously documented the possibility of partial flower development followed by a reversion to vegetative growth resulting from defoliation treatments.

**Literature Cited**


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