

# Crop Profile for Peaches in New Jersey

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## General Production Information

- New Jersey ranks 4<sup>th</sup> in the U.S. in the production of peaches in 2002, producing 2.3% of the total U.S. crop (5).
- New Jersey ranks 4<sup>th</sup> in value of production because of fresh market sales (5).
- 57.0 million pounds of peaches valued in excess of \$ 25.1 million were produced during the 2002 crop year on 8,000 acres (5).
- 100% of the crop is sold to the fresh market.
- Peach-bearing acreage has decreased from 10,800 in 1994 to 8,000 in 1998 (5).
- It costs approximately \$ 3,129 per acre to produce peaches in NJ (1).

## Production Regions

The Southern district (Gloucester, Cumberland, Camden, and Atlantic counties) is the major growing region in New Jersey where 88.3% of the state's production is concentrated. Gloucester county is the main growing area where 42.3% of New Jersey's peach production is located, followed by Cumberland county (22.4%), Camden county (14.1%), and Atlantic county (9.5%) of the New Jersey peach production respectively. The Central district (Burlington, Monmouth, Middlesex, and Mercer counties) represents 6.8% of the total production. The Northern District (Bergen, Hunterdon, Morris, Sussex, and Warren counties) produces 2.3% of the crop, while the remaining counties produce 2.6% of New Jersey's peach crop (3).

## Cultural Practices

- Medium textured friable, well-drained soils that are deep with no hard pan and high in organic matter are the best soils for growing fruit trees. Good subsoil aeration and drainage are essential for good growth, production, and longevity of peach trees.
- Growers in New Jersey establish and maintain permanent sod or keep bare soil in the drive rows by disking and herbicide applying. When necessary, they mow sod and weeds, and apply herbicides to reduce noxious weeds. Tree row is maintained as bare soil by herbicide sprays.
- Annual fertilization is a common practice to insure optimum growth and production of peach trees. Fertilizers include all major nutrients, but especially nitrogen.
- Tree pruning is performed annually and usually is conducted during late winter until sometime after bloom. It is performed for various horticultural reasons and to remove dead wood and winter killed buds, as well as disease infected tissue.
- Manual fruit thinning to maximize fruit size is a required practice during most crop years.

## Worker Activities

A number of worker activities occur throughout the year that may affect application timing, as well as the specific pesticides used. Manual pruning is done during the dormant season, usually from late February through the middle of April. No pesticides are applied during that time.

Since chemical fruit thinning is not possible in peaches, hand thinning can be done at any time after the beginning of June. Herbicides are applied in mid April to early May, but may be spot applied with a hand or backpack sprayer during June or July, depending on the weed species being controlled. Mechanical cultivation may be rarely carried out 2 to 3 times a season during early May through June. Mechanical and hand cultivation is more common in blocks of newly planted non-bearing trees that are not yet under a complete spray program. Well managed orchards usually have grass or mixed vegetation aisles that are mowed at 10 day to 2 week intervals throughout the growing season. Harvesting is done by hand, usually starting in mid July for early cultivars, and continuing through September for late cultivars. The latest insecticide applications stop by mid October, with some fungicide use continuing after picking.

## Insect Pests (4)

### European Red Mite (ERM) - *Panonychus ulmi* (Koch) (ACARI: *Tetranychidae*)

ERM overwinters in the egg stage on twigs and in bark cracks and crevices. Overwintering eggs hatch in the spring and larvae immediately move to young foliage and commence feeding. ERM can build up to the point where leaf bronzing is visible by mid- to late July. If leaf damage is both heavy and early enough (second to fourth covers) leaves can drop prematurely, tree susceptibility to winter injury increases and next year's crop can be affected.

### Chemical Control

In recent years, a number of orchards were found to have strains of mites with various degrees of resistance to Kelthane, Carzol, and Vendex. Because of this problem, Superior oil applications in dormant and delayed dormant, and pre-bloom control with either oil or Apollo becomes even more important. Petal-fall miticide sprays can help season-long mite control. No thresholds exist for this pest. Savey and Pyramite may also be applied at shuck-split and in cover sprays when needed.

- **Superiol oil** - 6 gal/acre in Dormant or 4 gal/acre in delayed Dormant; 200 gal spray/acre gives the best results; Supracide or Lorsban in combination with oil enhances control.
- **Supracide 25WP** - 4-6 lbs/acre in Dormant or delayed Dormant.
- **Lorsban 4EC** - 2-4 pt/acre in Dormant or delayed Dormant.
- **Apollo 50SC** - 2-8 oz/acre when needed; < 4 oz/acre can be applied in IPM programs if predator mites are present.
- **Vendex 50WP** - 1-2 lbs/acre when needed.

- **Carzol SP** - 1-1.25 lb/acre when needed.
- **Pyramite 60WP** – 4.4 oz/acre when needed.
- **Savey DF or 50WP** – 3-6 oz/acre when needed; do not apply more than once per year.

### **Two Spotted Spider Mite (TSM) – *Tetranychus urticae* Koch (ACARI: Tetranychidae)**

This mite overwinters as an adult on perennial plants (weeds) and orchard trees. Dormant oil sprays are not effective for controlling this species, however, most other miticides are satisfactory. In spring, two-spots serve as food for the predator mite, *Amblyseius fallacis* and *Stethorus punctum*.

#### **Chemical Control**

All below listed materials applied when needed against ERM effectively control TSM.

- **Apollo 50SC** - 2-8 oz/acre.
- **Vendex 50WP** - 1-2 lbs/acre.
- **Carzol SP** - 1-1.25 lb/acre.
- **Pyramite 60WP** – 13.2 oz/acre when needed.
- **Savey DF or 50WP** – 3-6 oz/acre when needed; do not apply more than once per year.

### **Peach Silver Mite (PSM) - *Aculus cornulus* (Banks) (ACARI: Eriophyidae)**

This mite feeds on leaf surfaces causing a silvery appearance. In orchards where sulfur is used, they are usually not a problem. This mite is unlikely to cause injury.

#### **Chemical Control**

- **Thiodan 50WP** - 2-4 lbs/acre and **Vendex 50WP** - 1-2 lbs/acre are labeled for control of PSM when needed.

### **San Jose Scale (SJS) - *Quadraspidiotus perniciosus* (Comstock) (HOMOPTERA: Diaspididae)**

SJS overwinters as nymphs under waxy coverings. It has three generations a year. Adults and larvae feed on trunks, limbs, twigs, and fruits. Fruit obtain characteristic red spot where insects settle and feed. High populations may affect tree vigor, growth and productivity, and kill fruiting branches and main limbs. SJS damage levels can exceed 17%.

#### **Chemical Control**

SJS seems to be more troublesome every year and difficult to control once the immature stages (crawlers) and, particularly adult scales, are noted on twigs and limbs during the growing season. A dormant application of **Superior oil** - 6 gal/acre or 4 gal/acre in Delayed Dormant still is the best way to control this pest and is recommended in problem blocks. Best results are obtained when oil is applied in at least 200 gallons of spray per mature acre. An organophosphorous spray added to oil aids in control. **Esteem 35WP** – 4.5 oz/acre is also labeled for dormant and delayed dormant applications; apply using at least 200 gallons per acre. **Supracide 25WP** - 4-6 lbs/acre or **Lorsban 4EC** - 2-4 pt/acre in Dormant or Delayed Dormant are also recommended. For postbloom scale control, **Guthion 50 WP** - 1 lb/acre and **Imidan 70WP** - 1.5 lb/acre are labeled and are only effective against the crawler stage.

### **Oriental Fruit Moth (OFM) - *Grapholita molesta* (Busck) (LEPIDOPTERA: Tortricidae)**

OFM attacks both stone and pome fruit. There are normally four generations of this insect each year but a fifth generation may occur in the southern two-thirds of the state during a warm year. First generation larvae bore into succulent twigs usually about the time when shucks split. Later generations attack developing fruit, often boring into the fruit as tiny larvae, close to the stem. First brood larval control is timed to degree-day accumulations and usually commences about the time shucks split. In bad years, up to 16% of fruit can be damaged by OFM.

#### **Chemical Control**

- **Guthion 50WP** - 1 lb/acre when needed.
- **Imidan 70WP** - 1.5-2 lbs/acre when needed.
- **Sevin 50WP** - 4 lbs/acre when needed.
- **Sevin 80WP** - 1-2 lbs/acre when needed.
- **Sevin XLR** – 2 qt/acre when needed.
- **Lannate 90SP** - 0.5-2 lbs/acre when needed.
- **Asana XL** – 5-10 fl oz/acre at petal fall, shuck-split and 1 cover.
- **Ambush 25W** – 6-16 fl oz/acre at petal fall, shuck-split and 1 cover.
- **Pounce 3.2 EC** – 4-12 fl oz/acre at petal fall, shuck-split and 1 cover.
- **Intrepid 2F** – 10-6 oz/acre at petal fall, shuck-split and 1 cover.

Mating disruption of OFM was implemented in four commercially managed orchards in Cumberland County in 1999. It provided over four months non-insecticidal control that reflected to total reduction of organophosphorus and carbamate insecticides in average 4.7 lbs ae/A when compared with conventionally managed orchards. The decreased number of insecticide sprays allowed beneficial arthropods to build up to levels almost twice that observed in conventionally managed orchards.

### **Plum Curculio (PC) - *Conotrachelus nenuphar* (Herbst) (COLEOPTERA: Curculionidae)**

Generally, overwintering adults (weevils) make their first appearance in orchards during peach bloom. Cool weather

slows down their emergence from overwintering sites while warm spells (70oF and above) can cause large numbers of weevils to suddenly appear in trees. There is one generation per year in Northern New Jersey and two in the South. PC damage fruit can exceed 8%.

### **Chemical Control**

The petal fall, shuck split, shuck fall, first and second cover sprays are most critical for control. Most effective insecticides labeled for plum curculio control are:

- **Guthion 50WP** - 1 lb/acre or **Imidan 70WP** - 1.5 lb/acre applied when needed.

### **Green Peach Aphid (GPA) - *Myzus persicae* (Sulzer) (HOMOPTERA: Aphididae)**

It is a common pest of peach and nectarine throughout New Jersey. Large numbers of aphids suck the plant juice from the leaves causing them to become stunted, curled, and discolored (yellow) by June. High numbers affect fruit quality. Aphids normally disperse to other host plants by mid-June. Up to 25 % damage to peaches can be exceeded in bad years.

