Integrated Crop Pollination Project

Florida Blueberry Grower Survey Report

Photo: Emily May

Contents:

To learn more visit www.projecticp.org

Loyola University Chicago — Preparing people to lead extraordinary lives

University of Florida

Xerces Society for Invertebrate Conservation

NIFA

United States Department of Agriculture
National Institute
of Food and Agriculture

Survey Overview

Florida's blueberries depend on crop pollinators, which can include managed honey bees, managed bumble bees, and wild bees. The combined use of different pollinator species, habitat augmentation, and farm management practices to provide reliable and economical crop pollination is called Integrated Crop Pollination (ICP). In order to better understand the pollination strategies and information sources that growers currently use and the perceived benefits and challenges associated with "pollinator friendly" management practices, we conducted a grower survey in collaboration with the National Agricultural Statistics Service.

In 2014-15, we surveyed 69 blueberry growers in five counties in Florida: Alachua, Jackson, Lake, Marion, and Polk. This survey report summarizes growers' practices, management priorities, and key information sources related to crop pollination.

Photo: Emily May

Florida Blueberry Grower Survey Highlights:

Information sources: Florida blueberry growers get information on crop pollination from a variety of sources. The top groups for sharing information on pollination management reported by growers in the survey were beekeepers, other growers, and Florida Blueberry Grower's Association.

Pollination Goals: Florida blueberry growers' most important goal for crop pollination was achieving consistent, reliable crop pollination. It may, therefore, be useful to frame grower-oriented communication about pollinator friendly farming practices in terms of this goal.

Managed pollinators: About half of Florida blueberry growers (51%) reported using managed honey bees. Some growers also used combinations of honey bees plus wild bees or bumble bees (37%), or bumble bees alone (12%). The average stocking rate for honey bees in 2014 was 1.9 hives/acre and growers paid $41.12 ± 8.40 per hive. Growers with large farms were more likely to buy or rent bees than small farm growers.

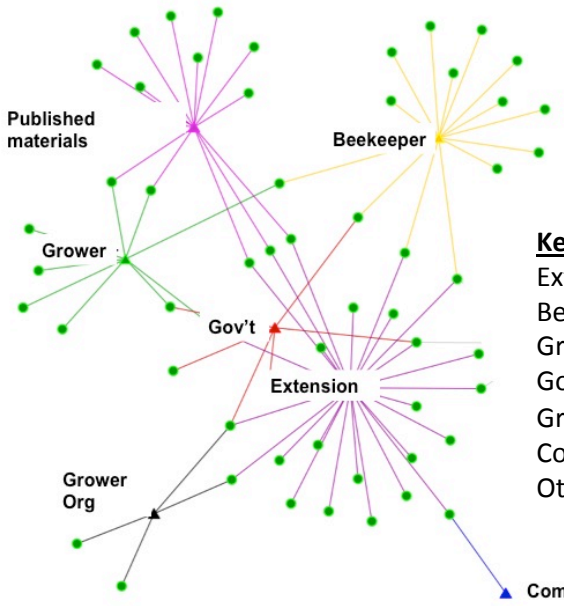
Attracting diverse pollinators: In addition to renting or buying honey bees, growers reported using practices that provided floral and nesting resources for pollinators (e.g. maintaining natural habitat, using cover crops, and reducing tillage practices). Practices to attract diverse pollinators (e.g. floral plantings, leaving fallows, and establishing natural habitat) were thought to improve crop pollination, increase the presence of natural enemies of crop pests, and increase economic returns to growers. However the potential for increases in weeds, investment, or regulation were reported as concerns. Addressing these benefits and concerns may be useful to support growers' adoption of practices to attract diverse pollinators.

Pesticide management: There was widespread use of pest management practices designed to minimize impacts on bees. These included reducing the amount and modifying the timing of pesticide and fungicide applications to minimize impacts on bees and making an effort to choose active ingredients that have the least known impact on bees. This suggests that pesticide impact messages have been highly visible; extension may reinforce this message and recognize success of wide-spread adoption while emphasizing additional practices to minimize risk to bees.

1. Communication networks for pollination management

We wanted to understand how growers share information about pollination management. Growers reported on the most important people with whom they communicate about pollinators and pollinator management, and the type of job or role their contacts have. The results are presented below, with each dot representing a responding grower and the roles of their contacts grouped together by color.

