RUTGERS
New Jersey Agricultural
Experiment Station

This is a section from the

2023/2024
New Jersey Commercial
Tree Fruit Production Guide

The recommendations are **NOT** for home gardener use.

The **full guide** can be found on the Rutgers New Jersey Agricultural Experiment Station (NJAES) website at: *https://njaes.rutgers.edu/pubs/publication.php?pid=e002*. The guide is revised biennially.

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PESTICIDE USE DISCLAIMER

THE LABEL IS THE LAW

A pesticide applicator is legally bound by the labeling found on and with the pesticide container in their possession. Before using a pesticide, check and always follow the **labeling distributed with the product at the point of sale for legally enforceable rates and restrictions**.

In addition to the pesticide products listed in this Production Guide, other formulations or brands with the same active ingredient(s) may be commercially available.
ALWAYS CHECK THE LABELING ON THE PRODUCT CONTAINER ITSELF:
a) to ensure a pesticide is labeled for the same use,
b) to ensure the pesticide is labeled for the desired crop,
c) for differences in rates and percent active ingredient, and
d) additional restrictions.

Check the physical product label for the maximum amount of pesticide per application and the maximum number of applications per year.

IMPORTANT: DO NOT RELY ON ELECTRONIC LABELING (unless it is "web labeling" found directly on the product container)**.** *Online pesticide* labels may not be the same as the labeling distributed with the product. Some services include: Proagrica's CDMS *http://www.cdms.net/*; Agworld DBX powered by Greenbook *https://www.greenbook.net*; or Agrian *https://www.agrian.com/labelcenter/results.cfm.*

These electronic label services provide use disclaimers, and in some cases legally binding User Agreements assigning ALL liability to USER of service. For example, Agrian's webpages***** cite (in red): The *material and content contained in the Agrian Label Database is for general information only. Agrian Inc. does not provide any guarantee or assurance that the information obtained through this service is accurate, current, or correct, and is therefore not liable for any loss resulting, directly or indirectly, from reliance upon this service. This Label Database does not replace the official manufacturer issued label. Users of this database must read and follow the actual product label affixed to the container before use of the product. Use of the Label Database is subject to the Terms of Use and Privacy Policy* ***** [*date accessed: 12/23/2022*].

See a detailed regulatory discussion of this and other essential information on Pesticide Safety and the Pesticide Label in Chapter 1. Electronic labeling is discussed in section 1.3.1.

If you are having a medical emergency after using pesticides, always call 911 immediately.

POISON Help®
1-800-222-1222

In Case of an Accident

- Remove the person from exposure
- Get away from the treated or contaminated area immediately
- Remove contaminated clothing
- Wash with soap and clean water
- Call a physician and/or the National Poison Control Center (1-800-222-1222). Your call will be routed to your State Poison Control Center.
- Have the pesticide label with you!
- Be prepared to give the EPA registration number to the responding center/agency

5 Orchard Weed Control

5.1 Weed Control Measures and Orchard Floor Management

Introduction

Effective weed control requires a program that emphasizes prevention and combines chemical with mechanical control methods.

Weed Control Measures

- **Weed identification** is the first step in a successful weed control program. Knowledge of the weed species in an orchard is needed for control measures to be successful and economical. Plan control measures when the weed is most susceptible.
- **Good cultural practices** can reduce many weed problems. Control difficult perennial weeds before planting a new orchard. Sow areas in the orchard where bare ground is not desired to a cool season grass that will not compete vigorously with the trees, but will suppress weeds.
- **Prevent weed seed production.** Many weeds can produce 10,000 to over 100,000 seeds/plant. Most will be "hard" seed that will not germinate for several years. One good year of weed seed production can result in a supply that will last many years. **Preventing seed production of new "hard-to-control weeds" is particularly important**.
- **Mechanical weed control** methods include plowing, disking, and harrowing before planting an orchard and disking, mowing, and hand-weeding after trees are planted. Many weeds, including established perennials, can be controlled mechanically by starving the roots. The weed begins to send food to the roots 10 to 14 days after a shoot emerges from the soil. Repeated close mowing or shallow cultivation within 7 to 10 days after any new shoots appear can eventually kill the weed. Many repeated cultivations are usually needed. One late or missed cultivation can "save" the weed. Mechanical weed control has disadvantages. Close cultivation can injure tree trunks, and cultivating too deep can prune tree roots. Repeated cultivation can destroy soil structure and reduce the organic matter content.
- **Chemical weed control** has many advantages over mechanical weed control in an established orchard. Chemical weed control is effective, economical, and safe, when used correctly. It also eliminates trunk injury from cultivating too close, eliminates root pruning from cultivating too deep, and reduces mouse injury by completely eliminating cover near the tree.

Orchard Floor Management

Recommended management of the orchard floor includes **maintaining a vegetation free zone in the tree row and establishment of a perennial grass sod between the rows**. Integration of vegetation management with insect and disease control programs is essential. Maintain the vegetation free zone in the tree row to prevent competition with the fruit tree. The width of the vegetation free zone should be about forty percent of the distance between the tree rows in most orchards. The width may vary, however, depending on soil fertility, water holding capacity, and exposure to erosion. Do NOT reduce the width of the vegetation free zone in young, nonbearing orchards. Maintain the full width of the vegetation free zone in newly planted orchards to achieve maximum tree growth.

Sod between the tree rows prevents soil erosion, provides traction for equipment, increases soil organic matter, improves soil structure and water permeability, and furnishes shelter for beneficial insects. Sod should not include plants that are an alternate host for insect pests, or diseases and nematodes that attack fruit trees. In addition, the sod should be easily maintained, tolerant to drought, require little or no fertilization, and compete minimally with the fruit trees.

Tall fescue perennial grass sod is recommended for orchard row middles. Fescue is tolerant to disease, drought, low pH, and low fertility. Fescue sod competes effectively with weeds, does not spread or creep into the

tree row by rhizome or stolen growth, and is semi-dormant during the hot, dry, summer months. Tall fescue is vigorous and is easily established, but requires frequent mowing. Newly developed “turf type” tall fescue varieties are vigorous, and have a lower mowing requirement than the traditional ”Kentucky 31” tall fescue. Hard fescue grows close to the ground and has a minimal mowing requirement, but grows more slowly than the tall fescues and is difficult to establish.

The addition of clover or other legumes is not recommended for orchard sods. Although legumes do fix nitrogen, release for plant use is unpredictable and often at the wrong time of year, which can reduce winter hardiness. Legumes are also alternate hosts for pests such as catfacing insects, nematodes, and tomato ring-spot virus, which causes stem pitting in stone fruits and union necrosis in pome fruits. Legume bloom frequently coincides with apple bloom, and is preferred by bees and other pollinators.

Preparation for sod establishment should begin before the orchard is planted. Control perennial weeds and nematodes, and correct soil pH and nutrient deficiencies first. Complete primary tillage operations the summer **before** the orchard will be planted. Build gently sloping raised ridges to improve drainage in the future tree rows before sowing grass or planting trees. Orchards planted flat have developed depressions in the row between the strips of sod due to the improving soil structure in the sod compared with the vegetation free strip.

The success of a sod planting will depend on accurate seeding and timing. Sow fescues in late-summer into a well-prepared seedbed. Broadcast 40 to 75 lb of seed/ A. The higher rates will help with faster establishment and thicker cover. Use a seeder manufactured to sow grass and other similar sized seed that will ensure proper seed placement, a firm seedbed, and good seed and soil contact. Failure to use adequate equipment for seeding frequently results in poor establishment. Seeding should be completed by September 1st in the northern counties of New Jersey, and by September 20th in the southern counties. Apply nitrogen at 50 lb N/A at seeding and repeat in late-fall or early-spring to encourage rapid establishment.

Planting in killed sod has been shown to be an effective method to help newly planted trees get off to a fast start. Use perennial ryegrass in the row rather than fescue, and seed the fescue between the future tree rows. Rapid establishment and growth and susceptibility to herbicides make perennial ryegrass a better choice for the in-row use. Kill the sod in the row just prior to when the trees are planted and “no-till” the trees into the dead sod. Use recommended herbicides to control grasses. The sod‘s roots increase soil organic matter, and improve soil structure and water permeability before it is killed, and act as a mulch to conserve water and prevent erosion during the establishment year of the orchard. By fall, the dead sod will have deteriorated and will not be attractive to rodents.

Establishment of a dense sod that is competitive with weeds will require fifteen to twenty months. Some additional effort during this period will ensure success. Apply Prowl H2O to the sod in early spring to control large crabgrass and other summer annual grasses. Use 1 to 2 lb of active ingredient/A, about half the rate recommended for use in the tree row on newly planted trees. Use 2,4-D choline 0.5 to 1.0 pt of active ingredient/A early the first spring after sowing the grass to control broadleaf weeds. Continue to use 2,4-D choline in the fall or early spring in subsequent seasons, at normal recommended orchard rates, when needed to control dandelions and other broadleaf weeds in the sod.

5.2 Herbicides Categories

Residual

Residual herbicides remain in the soil and kill weeds through their roots for up to several months. Application should be made 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. Rainfall or overhead irrigation is usually needed to move the herbicide into the soil and make it available to emerging weeds. If weeds are present, a postemergence herbicide should be combined with the residual herbicide. Residual herbicides are applied incorporated or preemergence.

Postemergence

These herbicides are applied when weeds are present. Postemergence herbicides kill weeds through their leaves rather than through the roots. They can be safely used in orchards by carefully applying the herbicide to the weeds without allowing it to contact the fruit tree. The herbicide should be applied when weeds are growing rapidly. Do not treat weeds that are dormant or under stress from drought, extreme heat, cold, or other adverse growing conditions. The optimum weed stage of growth for herbicide application depends on the herbicide used and the weed species. Most herbicides that enter the plant through the leaves need a minimum rain free period of at least 8 hours after application for maximum effectiveness. Postemergence herbicides may be selective or nonselective, and work only where they contact the plant or translocate throughout the plant.

- **Selective** postemergence herbicides kill only certain weeds. Plants that are not susceptible will not be harmed. Poast, 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, because movement throughout the plant takes time. Results may not be evident for several weeks.

5.3 Herbicide Application Notes

CAUTION: Strict Rate Control Is Necessary.