### **Chemical Control**

For best results, **Thiodan 50WP** - 2-4 lbs/acre, **Lannate 90SP** - 0.5-2 lbs/acre or **Lannate LV** - 3-6 pt/acre should be applied dilute at pink bud and again at petal fall. **Lannate** will provide fair control of oriental fruit moth and catfacing insects. Make applications before leaves become curled and discolored.

### **Black Peach Aphid (BPA) - *Brachycaudus persicae* (Passerini) (HOMOPTERA: Aphididae).**

Unlike other aphids, BPA feeds below ground on peach roots and large populations can severely debilitate young trees. In spring, many of these overwintering root feeders emerge to establish colonies on the buds. Their color is dark brown to black and when full grown, is nearly 1/10 inch long. Populations can increase rapidly as the winged forms spread the infestation throughout the orchard. In midsummer, aphids migrate downward through soil cracks to peach roots where they spend the winter. Once aphids become established on the roots, control is difficult.

### **Chemical Control**

Control on twigs and leaves is best achieved when **Thiodan 50WP** - 2-4 lbs/acre, **Lannate 90SP** - 0.5-2 lbs/acre or **Lannate LV** - 3-6 pt/acre is applied early in the season before leaves become deformed (Bloom (Stages 7-8) and Shuck-Split).

The most effective control of the black peach aphid is to prevent its introduction into the orchard on the roots of nursery stock. This is easily accomplished by dipping the roots of young trees in a **Thiodan** solution. To prepare dip, mix 1 pound

of **Thiodan 50WP** with every 10 gallons of water. Dip trees to a point several inches above the bud scar and allow them to dry. Dip trees several days before planting.

**Catfacing Insects: Tarnished Plant Bug (TPB) - *Lygus lineolaris* (Palisot de Beauvois) (HETEROPTERA: Miridae); Dusky Stink Bug (DSB) - *Euschistus tristigmus* (Say) (HETEROPTERA: Pentatomidae); Green Stink Bug (GSB) - *Acrosternum hilare* (Say) (HETEROPTERA: Pentatomidae); Brown Stink Bug (BSB) - *Euschistus servus* (Say) (HETEROPTERA: Pentatomidae)**

The TPB, DSB, GSB, and BSB collectively form the group called catfacing insects. Their feeding on peaches during the pink and petalfall through shuck split periods generally results in dimpled, fuzz-free areas and/or aborted fruit. Feeding during the shuck fall to second and third covers results in unsightly, slightly sunken, callused, black blemishes on the skin surface generally 1/16 to 1/4 inch in diameter. These insects overwinter as adults and move into peach orchards about the time buds begin to swell. Because these bugs are strong fliers, their presence may be widespread, and depending upon availability of other host plants, injury can vary considerably from block to block. Other hosts include vetch, alfalfa, clover, goldenrod, fleabane, dog fennel, pigweed, ragweed, lambsquarter, and dozens of different kinds of flowers and commercial vegetables. Up to 34% of fruit can be damaged by these insects.

## **Chemical Control**

Where catfacing has been a problem, insecticide applications are essential at PF and shuck split. Additional bug controls are needed during the shuck split to shuck fall period through third covers, depending upon the extent of the bug populations. Early season orchard cultivation is risky because it forces the bugs up into the trees. Eliminating alternate weed hosts in the orchard should reduce damage caused by this pest complex. Insecticides for controlling catfacing insects include:

- **Asana XL.66EC** - 4.8-8 oz/acre in Pink-Bud.
- **Ambush 2EC** - 7-12 oz/acre in Pink-Bud.
- **Pounce 3.2EC** - 4-8 oz/acre in Pink-Bud.
- **Carzol 92SP** - 8 oz/acre in Pink-Bud or 8-12 oz/acre when needed.
- **Guthion 50WP** - 1 lb/acre when needed.
- **Thiodan 50WP** - 2 lbs/acre in Pink-Bud and when needed, or 2-4 lbs/acre in 100% Petal-Fall.
- **Imidan 70WP** - 1.5 lb/acre when needed.
- **Lannate 90SP** - 0.5-2 lbs/acre when needed.
- **Lannate LV** - 3-6 pt/acre when needed.

In 1999 we monitored catfacing insects number and harmfulness to peaches in both orchards with good ground cover management (established sod) and typical, conventionally managed orchards. We found 42% fewer catfacing insects and 50% less catfacing damage to peaches in orchards with established sod in comparison with weedy and conventionally managed orchards.

**Flower Thrips (FT) and Western Flower Thrips (WFT) - *Frankliniella occidentalis* (Pergande)**  
**(*THYSANOPTERA: Thripidae*)**

On nectarine and peach, early season feeding damage can result in russeted fruit while late season damage takes on a silvering appearance. Cold, wet springs are not favorable for this pest because it delays development and heavy rains can actually kill these frail insects. Mowing ground cover during bloom and harvest should be avoided to prevent thrips from leaving the ground cover for the fruit. Also, eliminating flowering weeds in the orchard should prevent thrips populations from increasing and subsequent movement to the crop. Early thrips damage levels on fruit can exceed 26% while silvering caused by late thrips can be up to 80%.

**Chemical Control**

- **Carzol 92SP** - 0.5-1 lb/acre
- **Lannate 90SP** - 1-2 lbs/acre when needed
- **Spintor 2SC** – 6-8 oz/acre at petal fall, shuck-split or 5<sup>th</sup> cover.

**Japanese Beetle (JB) - *Popillia japonica* Newman (*COLEOPTERA: Scarabaeidae*)**

Larvae feed on roots of grass, herbaceous plants, and nursery stock, while adults feed on foliage and fruits. Fruit feeding is most common injury to stone fruits, particularly to varieties ripening during the JB flight period. For example "Redhaven", "Norman", "Glohaven", and "Loring" are subject to attack by JB. It can cause up to 21% damage to peaches.

**Chemical Control**

For best control, **Guthion 50WP** - 1 lb/acre, **Imidan 70WP** - 1.5 lb/acre, **Sevin 50WP** - 4 lbs/acre, **Sevin 80WP** - 2.5 lbs/acre or **Sevin XLR** - 2 qt/acre applied when needed.

**Tufted Apple Bud Moth (TABM) - *Platynota idaeusalis* (Walker) (*LEPIDOPTERA: Tortricidae*)**

There are two generations per year. Adults generally begin flying and laying eggs from about mid-June to mid-July and from about mid-August through mid-September. In recent years, most damage has come from the second generation of moths because either spraying has stopped, fruit is tightly clustered, insufficient spray volume was used, or because of resistance development. Damage appears as a "shotgun" type of scarring on the upper and side surfaces of the fruit. TABM can also bore into ripening peaches. Heavier crops are most likely to sustain damage. TABM is mainly a problem in the Southern and Central counties where damage can exceed 21% in bad years.

**Chemical Control**

For best results, increase spray volume per acre and thin to eliminate fruit from touching each. **Lannate 90SP** - 0.5-0.75 lb/acre or **Lannate LV** in combination with the below listed insecticides (all at reduced rates) gives the best control.

- **Lannate 90SP** - 0.5-0.75 lb/acre.
- **Lannate LV** - 1.5-2 pt/acre plus **Guthion 50WP** - 0.5 lb/acre.
- **Lannate LV** - 1.5-2 pt/acre plus **Imidan 70WP** - 0.75 lb/acre.
- **Lannate LV** - 1.5-2 pt/acre plus **Sevin 50WP** - 2 lbs/acre.
- **Lannate LV** - 1.5-2 pt/acre plus **Sevin 80WP** - 1.75 lb/acre.
- **Lannate LV** - 1.5-2 pt/acre plus **Sevin XLR** - 1 qt/acre.
- **Asana XL** - 4.8-10 oz/acre.
- **Spintor 2SC** - 4-6 oz/acre
- **Intrepid 2F** - 8-16 oz/acre

The *B.t.* 's have also provided excellent control in New Jersey with repeated applications at high volume.

#### **Lesser Peach Tree Borer (LPTB) - *Synanthedon pictipes* (Grote & Robinson) (LEPIDOPTERA: Sesiidae)**

Peach and nectarine are the preferred hosts of LPTB. This borer attacks weak and injured trees, particularly those with Cytospora canker, winter-damaged orchards, and diseased trees. Adult borers (moths) are attracted to injured trees and deposit eggs in wounds from May through early July and again in September. Insecticide protection is recommended primarily for the control of the second brood in early September, and slightly later in northern counties.

#### **Chemical Control**

Applications should be made with a handgun to the point of run off, making sure to cover all cankers. **Lorsban 4E** - 1.5-3 qt/acre, **Asana XL** - 5.8 oz/acre or **Thiodan 3EC** - 1 qt/acre should be applied post-harvest with a handgun.

#### **Peach Tree Borer (PTB) - *Synanthedon exitiosa* (Say) (LEPIDOPTERA: Sesiidae)**

It is generally not as important as LPTB in the New Jersey peach orchards but localized severe infestations have occurred. Unlike LPTB, PTB can become established in healthy trees and can cause death of young trees in a single season. PTB usually flies from mid-June and most of the larvae are present in the trees by early September.

#### **Chemical Control**

Control can be achieved by drenching the tree trunk and scaffold limbs with **Thiodan 50WP** at 1.5 pounds per 100-gallon rate, **Lorsban 4E** at the 1.5 quarts per 100-gallon rate, or **Asana XL** at 4 oz per 100-gallon rate after harvest. Trees should be treated for peach tree borers the same time that the scaffold limbs are treated for lesser peach tree borers. The



fumigating action of the insecticide, along with its residual action, should give good kill for those larvae already in the tree, if applied by early to mid-September. The residual action should also provide control for those young larvae still hatching from eggs. For best results, apply 0.5 to 1 gallon of spray to each trunk, preferably with a handgun. Airblast sprayers are not suited for borer control because not enough spray reaches the target area. Protect young trees before planting with a **Thiodan** root dip. To prepare dip, mix 1 pound of **Thiodan 50WP** with every 10 gallons of water. This solution must be agitated to prevent settling out of the wettable powder. **Lorsban 4E** may be used as a pre-planting root dip at the equivalent rate of 3 qt/100 gallons of water. Dip trees to a point several inches above the bud scar and allow them to dry. Dip trees several days before planting.

