



Spring new flush and bloom

New flush and bloom considerations

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Citrus growers must increase production efficiency and maximize profits to stay competitive in a world market. Basic horticultural inputs to increase production efficiency include optimization of fertilization, irrigation, weed control, pest management and the potential use of mechanical harvesting. To add to the complexity, fertilization, irrigation and pest management strategies are typically conducted differently for fresh and processed fruit.

For mature trees, the highest nutrient requirement extends from late winter through early summer. Irrigation is also of particular importance during the typically dry spring period from February through May. This coincides with the critical stages of leaf development and expansion, bloom, fruit set and fruit enlargement.

Managing the balance between vegetative and reproductive growth is an important aspect of crop management, but is not easy under Florida's warm and wet weather conditions. Integrated pest management (IPM) requires grove scouting and close observations to determine the need and timing for pesticide applications as well as modification of cultural practices to minimize pest damage. Scouting not only helps growers control pests more efficiently, but also lowers the use of pesticides and the probability of pesticide resistance.

In Florida, on mature citrus trees, the first and most important flush of leaves usually starts emerging in February and March. Another major flush occurs during the warm wet summer in June and July and a third flush occurs in the fall in September and October. In young trees, shoots are produced throughout the year with reduced vegetative growth during

the winter months. Growth of leaf flushes is reduced or delayed by drought

and/or cool weather. The major bloom is borne on the new flush during the spring time. Trees with excessive vegetative growth usually do not bloom well.

In subtropical regions during the winter months, the temperature normally falls below 70°F for many days. This causes growth to cease and trees to become quiescent (a rest period similar to dormancy) for about three months. This quiescent period, among other things, induces flowering when warm temperatures in the early spring cause resumption of vegetative growth. In a tropical climate, there is no period of cool temperature to induce quiescence. However, with periods of less than ample soil water content, flushes of vegetative growth and bloom normally follow periods of drought.

Vegetative growth is competitive with fruit growth for available nutrients such as carbohydrates (sugars) and minerals. Well established is the fact that shoots with fruit do not flower the following year. A heavy fruit crop tends to deplete carbohydrates and results in a smaller crop and increased vegetative growth the following year. Pruning after a heavy crop additionally stimulates vegetative growth and reduces fruit yield the following year.

Water and temperature are among the most important environmental factors regulating the time and extent of citrus flowering, fruit set and growth. There are also several physiological factors that affect or control flowering in citrus. The most important ones are carbohydrates, nutrition and water relations. Low levels of carbohydrates in the roots due to excessive cropping have been associated with limited shoot and flower production. Plant nutrition is very important for vegetative growth and flow-

ering. High levels of nitrogen can induce excess vigor and produce more shoots and fewer flowers. Low leaf nitrogen reduces vegetative growth and promotes flowers, but reduces fruit set and fruit yield. Therefore, maintaining leaf nitrogen levels within the optimum range is recommended. Water stress during the winter can increase flowering during the spring. However, water stress during the spring can reduce fruit set and development and increase young fruit drop.

Citrus trees usually bloom extensively. However, less than 2 percent of the flowers will set the final crop. The major flower drop occurs during the first month after bloom. A second drop period called physiological drop of young fruit occurs in May. This physiological drop is aggravated by high temperature and water stress. Yield potential of citrus trees is limited by poorly watered or drained soils, inadequate nutrition and severe pest (disease, insect, and weeds) pressure. Managing these problems requires accurate information, proper strategies and good production practices to sustain profitable and economic production.

In citrus, carbohydrates are stored in leaves, twigs and branches with a minor amount in roots. The maximum amount of stored carbohydrates occurs in late winter before the emergence of the spring flush. The balance between vegetative growth and flowering depends on several factors, including the relationship between carbohydrates and nitrogenous compounds within the tree. When both are adequate, moderate vegetative growth and high fruit production occur. When both are low, vegetative growth as well as fruiting will be reduced. A tree low in carbohydrates and high in nitrogen tends to produce vegetative growth at the expense of fruit production. Since carbohydrates are manufactured and stored in leaves, excessive leaf loss in the fall and early winter will reduce flowering and fruiting the following spring. Heavy pruning that removes a

Citrus leafminer



large portion of leaves will promote vigorous new vegetative growth and reduce cropping.

Reducing or omitting nitrogen application before and after severe pruning will reduce excessive vegetative growth. Therefore, nitrogen application should be adjusted to the severity of pruning, especially when done before a major flush.

Management strategies that limit the duration of leaf flushes can reduce leafminer and psyllid populations and impact the need for additional pesticide applications. Citrus leafminer can occur on new flush throughout the growing season. However, during the winter, due to the low temperatures and the lack of flush for larval development, citrus leafminer populations decline to their lowest levels. Then, the populations of leafminer build rapidly on the spring flush, but with no significant visibility or damage until the second spring or first summer flush. Citrus leafminer does not significantly affect growth and yield of mature trees. However, resets and young trees are very vulnerable to severe damage of leafminer because of their frequent flushes which support higher pest populations. Citrus leafminer greatly aggravates the severity and the spread of citrus canker. Therefore, leafminer man-

agement is particularly important in canker infected groves and for young trees. Use of the soil-applied systemic insecticide imidacloprid is the most effective means of preventing mining damage on the new flush for young trees less than 5 feet tall. Soil applications of imidacloprid should be made two weeks prior to leaf expansion to allow time for the pesticide to move from the roots to the canopy. Soil applications of imidacloprid are not effective for leafminer control on large trees. Aldicarb (Temik), which is effective in suppressing psyllid populations on large trees, does not provide control of the leafminer. However, there are several products that provide short-term protection against leafminer when applied as sprays on mature trees. Scouting is necessary to determine peak periods of larval activity during flushing periods to increase the efficacy of insecticidal chemicals.

In Florida, management of the citrus psyllid has become very critical because of citrus greening. The use of insecticides to reduce psyllid populations should help slow down the rate of spread and high incidence of the greening disease. The citrus psyllid is similar to the citrus leafminer in requiring a new flush of leaves for repro-

duction. However, unlike the citrus leafminer, adult psyllids can survive on hardened leaves and, if not controlled, will move to new flush as it becomes available. Therefore, suppression of adult psyllids during the winter is useful before they reproduce prior to the spring flush with a foliar application of a broad-spectrum insecticide. Successful suppression of psyllids during the early part of the year can result in lower populations throughout the rest of the year.

The young new spring flush needs protection from psyllids. Soil-applied systemic insecticides will provide the longest lasting control of psyllids with the least impact on beneficials. These systemic insecticides have to be applied a few weeks before the anticipated emergence of the flush to allow the material to move from the roots up to the tree canopy. For young citrus trees, use of systemic pesticides, such as imidacloprid, are very effective for suppressing psyllid populations. For mature trees, aldicarb is the recommended systemic pesticide which should be applied at least 30 days prior to the initiation of the spring flush. With the application of soil applied systemic materials for mature trees, these materials should be applied prior to the drier spring period to obtain maximum control as rain will enhance plant uptake.

For more details on leafminer and psyllid management and a complete list of pesticides, go to <http://edis.ifas.ufl.edu/IN686>.

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Citrus psyllid