Improperly applied herbicides or 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 5.4). Adjust by changing tractor speed and maintaining pressure when spraying an orchard with soil that requires different herbicide rates. Determine type and percentage of organic matter for each soil on the farm with a separate soil test for each soil. **Herbicide application** should be accomplished with a "conventional" fixed-boom sprayer calibrated to accurately deliver 40.0 to 60.0 gal of water/A 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/sprayed A).**

Good agitation is needed for uniform distribution of the chemical in the spray solution. It is most important when wettable powders are sprayed. Good agitation can be achieved mechanically with paddles or hydraulically with spray material from the bypass line. If hydraulic agitation is used, be sure the pump has the capacity to spray and agitate at the same time. Tank shape also affects agitation. Corners and edges in tanks increase the agitation requirement. The boom should be modified to reach under the tree canopy. The outside nozzle should be of the offset type to reach into the row.

Nozzle tips may be made from many materials, including plastic, brass, stainless steel, and tungsten carbide. Plastic and brass tips wear more rapidly and should be replaced annually. Use ONLY stainless steel or tungsten carbide nozzles if wettable powders are used regularly. These products are abrasive and wear other tips too quickly.

Flat fan nozzle tips are designed for herbicide application. Most herbicides should be applied with an 8002 to 8004 nozzle. Larger nozzles deliver too much water. Smaller nozzles clog easily and produce more "fine" spray particles which drift easily. Flat fan nozzles have a wide spray angle so the boom can be kept close to the ground to reduce drift. They produce spray droplets that are large enough not to drift easily and small enough to provide good coverage of weeds with postemergence herbicides with little or no run-off. Most herbicides can be applied effectively with flat fan nozzles using between 10 and 50 gal of water/A.

5.4 Influence of Soil Properties and Water (Rainfall and Irrigation) on Herbicides

Weed control programs rely on residual preemergence herbicides and non-residual postemergence (knockdown) herbicides to control weeds. Applications are typically sprayed in orchards once a year in the spring, or twice a year, in late-fall and late-spring. Residual herbicides applied at these times are relied on to control weeds through the summer months and harvest. After application to the soil surface, most residual herbicides must be moved into the soil by rainfall or overhead irrigation to be effective. The amount of rain or overhead irrigation needed depends on weeds targeted, soil properties, and the chemical properties of the herbicide.

Weeds Targeted

Many weeds (*e.g.,* pigweed species) produce huge numbers of tiny seeds. Small seeds must germinate at or very near the surface of the soil. Other weeds (*e.g.,* morningglory or yellow nutsedge) can germinate or sprout from several inches deep. Early in the season, herbicides must be moved further into the soil to control weeds that germinate or sprout from deeper in the soil. Later in the season, shallow germinating weeds may become established and escape control if the herbicide has moved too deep into the soil to be available during weed emergence and establishment.

Soil Properties: Texture, pH, Cation Exchange Capacity

Soil properties have a strong influence on weed growth and residual herbicide effectiveness, especially texture, percent organic matter, and pH. Soil maps list soil texture and standard soil tests use the "feel" method to gauge soil properties. However, these approaches may give you inaccurate information about your soil. Instead, arrange a more accurate one-time mechanical soil analysis, which will determine the amounts of sand, silt, and clay in the mineral portion of the soil. The texture will not change unless soil is lost by erosion or other means.

Sand particles are the largest, **silt** is medium in size, and **clay** particles are the smallest soil particles. Soils with a large percentage of large sand particles are considered to be coarse in texture and are called sand, loamy sand, or sandy loam. Soils with a moderate amount of each size soil particle are considered to be medium in texture, and are called loam, or silt loam. Soils with a large percentage of small clay particles are considered to be fine in texture and are called silty clay loam, clay loam, or clay.

Soil particles are negatively (-) charged and attract positively (+) charged molecules from fertilizers, such as $H_2PO_4^+$, K^+, Ca^{++}, Mg^{++}, and many herbicides. This attraction slows leaching. Other fertilizer molecules (*e.g.*, NO^-) and a few herbicides have a negative charge. Negatively (-) charged molecules are not bound to the soil and are more subject to leaching, especially if they are highly soluble in water. Since substances that are positively (+) charged are called cations, the measure of a soil's ability to hold onto cations is called the **Cation Exchange Capacity** or **CEC**. Sand has the lowest CEC value, of less than 1. Silt has an intermediate CEC value, near 5. Clays have the highest CEC value of the mineral component of soil, near 35, depending on the type of clay.

Organic matter makes up only a small part of most soils, usually between 0.5 and 5.0 percent in soils across the northeastern United States, but it has the highest CEC value, near 200. Even small changes in the percent organic matter in soils, especially sandy soils, can have a strong influence on herbicide performance. That is the reason why small changes in percent organic matter may require herbicide rate changes. Rate tables may have several columns with different herbicide rates for different levels of organic matter in each soil type (Table 5.4).

Soil pH also affects the performance of some herbicides by influencing the degree of attraction to soil particles. Recommended soil pH levels for many crops range between 6.0 and 7.0. Low pH (below 6.0) or high pH (above 7.0) may affect the availability of certain herbicides by changing the positive (+) charge of the molecule. Weed control may be reduced and/or herbicide carryover may be increased if the herbicide is more tightly bound to the soil than at "recommended" pH levels. The risk of crop injury may increase if an herbicide is less tightly bound to the soil, and more available, than at "recommended" pH levels. Herbicides that are affected by pH may have **DO NOT USE** warnings on the label if the soil pH is above or below a value that increases the risk of crop injury, herbicide carryover, or poor weed control.

Chemical Properties of the Herbicide: Water Solubility and Adsorption to Soil Particles

The solubility, or the ease with which an herbicide dissolves in water, affects the rate of movement through the soil (Table 5.1). An herbicide that is more soluble in water may be "activated" by less rainfall or irrigation, but may not provide the duration of control that could be obtained with a less soluble herbicide, especially in a coarse-textured soil low in organic matter.

In addition, most **residual herbicides** can become bound to soil particles. When attached or bound to the soil, these individual herbicide molecules are not available for uptake by the weeds or the crop. Herbicides can be held onto by the soil to varying degrees (Table 5.1). The degree of binding is influenced by the chemistry of the herbicide, the soil pH, and the **Cation Exchange Capacity (CEC)** of the soil. Lower herbicide rates are needed to prevent crop damage in soils with a low CEC. Plant nutrients, such as NO_3^-, and herbicides with a negative (-) charge are not held by the soil, leach more rapidly, and are less affected by soil texture than those with a positive (+) charge.

Table 5.1 Herbicide Water Solubility and Soil Adsorption Characteristics

Category	Herbicide	Solubility	Soil Adsorption
Residual Herbicides	Alion (indaziflam)	Low	Moderate to Strong
	Broadworks (mesotrione)[1]	High	Strong
	Chateau (flumioxazin)	Very Low	Not Available
	Goal 2XL/Galigan 2E (oxyfluorfen)	Very Low	Strong
	Karmex (diuron)	Low	Strong
	Kerb (pronamide)[1]	Low to Moderate	Strong
	Matrix FNV (rimsulfuron)	Low	Not Available
	Norosac/Casoron (dichlobenil)	Low	Moderate
	Princep (simazine)	Very Low	Moderate
	Prowl (pendimethalin)	Very Low	Strong
	Sinbar (terbacil) [1]	Moderate	Weak
	Solicam (norflurazon)	Low to Moderate	Strong
	Surflan (oryzalin)	Very Low	Strong
Postemergence Herbicides	2,4-D choline	Very High	Very Weak
	Fusilade 2000 (fluazifop butyl)	Very Low	Very Strong
	Glyphosate products	Very High	Very Strong
	Gramoxone SL2.0 (paraquat)	Very High	Very Strong
	Poast (sethoxydim)	Moderate to Very High (pH dependent)	Moderate
	Sandea (halosulfuron) [2]	Low to Moderate	Moderate
	Select (clethodim)	NA	Weak
	Starane (fluroxypyr)	Moderate to High	Weak
	Stinger (clopyralid) [2]	Very High	Very Weak

[1] Broadworks, Kerb, and Sinbar are residual herbicides that will also control young seedlings of sensitive weed species

[2] Sandea and Stinger are herbicides that will control emerged weeds AND have residual activity

Non-residual postemergence herbicides may have no activity after application for one of two reasons. First, some herbicides are too tightly bound to the soil to be available to plants after application. However, in soil-less growing environments care must be exercised, where surprising residual activity can be observed from these herbicides. Secondly, some herbicides are highly soluble in water and are not bound to soil particles. Residual activity from these herbicides can be observed in the soil, but it often lasts only a few days. They are rapidly degraded and/or leached out of the zone of weed seed germination.

Examples of non-residual herbicides which are too tightly bound to the soil to have residual activity are glyphosate and paraquat. These herbicides are completely unavailable to plants after application and remain tightly bound to the soil until broken down. Glyphosate can be degraded or digested by soil microorganisms. Paraquat is degraded by sunlight, and is less likely to cause problems when used on plastic mulch, in greenhouses, or in soil-less growing systems.

In another example, 2,4-D choline is highly soluble in water and has a negative (-) charge, which is repelled by the soil particles. This herbicide is not bound tightly to the soil and is readily available for chemical or biological

degradation and leaching. Disappearance of 2,4-D in the soil environment is rapid. Residual activity in the soil can be observed, but it often lasts only a few days to a week. Stinger and Starane are also soluble in water, but have longer residual activity in the soil.

Trickle Irrigation and Herbicide Effectiveness

Efficiency, water conservation, and disease control are reasons to consider trickle irrigation in orchards. The crop can be irrigated using less water provided by a smaller pump delivered at lower pressure than with traditional overhead sprinkler systems. In addition, evaporation losses are lower. Since trickle lines and micro-sprinklers operate under the tree, the fruit and foliage remain dry, reducing the incidence of many diseases. **Unfortunately, improved weed control is NOT a benefit of trickle irrigation. Expect higher herbicide and application costs, and less effective and less consistent weed control in trickle irrigated orchards.** No herbicide, not even the least soluble in water and most tightly bound to the soil, can withstand leaching from the volume of water that flows from an emitter hole in trickle irrigation tubing. Herbicide failure can be first observed in fields under trickle irrigation by small tufts of weeds growing at each emitter. As the season progresses, the weeds grow more readily, and the spot enlarges as a wider area is leached free of herbicide. Although trickle irrigation prevents the crop from water stress, weeds can be fierce competitors for nutrients and sunlight, can act as hosts for insects, and can interfere with harvesting.

