EFFICACY OF ULV INSECTICIDES AGAINST BOLL WEEVILS

J. E. Mulrooney, K. D. Howard, J. E. Hanks,
USDA-ARS-APTRU, Stoneville, MS,
and R. G. Jones, APHIS,
Mississippi State, MS

Abstract

In 1994, preliminary tests were conducted to evaluate the effectiveness of an air-assisted ultra low volume (ULV) ground sprayer for boll weevil control. This spraying system was mounted on a tractor and had been used primarily for herbicide application. This research evaluated 16, 12, and 8 oz of ULV malathion applied in cottonseed oil at a total volume of 32 oz. Cyfluthrin applied ULV and guthion applied as conventional 5 gal/A application were also evaluated. Bioassays were conducted in the field by caging weevils on treated cotton terminals using 16 oz styrofoam cups. Mortality was determined after 24 hours.

In 1995, an air-assisted ULV spraying system was mounted on a John Deere 600 high cycle. Malathion at 16 and 12 oz/A as well as an emulsifiable formulation (EC) of malathion were tested. Fipronil, endosulfan, and cyfluthrin also were evaluated for boll weevil control. Total volume of the ULV applications was 16 oz/A and cottonseed oil was used as diluent. Bioassays were conducted in the field using boll weevils caged on individual plants and in the laboratory using boll weevils placed on individual leaves in petri dishes. Tests of aerial ULV applications of fipronil at 0.05. 0.038, and 0.025 lb/A against boll weevils were also conducted in cotton in 1995. Bioassays in the field (cages) and laboratory (petri dishes) were used to evaluate treatments.

Results in 1994 showed that 16 and 12 oz/A of ULV malathion gave comparable control of boll weevils with average mortalities of 69 and 59%, respectively, in field cage bioassays conducted from 4 to 48 hours after treatment (HAT). The lowest rate, 8 oz/A (21% mortality), was not as effective as 16 oz/A (40%) or 12 oz/A (32%) in a separate test comparing malathion rates. Malathion at 16 oz/A was more effective over a longer period than guthion or ULV cyfluthrin and produced 69% mortality at 48 HAT compared to 12% for guthion and 17% for cyfluthrin at the same time after application.

Results in 1995 showed that in field cage tests, 16 and 12 oz/A rates of ULV malathion killed an overall average of 80 and 59%, respectively, of weevils in field cages over a 24 to 72 HAT period, while malathion EC only killed 25% over the same period. Fipronil, endosulfan, and cyfluthrin, with mortalities of 40, 46, and 27% respectively, were not as toxic to weevils in these bioassays as ULV malathion. Results from petri dish bioassays were slightly different from those in field cage bioassays. Higher average mortalities over the 72 h test period from fipronil (85%) and endosulfan (75%) made these compounds more competitive with malathion (99%) as a boll weevil insecticide. Cyfluthrin was not effective in our bioassays in either 1994 or 1995. This result may have been due to the slower onset of toxicity associated with pyrethroid insecticides. Mortality readings at 48 h perhaps were too soon to detect the toxicity of cyfluthrin.

In the aerial application tests with fipronil applied ULV, there were no differences in mortality between 0.038 and 0.05 lb/A rates in either the field cage bioassay or the petri dish bioassay. There were no differences in mortality between 0.038 and 0.025 lb/A when treatments were bioassayed using petri dishes; however, greater mortality from the 0.025 application was observed in the field cage bioassay at both 24 and 48 HAT.

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