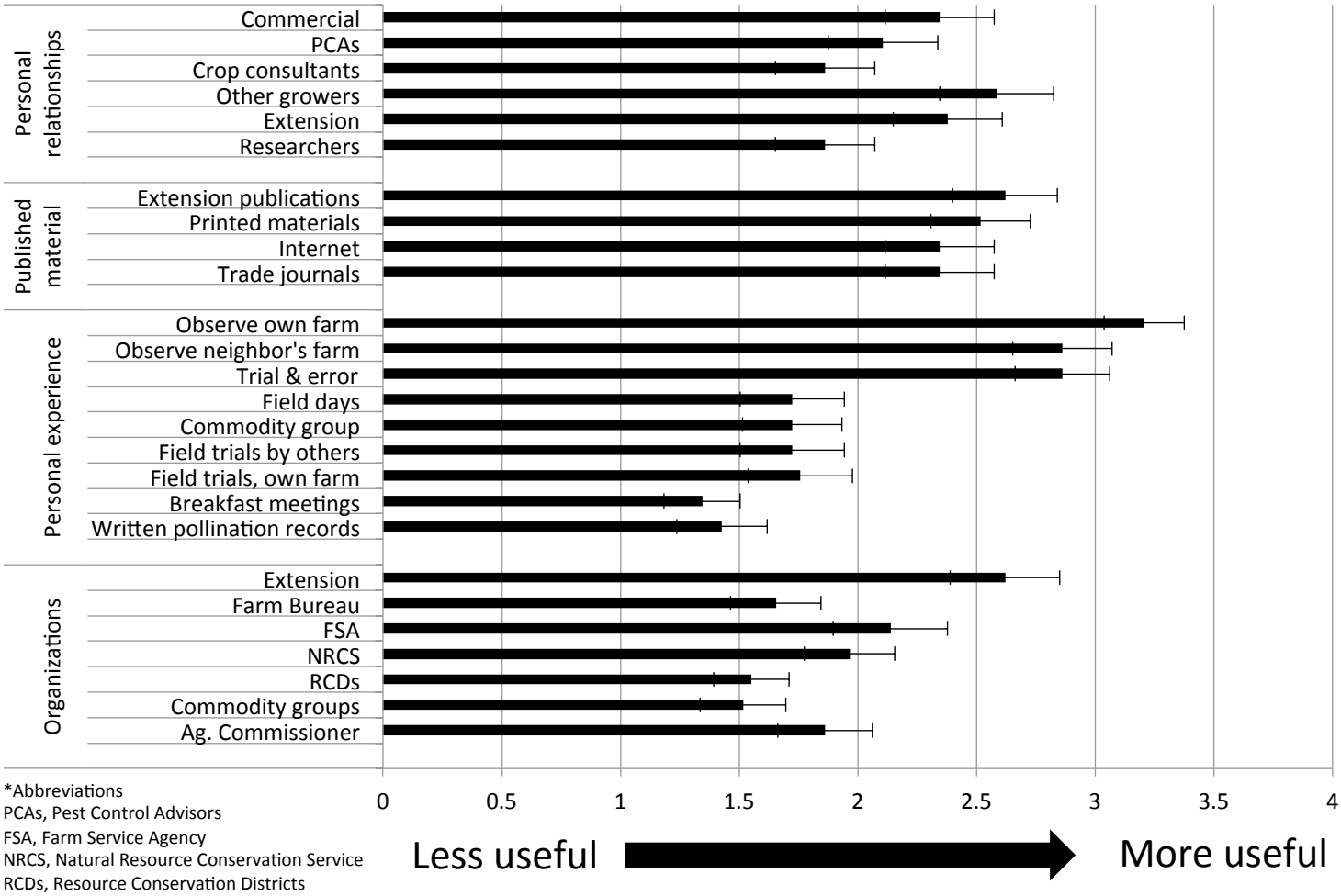
Extension specialists were an important source of information, representing 26% of network contacts named by growers. Responses also highlight the importance of ***beekeepers***, which were reflected by 14% of growers' network contacts. ***Grower-to-grower communication*** also played an important supporting role, representing 9% of network contacts.



Key Roles

Extension	26%
Beekeeper	14%
Grower	9%
Gov't	6%
Grower Org.	4%
Commercial	1%
Other	3%

Blueberry growers also rated their sources of information for pollination management on a scale from 0-4, *Never Used* to *Most Useful*. Growers rated observation of their own farm, observing neighbors' farms, trial and error, and communication with extension specialists and other growers most highly. On average, information sources in the published material and personal relationship categories had higher ratings than the other categories.

