



Managing Herbicide Resistance

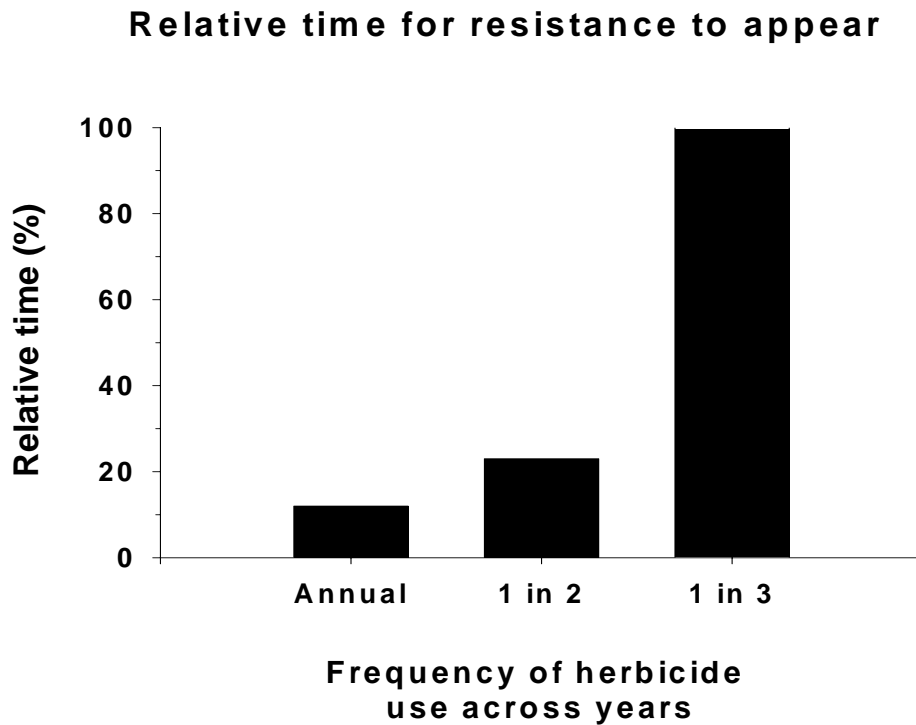
Development of Weed Resistance as Affected by Frequency of Herbicide Application

Producers have numerous cultural strategies to manage herbicide resistance. The goal of these strategies is to reduce selection pressure by herbicides on the weed community. With weed species, natural genetic variability results in plants that may be resistant to a herbicide; scientists suggest that one out of every million plants may be naturally resistant even before the herbicide is applied to a weed population. The impact of this resistant plant on long-term population dynamics reflects interactions among several biological characteristics, such as seed production per plant, seed survival in the soil, and intensity of selection pressure by the herbicide.

To help understand herbicide resistance, scientists developed mathematical models that predict population changes over time as affected by herbicide selection pressure. For example, a model has been developed for wild oat based on its population dynamics, genetic characteristics, and resistance to ACCase-inhibiting herbicides (*i.e.* Poast or Hoelon).

One possible strategy for producers is to reduce frequency of herbicide use. With this wild oat simulation model, scientists can estimate how quickly resistant wild oats would develop based on how frequently an ACCase-inhibiting herbicide was used. The simulation assumed a no-till system, with herbicides of different modes of action controlling wild oats in alternative years.

The model suggests that a resistant population takes twice as long to develop if the herbicide is applied every other year, compared to applying the herbicide every year (see figure below). Surprisingly, resistance takes 10 times longer to appear if the herbicide is only apply every third year.



Thus, producers can drastically minimize selection pressure for resistant plants by not applying a herbicide with the same mode of action for consecutive years. Producers in Canada are using this principle to manage resistant wild oat; they are planning cropping systems that enable them to limit use of this class of herbicides to once only once every 3 years for wild oat control.