


# CUTT

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## New Strategies for Broadleaf Weed Management

**T**here is an increasing array of herbicides on the market for postemergence broadleaf weed control. Enhancing the overall spectrum of broadleaf weed control, these new products feature new active ingredients and possibilities for combinations. To adequately manage weeds in commercial turf settings, the ability to selectively remove broadleaf weeds from turfgrasses is of critical importance. Although broadleaf herbicides have been available since the 1940's when 2,4-D first came on the market, and the phenoxy herbicides are still the most widely used for turfgrass weed management, new formulations and products will help provide the chemical tools for future weed control. 

### Formulations

Besides the active ingredients, product efficacy also depends on formulation and the environmental conditions at the time of application. Herbicides are available in a wide variety of formulations including liquids, powders, emulsifiable concentrates, dissolvable granules, and granular forms. Most commercial applicators and turfgrass managers prefer to use liquid applications as they are considered to be most effective and faster acting. However, granular formulations are now widely available for many herbicides and with new formulations, are faster acting and more available for uptake by foliage. In addition, for some operations, they can be easier to handle and apply; for example in landscape beds or large areas for application.

Certain formulations also differ in volatility and ability to be absorbed by foliage of broadleaf weeds. Ester formulations are more volatile than salt formulations of 2,4-D or phenoxy products and tend to penetrate foliage more quickly. Due to their volatility, especially under warm conditions, these esters often put nearby ornamentals at risk; therefore many companies have developed LV or lower volatility ester formulations. Granular products can also occasionally volatilize if not watered in shortly after application. In any case, if a large rainfall is predicted, it would be better to postpone application until the chance of imminent rainfall has passed. If droughty conditions are experienced, uptake and translocation of

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*Concern about the potential for cancer and lymphoma, which may be linked with repeated applications of 2, 4 D, has resulted in greater interest in new chemistries for broadleaf control.*

*However, the application of dicamba at high concentrations can be a real problem around well-established ornamentals in that penetration into the rooting zone of trees and shrubs can result in death and injury of expensive ornamental plantings.*

postemergent products is often limited. Timely irrigation before application may be helpful to ensure adequate uptake.

### Active Ingredients

Many postemergent broadleaf herbicide products contain two or more active ingredients to enhance the overall spectrum of weeds controlled by the product. Most of these products contain two or more of the following active ingredients: 2,4-D, dichlorprop, MCPA, MCPP, dicamba, triclopyr, and clopyralid. All of these herbicides are considered to have growth regulatory effects, meaning that they act as synthetic auxins or growth regulators when taken up by the plant, resulting in overstimulation of growth, and twisting or deformation of foliage. This 'epinasty' or deformation eventually results in the death of the plant as the vascular system is destroyed (see photo below).

Although these phenoxy herbicides have a similar mode of action in the plant, their effectiveness on broadleaves varies depending on the ability of some weeds to metabolize the particular phenoxy herbicide before killing the plant. Many of you are familiar with this problem, when applying 2,4-D-containing products to turfgrasses infested with deeply rooted weeds such as broadleaf plantain, perennial buttercups or thistles, which can often effectively metabolize these herbicides. Concern about the potential for cancer and lymphoma, which may be

linked with repeated applications of 2, 4 D, has resulted in greater interest in new chemistries for broadleaf control.