## Weeds (4)

Weeds are serious problem in orchard. They compete with fruit trees for light, water, nutrient, space, and serve as alternate hosts for harmful insects, diseases, and nematodes, and as well as provide cover for undesirable animals. Weeds can affect crop quality, reduce yield, and impede harvest.

When planning a control program, summer annuals, winter annuals and biennials, and perennial weeds should be considered separately.

### 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 newly planted 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 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 (marestalk) 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. Apply 2,4-D to control emerged winter annual broadleaf weeds tank-mixed with Princep for residual control. Consider Roundup 4SC 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 50WP is the only grass herbicide that *must* be applied in the 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 50WP.

Solicam 90DF, Surflan 80WP, Devrinol 50WP and Prowl 4EC 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. Sinbar 80WP applications for annual grass control should be applied only in late spring. The relatively high solubility of Sinbar 80WP results in leaching when applied in the fall. Increased risk of crop injury and poor weed control can result.

**Followup 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 80WP for residual broadleaf weed control. Apply Sinbar 80WP or the second half of a split herbicide treatment of Solicam 80PF, Surflan 80WP, Devrinol 50PF or Prowl 3.3EC for annual grass control. Include 2,4-D if seedling annual broadleaf weeds are observed or Roundup 4SC to control established annual or perennial grasses and broadleaf weeds. Sinbar 80WP 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.

### **Orchard Sod Weed Control**

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 applied before the weeds become dormant for the winter. Use 1 quart of Weedar 64 per acre or other labeled formulations (1.0 lb ai/acre 2,4-D amine). 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 and certain other weeds, including wild onion and garlic, 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 quart per 100 gallons 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 will reduce control. Splitting the application by applying half the 2,4-D rate twice, about seven to fourteen 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.

### **Preemergence Herbicides (before weeds appear)**

**Devrinol (napropamide) — 2-4 lb ai (active ingredient)/A.** Use 4-8 lb/A Devrinol 50DF. Apply in late fall and/or early spring to weed-free soil, or add an appropriate postemergence herbicide to kill existing vegetation. Use the high rate for long-term control (4 to 8 months) and the low rate for short-term control (2 to 4 months). Devrinol controls primarily annual grasses. Tank-mix with Princep plus 2,4-D in late fall or with Goal 2XL/Galigan 2E or reduced rates of Princep, Karmex, OR Sinbar in the spring when labeled for the crop to control annual broadleaf weeds. Use when interplanting young, established orchards. Labeled for use in newly planted (nonbearing) apples, peaches, pears, plums, and cherries and established (bearing) apples, peaches, pears, plums, and cherries.

**Dual Magnum 7.62E (s-metolachlor) — 1.27-2.53 lb ai/A.** A Special Local Needs 24(c) Label has been approved for the use of Dual Magnum 7.62E to control weeds in peaches in New Jersey. The use of this product in peaches is legal ONLY if the waiver of liability, provided by the local growers association, has been signed by the grower, all the fees have been paid, and a label has been provided by the association. Use 1.33 to 2.66 pints/A. Apply Dual Magnum 7.62E in the spring

to weed-free soil or add a postemergence herbicide to control emerged weeds. Primarily controls annual grasses, yellow nutsedge, and a few broadleaf weeds. Tank-mix with Goal/Galigan 2E, Princep, or Karmex to improve broadleaf weed control, and with Sinbar at the full tank-mix rate for the soil type to improve yellow nutsedge control when the population of the weed is high. For newly planted and/or established peaches.

**Gallery 75DF (isoxabin) — 0.75–1.0 lb ai/A.** Use 1.0 to 1.33 lb/A Gallery 75DF. Apply in late fall or early spring to weed-free soil to control many broadleaf weeds. In newly planted trees, allow the soil to settle and fill any depressions around the tree before application. Add a postemergence herbicide to improve the control of emerged weeds. Gallery primarily controls annual broadleaf weeds. Tank-mix with Prowl to control annual grasses. For newly planted (nonbearing) apples, peaches, pears, plums, and cherries. CAUTION: Gallery is NOT labeled for BEARING FRUIT TREES.

**Goal 2XL/Galigan 2E (oxyfluorfen) — 2 lb ai/A.** Use 4 qt/A Goal 2XL or Galigan 2E. Apply in early spring before bloom. Add an appropriate postemergence herbicide to kill existing vegetation. Goal 2XL/Galigan 2E controls annual broadleaf weeds and suppresses annual grasses. Tank-mix with Prowl, Devrinol, or Surflan to improve length of annual grass control. Do NOT incorporate Goal 2XL/Galigan 2E into the soil with a disk or other implement, or reduced weed control may result. For newly planted apples, peaches, pears and cherries.

#### **For established apples, peaches, pears and cherries**

**Karmex (diuron) — 1.0-3.0 lb ai/A.** Use 1.25-3.75 lb/A Karmex 80DF. Apply in late fall or spring to weed-free soil, or add an appropriate postemergence herbicide to kill existing vegetation. Primarily for annual broadleaf weed control. Tank-mix with Prowl (nonbearing only), Surflan, Solicam, Devrinol, OR a reduced rate of Sinbar at one-half the labeled Karmex use rate alone for the soil type to improve crop safety and the range of weeds controlled. Apply to apples and pears established a minimum of 1 year and to peaches established a minimum of 3 years. For established (bearing) apples, peaches, and pears.

**Norosac/Casoron (dichlobenil) — 4-6 lb ai/A.** Use 100-150 lb/A Norosac/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. Norosac/Casoron is volatile in warm temperatures and must be irrigated or incorporated after application if applied in warm weather. For established (bearing) apples and peaches.

**Princep (simazine) — 2-4 lb ai/A.** Use 2.2-4.4 lb/A Princep 90DF (or other labeled formulations). Apply in late fall OR spring to weed-free soil, or add an appropriate postemergence herbicide to kill existing vegetation. Primarily for annual broadleaf weed control. Tank-mix with Prowl (nonbearing only), Surflan, Solicam, OR Devrinol at one-half the labeled Princep use rate alone for the soil type to improve crop safety and the range of weeds controlled. Apply to trees established a minimum of 1 year. For established (bearing) apples, peaches, and pears.

**Prowl (pendimethalin) — 2-4 lb ai/A.** Use 2.4-4.8 qt/A Prowl 3.3EC. Apply in late fall and/or early spring to weed-free soil or add a postemergence herbicide to control emerged weeds. Add 2, 4-D in early spring before bloom to control susceptible broadleaf weeds OR add an appropriate postemergence herbicide to kill existing vegetation. Use the high rate

for long-term control (4 to 8 months) and the low rate for short-term control (2 to 4 months). Prowl controls primarily annual grasses. Tank-mix with Princep plus 2,4-D in late fall or with Goal 2XL/Galigan 2E, Karmex, OR Sinbar in the spring when labeled for this crop to control annual broadleaf weeds.

For newly planted (nonbearing) apples, peaches, plums, and cherries. CAUTION: Prowl is NOT labeled for BEARING FRUIT TREES.

**Sinbar (terbacil) — 1.0-3.0 lb ai/A.** Use 1.25-3.75 lb/A Sinbar 80DF. Apply in the spring to weed-free soil, or add an appropriate postemergence herbicide to kill existing vegetation. Tank-mix with Surflan, Devrinol, OR a reduced rate of Karmex at one-half the labeled Sinbar use rate alone for the soil type to improve crop safety and the range of weeds controlled. Apply to trees established a minimum of 3 years. For established (bearing) apples and peaches.

**Solicam (norflurazon) — 2-4 lb ai/A.** Use 2.5-5 lb/A Solicam 80DF. Apply in late fall or spring to weed-free soil, or add an appropriate postemergence herbicide to kill existing vegetation. Primarily for annual grass control, Solicam may provide partial control of many broadleaf weeds. Tank-mix with Princep plus 2,4-D in late fall or with Goal 2XL/Galigan 2E, Karmex, OR Sinbar in the spring when labeled for the crop to improve the control of broadleaf weeds. For newly planted (nonbearing) apples and peaches and established (bearing) apples and peaches.

**Surflan (oryzalin) — 2-4 lb ai/A.** Use 2-4 qt/A Surflan 4AS (or other labeled formulations). Apply in late fall and/or early spring to weed-free soil, or add an appropriate postemergence herbicide to kill existing vegetation. Use the high rate for long-term control (4 to 8 months) and the low rate for short-term control (2 to 4 months). Surflan controls primarily annual grasses. Tank-mix with Princep plus 2,4-D in late fall or with Goal 2XL/Galigan 2E, Karmex, OR Sinbar in the spring when labeled for the crop to control annual broadleaf weeds. For newly planted (nonbearing) apples, peaches, pears, plums, and cherries. For established (bearing) apples, peaches, pears, plums, and cherries.

### Postemergence Herbicides

**Note:** Add a labeled insecticide for catfacing insects to the weed spray in peach, nectarine, and plum orchards when a crop, the pest(s), and heavy weed vegetation are present.

#### Selective

**2,4-D — 1 lb ai/A.** Use 1 qt/A Weedar 64 or OLF. Controls a wide variety of broadleaf weeds. Effectiveness depends on herbicide rate, weed species, and growth stage. Apply to weed foliage in the fall after harvest (including drops), or in early spring before trees or dandelions flower. Fall applications are more effective and reduce the risk of herbicide drift injury to adjacent crops. Weeds are most susceptible to 2,4-D when they are growing vigorously, not under stress, and before flower buds appear. Apply before the leaves of perennial weeds lose normal summer green color. **WARNING:** Use only 2,4-D formulation(s) labeled for use in orchards. Lower cost 2,4-D formulations are available but may be more likely to drift, may not contain a "low drift" agent in the formulation, are not labeled, and should not be used! BEWARE

of herbicide drift! Grapes, many flowers, and vegetables are extremely sensitive to 2,4-D. Injury may occur in adjacent fields if sprayed when unfavorable conditions prevail. For established (bearing) apples, peaches, pears, plums, and cherries.

**Fusilade DX 2EC (fluazifop butyl) — 0.18-0.38 lb ai/A.** Use 12-24 fl.oz./A Fusilade DX 2EC. Add 2 pints crop oil concentrate OR nonionic surfactant to be 0.25% of the spray solution (1 qt. per 100 gallons of spray solution.). Use the lower rate on most annual grasses less than 6 inches tall and to johnsongrass. Use the higher rate to control other perennial grasses, crabgrass, and annual grasses more than 6 inches tall.

