Research on the Boll Weevil

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Summary

Much of the research effort on the boll weevil has been directed towards gaining a better understanding of its biology and ecology, and, in turn, its capacity to survive in the desert Southwest. Particular emphasis has been placed on studying the capacity for overwinter survival. Information gained in these studies will aid in designing cotton production systems necessary to eliminate or reduce the boll weevil to non-economic pest status. The alternative for coping with this pest is in-season insecticidal control. Research on this method was conducted in both 1983 and 1984.

The boll weevil overwinters as an adult. This occurs as a free-living adult or as adults in boll cells formed by the developing larvae. Many of the adults trapped in boll cells are released when stalks are shredded in fall and winter. The exact overwintering site of free-living adults has not been determined. However, it appears that many, if not all, free-living adults move about during periods of warm weather. How this movement prior to availability of cotton in the spring affects survival is unknown. Survival of weevils trapped in boll cells, has been determined, however. For this segment of the population, weevil survival extends well into the cotton season, permitting establishment of the first generation in early-squaring cotton. Infected bolls collected on November 15, 1983, showed almost 4% of the weevil adults still alive in early June of 1984.

Survival of free-living adults is enhanced when flowering globemallow is available on which to feed. Even though globemallow serves as a food host for the boll weevil, reproduction does not occur on it. The cooler winter temperatures and higher relative humidity also favor survival. Studies have shown that survival is significantly enhanced with relative humidities above the 50% level. Boll weevils are known to overwinter in well-protected places with dense ground trash, sites where high humidities occur.

A large part of the boll weevil population leaves the field in the fall and winter in search of overwintering quarters. However, where infestations occur in the top crop late in the season, many weevils remain in the field. Several studies have shown that burial of the crop residue is extremely important in preventing overwinter survival and spring emergence of the boll weevil. Crop residue buried to a depth of 4 inches has been shown to almost completely prevent survival.

A study was conducted in the North Gila Valley in 1984 to determine the capability of boll weevils surviving on seedling cotton from seedling emergence till square formation. Weevils that had survived the winter in boll cells were used in this test. Effect of planting date was also determined, beginning with the first planting on March 1 and followed with 3 subsequent plantings of 2 week intervals. Weevils survived from the early-seedling stage until infestable squares were available, regardless of planting date.

An early-season population growth study in both the first and fourth

cotton plantings showed that the boll weevil reproduces and survives quite well during the early part of the growing season. Progeny per female for the first generation ranged from ca 85 to 100. Since the sex ratio is about equal, males to females, this indicates a 45 to 50 fold population increase for the first generation.

Three main areas of insecticidal control have been investigated. These include: topical applications to determine LD50's for a number of organophosphates and pyrethroids; field applications to determine efficacy of several registered and experimental insecticides, and, studies on the effects of Dimilin on boll weevil reproduction.

Results of the topical studies show that susceptibility of the boll weevil in the Southwest is quite similar to that of the weevil in the southern states. Weevils collected in pheromone traps were more susceptible than those taken from boll cells, indicating that those weevils were in a weakened condition.

Studies with Dimilin showed highly variable results relative to eliminating reproduction. Only in certain cases was comnplete egg-hatch inhibition achieved. In areas where establishment of the boll weevil is to be prevented, Dimilin would not be a wise choice of materials for control.

Insecticidal control experiments have shown several materials, both organophosphates and the newer pyrethroids, to be effective in suppressing boll weevil populations. However, these materials must be applied on a short-application interval of about 4 days. Some promise was shown for control with a few materials - Ammo at 0.06 lbs/A, PENN CAP-M at 0.5 lbs/a and Baythroid at 0.03 lbs/A - at 6 day application intervals.