Modifications to the trickle irrigation system can moderate the weed control problem. Any change in the system that reduces the volume of water applied at a point source will reduce herbicide leaching. Unfortunately, reducing the distance between the holes in traditional trickle tubing or suspending the tubing from a trellis wire to increase distribution by splashing is not likely to eliminate the weed problem. Burying the tubing more than 4 inches deep will effectively reduce the adverse effects on residual herbicides, since their effectiveness is usually confined to the upper 2 to 4 inches of soil. Switching from trickle tubing that drips, to micro-sprinklers, in crops where they can be used, also effectively reduces the adverse effects of the irrigation on weed control.

When trickle irrigation will be used, choose herbicides for the residual herbicide weed control program during the irrigation season that are least soluble in water and most tightly adsorbed by the soil (Table 5.1). On coarse-textured sandy soils low in organic matter, Prowl H2O (pendimethalin) or Surflan (oryzalin) (for annual grass control) and Princep (simazine) (for annual broadleaf weed control) are the best choices, based on the very low water solubility of these herbicides. On fine-textured soils and soils higher in organic matter, Prowl H2O (pendimethalin) or Surflan (oryzalin) (for annual grass control) and Karmex (diuron) (for annual broadleaf weed control) are the best choices based on their very low or low water solubility and strong adsorption to the soil. Unfortunately, certain weeds (*e.g.*, yellow nutsedge) escape this herbicide combination. Adjust the application timing in the spring so the herbicides can be "activated" by 1 to 2 inches of rainfall or overhead irrigation before the trickle irrigation is used. This will allow the herbicides to move into and be attached to the soil before being subjected to the intense leaching of the trickle irrigation.

Remember that choosing the herbicide(s) that is(are) least soluble in water and most strongly adsorbed to the soil will delay, but not prevent, herbicide failure and weed breakthroughs in trickle irrigated crops. Coarse-textured sandy soils and soils low in organic matter that require frequent irrigation, increase the likelihood of weed control failure, especially during prolonged periods of heat and drought stress. Plan to use repeated applications of non-residual postemergence herbicides on a regular schedule, every 2 to 4 weeks during the growing season, to control weeds in trickle irrigated crops. Time the application of residual herbicides to derive the maximum benefit from their use when harvest approaches and preharvest interval (PHI) restrictions will not permit the continued use of the non-residual postemergence herbicides.

5.5 Reducing the Risk of Herbicide Resistance

Reducing the risk for developing herbicide-resistant weed populations requires incorporating a number of guidelines in managing your orchards:

- Spray only when necessary.
- Use alternative methods of weed control whenever possible such as mowing , cover-cropping, or mechanical cultivation.
- Rotate herbicides' site of action (HRAC Group Number – see note below).
- Limit the number of applications of herbicide(s) with the same site of action in a given growing season.
- Use mixtures or sequential herbicide treatments with different site of action that will control the weeds of concern.
- Scout orchards after herbicide application to detect weed escapes or shifts.
- Clean equipment before leaving orchards infested with or suspected to have resistant weeds.

HRAC Group Number

A classification of herbicides based on site of action, was developed to better understand and plan for resistance management. **Rotating herbicides with different sites of action is important for minimizing the risk of developing herbicide-resistant weeds**. The system was developed by the Weed Science Society of America (WSSA) and the Herbicide Resistance Action Committee (HRAC). More information on herbicide-resistant weeds and herbicide's sites of action can be found at *https://hracglobal.com/herbicide-resistance/overview*. See Table 5.2 for the HRAC Group Number of herbicides registered for use on tree fruits.

5.6 Weed Control in Tree Rows

New Plantings

Weed control in a newly planted orchard 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 trees, but before weeds emerge or tree buds break.

Established Orchards

Apply herbicides to the tree row in established orchards twice annually, in late-fall and in late-spring. Herbicides applied in late- fall 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/year include:

1. Control of winter annual weeds, including camphorweed, wild lettuce and horseweed (marestail) 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.

ORCHARD WEED CONTROL

Late-Fall Herbicide Applications

Late-Fall Herbicide Applications should be applied after soil temperatures at the 4 inch depth drop below 50°F, but before the soil freezes. Include a translocated postemergence herbicide and a residual broadleaf herbicide. Apply 2,4-D choline or Gramoxone 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. Add Princep for residual control of broadleaf weeds.

The use of a grass herbicide in the fall depends on the product chosen. Kerb is the only grass herbicide that must be applied in the late-fall, if it is used to control 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.

Solicam 80DF, Surflan 4AS, and Prowl H2O are annual grass herbicides that should be applied in late-fall or as a split application, the first 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.

Sinbar 80WDG applications for annual grass control should be applied only in late-spring. The relatively high solubility of Sinbar 80WDG results in leaching when applied in the fall. Increased risk of crop injury and poor weed control can result.

Follow-up Late-Spring Applications

Follow-up Late-Spring Applications should include a different residual broadleaf weed herbicide and a residual grass herbicide. Add a postemergence herbicide only if needed. Use Karmex 80DF for residual broadleaf weed control. Apply Sinbar 80WDG or the second half of a split herbicide treatment of Solicam 80DF, Surflan 4AS, or Prowl H2O for annual grass control. Include 2,4-D choline if seedling annual broadleaf weeds are observed, or a labeled glyphosate product to control established annual or perennial grasses and broadleaf weeds. Sinbar 80WDG is also effective for seedling weed control postemergence. No other postemergence herbicide may be needed if no established weeds are present and seedling weeds are sprayed before they exceed 1 inch in height. See Table 5.2 for recommended herbicides for each crop.

5.7 Weed Control in Sod Between Tree Rows

Broadleaf weeds are undesirable in an orchard sod growing between the tree rows. Competition with the crop and mowing requirements may be increased. Many weeds are alternate hosts for diseases, insects, and nematode pests. The flowers of dandelion, clover, mustard species, and other weeds coincide with apple bloom and are preferred by pollinating insects. The same weeds, and others, may also bloom before or after the trees bloom and attract bees into the orchard when insecticides must be sprayed. The seedheads of dandelion clog tractor radiators and delay other orchard maintenance operations. Many broadleaf weeds can be controlled or suppressed in the fall with 2,4-D choline applied before the weeds become dormant for the winter. Use 2.0 pt/A of Embed Extra (1.0 lb a.e./A 2,4-D choline). Spray to uniformly wet the foliage of the target weeds. Flat fan nozzles provide more uniform coverage than flood tips and should be used to apply postemergence herbicides. Choose a day to spray when no rain will occur for a minimum of eight hours after application.

Clover is difficult to control, but can be suppressed or controlled in an orchard sod with good management practices and herbicides. Manage fertilizer applications to favor grass rather than the clover. Nitrogen fertilizer stimulates grass growth, and phosphorus and potassium stimulate clover growth in a mixed grass and legume sod. Do not apply fertilizer containing phosphorous or potassium to sod if clover control is a problem. Rather, apply fertilizer for tree growth in the vegetation free strip. Mowing height also influences the composition of a mixed grass and clover sod. Close mowing favors the clover. Taller sod will favor the grass. Mow no closer than four inches if clover control is a problem in the sod. Clover is difficult to control with 2,4-D, but excellent control can be obtained by tank-mixing Stinger with 2,4-D. Certain other weeds, including wild onion and garlic, and clover can be suppressed or controlled with 2,4-D, but good results require additional effort. The leaves of clover are

densely covered by fine hairs and wild onion leaves are waxy and vertical. Both weeds retain spray poorly. Add nonionic surfactant to increase wetting and spray retention to improve control. Add the surfactant in units of 1 qt/100 gal of spray solution. Check for improved wetting after adding each quart of surfactant. The amount of surfactant needed will depend on the characteristics of the water used. Use the amount needed to improve wetting. Too much or too little surfactant will reduce control. Splitting the application by applying half the 2,4-D rate twice, about 7 to 14 days apart, will further improve the suppression or control of clover and wild onion. Use 2,4-D in conjunction with good fertilization and mowing practices to suppress clover on sites where the weed is well adapted.

5.8 Tree Fruit Herbicide Recommendations

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 5.2), and control the weed species in your orchard (Table 5.3). Use the correct amount of residual herbicides for each soil type (Table 5.4) or emerged weed species (Table 5.5). Make sure to respect Re-Entry Interval (**REI**) AND Pre-Harvest Interval (**PHI**) following herbicide application (Table 5.6).

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. Information on dwarf trees and trees growing on their own roots is incomplete. Use herbicides with care on these trees.

The Label is the Law

A pesticide applicator is legally bound by the labeling found on and with the pesticide container in their possession. Before using a pesticide, check and always follow the **labeling distributed with the product at the point of sale for legally enforceable rates and restrictions**. **See the Pesticide Use Disclaimer on page 2.**