**WARNINGS:**

1. Do NOT tank-mix Fusilade DX 2EC with any other pesticide.
2. Do NOT apply within 1 hour of rainfall.
3. Do NOT apply to grasses suffering from drought, heat, cold, or any other stress condition.

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

For established (bearing) peaches, nectarines, cherries, and plums.

**Kerb (pronamide) — 2-4 lb ai/A.** Use 4-8 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.

**Poast (sethoxydim) — 0.2-0.5 lb ai/A.** Apply 1-2.5 pt/A Poast 1.53EC. Add 2 pints crop oil concentrate per acre. Use the lower rate to control annual grasses less than 6 inches tall. Use the higher rate to control annual grass 6 to 12 inches tall and to control perennial grasses.

**WARNINGS:**

1. Do NOT tank-mix Poast with any other pesticide.
2. Do NOT apply within 1 hour of rainfall.
3. Do NOT apply to grasses suffering from drought, heat, cold, or any other stress condition.

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

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

**Select 2EC (clethodim) — 0.125-0.25 lb ai/A.** Apply 8 to 16 fluid ounces of Select 2EC per acre to control most grass weed species, including certain hard to control grass weeds, such as small grain volunteers and cover crops, and perennials such as hard fescue, tall fescue, Bermudagrass, orchardgrass, quackgrass, Johnsongrass, and wirestem muhly. Use the lower rate to control annual grasses and the perennial grasses listed above. Repeat the application if regrowth occurs. Always add oil concentrate to be 1% of the spray solution, or a minimum of 1 pint per acre.

**WARNINGS:**

1. Do NOT tank-mix with any other pesticide unless labeled.
2. Do NOT apply within 1 hour of rainfall.
3. Do NOT apply to grasses suffering from drought, heat, cold, or any other stress condition.
4. Select is currently LABELED for NONBEARING FRUIT TREES only! Do NOT apply within 12 months of harvest.

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

Nonselective

**Gramoxone Max (paraquat) — 0.6-1.0 lb ai/A.** Use 1.7–2.7 pints/A Gramoxone Max 3SC. Contact killer only; no translocation or residual activity. Best results occur when weeds are 6 inches tall or less. Regrowth may occur from the root systems of established weeds. Use a surfactant to be 0.25% of the spray solution (1 qt. per 100 gallons of spray solution). Combine with recommended preemergence herbicide(s) for residual weed control. Do not allow spray or drift to contact green bark, leaves, or fruit. Crop damage may result. **DANGER: Do not breathe spray mist. Read safety precautions on the label.**

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

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

**Roundup Ultra Max (glyphosate)** will control many serious annual and perennial weeds in orchards. It is a translocated, slow-acting herbicide with no soil or residual activity. Results will become evident 1 to 3 weeks after application. Optimum rate and time of application depend on weed species and growth stage. Weeds should be growing vigorously when treated. Do not treat weeds that are under stress from drought, extreme heat, cold, or other adverse growing conditions.

*Broadcast:* 0.56-3.75 lb ae/A. Use 0.6 - 4 qt/A Roundup Ultra Max. Apply lower rates, 0.6 - 1 qt/A, to control seedlings

and annual weeds and to suppress established perennial weeds. See warnings below. Labeled for peach and plum in New Jersey only.

*Spot Treatment:* 1-2% solution. Use 1-2 gal. Roundup Ultra Max/100 gal. water. Wet weed foliage thoroughly. See warnings below. Labeled for peach and plum in New Jersey only.

*Ropewick Applicator:* Mix Roundup Ultra Max and water at a 1:2 ratio (1 part Roundup Ultra Max to 2 parts water) and fill pipe only one-half full to prevent excessive dripping. One gallon of Roundup Ultra Max will wipe 10 to 100 acres, depending on weed density. Repeated wiping may be needed to provide control equal to broadcast or spot applications. The Ropewick applicator offers significant herbicide cost savings. See factsheet FS017 on Ropewick applicator construction and use warnings below.

#### **WARNINGS:**

1. Do NOT allow Roundup Ultra Max to contact the leaves, young green bark, fresh trunk wounds, or root suckers, or severe crop injury may occur.
2. Do NOT allow Roundup Ultra Max to contact ANY IMMATURE PART of PEACH or PLUM trees.
3. Do NOT use GALVANIZED containers. Roundup Ultra Max will react with the container to produce explosive hydrogen gas.

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

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

**Touchdown (glyphosate)** will control many serious annual and perennial weeds in orchards. It is a translocated, slow-acting herbicide with no soil or residual activity. Results will become evident 1 to 3 weeks after application. Optimum rate and time of application depends on weed species and growth stage. Weeds should be growing vigorously when treated. Do not treat weeds that are under stress from drought, extreme heat, cold or other adverse growing condition.

*Broadcast:* 0.56-3 lb ae/A. Use 0.75 - 4 qt/A Touchdown. Apply lower rates, 0.75 – 1 qt/A, to control seedling and annual weeds and to suppress established perennial weeds. See warnings below. Labeled for nonbearing tree fruit crops only! Recommended for nonbearing established tree fruit crops only!

*Spot Treatment:* 1-2% solution. Use 1-2 gal. Touchdown/100 gal. water. Wet weed foliage thoroughly. See warnings below. Labeled and recommended for newly planted and established nonbearing tree fruit crops only!

#### **WARNINGS:**



1. Do NOT allow Touchdown to contact the leaves, young green or red bark, fresh trunk wounds, or root suckers; or severe crop injury may occur.

2. Do NOT allow Touchdown to contact ANY IMMATURE PART of a FRUIT TREE.

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

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

**Glyphomax Plus 4SC (glyphosate)** will control many serious annual and perennial weeds in orchards. It is a translocated, slow-acting herbicide with no soil or residual activity. Results will become evident 1 to 3 weeks after application. Optimum rate and time of application depend on weed species and growth stage. Weeds should be growing vigorously when treated. Do not treat weeds that are under stress from drought, extreme heat, cold, or other adverse growing conditions.

*Broadcast:* 0.56-3.75 lb ae/A. Use 0.75 - 5 qt/A Glyphomax Plus 4SC. Apply lower rates, 0.75 - 1 qt/A, to control seedlings and annual weeds and to suppress established perennial weeds. See warnings below. Labeled for peach and plum in New Jersey only.

*Spot Treatment:* 1-2% solution. Use 1-2 gal. Glyphomax Plus 4SC/100 gal. water. Wet weed foliage thoroughly. See warnings below. Labeled for peach and plum in New Jersey only.

*Ropewick Applicator:* Mix Glyphomax Plus 4SC and water at a 1:2 ratio (1 part Glyphomax Plus 4SC to 2 parts water) and fill pipe only one-half full to prevent excessive dripping. One gallon of Glyphomax Plus 4SC will wipe 10 to 100 acres, depending on weed density. Repeated wiping may be needed to provide control equal to broadcast or spot applications. The Ropewick applicator offers significant herbicide cost savings. See factsheet FS017 on Ropewick applicator construction and use warnings below.

#### **WARNINGS:**

1. Do NOT allow Glyphomax Plus 4SC to contact the leaves, young green bark, fresh trunk wounds, or root suckers, or severe crop injury may occur.

2. Do NOT allow Glyphomax Plus 4SC to contact ANY IMMATURE PART of PEACH or PLUM trees.

3. Do NOT use GALVANIZED containers. Glyphomax Plus 4SC will react with the container to produce explosive hydrogen gas.

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

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

**Canada Thistle - *Cirsium arvense* (L.)** A perennial weed with 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.

### Chemical Control

- **Roundup Ultra Max (glyphosate)** – 2.25 lbs ae/A (2.4 qt/A) broadcast application and/or 2-5% (2-5 gal of Roundup Ultra Max/100 gal water) spot spray in late June when the weed has flower buds or flowers, or in the fall after the shoots are 6 to 8 inches tall, but before frost. For newly planted (nonbearing) and established (bearing) peaches.
- **Glyphomax Plus 4SC (glyphosate)** - 3 lbs ae/A (3 qt/A) broadcast application and/or 2-5% (2-5 gal/100 gal water) spot spray in late June when the weed has flower buds or flowers, or in the fall after the shoots are 6 to 8 inches tall, but before frost. For newly planted (nonbearing) and established (bearing) peaches.
- **Touchdown (glyphosate)** – 2.25 lbs ae/A (3 qt/A) broadcast application and/or 2% (2 gal Touchdown 6SC/100 gal water) spot spray in late June when the weed has flower buds or flowers, or in the fall after the shoots are 6 to 8 inches tall, but before frost. For newly planted (nonbearing) and established (nonbearing) peaches.

**Camphorweed - (*Heterotheca subaxillaris* (Lam) Britt. & Rusby.** 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 New Jersey or originate from seed that germinates in the spring is unknown.

### Chemical Control

- **2,4-D** - 1 lb ae/A (1 qt/A) applied in the early spring after seeds have germinated, but before the plants begin to bolt for nonbearing established tree fruit crops only.
- **Roundup Ultra Max (glyphosate)** – 0.75-1.5 lbs ae/A (0.8-1.6 qt/A) broadcast application when the weed is growing rapidly and/or spot treatment 1-2% solution (1-2 gal /100 gal spray solution) when the weed is growing rapidly. For newly planted (nonbearing) and established (bearing) peaches.
- **Touchdown (glyphosate)** - 1-2 lbs ae/A (1.33-2.66 pt/A) broadcast application and/or spot treatment 1-2% solution (1-2 gal/100 gal water) when the weed is growing rapidly. For newly planted (nonbearing) and established (nonbearing) tree fruit crops only.
- **Glyphomax Plus 4SC (glyphosate)** – 0.75-1.5 lbs ae/A (1-2 qt/A) broadcast application and/or 2-5% (2-5 gal/100 gal water) when the weed is growing rapidly. For newly planted (nonbearing) and established (bearing) peaches.

**Dandelion - *Taraxacum officinale* Weber.** A perennial plant grows actively during the spring and fall. Flowering in the spring coincides with many fruit tress 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.

