

**2007**  
**North Carolina**  
**Peach and Nectarine Disease**  
**and Pest Management Guide**



## Safety

No pesticide should be used until the label on the container has been read and all directions and safety precautions thoroughly understood. The label is the law; any use not consistent with a label is a violation of both state and federal pesticide laws.

Precautions should be observed when handling pesticides. Personal protective equipment must be used as noted on each label. Maintain a wardrobe of protective equipment, including coveralls, hats, boots, and an appropriate respirator that fits, to be used by anyone handling, mixing, or spraying chemicals in the orchard. No pesticide user should wear clothing that has been contaminated with pesticides. Always put on clean clothing before each day's spraying, and change to clean clothing before eating.

Always read the label before each use of a pesticide. Never smoke while spraying. Avoid inhaling sprays or dusts and, when directed, wear a respirator. Wash hands and face after each spray operation. Avoid contaminating streams and ponds. Never apply fungicides and insecticides with the same spray equipment as is used for applying hormone-type herbicides. Store pesticides out of reach of children or domestic animals. Never store pesticides in the home, and always store them away from food, beverages, eating utensils, tobacco products, seed, fertilizers, etc.

Keep the name, address, and telephone number of the nearest poison control center posted near your place of business in case of accident.

Follow all label first aid directions in case of suspected poisoning. **Symptoms of pesticide poisoning include headache, blurred vision, weakness, nausea, cramps, diarrhea, and chest discomfort.** If any of these symptoms of poisoning occur during or after the mixing or application of pesticides, stop work at once and call a physician. Do not take chances. If a pesticide is spilled on the skin, immediately wash the area thoroughly with large amounts of soap and water. If the pesticide is in an eye, flush the eye with clean water according to label directions. If poisons are accidentally inhaled, immediately place the victim in the open air and transport the person to a physician. If a pesticide is swallowed, do not induce vomiting unless directed to do so on the label. Do not attempt to give liquids to an unconscious person. Immediately call your local or state poison control center (see telephone number below) for specific instructions. **Whenever a pesticide poisoning occurs, take the victim immediately to the nearest emergency medical center.** Be sure to tell medical personnel what pesticide caused the poisoning. If possible, take a copy of the label, not the container, with you to the doctor.

In addition to providing information on safety, pesticide labels give information and instructions about potential environmental hazards. Consult the label for information about such things as endangered species, prevention of surface water and groundwater contamination, and proper disposal of pesticides and empty pesticide containers.

### STATE DESIGNATED POISON CENTER

Carolinas Poison Center  
Telephone: 1-800-848-6946 (1-800-84-TOXIN)  
P.O. Box 32861  
Charlotte, North Carolina 28232-2861

### Regional Poison Centers

Wilmington  
Poison Center  
2131 S. 17<sup>th</sup> Street  
Telephone: 1-910-343-7046

Greensboro  
Triad Poison Center  
Moses Cone Hospital  
1200 N. Elm Street  
Telephone: 1-800-953-4001

### MISUSE OF PESTICIDES

It is a violation of the law to use any pesticide in a manner not permitted by its labeling. To protect yourself and others, never apply any pesticide in any manner or for a purpose other than as instructed on the label, or in labeling accompanying the pesticide product that you purchase. Do not ignore the instructions for use of protective clothing and devices and for storage and disposal of pesticide wastes, including containers. All recommendations for pesticide uses included in this publication were legal at the time of publication, but the status of registration and use patterns are subject to change by actions of state and federal regulatory agencies.

# 2007 Peach and Nectarine Disease and Pest Management Guide

This publication is intended to help you manage diseases and pests of peaches. In choosing a management program, you must weigh the extent of pesticide use against the amount of risk of crop damage you are willing to accept. A rigorous spray program provides the least risk of loss, whereas a minimal spray program using less effective but possibly less hazardous pesticides involves a greater risk of loss. Before choosing a spray program, you should consider previous disease and pest problems in the orchard, cost of pesticides and their application, the possible hazard to the environment, the market in which you want to sell the fruit, and the quality of the fruit to be sold.

