STRUCTURAL AND BIOCHEMICAL INVESTIGATIONS OF DINITROANILINE RESISTANCE

K. C. Vaughn
United States Department of Agriculture, Southern Weed Science Laboratory,
P.O. Box 350, Stoneville, MS 38776 USA

Abstract. Since the initial discovery of dinitroaniline-resistant (R) populations of goosegrass (*Eleusine indica*) found in the S.E. USA by Gossett and colleagues, trifluraline-resistant (but not resistant to all dinitroaniline herbicides) biotypes of green foxtail (*Setaria viridis*) and annual ryegrass (*Lolium rigidum*) were discovered in Canada and Australia, respectively. The goosegrass biotype is highly resistant to all dinitroanilines and the unrelated herbicide amiprophosmethyl. Dinitroaniline herbicides disrupt mitosis by preventing polymerization of tubulin protein into microtubules. Microtubules were found in the R biotype, but not the S, following treatment with dinitroaniline herbicides. Moreover, isolated tubulin protein of the R biotype may form microtubules in the presence of 1 μM oryzalin, whereas no microtubules form in tubulin extracts of the S biotype in the presence of oryzalin. An altered beta tubulin form is found in the R biotype, that hyperstabiizes the microtubules, allowing for dinitroaniline resistance. The green foxtail and ryegrass biotypes with dinitroaniline resistance have a much lower level of resistance and exhibit different cross-resistance patterns from the goosegrass. Research on the mechanism(s) for dinitroaniline resistance in these species is in progress and will be reported at these meetings.