Table 5.2 Crop Safety of Herbicides for Use in Tree Fruits

Commercial Product	Active Ingredient	HRAC Group[1]	Apple		Pear		Peach		Plum		Cherry		General Comments
			New	Est	New	Est	New	Est	New	Est	New	Est	
Incorporated (residual)													
Treflan HFP 4EC	trifluralin	3	–	–	–	–	L	L	L	L	–	–	Incorporation within 24 h after application
Preemergence (residual)	**THE AREA TO BE TREATED MUST BE FREE OF SURFACE LITTER**												
(Matrix SG, Solida) 25WG	rimsulfuron	**2**	–	G	–	G	–	G	–	G	–	G	For broad spectrum residual control, tank mix with Karmex, Sinbar, Surflan or Prowl.For nonselective POST control, apply in combination with glyphosate, paraquat, or glufosinate. Rainfall (½ to 1") necessary within 14 days of application for incorporation. May be applied sequentially. Not effective on group 2 resistant horseweed.
(Kerb) 50WP (Kerb) 3.3SC	pronamide	3	–	G	–	G	–	G	–	G	–	G	**Restricted use pesticide**. Application of Kerb must be in the fall, after the fruit is harvested, but prior to soil freeze-up. See label for details pertaining use restrictions based on soil type. Rainfall (½ to 1") necessary within 14 days of application for incorporation.
(Prowl H2O) 4AS	pendimethalin	3	G	G	G	G	G	G	G	G	G	G	May be applied sequentially. Rainfall (½ to 1") necessary within 7 days of application for incorporation. Tank mix with paraquat, glyphosate, or glufosinate for non-selective POST weed control.
(Surflan, Oryzalin) 4S (Surflan XL) 2G[5]	oryzalin + benefin[8]	3	G	G	G	G	G	G	G	G	G	G	Can be tank mixed with Goal, paraquat, glyphosate, simazine, or Solicam. May be applied sequentially. Rainfall (½ to 1") necessary within 10 days of application for incorporation.
(Princep, Simazine) 4L (Princep Caliber) 90WDG	Simazine	**5**	–	F/G	–	F/G	–	F/G	–	L	–	L	Tank mixing with Surflan, Solicam, or Prowl will expand residual control of annual grasses. Tank mix with paraquat, glyphosate, or glufosinate for non-selective POST weed control.
(Sinbar) 80WDG	Terbacil	**5**	L	F/G	L	–	L	F	L	–	L	–	See label for details pertaining to tanx mixing with Karmex and use restrictions based on soil type
(Karmex) 80DF (Direx) 4L	Diuron	**7**	–	L	–	L	–	L	–	–	–	–	Apply in spring (March through May). Tank mix with paraquat, glyphosate, or glufosinate for non-selective POST weed control.
(Solicam) 80DF	norflurazon	12	F/G	G	–	L	F/G	G	–	L	–	L	Can be tank mixed with diuron, Goal, paraquat, Prowl, glyphosate, simazine, rimsulfuron, or oryzalin. See label for details pertaining to use restrictions based on soil type

Table 5.2 Crop Safety of Herbicides for Use in Tree Fruits - Preemergence (residual) continued on next page

Table 5.2 Crop Safety of Herbicides for Use in Tree Fruits - Preemergence (residual) continued

Commercial Product	Active Ingredient	HRAC Group[1]	Apple		Pear		Peach		Plum		Cherry		General Comments
			New	Est	New	Est	New	Est	New	Est	New	Est	
(Zeus Prime XC) 3.5 XC	sulfentrazone + carfentrazone	**14**	–	G	–	–	–	–	–	–	–	–	Sequential applications of Zeus Prime can be applied when directed as a banded application (50% band or less of orchard floor) so long as total use rate does not exceed 15.1 fl. oz/A on a broadcast basis within a year and the second application is not applied within 60 days of the initial application. For optimum residual control of annual grass weeds tank mix with oryzalin, Prowl, or Solicam.
(Goal 2XL, Galigan) 2EC	oxyfluorfen	**14**	G	G	G	G	G	G	G	G	G	G	**Dormant application only**
(Chateau) 51SW (Tuscany) 4SC	flumioxazin	**14**	G	G	G	G	G	G	G	G	G	G	Sequential applications are very effective. See label for details pertaining to use restrictions. Tank mix with paraquat, glyphosate, or glufosinate for non-selective POST weed control
(Casoron) 4G	dichlobenil	20	L	G	L	G	–	–	–	–	L	L	Apply between December and Februrary.
(Casoron CS) 1.4L	dichlobenil	20	–	G	–	G	–	–	–	–	–	L	Apply when temperatures are less than 70°F. Tank mix with paraquat, glyphosate, or glufosinate for non-selective POST weed control
(Gallery, Trellis) 4.16SC	isoxaben	21	G	L[6]	G	–	G	–	G	–	G	–	Tank mix with oryzalin, Prowl, or Solicam to provide residual control of annual grass weeds. Rainfall (½ to 1") necessary within 10 days of application.
(Motif) 4L	mesotrione	**27**	–	F/G	–	F/G	–	F/G	–	F/G	–	F/G	Provides both residual and post-emergence control of susceptible broadleaf weeds. Tank mixing with Surflan, Solicam, or Prowl H2O will expand residual control of annual grasses.
(Alion) 1.67SC	indaziflam	29	–	G	–	G	–	G	–	G	–	G	See label for use restrictions pertaining to soil type amd maximum rate allowed. Tank mix with paraquat, glyphosate, or glufosinate for non-selective POST weed control
Postemergence (selective) DIRECTED UNDERNEATH TREE													
(Fusilade DX) 2EC	fluazifop	**1**	G	–	G	–	G	G	G	G	G	G	**GRASS CONTROL ONLY**. Non-bearing orchards ONLY for apple and pear. See label for rate and optimum grass size to treat. Add COC at 1% v/v.
(Poast) 1.5EC	sethoxydim	**1**	G	G	G	G	–	G	G	–	G	G	**GRASS CONTROL ONLY**. See label for rate and optimum grass size to treat. Add COC at 1 qt/A.

Table 5.2 Crop Safety of Herbicides for Use in Tree Fruits - Postemergence (selective) continued on next page

ORCHARD WEED CONTROL

Table 5.2 Crop Safety of Herbicides for Use in Tree Fruits - Postemergence (selective) continued

Commercial Product	Active Ingredient	HRAC Group[1]	Apple		Pear		Peach		Plum		Cherry		General Comments
			New	Est	New	Est	New	Est	New	Est	New	Est	
(Select Max) 1EC (Select, Intensity) 2EC	clethodim	**1**	G	–	G	–	G	L[7]	G	–	G	–	**GRASS CONTROL ONLY**. Unless otherwise stated on label, **all clethodim products are for non-bearing orchards ONLY**. Apply to actively growing grasses not under stress. See label for rate and optimum grass size to treat. When using the 2 EC formulations, add COC at 1% v/v. When using the 1 EC formulations, add NIS at 0.25% v/v.
(Sandea) 75WG[2]	halosulfuron	**2**	–	G	–	G	–	–	–	–	–	–	**Provides both residual and post-emergence control of susceptible broadleaf weeds.** Sequential applications of at least 0.75 oz/A per application are more effective on yellow nutsedge. Addition of a nonionic surfactant is necessary for optimum herbicide performance. Halosulfuron may be tank mixed with glyphosate for broad spectrum POST weed control. Not effective on group 2 resistant horseweed.
(Embed) 3.8SL[2, 4]	2,4-D choline	4	-	G	-	G	-	G	-	G	-	G	Apply any time during the growing season to actively growing annual and perennial broadleaf weeds **EXCEPT during bloom**. **DO NOT** apply on loamy sand or coarser soils. See label for details pertaining to use restrictions. Reduced drift technology associated with 2,4-D choline
(various manufacturers and brands)3.8SL[2, 4]	2,4-D amine	4	F	G	F	G	F	G	F	G	F	G	Apply any time during the growing season to actively growing broadleaf weeds **EXCEPT during bloom**. See label for use restrictions.
(Stinger, Spur) 3EC	clopyralid	4	–	G	–	–	G	G	G	G	G	G	**DO NOT** apply during bloom. Effective on broadleaf weeds including clover, horseweed, thistle, dandelion and mugwort.
(Aim) 2EC[2]	carfentrazone	**14**	G	G	G	G	G	G	G	G	G	G	Best results obtained on broadleaf weeds in the 2-3-leaf stage, and mixed with NIS 0.25% v/v or COC 1% v/v at a minimum of 20 GPA. Apply alone or tank mixed with other herbicides.
(Treevix) 70WG[2]	saflufenacil	**14**	–	L	–	L	–	–	–	–	–	–	Treevix may be tank mixed with glyphosate, glufosinate, Poast, and oxyfluorfen. Treevix provides excellent control of horseweed, purslane, morningglory species, ragweed, and smartweed. The addition of MSO at 1% v/v plus ammonium sulfate at 8.5 to 17 lb/100 gal of spray solution is required for optimum herbicide performance.

Table 5.2 Crop Safety of Herbicides for Use in Tree Fruits - Postemergence (selective) continued on next page

Table 5.2 Crop Safety of Herbicides for Use in Tree Fruits - Postemergence (selective) continued

Commercial Product	Active Ingredient	HRAC Group[1]	Apple		Pear		Peach		Plum		Cherry		General Comments
			New	Est	New	Est	New	Est	New	Est	New	Est	
(Venue) 0.17L[2]	pyraflufen-ethyl	**14**	G	G	G	G	G	G	G	G	G	G	Best results obtained on broadleaf weeds in the 2-3-leaf stage, and mixed with NIS 0.25%v/v or COC 1% v/v at a minimum of 20 GPA. Apply alone or tank mixed with other herbicides.
(Motif) 4L[2]	mesotrione	**27**	–	F/G	–	F/G	–	F/G	–	F/G	–	F/G	**Provides both residual and post-emergence control of susceptible broadleaf weeds.** Tank mixing with Surflan, Solicam, or Prowl H2O will expand residual control of annual grasses. For application to emerged weeds, the use of COC at 1% v/v or NIS at 0.25% v/v is recommended. Addition of ammonium sulfate or other nitrogen-based adjuvants will increase efficacy when used in combination with COC or NIS. Apply on weeds less than 5" tall.
Postemergence (nonselective) DIRECTED UNDERNEATH TREE													
(Starane Ultra) 2.8SL[3]	Fluroxypyr	4	–	L	–	L	–	–	–	–	–	–	Supplemental label use. **DO NOT** apply during bloom or to trees less than 4 years old. **DO NOT** make more than one treatment per crop per year. Apply during calm periods and when air temperatures are between 50 and 80°F.
(various brands and formulations)[3]	Glyphosate	**9**	G	G	G	G	G	G	G	G	G	G	Trees are more susceptible to injury from midsummer until dormant. Repeat applications may be necessary for control of perennial weeds. See label for spray additive information and for detailed restriction information.
(Rely, Interline) 2.34L[3]	glufosinate	10	G	G	G	G	G	G	G	G	G	G	**DO NOT SPRAY GREEN BARK, UNCALLOUSED BARK OR DESIRABLE FOLIAGE UNLESS TREES ARE PROTECTED**. Apply as a directed spray at a minimum of 20 GPA. Repeated applications may be necessary for control of perennial weeds. The addition of ammonium sulfate will enhance glufosinate activity on difficult to control species; however, the addition of surfactants and crop oil will increase risk of crop injury. For optimal performance, spray under cloudless conditions and when sun is high in the sky.
(Gramoxone SL) 2SL [2] (Firestorm) 3SL[2]	Paraquat	22	G	G	G	G	G	G	G	G	G	G	**Restricted use pesticide**. Apply on actively growing grasses and broadleaf weeds that are 1 to 6 inches tall for best results. Add NIS surfactant at 0.25% v/v.

