SOUTHERN GRAIN INSECTS

RESEARCH LABORATORY

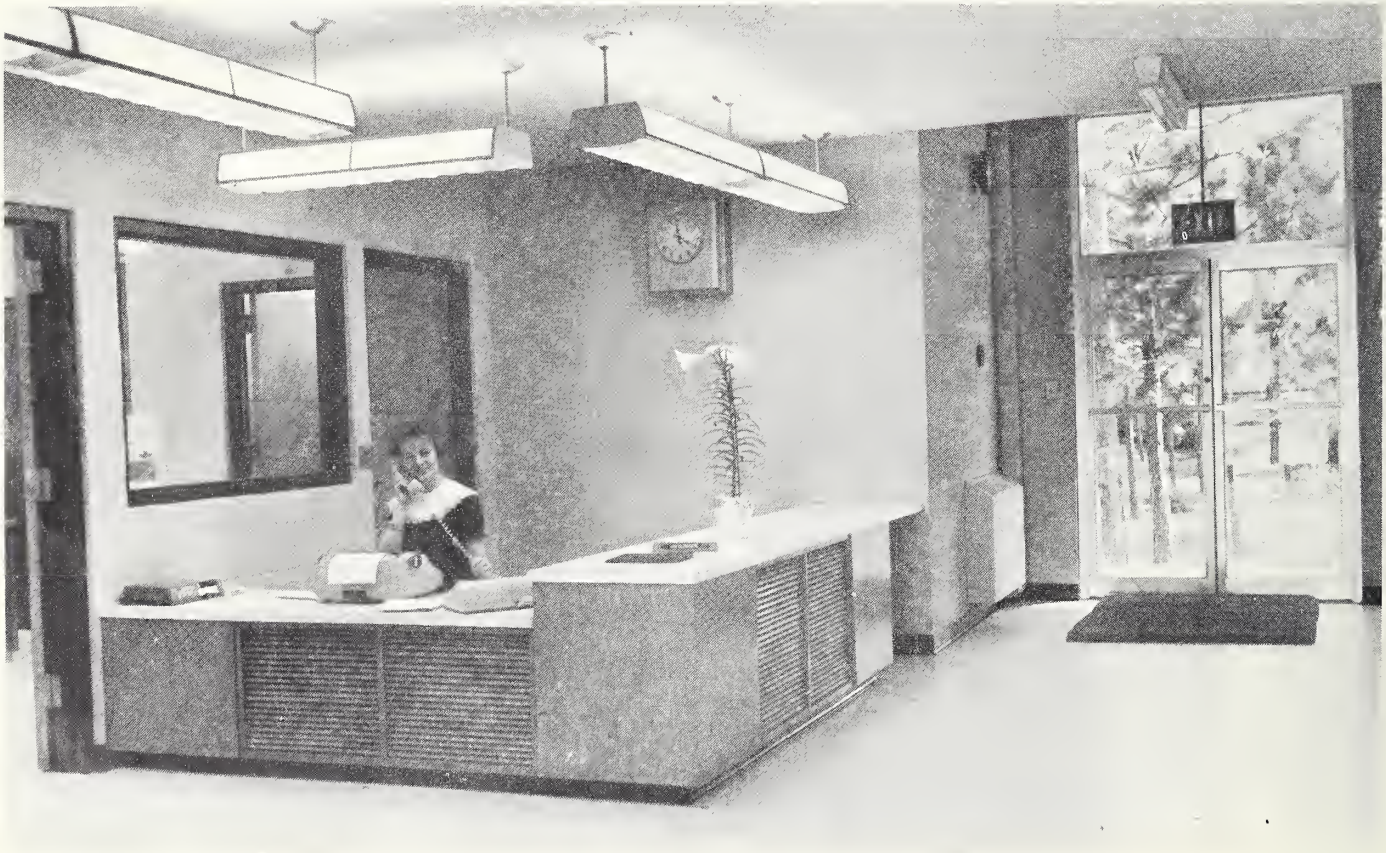
TIFTON, GEORGIA

Growth Through Agricultural Progress

Agricultural Research Service

UNITED STATES DEPARTMENT OF AGRICULTURE

Main entrance and view of front of building (north exposure).



