Determining Percent Bloom in Florida Citrus Groves

Michael E. Rogers, Jamie D. Ellis, David A. Westervelt and L. Gene Albrigo [1]

In Florida, citrus bloom varies by year, typically occurring in 2-3 waves of flowering any time from February through the end of March. When citrus trees are in bloom, many pesticide labels prohibit application due to potential for negative effects on pollinators, particularly managed honeybees. The expected time of greatest foraging in blooming citrus by bees is from 10-90% open bloom for each cultivar. For Florida citrus growers, this would be the period when use of those pesticides, which restrict application during bloom, should cease. In this document we define bloom to help distinguish the season when bees are most likely to be in groves. Many pesticide product labels prohibit application when bees are foraging in the area to be treated, thus it's important to ALWAYS READ AND FOLLOW PESTICIDE LABEL INSTRUCTIONS!

There are a number of factors that can influence when citrus trees will bloom including weather patterns, cultivar, expected yield, tree age, and soil type. Tree stress, such as drought stress probably occurs in HLB affected trees and causes trees to produce off-season bloom. Because low levels of off-season bloom can occur weeks to months in advance of "true abundant bloom", it is important to have a good understanding of when "true bloom" is likely to occur and focus efforts on monitoring bloom abundance at that particular time.

The Citrus Flowering Monitor (http://disc.ifas.ufl.edu/bloom/) is an online tool for Florida citrus growers that predicts when peak bloom is likely to occur in a growing area based on factors such as weather, cultivar, and growing conditions. When a prediction of peak bloom is obtained, growers should begin documenting bloom abundance in their groves at least 4 weeks prior to peak bloom to determine when the grove has reached or exceeded 10% bloom. At 10% bloom, the application of bloom prohibited pesticides should cease. Monitoring should also occur as the bloom period nears 90% completion, to document when pesticide applications can resume. The following sampling protocol can be used to determine the percent bloom in a citrus grove.

With the exception of grove edges, which receive more sunlight than the rest of the grove and are likely to bloom earlier, bloom is typically uniform throughout a grove and thus sampling to estimate bloom abundance can be performed with relatively minimal effort. Sampling bloom abundance is performed using a 2'x2' frame (made of PVC pipe or other material of choice) placed at the surface of the canopy of the tree and the total number of open blooms counted within the frame (to include those blooms deep inside the canopy) is divided by the total number of potential blooms (pinhead, popcorn, and open blooms) and multiplied by 100 to get % bloom. Towards the end of bloom, the total number of open blooms is counted and divided by the sum of the total number of potential blooms plus the number of fruitlets. Dividing the frame using string to create four quadrants may facilitate the ease of counting the numerous bloom stages that may be present. Counts should be taken at least at the midpoint of tree height; counting from a pickup bed will speed up the process.

[1]Michael E. Rogers, Associate Professor, Department of Entomology & Nematology, Citrus Research & Education Center, Lake Alfred, Florida; L. Gene Albrigo, Professor Emeritus, Department of Horticultural Science, Citrus Research & Education Center, Lake Alfred, FL; Jamie D. Ellis, Associate Professor, Department of Entomology & Nematology, Gainesville, FL; David A. Westervelt, Assistant Chief, Apiary Inspection Section, Bureau of Plant and Apiary Inspection, Division of Plant Industries, Gainesville, FL.

A total of 12 frame counts of bloom can be made to estimate bloom abundance in a cultivar. Choose two row middles (spaced approximately 1/3 and 2/3 across the block) to make counts. For each of the 2 row middles sampled, select 3 sampling locations evenly spaced down the row. At each stop, make frame counts of bloom abundance on two trees (one tree on the left side of the row middle [tree 1] and one tree on the right side of the row middle [tree 2]).

Table 1 is provided as a template for record keeping purposes for documenting the stage of bloom present. When 10% of the developing bloom (pinhead stage, popcorn stage or open flowers) have reached the open flower stage, then application of bloom restricted pesticides should cease. Conversely, when 90% of developing bloom has reached petal fall (developing fruitlets predominate) and less than 10% of developing fruit stages consist of open bloom, then pesticide applications can resume. In the event that questions should arise regarding application of pesticides during bloom, growers should retain documentation of bloom sampling used to time pesticide applications based on percent bloom along with your pesticide application records. **ALWAYS READ AND FOLLOW PESTICIDE LABEL INSTRUCTIONS!**

Table 1. Data recording sheet for estimating percent bloom in a citrus grove.

Block Name: _____ Cultivar:_____ Date:_____

		Tree 1		Tree 2	
	Stop	# developing flowers[1]/ fruitlets[2]	# open blooms	# developing flowers[1] / fruitlets[2]	# open blooms
Row middle 1 (1/3 across grove)	1				
	2				
	3				
Row middle 2 (2/3 across grove)	1				
	2				
	3				
		Sum =	Sum =	Sum =	Sum =
		Column A	Column B	Column C	Column D

[1] includes pinhead stage, popcorn stage, and open flowers. [2]exposed fruitlets will be the predominant stage present when approaching 90% petal fall.

Sum Column A_____ + Column C _____ = (E)_____

Sum Column B _____ + Column D_____ = (F)_____

Percent bloom = total # open bloom (F) ÷ Total # developing buds (E)

[(F)_____ ÷ (E)_____] X 100 = _____Percent bloom

UF UNIVERSITY of FLORIDA IFAS Extension