

Keeping Landscapes Weed-Free

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Weeds are arguably the most common pest problem in landscape management. Almost everyone can spot a weed—especially when it's chickweed sticking out like a sore thumb in a stand of dormant bermudagrass in March.

Weed scientists agree that air temperature impacts how well an herbicide works. Herbicides work best when both weeds and plants are actively growing. Herbicides generally don't work as well as when applied during warm temperatures, with a few exceptions. Ideal temperatures for applying most post emergent herbicides are between 65 and 85F (18 and 29C). Herbicides will still kill weeds when applied below 65F, just maybe a bit slower. This is due to a few factors.

First of all, plants' growth and metabolism slow dramatically in cool weather, which lessens herbicide absorption and translocation within the plant. Translocation of a systemic herbicide within a weed simply slows down during cooler temperatures. The amount of translocation lessens as well. Once absorbed, systemic herbicides, in particular, must be translocated from the point of contact or entry (usually leaves or roots) to a specific, targeted site of action in the weed's growing points. Herbicides work by inhibiting a metabolic process necessary for the weed to grow. For example, glyphosate works by stopping production of a plant enzyme necessary for the synthesis of key amino acids. Without this enzyme, plants cannot grow. Therefore, a weed must be actively growing for an herbicide to work.

Secondly, certain physiological changes occur in plants in response to cool temperatures. For example, the waxy cuticle layer coating plant leaves gets thicker and changes in viscosity. Think of the waxy cuticle as being kind of like butter—it becomes softer and more fluid during warm temperatures, allowing herbicide penetration (and, therefore, faster control). However, during cooler temperatures, the wax layer hardens and thickens, which limits herbicide penetration (and ultimately slows control). The hardened wax layer also creates a hydrophobic environment, which decreases an herbicide's leaf-wetting capability. Cellular membranes behave this way as well.

When to spray?

So it would seem that the easiest solution would be to delay herbicide applications until more favorable temperatures are prevalent. However, delays in applications can create other problems in the green industry.

Landscape managers face the challenge of scheduling a variety of activities and, as a consequence, can struggle to stay ahead of spring weed control. Often the first herbicide application is timed in conjunction with mulch laying, creating a labor bottleneck. One strategy to overcome this is to move herbicide applications from high labor demand during springtime to typically less-busy periods, such as late fall/early winter or late winter. This leads landscape managers to ask: "Do herbicides still work when applied in cool temperatures?"

"In an already tight labor market, the importance of keeping up with the latest weed control research strategies regarding timing and efficacy of applications cannot be taken for granted by today's landscape manager. In my role, I am very interested in the effects of temperature on weed control strategies, so that I can spread the traditional seasonal workload across 12 months in an attempt to retain more personnel year-round while improving quality and reducing potential overtime costs," says Joe Ketterer, Director of Quality and Efficiency with Ruppert Landscape.

What to spray?

Herbicide formulation merits a mention in this discussion as well because it may overcome some of the above-mentioned impediments. Ester formulations, as opposed to amines, are more soluble in the plant cuticle—which means it has a better chance of breaching a fortified wax layer—and are more easily absorbed by plants. Combining a contact herbicide (such as carfentrazone or sulfentrazone) with a systemic (such as 2,4-D or dicamba) is another tactic to increase weed control.

Dr. Jeff Derr, Virginia Tech University, conducted a series of experiments that accounted for these variables. He assessed the impact of temperature on herbicide efficacy against winter annuals (ivyleaf speedwell, henbit, common chickweed and purple deadnettle) in turfgrass (both cool and warm-season varieties). Contact and systemic herbicide activity was compared alone and in premix combinations, and both ester and amine formulations were included. The following products were tested:

- Surge** (sulfentrazone + 2,4-D, amine + MCPP + dicamba)
- QuickSilver** (carfentrazone)
- SpeedZone Southern** (carfentrazone + 2,4-D, ester + MCPP + dicamba)
- PowerZone** (carfentrazone + MCPA, ester + MCPP + dicamba)
- SpeedZone** (carfentrazone + 2,4-D, ester + MCPP + dicamba)
- Trimec Classic** (2,4-D, amine + MCPP + dicamba)

These study results prove informative and useful for landscape managers. "Control of winter weeds is an important concern for lawn care companies, golf course superintendents, sports turf managers and others maintaining landscape areas. A concern in winter is the impact of colder air temperatures on the effectiveness of herbicides used for controlling emerged broadleaf weeds. Unless weeds need to be controlled very quickly, landscape managers have a wider window of opportunity to spray post-emergence broadleaf herbicides than previously thought," said Dr. Derr.

Using a combination of contact and systemic herbicides, whether a custom tankmix blend or a premix product, increases the chances of winter annual weed control. Products containing carfentrazone (a contact) premixed with a systemic herbicide(s) controlled weeds better than a systemic applied alone. However, premix products in this study contained ester formulations, which also could explain the enhanced performance.

Following with results from previous researchers, Dr. Derr concluded that temperature did indeed affect herbicide activity. Overall, herbicide applications made during warmer temperatures (65F), injured weeds faster than when made during cooler temperatures (45F). However, within three weeks after application, weed control was the same, regardless of whether applications were made during warm or cool temperatures.

If a landscape manager opts to prioritize speed of weed control, according to their customers' preference, then herbicide applications should be made in warmer weather conditions. On the other hand, if time management is a higher priority, herbicides can be applied during cooler weather, when more labor may be available. Selecting ester formulations and combining a contact with systemic(s) products may ensure greater success during cooler temperature applications. **GT**

This research was reported in the Journal of Environmental Horticulture (JEH), the journal of the Horticultural Research Institute to promote and communicate environmental horticulture research. JEH is the only peer-reviewed, scientific journal dedicated to the green industry and serves as the outlet for research pertinent to our industry and recently underwent revisions designed to increase accessibility.

For more information, please read the article in full online at hrijournal.org: 2016. Derr, J. and T. Serensits. Impact of application temperature on broadleaf herbicide efficacy. Journal of Environmental Horticulture. 34(4):123-130.

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