Table 5.2 Crop Safety of Herbicides for Use in Tree Fruits - continued on next page

Table 5.2 Crop Safety of Herbicides for Use in Tree Fruits -continued

G = Good, F = Fair, P = Poor (not recommended), L=Labeled (data insufficient or not recommended), – = NOT LABELED (DO NOT USE), New = New Plantings, Est = Established Orchards.

[1] **Bolded group numbers are herbicides at higher risk for selecting resistant weed populations.** [2] Do NOT alllow spray to contact young, green bark. [3] Do NOT alllow spray to contact any part of the tree, including mature bark. [4] Use only 2,4-D formulation(s) labeled for use in orchards! [5] Surflan XL 2G is only labeled on non-bearing fruit trees. [6] ONLY Trellis SC is labeled for use on bearing apples. [7] ONLY Select Max is labeled for use on bearing peach. [8] Benefin only present in Surflan XL.

Table 5.3 Herbicide Effectiveness on Major Annual Weeds in Tree Fruits

Herbicide performance is affected by weather, soil type, herbicide rate, weed pressure, and other factors. These ratings indicate ONLY relative effectiveness in tests conducted by Rutgers, The State University of New Jersey, on coarse- to medium-textured soils. Actual performance may be better or worse than indicated in this chart. **(G = Good, F = Fair, P = Poor, N = None, – = insufficient data)**

	Barnyardgrass	Crabgrass, large	Fall Panicum	Foxtail sp.	Goosegrass	Johnsongrass (seedlings)	Yellow nutsedge	Carpetweed	Cocklebur, common	Galinsoga, hairy	Jimsonweed	Lambsquarters, common	Marestail/Horseweed	Morningglory sp.	Nightshade, Eastern black	Pigweed sp.	Purslane, common	Ragweed, common	Shepherd's-purse	Smartweed, Pennsylvania	Velvetleaf	Bindweed, Hedge	Dandelion	Horsenettle	Thistle, Canada
Preemergence (residual)																									
(Alion) 1.67SC	G	F/G	–	G	G	–	N	G	–	G	G	G	G	F	G	G	G	F	G	–	G	N	–	–	N
(Casoron) 4G (Casoron CS) 1.4L	F	G	F/G	G	F	F	–	–	–	–	–	G	F	–	–	G	G	–	G	–	–	–	–	–	–
(Chateau) 51SW (Tuscany) 4SC	F	F	F	F	F	F	P	G	–	G	G	G	G	G	G	G	G	G	G	G	G	–	P	–	N
(Gallery, Trellis) 4.16SC	N	N	N	N	N	N	F	–	G	G	G	G	G	G	G	G	G	G	G	G	G	N	N	N	N
(Goal 2XL, Galigan)2EC	F	F	F	F	–	–	P	G	–	G	G	G	G	–	G	G	G	G	G	G	G	N	N	N	N
(Karmex) 80DF (Direx) 4L	G	F/G	G	G	F/G	N	N	G	–	G	G	G	G	G	G	G	G	G	G	F	G	N	N	N	N
(Kerb) 50WP (Kerb) 3.3SC	G	G	G	G	G	–	N	G	N	P	N	G	P	–	–	G	G	P	–	–	P	N	N	N	N
(Matrix, Solida) 25WG	G	F	F	G	P	–	F	–	F/G	–	F	F	–	F	N	G	G	F	P	P	F	–	F	–	–
(Motif) 4L	N	P	N	N	N	N	F	G	F	G	G	G	F/G	F/G	G	G	–	F/G	G	G	G	–	F	F	F
(Princep, Simazine) 4L (Princep Caliber) 90WDG	F/G	F	F/G	F	F	P	N	–	F/G	G	G	F	G	G	G	F	G	G	G	G	F/G	N	N	N	N
(Prowl H2O) 4AS	G	G	G	G	G	F	N	G	N	N	N	F/G	N	N	N	F	F/G	N	–	–	F/G	N	N	N	N

*Table 5.3 Herbicide Effectiveness on Major Annual Weeds in Tree Fruits – **Preemergence (residual)** continued on next page*

*Table 5.3 Herbicide Effectiveness on Major Annual Weeds in Tree Fruits - **Preemergence (residual)** continued*

	Barnyardgrass	Crabgrass, large	Fall Panicum	Foxtail sp.	Goosegrass	Johnsongrass (seedlings)	Yellow nutsedge	Carpetweed	Cocklebur, common	Galinsoga, hairy	Jimsonweed	Lambsquarters, common	Marestail/Horseweed	Morningglory sp.	Nightshade, Eastern black	Pigweed sp.	Purslane, common	Ragweed, common	Shepherd's-purse	Smartweed, Pennsylvania	Velvetleaf	Bindweed, Hedge	Dandelion	Horsenettle	Thistle, Canada
(Sandea) 75WG	N	N	N	N	N	N	G	P	G	G	P	N	–	P	P	G	G	G	G	F/G	G	–	–	–	–
(Sinbar) 80WDG	P	F	F	F	F	–	P	G	–	G	G	G	F	G	G	G	G	G	G	G	G	N	N	N	N
(Solicam) 80DF	G	G	G	G	G	F	F	P	P	–	F	F	P	P	–	F	G	F/G	–	P	F	N	N	N	N
(Surflan, Oryzalin) 4S (Surflan XL) 2G	G	G	G	G	G	G	N	F/G	N	N	N	F/G	N	N	P	F/G	F/G	N	N	P	P	N	N	N	N
(Zeus Prime XC) 3.5 XC	G	G	G	G	F	–	–	G	–	–	G	G	–	–	–	–	–	G	–	F	–	–	–	–	–
Postemergence (selective)																									
2,4-D amine	N	N	N	N	N	N	N	G	G	F	F/G	G	F	F/G	F	G	G	G	G	F	G	F	F	P	F
(Aim) 2EC	N	N	N	N	N	N	N	P	N	–	N	F	N	F	F	G	–	N	F	N	F	N	N	N	N
(Embed) 3.8SL	N	N	N	N	N	N	N	G	G	F	F/G	G	F	F/G	F	G	G	G	G	F	G	F	F	P	F
(Fusilade DX) 2EC	G	G	G	G	G	G	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
(Motif) 4L	N	P	N	N	N	N	F	G	F	G	G	G	F/G	F/G	G	G	–	F/G	G	G	G	–	F	F	F
(Poast) 1.5EC	G	G	G	G	G	G	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
(Sandea) 75WG	N	N	N	N	N	N	G	P	G	G	P	N	–	P	P	G	G	G	G	F/G	G	–	–	–	–
(Select Max) 1EC (Select, Intensity) 2EC	G	G	G	G	G	G	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
(Stinger, Spur) 3EC	N	N	N	N	N	N	N	N	G	G	F/G	P	F	N	F	P	N	G	N	P	P	N	F	P	G
(Treevix) 70WG	N	N	N	N	N	N	N	G	–	–		G	G	F	–	F/G	–	G	–	G	G	–	–	–	–
(Venue) 0.17L	N	N	N	N	N	N	N	N	–	–	N	F/G	N	F	F	F	–	N	–	N	G	N	N	N	N
Postemergence (non-selective)																									
(Gramoxone SL) 2SL (Firestorm) 3SL	F/G	F/G	F/G	G	F/G	–	N	F	G	G	G	F/G	F	F/G	G	G	F/G	F/G	G	F	G	P	P	P	N
glyphosate	G	G	G	G	G	G	P/F	G	G	G	G	G	N	F	F	G	G	G	G	G	G	F	F	F	G
(Rely, Interline) 2.34L	F/G	F/G	F	G	N	F	P/F	G	G	G	G	G	G	F/G	F	G	–	G	–	G	F/G	–	–	–	–
(Starane Ultra) 2.8SL	N	N	N	N	N	N	N	–	F/G	–	–	–	F/G	–	–	–	–	F/G	–	–	F/G	F	F	F	–

Table 5.4 Recommended Preemergence Herbicide Rates (Active Ingredients, lb/A)

Soil Type	Sand		Loamy Sand		Sandy Loam			Loam		Silt Loam		Clay Loam	
% Organic Matter	**0-1**	**1-2**	**0-1**	**1-2**	**0-1**	**1-2**	**2-4**	**1-2**	**2-4**	**1-2**	**2-4**	**1-2**	**2-4**
(Alion) 1.67SC	0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.085	0.085	0.085	0.085	0.085	0.085
(Casoron) 4G (Casoron CS) 1.4L	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
(Chateau) 51SW (Tuscany) 4SC	0.19-0.38	0.19-0.38	0.19-0.38	0.19-0.38	0.19-0.38	0.19-0.38	0.19-0.38	0.19-0.38	0.19-0.38	0.19-0.38	0.19-0.38	0.19-0.38	0.19-0.38
(Gallery, Trellis) 4.16SC	0.75	0.75	0.75	0.75	0.75	0.75	1	0.75	1	1	1	1	1
(Goal 2XL, Galigan) 2EC	1.5-2	1.5-2	1.5-2	1.5-2	1.5-2	1.5-2	1.5-2	1.5-2	1.5-2	1.5-2	1.5-2	1.5-2	1.5-2
(Karmex) 80DF[2] (Direx) 4L[2]	–	–	–	–	–	1.5	2	2	2.5	2.5	3	3	3
(Kerb) 50WP (Kerb) 3.3SC	2	2	2	2	2	2	2	2.5	3	3	3.5	3.5	4
(Matrix, Solida) 25WG	0.062	0.062	0.062	0.062	0.062	0.062	0.062	0.062	0.062	0.062	0.062	0.062	0.062
(Motif) 4L	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
(Princep, Simazine) 4L[1] (Princep Caliber) 90WDG[1]	–	–	–	–	–	2	2	2	3	2	3	3	4
(Prowl H2O) 4AS	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) 75WG	0.023-0.047	0.023-0.047	0.023-0.047	0.023-0.047	0.023-0.047	0.023-0.047	0.023-0.047	0.023-0.047	0.023-0.047	0.023-0.047	0.023-0.047	0.023-0.047	0.023-0.047
(Sinbar) 80WDG[1] - **New planting**	–	–	–	–	–	0.4-0.8	0.4-0.8	0.4-0.8	0.4-0.8	0.4-0.8	0.4-0.8	0.4-0.8	0.4-0.8
(Sinbar) 80WDG[1] - **Established**	–	–	–	–	–	1.6	2.4	2	2.8	2	2.8	2.4	3.2
(Solicam) 80DF	–	–	–	2	–	2	2.5	2.5	2.5	2.5	3	3	4
(Surflan, Oryzalin) 4S[2] (Surflan XL) 2G[2]	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
(Treflan HFP) 4EC[3]	0.5	0.5	0.5	0.5	0.5	0.63	0.75-1	0.63	0.75-1	0.63	0.75-1	0.63	0.75-1
(Zeus Prime XC) 3.5 XC	–	0.21-0.41	–	0.21-0.41	–	0.21-0.41	0.21-0.41	0.21-0.41	0.21-0.41	0.21-0.41	0.21-0.41	0.21-0.41	0.21-0.41

– = NOT LABELED (DO NOT USE)

[1] Use 50% of the recommended rate when tank-mixing with another preemergence herbicide.

