

Study of alternate bearing presents recommendations for citrus growers

November 2 2009



'Pixie' mandarin (*Citrus reticulata*) trees with mature fruit of a heavy on-crop year and the light return bloom that will produce a light off-crop. Credit: Photo by J.S. Verreyne

Alternate bearing (also called biennial or uneven bearing) is the tendency of fruit trees to produce a heavy crop one year (called "on-crop") followed by a light crop or no crop the following "off-crop" year. On-crop trees produce a large number of small fruit of little commercial value, while off-crop trees produce a small number of large fruit—a high proportion of which are culled in packinghouses due to their unattractive, thick rinds. The phenomenon is widespread and can occur in an entire region, in individual trees, part of a tree, or even on one branch.

Not surprisingly, understanding and dealing with alternate bearing load makes orchard management difficult for growers and creates challenging marketing issues for citrus producers worldwide. To study the phenomenon, Johannes S. Verreyne and Carol J. Lovatt from the Department of Botany and Plant Sciences, University of California, Riverside, designed a research study using 'Pixie' [mandarin](#) (*Citrus reticulata*) to investigate when and how fruit perpetuate cyclic differences in floral intensity. The results were released in a recent issue of the [Journal of the American Society for Horticultural Science](#).

Research has indicated that alternate bearing in citrus is due to a lack of flowering in the spring following a heavy on-crop year. Scientists know that the number of flowers produced and yield are inversely proportional to the number of fruit produced the preceding year, but how fruit exert an effect on floral intensity the following spring was not fully understood.

Verreyne and Lovatt set out to determine when in the phenology of the tree setting the on-crop has a negative impact on floral intensity of the return bloom, reducing return yield to perpetuate alternate bearing in 'Pixie' mandarin. Ten-year-old 'Pixie' mandarin trees located in commercial orchards in the Ojai Valley of California were used in two separate experiments.

Parent shoots (current spring flush shoots) were tagged on on-crop trees and fruit were removed from individual shoots or whole trees. The number of summer and fall vegetative shoots that developed on parent shoots with and without fruit and the contribution of spring shoots (floral and vegetative) made by 1-year-old parent shoots alone and by their summer/fall shoots to return spring bloom was quantified.

According to the study authors, removal of fruit from individual shoots on on-crop trees in June or July had no effect on the number of flowers

contributed by parent (current spring) shoots to return bloom, but increased total flower number four-fold because summer/fall shoot number increased more than eight-fold. Removal of fruit from individual shoots of on-crop trees after July had no effect on flower number.

In the whole-tree experiment, parent plus summer/fall shoots of off-crop trees produced more flowers the following spring than on-crop trees due to greater flower production by both parent shoots and their greater number of summer/fall shoots. Removal of all fruit in July from on-crop trees resulted in two-fold more flowers in spring compared with off-crop trees due to the increased number of flowers contributed by both parent shoots (75% of the total) and the increased number of summer/fall shoots.

The importance of summer/fall shoots to return bloom was confirmed by removing all summer/fall shoots from off-crop trees; this reduced floral intensity to that of on-crop trees. Removing all fruit from on-crop trees in December increased percent budbreak in spring and flower number on parent shoots to that of parent shoots of off-crop trees. However, total floral intensity for on-crop trees with fruit removed in December was lower than that of off-crop trees because the late removal of fruit reduced number of summer/fall shoots.

The research provides evidence that fruit of the 'Pixie' mandarin reduce floral intensity of the return bloom by inhibiting budbreak, which reduces summer/fall shoot growth and thus the number of nodes that can bear inflorescences and development of spring shoots, which are predominantly floral. The recommendation for growers: investigate the effects of degrees of fruit thinning or pruning to reduce fruit number in early summer of the on-crop year. According to Lovatt, for 'Pixie' mandarin, Valencia, and other cultivars that mature during or after spring bloom, "it is important that on-crop trees be harvested as soon as

possible after the fruit reach legal maturity to avoid having two crops on the trees into early summer."

The results of the research support other studies that indicate that "the cultural practice of holding fruit on the tree to extend the commercial harvest period during an on-crop year exacerbates alternate bearing."

More information: The complete study and abstract are available on the ASHS Journal of the American Society for Horticultural Science electronic journal web site: [journal.ashspublications.org/c...
t/abstract/134/3/299](http://journal.ashspublications.org/content/abstract/134/3/299)

Source: American Society for Horticultural Science

Citation: Study of alternate bearing presents recommendations for citrus growers (2009, November 2) retrieved 11 May 2024 from <https://phys.org/news/2009-11-alternate-citrus-growers.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.