Although many pesticides and formulations of the same active ingredient are registered, the pesticides listed in this publication have performed well under North Carolina conditions. Growers should use the gallons of water per acre best suited for their orchard and equipment that provides **coverage throughout the tree**. Based on a tree 8 feet in height, peach trees currently are sprayed using 75 to 125 gallons per acre at a travel speed of 2.5 to 3.5 mph. Less than 75 gallons of spray mix per acre may not provide adequate coverage. The amount of pesticide used should be based on the label recommended **rate per acre**. Some reduced adjustments may be made for smaller trees. Where **complete coverage** of the tree is **essential** (eg, oil for scale insects and fungicide for leaf curl), a **larger volume** of water and a **slower speed** may be necessary. See page 11 for more information. Pesticide rates, uses, and restrictions may change frequently; read and follow label instructions before using a pesticide.

**Effectiveness ratings in the following tables range from \*, slightly effective, to \*\*\*\*\*, highly effective.**

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**IMPORTANT:** Check labels for restricted entry interval (REI) and type of personal protective equipment (PPE) required for early entry into treated area.

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## DORMANT

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After leaves drop in the autumn to before buds swell in the spring – usually mid-November to early February.

### Diseases

**Leaf curl** is a fungal disease. The yeast-like fungus survives on twigs and branches. The years in which the disease occurs cannot be predicted reliably. Infection occurs in late winter and early spring as the buds swell and rainy periods occur. Some cultivars such as Candor, Clayton, Redhaven, Dixiland, Surecrop, Rubired, and Derby are among the less susceptible; however, none is immune. Less than 10 percent

leaf infection should not cause significant damage. Once infection occurs (after buds swell and rainfall) and the disease is observed, fungicide applications will be of little to no value. Captan cover sprays used the previous growing season may reduce leaf curl the following spring.

Controls	Effectiveness
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- |   |       |
|---|-------|
| 1. Plant the more tolerant cultivars if they have desirable cultural and marketing characteristics and are adapted to the growing area. | ***   |
| 2. Use a single fungicide application before buds swell. Recommended fungicides that give adequate leaf curl control include:           |       |
| ferbam (Ferbam Granuflo 76, 4.5 lb/acre),   | ***** |
| ---OR:  |       |
| chlorothalonil (Bravo 720, Bravo Weather Stik, 3.5 pt/acre, Bravo Ultrex 82.5WDG, 3.5 lb/acre, Equus 720 3.5 pt/acre,                   | ****  |
| ---OR:  |       |
| ziram (Ziram 76DF 4.0 lb/acre),   | ****  |
| ---OR:  |       |
| copper-containing fungicides (numerous formulations; see labels for rates and directions).  | ***   |

**Bacterial Spot** is a bacterial disease and thus few if any fungicides provide control. Spraying when leaves are wet may increase disease. Varieties developed in the in dry climates should be considered highly susceptible when grown under conditions favoring the disease. Its occurrence and severity are very sporadic, varying from year to year. Occurrence and severity of the disease depend upon moisture. On fruit, the disease is most severe when frequent periods of rainfall occur at petal fall and during the following 3 to 4 weeks. Susceptible cultivars planted on sandy soils are more likely to be damaged than if planted in heavier soils.

Controls	Effectiveness
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|--|------|
| 1. Plant cultivars that have some resistance to the disease, especially if the trees are to be planted in light, sandy soils.  | **** |
| 2. If leaf curl is not a concern, sprays for bacterial spot control may begin at 1 to 5% bud swell. However, it is essential that the first application be made before new leaf tissue emerges and on which new infections can occur. The following chemical control program is suggested for use where bacterial spot has been a problem: |      |

