

Pollen Trapping Honey Bee Colonies in Minnesota

Part II: Effect on Foraging Activity, Honey Production, Honey Moisture Content, and Nitrogen Content of Adult Workers^{1,2,3}

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ABSTRACT

Four (4) experimental pollen trapping treatments (full-time, part-time, no-time, and control) were developed to determine how pollen trapping affects honey bee colonies. The effect of pollen traps on several colony characteristics was measured. The full-time, part-time, and no-time treatments had significantly fewer returning foragers than did the control treatment in 1984. The full-time treatment had significantly fewer returning foragers than the other 3 treatments in 1985. The honey production of the full-time treatment was significantly less than that of the control treatment in 1984. In 1985 honey production differed significantly among treatments. The full-time treatment had the lowest honey production. The honey moisture contents of the full-time and part-time treatments were elevated in 1985.

INTRODUCTION

IN PART I we reported that pollen trapping regimes affected the amount of pollen trapped, brood production, and adult populations (Duff and Furgala, 1986). In this report we will discuss the effect of our pollen trapping regimes on foraging activity, honey production, honey moisture content, and nitrogen content of adult workers.

Levin and Loper (1984) studied the effect of pollen trapping on the activity of foraging bees. They reported that traps did not affect the number of bees leaving a colony. Both Levin and Loper (1984) and Rybakov (1961) reported, however, that foraging populations from colonies with pollen traps have a higher percentage of pollen collectors.

The level of efficiency that pollen traps remove pollen from returning foragers was measured by Levin and Loper (1984). They discussed factors that affected the efficiency of pollen traps.

Reports concerning the effect of pollen traps on honey production have varied. Hirshfelder (1951) and Lavie (1967) found that honey yields were reduced due to the presence of traps. McLellan (1974) on the other hand found that pollen trapping had no significant effect on the amount of honey stored. Rybakov (1961) reported an increase in honey yields from trapped colonies.

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MATERIALS AND METHODS

The experimental design, treatments, and management system used in this study were described in Part I (Duff and Furgala, 1986).

The foraging activity of all colonies was measured using a technique described by Sugden and Furgala (1982). All entrances were blocked for 60 seconds and the returning foragers were photographed at the colony entrance with a 35 mm camera (55 mm lens). The processed slides were projected and the individual bees counted. Photographs were taken during the seasonal nectar flows, 3 times in 1984 and 4 times in 1985. To reduce variation, the photographs were taken between 10:00 a.m. and 2:00 p.m. CST on sunny days (Fig. 1).

Samples of returning foragers were collected with a sweep net in 1985 (Aug. 6, Aug. 26). The bees were killed and later examined for pollen loads. The percentage of pollen collectors was calculated for each colony for both sample dates.

Honey production was measured both seasons by a technique similar to one used by Sugden and Furgala (1983). Each colony was weighed with a spring scale (Model No. 8920/Hanson Scale Co., Shubuta, MS 39360) before and after the main nectar flow. The weight gain was determined by subtracting the post-flow weight from the pre-flow weight and adjusting the difference to account for the wood and wax of the added honey supers (Fig. 2).

In 1985 the surplus honey from each colony was harvested separately, extracted by treatment, and stored in separate containers. After the honey had cooled and settled, 10 honey samples from each treatment were taken and the moisture content of each sample measured with a honey refractometer.

Percent total nitrogen content of the adult bees was determined at 3 different times during the experiment (October 17, 1984, May 1, 1985, June 26, 1985). Three (3) 50 adult bee samples from each colony were collected from the top hive body. The bees were placed in vials and frozen. Percent nitrogen content of each sample was then determined by the Kjeldahl procedure (Research Analytical Laboratory, University of Minnesota).

The mean number of returning foragers per minute, mean honey production per colony, and mean percent nitrogen content of adult bees were calculated for all of the treatments. Data were subjected to 2-way analysis of variance