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

[3] Recommended rates for new planting. For established planting, apply 1 to 2 lb a.i/A regardless of texture or %OM.

Table 5.5 Recommended Postemergence Herbicide Rates (Active Ingredients, lb/A)

Commercial Product	Active Ingredient	Apple		Pear		Peach		Plum		Cherry	
		New	Est	New	Est	New	Est	New	Est	New	Est
(various manufacturers and brands) 3.8SL	2,4-D amine	0.95 to 1.4		0.95 to 1.4		0.95 to 1.4		0.95 to 1.4		0.95 to 1.4	
(various brands and formulations)	glyphosate	1 to 2		1 to 2		1 to 2		1 to 2		1 to 2	
(Aim) 2EC	carfentrazone	0.008 to 0.025		0.008 to 0.025		0.008 to 0.025		0.008 to 0.025		0.008 to 0.025	
(Embed) 3.8SL	2,4-D choline	-	0.48 to 1.9	-	0.48 to 1.9	-	0.48 to 1.9	-	0.48 to 1.9	-	0.48 to 1.9
(Fusilade DX) 2EC	fluazifop	-	0.125 to 0.38	-	0.125 to 0.38	0.125 to 0.38		0.125 to 0.38		0.125 to 0.38	
(Gramoxone SL) 2SL (Firestorm) 3SL	paraquat	0.6 to 1		0.6 to 1		0.6 to 1		0.6 to 1		0.6 to 1	
(Motif) 4L	mesotrione	-	0.094 to 0.188	-	0.094 to 0.188	-	0.094 to 0.188	-	0.094 to 0.188	-	0.094 to 0.188
(Poast) 1.5EC	sethoxydim	0.19 to 0.47		0.19 to 0.47		-	0.19 to 0.47	0.19 to 0.47	-	0.19 to 0.47	
(Rely, Interline, Lifeline) 2.34L	glufosinate	0.88 to 1.5		0.88 to 1.5		0.88 to 1.5		0.88 to 1.5		0.88 to 1.5	
(Sandea) 75WG	halosulfuron	-	0.023 to 0.047	-	0.023 to 0.047	-	-	-	-	-	-
(Select Max) 1EC (Select, Intensity) 2EC	clethodim	0.094 to 0.126	-	0.094 to 0.126	-	0.094 to 0.126	-	0.094 to 0.126	-	0.094 to 0.126	-
(Starane Ultra) 2.8SL	fluroxypyr	-	0.35 to 0.70	-	0.35 to 0.70	-	-	-	-	-	-
(Stinger, Spur) 3EC	clopyralid	-	0.094 to 0.25	-	-	0.125 to 0.25		0.125 to 0.25		0.125 to 0.25	
(Treevix) 70WG	saflufenacil	-	0.044	-	0.044	-	-	-	-	-	-
(Venue) 0.17L	pyraflufen-ethyl	0.0040 to 0.0053		0.0040 to 0.0053		0.0040 to 0.0053		0.0040 to 0.0053		0.0040 to 0.0053	

– = NOT LABELED (DO NOT USE)

Table 5.6 Herbicide Reentry and Preharvest Interval Restrictions

Commercial Product	POME FRUIT				STONE FRUIT					
	Apple		Pear		Peach		Plum		Cherry	
	REI	PHI	REI	PHI	REI	PHI	REI	PHI	REI	PHI
Incorporated (residual)										
(Treflan HFP) 4EC	–	–	–	–	12 h	nl	12 h	nl	–	–
Preemergence (residual)										
(Alion) 1.67SC	12 h	14 d	12 h	14 d	12 h	14 d	12 h	14 d	12 h	14 d
(Casoron) 4G (Casoron CS) 1.4L	12 h	nl	12 h	nl	–	–	–	–	12 h	nl
(Chateau) 51SW (Tuscany) 4SC	12 h	60 d	12 h	60 d	12 h	60 d	12 h	60 d	12 h	60 d
(Gallery, Trellis) 4.16SC	12 h	30/365 d[1]	12 h	365 d	12 h	365 d	12 h	365 d	12 h	365 d
(Goal 2XL, Galigan) 2EC	24 h	nl	24 h	nl	24 h	nl	24 h	nl	24 h	nl
(Karmex) 80DF (Direx) 4L	12 h	nl	12 h	nl	12 h	nl	–	–	–	–
(Kerb) 50WP (Kerb) 3.3SC	24 h	nl	24 h	nl	24 h	nl	24 h	nl	24 h	nl
(Matrix, Solida) 25WG	4 h	7 d	4 h	7 d	4 h	14 d	4 h	14 d	4 h	14 d
(Motif) 4L	12 h	30 d	12 h	30 d	12 h	30 d	12 h	30 d	12 h	30 d
(Princep, Simazine) 4 (Princep Caliber) 90WDG	12 h	150 d	12 h	nl	12 h	nl	12 h	nl	12 h	nl
(Prowl H2O) 4AS	24 h	60 d	24 h	60 d	24 h	60 d	24 h	60 d	24 h	60 d
(Sandea) 75WG	12 h	14 d	12 h	14 d	–	–	–	–	–	–
(Sinbar) 80WDG	12 h	60 d	12 h	nl	12 h	60 d	12 h	nl	12 h	nl
(Solicam) 80DF	12 h	60 d	12 h	60 d	12 h	60 d	12 h	60 d	12 h	60 d
(Surflan, Oryzalin) 4S (Surflan X)L 2G	24 h	nl	24 h	nl	24 h	nl	24 h	nl	24 h	nl
(Zeus Prime XC) 3.5XC	12 h	nl	–	–	–	–	–	–	–	–
Postemergence (selective)										
2,4-D amine	48 h	14 d	48 h	14 d	48 h	40 d	48 h	40 d	48 h	40 d
(Aim) 2EC	12 h	3 d	12 h	3 d	12 h	3 d	12 h	3 d	12 h	3 d
(Embed) 3.8SL	48 h	14 d	48 h	14 d	48 h	40 d	48 h	40 d	48 h	40 d
(Fusilade DX) 2EC	12 h	365 d	12 h	365 d	12 h	14 d	12 h	14 d	12 h	14 d
(Motif) 4L	12 h	30 d	12 h	30 d	12 h	30 d	12 h	30 d	12 h	30 d

*Table 5.6. Herbicide Reentry and Preharvest Interval Restrictions - **Postemergence (selective)** continued on next page*

*Table 5.6. Herbicide Reentry and Preharvest Interval Restrictions - **Postemergence (selective)** continued*

Commercial Product	POME FRUIT				STONE FRUIT					
	Apple		Pear		Peach		Plum		Cherry	
	REI	PHI	REI	PHI	REI	PHI	REI	PHI	REI	PHI
(Poast) 1.5EC	12 h	14 d	12 h	14 d	12 h	25 d	12 h	365 d	12 h	25 d
(Sandea) 75WG	12 h	14 d	12 h	14 d	–	–	–	–	–	–
(Select Max, Intensity One) 1EC (Select, Intensity) 2EC	24 h	365 d	24 h	365 d	24 h	14/365 d[2]	24 h	365 d	24 h	365 d
(Stinger, Spur) 3EC	12 h	30 d	–	–	12 h	30 d	12 h	30 d	12 h	30 d
(Treevix) 70WG	12 h	0 d	12 h	0 d	–	–	–	–	–	–
(Venue) 0.17L	12 h	0 d	12 h	0 d	12 h	0 d	12 h	0 d	12 h	0 d
Postemergence (non-selective)										
glyphosate	4 h	1 d	4 h	1 d	4 h	17 d	4 h	17 d	4 h	17 d
(Gramoxone SL) 2SL (Firestorm) 3SL	24 h	nl	24 h	nl	24 h	14 d	24 h	28 d	24 h	28 d
(Rely, Interline) 2.34L	12 h	14 d	12 h	14 d	12 h	14 d	12 h	14 d	12 h	14 d
(Starane Ultra) 2.8SL	24 h	14 d	24 h	14 d	–	–	–	–	–	–

– = NOT LABELED (DO NOT USE), nl = not listed, h = hours, d = days

[1] 30 d only applicable for Trellis SC, all other isoxaben products are 365 d.

[2] 14 d only applicable to Select Max, all other cletodim products are 365 d.

5.9 Troublesome Weeds

Annual: A Weed that lives less than 1 full year.
Biennial: A Weed that lives longer than 1 year, but less than 2 full years. The plant often grows vegetatively during the first year, then flowers and dies during the second year.
Perennial: A Weed that lives longer than 2 full years, often reproducing vegetatively by horizontal shoots, roots, or rhizomes, as well as by seed.
Most problem weeds are either perennial or biennial plants. Complete weed control (eradication) of any weed is difficult or impossible. Established perennial weeds are among the most difficult to kill. One application of an herbicide recommended below may not provide complete control, but regrowth should be limited and competitive ability reduced. Follow-up spot treatments will improve the long-term result of the initial herbicide application.

Bindweed Species (Field & Hedge)

This perennial weed has deep vertical roots for food storage, and horizontal roots that spread the weed vegetatively. Shoots emerge from this extensive root system in the spring and wind themselves around any available support. Flowers first appear in June, and flowering continues throughout the summer.

