

# Managing Weeds in New York Vineyards

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GRAPE FACTS

## III. Pre-Emergence Herbicides

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Several pre-emergence herbicides are registered for vineyard use. Current recommendations for their use are given in Cornell Cooperative Extension *Pest Management Recommendations for Grapes*. Pre-emergence herbicides are applied before weed growth begins and kills germinating seeds. This Fact Sheet documents facts about all pre-emergence herbicides which may be used in New York vineyards. Information about usage restrictions is summarized in Table 1 and Table 2 lists information about persistence and soil behavior. (See Fact Sheets 1 and 2 for general information regarding weed management in vineyards and about chemical control of vineyard weeds. Fact Sheet 4 contains information about post-emergence herbicides which may be used in New York vineyards.)

### *Diuron (Karmex)*

Diuron has been the most commonly used pre-emergence herbicide in New York since its registration in the late 1950's. Diuron is a broad spectrum herbicide which can control many of the annual grass and broadleaf weed species commonly found in New York vineyards. Many perennial weeds are suppressed by high rates of diuron, and may be controlled by annual applications. The primary common New York weeds that are not well controlled by diuron are the various plantain species. Plantains can easily be controlled by combining diuron with simazine to control plantain as it germinates, or with glyphosate to control existing weeds. While post-emergence application of diuron controls certain weeds, it is most effectively applied pre-emergence, or sometimes as a tank mix with a post-emergence herbicide.

The proper timing for diuron application is in the spring, just prior to germination and growth of annual weeds. Fall applications are not permitted by the label, nor are they effective. This is due to diuron's greater solubility compared to that of many of the other pre-emergence herbicides. Fall application increases the amount of time the herbicide is exposed

to water, and increases the likelihood that the herbicide will leach below the upper few inches of soil where most weed seeds germinate.

Several restrictions on age and soil type apply to vineyard use of diuron. The vineyard must be established at least three years. Diuron should not be used on sand, loamy sand, gravelly soils or exposed subsoils, or on any soil where organic matter is less than 1 per cent. On soils low in clay or organic matter (1-2%), the lower labeled rates are recommended. The label states that severe plant injury may result on soils low in clay or organic matter content (1-2%) if heavy rainfall or more than one inch of irrigation occurs soon after treatment. The user assumes the risk of vine injury under these conditions. In New York and Pennsylvania, higher rates can be applied once every four years, under conditions specified on the label, for perennial grass control. This use is somewhat outdated, as perennial grasses are presently more easily controlled by spot application by any one of several post-emergence systemic herbicides.

### *Simazine, Caliper 90 (Princep)*

Simazine is another herbicide that

has been a part of successful vineyard weed control practices for many years. While it has limited activity against annual grasses, it is effective in controlling broadleaf weeds. Full season control of annual grasses is not always obtained, particularly when soil pH is low. Following several years of continuous use of simazine or other triazine herbicides, resistant biotypes of some weeds have developed. These resistant biotypes can only be controlled with non-triazine herbicides.

Despite its weakness in providing season-long control of annual grasses, simazine is an important part of many successful weed control programs. When combined with diuron to control plantain germinating from seed or with other residual herbicides such as norflurazon and oryzalin, the spectrum of weeds controlled is increased.

Simazine may be applied any time between harvest and early spring. To avoid possible crop injury, the manufacturer does not allow application to vineyards established less than 3 years.

### *Norflurazon (Solicam)*

Norflurazon controls most annual grasses, some annual broadleaf weeds, and suppresses some perennial grasses such as quackgrass and orchardgrass. However, common annual broadleaf weeds, such as smartweed and pigweed, are not controlled by norflurazon. For this reason, it is usually combined with another residual herbicide to increase the spectrum of weed control. Norflurazon has low solubility and long residual activity as compared to many of the other pre-emergence herbicides. Because of its low solubility, several inches of rainfall are necessary to move the herbicide into the soil. Best results are from fall or early spring application.