Lobby at main entrance.

SOUTHERN GRAIN INSECTS RESEARCH LABORATORY

Tifton, Georgia

The Southern Grain Insects Research Laboratory at Tifton, Ga., is the United States Department of Agriculture's new research facility for investigating insect pests of grains in the southern area of the United States. The primary objectives of this modern, well-equipped laboratory are (1) to develop new approaches to insect control, (2) search for insect resistant germ plasm to use in the crop improvement program, and (3) to improve existing control measures.

Research will be directed toward the several insects that damage grain crops in the South:

- corn earworm
- soil insects
- southwestern corn borer
- southern cornstalk borer
- sugarcane borer
- rice weevil (field)
- fall armyworm
- European corn borer
- lesser cornstalk borer
- corn flea beetle
- Angoumois grain moth (field)
- chinch bugs
- bill bugs
- cutworms
- sorghum midge
- sorghum webworm
- aphids

Estimates of the damage caused annually by grain insects are not available for all crops. Figures are available for corn. At least 25 species of insects attack corn, and these insects cause an estimated annual loss of more than $900,000,000, with damage in the southern region amounting to $134,300,000. In Georgia, the corn earworm alone caused an annual loss of over $2,000,000 in 1960 and 1961.

Research at the new laboratory will be conducted in close cooperation with the Georgia Coastal Plain and other State experiment stations and universities in the South.

LABORATORY FACILITIES

The laboratory at Tifton and the supporting structures are located on 5¼ acres of land adjacent to the Georgia Coastal Plain Experiment Station. Land for the laboratory was donated to the Federal Government by the State of Georgia. Additional land is used for testing plants, chemicals, and equipment. Facilities include the main laboratory and office building, headhouse and greenhouse, a large repair and testing shop with attached carport for machinery, a volatile solvent storage building, and a building housing a gamma irradiation facility.

Laboratory and Office Building

The main laboratory and office building occupies more than 16,000 square feet of floor space, and contains 53 rooms, including 17 offices, 13 major laboratories, and several small laboratories for special use, such as chromatography, instrumentation, and insect rearing. The building is of brick and concrete block construction.

Headhouse-Greenhouse

The headhouse measures 37' x 77' and in addition to a large work area for potting and soil storage, contains two rooms for seed preparation and storage, and a central storage room for glassware. The large work area will be equipped with four growth chambers to be used for special studies in plant physiology, and a large autoclave for sterilization of cages, soil, and other items.

The greenhouse is 32' x 103' and is divided into four compartments. Three compartments are equipped with conventional benches for growing plants in pots or flats. The fourth compartment has a soil floor so that plants may be grown directly in the ground.

Shop and Service Building

The shop measures 91' x 41' and is divided into three sections. The north section will be used by agricultural engineers to construct and test experimental equipment used in studies on the mechanical control of grain insect pests. The center section will house insect-rearing chambers, a large thermal oven, cold storage facilities, and space for general storage. The south section will be used primarily for the repair and construction of insect cages and equipment designed and used by personnel of the laboratory.

Cobalt-60 Irradiation Facility

The irradiation unit is housed in a separate building, located at the back of the property, and enclosed by a link fence. The unit was charged with 450 curies of radioactive cobalt in 1958. It is designed in such a manner that insects, seed, and other items may be placed in a cannister and lowered by a special control system into a lead-lined cask containing the radioactive cobalt.

