

GLYPHOSATE RESISTANCE IN HORSEWEED (*CONYZA CANADENSIS*) FROM A WESTERN KENTUCKY FARM. C.B. Rogers. Department of Agricultural and Human Sciences, Morehead State University, Morehead, KY 40351.

ABSTRACT

Horseweeds suspected of being resistant to glyphosate were first noted in a farm field in Logan County, Kentucky during the summer of 2000. The farmer brought these horseweeds to my attention when he was not getting proper kill after application of 1 quart/A of glyphosate (Roundup Ultra®). Subsequently the farmer applied another 2 quarts/A. of glyphosate and still did not get control. At this time, I suspected resistance and soon thereafter began seeing VanGessel's reports of resistance in Delaware. In the summer of 2001 spots of horseweed that did not respond to glyphosate were found in adjacent fields on the same farm. Four horseweed plants (coded RS1 – RS4) were selected at random from one of these spots and transferred to pots in the greenhouse at Morehead State University. These plants were allowed to flower and seed were collected from these plants. The seed from each plant were kept separate. Seeds were also collected from plants native to the Morehead, KY area and which were known not to have been exposed to glyphosate and were not suspected of glyphosate resistance (one composite sample, coded NS).

During late winter of 2002 seeds from the suspected resistant selections and from the non-suspect plants were germinated in ½ inch square plugs of potting media in plug flats in the greenhouse mist room. When the plants were at approximately the 4-leaf stage they were transplanted into 2 inch x 2 inch disposable pots. By mid-April the plants were 2 to 3 inches in diameter and were ready for treatment. Three pots of each selection (NS, RS1, RS2, RS3, RS4) were placed in open-bottomed flats and sprayed with glyphosate (Roundup Ultra Max®; 5lb. ai./gal.) using a CO₂-pressurized backpack sprayer to deliver 20 GPA spray volume. The herbicide rates used were 0, 1, 2, 4, 8, and 16 quarts/A. The plants were then returned to the greenhouse for observation and data collection. Data was collected over a period of 3 months and then selected plants were transferred to larger pots and allowed to continue growth.

There was little, if any, injury noted at 3 days after treatment (DAT) for all herbicide rates except 16 quarts/A where some of the horseweed plants exhibited symptoms similar to surfactant burn. It was most pronounced on the NS plants. At 7 DAT there were prominent injury symptoms on NS plants at all glyphosate rates other than the check (0) rate with the 16-quart rate showing severe leaf desiccation. There were some minor changes visible on the RS plants. By 10 DAT there were obvious injury symptoms present on the plants suspected of resistance with the severity of injury increasing with increasing herbicide rates. At 17 DAT NS plants were dead at all rates above 1 quart and nearly dead at the 1 quart/A rate. RS plants treated at 2 and 4 quart/A rates appeared to stabilize, and most plants in the 8 and 16-quart treatments were dead or nearly dead. Observations at 21 DAT showed all non-resistant type plants were dead except in the check (0) flat and all plants appeared dead in the 8 and 16-quart flats. At 25 DAT the resistant horseweed plants were beginning to show regrowth at the 1, 2, and 4-quart rates with progressively smaller regrowth at the higher rates. At 32 DAT one RS type plant in the 8-quart/A treatment began showing regrowth (had previously been thought to be dead). Regrowth soon began to look like normal plant growth but was slower at higher treatment rates. At 73 DAT representative plants were selected from each type and rate surviving and transplanted to larger pots. There were no detectable differences in any of the 4 selections of resistant type plants. All plants (including the 8-quart/A survivor) had flowered by early November and produced seed.

Glyphosate did cause some degree of injury to all treated plants. A few of the Suspected Resistant plants were killed at rates below 8 quarts/A but most of them recovered and produced seed. The 16-quart rate of glyphosate killed all plants. These horseweeds appear to be resistant to glyphosate at rates well above normal use rates but extreme rates killed them.