Good Pollination Practices in Florida Blueberry Fields

Southern highbush blueberry (SHB) is dependent upon pollinating insects for adequate fruit set. Symptoms of insufficient pollination include low ratios of fruit to flowers, delayed petal fall, petals turning brown while still on the bush, small berries, and a low number of seeds per berry. Implementing good pollination best practices can help minimize the likelihood of poor pollination.

Blueberry pollinators

The primary insect pollinators of SHB in Florida are managed honey bees and bumblebees. Although honey bees are the most commonly used pollinators, certain foraging behaviors can make them less-effective pollinators.

Figure 1. *Apis mellifera*, the European honey bee
Credits: R. Mallinger

Managed bumble bees can be more efficient pollinators of blueberry flowers than honey bees due to their ability to cause increased pollen shed through sonication (vibrating the flower by rapid wing movement), active blueberry pollen collection, and higher rates of visits to blueberry flowers per time. In addition, bumble bees are typically more active than honey bees during cool or wet weather. However, options for purchasing managed bumble bees are limited, and the activity of these pollinators may depend on the quality of commercial colonies.

While other bees pollinate wild blueberries in Florida, including the native specialist bee *Habropoda laboriosa* (the southeastern blueberry bee), wild bumble bee species, carpenter bees, sweat bees, and mining bees, the activity of these pollinators on SHB is minimal. This is likely due to a combination of the very early bloom time for SHB as well as commercial farm landscape and management practices that may reduce wild insect populations.


Figure 2. *Bombus pensylvanicus*, the American bumble bee
Credits: R. Mallinger

Issues that can lead to poor pollination

Too few bees: General recommendations are 4-8 honey bees foraging on each blueberry bush during peak bloom and the warmest part of the day; fewer numbers may result in a lower level of pollination. However, if more effective pollinators such as managed bumble bees are present and active on blueberry flowers, fewer bees overall may be needed. In some cases, growers may bring in a high density of managed bees, but see little activity on blueberry flowers. This may be due to the size or health of the colonies, competition for bees between blueberry flowers and other flowering plants in the region, or low attractiveness of the blueberry field (due to low flower density, pesticide applications, or availability of nectar and pollen, for example).

Wet or windy weather: Cloudy, cool, windy, or rainy weather can minimize bee activity, resulting in low pollination. Also, flowers may not shed pollen as easily when conditions are humid, making them more dependent on bee sonication, such as that provided by bumble bees, for pollen release.

Self-incompatibility and single-cultivar plantings: Although SHB are generally capable of producing fruit when self-pollinated, cross-pollination with a different variety may result in higher fruit set, larger fruit, and earlier fruit maturity. Therefore, large blocks of single SHB cultivars may not achieve optimal fruit set.

Flower thrips: A heavy thrips presence during bloom can significantly reduce pollination through damage to flower reproductive organs.

Best Practices for increasing pollination effectiveness

Pollinator density. Current recommendations are 4-5 honey bee hives/acre for a standard density planting (around 1,700 plants per acre). These recommendations will increase for higher density plantings. In addition, if there is a concentrated bloom or poor weather a greater number of bees may be required for adequate pollination. Alternatively, if managed bumble bees are used or if there are significant populations of wild bees, fewer honey bee hives may be needed.

Honey bee hive placement timing and location. Bee hives should be placed in the production field at or after 10% bloom but before 20% bloom. Placement too early when blueberry flower density is low may result in honey bees searching outside of the field for flowers and reduced foraging within the farm throughout the season. Hives should be placed in multiple locations around the farm to the extent possible without hindering production operations, facing east or southeast so they are exposed to morning sun, and sheltered from strong winds.

Honey bee colony health. Growers should check the health of bee colonies upon delivery and throughout the bloom period. Eight or more of the ten frames in a hive should be covered with adults (Figure 3), and six or more frames should have brood in the cells. A healthy colony will have steady activity into and out of the hive during good weather.

Figure 3. Honey bees on hive frame.
Credits: UF/IFAS

Mixed-cultivar plantings. Current recommendations are to plant at least two unrelated cultivars with a similar bloom period in the same general area. Although there is no specific guidance on the ideal number of alternating SHB rows, planting large solid blocks of a single cultivar is not recommended for optimal pollination.

Managed bumble bees. Growers should consider adding managed bumble bee colonies to supplement honey bees for successful pollination. The recommended density for managed bumble bees, which are typically sold in four packs known as quads, is one quad per acre when

used along with honey bees at the recommended rate. Bumble bee colonies should be placed at least 25 feet from honey bee colonies and also distributed throughout the farm to reduce negative interactions with honey bees.

Careful pesticide use. Pesticide selection during bloom is important in protecting bees. Entrust® (Spinosad) is toxic to bees for 3 hours after application (until it has thoroughly dried) but is relatively non-toxic to bees thereafter. Neonicotinoid insecticides should be avoided during or shortly before bloom. The best time to spray any pesticides is late evening, when bees are not foraging and the residue has time to dry before bee activity begins the following morning.

For additional information, see Pollination Best Practices in Southern Highbush Blueberry in Florida (https://edis.ifas.ufl.edu/publication/IN1237).

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