

## Olive Bloom and Pollination

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Although vegetative bud break commences in April (generally after temperatures exceed 70°F), flowering in California typically occurs in May. After the 2011 'OFF' year in the alternate bearing cycle, growers are anxiously monitoring the development of inflorescences and the weather forecast as we near full bloom.

### Flower production

The vegetative growth from 2011 will bear the fruit of the 2012 crop. Flower buds form in the axils of leaves and each inflorescence contains 15-30 flowers. Flower number will vary between growing season and cultivar and only 1-2% of flowers will set fruit. The optimum conditions for flowering are generally when daily temperature maximums are between 60 and 65°F and minimums are between 35 and 40°F.

### How does flower anatomy affect fruit set?

Botanically, olives are referred to as andromonoecious, meaning that they produce both hermaphroditic or 'perfect' flowers (containing male and female parts) and staminate flowers (containing male parts only) on the same plant. Each inflorescence may contain both perfect and staminate flowers. The proportion of staminate to perfect flowers is determined approximately 4 weeks prior to bloom. One or two perfect flowers within an inflorescence are sufficient to support a commercial crop. During early flower bud development, all buds are perfect. Imperfect flowers result from pistil abortion (loss of female flower part). During bloom one can visually differentiate between perfect and imperfect flowers. The perfect flowers contain a large, green pistil, whereas the imperfect flowers have a short brown, white, or greenish white style. The proportion of staminate to perfect flowers varies by inflorescence, cultivar, and environmental conditions. Only the perfect flowers are able to produce fruit.

In a cultivar exhibiting self-compatibility, the pollen from a perfect flower may be transferred to the pistil within the same flower for fertilization. Under optimal weather conditions at bloom, 'Manzanillo' is self-compatible. Under adverse conditions, (ie. temperatures exceeding 87°F at bloom), 'Manzanillo' pollen develops slowly resulting in reduced or no fertility. Consequently, 'Manzanillo' plantings may benefit from presence of a compatible pollinator cultivar (see below).

The dynamics of compatibility in olive are somewhat complex, and many varieties require cross pollination for adequate fruit set.

### Cultivar compatibility for pollination

Although 'Manzanillo' may self-pollinate, probability of pollination and fruit set may be greater after cross-pollination. Pollen tube growth is usually faster after cross-pollination than self-pollination and more pollen may reach the embryo sacs before the sac degenerates and becomes unreceptive to fertilization. Research studies in CA suggest that 'Manzanillo' olives may be best pollinated by 'Sevillano' and 'Barouni'. 'Ascalono'

and 'Mission' could also pollinate 'Manzanillo', but to a lesser extent than 'Sevillano' and 'Barouni'. Other reports in the international literature also indicate that 'Arbequina' and 'Frantoio' may pollinate 'Manzanillo'. Pollinating cultivars should be planted within 90 ft of trees requiring pollination, and pollinizer trees should be planted in rows across the direction of prevailing wind to allow for pollen dissemination.

Many olive varieties are not self-compatible. Self-incompatible cultivars include, but are not limited to: 'Frantoio', 'Kalamata', 'Koroneiki', 'Pendolino', and 'Picual'. 'Frantoio' serves as a good general pollinator for 'Manzanillo', 'Kalamata', 'Pendolino', and 'Picual'; however, these four varieties are not compatible with each other. 'Frantoio' and 'Koroneiki' are not compatible with each other. Similarly 'Manzanillo' and 'Mission' are not compatible with each other.

Recent studies utilize molecular techniques, literally using paternity tests to determine the parentage of progeny in olive. Interestingly, a study by Diaz et al (2007) demonstrated that of the seven cultivars tested, the compatibility relationships were the same regardless of which parent served as the male or female.

### **Supplemental pollination.**

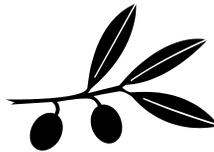
In 'Manzanillo' blocks where growers have not interplanted pollinizer trees, growers may utilize supplemental pollen applications by dusting 'Sevillano' pollen in an orchard. Research suggests that olive pollen can survive at least a year in refrigerator storage; therefore, pollen collected during bloom in 2011 can be utilized for supplemental pollination in 2012. Supplemental pollination may be of value in 'Manzanillo' blocks, particularly during years characterized by heat at bloom or in blocks that do not contain compatible pollinator trees. In a study completed in Madera County in 1989 and 1990, 30 g of undiluted 'Sevillano' pollen were utilized per treated acre at four application times during bloom (once at beginning of bloom, twice during midbloom, and once at 50% petal fall). The supplemental pollen was dusted onto trees by metering it through a modified leaf blower mounted on an all terrain vehicle traveling at around 15 mph down rows. Additionally, 'Manzanillo' orchards planted in hot, dry climates, such as in the Sonoran Desert in Arizona, have exhibit enhanced fruit set in research studies when supplemental pollen is utilized.

### **Selected References**

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*Olive Notes*  
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