Changing Trends in Southeastern Louisiana Honey Production Through 25 Years[1]

by EVERETT OERTEL,[2] THOMAS E. RINDERER,[2] and BOBBY G. HARVILLE[2]
Bee Breeding and Stock Center Laboratory Agricultural Research,
Science and Education Administration, USDA, Baton Rouge, Louisiana, and
Department of Agronomy, Louisiana State University 70808

Manuscript Received for Publication Aug. 11, 1980

ABSTRACT

Honey production records were maintained on a apiary of honey bees (Apis mellifera L.) for 25 years. Nectar flow began in March in 13 years and April in 12 years. Most years had four or five nectar-flow months. There was a weak nectar flow in October in seven years. The second month of nectar flow was significantly greater than the flow in any other month and was significantly decreased in the months following. For the first seven years, honey production was random, but for the next 18 years, a statistically significant (P 0.05) 2-year cycle occurred with a high-production year followed by a low-production year.

INTRODUCTION

CHANGING land use and agricultural practices cause changes in forage available to honey bees (*Apis mellifera* L.). While some changes improve bee-forage, most seem to impair bee-forage (see eg. Crane 1975). Honey yield records over a period of several years are useful for determining the effects of gradual changes in land use on nectar forage. In this paper, we present 25 years of honey yield records and identify seasonal and yearly trends in nectar production.

METHODS

An apiary was maintained on the agricultural research farm on the Baton Rouge campus of Louisiana State University from 1942 to 1967. Through this period, the research farm was used for the experimental production of several species of both plants and animals. Pecan trees, sugar cane, and grass-white clover (*Trifolium repens* L.) pastures predominated. A few additional nectar forage plants were available to bees in pasture areas, and these plants as well as white clover grew in the pecan orchards. Additional forage plants were available along fence lines, roadways, and in a large wood lot that bordered the farm.

The apiary had from 4 to 8 colonies, which were kept in hives on individual balance beam scales. Each month the weight changes of the hives were recorded. Records also were taken on occurrences of queenlessness, disease, and other events that would be expected to adversely affect honey production. The colonies were maintained as field honey-production units. Swarm prevention measures were routinely taken, and honey was removed from the hives after the major production period. Empty combs were returned to hives after the honey was removed, and all colonies in sound condition had hives with approximately equal amounts of storage comb.

The average colony honey production for each month within each year and the average colony honey production honey production average was calculated from apiary records of sound colonies. Also, the average colony honey production for the first and subsequent months of nectar-flow for all years was calculated. Additionally, the yearly honey production average was calculated. Trends, apparent in the data, were subjected to binomial tests of sign direction, correlation analysis, or where appropriate, a X^2 test.

RESULTS

Several characteristics of the seasonal nectar flow are apparent from an inspection of the monthly averages (Fig. 1). Foremost among these characteristics is the substantial variation among years. In 13 of the years, the nectar flow began in March, while in 12 years it began in April. Thirteen of the years had 5 months of spring-summer nectar flow; 10 years had 4 months of nectar flow; one year had 3 months of nectar flow; and one year had 2 months of flow. Occasionally (7 of 25 years) a weak fall nectar flow occurred in October.

The general structure of the spring-summer nectar flow is shown in Fig. 2. This figure shows the average colony honey production for 25 years for the first through fifth months of the spring-summer nectar flow. (Using the first month rather than a calendar month eliminates imprecision caused by the nectar flow starting in different months in different years.) The spring-summer flow increased rapidly, peaked in the second month and then gradually decreased. The consistency of the nectar flows through the years was very high. Binomial tests of sign direction showed that honey production in the first month was uniformly less than production in the second month ($P < 0.002$). Production in the second month was greater than in the third month ($P < 0.001$). Production in the third month was greater than in the fourth ($P < 0.01$), and production in the fourth month was greater than in the fifth ($P < 0.01$).