Norflurazon can be applied in the fall or early spring, to vines established at least two years. According to the manufacturer's recommendations,

norflurazon can be tank mixed with diuron or simazine, but not with both. It is not recommended for grapes grown in sand or loamy sand soils with less than 1 per cent organic matter and pH greater than 7.5. Read the product label to determine the appropriate use rate which is dependent upon soil texture.

#### *Oryzalin (Surflan)*

Oryzalin controls many annual grasses and some annual broadleaf weeds. Common weed escapes include ragweed and mustards. Oryzalin is often combined with other herbicides to increase the spectrum of weeds controlled. One-half to one inch of rainfall is necessary to move oryzalin into the weed seed germination zone.

Oryzalin is very safe to vines under a wide range of conditions, and may be used in non-bearing vineyards, including newly planted vines. Oryzalin is not recommended for soils containing more than 5 per cent organic matter. As with other dinitroaniline herbicides, oryzalin becomes bound to organic matter. In our experience, oryzalin provides more effective weed control on soils that have been recently worked, than in established vineyard situations where a layer of organic matter from dead weeds has built up over a period of time.

#### *Pendimethalin (Prowl)*

Pendimethalin is chemically similar to oryzalin (dinitroaniline). The spectrum of weeds controlled with pendimethalin is similar to that of oryzalin, so ragweed and the mustards are common escape weeds.

Pendimethalin is currently registered only for non-bearing vineyards. It can be applied to newly planted vines after the ground has settled and when there are no cracks present, but only before grape buds begin to swell (only fully dormant applications are permitted).

#### *Trifluralin (Treflan)*

Trifluralin is a dinitroaniline herbicide that is applied prior to planting. Because it is volatile, incorporation within 24 hours of application is necessary. A second incorporation just prior to planting also is necessary. Because of the necessity for two incorporations, trifluralin use has largely been replaced by a

glyphosate application in the year prior to planting to control existing perennial weeds, coupled with an application of residual herbicide after planting. When it is sub-layered, trifluralin will control or suppress field bindweed (*Convolvulus arvensis*)

#### *Metolachlor (Dual)*

While metolachlor controls a few annual broadleaf weeds, it is primarily used to control annual grasses. It is usually applied in combination with another residual herbicide in order to gain better control of annual broadleaf weeds. Metolachlor is very effective in controlling yellow nutsedge which can present a serious weed problem in new vineyards.

Metolachlor is currently registered only for non-bearing vineyards and cannot be applied to vines that will bear harvestable fruit within one year of application. It may be applied to vines established at least 30 days, but only after depressions around the vines have settled.

#### *Napropamide (Devrinol)*

The spectrum of weeds controlled by napropamide is similar to that of the dinitroanilines, meaning that ragweed and mustards are poorly controlled. Because it is susceptible to photodecomposition (decomposition due to light exposure), it must be incorporated by rainfall or irrigation soon after application. For this reason, and because it is relatively expensive, napropamide is seldom used in New York vineyards.

Napropamide is a very safe herbicide, and can be applied to newly planted vineyards. There are no soil type restrictions for its use.

#### *Oxyfluorfen (Goal)*

Oxyfluorfen primarily controls annual broadleaf weeds, and therefore, it should generally be combined with another residual herbicide to obtain annual grass control. It controls weeds at the surface as they emerge from the soil, and for this reason should not be incorporated or cultivated for the length of time that control is expected.

While oxyfluorfen has some post-emergence activity, it must be applied prior to bud swell. Because of this, it is generally used as a pre-emergence herbi-

cide in vineyards. Oxyfluorfen is not registered for use on vines established less than three years, unless the vines are on a trellis wire at least 3 feet above the soil surface.

#### *Dichlobenil (Casoron)*

Dichlobenil is unusual among pre-emergence herbicides in that it controls many perennial as well as annual grasses and broadleaf weeds. Because it is a highly volatile compound, and the granular formulation, which is most commonly used, cannot be applied by traditional equipment and because it is expensive relative to other herbicides labeled for vineyard use, dichlobenil is rarely used in New York vineyards. A wettable powder formulation is made which may be useful to manage difficult-to-control perennials.