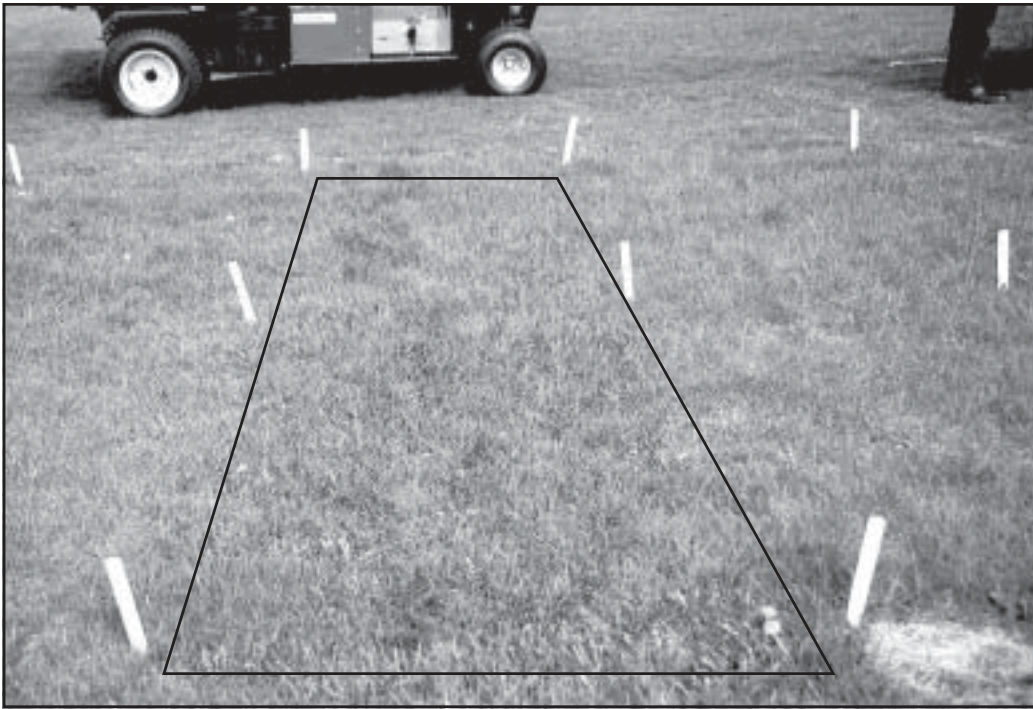
Within 2,4-D-product mixtures, one often finds MCPA and MCPP, both phenoxy acid herbicides. They are combined with 2, 4 D because they are active on clovers and chickweeds in particular, and enhance the weed control spectrum of 2, 4 D. Dicamba is a benzoic acid herbicide with a similar growth regulator type mode of action. It is active upon many broadleaf weeds, including summer annuals such as knotweed, spurge and purslane, and also certain perennials including plantains and ground ivy. Many of these 3-way product formulations have small percentages of dicamba and do not completely control ground ivy or other perennials which require higher concentrations of dicamba for complete management. However, the application of dicamba at high concentrations can be a real problem around well-established ornamentals in that penetration into the rooting zone of trees and shrubs can result in death and injury of expensive ornamental plantings.

### Triclopyr and Clopyralid

Triclopyr and clopyralid—and combinations containing these products—have been labeled for use in turf in New York over the past few years. Both these herbicides are classified as pyridinoxy acids and control many weeds that 2, 4 D and other phenoxy herbicides do not ef-

*Epinastic growth (curling) typical of injury by phenoxy-based herbicide.*





2,4-D and triclopyr activity on ground ivy applied at full bloom.

fectively manage. Triclopyr is effective on oxalis, ground ivy and small-seeded legumes and is often sold in combination with 2, 4 D, MCPA or clopyralid. Triclopyr can be safely applied to both warm and cool season grasses at low rates, but should be carefully applied on bentgrass and warm season grasses at higher rates as injury will result.

Clopyralid will provide good control of such weeds as clover, thistle, pineapple weed, perennial buttercups, and dandelions. Clopyralid and products containing clopyralid, such as Confront and Millenium, can be a problem when considering residual activity of the herbicide in mulches and manures. Because of this problem, clopyralid is no longer available for use in residential lawns. After the herbicide is applied to lawns or pasture, it can wind up in clippings or in animal manure that may be further composted.

Due to the persistence of the herbicide, which does not break down as rapidly in the composting process as expected, the herbicide can remain active in the compost for up to 18 months, leading to unexpected toxicity when compost is applied to ornamentals or garden plants. This problem has been observed in Washington, California and a few other states in the US applying municipal compost to gardens. Due to these concerns, Dow has been working with our research team and others across the US to study the activity and development of fluroxapyr as a clopyralid replace-

ment in turf and ornamentals. This product may well be labeled in NY in the near future.