## Chemical Control

- **2,4-D** - 1 lb ae/A (Use 1 qt/A Weedar 64 or OLF) applied in the fall after harvest or in early spring after the weed is growing actively but before flowers appear. Spray the vegetation-free zone under the fruit trees and the sod between the tree rows. For established (bearing) peaches.
- **Roundup Ultra Max (glyphosate)** – 3-3.75-1.5 lbs ae/A (3.2-4 qt/A) broadcast application and/or 2% (2 gal /100 gal water) spot treatment when the weed is growing actively and has flower buds. Spring or fall applications may be more effective than applications made in midsummer. For newly planted (nonbearing) and established (bearing) peaches.
- **Touchdown (glyphosate)** – 2.75- lbs ae/A (3 pt/A) broadcast application and/or 2% (2 gal /100 gal water) spot application when the weed is growing rapidly and has flower buds. Spring or fall applications may be more effective than applications made in mid summer. For newly planted (nonbearing) and established (nonbearing) tree fruit crops only.
- **Glyphomax Plus 4SC (glyphosate)** – 3-3.75 lbs ae/A (4-5 qt/A) broadcast application and/or 1% (1 gal/100 gal water). Spring or fall applications may be more effective than applications made in midsummer. For newly planted (nonbearing) and established (bearing) peaches.

**Goldenrod Species - *Solidago canadensis* L., *Solidago* ssp.** Close related perennial weeds growing 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.

## Chemical Control

- **Roundup Ultra Max (glyphosate)** – 1.5-3 lbs ae/A (2-4 qt/A) broadcast application and/or spot treatment 2% (2 gal /100 gal spray solution) 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. For newly planted (nonbearing) and established (bearing) peaches.
- **Touchdown (glyphosate)** – 1.5-3 lbs ae/A (2-4 qt/A) broadcast application and/or spot treatment 2% (2 gal/100 gal water) 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. For newly planted (nonbearing) and established (nonbearing) peaches.
- **Glyphomax Plus 4SC (glyphosate)** – 1.5-3 lbs ae/A (2-4 qt/A) broadcast application and/or spot treatment 2% (2 gal /100 gal spray solution) 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. For newly planted (nonbearing) and established (bearing) peaches.

**Horseweed (Marestail) - *Conyza canadensis* (L.)** A biennial plant with seed that germinates in late summer or early fall. The seeding 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.

## Chemical Control

- **2,4-D** - 1 lb ae/A (1 qt/A Weedar 64 or OLF) applied in the fall after harvest or in early spring to control the weed in the rosette stage of growth. It is less effective after the weed bolts. For established (bearing) peaches.
- **Glyphosate** resistant horseweed has been identified in the mid-Atlantic region. Due to this situation, products containing glyphosate are no longer recommended in New Jersey for horsetail control.

**Poison Ivy - *Toxicodendron radicans* (L.)**. A woody perennial vine or shrub with capability to climb fruit trees. 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. Initiate control measures before vine grows up the tree trunk.

### Chemical Control

- **Roundup Ultra Max (glyphosate)** – 3-3.75 lbs ae/A (3.2-4 qt/A) broadcast spray and/or 2-5% (2-5 gal /100 gal spray solution) spot treatment in mid-to late summer after the weed flowers in late June or early July or in early fall before fall colors appear. For newly planted (nonbearing) and established (bearing) peaches.
- **Touchdown (glyphosate)** - 3 lbs ae/A (4 qt/A) broadcast spray and/or 2% solution (2 gal /100 gal water) spot applicator in mid to late summer after the weed flowers 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 have formed. For newly planted (nonbearing) and established (nonbearing) peaches.
- **2,4-D** - 1 lb ae/A (1 qt/A Weedar 64 or OLF). Applied in the fall after harvest but before fall colors appear. One application may provide suppression only. A second application 2 weeks after the first application will improve control. For established peaches.
- **Glyphomax Plus 4SC (glyphosate)** – 3-3.75 lbs ae/A (4-5 qt/A) broadcast spray and/or 2-5% (2-5 gal /100 gal spray solution) spot treatment in mid-to late summer after the weed flowers in late June or early July or in early fall before fall colors appear. For newly planted (nonbearing) and established (bearing) peaches.

**Quackgrass - *Elytrigia repens* (L.)**. This perennial plant grows actively in the late spring and early fall when daily high temperatures range between 65o and 80oF (18.3o and 26.7oC). High midsummer temperatures, above 85oF (29.4oC) 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 one-eighth 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.

### Chemical Control

- **Roundup Ultra Max (glyphosate)** – 1.5 lbs ae/A (1.6 qt/A) broadcast spray and/or 1-2% solution (1-2 gal of Roundup Ultra 4SC/100 gal spray solution) spot treatment 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. For newly planted (nonbearing) and established (bearing) peaches.
- **Touchdown (glyphosate)** – 1.5 lbs ae/A (2 qt/A) broadcast application and/or 1-2% (1-2 gal Touchdown 6SC/100 gal water) spot treatment 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. For newly planted (nonbearing) and established (nonbearing) peaches.

- **Kerb (pronamide)** - 2-4 lbs ae/A (4-8 lbs/A Kerb 50WP) in November when soil temperatures are between 35o and 55oF (1.67o and 12.8oC). Primarily controls perennial grasses, including quackgrass, bluegrass, ryegrass sp., fescue sp., and also provides early control of annual grasses the following spring.
- **Glphomax Plus 4SC (glyphosate)** – 1.5 lbs ae/A (1.6 qt/A) broadcast spray and/or 1-2% solution (1-2 gal of Glyphomax Plus 4SC/100 gal spray solution) spot treatment 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. For newly planted (nonbearing) and established (bearing) peaches.

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) peaches.

**Virginia Creeper - *Parthenocissus quinquefolia* (L.)** A woody perennial vine with capability to climb and smother fruit trees. 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.

### Chemical Control

- **Roundup Ultra Max (glyphosate)** – 3-3.75 lbs ae/A (3.2-4 qt/A) broadcast spray and/or 2 - 5% (2-5 gal/100 gal spray solution) spot treatment 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. For newly planted (nonbearing) and established (bearing) peaches.
- **Touchdown (glyphosate)** - 3 lbs ae/A (4 qt/A) broadcast treatment and/or 2% (2 gal Touchdown 6SC/100 gal water) spot spray in mid to late summer after the vine flowers in early July or in early fall before fall colors appear. Applications before flowering have been less effective. Repeat applications may be needed. One application may merely suppress Virginia creeper. For newly planted (nonbearing) and established (nonbearing) peaches.
- **Glphomax Plus 4SC (glyphosate)** – 3-3.75 lbs ae/A (4-5 qt/A) broadcast spray and/or 2 - 5% (2-5 gal/100 gal spray solution) spot treatment 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.
- **2,4-D** - 1 lb ae/A (1 qt/A Weedar 64) applied in July to weed foliage. Do not spray fruit tree foliage or green bark. Will provide suppression only. May be tank-mixed with residual herbicides. Do NOT tank-mix with **Paraquat/Gramoxone** or control may be reduced. For established (bearing) peaches.

**White Heath Aster - *Aster pilosus* Willd.** A perennial weed that begins growing in April from rosettes or rootstocks. Typically, blooms are about 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.

## Chemical Control

- **Roundup Ultra Max (glyphosate)** – 1.5-3 lbs ae/A (2-4 qt/A) broadcast treatment and/or 2% (2 gal Roundup Ultra 4SC/100 gal spray solution) spot spray in May or June after spring growth is at least 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. For newly planted (nonbearing) established (bearing) peaches.
- **Touchdown (glyphosate)** – 1.5-3 lbs ae/A (2-4 qt/A) broadcast spray and/or 2% (2 gal Touchdown 6SC/100 gal water) spot treatment 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 can be delayed until June. For newly planted (nonbearing) and established (nonbearing) peaches.
- **Glyphomax Plus 4SC (glyphosate)** ) – 1.5-3 lbs ae/A (2-4 qt/A) broadcast treatment and/or 2% (2 gal Roundup Ultra 4SC/100 gal spray solution) spot spray in May or June after spring growth is at least 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. For newly planted (nonbearing) established (bearing) peaches.

## Cultural Control of Weeds

Plowing, disking, and harrowing before planting an orchard and disking, mowing, and hand-weeding after trees are planted helps eliminate perennial and broad leaf weeds.

## Diseases(4)

### Bacterial Spot

Bacterial Spot is caused by the plant pathogenic bacterium *Xanthomonas campestris* pv. *pruni*. Bacterial spot infections occur anytime from petal fall until after harvest. This bacterium can attack leaves, twigs, and fruit. Foliar infection results in angular, grayish lesions about 1/8 inch in diameter. As lesions age, they become purple and necrotic, and sometimes abscise, leaving a shot-hole appearance. Multiple lesions result in leaf chlorosis (yellowing) and defoliation.

Cankers are visible in early spring as slightly raised, blister-like areas along the twig. If the terminal bud region becomes infected, the shoot tip becomes a blackened canker that may extend downward along the shoot for about an inch. In this case, the terminal bud is killed.

Fruit symptoms are first observable three to five weeks after petal fall, and later appear as depressed, brownish lesions, sometimes accompanied by pits, cracks, or exuding gum. Up to 39% of fruit can be infected by bacterial spot.

## Chemical Control

The two to four week period immediately after petal fall is critical for both early foliage and fruit infection. Thus, to properly control fruit infection, sprays should be applied from petal fall until 15 days before harvest. **Mycoshield 17WP** - 1-1.5 lb/acre and **Tennacop 5E** - 4-8 oz/acre in the Shuck-Split, First, Second, Third, Fourth, Fifth, and Sixth Cover provide satisfactory disease control.

In addition to the protective sprays mentioned above, there is some evidence that early applications just before bud-swell and prior to bloom can help to reduce the overwintering epiphytic inoculum on tree surfaces. These sprays lower the bacterial population, thereby decreasing the likelihood of infection of newly emerging leaves and fruit. Also, autumn applications during leaf drop may be beneficial in preventing canker formation. Fixed copper materials can be used at both these times.

## Brown Rot

Brown Rot: Infection caused by *Monilinia fructicola* occurs at bloom or during the preharvest period. Bloom infection results in blossom blight a necrosis of flowers. Once a flower is infected, the fungus can also proceed into the stem and cause a canker. A spore produced on these flowers and cankers then becomes the inoculum for subsequent infection during the preharvest fruit rot phase.

