fore the second irrigation (under Tulare County conditions only). Waukena White should receive a pre-harvest irrigation.

Lygus

Lygus should be controlled to avoid the early loss of squares, which reduces yield and contributes to excessive vegetative vigor. As a young seedling, Waukena White may be moderately damaged by thrips, but recovery is usually prompt. Waukena White also appears to be resistant to spider mites. Under greenhouse conditions in Berkeley, where spider mites usually are more severe and more difficult to control than in the field, Waukena White was resistant. Under field conditions of these limited tests, treatment for mites was not necessary. Mites were occasionally observed on plants, however, and whether this indicates that a strain may develop which is capable of attacking Waukena White is not known at this time.

Waukena White may also be resistant to the so-called potassium deficiency disease complex. It was grown in an area where the disease developed severely in previous years on Acala SJ-1, and it remained free from the symptoms. Possibly the deep branching habit of the root system of Waukena White, in contrast to the shallow root branching of Acala SJ-1, is a factor in its freedom from the nutritional disease.

Clean harvesting

After rains of one-half inch or more prior to harvest of the experimental plots in 1968 and 1969, very little cotton fell to the ground. The upright, rigid habit of the plant facilitates clean harvesting. The leaves of Waukena White are glabrous and thus tend to reduce the problem of trash; Waukena White lint makes an attractive bale.

Growing Waukena White is illegal at present in our one-variety Acala district of California. It is hoped, however, that Waukena White will provide a germ plasma bearing resistance to Verticillium wilt that can be bred into improved upland cotton strains.

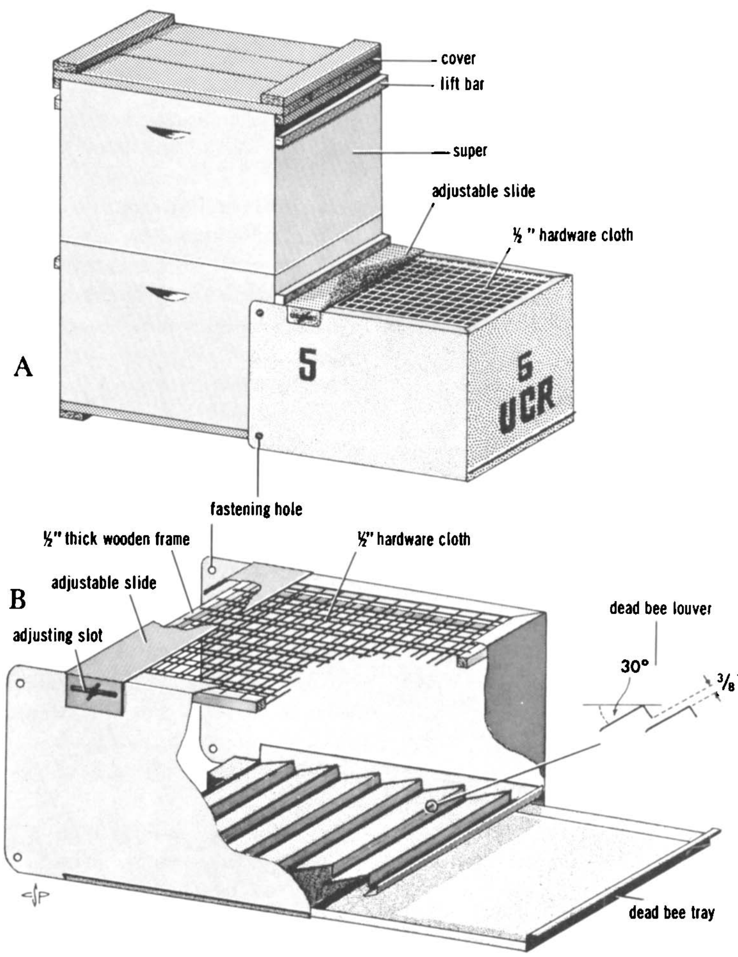
Stephen Wilhelm is Professor; James E. Sagen is Laboratory Technician; Helga Tietz is Assistant Specialist, Department of Plant Pathology, University of California, Berkeley. Alan G. George is Farm Advisor, Tulare County. Calcot Ltd. ran the fiber analyses and Ranchers Cotton Oil tested the seed. Dr. Douglas J. Phillips assisted with the soil-root studies.

