

# HERBICIDES for Apples

Casoron (*dichlobenil*)  
Devrinol (*napropamide*)  
Fusilade (*fluazifop*)  
Goal (*oxyfluorfen*)  
Karmex (*diuron*)  
Kerb (*pronomide*)  
Bueno 6 (*MSMA*)  
Paraquat (*paraquat CL*)

Poast (*sethoxydim*)  
Prowl (*pendemethalin*)  
Roundup (*glyphosate*)  
Princep (*simazine*)  
Solicam (*norflurazon*)  
Surflan (*oryzalin*)  
Envy (*2,4D*)

*Changes in the registration status of herbicides may occur at any time. Therefore, always read and follow the directions printed on the label. This is not a recommendation for the use of herbicides in orchards. Most orchards are infested with a broad spectrum of weeds. To control them effectively, combinations and/or sequential applications of herbicides are required. The attached susceptibility charts may serve as a guide. To simplify information, trade names of products have been used. No endorsement of named products is intended, nor is criticism implied of similar products which are not mentioned.*

## HOW HERBICIDES WORK

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There are about 300 herbicides available in the United States and they are the most widely used pesticides for agriculture. Herbicides are classified into families based on their chemical configuration. Selectivity is based on the chemical nature of the compound, plant species, and placement. Each herbicide effects one or more physiological processes in plants such as blockage of biochemical pathways, interference with synthesis of organic compounds, or stopping cell division. The following description of herbicides may help you understand their use.

### TRADE NAME (GENERIC/COMMON NAME)

#### Casoron (*dichlobenil*)

Used for pre-emergence control of grass and broad-leaved weeds. Absorbed by seeds, roots, and shoots of emerging seedlings, and translocated upward. A mitotic poison that prevents cell division in meristems. It volatilizes rapidly and must be incorporated to prevent loss; mechanical incorporation is better than water incorporation. Dichlobenil leaches slowly, residual is about 4-6 months, and selectivity is achieved by growing tree roots below the treated surface band of soil. Other names include Norosac and Diclomec. Cannot be used on young trees.

Devrinol (*napropamide*)

A very safe pre-emergent herbicide with long residual when properly incorporated (within 7 days, mechanically or with water). Residual is better for grass control (1 year) than for broad-leaved weeds. Controls mustard, groundsel, and shepherd's purse well; weak on nightshade, henbit, fleabane, and Russian thistle. It will control yellow nutsedge with prolonged use. Can be used on newly planted trees, but not prior to planting.

Goal (*oxyfluorfen*)

Applied as a pre-emergent to soils for grasses and as both a pre-emergent and post-emergent contact for many broad leaf weeds. It translocates very little after either root or foliar absorption and it does not readily leach in soil. Goal causes a breakdown of cell membranes much like weed oils. It is very safe during the dormant season but can cause damage to trees when foliage is present. Volume of spray must be kept above 40-50 gal/acre for good weed control. It controls cheeseweed (malva), clovers, filaree, and mustard. It has a low toxicity to mammals and is not registered on some young trees.

Karmex (*diuron*)

It has low water solubility, absorbs readily to soil colloids and thus resists leaching. Volatility is low; incorporate within a few weeks with water. It is more effective against broadleaf weed seedlings than grasses; applied as a pre-emergent herbicide. Selectivity is mainly due to placement. Deeper tree roots do not contact the material in the upper few inches. It has some contact action when temperatures are high and when combined with a surfactant. A good broad spectrum pre-emergent that lasts 4-6 months; it cannot be used on young trees. It will not control wild oat, groundsel, turkey mullen, or plantain seedlings.

Kerb (*pronomide*)

A benzamide compound used as a selective pre-emergence and early post emergence herbicide. Requires water or mechanical incorporation for root uptake to be effective.