### Other Products

Other products that were recently labeled for turf use in NY include metsulfuron (Escort) and chlorsulfuron (Lesco TFC), both initially manufactured by DuPont but now reintroduced by Riverdale as Manor and Corsair. In NY, metsulfuron (Escort) can only be used on industrial turf for control of broadleaf weeds. Both metsulfuron and chlorsulfuron belong to the sulfonyleurea family of herbicides, which have extremely low toxicity to animals but are highly toxic to susceptible weeds at very low rates.

These products control establishments of wild garlic, onions, ryegrass, tall fescue, and other undesirable grasses as well as numerous broadleaf weeds. They are often spot applied to remove these infestations and in the southern US metsulfuron tends to be widely used for weed management in warm season turfs due to the tolerance St. Augustine grass exhibits with this herbicide. Unfortunately, repeated applications of both metsulfuron and chlorsulfuron, when used in other cropping systems, have resulted in the appearance of sulfonyleurea resistant weeds.

### Carfentrazone

Of great interest to NY turf managers has been the recent introduction and labeling of the  
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# Broadleaf Weed Management

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carfentrazone-based products. Carfentrazone (also known as Quicksilver) has been produced and used for weed management in cereal crops in Europe and in combination with other herbicides for use along utility lines and rights of way. FMC is now marketing this product for use alone in warm and cool season turfgrasses for broadleaf weed management, and Riverdale is marketing it in combination with other products (including 2,4-D, MCPA, MCPP and dicamba).

Carfentrazone applications result in rapid weed control, with results often seen within hours after application. Complete control of certain perennials was noted in up to 7 days after application. Speed Zone and Power Zone are two new products which contain carfentrazone plus MCPA, MCPP, and dicamba or 2,4-D, MCPP and dicamba, respectively. Both of these products are marketed by Riverdale and enhance the spectrum of activity of carfentrazone for broadleaf weed management. These products excel in cool weather control so applications can be made in early spring and the products are rain-fast in as little as 3 hours after application.

Power Zone is particularly effective at controlling clover, dandelion, ground ivy, and spurge in turfgrass. Carfentrazone is remarkable in that it is particularly fast acting, non persistent in the soil, and apparently not associated with the development of any herbicide resistance to date. Upcoming formulations of carfentrazone may include combinations with newer chemistry such as clopyralid and fluroxapyr. We are currently working with both FMC and Dow to evaluate these product combinations for greatest efficacy. It has been reported that carfentrazone plus phenoxy-product combinations may exhibit additive or synergistic effects when combined in comparison to each product applied separately. We are currently evaluating these mixtures to determine if this is a possibility.

This fall I will be releasing a new website for weed management in turf and ornamentals which will contain articles, references, many photographs, and web-based publications which describe the latest in both chemical and alternative forms of weed management. Hopefully you will find this tool helpful to logically select an effective weed management program for your landscape setting.

*Leslie A. Weston, Ph.D.*

Product	Mode of action	Soil persistence	Rapidity of control
2,4-D	growth regulator	limited	moderate
dicamba	growth regulator	moderate	moderate
triclopyr	growth regulator	moderate	rapid
clopyralid	growth regulator	long	rapid
metsulfuron	inhibitor of branched chain amino acids	long	moderate
chlorosulfuron	inhibitor of branched chain amino acids	long	moderate
carfentrazone	PPO inhibitor	none	very rapid

# Preventing Compaction

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ognizing that a dense turf absorbs and dissipates much of the compactive forces. Most importantly, manage the traffic by regularly moving the cups and tee markers, and scatter golf cart traffic. Consider moving them more than once a day if heavy traffic is expected with non-tournament play. Communicate these issues with

architects and golf professionals so that they understand the importance of dispersing traffic by providing large tee areas and copious amounts of cupping space. In the end, the Tiger Effect equals compaction that must be tamed!

*Frank S. Rossi, Ph.D.*

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