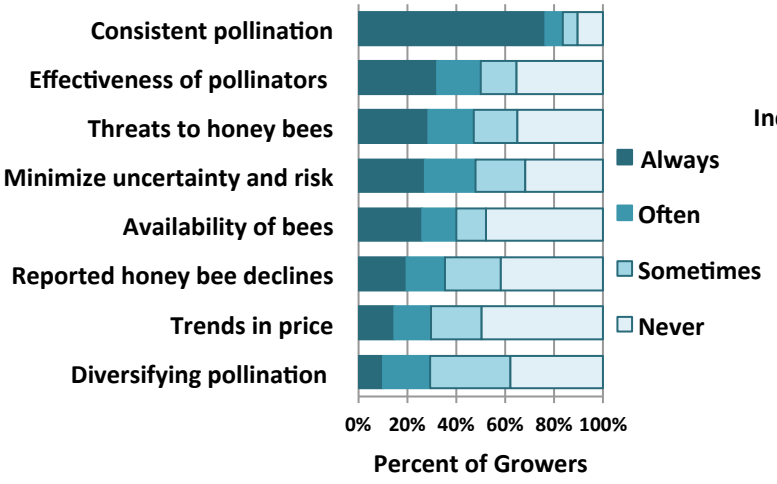


*Abbreviations
PCAs, Pest Control Advisors
FSA, Farm Service Agency
NRCS, Natural Resource Conservation Service
RCDs, Resource Conservation Districts

2. Pollination management priorities

We also investigated pollination management priorities for blueberry growers. Respondents categorized a list of considerations as *Always, Often, Sometimes*, or *Never* a priority in pollination management decisions (Figure 1).

Figure 1: Pollination management priorities, FL blueberry growers



Consistent, reliable crop pollination was a top management priority for blueberry growers.

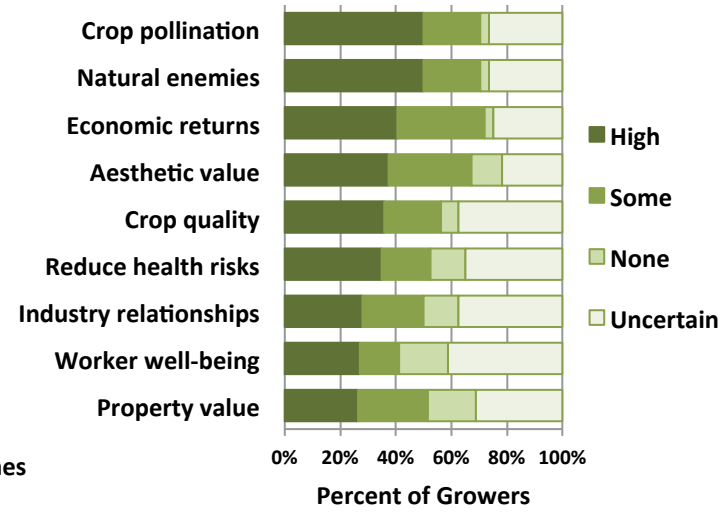
Taken together, the priorities data suggested three tiers of management priorities for Florida blueberry growers; consistent, reliable pollination represented a top tier priority. A second tier of considerations included threats to honey bee populations, effectiveness of pollinator species, and minimizing risk and uncertainty. Reported declines in honey bee populations, trends in price, and diversifying pollination strategies were lower rated management priorities.

3. Potential benefits & concerns of practices to attract diverse pollinators

Growers were asked about potential benefits and concerns of practices to attract diverse pollinators (e.g., floral plantings, leaving fallows, establishing pollinator habitat).

Respondents ranked benefits and concerns as *High, Some, None*, or *Uncertain* (Figure 2a, Benefits; Figure 2b, Concerns).