Honey production patterns were apparent through the years (Fig. 3). Between 1942 and 1949-1950, production seemed random. While some years had greater production than others, honey production in one year could not be used to predict production in following

FOOTNOTES

[1]In cooperation with Louisiana Agricultural Experiment Station.

[2]Research Entomologist (Retired), AR, SEA, USDA: Research Leader, AR, SEA, USDA: and Associate Professor, Department of Agronomy, LSU, respectively.

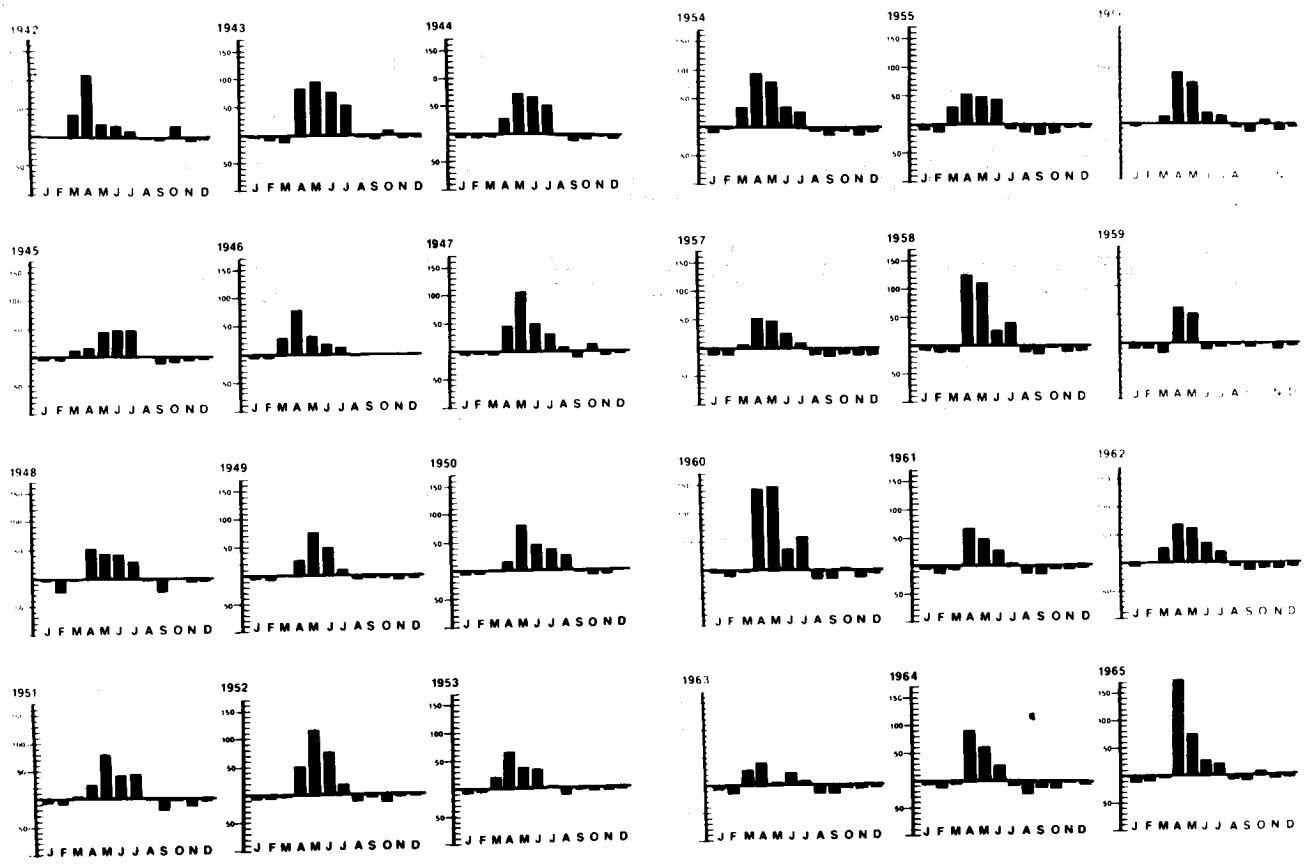


Figure 1: Average colony honey production in pounds for each month during 25 years.

