

Weed Management in Tree Fruit

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A good orchard floor management program eliminates and prevents the reestablishment of undesirable vegetation. Weeds compete with fruit trees for water, nutrients, and light; serve as alternate hosts for diseases and harmful insects; harbor rodents; and impede harvest. Herbicides used to control weeds must have a good margin of crop safety to minimize the risk to the tree.

Choose herbicides for use in the tree row that are labeled, have adequate crop safety (Table 1), and control the weed species in your orchard (Table 3). Use the correct amount of residual herbicides for each soil type (Table 2). The use of a single herbicide repeatedly will lead to an increase in resistant weeds or weed species. The use of herbicide combinations, herbicide rotations, and sequential or spot treatments in a well-managed weed control program will eliminate or minimize problems. The recommended herbicides have been evaluated for crop safety and effectiveness.

Weeds can be classified by their life cycle. Annuals live less than one year. Summer annuals germinate in the spring or early summer, grow, flower, produce seed, and die in the fall. Winter annuals germinate in late summer or in the fall, grow vegetatively through the fall, overwinter, flower, produce seed, and die in the spring. Biennial weeds live more than one year but less than two years, produce seed, and die. Perennial weeds live more than two years, and often reproduce vegetatively, as well as by seed. They can be much more difficult to control. Consider summer and winter annuals, biennials, and perennial weeds separately when planning a control program.

Residual herbicides remain in the soil and kill weeds through their roots for up to several months. Application should be made preemergence, or before weeds germinate. Weeds begin to compete with most crops within 2 to 4 weeks after they appear, and some products are effective only on germinating seeds. If weeds are present, a postemergence herbicide should be combined with the residual herbicide. Rainfall or overhead irrigation before weeds emerge is usually needed to move the herbicide into the soil and make it available to the weeds.

Non-residual herbicides kill weeds present at the time of application, but do not continue to control weeds that appear after treatment. These herbicides either degrade rapidly in the environment, or degrade slowly but are tightly bound to the soil and unavailable to plants after application. Non-residual herbicides kill weeds through their leaves are applied postemergence, or after they have germinated and emerged. Do not treat weeds that are dormant or under stress from drought, extreme heat, cold, or other adverse growing conditions. The optimum stage of growth depends on the herbicide used and the weed species. Most herbicides that enter the plant through the leaves need a minimum rain-free period after application for maximum effectiveness.

Selective postemergence herbicides kill only certain weeds. Plants that are not susceptible will not be harmed. Poast, Select, Fusilade DX and 2,4-D are examples of selective postemergence herbicides. Poast and Fusilade DX kill grasses. 2,4-D affects only broadleaf plants (including fruit trees).

Nonselective postemergence herbicides kill or injure any treated plant. They may be *contact* or *translocated*. *Contact* herbicides work only where they are placed. Thorough spray coverage is essential for good results. Roots of established perennial weeds may survive.

Translocated herbicides move in the weed after treatment. Application at the proper growth stage will often result in good control of the roots as well as tops of established and perennial weeds. Translocated herbicides work slowly to provide time for movement throughout the plant. Results may not be evident for several weeks.

Rely (glufosinate) has injured peaches and apples through mature brown bark and is not recommended due to the risk of fruit tree injury. The injury appeared as death of the cambium layer at the point of contact. The tree was killed when girdled by the injury.

Glyphosate products are non-selective translocated postemergence products that require special care in orchards. Glyphosate applied to one part of a tree can “translocate” to other parts of the tree and cause injury or death to the entire tree. Sub-lethal doses of the herbicide can be stored in the roots and move into the tree in subsequent years when the tree calls on stored energy reserves in the roots to establish a new leaf canopy each spring. Glyphosate injury can appear as a whitish yellowing of the shoot tip and new foliage, as malformed leaves similar to growth regulator herbicide injury, or both. Stunting of the growth is also usually observed.