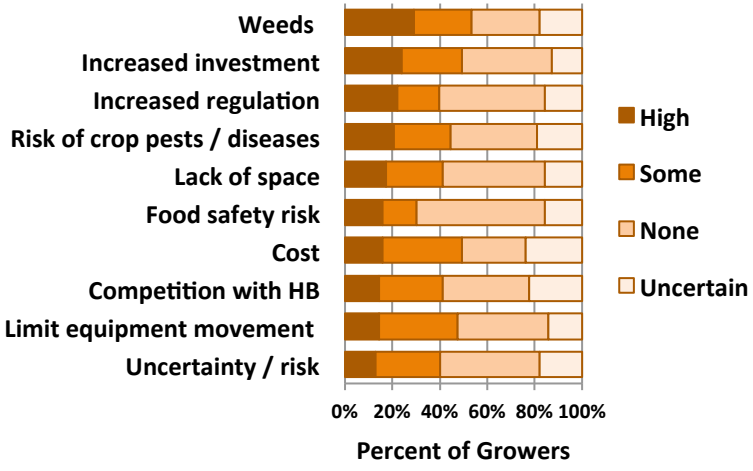
Figure 2a: Benefits of practices to attract & retain diverse pollinators



Benefits that directly support on-farm economic productivity were rated most highly, including increasing crop pollination, increasing natural enemies of crop pests, and increasing economic returns to growers (Figure 2a).

Lower rated potential benefits included reducing health risks to workers, improving industry relationships, well-being of farm workers, and increasing property value.

Figure 2b: Concerns of practices to attract & retain diverse pollinators



The top rated potential concerns associated with practices to attract and retain diverse pollinators were weeds, increased farm investment (e.g., additional equipment, labor, and paperwork), increased regulation, and potential for increased risk of crop pests and diseases.

4. Pollinator management findings

Buying or renting managed bees

Forty-two percent of Florida blueberry growers reported buying or renting bees annually (Table 1), with 58% not buying or renting managed pollinators. Among the growers that did not buy or rent pollinators, most reported relying on wild pollinators (39%); using bees that they own (10%), relying on bees sourced by neighbors (5%), encouraging bees with habitat (5%), or using other strategies (6%).

Blueberry growers reported buying or renting pollinators more frequently than watermelon growers in the surveyed counties. Growers with larger farms buy or rent pollinators more often than growers on smaller farms. Growers on less than 10 acres buy or rent bees least frequently.

Table 1. Pollinator rental & purchase

Crop by county	n	Buy/Rent	None
Blueberries	**69**	**42%**	**58%**
Alachua	21	33%	67%
Jackson	5	0%	100%
Lake	7	57%	43%
Marion	12	25%	75%
Polk	24	61%	39%

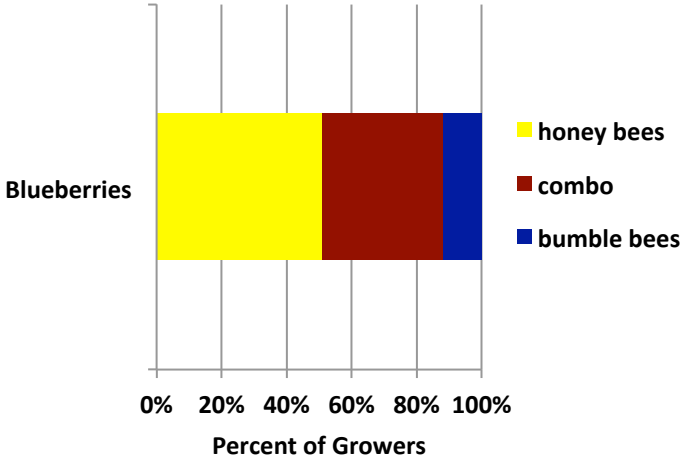
Trends in buying/renting bees by county

Lake and Polk counties had a higher proportion of blueberry growers that buy or rent pollinators (57% and 61%, respectively) than other surveyed counties. This may be due in part to trends in larger, commercial


Photo: Emily May

operations in these counties; farm sizes have increased 27% in Lake and 9% in Polk counties between 2007 and 2012. The number of farmed acres in Lake county increased 25% between 2007 and 2012.[1]

Figure 3. Proportion of FL Blueberry growers using managed pollinators



Main pollinators used in blueberries

Honey bees are the most frequently used managed pollinators (Figure 3). About half of Florida blueberry growers use honey bees (51%), with 12% of growers reporting bumble bees as their primary pollinator; 37% reported using a combination of honey bees and bumblebees, or honey bees and wild bees. Other pollinators can also be managed for crop pollination.

