Full, Recommended Herbicide Rates Help Delay Onset of Resistance

Using crop protection chemicals with different or multiple modes of action and rotating fields to different crops are highly recommended in any resistance management program. Studies also show that using the full, recommended herbicide rate of any product is equally as important.

Full, recommended herbicide rates provide consistently high levels of weed control and eliminate biotypes with a low level of natural resistance. With repeated exposure to low or cut-rate herbicides, more biotypes with moderate levels of natural resistance are more likely to survive, therefore increasing the population of resistant weed biotypes.

The Research Behind Labeled Rates

Before a herbicide is registered for use, countless field trials and experiments are conducted to determine the lowest effective use rate that consistently controls each target weed. The reason so many years and resources are dedicated to collecting this precise data is that deviation from labeled rates can cause severe problems:

• Applying more than the recommended rate can cause crop damage
• Applying less than the recommended rate can cause poor weed control and lead to herbicide resistance
Studies Point to Reduced Rates Leading to Herbicide Resistance

Multiple field trials and studies have been conducted to evaluate the consequences of using reduced herbicide rates, and many reveal negative effects.

Drs. Paul Neve and Stephen Powles, demonstrated that by repeatedly using reduced herbicide rates, resistant weed populations increased more compared to when a full, recommended rate of the herbicide was used.

After only three generations of selection pressure with reduced rates of diclofop-methyl, rigid ryegrass biotypes were selected that were six to 50 times more resistant than the original, non-selected biotype. Both cross and multiple resistance to herbicides not included in the selection process were also observed (fluazifop-butyl, haloxyfop-R-methyl, sethoxydim, cethodim and imazethapyr).

Jonathan Gressel introduced the concept of creeping resistance as a result of using reduced herbicide rates. Creeping resistance refers to the incremental increase in tolerance of a weed population to a herbicide with each generation, eventually leading to resistance.

It has been suggested by Gressel that the phenomenon of creeping resistance comes about largely as a result of using reduced rates of a herbicide. Lower doses of herbicides applied to plants allows plants with minor genes for resistance to survive, which provides the genetic material for future herbicide-resistant biotypes. These lower rates may be attributed to deliberate rate-cutting, antagonistic mixtures, spraying of older or larger plants, spraying under stressful conditions or non-uniformity of application.

Best Management Practices to Delay Herbicide Resistance in Cereal Crops

• Use full, labeled herbicide rates
• Use multiple modes of action and alternate chemistries within each mode of action
• Use diverse crop rotations
• Use correct application timing
• Maintain accurate spray records from year to year

• Use multiple control tactics:
  – Sequential applications and/or tankmixtures of herbicides with different modes of action
  – Pre-plant burndown applications of Touchdown® and Gramoxone® brand herbicides and/or cultivation in the fallow portion of the crop rotation

For more information, talk to your Syngenta dealer, call the Syngenta Customer Center at 1-866-SYNGENTA (866-796-4368) or visit resistancefighter.com.