HONEY BEE FIELD RESEARCH

aided by Todd dead bee hive entrance trap

FIELD RESEARCH on the effect of pesticides on honey bees has been conducted in California since 1952. F. E. Todd of the Bee Research Branch, USDA, ARS cooperated in these field tests through 1968. Several methods have been used to collectively measure the effects of pesticide treatments on honey bees. Of these, colony strength, forager bee visitation in the field, caged bees in the field, bioassay of foliage residues in cages using honey bees, and dead bees at the colony are the most useful, according to previous tests.

Bees dying at the hive provide a useful qualitative and quantitative index of larval and adult bee losses caused by pesticide applications. In addition, substantial quantities of poisoned bees can be gathered for chemical residue analyses,



The modified Todd Dead Bee Entrance Trap for honey bee field research.

E. L. ATKINS · F. E. TODD
L. D. ANDERSON

studies of bee longevity, and studies of losses of larvae and adults attributed to diseases.

In 1956, bees dying at the hives were counted on cleared bare ground areas in front of each hive. Continuous efforts were made to develop more reproducible dead bee counts. In 1957, a cleared, defined 2 × 6-ft area was used, and also a cleared area of bare ground defined by a 3 × 3-ft frame which was fitted with 8-mesh hardware cloth to facilitate the removal of dead bees. The most serious drawback of these traps was that hive bees carried away many of the dead bees. Therefore, data obtained by these counts were inconsistent.

Prototype

In 1959, the first prototype dead bee trap was introduced (by Todd) consisting of a sheet metal box 4 inches high and 16¼ inches square, and open on top. The front half of the open area was covered with 2-mesh hardware cloth and bands of aluminum foil 2 to 4 inches wide bordered the sides and front, to prevent hive bees from crawling out of the trap with dead bees. The trap was approximately 50 per cent successful in preventing the removal of dead bees.

The first Todd Dead Bee Entrance Trap (formerly designated the USDA Dead Bee Trap) was tested in field tests during 1960. The traps were handmade, soldered and had the double 2-mesh hardware cloth fitted on top of the trap. The Todd Dead Bee Entrance Trap is a galvanized sheet metal box approximately the size of a standard deep 10-frame super. The open end is fitted snugly to the front of the hive and is secured to the hive with 4 shingle nails (4d). The top of the box is fitted with two layers of 2-mesh lightweight hardware cloth separated by a ½-inch space and with the mesh openings staggered. The bottom of the box is fitted with a tray ½-inch deep. Immediately above the removable tray is a frame fitted with 7 louvers which are 2 inches wide set at an angle of 30° and spaced ⅜-inch apart (see drawing). Weakened and dying bees crawling from the hive eventually fall through the louvers and into the tray below. Also, live bees (as they carry dead and dying bees from the hive) are unable to carry their bulky load through the double layer of hardware cloth. They drop the dead bees, which fall out of sight into the tray below the louvers. Live bees seldom go below the louvers to attempt to remove dead bees, but instead, return to the hive to attempt to remove another dead bee. Thus bees dying at the hive are retained in the trap where they can be conveniently counted. This trap is 90 to 95 per cent successful in preventing the removal of dead bees.

The trap was designed to fit standard 10-frame hive equipment. Since many bottom boards are not of standard dimensions, the need was apparent for an adjustable trap to fit snugly to hive equipment, and to prevent bees from exiting without going through the hardware cloth. Therefore, in 1961 an adjustable slide was designed for the Todd trap (see drawing).

This change necessitated an additional modification in the placement of the two layers of 2-mesh hardware cloth from its position on top of the trap to a location immediately below the lip of the top of the trap. This allows the 3⅝-inch adjustable slide to be moved to fit any 10-frame hive equipment. After the trap is fixed to the hive, the adjusting slide is positioned snugly against the hive body and held in place by a bolt through the adjusting slot secured with a wing nut.

The dead bee traps can be manufactured by a sheet metal shop which does not require the extensive soldering of the original trap.

A second modification was made to allow rain and irrigation water to drain out of the dead bee trap. This modification consisted of drilling three ¼-inch holes in the bottom of the tray at the front and at rear edges.

A third modification consisting of adding an inverted L-shaped frame constructed of galvanized sheet metal, fastened immediately below the hardware screens to prevent dead bee laden workers from crawling up the inside of the trap directly to the hardware cloth. This modification prevents the removal of up to another 5 per cent of dead bees from the trap.

Todd had the hardware cloth screens originally painted with black, blue, white and/or yellow in various patterns to facilitate hive identification and orientation by honey bees. The identification patterns are now painted on the adjustable slide of the trap. Each trap has also been stenciled with a number 4 inches high on the front, and on each side, to facilitate the identification of test colonies during field tests.

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