Controls	Effectiveness
<i>Dormant to Early Bud-break</i>	
Use 2.0 to 3.0 lb metallic copper/acre (Kocide DF 5.0 to 7.5 lb/acre <b>OR</b> Kocide 2000, 6.0 to 8.0 lb/acre <b>OR</b> Kocide 4.5LF, 7.0 to 8.0 pt/acre, <b>OR</b> Cuprofix Ultra 40 Disperss 5.0 to 7.5 lb/acre, <b>OR</b> C-O-C-S 50WDG 4.0 to 6.0 lb/acre); spray at this time also controls leaf curl.	***
<i>Pink-bud but before Blossom Open</i>	
Use 1.0 to 2.0 lb/acre metallic copper/acre (Kocide DF, 2.5 to 5.0 lb/acre <b>OR</b> Kocide 2000, 3.0 to 4.0 lb/acre <b>OR</b> Kocide 4.5LF, 3.5 to 4.0 pt/acre <b>OR</b> Cuprofix Ultra 40 Disperss 2.5 to 5.0 lb/acre, <b>OR</b> C-O-C-S 50WDG 2.0 to 4.0 lb/acre).	***
<i>Blossoms Opening (1 to 5% open)</i>	
Use 0.75 to 1.0 lb metallic copper/acre (Kocide DF, 1.75 to 2.5 lb/acre <b>OR</b> Kocide 2000, 1.5 to 2.8 lb/acre <b>OR</b> Kocide 4.5LF, 2.0 to 2.5 pt/acre <b>OR</b> Cuprofix Ultra 40 Disperss 1.75 to 2.5 lb/acre, <b>OR</b> C-O-C-S 50WDG 1.5 to 2.0 lb/acre).	***
<i>Petal fall(50-75%) but less than 1% shuck split</i>	
Use 0.50 to 0.75 lb metallic copper/acre (Kocide DF, 1.25 to 1.75 lb/acre <b>OR</b> Kocide 2000, 1.5 to 2.0 lb/acre <b>OR</b> Kocide 4.5LF, 1.5 to 2.0 pt/acre <b>OR</b> Cuprofix Ultra 40 Disperss 1.25 to 1.75 lb/acre <b>OR</b> C-O-C-S 50WDG 1.0 to 1.5 lb/acre.	***
<i>Shuck -split/Shuck -off</i>	
Use 0.125 (2.0 oz) to 0.25 lb (4.0 oz) metallic copper/acre (Kocide DF, 0.30 to 0.60 lb/acre <b>OR</b> Kocide 2000, 0.30 to 0.70 lb/acre <b>OR</b> Kocide 4.5LF, 0.50 to 0.75. pt/acre <b>OR</b> Cuprofix Ultra 40 Disperss 0.30 to 0.60 lb/acre <b>OR</b> C-O-C-S 50WDG 0.25 to 0.50 lb/acre, <b>OR</b> oxytetracycline (Mycoshield 17W 0.75 lb/acre, FlameOut 17W 0.75 lb/acre)	***
Additional applications of oxytetracycline may be needed for highly susceptible varieties and when environmental conditions are wet. Low rates (1.0 to 2.0 oz metallic copper/acre) of copper formulations applied in cover sprays alternated with Mycoshield or FlameOut or tank-mixed may be used. Sprays are most effective if applied within a 24-hour period prior to anticipated rainfall but with sufficient time for pesticide to dry. <b>Avoid spraying when leaves are wet if spray material does not include a bactericide.</b> If weather is dry the number of applications can be reduced. From mid-May to early June, assess the incidence of bacterial spot in the orchard. Sprays after mid-June appear to have little impact on fruit infection if disease is controlled at this time.	

**Caution:** Spotting and shot-hole of leaves and defoliation may occur from use of copper sprays. If rainfall is infrequent, copper residues can buildup and increase the risk of injury from excessive copper. There is greater risk of injury when weather is cool and wet. **Always examine trees for unacceptable injury (leaf-spotting and defoliation) from previous copper sprays before making another application of copper.**

## Arthropods

**White peach scale** over-winters as immatures (nymphs) on branches and limbs of the trees. Infestations are easily recognized by the male's fluffy white appearance on the trunk or scaffold limbs. Females are flat and grayish; they are usually found higher in the tree.