## Chemical Control

Normally, two sprays are applied during the bloom period, the first at 5-10% bloom and the second at full bloom. The most effective fungicides are: **Abound 2F** - 12-15 oz/acre, **Bravo WS** - 3-4 pt/acre, **Captan 50WP** - 4 lbs/acre, **Elite 45DF** - 5 oz/acre, **Indar 75WSP** - 2 oz/acre, **Nova 40W** - 2.5-6 oz/acre, **Orbit 3.6EC** - 4 oz/acre, **Rovral 50WP** - 1-2 lbs/acre, **Sulfur, actual** - 10-12 lbs/acre, **Elevate 50WDG** - 1-1.5 lb/acre, **Flint 50WG** - 2-4 oz/acre and **Vanguard WG** - 5 oz/acre. If the weather is very dry, only one spray may be needed. Conversely, if much rainy weather is encountered, a third spray at petal fall may be desirable.

As the fruit softens during the ripening process, it becomes more susceptible to brown rot. Fungicides are applied at regular intervals during this period. The first spray is applied at 14-21 days preharvest, or at first color. Usually, only two sprays at 7-14 days apart are needed, but a third spray may be necessary in the event of very wet weather. Recommendations include one of the first six above mentioned fungicides, and as well **Topsin-M 70WP** - 0.5 lb/acre plus one of the following: **Captan 50WP** - 2 lbs/acre or **Sulfur, actual** - 6 lbs/acre. A final application of a systemic material just before harvest is also a good practice to protect fruit during shipping and packing operations. Fungicides differ in spray and preharvest intervals.

Insect feeding injury increases brown rot infection; therefore, adequate insecticide protection helps suppress injury. Also, experiments indicate that brown rot is most difficult to control where peach trees make excessive growth. In

such orchards, nitrogen-containing fertilizers should be used sparingly.

Special attention to brown rot control is required where trees are planted closely or where orchards are surrounded by woods. Such conditions reduce air drainage, and dew or rain evaporates more slowly from blossoms and fruit than where air drainage is better.

### **Powdery Mildew**

The fungus *Sphaerotheca pannosa* causes powdery mildew of peach and nectarine. This is the same pathogen that causes mildew on roses. Sporulating colonies of this fungus have been observed on multiflora roses growing wild along woods adjacent to orchards.

#### **Chemical Control**

Since the fruit becomes resistant to infection shortly before pit hardening, infections generally occur between pink-bud and third cover sprays. However, once lesions are established, they will continue to expand in size. **Sulfur** - 4 lbs/acre applied when needed, provides reasonably good control. **Nova 40W** - 10-12 lbs/acre, **Flint 50WG** – 2-4 oz/acre and as well a combination of **Benlate 50WP** - 0.5 lb/acre or **Topsin-M 70WP** - 0.5 lb/acre plus **Captan 50WP** - 2 lbs/acre or **Sulfur, actual** - 6 lbs/acre applied when needed are extremely effective.

### **Rusty Spot**

The fungus that causes this disease is believed to be the apple powdery mildew pathogen, *Podosphaera leucotricha*. Consequently, the disease can be anticipated in blocks adjacent to mildew susceptible apple blocks.

Fruit infections can occur throughout the growing season, but are most common at shuck-split and shuck-off. Fruit not protected at these critical times may become 100% infected, even if a good spray program is employed during the remainder of the year. The varieties most susceptible to the disease are Rio-So-Gem, Jefferson, Jerseyqueen, Biscoe, Loring, Early Loring, Redskin, Jerseyglo, and Garnet Beauty.

Since it is a powdery mildew disease, dry weather favors sporulation and spread of the mildew spores. Periods of heavy or frequent rainfall are less favorable. Also, moderate winters favor overwintering of the fungus on apple, thus providing higher inoculum levels for rusty spot in neighboring peach blocks. Rusty spot damage levels can exceed 23% of fruit infected at harvest.

#### **Chemical Control**

**Nova 40W** - 2.5-6 oz/acre applied when needed is considered the best material for disease control. **Flint 50WG** – 2-4 oz/acre



is a close second.

## Scab

Peach Scab is caused by the fungus *Cladosporium carpophilum*. It over-winters in twig cankers produced on current season's twigs. Spores are released around shuck split and for the remainder of the season.

The infection process begins each year from spores produced in cankers formed on last year's growth. The spores are not readily released into the air until they become wetted. The period between infection and visual appearance of the disease on the fruit is very long, from 40 to 70 days. Because of the long period between infection and visual symptoms of the disease, early maturing varieties may be harvested before the fruit spots are visible to the naked eye. Infections can occur on the fruit, green twigs, and leaves.

Cankers formed on current season twigs are light brown, diffuse, small (1/16 to 1/8 inches in diameter) initially, and later increase in size, becoming circular in outline and turning a darker brown color. A slightly raised bark callus surrounds the margin of the lesion. In the spring, velvety-textured, olive-colored spots appear within the lesion.

On the fruit, the tiny spots appear around third cover (early July in southern counties) when the fruit are about one-half their final size. The spots develop quickly into very dark, olive-colored, circular spots. Later the spots appear almost black in color. The spots do not "break" the skin, as do the fruit spots caused by bacterial spot. However, the skin frequently cracks open in the areas where numerous infected spots occur, and the Brown Rot or Rhizopus Rot fungus then attacks the flesh of the fruit. The spots are invariably more numerous on the stem end of the fruit. This is the result of where the spores land most frequently on the fruit and to the generally higher wetness and humidity, which occurs at the stem end of the fruit. Damage to peaches caused by scab can range 30-45%.

### Chemical Control

**Benlate/Topsin-M** (0.5 lb/100 gal), when applied at petal fall, has resulted in "burn out" of many of the overwintering lesions on the twigs. Thus, disease pressure can be measurably reduced as a result of a lower inoculum level. Fruit infections are most common from shuck-split through third cover. Foliar sprays with **Abound SC** - 8-9 oz/acre, **Bravo WS** - 3-4 pt/acre, **Flint 50WG** - 2-4 oz/acre, **Captan 50WP** - 4lbs/acre, and **Topsin-M 70WP** plus **Captan 50WP** - 2 lbs/acre at Shuck-Split, First, Second, Third, and Fourth Cover are effective in protecting the fruit from infection, and a single fungicide spray applied around first cover will provide reasonably good control of twig infections in non-bearing blocks.

The disease is troublesome in commercial blocks when the trees did not receive a regular spray program in the preceding year. Where the disease is troublesome, half rates of **Benlate** or **Topsin-M** in combination with **Sulfur** or **Captan** give good control. **Bravo** is also a very effective material and has good retention capabilities. Sprays should be applied from shuck-split through third cover.

## Post Harvest Control Practices:

To prevent fruit rot development during storage and in marketing channels, postharvest fungicide treatment is conducted. Hydrocooling fruit before placing in cold storage with **Agclor 310 (12.5%)** - 0.75 gal for 1000 ppm, household bleach (5.25%) - 1.8 gal for 1000 ppm, or **HTH Chlorine (65%)** - 1.33 lb for 1000 ppm has proven to be one of the best controls.

To avoid postharvest peach skin discoloration (inking), hydrocoolers and dumptanks should be kept as clean as possible, with the pH of water in hydrocoolers and dumptanks between 6.5 and 7.0. Equipment should be checked for loss of ammonia, since leaks in the refrigeration system can also stimulate inking. In reduction of discoloration, chlorine levels of 120 ppm have shown excellent results.

## Nematodes

Nematodes are microscopic roundworms that live mainly in soil and plant tissue. Plant parasitic nematodes feed on plants by puncturing and sucking the cell contents with a stylet mouthpart. They can reduce the vigor and yield of trees, and as well as transfer virus diseases like tomato ringspot virus (TmRSV) that debilitates and kills trees.

Plant-parasitic nematodes are always a problem where peaches follow peaches. Where nematodes are troublesome, trees do not grow as vigorously. Nematode feeding increases the incidence of peach decline, and it can increase the incidence of stem pitting.

### Chemical Control

Preplant nematicides **Basamid** - 222-265 lbs/acre, **Nemacur** - 2.5 gal/acre, **Telone II** - 36-48 gal/acre, **Telone C-17** - 30-40 gal/acre, **Vapam** 50-100 gal/acre, and **Vydate L** - 3-4 gal/acre are used to promote tree vigor and to prevent the replant problem. Postplant treatments with **Nemacur** - 2.5 gal/acre and **Vydate L** - 2 pt/acre reduce tree loss from peach decline and stem pitting. All nematicides are fumigants except **Nemacur** and **Vydate**. Rates are for light, sandy soils. Heavier soils require higher rates.

Nematodes build up and reach damaging levels by the end of the second growing season when fumigant-type nematicides are used. The nematode buildup may occur at the end of the first growing season with nonfumigant-type nematicides. When sufficient nematode populations are present, postplant nematicide treatments are needed yearly to prevent tree loss.

Soil fumigants can be applied any time the soil temperature is at least 55° F at the 12-inch depth. Generally, soil temperatures reach this point from mid-April to mid-November in southern counties and from mid-April to early November in northern counties. During mid-summer, soil temperature may become too high for successful treatment (90° F). After making the application, soil should be shallow cultivated and irrigated with a half-inch of water.

Nonfumigant types of nematicides are formulated as sprayable materials. Sprayable soil-applied nematicides can be applied with a properly calibrated weed sprayer, and they have been successfully used in combination with all of the herbicides commonly used on tree fruit. To prevent injury to nontarget organisms, all of the soil-applied nematicides should be shallow incorporated shallowly in the soil immediately after application. They must enter the soil water and contact the nematode to effect control. As nonfumigants, soil temperature and soil moisture are not so critical for satisfactory control. Satisfactory control has been obtained with applications any time between mid-March and late November when the ground is not frozen. The nonfumigant nematicides presently cleared for use on tree fruit all possess some systemic activity. Consequently, when they are applied to soils, the ground should be weed-free for maximum control.

