REARING INVESTIGATIONS

Raymond Patana, Entomologist, E.R.D., A.R.S., U.S.D.A.
William McAda, Agr. Res. Technician, E.R.D., A.R.S., U.S.D.A.

Objective

To improve rearing and mass production of insects infesting cotton for use in programs involving the release of sterile insects and in programs requiring production of parasites and predators for field release.

Summary of Progress

Laboratory cultures of boll weevils, bollworms, beet armyworms, cabbage loopers, pink bollworms, tobacco budworms, and salt-marsh caterpillars are maintained at the U.S.D.A. Cotton Insects Research Laboratory in Tucson. The pink bollworm is being used for studies of irradiation-induced sterility and parasite studies. The other Lepidoptera are used in studies of parasites and predators and are oriented toward biological control.

During the summer of 1968 sufficient numbers of pink bollworms were reared to provide stock for a new Plant Pest Control Division rearing facility at Harlingen, Texas. From 1,000 to 10,000 pink bollworm eggs per day were shipped for two months.

Rearing methods and diets are being improved constantly, and the rearing program now provides host insects for the biological control program and for the studies of irradiated pink bollworms. The rearing techniques are now being utilized to obtain developmental data about the major insect pests of cotton in Arizona. When these studies are completed, mathematical models will be possible for the study of the population dynamics of these pests.

* * * * * *

INSECT GENETIC INVESTIGATIONS

A. C. Bartlett, Geneticist, E.R.D., A.R.S., U.S.D.A.

Objective

To develop genetic methods of controlling insects injurious to cotton.

Summary of Progress

Studies on F_1 sterility. Preliminary cytological investigations of pink bollworms showed that chromosomal abberations such as translocations could be

detected in the F_1 male larvae obtained when irradiated insects of either sex mated with unirradiated or irradiated insects. Data are now being accumulated to measure the proportion of F_1 insects carrying these chromosomal aberrations after doses ranging from 5000 to 25000 rad of gamma irradiation or after timed exposures to fast neutrons.

Effects of irradiated on pink bollworms. If male pink bollworms are given 20000 rad of gamma irradiation and then allowed to mate with normal females, the egg production of the females is reduced to 25% of the control. In studies to determine the cause of this reduction, it has so far been shown that the irradiated males mate as often as the normal males (as determined by spermatophore counts in single pair matings) and that the longevity of males irradiated at 20 k rad is equal to that of untreated males. Subjective determinations of sperm showed more variation in irradiated males than in unirradiated males, but sperm were found in the spermatheca of females allowed to mate with treated males as often as in females allowed to mate with untreated males. Thus, a physiological (chemical) factor is apparently responsible for the decrease in production of eggs.

Pink bollworm mutant isolated. A stock of pink bollworms has been established in which all larvae have black heads compared with the brown heads in the wild-type stocks. The inheritance of this trait is not completely determined.

* * * * * *

THE BIOLOGY AND ECOLOGY OF LYGUS SPP. ON COTTON AND ASSOCIATED CROPS

G. D. Butler, Jr., Entomologist, E.R.D., A.R.S., U.S.D.A.
A. L. Wardecker, Agr. Res. Technician, E.R.D., A.R.S., U.S.D.A.

Objective

To determine the biology and ecology of the several species of Lygus in Arizona and to use this information to improve the control of Lygus spp. in cotton.

Summary of Progress

After the first frost in the fall, populations of lygus bugs in alfalfa are predominantly adults. On warm winter days, these adults become active and lay eggs. Because the egg has a threshold developmental temperature of about 46.5°F, the stage is greatly prolonged at low temperatures. Mortality of eggs is probably high during this time because the tender plant tissues in which the eggs are laid are subjected to periodic frosts. When the frozen tissues dry, the eggs of the lygus bug are destroyed. The appearance of nymphs is therefore dependent on minimum temperatures. During warm winters, nymphs may be present in January; in colder years, none will be found. Rainfall during December and January reduces spring populations, possibly because of