SUMMARY

D. R. Rummel

After ingestion or contact treatment of the adult female boll weevil, diflubenzuron acts to inhibit the hatch of eggs from treated females if sufficient concentrations are secreted in eggs. However, female weevils recover rapidly after a single treatment, and retreatment is required to maintain the effect.

After foliar application on cotton plants, very little diflubenzuron is absorbed by the leaves. The chemical adheres well to foliage and is highly resistant to photodegradation on foliar surfaces and to metabolism within leaves. The chemical is fairly stable in soil when associated with plant litter, but apparently degrades rapidly when applied directly to soil. No significant residues in cotton seeds have been noted after application of the chemical to cotton.

Test results indicate that diflubenzuron and/or the crop oils with which it is formulated may have some detrimental effects on certain of the beneficial arthropods associated with cotton. However, these deleterious effects appear minimal and may cease after treatments are terminated. It should be emphasized that diflubenzuron appears to be far less detrimental to most beneficial arthropods associated with cotton than are conventional insecticides used for boll weevil control.

Diflubenzuron exhibited varying degrees of effectiveness in field tests conducted throughout the state. The highest level of reproductive suppression usually occurred with the higher application levels and the material was generally more effective against light weevil populations.

The poorest results were obtained in the Rio Grande Valley where, on a seasonal basis, there were no significant differences in reproduction suppression between treated and untreated plots. In the Upper Gulf Coast area, survival of boll weevil eggs in treated fields never fell below 43% even though the population pressure was light.

When tested against very heavy weevil infestations in West Texas, the 70 g and 140 g Al/ha (1.0 oz and 2.0 oz/A) rates resulted in an average adult weevil emergence of about 40% compared to an average emergence of 73% from untreated plots. Under light infestations in the same area, the average adult emergence was only 13.4% for the 70 g Al rate and 9.2% for the 140 g Al rate. In tests conducted in Central Texas, substantial reproduction suppression in treated fields also was noted. In 1976 tests, the weevil mortality in fields treated with diflubenzuron at rates of 35, 70 and 140 g Al/ha averaged 46.4, 67.4, and 77.3%, respectively.

Even though suppression of reproduction was obtained with diflubenzuron treatments in various tests, the levels achieved did not approach those reported from some tests in other states. Generally heavier boll weevil infestations encountered in Texas tests may account for much of the difference in the degree of suppression obtained.

The results reported in this study suggest that adequate season-long control of boll weevils with diflubenzuron, even with light to moderate infestations, will be difficult and may require special management practices. The most effective method of using diflubenzuron for boll weevil control appears to be a program designed to suppress reproduction by overwintered females. Due to the mode of action of diflubenzuron (i.e., inhibited reproduction) and the boll weevil's capacity for rapid population increase, the 1st application must be made to cotton when fruiting is in
the "pinhead square" stage or earlier, before oviposition begins. The unusual persistence of diflubenzuron on cotton does not result in extended activity against the boll weevil, and it apparently must be applied at regular intervals of 5-7 days for an extended period to maintain control. This type program would be designed to limit boll weevil reproduction long enough to obtain an acceptable boll set before the populations develop to a damaging level after the termination of treatments. In instances where the overwintered boll weevil population is large, diflubenzuron applications may have to be supplemented with fall treatments for diapausing weevils and/or with at least 1 application of a conventional insecticide in the spring to reduce the number of adult boll weevils that survive the winter. Diflubenzuron applications should be integrated with proven management practices such as planting short season cotton varieties and early harvest and stalk destruction. In addition, the use of the IGR in community or area-wide programs would produce better results than when used on an individual farm basis.

Research conducted in Texas indicates that diflubenzuron does have a place in boll weevil management. However, both the advantages and disadvantages related to its use must be considered.