## Contacts

### **Peter Shearer, Ph.D.**

Rutgers, The State University of New Jersey  
Rutgers Agricultural Research & Extension Center  
121 Northville RD  
Bridgeton 08302, NJ  
(856) 455-3100

### **George Hamilton, Ph.D.**

Pest Management Office  
Rutgers, The State University of New Jersey  
93 Lipman Drive  
New Brunswick, 08901  
(732) 932-9801

### **Dean Polk**

Rutgers, The State University of New Jersey  
Cream Ridge Fruit Research and Extension Center  
283 Route 539  
Cream Ridge, NJ 08514  
(856) 758-7311

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## Tables

| TABLE 1. Insecticides and miticides used to control New Jersey Peach Pests: 2002 |        |        |             |               |          |        |         |         |
|--|--------|--------|-------------|---------------|----------|--------|---------|---------|
|  |        | APOLLO | ASANA<br>XL | AZINPHOS      | DIAZINON |        | GUTHION |         |
| Arthropod<br>Pest  | AMBUSH | SC     | .66EC       | METHYL<br>50W | 50WP     | DAMOIL | 50PVA   | PROVADO |
| European<br>Red Mite   |        | x      |             |               |          | x      |         |         |
| Two Spotted<br>Spider Mite   |        | x      |             |               |          | x      |         |         |
| San Jose<br>Scale  | x      |        | x           | x             | x        | x      | x       | x       |
| Oriental<br>Fruit Moth   |        |        | x           | x             | x        |        | x       |         |
| Plum<br>Curculio   | x      |        | x           | x             | x        |        | x       |         |
| Green Peach<br>Aphid   | X      |        | x           |               | x        |        |         | x       |
| Black Peach<br>Aphid   | x      |        | x           |               | x        |        |         |         |
| Catfacing<br>Insects(TPB,<br>etc.)   | x      |        | x           | x             | x        |        | x       |         |

|                         |      |      |      |      |      |     |      |      |
|-------------------------|------|------|------|------|------|-----|------|------|
| Western Flower Thrips   | x    |      |      |      | x    |     |      |      |
| Japanese Beetle         |      |      | x    | x    | x    |     | x    | x    |
| Tufted Apple Bud Moth   | x    |      | x    | x    | x    |     | x    |      |
| Lesser Peach Tree Borer | x    |      | x    |      | x    |     | x    |      |
| Peach Tree Borer        | x    |      | x    |      | x    |     | x    |      |
| # Acres Treated         | 0.8  | 45.6 | 4016 | 0.8  | 1144 | 224 | 7240 | 4528 |
| % Acres Treated         | 0.01 | 0.57 | 50.2 | 0.01 | 14.3 | 2.8 | 90.5 | 56.6 |

|                         |         |         |         |        |        |       |       |          |
|-------------------------|---------|---------|---------|--------|--------|-------|-------|----------|
| TABLE 1.<br>Cont.       |         |         |         |        |        |       |       |          |
|                         | LANNATE | LANNATE | LORSBAN | CARZOL | IMIDAN | SEVIN |       | SUNSPRAY |
| Arthropod Pest          | 90SP    | LV      | 4EC     | SP     | 70WP   | 4F    | DIPEL | 6E       |
| European Red Mite       |         |         |         | x      |        |       |       | x        |
| Two Spotted Spider Mite |         |         |         | x      |        |       |       | x        |
| San Jose Scale          | x       | x       | x       |        | x      |       |       | x        |
| Oriental Fruit Moth     | x       | x       |         |        | x      | x     | x     |          |
| Plum Curculio           | x       | x       |         |        | x      | x     |       |          |
| Green Peach Aphid       | x       | x       | x       |        |        |       |       | x        |

|                              |          |       |       |       |       |            |         |         |
|------------------------------|----------|-------|-------|-------|-------|------------|---------|---------|
| Black Peach Aphid            | x        | x     |       |       |       |            |         | x       |
| Catfacing Insects(TPB, etc.) | x        | x     |       | x     | x     | x          |         |         |
| Western Flower Thrips        | x        | x     |       | x     |       |            |         |         |
| Japanese Beetle              | x        | x     |       |       | x     | x          |         |         |
| Tufted Apple Bud Moth        | x        | x     |       |       | x     |            | x       |         |
| Lesser Peach Tree Borer      | x        |       | x     |       | x     |            |         |         |
| Peach Tree Borer             | x        | x     | x     |       | x     |            |         |         |
| # Acres Treated              | 2400     | 2496  | 1400  | 192   | 3608  | 64         | 264     | 720     |
| % Acres Treated              | 30       | 31.2  | 17.5  | 2.4   | 45.1  | 0.8        | 3.3     | 9       |
| TABLE 1. Cont.               |          |       |       |       |       |            |         |         |
|                              | CARBARYL | SEVIN | SEVIN | SEVIN | SEVIN | ENDOSULFAN | SPINTOR | THIODAN |
| Arthropod Pest               | 4L       | 50W   | 80S   | WSP   | XLR   | 3EC        | 2SC     | 50WP    |
| European Red Mite            |          |       |       |       |       |            |         |         |
| Two Spotted Spider Mite      |          |       |       |       |       |            |         |         |
| San Jose Scale               | x        |       |       |       |       | X          | x       | x       |
| Oriental Fruit Moth          | x        | x     | x     | x     | x     | X          | x       | x       |

|                              |     |      |      |     |      |      |      |     |
|------------------------------|-----|------|------|-----|------|------|------|-----|
| Plum Curculio                | x   | x    | x    | x   | x    | X    | x    | x   |
| Green Peach Aphid            |     |      |      |     |      | X    | x    | x   |
| Black Peach Aphid            |     |      |      |     |      | X    |      | x   |
| Catfacing Insects(TPB, etc.) | x   | x    | x    | x   | x    | X    | x    | x   |
| Western Flower Thrips        |     |      |      |     |      |      | x    |     |
| Japanese Beetle              | x   | x    | x    | x   | x    |      |      |     |
| Tufted Apple Bud Moth        |     |      |      |     |      |      | x    |     |
| Lesser Peach Tree Borer      |     |      |      |     |      | X    | x    | x   |
| Peach Tree Borer             |     |      |      |     |      | X    | x    | x   |
| # Acres Treated              | 456 | 46.4 | 50.4 | 424 | 77.6 | 1232 | 2184 | 240 |
| % Acres Treated              | 5.7 | 0.58 | 0.63 | 5.3 | 0.97 | 15.4 | 27.3 | 3   |

|                         |          |           |
|-------------------------|----------|-----------|
| TABLE 1.<br>Cont.       |          |           |
|                         | PYRAMITE | MALATHION |
| Arthropod Pest          | 60WP     | 5E        |
| European Red Mite       | x        |           |
| Two Spotted Spider Mite | x        |           |

|                              |     |      |
|------------------------------|-----|------|
| San Jose Scale               |     | x    |
| Oriental Fruit Moth          |     | x    |
| Plum Curculio                |     | x    |
| Green Peach Aphid            |     | x    |
| Black Peach Aphid            |     | x    |
| Catfacing Insects(TPB, etc.) |     | x    |
| Western Flower Thrips        |     |      |
| Japanese Beetle              |     | x    |
| Tufted Apple Bud Moth        |     | x    |
| Lesser Peach Tree Borer      |     | x    |
| Peach Tree Borer             |     | x    |
| # Acres Treated              | 552 | 3.2  |
| % Acres Treated              | 6.9 | 0.04 |

|  |         |       |        |             |        |        |            |       |
|--|---------|-------|--------|-------------|--------|--------|------------|-------|
| TABLE 2. Fungicides and bacteriacide used to control New Jersey Peach Diseases: 1998 |         |       |        |             |        |        |            |       |
|  | Benlate | Bravo | Bravo  | Bravo       |        | Captan | Mycoshield | Elite |
| Disease Pest   | 50WP    | 720   | Ultrex | Weatherstik | Abound | 50W    | AT         | 45DF  |



|                 |       |        |      |        |      |        |        |      |
|-----------------|-------|--------|------|--------|------|--------|--------|------|
| Bacterial Spot  |       |        |      |        |      |        | x      |      |
| Brown Rot       | x     | x      | x    | x      | x    | x      |        | x    |
| Powdery Mildew  |       |        |      |        |      |        |        |      |
| Rusty Spot      |       |        |      |        | x    |        |        |      |
| Scab            | x     | x      | x    | x      | x    | x      |        |      |
| Leaf Curl       |       | x      | x    | x      |      | x      |        |      |
| Rhizopus Rot    |       |        |      |        |      | x      |        | x    |
| Pytopthora      |       |        |      |        |      |        |        |      |
| # Acres Treated | 712.0 | 1992.0 | 38.4 | 1152.0 | 60.0 | 7528.0 | 2584.0 | 15.2 |
| % Acres Treated | 8.9   | 24.9   | 0.5  | 14.4   | 0.8  | 94.1   | 32.3   | 0.2  |

|                 |        |        |          |         |        |        |          |       |
|-----------------|--------|--------|----------|---------|--------|--------|----------|-------|
| TABLE 2. Cont.  |        |        |          |         |        |        |          |       |
|                 | Ferbam | Indar  | Tennocop | Copper  | Kocide | Lime   |          | Nucop |
| Disease Pest    | 76WDG  | 75WSP  | 5E       | Sulfate | LF     | Sulfur | Vanguard | 50WP  |
| Bacterial Spot  |        |        | x        | x       | x      | x      |          | x     |
| Brown Rot       | x      | x      | x        |         |        |        | x        |       |
| Powdery Mildew  |        |        | x        |         |        |        | x        |       |
| Rusty Spot      |        |        | x        |         |        |        |          |       |
| Scab            |        | x      |          |         |        |        |          |       |
| Leaf Curl       | x      |        | x        | x       | x      | x      |          |       |
| Rhizopus Rot    |        |        |          |         |        |        |          | x     |
| Pytopthora      |        |        |          |         |        |        |          |       |
| # Acres Treated | 464.0  | 1728.0 | 7455.2   | 175.2   | 398.4  | 175.2  | 2632.0   | 211.2 |
| % Acres Treated | 5.8    | 21.6   | 93.2     | 2.2     | 5.0    | 2.2    | 32.9     | 2.6   |

|                |       |      |          |       |        |          |        |        |
|----------------|-------|------|----------|-------|--------|----------|--------|--------|
| TABLE 2. Cont. |       |      |          |       |        |          |        |        |
|                | Orbit | Nova | Topsin M | Ziram | Kocide | Topsin M | Sulfur | Syllit |
| Disease Pest   | 3.6EC | 40W  | 70W      | 76DF  | 101WP  | WSB      | WP     | 65WP   |