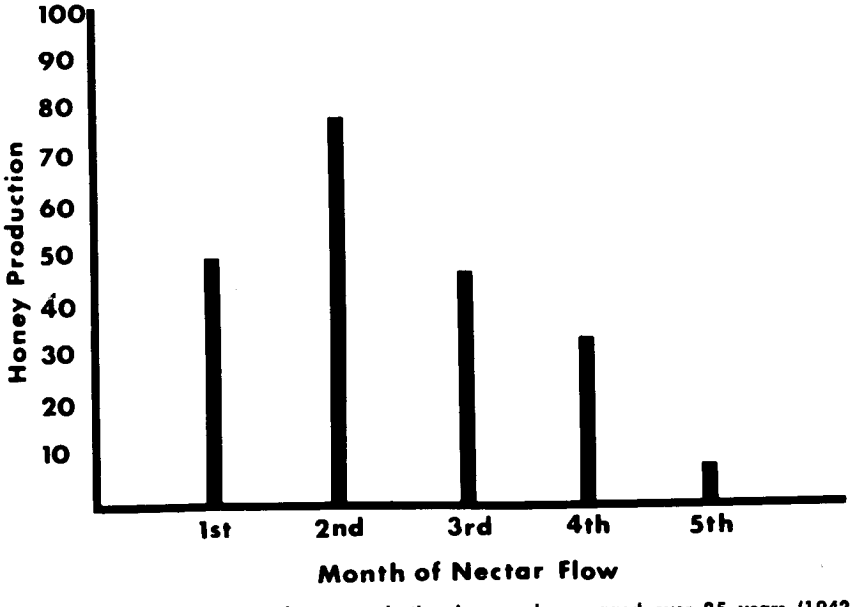
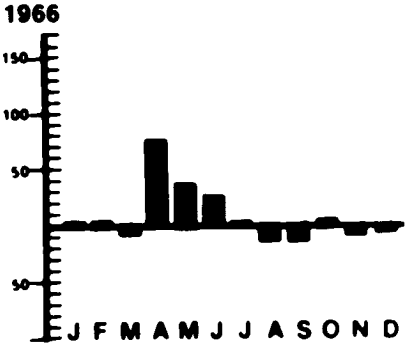


Fig. 2. Average colony honey production in pounds averaged over 25 years (1942-1966) for the first through fifth months of the spring-summer nectar flow.

years. Between 1949-1950 and 1966, a 2-year cycle occurred ($P < 0.001$). Years with high production, with only one exception, were both preceded and followed by years with lower production. The one exception, 1963, followed the coldest year on record in the area.

The number of months of nectar flow was shifted through years ($P < 0.05$; $X^2 = 5.00$, df = 1). In the last 9 years of the study, only 2 years had 5 months of nectar flow, while during the previous 16 years, 11 years had 5 months of nectar flow. Honey production was not significantly correlated with years ($r = -0.11$).



DISCUSSION

The variation in initiation time of nectar flow among years for the spring flow and lack of similar variation for initiation of fall flow suggests that certain differences existed between plants blooming in the two seasons. Spring plants that provided nectar during this study seemed to be dependent upon weather factors to control bloom time. Fall plants seemed more likely than spring plants to rely on a fixed cue such as photo-period to control bloom time.

