

Resistance Management

Insecticide Resistance in Obliquebanded Leafroller, 1997-2004

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Abstract: Insecticide resistance in various field-collected populations of obliquebanded leafroller (OBLR) was surveyed in 1997, 2001 and 2004. A susceptible laboratory colony was evaluated for tolerance to azinphosmethyl, spinosad and methoxyfenozide during each of the bioassay periods. Field-collected populations were initially screened for resistance to all three insecticides, azinphosmethyl, spinosad and methoxyfenozide. Resistance ratios were determined by comparing the baseline LC₅₀ of the susceptible colony with LC₅₀ value of each insecticide for each field population. Each field population was then analyzed for azinphosmethyl mediated cross-resistance to either spinosad or methoxyfenozide. Nearly every population of OBLR collected in the field since 1997 had some level of resistance to azinphosmethyl with the exception of one population collected from a non-commercially managed orchard. The average LC₅₀ from the laboratory colony was 7.0 ppm (range 3.1-12.2 ppm). LC₅₀s from 24 commercially managed orchards ranged from 30.7-290.5 ppm. Interestingly, the insect growth regulator methoxyfenozide had fairly well correlated cross-resistance to azinphosmethyl prior to widespread use of this new insecticide chemistry. The average LC₅₀ from the laboratory colony was 1.44 ppm (range 0.45-2.86), but in 1997, 2001 and 2004 field collected populations had LC₅₀ values ranging from 5.7-11.8 (2 orchards), 9.7-28.1 (5 orchards) and 2.93-11.0 (6 orchards), respectively. Although cross-resistance was noted initially with methoxyfenozide, it did not appear that resistance levels have changed significantly within geographic regions between 1997-2004. Initial spinosad bioassays were conducted in 2001. The average LC₅₀ from the laboratory colony was 0.3 ppm (range 0.13-0.50). In 2001, it was apparent that azinphosmethyl mediated cross-resistance was not a concern as LC₅₀ values from azinphosmethyl resistant populations ranged from 0.19-0.62 (8 orchards). However, in 2004 LC₅₀ values from field-collected populations ranged from 0.46-1.82 (10 orchards). This represented a significant shift in the susceptibility of some field-collected populations, and it appeared that those populations of OBLR have become more tolerant to spinosad since its introduction.