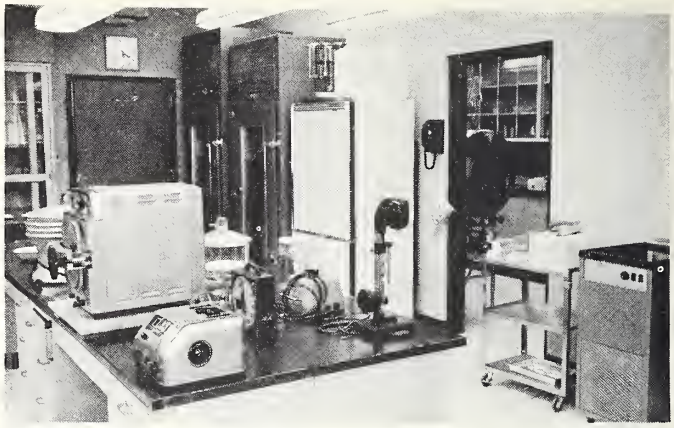
STAFF

The Director of the Southern Grain Insects Research Laboratory is Dr. H. C. Cox, formerly head of the Corn Insects Station at Tifton. He is assisted by 10 senior scientists who with supporting technicians, laboratory helpers, and clerical workers, make up a staff of about 40 people.

STUDIES TO BE CONDUCTED

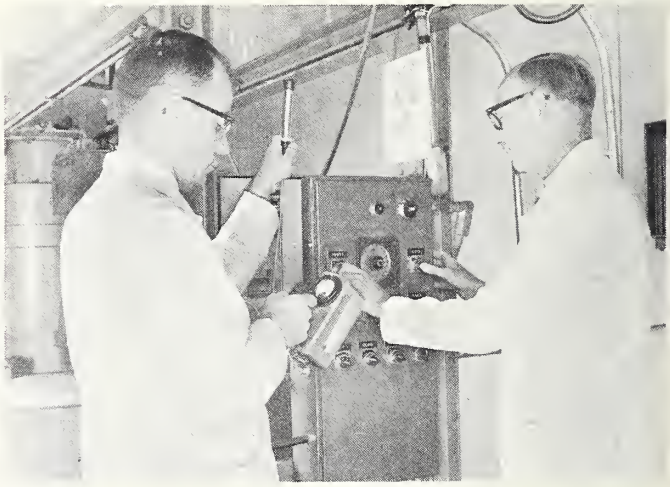
In the past, scientists often worked alone in their particular field and, of necessity, undertook work in other fields as well. Research today has become so complex it demands the cooperation of a number of scientists working as a team toward a common goal.

To illustrate, scientists have known for years that certain strains of corn are resistant to attack by some insect pests. With this information they have been able to produce commercially acceptable hybrids that carry a high degree of resistance to the corn earworm and a few other insects. It is important to know more about the cause of insect resistance. So



Shop and service building, with carport for machinery (left). Well-equipped insect pathology laboratory (right).

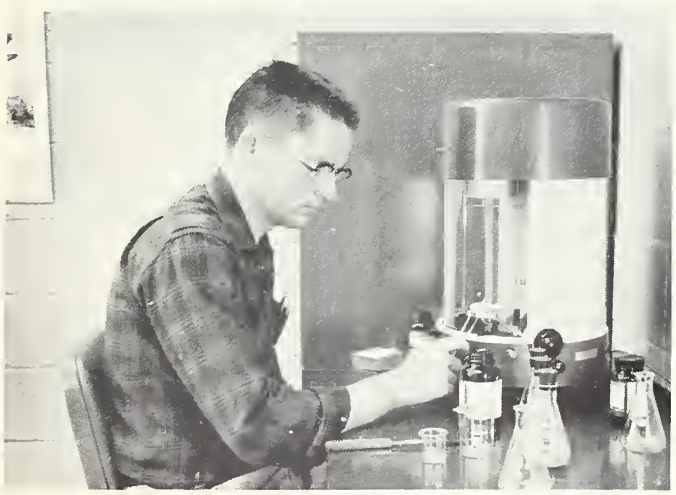
Headhouse-greenhouse.



Entomologists exposing insects to radioactive cobalt.

An entomologist tests sex attractants on fall armyworm in olfactometer.

Entomologists field testing corn for resistance to the corn earworm, the rice weevil, and the fall armyworm (left).



Insect toxicologist weighing test materials on analytical balance.

many factors appear to be involved, this research will require the talents and close cooperation of entomologists, plant geneticists, plant physiologists, and biochemists.