The regularity of the pattern of spring-summer nectar flow is noteworthy. This pattern also is present in honey production records from apiaries

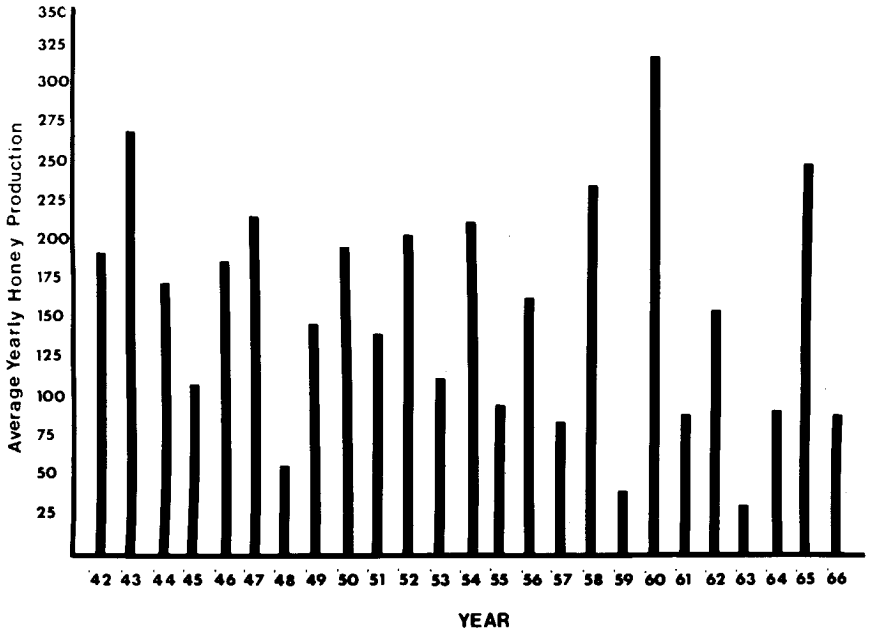


Fig. 3. Average yearly colony honey production in pounds for 25 years.

in Manitoba, Brazil, Argentina, and elsewhere (see eg. Crane, 1975). Predictability in the pattern of nectar availability could conceivably be a basis for strong selection pressures in honey bees. Such selection would result in evolutionary development of mechanisms assuring optimal nectar resource utilization throughout the nectar flow.

The apparent reduction through years in the length of nectar flow was probably caused by land use changes. Clearing of nectar plants from fence lines and along roads had become common practice near the apiary site. Also herbicidal and mechanical "weed control" reduced the number of nectar plants in pecan orchards and row crop areas. These practices would tend to reduce the variety of nectar sources and would, thereby, result in shortening the nectar flow.

The biannual honey production cycle seen beginning in 1949-1950 is probably related to nectar availability from white clover. Differences in nectar yields from field plots of white clover between years (Oertel, 1956) followed yearly differences in honey production. White clover forage yields showed a biannual pattern (Mondart and Harville, 1978) that followed the yearly pattern in honey production. Twenty-seven acres of white clover was established near the apiary in 1950 and maintained as a yearly forage crop until 1960 (Anon., 1945-1967). Also during this period, perhaps because of the planting and other work on white clover, this nectar plant seemed more widespread on land surrounding the apiary. Apparently, the loss of variety of nectar sources was compensated for by an increase in the abundance of white clover. The result of these two trends, one favorable and one unfavorable for honey production, was substantially unchanged production through the years.

ACKNOWLEDGMENTS

We thank James R. Baxter and Sandra Kleinpeter for preparing the figures.

REFERENCES

Anon. 1945-1967. Annual Reports: Dairy Science Department, Louisiana State University.

Crane, E. 1975. The flowers honey comes from. In: **Honey,** 3-76. (Ed. by E. Crane). London: Heinmass.

Mondart, C. L., Jr. and B. G. Harville. 1978. Forage yields of red and white clover. Progress Report — Clovers and Special Purpose Legumes Research. 11: 37-9.

Oertel, E. 1956. Nectar production by white clover. **Glean. in Bee Cult.** 84:461-3.

Reprinted from November, 1980, American Bee Journal
Vol. 120 (11): 763, 764, 765