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BREEDING HONEY BEES TO THE CROP<sup>1/</sup>

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SUMMARY

It is well known that honey bees, Apis mellifera L., visit alfalfa (lucerne), Medicago sativa L., more frequently to obtain nectar than to obtain pollen and that when they visit it for nectar, they pollinate only a small percentage of the flowers because of the peculiarities of the alfalfa flower. This flower is largely self-sterile and must be fertilized by pollen from another alfalfa plant. The anthers and stigma (the male and female parts) form a sexual column that is tightly enclosed by the petals, and when the column is suddenly released (or tripped), it strikes the bee on its head and leaves a mass of sticky pollen. If the bee visits another alfalfa blossom, the process is repeated, and pollination results.

Perhaps honey bees find the action of the tripping mechanism disagreeable, as many people have stated, but, more likely, they merely learn that they can obtain the nectar more rapidly without tripping the flower. At any rate, nectar-seeking bees soon learn to slip their tongues in from the side and avoid tripping the flower. Pollen-collecting bees, however, trip nearly every flower, and hence are much more valuable to the grower of alfalfa seed.

Many beekeepers have observed that pollen traps on some colonies yield more pollen than others and that not all traps at a given location yield the

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same kinds of pollen, even on the same day. Perhaps foraging bees from different colonies become oriented to different areas where different plants grow; there has been some scientific evidence that this does occur. Also, sharply different percentages of alfalfa pollen are often brought into hives placed side by side in an apiary; this may be an indication of a genetic difference. However, no effort to prove either theory was made until 1962.

In the first tests of the investigation, colonies collecting large and small amounts of alfalfa pollen were selected. These daughters of queens from these colonies were inseminated from their brothers, and the colonies headed by the resulting queens were tested. Colonies headed by sister queens proved to be more similar in the proportion of alfalfa pollen they collected than were those headed by unrelated queens.

The steady progress since made in separating inbred lines that rank high and low as collectors of alfalfa pollen through six generations of selections and the complete separation of the two lines has now proved that the tendency to collect alfalfa pollen is heritable. The investigators are therefore mainly pursuing the genetic and other scientific aspects of this discovery; commercial breeders, however, have been quick to realize the economic value of tailor-made honey bees for alfalfa pollination.

Since pollen collectors are much more efficient than nectar collectors in tripping and cross-pollinating alfalfa flowers and since increased cross pollination benefits the production of seed, the greater value of a line that ranks high as collectors of alfalfa pollen seems inescapable.