Prowl (*pendimethalin*)

Registered for non-bearing trees only. It does not readily leach but is degraded by ultraviolet light and must be incorporated within 21 days. It is a mitotic inhibitor and controls grass seedlings much better than broad-leaved weeds. Residual about 4-6 months for grasses only. It can be used on young trees.

Solicam (*norflurazon*)

A long residual material, at high rates, that controls grasses better than broad-leaved weeds. It is somewhat volatile and needs water incorporation. It has no contact activity, but acts through absorption by roots and is translocated to foliage where formation of pigments is inhibited in susceptible plants (will injure Bermudagrass and nutsedge). It leaches in light soils and can be picked up by tree roots. Cannot be used on young plantings.

### Surflan (*oryzalin*)

A semi-volatile herbicide for pre-emergent weed control that requires incorporation within 21 days of application (sunlight breaks it down). It is very good for the control of annual grasses and will last about 4-6 months in the soil where it is degraded by soil microorganisms. It controls seedling bindweed, but is poor on many broad-leaved weeds. It is absorbed by seedling roots and stops root and shoot growth by inhibiting cell division. It can be used on young trees.

### Fusilade (*fluazifop*)

Registered for non-bearing trees only. Effective as an early contact grass control herbicide with little or no effect on broad leaved plants. It can be applied directly over trees to selectively kill grasses. It translocates readily throughout the grass plant, but takes a long time to kill under cool conditions. It controls perennial grasses well, but repeated applications are necessary when weeds are moisture stressed. It will not kill annual bluegrass, or fine fescue. Fusilade requires a surfactant. Good uses include: grass control in young trees where glyphosate cannot be used, and to select for desirable ground covers.

### BUENO 6 (*MSMA*)

Registered on non-bearing vines only. A warm season grass herbicide that is readily soluble in water and requires a surfactant for maximum activity. There is no soil activity due to rapid and strong absorption to soil particles. It will not control Bermudagrass, or any broad-leaved weeds; provides good control of johnsongrass, dallisgrass, and yellow nutsedge. Repeated applications may be necessary.

### Poast (*sethoxydim*)

Registered for non-bearing trees only. It is very similar to Fusilade; used as a post emergent grass herbicide. It is absorbed through the foliage, translocated throughout the plant where it slowly kills grasses as a mitotic poison. It does not control annual bluegrass, fine fescue, or broad-leaved plants. It should be used with non-phytotoxic oil.

### Roundup (*glyphosate*)

A foliar absorbed post emergent herbicide that has no toxicity to plants when applied to soil, where it is strongly adsorbed. Selectivity is achieved by avoiding contact with green parts of desirable plants. Glyphosate symptoms include chlorosis, necrosis, shortening of internodes, and proliferation of shoots. It is highly mobile in plants but symptoms may not appear for 3-10 days. It interferes with aromatic amino acid synthesis and causes damage to membranes. Poor control is achieved on drought stressed or new growth of perennial weeds. Perennials should be treated when mature (flowering) so that the material moves down into the roots and kills the entire plant. Annuals can be easily controlled anytime. Malva and filaree require higher rates, lower volume of water, or the addition of a surfactant for good control. Recent label changes now allow the use of glyphosate on trees less than 3 years old, as long as spray does not contact any green tissue.

### Envy (2,4D)

There are several formulations of the parent acid. The amine form is used on apples. It is used for control of broad-leaved weeds, with little or no effect on established grasses. It is applied to annuals or mature foliage of rapidly growing perennials. It translocates to new shoots and roots and interferes with nucleic acid metabolism and with photosynthetic translocation. Most phenoxy herbicides are degraded rapidly in warm weather. Care must be taken to prevent spray or vapor from contacting sensitive desirable broad-leaved plants. Use in the dormant season only for specific broad-leaved weed control and vegetation management between the tree rows.

