PATTERNS OF CROSS-RESISTANCE TO ACCASE-INHIBITOR HERBICIDES IN WINTER WILD OAT (AVENA LUDOVICIANA) POPULATIONS

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The level of resistance and patterns of cross-resistance to clodinafop-propargyl, sethoxydim and pinoxaden were examined in 12 putative resistant and one susceptible population of winter wild oat (Avena ludoviciana Durieu.) collected from Iran. The responses of biomass, plant survival, and coleoptiles to the increasing dosages of the three herbicides were determined in whole-plant and seed bioassays, respectively.

In whole-plant bioassay, all 8 putative resistant populations were indeed confirmed resistant to clodinafop-propargyl with resistance ratios ranging 3.1 to >34.1 or 2.57 to >50.6 for biomass and survival data, respectively. Most clodinafop-resistant populations exhibited low levels of cross-resistance to sethoxydim. On the other hand, two highly sethoxydim resistant populations, F2 and ES4, (with R/S: ~12) were slightly resistant to clodinafop-propargyl. Four of 12 populations (F2, S2, S4 and ES4) always showed high cross-resistance to pinoxaden with ED₅₀ values 12.4- to 27.8-fold greater than the susceptible population. M2, a highly clodinafop-propargyl resistant population, was more sensitive to pinoxaden than the susceptible population suggesting some evidence for the negative cross-resistance to the herbicide. Overall, there was a close similarity between the results of the bioassay and those observed in whole-plant experiment.

Keywords: Avena ludoviciana, Herbicide resistance, Resistance ratio, Seed bioassay, Whole-plant assay.