Ryegrass in Almond Orchards Found to be Glyphosate Resistant, A Management Perspective

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In 1996 in Australia, a weedy biotype of annual rye-grass (*Lolium rigidum*) survived labeled rates of glyphosate, the active ingredient in Roundup herbicide. After examination of thousands of samples, only four locations were confirmed as having the resistant population - indicating the phenomenon is not widespread. Monsanto and Charles Sturt University researchers embarked on a collaborative research project to better understand the mechanism of survival to glyphosate for this particular biotype of ryegrass. Results of these studies were presented by Dr. Jim Pratley, Professor of Weed Science at Charles Sturt University, at the Weed Science Society of America meeting in February, 1999. Observations include that the resistant ryegrass is easily controlled by tillage or other herbicides and the resistance is caused by a complex inheritance pattern, unlikely to occur across a wide range of other species. It is worth mentioning that glyphosate remains an effective weed management tool in the areas where this resistant population was identified, for control of most weed species.

Monsanto is also working in cooperation with Professor Dave Bayer, University of California, to investigate additional reports of resistant ryegrass in northern California. Similar to the Australian locations, these fields are small and isolated. Investigations appear to begin at the point of irrigation and move into the orchards a short distance becoming less dense as distance from the source increases. Again, the use of mowing and other herbicides have been very effective in managing the ryegrass. For the affected almond orchards residual weed control programs recommend Surflan (2-4 pounds ai/A) tank mixed with Roundup ULTRA (0.75-1.0 pounds ae or 2-3 pints/acre) when emerged weeds are present. The minimum application volume for Surflan is 20 gallons per acre, therefore nonionic surfactant (0.5% of spray volume) is also recommended.

For residual free programs (also ryegrass escapes), a Roundup/Poast (sethoxydim) tank-mix is recommended. Fourth quarter tank mix rates are 0.75 pounds ae or 2 pints/Acre Roundup Ultra and 0.2 pounds ai or 1 pint/acre Poast. After January 1, we recommend 1.0 pound ae or 3 pints/acre Roundup Ultra and 0.4 pounds ai or 2 pints/acre Poast. Crop oil concentrate (0.25% of spray volume) is recommended with this tank-mix.

Middles are maintained mechanically (mowing) to prevent seed production.

Despite generating a large amount of information, the exact biochemical nature of the resistance has yet to be determined. None of the traditional resistance mechanisms (uptake of herbicide, translocation of herbicide in the plant, glyphosate breakdown in the plant, or altered biochemical site of action) have shown to be responsible for the resistance. Current hypothesis is that the resistance mechanism is more complex than that observed for most resistances.
Monsanto’s current position on resistance is that resistance to glyphosate is a rare event, far less frequent in occurrence and breadth than other herbicides. However, Monsanto does recommend that growers follow the following guidelines in developing weed management strategies:

Use good cultural and sanitary practices

- clean off equipment when leaving every field
- use only certified seed in annual cropping systems or cover crops
- use appropriate crop, tillage, cultural practice rotation to manage weed
- spectrum and competitive ability
- mow/spray non-crop vegetation to prevent seed production
- use label recommended rates
- avoid mixtures recommending glyphosate at below label rates

Report any incidence of repeated Roundup non-performance on a particular weed to your PCA and local Monsanto Representative

References


