FEATURE ARTICLE

The Effects of Drought on Weed Control with Postemergence Herbicides

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The effectiveness of postemergence herbicides can vary widely depending on a variety of conditions that exist at application. Of course, application rates, spray volumes, size of weeds, and application accuracy and precision are all very important for controlling weeds with postemergence herbicides. However, **a very important aspect of control involves weather conditions around the time of application.** In particular, the physiological growth state of the weeds that are the target of control measures is extremely important. **Weeds that are actively growing are much easier to control than those that are not actively growing.**

What are the conditions that lead to actively growing weeds? There are several, but none are more important that soil moisture. **Drought-stressed plants (weeds) are extremely difficult to kill with postemergence herbicides.** This is because of the effect a lack of water has on the leaf cuticle. Before this relationship is discussed, it is important to understand what the leaf cuticle is and its importance in herbicide uptake.

The leaf cuticle is the outermost layer of all aerial plant parts. It is composed of a complex layer of waxes and the outermost coating of the cuticle is called the epicuticular wax. The cuticle prevents excess water loss from transpiration and provides plants some protection against a variety of things including insects and diseases. This waxy cuticular layer is hydrophobic, which essentially means that it repels water. The best analogy of how water interacts with the cuticle of plants is when wax or polish is applied to a vehicle. When wax is applied to a vehicle, water is repelled due to an increase in surface tension. This is exactly what happens when a spray solution is applied to a leaf surface. Further, the thicker this waxy cuticle is, the more surface tension exists and the more water is repelled.

Leaves that develop under conditions of low soil moisture tend to develop a thicker epicuticular wax than those that develop under high soil moisture. Why is this important to control with postemergence herbicides? Because all postemergence herbicides must be absorbed through this cuticle. **The thicker the cuticle, the more difficult penetration of herbicides becomes.** Less penetration and absorption into the leaf translates into reduced herbicide performance (reduced control).

It is also noteworthy to comment on the roll of stomata in herbicide uptake. The primary roll of stomata in plant growth involves gas exchange and evapotranspiration (plant cooling). In addition, the location of stomata is primarily on the lower leaf surface, although some can be found on the upper surface and there is species-to-species variation in their distribution. But the important point is **stomata have an insignificant roll in the uptake of herbicides. Postemergence herbicides are primarily absorbed through tiny cracks in the leaf cuticle.** And a cuticle that is thin is more easily penetrated than a thick cuticle.

In summary, postemergence herbicide performance will be reduced when applied to drought-stressed plants. This can be alleviated to a significant degree by watering a couple of days prior to application of herbicides if a drought condition exists.

About Fairy Rings...

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amounts of nitrogen at the appropriate time of year to help mask fairy rings. Fairy rings, however, can be stimulated by excessive nitrogen or organic matter.

Fungicides are sometimes effective in suppressing Type 1 fairy rings. Aerification followed by drenching with either Bayleton® (triadimefon), Heritage® (azoxystrobin), or ProStar® (flutalonil) have been shown to suppress, but not necessarily eliminate, some fairy rings. A fungicide should be tank-mixed with a wetting agent and watered-in as deeply as possible. For best results, affected sites should be aerified (or at least spiked if core aeration is not an option) and pre-irrigated to moisten soil, thus improving movement of the fungicide and wetting agent into the soil. **Fungicide-wetting agent combinations should be applied in large amounts of water (i.e., 150 gal water per acre; 1,400 L/ha) and watered-in as deeply as possible on a 4-week interval or whenever drought symptoms recur.**