### Paraquat (*paraquat cl*)

A contact herbicide that kills photosynthesizing plants in the light, but not in darkness (very slow in cloudy weather). It is poorly translocated, so good coverage is needed. It does not move into or affect plant growth when applied to soil. Paraquat is non-selective and kills almost any green tissue it contacts. It can be used on young trees when completely dormant. It is very toxic to humans; when ingested it causes non-reversible damage to living tissue. *Handle with care!*

## **SUMMARY OF HERBICIDE USE**

As you can see, several herbicides can be used on orchard trees. The choice of material depends on the seed species present, time of application, cost, personal preference, and registration. Know your weeds. If you need assistance on weed identification, contact your farm advisor. Publication #4030, "*Growers Weed Identification Handbook*", is also available, showing a full-page color picture of each weed, including inserts of flower and seedling stages. The cost of this publication is \$80.00.

Weed control is extremely important, especially on young trees. Fourteen years of weed control trials conducted from 1971-1985, by A.H. Lange, Weed Control Specialist, U.C. Kearney Agricultural Center, on trees, provides the overwhelming conclusion that herbicides giving the best weed control also give the best tree growth. Good early weed control in several trials resulted in increased tree top weight and regrowth the following spring. Most trees showed a 50-100% increase in growth when weeds were eliminated from the base of the tree. Even when excessively high rates were used to test for damage to trees (phytotoxicity), growth far exceeded that of weedy check plots. In most trials, early reduction of top weight due to phytotoxicity, caused by improper herbicide application, was reversed by excellent long-term pre-emergent weed control.

Timing of pre-emergent herbicides can be different for young trees and for bearing trees. Many young trees will not tolerate certain contact or pre-emergent herbicides so they must be hand weeded or mulched the first year. Strip sprays on mature trees generally are applied as late as possible, using a tank mix of pre-emergent and contact herbicides. The ground should be moist but not saturated, with no standing water. Generally, hillsides and wet areas are sprayed first. Good soil coverage is achieved with no leaves in the way and frequent rains activate the materials soon after application. Once activated, herbicides begin to break down through soil microbial activity. The most

important consideration is to have enough residual present into May and June to control the warm season weeds that germinate in the spring. A second application may be necessary.

Perennial weeds are generally controlled with a special contact spray as a spot treatment. Most perennial weeds are better controlled when in full foliage (flowering stage) and not water stressed. Several perennial weed problems such as field bindweed and Bermudagrass, covering large areas, may require large-scale treatments. Good success has been achieved by using glyphosate in late spring to early summer; basically just keeping spray from contacting or drifting to tree foliage.

Total weed eradication in the orchard through the use of herbicides or cultivation may not be economically feasible. One hundred percent weed control is certainly not necessary from the standpoint of tree growth; a weed here and there has little effect. Other considerations like cosmetic appearance of the orchard and elimination of weed seed sources can be important. However, a quick pass through with a hand crew or backpack spot treatment may be more economical than trying to control every single weed with one application.

It is a good idea to switch between similar pre-emergent herbicides at least every other year to prevent development of resistant weed species or build up of microorganisms in the soil that break down herbicides very rapidly.

Each herbicide is a tool designed for a specific use. Growers should learn how to work with each individually and in combination for more broad-spectrum weed control. Try different materials and rates to determine what works best for you.

Lightweight all terrain vehicles (ATV) work very well for applying herbicides because they can get on wet ground and are less expensive to operate than tractors. Applications can be as light as 20 gal/acre using a micromax or boom. Application costs are approximately \$5.00/acre.

Roundup has been used as a material for chemical “mowing” by applying light rates (6-8 oz/acre) to stunt weed or cover crop growth in the drive area between rows.

Roundup can also be applied 3-4 times a year without the addition of a residual pre emergent herbicide. Some growers have found it to be cost effective and offer less risk in leaching and runoff into water supplies. Weeds are sprayed in the early winter when most seeds have germinated yet are still small, at rates of 6-8 oz/acre. Later, sprays of 10-16 oz/acre are used as weeds appear.