Annual Bluegrass Resistance to Dinitroaniline Herbicides Identified

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In a previous issue of Turfax, we discussed the mechanisms of herbicide resistance in weed populations. To summarize, herbicides do not cause genetic changes in plants that trigger resistance. Continuous use of the same herbicide, family of herbicides, or herbicides with the same mode-of-action selects for a weed population that has resistance to the herbicide. For instance, for a weed population to become resistant to an herbicide, there must be at least one plant in the original population that has the genetic make up to be resistant to that herbicide. This is why herbicide resistance never occurs in some weed populations with some herbicides; the naturally occurring plants that have genetic resistance do not exist in the wild population. Therefore, it can be stated that the development of herbicide resistance is an evolutionary process that is a result of selection pressure exerted by an herbicide.

In recent years on golf courses in North Carolina and Mississippi, annual bluegrass (*Poa annua*) resistance to triazine herbicides has been identified. However, these are not the first cases of resistance identified with triazines and annual bluegrass. Triazine-resistance in annual bluegrass was first identified in France in 1975 on a highway roadside. However, a case of annual bluegrass resistance to dinitroaniline herbicides has not previously been identified. Recently, in North Carolina, we **identified the first case of annual bluegrass resistance to dinitroanilines.** The following is an example of what happened on this golf course and the herbicide program for annual bluegrass control.

The golf course was constructed and grow-in was completed in 1990. An herbicide program for annual bluegrass control of the winter-annual biotype was initiated in the autumn of 1991, and proceeded until herbicide resistance was identified in 1998.

Starting in 1996, the golf course superintendent at this site noticed control from his herbicide program was starting to deteriorate. In the autumn of 1997 and the spring of 1998, control from Barricade was very poor. It should be noted that annual bluegrass control of the annual biotypes of *Poa annua* is very good with Barricade. Samples were taken from the annual bluegrass population and appropriate greenhouse and laboratory tests identified resistance as the reason for poor control.

It should also be noted that in this case, **herbicide resistance developed to a group of herbicides with a similar mode-of-action.** Simply rotating herbicides with the same mode-of-action will not break the resistance cycle. Dimension is not a dinitroaniline herbicide, but the mode-of-action is the same as that of dinitroanilines. Therefore, Dimension will not break the resistance cycle.

Rotating herbicides with a different mode-of-action is the only way to prevent herbicide resistance from developing. Annual bluegrass is a species that is known to have many different biotypes, which indicates genetic diversity. It should be expected that annual bluegrass populations have the genetic make up to be resistant to many different herbicide modes-of-action. With annual bluegrass management, rotating herbicides with different modes-of-action will be important in preventing the development of herbicide resistance.

Year	Herbicide	Herbicide Family	Herbicide Mode of Action
1991	Dimension	pyridine	mitotic inhibitor
1992	Dimension	pyridine	mitotic inhibitor
1993	Surflan	dinitroaniline	mitotic inhibitor
1994	Surflan	dinitroaniline	mitotic inhibitor
1995	Team	dinitroaniline	mitotic inhibitor
1996	Team	dinitroaniline	mitotic inhibitor
1997	Barricade	dinitroaniline	mitotic inhibitor

The Amazing Grass Plant

The grasses (*Poaceae* plant family) are the most ubiquitous of the higher plant groups found on this earth. With an estimated 600 genera and 7,500 species, the *Poaceae* ranks third in number of genera among families of flowering plants. With respect to completeness of representation in all regions of the world and to percentage of the total world's vegetation, grasses surpass all other genera. Grasses are one of the first permanent vegetations to reappear after disasters, such as volcanic activity, extended droughts, floods, fires, explosions, abandoned urban ghettos, and battlefields. Without the forgiveness of grasses, many ill-advised construction excavations and agricultural activities would have had far more disastrous effects on our vital natural resource—the earth's surface soil mantle.

To humans, grasses are the most important of all plants. The cereal grains and corn—all members of the grass family—serve as food for humans and animals. A host of grazing ruminant animals use grasses for their major food source as forage, pasture, and prepared feeds. Bamboo, a grass, is a major building

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