**Spider mites** over-winter under bark or in the ground-cover surrounding a tree. Mite populations are very low during the winter but develop quickly on annual weeds that grow and flower in late winter and early spring as temperatures rise. Henbit, vetch, clover, chickweed, and geranium are particularly good hosts for spider mites. Mite populations develop most rapidly under hot, dry weather conditions.

Controls	Effectiveness
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1. Eliminate winter annual weeds from the ground cover by disking or using herbicides (see the weed control section). Weed control also helps reduce injury by catfacing insects after bloom.	****
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2. Make two applications of a dormant oil spray (14 days apart) in early winter. This is the best control strategy for white peach scale. Apply the sprays before buds begin to break but when wind speed is low (less than 2 mph), air temperatures remain above 45 F for 24 to 48 hours, and no rain is expected.	***
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3. Where spider mites have been a problem during the previous season, apply clofentezine (Apollo SC, 4 to 8 fl oz/acre) <b>or</b> hexythiazox (Savey 50WP, 3 to 6 oz/acre) to the trees and surrounding ground cover in early spring. Thorough coverage will kill eggs and young nymphs. For best results apply before May 1. Do not apply more than once per season.	***
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## BLOOM

From the time petals or other parts of the flower are visible until the petals begin to drop – usually early March to mid-April.

## Diseases

**Blossom blight** is a sporadic fungal disease. The fungus survives in association with mummified fruit that remain in the tree and on brown rot twig cankers from the previous growing season. Orchards that had brown rot the previous season are more likely to be at risk for blossom blight if conditions are wet during bloom. Extended periods (more than 24 hours) of misty-type precipitation are very favorable for blossom blight. Infected blossoms can serve as a source of inoculum for the fruit rot phase (brown rot) of this disease. Moisture must be present for spores to germinate and infection to occur.

Controls	Effectiveness
1. Remove and discard all fruit that remain at the last harvest.	**
Prune out any mummified fruit and diseased twigs	***
<b>before bloom.</b>	
Remove alternate hosts (such as wild plums)	***
adjacent to the orchard that can serve as inoculum sources.	
Use good insect management to avoid fruit injury	**
2 A fungicide spray at 10% bloom and again at 80-100% bloom may reduce blossom blight, when the bloom period is extended and weather conditions are wet. Demethylation inhibiting (DMI) fungicides [(Elite, Trisum, Orius); Indar; Nova, and (Bumper, Orbit, PropiMax)] are effective against blossom blight but are at risk to resistance problems if used regularly. Resistance to anyone of the DMI fungicides may result in cross-resistance to the others. It is recommended that DMI fungicides be saved for preharvest sprays and that they not be used in bloom and cover sprays. Recommended fungicides for blossom blight include:	
chlorothalonil (Bravo 720, Bravo Weather Stik, 3.125 pt/acre, Bravo Ultrex 82.5WDG, 3.0 lb/acre, Equus 720 3.125 pt/acre),	***
<b>OR</b>	
cyprodinil (Vangard 75WG, 5.0 oz/acre),	****
<b>OR</b>	
iprodione (Rovral 50WP, 1.0 lb/acre, Rovral 4 F 1.0 pt/acre). Rovral is <b>NOT</b> labeled for use after petal fall,	****
<b>OR</b>	
captan + thiophanate-methyl (Captan 50WP, 4.0 lb/acre, Captac 4L, 2.0 qt/acre + Topsin M 70WP, WSP, 1.25 lb/acre).	****

**Bacterial spot.** See information under DORMANT.

## Arthropods

Do **NOT** apply insecticides during bloom. Honey bees and other beneficial insects can be unnecessarily killed.

## PETAL FALL

When petals begin to drop but before fruit are visible (shuck split).

### Diseases

Including a fungicide in the petal fall spray may enhance peach scab control. Including sulfur at 8.0-10.0 lb/acre is recommended for use in the petal fall spray. This is of greater importance in orchards not sprayed for scab the previous year.