1. NASS 2012, http://www.agcensus.usda.gov/Publications/2012/Online_Resources/County_Profiles/Florida/cp99026.pdf

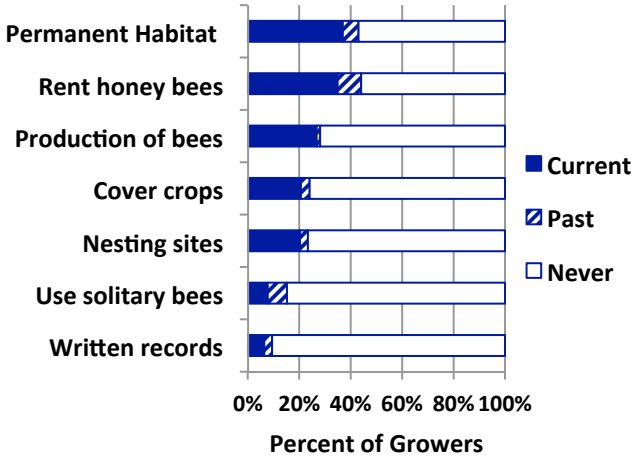
Perceptions & rental trends

We asked blueberry growers whether they expected pollinator rental/purchase prices to change in the future. Responses reflected anticipated change (39%) or uncertainty (44%), with only 17% of growers expecting prices to stay the same. Growers that expected pollinator prices to change in the future indicated that prices are expected to increase. This may reflect the trend of increased rental prices nationwide.[2] The average price per honey bee hive in 2014 was $41.12 ± 8.40 (± se), with growers arranging contracts 10 months in advance.

5. Pollinator & pest management

The ICP survey asked growers about their current pollinator and pest management practices, those that were tried in the past but discontinued, and practices that had never been used (Figures 2, 3: *Current* practices in solid bars, *Past* practices in striped bars, practices *Never* used in open bars; frequencies across categories sum to 100 for each practice).

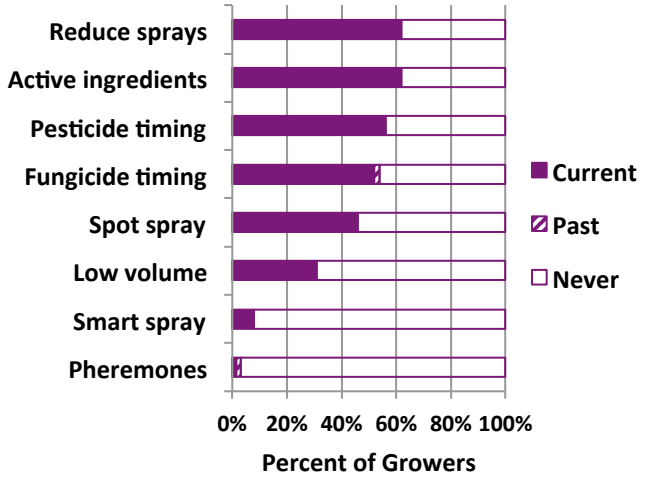
Figure 2: FL blueberry growers' pollination management practices



Pollinator habitat: Practices of using habitat to attract and retain diverse pollinators had intermediate levels of adoption: 37% of growers report encouraging pollinators with areas of permanent habitat; 21% of growers encouraged pollinators using temporary cover crops; 20% report creating bee nesting sites (e.g., installing bee boxes or leaving areas of reduced tillage).

Use of permanent habitat should likely be interpreted as retaining existing habitat rather than activities of "creation or restoration" of permanent habitat; it includes maintaining wooded areas, old fields, and other semi-natural areas adjacent to cropped areas. Renting managed honey bees was the second most frequently reported current management practice (35% of blueberry growers).

Figure 3: FL blueberry growers' pest management practices



More than half (62%) of Florida blueberry growers reported using reduced sprays and making an effort to choose active ingredients that have the least impact on bees in their pest management practices. Pesticide and fungicide timing were also reported as widely used practices, employed by 56% and 52% of Florida blueberry growers respectively.

These practices, timing pesticide and fungicide applications and monitoring active ingredients, are highly visible management applications promoted through extension, beekeepers and suppliers, and commodity groups, offering a possible explanation for their relatively widespread adoption.

2. USDA ERS, 2012 http://www.ers.usda.gov/media/1679173/special-article-september_-pollinator-service-market-4-.pdf

6. Overview of Florida blueberry farms

The average number of blueberry acres ranged from 0.1 to 435 acres, with an average of 10 acres in blueberry production. The farm acreage is representative of average farm sizes for the counties surveyed (Table 2). The total median blueberry acres for the Florida counties surveyed were as follows: 4 acres in Alachua, 1 in Jackson, 4 in Lake, 2.5 in Marion, and 8 acres in Polk. Total median acres for all crops were 1.5 in Alachua, 15 in Jackson, 109 in Lake, and 5 acres in Marion county.

