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MONITORING SUSCEPTIBILITY OF WESTERN CORN ROOTWORM POPULATIONS ASSOCIATED WITH AREAWIDE MANAGEMENT PROGRAMS

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Populations of adult rootworms from both within and outside management programs were collected and sent to the University of Nebraska for each of the six years of the pilot program. Susceptibility of western corn rootworm populations was determined using both traditional dose-response assays as well as a diagnostic concentration assay validated with populations known to be resistant to carbaryl for each of the areawide management sites. Biochemical assays were also conducted to determine potential changes in activity of specific detoxification enzymes known to participate in carbaryl resistance. Additionally, feeding behavior assays were conducted at the end of the program by measuring the propensity of beetles to feed on cucurbitacin treated cellulose discs. In three of the four areawide management sites (IN/IL, IA, and KS), the mortality of rootworm adults at a diagnostic carbaryl concentration declined significantly over the six years of the study. In contrast, no significant changes were observed in populations obtained from the companion areas outside of the management program. A significant shift in responsiveness to cucurbitacin baits was also observed among populations from the managed relative to the companion areas. Although there were no reports of reduced efficacy of insecticidal baits employed in the areawide programs, these results suggest strongly that rootworm populations were in the early stages of resistance development and continued selection may lead to control failures. These results suggest that if an areawide approach to rootworm management becomes widely practiced that alternative technologies (e.g., alternative active ingredients, crop rotation, transgenics) be incorporated into the program.