

Influence of Honey Bees on Cantaloupe Production in Indiana

T. E. MOUZIN¹, D. K. REED¹, and W. E. CHANEY²
Fruit and Vegetable Research Laboratory
AR, SEA, USDA
Vincennes, IN 47591

Introduction

Wild and domestic honey bees and other native bees play a vital role in food production. The production of at least 90 crops in the United States is dependent to some extent upon bees for pollination (Koch 1977). In Indiana, one such crop is cantaloupes. Without the aid of pollinators, commercial cantaloupe production is impossible. Melon plants caged with bee colonies have sweeter, larger fruit with more seeds than plants in the open; plants caged without bees produce only a few small, worthless fruit (McGregor and Todd, 1952).

Over the last 20 years, increase in population and related urbanization of rural land, reduction of wild plants due to intensive practices, and use of agricultural chemicals, often with little consideration of their impact upon bees, have reduced the number of the endemic pollinators. As a result, farmers are increasingly supplementing the pollinator by renting honey bee colonies from beekeepers.

Materials and Methods

Research was conducted at Vincennes, IN during 1977 and 1978 to demonstrate the effect of bee pollination in cantaloupes and to provide information about optimum numbers of hives. In 1977, a two-story hive body with at least 30,000 bees was placed on each of four one-acre plots in each of 4 cantaloupe fields on June 1. Weekly counts of numbers of bees in the plants were made until August 15 when the colonies were removed, counts were made by carefully placing a square grid made of $\frac{1}{4}$ in. rodding, which encompassed an area of 101 cm² over a plant. The number of visible bees within that area was determined; then the plant was disturbed so other bees could be counted as they flew away. A minimum of 100 plants was counted at each location each week. Also the number of small (2.5-7.6 cm) and large 7.6-12.7 cm) fruit, in the area near each hive, and in an area at least 175 m away (in the same field) was determined. Mature fruit was weighed in both the areas on 3 dates when fruit would usually be harvested

In 1978, 2 growers' fields received one hive and 2 fields received 2 hives on June 2. The colonies were removed Aug. 21, one week later

¹ Fruit and Vegetable Research Laboratory, AR, SEA, USDA, Vincennes, IN.

² Co-operative Education Agreement for Graduate Students, Purdue University, USDA, SEA, AR.

TABLE 1. Summary of weekly counts of the numbers of bee and melons in bee release and control blocks in cantaloupe field in 1977-1978.

Date	Bee Release Block			Control Block		
	No. of Bees	No. Small Melons ¹	No. Large Melons ²	No. of Bees	No. Small Melons ¹	No. Large Melons ²
<i>1977 4 Hives</i>						
6/10-7/14	223.5	319.5	379.5	129.8	278.5	296.5
7/15-8/10	70.3	219.8	Harvested	32.8	171.3	Harvested
Total	293.8	539.3	379.5	162.6	449.8	296.5
<i>1978 1 Hive</i>						
6/9-7/14	177.0	216.0	225.5	100.0	172.0	176.0
7/15-8/18	114.0	231.5	Harvested	41.5	165.5	Harvested
Total	291.0	447.5	225.5	141.5	337.5	176.0
<i>1978 2 Hives</i>						
6/9-7/14	198.0	214.0	205.0	100.0	180.0	171.0
7/15-8/18	170.5	266.0	Harvested	63.5	186.0	Harvested
Total	368.5	480.0	205.0	163.5	366.0	171.0

¹ 2.5-7.6 cm dia.² 7.6-12.7 cm dia.

than in 1977, because of dry growing conditions. Counts were taken as in 1977.

Results

Results of observations made on the number of bees and melons during the two seasons are presented in Table 1 which gives the average of 4 fields. The plots pollinated by bees had a 10% increase in the number of melons in 1977 and a 12.8% increase in 1978. (The smaller number of melons produced overall in 1978 probably reflected the dry summer). The little difference seen between areas exposed to 1, 2 or 4 colonies indicated that one colony per acre would be adequate, but the increase in number of flowers as the plants mature, means that more bees are needed during the middle of the season. It is estimated that one bee for each 10 hermaphrodite flower will provide adequate pollination McGregor (1976).

Table 2 shows difference in weights of melons between plots. The average weight gains differed only slightly (180 g. in 1977 and 157 g. in 1978), but even small gains become important when one considers the number of acres involved. Over the whole melon growing area, yield gains should be great in bee-pollinated fields.

Bees are therefore beneficial as pollinators of cantaloupe in Indiana. Other experiments are planned to obtain quantitative data using caged bees and other techniques.

TABLE 2. *Weights of mature melons at various dates during 1977 and 1978 seasons in bee release and control blocks.*

Date	Average Weight (Kg.)	
	Bee Release Block	Control Block
<i>1977</i>		
7/7	1.956	1.814
7/14	2.299	2.089
7/21	2.384	2.197
Avg./Date	2.213	2.033
<i>1978</i>		
7/7	1.638	1.497
7/14	1.942	1.777
7/21	2.429	2.265
Avg./Date	2.003	1.846

Literature Cited

1. MCGREGOR, S. E. and F. E. TODD. 1952. Cantaloupe production with honey bees. *J. Econ. Entomol.* 45(1):43-7.
2. MCGREGOR, S. E. 1976. Insect pollination of cultivated crop plants. *Agriculture Handbook No. 496.* pp. 256-61.
3. KOCH, C. M. 1977. The role of honey bees in feeding the world. *American Bee Journal*, Nov. 1977, Vol. 117.