The team approach will be used generally by scientists at the Tifton laboratory in carrying on investigations in the following broad areas of research.

Insect Physiology

Insect physiologists will study the factors involved in the attractance of insects--both the sex attractants and the attractance of insects to plants. The latter study could lead to, or involve, studies on insect nutrition. In addition, research will be undertaken on the diapause of grain insects, particularly the biochemical aspects. Much emphasis will be placed on antifertility agents (chemosterilants).

Biochemistry

Working closely with other scientists, biochemists will study the biochemical nature of plant resistance to insect attack and damage, as well as the chemical nature of factors responsible for host-plant selection by grain insects. Research will involve exploration to determine the biochemical nature of sex attractants.

Plant Physiology

Among other things, this project will involve research in the physiology of plants, both susceptible and resistant, subjected to insect attack. Studies will also be undertaken to determine the effects of light on the interrelationship of plant growth and insect development.

Host Plant Resistance

The scientists will seek to learn more of the nature of plant resistance to insect attack. They will investigate such phases as mechanical resistance to egg laying or insect feeding, plant material and its relationship to insect nutrition, and the possible production of toxic substances within the plant that are lethal to the insect.

Plant Genetics

Working closely with the other scientists on plant resistance, geneticists will seek to learn not only the modes of inheritance of resistance, but also the number and location of the controlling genes, and the cytological basis for resistance. They will be interested in devising ways of increasing resistance as well as transferring it by breeding to superior varieties and hybrids.

Biology and Ecology

A thorough knowledge of the biology and ecology of insect pests is basic to research on their control or eradication. The entomologists working in this field will investigate the seasonal appearance, duration, and relative abundance of insects attacking small grains and corn. They will study the feeding habits, life cycles, flight ranges, and mating habits of these insects.

Biological Control

Initially, the major part of this research will be directed toward insect pathology. This will include the detection, identification, and classification of diseases of insects attacking grain crops; studies on the mode of action of diseases on the insects; and the determination of how insect disease organisms might be used for controlling specific insect pests.

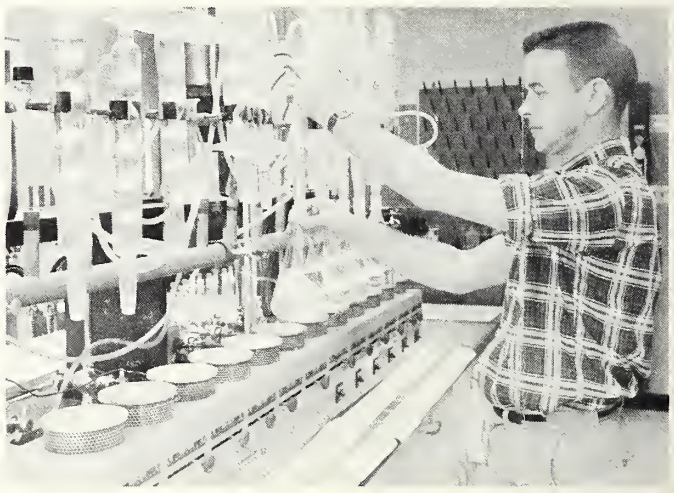
Insect Toxicology

Research will include screening of possible toxicants for effect on grain insects and studies into the mode of action of various toxicants on insects. Scientists working on this project will cooperate closely with agricultural engineers and assist in evaluating the effectiveness of equipment developed for insect control.

Agricultural Engineering

Studies in this field will include the development of improved techniques for more accurate and uniform application of all types of pesticides, and development of basic information relating to the effect of electromagnetic radiation on insects.

Agricultural engineers at drafting table.



Analytical chemist purifying solvents for use in analysis of insecticide residues.

Analytical Chemistry - Residues Analyses

The chemists in this field will work closely with the toxicology and agricultural engineering projects. They will develop new, or use existing procedures to determine the amount and location of toxic residues in or on plants and soil.

Scientists on the professional staff of the laboratory are considered to be faculty members, in their respective departments, of the University of Georgia, Agricultural Experiment Station systems.

Washington, D. C.

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