

Pesticide Mode of Action and Resistance Management

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The resistance of certain pests (insects, diseases, and weeds) to the pesticides normally used to control them has left some applicators scratching their heads and wondering how they will control these pests in the future. One of the most vital aspects of any resistance management program is the comprehension of pesticide mode of action (MOA) and its implications in resistance management.

Each chemical used to control pests has a certain method by which it kills, destroys, or mitigates the target pest. Some pesticides have incredibly specific biochemical pathways upon which they act while others have broader biological activity. Most instances of resistance have arisen due to an over-reliance upon pesticides with certain modes of action.

For many years scientists in each respective discipline (entomology, plant pathology, weed science) have grouped or classified the various pesticides according to their mode of action. For example, the sulfonylurea and imidazolinone herbicide families share the same mode of action known as ALS (acetolactate synthase) inhibition. Because these herbicides share the same MOA, a weed that has developed resistance to ALS inhibitors will likely not be controlled by any herbicide that is a member of either family, even though there may be numerous different products sold within each family.

This exemplifies the importance of producers and applicators understanding the principle of MOA rotation when applying pesticides. The most common mistake made by applicators is to assume that changing products will help manage resistance. In reality, changing products might not accomplish anything if the MOA is the same for both products.

How can applicators discover the MOA?

In the last several years, many chemical companies have started displaying the MOA for products prominently on the product label. It seems that this is a much more common practice for agricultural pesticides as compared to those marketed to the urban sector. If the MOA is not listed on the product label there are discipline-specific websites that provide MOA information for the majority of products on the market. For example, the label for the herbicide Roundup PowerMax™ prominently displays this image



The Group 9 Herbicide designation alerts the user that this herbicide belongs to the WSSA herbicide MOA grouping for inhibition of EPSP synthase.

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