RESEARCH ON HONEY BEES

at the
Carl Hayden
Bee Research Center
Tucson, Arizona

U.S. DEPARTMENT OF AGRICULTURE
SCIENCE AND EDUCATION ADMINISTRATION

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Honey bees are so important to the Nation's economy that research at the U.S. Department of Agriculture's Carl Hayden Bee Research Center at Tucson, Arizona, is devoted largely to their study. In the United States each year, honey bees pollinate more than 50 different agricultural crops valued at over $10 billion, and they produce honey and beeswax worth more than $100 million.

The Bee Research Center at Tucson, administered by the Science and Education Administration, houses facilities for the investigation of several areas of bee behavior and biology and crop pollination requirements. Scientists there are working to make bees even more helpful than they are now in growing this Nation's food, feed, fiber, and seed crops.

AREAS OF STUDY

USDA bee research at Tucson has been conducted in cooperation with the Arizona Agricultural Experiment Station since 1949, when the Department established a field station there. Early work was primarily focused on pollination and pesticide studies.

Expansion of the research program now gives scientists greater capabilities in trying to fill the many gaps that still exist in our information about bees. We need to know how to manipulate bees so that they will produce more honey and be more effective pollinators.

Researchers at the Center are asking some very fundamental questions: Why are bees attracted to certain plants and not to others? How do aroma and color influence flower selection by bees? How do vibrations, sound,

The Carl Hayden Bee Research Center at Tucson, Arizona.

Microorganisms are isolated from bees and their food, then tested for their effects on bee nutrition.

light, temperature, humidity, and other stimuli affect bee behavior?

Two research units were established in October 1978—the Honey Bee Nutrition Unit and the Honey Bee Crop Pollination Unit. These units incorporated the following areas of study:

- *Pollination Requirements of Crop Plants.* Researchers study the influence of such fac-

A virgin queen is confined in a tabular screen cage until old enough to be artificially inseminated. She is then placed in a full-size colony for pollination and nutrition studies.

tors as flower, color, and aroma; nectar volume and sugar concentration; and environmental conditions on the pollination and fertilization of crop plants.

• *Management of Honey Bees for Pollination of Field Crops.* Development of practical colony management systems to enhance crop pollination depends on a basic understanding of bees and the factors affecting their foraging behavior.

• *Management of Honey Bees for Pollination of Greenhouse Crops.* Studies are aimed at (1) determining colony size make up, location, and hive food stores best suited to the specific greenhouse and crop and (2) obtaining information on factors controlling flight and foraging in greenhouses.

• *Influence of Flower Chemicals on Visitation and Pollination by Honey Bees in Alfalfa and Other Small Legumes.* Equipment is now available for the rapid analysis of nectars for sugar content and flower aroma chemistry. The data are used to screen nectar and aroma composition of both specific crops and competing plants.

A high-pressure liquid chromatograph used to study sugars and other chemicals in nectar and pollen.

• *Nutritional Requirements of Honey Bees.* The major aim of this research is to develop an artificial food that is a complete replacement for pollen. If this can be done, colonies can be at maximum strength when they are needed for honeyflows of crop pollination.

• *Use of Physical and Chemical Stimuli to Modify the Foraging Behavior of Honey Bees.* Scientists at the Center are obtaining information about the significance of vibrations and other physical and chemical stimuli to honey bee behavior. The goal of this research is to enable beekeepers to influence the behavior of their bees.

• *Identification and Role of Microorganisms in the Nutrition, Biochemistry, and Physiology of the Honey Bee.* Researchers are studying the role that bacteria, fungi, and yeast play in converting certain substances into complete foods acceptable to honey bees.

• *Honey Bee Behavior and Biology of Reproduction in Relation to Supplemental Pollen Feeding.* This research is designed to obtain new knowledge about the effects of supple-

Scientist examining cucumber fruit in pollination research on factors that attract honey bees to the flower.

mental pollen feeding on (1) increased honey and brood production and (2) the biology and behavior of honey bees.

THE FACILITY

The Carl Hayden Bee Research Center is on a 5.3-acre tract provided by the University of Arizona and is about 5 miles from its main campus in Tucson. The site allows for close cooperation between Center personnel and the University staff.

Establishment and creation of this station in 1949 was largely due to the efforts of Senator Carl Hayden. In honor of his contribution, the Bee Research Laboratory was renamed the Carl Hayden Bee Research Center on April 9, 1979.

The laboratory was completed in 1966 and is equipped with the most advanced technical equipment and instruments.

Team research at the Center is conducted by apiculturists, biochemists, engineers, entomologists, microbiologists, and plant physiologists.

Intense flight activity at the hive entrance shows colonies are populous or "strong" and ideally suited for crop pollination.

Honey bee feeding on syrup from a bee feeder. Part of a study to determine food preference of bees.

The main laboratory and office building covers more than one-third of an acre. Also on the site are a large greenhouse, smaller isolation greenhouses, a shop area, a large storage building, three auxiliary office-laboratory buildings, and two small service buildings.

INFORMATION

Any questions regarding agricultural research at this facility, elsewhere in the Western Region, or anywhere throughout the Agency may be directed to the following address:

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2000 East Allen Road
Tucson, AZ 85719

or call area code 602, 795-3222.

On the cover. Honey bee collecting nectar from honeysuckle flower.