Glyphosate. Apply when the weed is growing actively and has flowers in late-spring or early summer and/or in late-summer or early-fall after harvest, but before the first frost. Late-spring or fall applications may be more effective than applications made in mid-summer. See WARNINGS for glyphosate in the listing of Postemergence Herbicides - Nonselective above.
Broadcast: 3.0 to 3.75 lb a.e./A. Spot Treatment: Use the higher percent solution on the label of the glyphosate product being used. Apply to wet the foliage to the drip point.
For newly planted (nonbearing) apples, peaches, pears, plums, and cherries.
For established (bearing) apples, peaches, pears, plums, and cherries.

Starane Ultra (fluroxypyr) – 0.25 to 0.5 lb a.i./A. Use 0.7 to 1.4 pt of Starane Ultra/A control or suppress bindweed species. Apply to the foliage of actively growing bindweed in late-spring. Treat the tree rows and sod middles in the area where bindweed is established. Do not apply more than 1.4 pt of Starane/year. Do not apply Starane Ultra more than one time/year, during bloom, within 14 days of harvest. Do not treat trees less than 4 years old. If bindweed regrowth occurs in late-summer or early-fall, treat sod middles with 2,4-D, and tree rows with 2,4-D or a glyphosate product after harvest, but before frost.
For established apples and pears ONLY.

Canada Thistle

This perennial weed has deep vertical roots for food storage, and horizontal roots that spread the weed vegetatively. Shoots emerge from this extensive root system in the spring. Flowers appear in late-June, and seed is dispersed in July. The shoots die after the seed is dispersed. New shoots appear in late-summer and grow vegetatively until frost. These fall shoots make food for the roots and do not flower.

Glyphosate (Roundup products, Touchdown products, Glyphomax Plus, and other labeled formulations). Apply in late- June when Canada thistle has flower buds or flowers, or in the fall after the shoots are 6 to 8 inches tall, but before frost. Roundup translocates into the vertical roots of the plant well, but in less quantity into the horizontal roots. Follow-up spot treatments may be needed to control regrowth from pieces of horizontal roots that were not killed by the initial application. See WARNINGS for glyphosate in the listing of Postemergence Herbicides - Nonselective above.
Broadcast: 2.25 lb a.i./A. Spot Treatment: Use the higher percent solution on the label of the glyphosate product being used. Apply to wet the foliage to the drip point. Wet a minimum of 50 percent of the weed foliage for effective control. ***For newly planted (nonbearing) apples, peaches, pears, plums, and cherries.***
For established (bearing) apples, peaches, pears, plums, and cherries. *Canada Thistle - continued on next page*

Canada Thistle – continued

Stinger 3EC (clopyralid) – 0.25 lb a.i./A. Use 10.5 fl oz/A of Stinger 3EC (or other labeled formulations) to control Canada thistle. Treat the weed when it emerges in the spring, or, for the most consistent control, split the treatments. Apply 5.25 fl oz/A of Stinger when the weed emerges in early spring. Apply another 5.25 fl oz/A of Stinger sixty to ninety days later. Treat the sod middles as well as the tree rows. **Stinger is a postemergence foliage absorbed herbicide AND a residual herbicide, therefore, Stinger must be applied with a calibrated sprayer that can deliver a predetermined number of gallons of spray solution/A. Maintain a 30 day PHI.**

Camphorweed

This is a biennial in the southern states. Seeds germinate in the late-summer or fall, and the plant overwinters as a rosette. Flowers are produced the following summer, and the plant dies. Whether camphorweed seedlings overwinter in NJ, or originate from seed that germinates in the spring, is unknown.

Glyphosate (Roundup products, Touchdown products, Glyphomax Plus, and other labeled formulations). Apply when the weed is growing rapidly. See WARNINGS for glyphosate in the listing of Postemergence Herbicides - Nonselective above.

Broadcast: 0.75 to 1.5 lb a.e./A.

Spot Treatment: Use the lower percent solution on the label of the glyphosate product being used. Apply to wet the foliage to the drip point.

For newly planted (nonbearing) apples, peaches, pear, plums, and cherries.

For established (bearing) apples, peaches, pears, plums, and cherries.

Dandelion

This perennial plant grows actively during the spring and fall. Flowering in the spring coincides with many fruit trees and may interfere with pollination by attracting bees away from the trees. This weed is known to be an alternate host for the stem-pitting virus of peaches and other stone fruits.

Glyphosate (Roundup products, Touchdown products, Glyphomax Plus, and other labeled formulations). Apply when the weed is growing actively and has flower buds. Spring or fall applications may be more effective than applications made in mid-summer. See WARNINGS for glyphosate in the listing of Postemergence Herbicides - Nonselective above.

Broadcast: 3.0 to 3.75 lb a.e./A.

Spot Treatment: Use the higher percent solution on the label of the glyphosate product being used. Apply to wet the foliage to the drip point.

For newly planted (nonbearing) apples, peaches, pears, plums, and cherries.

For established (bearing) apples, peaches, pears, plums, and cherries.

Goldenrod Species

These closely related weeds are perennials that begin growth in April from rosettes or rootstocks. Typically, yellow blooms appear in late-summer and the stems die in the fall. Some regrowth, as short stems or rosettes, often occurs before winter. Strong root systems overwinter and resume growth in the spring. The weeds spread using underground horizontal roots. Once established, control of this weed is difficult, since it is tolerant to most herbicides and the roots can be spread by cultivation or other tillage practices.

Glyphosate. Apply in May or June after spring growth is 8 to 10 inches tall, but before the shoots become too tall for good coverage with the spray solution. Generally, broadcast sprays must be applied in May, while spot treatments and ropewick applications can be delayed until June. See WARNINGS for glyphosate in the listing of Postemergence Herbicides - Nonselective above.

Broadcast: 1.5 to 3.0 lb a.e./A. Use 2.0 to 4.0 qt/A Roundup Ultra Max.

Goldenrod Species - Glyphosate - continued on next page

Goldenrod Species - Glyphosate - continued

Spot Treatment: Use the higher percent solution on the label of the glyphosate product being used. Apply to wet the foliage to the drip point. Ropewick Applicator: Wipe twice; travel in opposite direction for each wipe.
For newly planted (nonbearing) apples, peaches, pears, plums, and cherries.
For established (bearing) apples, peaches, pears, plums, and cherries.

Stinger 3EC (clopyralid) – 0.25 lb a.i./A. Use 10.5 fl oz/A of Stinger 3EC (or other labeled formulations) to control goldenrod. Treat the weed when it emerges in the spring, or, for the most consistent control, split the treatments. Apply 5.25 fl oz/A of Stinger, tank-mixed with 2,4-D, when the weed emerges in early spring. Apply another 5.25 fl oz/A of Stinger sixty to ninety days later. Treat the sod middles as well as the tree rows. **Stinger is a postemergence foliage absorbed herbicide AND a residual herbicide, therefore, Stinger must be applied with a calibrated sprayer that can deliver a predetermined number of gallons of spray solution/A. Maintain a 30 day PHI.**

Hemp Dogbane

Glyphosate. Apply when the weed is growing actively and has flowers in early summer and/or treat fall regrowth in late-summer or early-fall after harvest, but before the first frost. Late-spring or fall applications may be more effective than applications made in mid-summer. See WARNINGS for glyphosate in the listing of Postemergence Herbicides - Nonselective above.
Broadcast: 3.0 to 3.75 lb a.e./A. Spot Treatment: Use the higher percent solution on the label of the glyphosate product being used. Apply to wet the foliage to the drip point.
For newly planted (nonbearing) apples, peaches, pears, plums, and cherries.
For established (bearing) apples, peaches, pears, plums, and cherries.

Starane Ultra (fluroxypyr) – 0.25 to 0.5 lb a.i./A. Use 0.7 to 1.4 pt of Starane Ultra/A to control or suppress hemp dogbane. Apply to the foliage of actively growing dogbane in late-spring. Treat the tree rows and sod middles in the area where dogbane is established. Do not apply more than 1.4 pt of Starane/year. Do not apply Starane Ultra more than one time/year, during bloom, within 14 days of harvest. Do not treat trees less than 4 years old. If dogbane regrowth occurs in late-summer or early-fall, treat sod middles with 2,4-D, and tree rows with 2,4-D or a glyphosate product after harvest, but before frost.
For established apples and pears ONLY.

Horseweed (Marestail)

Horseweed is a biennial plant with seed that germinates in late-summer or early-fall. The seedling grows as a rosette during the fall and early spring. The plant bolts during the summer, flowers, sets seed, and dies during its second late-summer and fall season. The common name “marestail” is a misnomer. Herbicide labels that claim “marestail control” may be referring to another weed.

Stinger 3EC (clopyralid) – 0.094 to 0.125 lb a.i./A. Use 4.0 to 5.25 fl oz/A of Stinger 3EC, tank-mixed with 2,4-D, to control horseweed. Treat in the spring, while the weed is still in the rosette stage of growth, for best results. Thorough wetting of the foliage is needed for optimum control. Ensure good wetting of the foliage if treatment is delayed until after the weed has begun to grow tall in the late-spring to flower. Expect poor control after flower buds have formed. **Stinger is a postemergence foliage absorbed herbicide AND a residual herbicide, therefore, Stinger must be applied with a calibrated sprayer that can deliver a predetermined number of gallons of spray solution/A. Maintain a 30 day PHI.**

Note: GLYPHOSATE RESISTANT horseweed, also called marestail or stickweed locally, has been identified in the Mid-Atlantic Region, including NJ. Horseweed can behave like a biennial or summer annual weed, but usually behaves like a winter annual. The weed produces a large number of wind distributed seed in late-summer and early-fall. Due to the wind borne distribution of the seed, it is likely that glyphosate resistant
Note: GLYPHOSATE RESISTANT horseweed - continued on next page

Note: GLYPHOSATE RESISTANT horseweed – continued

biotypes will spread to your farm despite good integrated weed management by individual growers. Therefore, all horseweed populations should be considered potentially glyphosate resistant. Glyphosate, formulated as Roundup products, Touchdown, Glyphomax Plus, and other generic formulations were recommended for horseweed control prior to 2003, but have been removed from the recommendations for horseweed control due to the resistance development.

Milkweed, Common

Glyphosate. Apply when the weed is growing actively and has flowers in early summer and/or treat fall regrowth in late-summer or early-fall after harvest, but before the first frost. Late-spring or fall applications may be more effective than applications made in mid-summer. See WARNINGS for glyphosate in the listing of Postemergence Herbicides - Nonselective above.