Table 2. Census data and ICP sample summary

	Ag. Census 2012	ICP Survey 2014-15			
County	**Farm size* *acres***	**Farm size *acres***	**Blueberry *acres***	**Blueberry Farms**	**Buy /rent pollinators**
Alachua	113	47.8	6.4	21	33%
Jackson	226	164.1	0.6	5	0%
Lake	85	699.5	5.4	7	57%
Marion	83	115.3	2.8	12	25%
Polk	216	63.5	38.2	24	61%
Average	**144.6**	**218**	**10.7**	**Total = 69**	**42%**

Integrated Crop Pollination Project

Integrated Crop Pollination (ICP) is the combined use of different pollinator species, habitat augmentation, and farm management practices to provide reliable and economical crop pollination.

For a full copy of the survey, visit: http://icpbees.org/wp-content/uploads/2016/03/ICP_Survey_11-1-2014.pdf

For more information, visit our website at: www.projecticp.org or find us on Facebook.

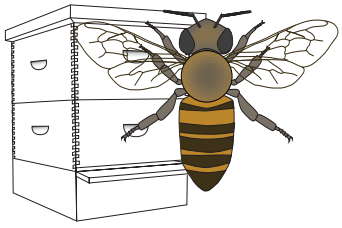
This project is funded by a USDA-NIFA Specialty Crop Research Initiative Grant (Award #2012-51-181-20105). This working paper is document number ICP-FLBB2016.1E.

For ICP survey details, contact:
Dr. Kelly Garbach
kgarbach@pointblue.org
(913) 515-5079

Overview of Blueberry Pollination in Florida

There are about 316 species of native bees in Florida.[3] Major bees contributing to Florida blueberry pollination include honey bees, bumble bees, and southeastern blueberry bees. Recent studies from the University of Florida have found that honey bees are not the most efficient blueberry pollinators because they do not move pollen by sonicating flowers (e.g., by vibrating their wings at high frequency). Recommendations to blueberry growers include implementing strategies to maximize bumble bee and southeastern blueberry bee populations in or near their fields. Nearby wooded areas may be nesting sites for native bees and should be left as undisturbed as possible.

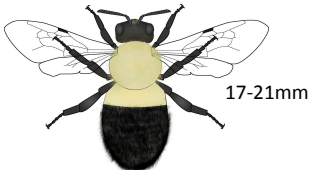
Important Florida Bee Types*



Honey bee (*Apis mellifera)*

Honey bees (*Apis mellifera)* are the most important bee for blueberry pollination if Florida, as well as the U.S. as a whole. The European honey bee and African honey bee, nearly identical, represent the two most used honey bees in Florida. Honey bees are less efficient blueberry pollinators per visit than many wild bee species, but are easy to manage and transport, and provide many active pollinators per hive. Honey bees are social insects, on any given day, a 6-8 frame colony will have roughly 14,000-19,000 pollinating bees.

Wild bees

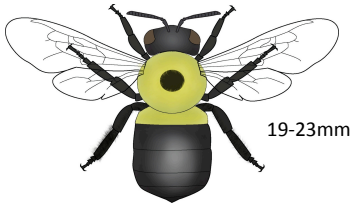


Bumble bee (*Bombus* spp.)

Bumble bees (*Bombus* spp.) are highly efficient blueberry pollinators. There are four wild and one managed species of bumble bees that frequent Florida blueberry bushes. Because of their large body size, bumble bees can fly in cooler conditions than honey bees. Researchers are exploring the effectiveness of commercial bumble bees as an alternative managed pollinator.

Southern blueberry bee *(Habropoda labriosa*)

Southeastern blueberry bees (*Habropoda labriosa***)** are solitary, ground-nesting bees that are effective and abundant pollinators of both high-bush and rabbit-eye blueberries. The southeastern blueberry bee is not found on all Florida blueberry farms, but is typically very active where it is found.



Carpenter bee (*Xylocopa* spp.)

Carpenter bees (*Xylocopa* spp.) excavate nesting tunnels in wood. Like bumble bees, their large size allows them to visit flowers on cool, cloudy days. They often cut a slit in the side of blueberry flowers to access the nectar, which allows honey bees to also access nectar on later visits. These nectar robbing bees transfer some pollen between flowers, however when the rate of nectar robbing approaches half of all honey bee visits, blueberry seed and fruit set are reduced.

3. http://edis.ifas.ufl.edu/in1027