**Bacterial spot.** If using chemicals for bacterial spot control, see discussion under DORMANT.

### Arthropods

**Catfacing insects** (tarnished plant bugs and stink bugs) use piercing-sucking mouthparts to feed inside the developing peach. Injury from these insects may cause deformity, scarring, or dimpling as the fruit grows. Catfacing insects are highly mobile and move into the orchard from nearby weeds.

**Plum curculio** are snout beetles (weevils) that lay eggs in the young peach. Developing larvae burrow through the fruit as they grow. There are two generations per year. Larvae of the first generation cause fruit drop, whereas larvae of the second generation may persist in the fruit at harvest, causing wormy fruit.

**Oriental fruit moths** emerge as adults in early spring when new tree growth begins. The first generation feeds as borers in the terminal shoots, but later generations may move into the fruit and excavate shallow galleries under the skin or around the stem.

Controls	Effectiveness
1. Weed control and sanitation of orchard surroundings has a big impact on the level of catfacing injury sustained early in the growing season. Because pests in the ground cover may be flushed up into the trees when disturbed, try to avoid unnecessary traffic in the orchard and mow the ground cover shortly after an insecticide application.	***
2. Insecticide sprays are almost essential during petal fall to reduce injury by catfacing insects and to prevent establishment of plum curculio and oriental fruit moth populations. Weekly applications through the end of April will usually control pests in orchards where growers maintain good sanitation and weed control. Recommended insecticides include:	

Controls	Effectiveness	Controls	Effectiveness
endosulfan (Thiodan or Phaser 50WP, 2.0 lb/acre) has longer residual but cannot be applied within 30 days of harvest,	****	may be aided by factors such as adequate pruning and selecting orchard sites that allow for rapid drying of the foliage.	
<b>OR</b>			
phosmet (Imidan 70WP, 2 to 4 lb/acre)	***	Recommended fungicides include:	
<b>OR</b>			
esfenvalerate (Asana 0.66EC, 11.6 oz/acre) a good general insecticide, but use only where weeds are well controlled and mites have NEVER been a problem - may aggravate mite Problems,	****	azoxystrobin (Abound 2.08F, 10.0 fl oz/acre). Because of the risk of resistance, only one application for scab is recommended before switching to a fungicide having a different mode of action. Abound can cause serious injury to some apple cultivars (especially McIntosh and Cortland),	****
<b>OR</b>			
permethrin (Pounce 3.2EC, 8.0 oz/acre OR Ambush 2EC, 12 oz/acre) good general insecticides, but may also aggravate mite problems.	****	trifloxystrobin (Flint 50WG, 4.0 oz/acre). Because of the risk of resistance, only one application for scab is recommended before switching to a fungicide having a different mode of action.	*****

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## SHUCK SPLIT TO SHUCK FALL

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When shucks begin to split, exposing the small fruit, until the shucks fall (shuck off).

### Diseases

**Peach scab.** Shuck split is a very critical period for starting peach scab control. Apply a fungicide for scab control to nectarines at early shuck split. The peach scab fungus has an incubation period of 5 to 6 weeks after the infection occurs before the scab lesions become visible (usually the first week in June). Peach scab occurs almost every year in North Carolina unless an effective fungicide program is correctly used. This disease is most severe in orchards in which a good fungicide has NOT previously been used and when frequent periods of moisture occur from shuck split to approximately 5 weeks (second to third cover, pit-hardening) after shuck split. First lesions are usually visible late May to early June.

**Brown rot** is generally of little concern if blossom blight did not occur. Fungicides used for scab control normally provide adequate control of brown rot during this period.

