

# Amount of Empty Comb, Comb Color, And Honey Production<sup>1, 2</sup>

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SEVERAL observations have been made on the effects of comb on honey storage by bees. When given a honey super containing some light and some dark comb, bees tend to fill the dark comb with nectar before they fill the light comb. Not only is this a common observation in the apiary, it has also been seen in laboratory experiments (Free and Williams, 1972). We also know from both field and laboratory experiments that when bees are given large amounts of empty dark comb, they store more sugar solution in the comb and produce more honey than when given smaller amounts of comb. (Rinderer and Baxter, 1978a; Rinderer and Baxter, 1978b; Rinderer, et al. 1979) Furthermore, in a limited experiment, Free and Williams (1972) observed that bees stored more honey in dark comb than in light comb.

Honey producers are interested in producing the most profitable crop possible. Since bees store more honey when given large amounts of dark comb, use of this technique will produce more honey. However, honey extracted from light comb is itself lighter (Townsend, 1969) and usually commands a better price. Clearly, the most desirable supering technique would involve supplying bees with large amounts of light comb — if light comb is as effective as dark comb in producing a greater crop.

Previous experiments and observations did not show whether light comb is as effective as dark comb. The preference of bees to store honey in dark comb first might have different biological origins than their tendency to store more honey if given more comb. Furthermore, the tendency seen by Free

and Williams (1972) for bees to store more in dark comb than in light comb might not have been true for all bees since they tested bees from only one colony. Consequently, the relative value of light comb compared to dark comb in honey supers is not known. This experiment was designed to answer these questions.

## MATERIALS AND METHODS

The basic tool used in this experiment was a hoarding cage (Kulincevic et al., 1973). These cages contain a piece of comb, feeders with water, pollen substitute, and sugar solution. Bees placed in such cages take sugar solution from the feeder and store it in the comb. This storage, called hoarding behavior, is related to honey production (Kulincevic and Rothenbuhler 1973; Kulincevic et al. 1974; Rinderer and Baxter 1978a; Rothenbuhler et al. 1979).

We used cages fitted with either 3 pieces of light-yellow comb, 3 pieces of dark-brown comb, one piece of light comb or one piece of dark comb. The light comb never had brood reared in it, while the dark comb had been used repeatedly for brood rearing. All pieces of comb were of equal size.

Combs of emerging adult worker bees were obtained from 5 colonies and held in an incubator (35°C and 50% RH) until the bees were 0-24 h old. Bees from each colony were then placed in 4 of each of the 4 types of cages. All cages received 30 bees (Rinderer and Baxter, 1978b).

After the hoarding cages were stocked with bees, they were placed in an incubator (35°C and 50% RH). Each cage was inspected daily for 7 days: the amount of sugar solution removed from the feeders was measured and all feeders were replenished. Data on the volume of sugar solution removed from the feeders were submitted to statistical analysis.

## RESULTS AND DISCUSSION

Analysis showed that, overall, bees hoarded somewhat more in dark comb (22.7 ml) than in light comb (20.8 ml), but the difference was insignificant. Closer inspection of the data showed that bees from 3 colonies actually hoarded slightly more sugar solution in light comb, whereas bees from 2 colonies hoarded significantly more sugar solution in dark comb. Consequently, although the tendency to store more in dark comb might be a characteristic of some colonies of bees, it is not a tendency for all colonies of bees.

Analysis also showed that the bees hoarded significantly more sugar solution in cages with 3 combs (23.9 ml) than in cages with 1 comb (19.6 ml) (Table 1). Bees from all 5 colonies followed this trend and the trend occurred with the light comb as well as the dark comb. These results indicate that greater amounts of light comb would be as effective as greater amounts of dark comb in increasing honey production.

These results also suggest that in many cases supering with light comb

Table I. Milliliters of sugar solution hoarded by bees from 5 colonies with 2 colors and 2 amounts of comb.

Comb Color	3 combs	1 comb	Average
Dark comb	24.7	20.8	22.7
Light comb	23.2	18.5	20.8
Average	23.9	19.6	

## FOOTNOTES

<sup>1</sup>In cooperation with Louisiana Agricultural Experiment Station.

<sup>2</sup>This article summarizes the research reported in Rinderer, T. E. and J. R. Baxter, 1980.

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will be as effective in causing bees to produce maximum honey crops as su-pering with dark comb. However, there are some colonies of bees and perhaps entire stocks of bees that will probably produce more honey when given dark comb.

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