Broadcast: 3.0 to 3.75 lb a.e./A.

Spot Treatment:

Use the higher percent solution on the label of the glyphosate product being used. Apply to wet the foliage to the drip point.

For newly planted (nonbearing) apples, peaches, pears, plums, and cherries.

For established (bearing) apples, peaches, pears, plums, and cherries.

Starane Ultra (fluroxypyr) – 0.25 to 0.5 lb a.i./A. Use 0.7 to 1.4 pt of Starane Ultra/A to control or suppress common milkweed. Apply to the foliage of actively growing milkweed in late-spring. Treat the tree rows and sod middles in the area where milkweed is established. Do not apply more than 1.4 pt of Starane/year. Do not apply Starane Ultra more than one time/year, during bloom, within 14 days of harvest. Do not treat trees less than 4 years old.

For established apples and pears ONLY.

Mugwort (wild chrysanthemum)

Stinger 3EC (clopyralid) – 0.25 lb a.i./A. Use 10.5 fl oz/A of Stinger 3EC (or other labeled formulations) to control mugwort. Treat the weed when it emerges in the spring, or, for the most consistent control, split the treatments. Apply 5.25 fl oz/A of Stinger, tank-mixed with 2,4-D, when the weed emerges in early spring. Apply another 5.25 fl oz/A of Stinger sixty to ninety days later. Treat the sod middles as well as the tree rows.

Stinger is a postemergence foliage absorbed herbicide AND a residual herbicide, therefore, Stinger must be applied with a calibrated sprayer that can deliver a predetermined number of gallons of spray solution/A. Maintain a 30 day PHI.

Poison Ivy

This woody perennial vine or shrub is capable of climbing a fruit tree. Contact with any part of the plant may result in an itching, blistering skin rash. Nonselective postemergence herbicides must be used to control this weed. Take control measures before vines grow up the tree trunk.

Glyphosate. Apply in mid- to late-summer, after the weed flowers in late-June or early-July, or in early-fall before fall colors appear. Results of the fall application may not become evident until the following spring. Best results have been obtained in late-summer after the fruit has formed. See WARNINGS for glyphosate in the listing of Postemergence Herbicides - Nonselective above.

Broadcast: 3.0 to 3.75 lb a.e./A.

Spot Treatment: Use the higher percent solution on the label of the glyphosate product being used. Apply to wet the foliage to the drip point.

For newly planted (nonbearing) apples, peaches, pears, plums, and cherries.

For established (bearing) apples, peaches, pears, plums, and cherries.

Quackgrass

This perennial plant grows actively in the late-spring and early-fall when daily high temperatures range between 65° and 80°F (18.3° and 26.7°C). High mid-summer temperatures, above 85°F (29.4°C), and/or low soil moisture cause the weed to become dormant or semi-dormant until moisture and cooler weather return. The weed reproduces by seed and vegetatively by rhizomes, horizontal underground stems that eventually curve upward and make new shoots. The seedhead, which appears in June, resembles ryegrass, except each floret is rotated one quarter turn compared to ryegrass. The rhizomes are about 0.125 inch in diameter and may grow horizontally for up to several feet in length before curving upward and making a new shoot. Ryegrass does not have rhizomes.

Glyphosate. Apply in late- spring, May or June, or in the fall, October or November, when the weed has vigorous healthy foliage, a minimum of 4 to 6 leaves, and has begun to tiller. Do NOT till the field or otherwise disrupt the root and rhizome system of the weeds in the soil for a minimum of 8 months before treatment.
Broadcast: 1.5 lb a.e./A.
Spot Treatment: Use the higher percent solution on the label of the glyphosate product being used. Apply to wet the foliage to the drip point.
For newly planted (nonbearing) apples, peaches, pears, plums, and cherries.
For established (bearing) apples, peaches, pears, plums, and cherries.

Kerb (pronamide) – 2.0 to 4.0 lb a.i./A. Restricted use pesticide. Use 4.0 to 8.0 lb/A Kerb 50WP. Apply in November when soil temperatures are between 35° and 55°F (1.67° and 12.8°C). Primarily controls perennial grasses, including quackgrass, bluegrass, ryegrass sp., fescue sp., and also provides early control of annual grasses the following spring. Apply Surflan, Prowl, Solicam, or Sinbar the following May or June for full season annual grass control. Tank-mix Kerb with 2,4-D and Princep for postemergence and residual broadleaf weed control.
For established (bearing) apples, peaches, pears, plums, and cherries.

Virginia Creeper

Virginia Creeper is a woody perennial vine, capable of climbing and smothering a fruit tree. Nonselective postemergence herbicides must be used to suppress or control this weed. Remove the vine from the tree during winter pruning and lay it on the ground. Do NOT "prune out" the vine. Maximum leaf area is needed for herbicide application during the summer.

Glyphosate. Apply in mid- to late-summer after vine flowers in early July, but before fall colors appear. Applications in spring or early summer, before flowering, have been less effective. Repeat applications may be needed. One application may merely suppress Virginia Creeper. See WARNINGS for glyphosate in the listing of Postemergence Herbicides - Nonselective above.
Broadcast: 3.0 to 3.75 lb a.e./A. Spot Treatment: Use the higher percent solution on the label of the glyphosate product being used. Apply to wet the foliage to the drip point.
For newly planted (nonbearing) apples, peaches, pears, plums, and cherries.
For established apples, peaches, pears, plums, and cherries.

White Heath Aster

This is a perennial that begins growth in April from rosettes or rootstocks. Typically, blooms are about 0.5 inch in diameter. The flowers have white or slightly tinted purple petals with yellow centers. They appear in late-summer, set seed, and the stems die in the fall. Some regrowth, as short stems or rosettes, often occurs before winter. The weed spreads using underground horizontal roots. Once established, control of this weed is difficult since it is tolerant to most herbicides and the roots can be spread by cultivation or other tillage practices.

Glyphosate. Apply in May or June after spring growth is 8 to 10 inches tall, but before the shoots become too tall for good coverage with the spray solution. Generally, broadcast sprays must be applied in May, while spot
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White Heath Aster - Glyphosate – continued

treatments and ropewick applications can be delayed until June. See WARNINGS for glyphosate in the listing of Postemergence Herbicides - Nonselective above.

Broadcast: 1.5 to 3.0 lb a.e./A. Spot Treatment: Use the higher percent solution on the label of the glyphosate product being used. Apply to wet the foliage to the drip point.

For newly planted (nonbearing) apples, peaches, pears, plums, and cherries.

For established (bearing) apples, peaches, pears, plums, and cherries.

Stinger 3EC (clopyralid) – 0.25 lb a.i./A. Use 10.5 fl oz/A of Stinger 3EC (or other labeled formulations) to control white heath aster. Treat the weed when it emerges in the spring, or, for the most consistent control, split the treatments. Apply 5.25 fl oz/A of Stinger, tank-mixed with 2,4-D, when the weed emerges in early spring. Apply another 5.25 fl oz/A of Stinger sixty to ninety days later. Treat the sod middles as well as the tree rows. **Stinger is a postemergence foliage absorbed herbicide AND a residual herbicide, therefore, Stinger must be applied with a calibrated sprayer that can deliver a predetermined number of gallons of spray solution/A. Maintain a 30 day PHI.**

Yellow Nutsedge

This perennial sprouts from over wintering nutlets from mid- to late-spring through early summer. In late-spring and early-summer the weed grows vegetatively and spreads by underground rhizomes that curve up and establish new plants. In late-summer, after about August 1st, rhizomes stop curving up to make new plants. A new flush of rhizomes grow down, the tips swell, and form new nutlets. In early- to mid-fall the plant dies, separating the nutlets from each other. The nutlets survive the winter and may sprout the following spring, or may remain dormant for several years before sprouting.

Casoron (dichlobenil) – 4.0 to 6.0 lb a.i./A. Use 100 to 150 lb/A Casoron 4G. Apply between November 15 and February 15 to control labeled perennial/biennial weeds or in early spring, before weed growth begins and daily high temperatures exceed 50°F, to control labeled annual weeds. Casoron is volatile in warm temperatures and must be irrigated or incorporated after application if applied in warm weather.

For newly planted (nonbearing) and established (bearing) apples, pears, and cherries.

Matrix SG (rimsulfuron) – 0.031 to 0.062 lb a.i./A. Use 4.0 dry oz /A of Matrix SG in a single application or split the application and apply 2 dry oz two times. Apply in the spring, or split the application and apply Matrix SG in late-fall or spring and repeat in early summer. Matrix SG controls many annual grasses and broadleaf weeds, and will suppress or control yellow nutsedge. Always add nonionic surfactant to be 0.25% of the spray solution, and always maintain the spray solution at a pH between 4.0 and 8.0. Matrix SG is a group 2 herbicide with a single site of action in susceptible weeds, which makes it a high risk for weed resistance development. Tank-mix or use Matrix SG in combination with other herbicides with a different mode of action in your annual weed control program. ***For established (bearing) apples, peaches, pears, plums, and cherries.***

Sandea (halosulfuron) – 0.023 to 0.047 lb a.i./A. Use 0.5 to 1.0 dry oz/A Sandea 75DF in late-spring and/or early-summer to control yellow nutsedge. Always add nonionic surfactant to be 0.25% of the spray solution. Use in combination or tank-mixed with other residual herbicides for annual grass and improved annual broadleaf weed control. When yellow nutsedge pressure is heavy, apply in the spring after the weed has emerged and developed several leaves, and repeat the application 45 to 60 days later if additional yellow nutsedge emerges. Do NOT apply more than 2 dry oz of Sandea/A/year. Sandea will not injure established orchard sod. Apply to trees established a minimum of 1 year.

For established (bearing) apples.

Sinbar (terbacil) – 1.0 to 3.0 lb a.i./A. Use 1.25 to 3.75 lb/A Sinbar 80 WDG in late spring to suppress or control emerged yellow nutsedge for 6 to 10 weeks. Rainfall is required for herbicide activation, but, above average rainfall after application will reduce length of control. Below average rainfall will increase length of control. Tank-mix with Matrix plus nonionic surfactant to improve control. Use lower rate on coarse textured soils low in organic matter, and a higher rate on fine textured soils and on soils high in organic matter. Observe a 60 day PHI. ***For established (bearing) apples and peaches.***