Minor exposure to glyphosate, even through root suckers in apples, can result in the translocation of the herbicide into tree roots and result in chronic and debilitating injury. Both time of year and whether the accidentally treated root sucker is growing in dense shade or partial sun can affect the direction of glyphosate translocation. In late spring when the tree is growing rapidly, glyphosate is translocated from the treated leaves to the shoot tip(s) regardless of sun or shading of the root sucker. Early summer is a transition period. By late summer apple root suckers in full or partial sun are exporting carbohydrates, and when treated with glyphosate are likely to translocate the herbicide into the roots. Root suckers in dense shade are carbohydrate sinks and do not move glyphosate into the roots. Always carry pruning shears when applying glyphosate products. Prune any accidental application to fruit tree foliage immediately. Use extreme caution after shoot growth has terminated in late spring or early summer.

Herbicide application should be accomplished with a “conventional” fixed-boom sprayer calibrated to accurately deliver 20 to 60 gallons of water per acre using flat fan nozzles and 30 to 40 psi, unless otherwise stated. **Herbicide rate recommendations are made on a broadcast basis** (amount of herbicide applied per sprayed acre). **CAUTION: Strict rate control is necessary.** Herbicides applied above recommended rates may cause crop damage. Residual herbicide rates must be matched with soil type and percentage of organic matter to obtain good weed control and crop safety (see Table 2).

Weed control in **newly planted orchards** should be planned to provide a maximum margin of crop safety. Tillage and/or herbicides prior to planting should control established biennial and perennial weeds. Apply a combination of herbicides to control annual grasses and broadleaf weeds. Apply in early spring after 1 to 2 inches of rainfall or irrigation has settled the soil around the roots of the newly planted trees, but before weeds emerge or tree buds break.

Apply herbicides to the tree row in **established orchards** twice annually, in late fall and in late spring. Herbicides applied in late October or early November control winter annuals, certain perennials, and early season summer annuals. Spring herbicide applications extend summer annual weed control through harvest. Advantages of two herbicide applications per year include:

1. Control of winter annual weeds, including camphorweed, wild lettuce and horseweed (marehail) and summer annual weed control for the same cost as most single application weed control programs.
2. Improved spring labor and equipment distribution requirements by controlling early summer annual weeds with residual herbicides applied the previous fall, thus delaying the need to spray in the spring until May or early June.
3. Increased consistency of weed control treatments, especially control of summer annual weeds when dry weather follows the spring herbicide application.
4. Decreased risk of crop injury, since each herbicide application must last less than a full year. Herbicides can be alternated and rates can be reduced or split to improve crop safety.
5. Decreased competition from established winter annual weeds and summer annual weed seedlings in March, April, and May for fertilizer and water when the trees begin to grow.

Late Fall Herbicide Applications should include a translocated postemergence herbicide, and a residual broadleaf herbicide. A residual grass herbicide may also be applied in the fall. Apply 2,4-D to control emerged winter annual broadleaf weeds tank-mixed with Princep for residual control. Consider a labeled glyphosate product if perennial weeds are present and treatment is recommended in the fall.

The use of a grass herbicide in the fall depends on the product chosen. Kerb 50WP is the only grass herbicide that *must* be applied in the fall, if it is used, to control certain cool season perennial grasses. An additional residual annual grass herbicide is needed in the spring to provide full season summer annual grass control following a fall application of Kerb 50WP. Solicam 90DF, Surflan 80WP, Devrinol 50WP and Prowl 4EC (non-bearing only) are annual grass herbicides that should be applied in late fall or as a split application, half in the fall and the second half in the spring. Use the split application when grass pressure is heavy for best results. The use of these herbicides in spring only has resulted in inconsistent weed control when dry weather followed the application.

Followup Late Spring Applications should include additional or a different residual broadleaf weed herbicide and a residual grass herbicide. Add a postemergence herbicide only if needed. Apply the second half of a split herbicide treatment of Solicam 80PF, Surflan 80WP, Devrinol 50PF or Prowl 3.3EC (non-bearing only) for annual grass control. Include 2,4-D if seedling annual broadleaf weeds are observed, Gramoxone Max to control annual grasses and broadleaf weed seedlings, or a labeled glyphosate product to control established annual or perennial grasses and broadleaf weeds. No postemergence herbicide may be needed in the spring if no weeds are present when the spring residual herbicides are applied.

Table 1. Crop Safety of Herbicides for Use in Tree Fruits.