For perennial weed control, dichlobenil can only be applied between November 15 and February 15, but it can be applied in early spring before seed germination to control annual weeds. Incorporation by rainfall is needed before temperatures rise above 55 F. Dichlobenil is labeled for bearing and non-bearing vineyards; however, it should not be applied within four weeks of transplanting vines.

#### *Pronamide (Kerb)*

Pronamide provides pre-emergence control of some annual grasses and broadleaf weeds, as well as giving early post-emergence control of some winter annuals and perennial grasses. Because it degrades at soil temperatures above 55° F, pronamide will generally not provide season-long weed control. In vineyards, a late fall application is most useful for controlling established perennial grasses. Perennial grass control, however, is often more cost effective with other systemic post-emergence materials.

Pronamide kills sensitive weeds through root uptake. It is relatively safe for vineyard use, and can be applied six months after spring planting of vines. *Pronamide is a restricted use pesticide that can only be purchased or applied by certified pesticide applicators. It is a dangerous poison that can be harmful to skin and eyes, and can be fatal if swallowed, inhaled, or if absorbed through skin.*

Table 1.—Recommendations and Restrictions for Pre-emergence Herbicides used in New York Vineyards.

Trade Name	Common Name	Usage	Soil Types Restrictions	Vine Age Restrictions	Weeds Controlled	Weeds NOT Controlled
Princep, Caliper 90	simazine	Preemergence only controls seedlings as they emerge.	Do not use on gravelly or sandy or loamy sands.	Only vines established for 3 years or more.	Many broadleaf weeds from seed.	Only fair on annual grasses & poor on perennial weeds at usage rates.
Karmex	diuron	Preemergence with some post activity <i>Risk for vine damage if &gt;1" rain occurs soon after application.</i>	Do not use on soils with <1-2% O.M. or low in clay.	Vines established for 3 years or more.	Many broadleaf weeds from seed, some annual grasses.	Only fair on annual grasses & poor on perennial weeds at usage rates.
Surflan	oryzalin	Preemergence only	No soil texture restrictions for NY soils.	No vine age restrictions.	Annual grasses, some small seeded broadleaf weeds	Perennial weeds, large seeded broad leaf weeds
Prowl	pendimethalin	Preemergence only, rainfall within 7 days to activate: Apply prior to bud swell.	No soil texture restrictions applicable for NY.	Non-bearing only, newly transplanted & 1 year established	Annual grasses, some small seeded broadleaf weeds	Perennial weeds, large seeded broad leaf weeds
Treflan	trifluralin	Preemergence only (used in CA for bindweed control with a subsurface layerer).	No soil texture restrictions applicable for NY.	For new plantings: incorporate 1-2" prior to planting. For established vines: direct spray & incorporate.	Annual grasses, some small seeded broadleaf weeds	Perennial weeds, large seeded broad leaf weeds
Devrinol	napropamide	Preemergence only needs irrigation or rain within 2 days for best control.	No soil texture restrictions applicable for NY.	Newly planted or established crop	Annual grasses, some small seeded broadleaf weeds including groundsel	Established weeds, perennial weeds
Dual	metolachlor	Preemergence only needs irrigation or rain within 2 days for best control.	Use lower rates on coarse soils with low O.M.	Non-bearing only. Thirty days after transplant til 12 months before 1st harvest.	Annual grasses, some annual Broad weeds, yellow nutsedge	Established weeds, perennial weeds other than nutsedge
Solicam	norflurazon	Preemergence only must be rainfall in 4 weeks so it moves into weed zone.	Not for grapes grown in sand or loamy sands with <1% organic matter and pH>7.5.	Vines established for 2 years or more	Annual grasses & broad leaf weeds suppressed; nutsedge & a few other perennials	Perennial weed suppression, may not provide full season control
Goal	oxyfluorfen	Preemergence with some early post activity	No soil texture restrictions applicable for NY.	Three year established (younger vines when on a trellis wire $\geq$ 3 feet above soil)	Many biennial & annual broad leaf weeds including pepperweed.	No systemic control of perennials; weak control of annual grasses.
Casoron	dichlobenil	Preemergence but absorbed by shallow rooted weeds needs water to incorporate	Do not use on fine sand.	Four weeks after planting - established bearing crop	Annual broad leaf & grasses some perennial weeds	At usage rates, only early suppression of nutsedge.
Kerb <sup>†</sup>	pronamide <sup>†</sup>	Pre&postemergence apply to trash free soil <55°F rain & snowmelt move it into weed zone.	Activity is best on coarse or medium textured soils with <4 % OM.	Can be used on vines established 6 months or more, nonbearing or bearing.	Annual & perennial grasses; broad leaf weed; winter annuals & few perennials	Most established broad leaf perennials