|                 |        |        |       |        |     |      |        |       |
|-----------------|--------|--------|-------|--------|-----|------|--------|-------|
| Bacterial Spot  |        |        |       |        | x   |      |        | x     |
| Brown Rot       | x      | x      | x     | x      |     | x    | x      |       |
| Powdery Mildew  |        | x      |       |        |     |      | x      |       |
| Rusty Spot      |        | x      |       |        |     |      |        |       |
| Scab            |        |        | x     | x      |     |      | x      |       |
| Leaf Curl       |        |        |       |        | x   | x    |        |       |
| Rhizopus Rot    |        |        |       |        |     |      |        |       |
| Pytophthora     |        |        |       |        |     |      |        |       |
| # Acres Treated | 5880.0 | 6064.0 | 260.0 | 2224.0 | 8.0 | 50.4 | 6344.0 | 175.2 |
| % Acres Treated | 73.5   | 75.8   | 3.3   | 27.8   | 0.1 | 0.6  | 79.3   | 2.2   |

| TABLE 3 Insecticides and fungicides used in NJ peach production |                 |                        |     |     |              |
|---|-----------------|------------------------|-----|-----|--------------|
|   | Trade           |                        |     |     | Applications |
| Chemical Name   | Name            | Formulations           | PHI | REI | per season   |
| Ambush, Pounce  | permethrin      | 25WP, 3EC              | 7   | 24  | 1            |
| Apollo  | clofentazine    | SC                     | 21  | 12  | 1            |
| Asana   | esfenvalerate   | 0.66EC                 | 14  | 24  | 1            |
| Azinphos methyl, Guthion, Sniper                                | azinphos methyl | 2S, 50WP, 70WP, 50PVA  | 21  | 24  | 6            |
| Carbaryl, Sevin   | carbaryl        | 50W, 80S, WSP, XLR, 4L | 1   | 12  | 2            |
| Carzol  | formetanate HCL | SP                     | 21  | 24  | 1            |
| Damoil  | oil             |                        | 0   | 4   | 1            |
| Diazinon  | diazinon        | 50WP                   | 21  | 24  | 6            |
| Dipel   | B.t.            | 2X, DF, ES             | 0   | 4   | 1            |
| Endosulfan, Thiodan   | endosulfan      | 3EC, 50WP              | 30  | 48  | 1            |
| Imidan  | phosmet         | 70WP                   | 14  | 24  | 5            |
| Lannate   | methomyl        | 90SP, LV               | 4   | 24  | 2            |
| Malathion   | malathion       | 25WP                   | 7   | 12  | 1            |

|                      |                       |                                 |         |    |    |
|----------------------|-----------------------|---------------------------------|---------|----|----|
| Provado              | imidacloprid          | 1.6F                            | 3       | 12 | 3  |
| Pyramite             |                       | 60WSP                           | 7       | 12 | 2  |
| Sunspray             | oil                   | 6E                              | 0       | 4  | 1  |
| Abound               | azoxystrobin          | 22.9F                           | 0       | 4  | 4  |
| Benlate              | benomyl               | 50WP                            | 3       | 24 | 3  |
| Bravo, Terranil      | chlorothalonil        | 720, Ultrex, Weatherstik,<br>6L | FC      | 48 | 2  |
| Captan               | captan                | 50W, 80W                        | 0       | 96 | 7  |
| Champ, Kocide, Nucop | copper hydroxide      | WP, DF, 3L, DF                  | 21      | 24 | 1  |
| Copper sulfate       | copper sulfate        | WP                              | 21      | 24 | 2  |
| Elite                | tebuconazole          | 45DF                            | 0       | 12 | 1  |
| Ferbam               | carbamate             | 76WDG                           | 21      | 12 | 1  |
| Indar                | fenbuconazole         | 75WSP                           | 0       | 12 | 2  |
| Lime Sulfur          | lime sulfur           | WP                              | 0       | 48 | 1  |
| Mycoshield           | terramycin            | AT                              | 21      | 12 | 3  |
| Nova                 | myclobutanil          | 40W                             | 0       | 24 | 3  |
| Orbit                | propiconazole         |                                 | 0       | 24 | 2  |
| Ridomil              | metalaxyl             | 2E                              | Dormant | 12 | 1  |
| Sulfur               | sulfur                | 90G, WP                         | 0       | 12 | 8  |
| Syllit               | dodine                | WP, 65WP                        | 15      | 48 | 1  |
| Tennocop             | copper                | 5E                              | 0       | 24 | 11 |
| Topsin M             | thiophanate<br>methyl | WSB                             | 1       | 12 | 2  |
| Vanguard             | cyprodinil            | 75WG                            | 2       | 12 | 2  |
| Ziram                | ziram                 | 76DF, 76G                       | 14      | 48 | 1  |

TABLE 4. Herbicides used to control weeds in New Jersey Peach orchards: 2001

|                           |       |        | Modown    | Fusilade          | Roundup      | Lorox     | Dual          | Devrinol      | Solicam       |
|---------------------------|-------|--------|-----------|-------------------|--------------|-----------|---------------|---------------|---------------|
| Weed Pest                 | 2,4-D | Diuron | (bifenox) | (fluazifop-butyl) | (glyphosate) | (linuron) | (metolachlor) | (napropamide) | (norflurazon) |
| Canada Thistle (P)        | s     |        |           |                   | x            |           |               |               |               |
| Camphorweed (B)           | x     |        |           |                   | x            |           |               |               |               |
| Dandelion (P)             | x     |        |           |                   | x            |           |               |               |               |
| Goldenrod Species (P)     | s     |        |           |                   | x            |           |               |               |               |
| Horseweed (Marestail) (B) | x     |        |           |                   | x            |           |               |               |               |
| Poison Ivy (P)            | s     |        |           |                   | x            |           |               |               |               |
| Quackgrass (P)            |       |        |           | x                 | x            |           |               |               | s             |
| Virginia Creeper (P)      | x     |        |           |                   | x            |           |               |               |               |
| Yellow nutsedge (P)       |       |        |           |                   |              |           | x             |               | s             |
| White Heath Aster (P)     | s     |        |           |                   | x            |           |               |               |               |
| Annual Grasses: (A)       |       | s      |           | x                 | x            | x         | x             | x             | x             |
| Carpetweed (A)            | x     | x      |           |                   | x            | x         | x             | x             |               |
| Cockleblur, common (A)    | x     |        |           |                   | x            | x         |               |               |               |
| Cranesbill (A)            | x     |        |           |                   | x            |           |               |               |               |
| Galinsoga, hairy (A)      | x     | x      |           |                   | x            | x         | x             |               |               |
| Jimsonweed (A)            |       | x      |           |                   | x            |           |               |               | s             |
| Lambsquarter, common (A)  | x     | x      |           |                   | x            | x         |               | s             | s             |
| Morning glory sp. (A)     | x     | x      |           |                   |              | x         |               |               |               |

|                               |            |               |            |                 |            |            |      |     |      |
|-------------------------------|------------|---------------|------------|-----------------|------------|------------|------|-----|------|
| Nightshade, eastern black (A) | x          | x             |            |                 | x          |            |      |     |      |
| Shepherdspurse (A)            | x          | x             |            |                 | x          | x          |      |     |      |
| Pigweed sp. (A)               | x          | x             |            |                 | x          | x          | x    | x   |      |
| Purslane, common (A)          | x          | x             |            |                 | x          | x          |      |     | x    |
| Ragweed, common (A)           |            | x             |            |                 |            | x          |      |     | x    |
| Smartweed, Pennsylvania (A)   |            | s             |            |                 | x          | x          |      |     |      |
| Velvetleaf (A)                | x          | x             |            |                 | x          |            |      |     |      |
| % Acres Treated: in row       | 12.5       | 7.2           | 0.1        | 3.2             | 13.9       | 1.3        | 10.3 | 1.2 | 14.4 |
| Sod Middle                    | 10         | 0             | 0          | 0               | 0          | 0          | 0    | 0   | 0    |
|                               | Surflan    | Goal          | Gramoxone  | Prowl           | Princep    | Sinbar     |      |     |      |
| <b>Weed Pest</b>              | (oryzalin) | (oxyfluorfen) | (paraquat) | (pendimethalin) | (simazine) | (terbacil) |      |     |      |
| Canada Thistle (P)            |            |               | x          |                 |            |            |      |     |      |
| Camphorweed (B)               |            |               |            |                 |            |            |      |     |      |
| Dandelion (P)                 |            |               | x          |                 |            | x          |      |     |      |
| Goldenrod Species (P)         |            |               |            |                 |            |            |      |     |      |
| Horseweed (Marestail) (B)     |            |               | x          |                 |            | x          |      |     |      |
| Poison Ivy (P)                |            |               |            |                 |            |            |      |     |      |
| Quackgrass (P)                | x          |               |            |                 |            | x          |      |     |      |
| Virginia Creeper (P)          |            |               |            |                 |            |            |      |     |      |
| Yellow nutsedge (P)           |            |               |            |                 |            | x          |      |     |      |

|                                     |     |     |      |     |      |      |
|-------------------------------------|-----|-----|------|-----|------|------|
| White Heath<br>Aster (P)            |     |     |      |     |      |      |
| Annual<br>Grasses: (A)              | x   |     |      |     |      |      |
| Carpetweed (A)                      | x   | x   |      | x   | x    |      |
| Cockleblur,<br>common (A)           |     |     | x    |     |      |      |
| Cranesbill (A)                      |     |     |      |     |      |      |
| Galinsoga,<br>hairy (A)             |     | x   |      |     |      |      |
| Jimsonweed<br>(A)                   |     | x   |      |     |      | x    |
| Lambsquarter,<br>common (A)         | x   | x   | x    |     | x    | x    |
| Morning glory<br>sp. (A)            |     |     | x    |     | x    |      |
| Nightshade,<br>eastern black<br>(A) |     | x   |      |     | x    | x    |
| Shepherdspurse<br>(A)               |     | x   |      | x   | x    | x    |
| Pigweed sp. (A)                     | x   | x   |      |     | x    |      |
| Purslane,<br>common (A)             | x   | x   |      |     | x    | x    |
| Ragweed,<br>common (A)              |     | x   |      |     | x    | x    |
| Smartweed,<br>Pennsylvania<br>(A)   |     | x   | x    | x   | x    | x    |
| Velvetleaf (A)                      |     | x   | x    | x   |      |      |
| % Acres<br>Treated: in row          | 0.5 | 0.2 | 29.6 | 6.5 | 17.3 | 18.2 |
| Sod Middle                          | 0   | 0   | 0    | 0   | 0    | 0    |