	<u>Apples</u>		<u>Peaches</u>		<u>Pears</u>		<u>Plums</u>		<u>Cherries</u>	
	New	Established	New	Established	New	Established	New	Established	New	Established
Incorporated (residual)										
Treflan	—	—	L	L	—	—	L	L	—	—
Preemergence (residual)										
Alion	—	G	—	G	—	G	—	G	—	G
Chateau	G ¹	G	G ¹	G	G ¹	G	G ¹	G	G ¹	G
Devrinol	G	G	G	G	G	G	G	G	G	G
Dual Magnum	—	—	G	G	—	—	—	—	—	—
Gallery	G	—	G	—	G	—	G	—	G	—
Goal 2XL/Galigan 2E	G	G	G	G	G	G	G	G	G	G
Karmex	—	F/G	—	F/G	—	F/G	—	—	—	—
Matrix	—	G	—	G	—	G	—	G	—	G
Norosac/Casoron	L	G	L	G	L	L	L	L	L	L
Princep	—	F/G	—	F/G	—	F/G	—	L	—	L
Prowl	G	—	G	—	G	—	G	—	G	—
Sandea	—	G	—	—	—	—	—	—	—	—
Sinbar	—	F/G	—	F	—	—	—	—	—	—
Solicam	G	G	F/G	G	—	L	—	L	—	L
Surflan	G	G	G	G	G	G	G	G	G	G
Postemergence (selective)										
2,4-D ¹	F	G	F	G	F	G	F	G	F	G
Fusilade DX	G	—	G	G	G	—	G	G	G	G
Kerb	—	G	—	G	—	G	—	G	—	G
Poast	G	G	G	G	G	G	G	—	G	G
Select	G	—	G	—	G	—	G	—	G	—
Starane	—	G	—	—	—	G	—	—	—	—
Stinger	—	—	G	G	—	—	G	G	G	G
Postemergence (nonselective)										
Gramoxone Max ¹	G	G	G	G	G	G	G	G	G	G
glyphosate products ¹	G	G	G ²	G ²	G	G	G ²	G ²	G	G
Rely ²	P	P	P	P	—	—	—	—	—	—

G = Good

F = Fair (use with care)

P = Poor (not recommended)

L = Labeled (data insufficient or not recommended)

¹Do NOT allow spray to contact young green bark

²Do NOT allow spray to contact any part of tree, including mature bark (labeled for use only in New Jersey and certain other states)

— = NOT LABELED (DO NOT USE)

Table 2. Recommended Preemergence Herbicide Rates (in Active Ingredients) for Common Tree Fruit Soil Types.

Soil Type	<u>Sand</u>		<u>Loamy Sand</u>		<u>Sandy Loam</u>			<u>Loam</u>		<u>Silt Loam</u>		<u>Clay Loam</u>		
	<u>% Organic Matter</u>	<u>0-1</u>	<u>1-2</u>	<u>0-1</u>	<u>1-2</u>	<u>0-1</u>	<u>1-2</u>	<u>2-4</u>	<u>1-2</u>	<u>2-4</u>	<u>1-2</u>	<u>2-4</u>	<u>1-2</u>	<u>2-4</u>
Preemergence (residual)														
Alion	.065-.085	.065-.085	.065-.085	.065-.085	.065-.085	.065-.085	.065-.085	.065-.085	.065-.085	.065-.085	.065-.085	.065-.085	.065-.085	.065-.085
Chateau	.19-.38	.19-.38	.19-.38	.19-.38	.19-.38	.19-.38	.19-.38	.19-.38	.19-.38	.19-.38	.19-.38	.19-.38	.19-.38	.19-.38
Devrinol ¹	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4
Dual Magnum	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2
Gallery	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	1	$\frac{3}{4}$	1	1	1	1	1
Goal 2XL/Galigan 2E	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Karmex ²	—	—	—	—	—	1½	2	2	2	2½	2½	3	3	3
Kerb	2	2	2	2	2	2	2½	2½	2½	3	3	3½	3½	4
Norosac/Casoron	4-6	4-6	4-6	4-6	4-6	4-6	4-6	4-6	4-6	4-6	4-6	4-6	4-6	4-6
Princep ²	—	—	—	—	—	2	2	2	2	3	2	3	3	4
Prowl	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4
Sandea	—	.03-.06	—	—	—	—	—	—	—	—	—	—	—	—
Sinbar ²	—	—	—	—	—	1½	2	2	2	2½	2½	3	3	3
Solicam	—	—	—	2	—	2	2½	2½	2½	2½	2½	3	3	4
Surflan ¹	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4

¹Use the lower recommended rate when tank-mixing with another preemergence herbicide, unless annual grass pressure is severe.