It is the responsibility of the user to read and follow the directions on the label before applying any herbicide.

\* These data are from current herbicide labels and from the 6th Ed., Herbicide Handbook, Weed Science Society of America. It attempts to list all herbicides legal for use in New York.

<sup>†</sup> Pronamide (Kerb) is a restricted use herbicide; pesticide application certification is required for purchase, possession or use.

**Table 2.—Soil Characteristics of Preemergence Herbicides Registered for New York Vineyards.**

Trade Name	Common Name	Average Persistence at Use Rates	Soil Behavior	Primary Means of Loss from Soil
<b>Princep, Caliper 90</b>	simazine	At 'selective' rates, one season. Carryover is possible at high rates on low pH soils.	Strongly adsorbed to both clay and organic matter. Little leaching except in sandy soils.	Microbial breakdown and chemical hydrolysis; particularly at higher pH
<b>Karmex</b>	diuron	At 'selective' rates, one season. Carryover to next year possible with 'soil sterilant' rates	Strongly adsorbed to both clay and organic matter. Little leaching except in sandy soils.	Microbial breakdown.
<b>Surflan</b>	oryzalin	Relatively persistent, but not usually more than a growing season.	Adsorbed to both clay and organic matter. Somewhat leachable. Photostable on soil surface	Chemical and microbial breakdown
<b>Prowl</b>	pendimethalin	Under normal conditions, no carryover is expected.	Strongly adsorbed to both clay and organic matter; little or no leaching.	Chemical breakdown, slight volatilization, apply before budbreak
<b>Treflan</b>	trifluralin	Under normal conditions, no carryover is expected .	Strongly adsorbed to both clay and organic matter (O.M.). Little or no leaching	Moderately volatile, photodegrades. Needs physical or water incorporation soon after application.
<b>Devrinol</b>	napropamide	Under normal conditions, no carryover is expected, however, if incorporated, fall cover crops may be affected.	Resists leaching in most mineral soils. May need shallow incorporation to activate because of its low soil mobility	Photodegradation can occur in bright sunlight. Slowly broken down by soil microbes. Little loss by volatility
<b>Dual</b>	metolachlor	Half-life of 30 to 50 days depending on soil and environmental conditions. No carryover expected.	Strongly adsorbed to O.M If soil has 2.0% O.M. or more, leaching is unlikely.	Primarily microbial breakdown, photodegradation and volatility also play a role.
<b>Solicam</b>	norflurazon	Under normal conditions, no carryover is expected, fall cover crops may be chlorotic.	Adsorbed to both clay and organic matter. Little or no leaching is likely.	Primarily microbial breakdown, photodegradation and volatility also play a role.
<b>Goal</b>	oxyfluorfen	Relatively short-lived. Carryover residues are not a problem.	Strongly held to soil. resists leaching.	Chemical and photodegradation are probable major factors.
<b>Casoron</b>	dichlobenil	Persistence is highly dependent on air temperature and soil moisture. once incorporated, it can last up to a year.	Strongly adsorbed to O.M Low water solubility, but leaching can occur on sandy soils low in organic matter.	Microbial breakdown. Will evaporate if air temp >50°F or soil is wet.
<b>Kerb†</b>	pronamide†	Persistence is variable. Greater in coarse soils low in organic matter. Carryover not usually a problem.	Strongly held to soil. Resists leaching.	Microbial breakdown primarily, photodegradation and volatility also play a role.

It is the responsibility of the user to read and follow the directions on the label before applying any herbicide.

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