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EFFECTIVENESS OF DIFFERENT BEE SPECIES IN POLLINATION OF BLUEBERRY FLOWERS

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One of the major limiting factors affecting yield in rabbiteye blueberry is poor fruit set. Flowers which have not been pollinated will not set fruit. The current recommendation for pollination is one hive of honeybees per acre. However, honeybees may not be an effective pollinator of rabbiteye blueberries compared to native bumble bees. Honeybees do not work well in cold weather, and may frequently collect nectar from the side of flower by slitting the corolla (side working) which means they effectively bypass the stigma and anther of the flower, thereby avoiding cross-pollination. A study was initiated to determine how effective honeybees and native bees were in pollinating rabbiteye blueberries.

MATERIALS AND METHODS

For two years, honeybees (Apis mellifera), large and small bumble bees were evaluated for three parameters which are indicative of their effectiveness as a pollinating agent for blueberries. Seventy individuals of each species of bees were rated for: 1) the method of nectar collection (top working, side working using preexisting holes in the corolla, or side working by making their own hole in the side of the corolla), 2) the amount of blueberry pollen carried by each pollinating agent, and 3) the number of flowers visited by each pollinating agent in 15 seconds.

RESULTS AND DISCUSSION

Only 54% of honeybees collected nectar by top working flowers; the rest mainly side worked through holes in the corolla previously made by carpenter bees (Table 1). Carpenter bees almost exclusively side worked flowers. In contrast, all Bumbus and Habropoda bumble bees top worked flowers. As a consequence of their flower working habits, honeybees and carpenter bees carried almost no blueberry pollen, while bumble bees species usually carried a light to heavy pollen load (Table 2). All bees, other than honey bees, were very active in working flowers, averaging 6 to 7 flowers in 15 seconds

compared to only 2 to 3 for honeybees.

These preliminary data suggest that honeybees are a poor pollinating agent for rabbiteye blueberries. Pollen transfer appears to occur almost exclusively by native bumble bees. Data from Florida, Georgia, and North Carolina also indicate that honeybees are not good forgers of blueberry pollen even when topworking. Honeybees may be simply taking the path of less resistance by sideworking previously split flowers. In instances when no corollas have been previously split by carpenter bees, then honeybees will mostly top work rabbiteye blueberry flowers. Considerably more research in this area is needed to better define the specific importance of each bee species to cross-pollination and fruit set of blueberries in Texas. The most important native species for pollination appears to be Habropoda.

CONCLUSIONS

Native bumble bees, excluding the carpenter bees can be very effective pollinating agents for blueberries in Texas. Care should be taken avoid pesticide application to rabbiteye plantings during bloom, because it may result in a long-term reduction or total loss of native pollinators. Where no native species exist or where populations are low, then honeybees can be important in cross-pollination. Until we know more about fruit set in blueberries, obtaining honeybee hives during bloom is still a safe insurance policy even if adequate bumble bee populations exist.

Table 1. Blueberry flower nectar extraction method used by different Pollinating agents

Pollinating Agent	% Top Worker	% Side Worker	
		New Hole	Old Hole
Apis - Honeybee	54	4	42
Bumbus - Large bumble bee	100	0	0
Xylocopa - Large Carpenter bee	2	97	1
Habropoda - Small bumble bee	100	0	0

Table 2. Pollen load carried by different pollinating agents

Pollinating Agent	Percentage of Bees — Pollen Load			
	none	small	medium	heavy
Apis honeybee	100	0	0	0
Bumbus large bumble bee	54	20	6	20
Xylocopa large carpenter bee	90	2	0	0
Habropoda small bumble bee	35	30	15	20

Table 3. Rate of blueberry flower visitation by different pollinating agents

Pollinating Agent	Percentage bees — Number flowers visited in 15 seconds								
	2	3	4	5	6	7	8	9	10
Apis honeybee	45	35	20	0	0	0	0	0	0
Bumbus bumble bee	4	4	4	4	16	36	16	12	4
Xylocopa large carpenter bee	4	9	23	23	33	4	0	0	0
Habropoda small bumble bee	0	5	0	25	20	30	10	5	5