²Use one-half the recommended rate when tank-mixing with another preemergence herbicide.

— = NOT LABELED (**DO NOT Use**)

Table 3. Herbicide Effectiveness on Major Annual Weeds in Tree Fruit.

Herbicide	Barnyardgrass	Crabgrass, large	Fall panicum	Foxtail sp.	Goosegrass	Johnsongrass (seedlings)	Yellow nutsedge	Carpetweed	Cocklebur, common	Cranesbill	Gainsoga, hairy	Jimsonweed	Lambsquarter, common	Morning glory sp.	Nightshade, eastern black	Shepherdspurse	Pigweed sp.	Purslane, common	Ragweed, common	Smartweed, Pennsylvania	Velvetleaf
Pre-emergence (residual)																					
Alion	F/G	F/G	-	F/G	F/G	-	P/F	G	-	-	G	G	G	F/G	-	G	G	G	F/G	-	G
Chateau	F	F	F	F	-	-	P	G	-	-	G	G	G	-	G	G	G	G	G	G	G
Dual Magnum	G	G	G	G	G	G	F/G	F	N	-	G	N	P	N	G	-	G	F/G	N	P	P
Gallery	N	N	N	N	N	N	N	F	-	-	G	G	G	G	G	G	G	G	G	G	G
Goal 2XL/Galigan 2E	F	F	F	F	-	-	P	G	-	-	G	G	G	-	G	G	G	G	G	G	G
Karmex	G	F/G	G	G	F/G	N	N	G	-	-	G	G	G	G	G	G	G	G	G	F	G
Matrix	G	F	F	G	P	-	G	-	F/G	-	F	F	F	P	P	G	G	F	P	P/F	F
Princep	F	P/F	F	G	F/G	P	N	-	F/G	-	G	G	G	G	G	G	F	G	G	G	-
Prowl	G	G	G	G	G	G	N	G	+	-	N	N	F/G	N	-	-	F/G	F/G	-	-	F/G
Sandea	N	N	N	N	N	N	G	P	G	-	G	G	P/F	P	-	G	F	G	F	N	G
Sinbar	G	G	G	G	G	-	P	G	-	G	G	G	G	G	G	G	F	G	G	G	G
Solicam	G	G	G	G	G	-	F	P	P	-	F	F	F	-	-	-	F	G	F/G	-	F
Surflan	G	G	G	G	G	G	N	F/G	N	-	N	N	F/G	N	P	N	F/G	F/G	N	P	P
Post-emergence (selective)																					
2,4-D	N	N	N	N	N	N	P	G	F/G	G	F/G	F	F/G	G	G	G	G	G	G	F	G
Fusilade DX	G	F/G	G	G	G	G	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Kerb	G	G	G	G	G	-	N	G	N	-	P	N	G	-	-	-	G	G	P	-	P
Poast	G	G	G	G	G	G	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Select	G	G	G	G	G	G	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Starane	P	P	P	P	P	P	P	-	G	-	P	P	P	G	P	G	P	G	P	F	G
Stinger	N	N	N	N	N	N	N	N	G	-	G	F	P	P	F	P	P	P	G	P	P
Postemergence (non-selective)																					
Gramoxone Max	F/G	F/G	F/G	G	F/G	F/G	P	G	G	-	G	G	F/G	F/G	P	G	G	F/G	G	F	G
glyphosate products	G	G	G	G	G	G	F	G	G	G	G	G	G	F	G	G	G	G	F	G	G
Rely	G	G	G	G	G	G	F	G	G	G	G	G	G	G	G	G	G	G	F	G	G

G = good F = fair P = poor N = none - = not available