**Bacterial spot.** If using chemicals for bacterial spot control, see the discussion under DORMANT.

**Peach scab** can be adequately controlled only with the proper use of a fungicide, although scab control

<b>OR</b>			
chlorothalonil (Bravo 720, Bravo Weather Stik, 4.0 pt/acre, Bravo Ultrex, 82.5WDG, 3.5 lb/acre, Equus 720)---provides 2 to 3 weeks protection, do <u>NOT</u> use after shuck split,	****		
<b>OR</b>			
captan (Captan 50WP, 5.0 lb/acre, Captan, Captec 4L 2.5 qt/acre). In orchards where scab has been a problem or orchards not previously sprayed for scab, tank-mixing thiophanate methyl (Topsin M 70WP, 1.25 lb/acre) with captan (Captan 50WP 4.0, lb/acre <b>OR</b> Captec 4L, 2.0 qt/acre) enhances scab control. When used for scab control early in the season, Topsin M should <b>NOT</b> be used later in the season for brown rot control because of potential resistance problems,	*****		
<b>OR</b>			
sulfur---many wettable powder and flowable formulations are available. Regardless of the formulation, do not use less than 9.0 pounds of actual sulfur per acre. If frequent periods of rainfall occur, apply sulfur at 5- to 7-day intervals. These close spray intervals are especially important during the 4 to 5 weeks after shuck split when risk of scab infection is greatest.	***		

### Arthropods

Same as for petal fall.

### Controls

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Same as for Petal Fall.

## COVER SPRAYS

*Some insecticides/miticides have lengthy preharvest intervals. Before application, check the label for the minimum number of days between application and harvest.*

Cover sprays start at 7 to 14 days after shuck off. During this period sprays are normally applied every 2 weeks, or when the need is indicated by scouting and monitoring for insects and diseases, or as dictated by periods of precipitation.

### Diseases

**Peach scab.** See comments for shuck split to shuck fall. Because of the 5 to 6-week incubation period for scab lesions to become visible, fruit that ripen before June 15 need only 1 or 2 cover sprays to control scab. Fruit that ripen later will require additional cover sprays depending on lateness of ripening.

**Sooty peach.** In orchards where this is a problem, use Ziram 76DF 4.0 lb/acre or Captan 50WP 4.0 lb/acre every 2 to 4 weeks starting no later than 15 June and until 2 weeks before harvest.

**Brown rot.** During cover spray period, brown rot is generally not a major problem. However, brown rot can become a problem if there are frequent periods of precipitation or if wounds occur in fruit such as those caused by hail or insects which may result in green-fruit rot. Fungicides used to control scab normally provide adequate brown rot control during the cover spray period. It is very important to control insects that wound fruit (eg, stink bugs).

Controls	Effectiveness
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Properly prune trees to allow for rapid drying of fruit and foliage and good penetration of fungicides.

Fungicides recommended for scab control in cover sprays include (See comments under Shuck Split to Shuck Fall):

captan (Captan 50WP, 4.0 to 5.0 lb/acre, or Captan, Captec 4L, 2.0 to 2.5 qt/acre),	*****
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**OR**

sulfur--there are many formulations. Use 9.0-10.0/acre pounds of actual sulfur per acre. When sulfur is used, sprays must be applied more frequently (every 5 to 10 days if rainy) than when a fungicide like captan is used.	***
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### Arthropods

**Spider mites** that build up in the ground cover during early spring may migrate into the peach trees in midsummer when their spring host plants begin to dry up. This movement and buildup usually occurs during hot, dry conditions. Look for yellowing along the midrib of peach leaves near the tree trunk, and check the back of the leaf with a hand lens to find the silk webbing that is indicative of spider mites.

**White peach scale** has three generations per year. Crawlers of the second generation are usually active during the last week of June and the first week of July. To determine when crawlers are active in your orchard, wrap an infested branch with black tape and coat the tape with petroleum jelly or stickum. Newly hatched crawlers become entangled in the adhesive and are visible as tiny pink or reddish dots on the black tape.

**Plum curculio** has two generations per year. The second generation may develop in late-ripening peaches if adults survive from the first generation or if adults migrate from plum thickets or poorly managed orchards nearby.

Controls	Effectiveness
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|---|----|
| 1. Pick up and destroy drops or thinned peaches that may be infested with first generation plum curculio. | ** |
| 2. Apply insecticides only as needed during the summer to suppress known insect populations.              |    |

Recommended materials include:

formetanate (Carzol 90SP, 1.0 lb/acre) effective for mites and catfacing insects but not curculio,	****
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**OR**

phosmet (Imidan 70WP, 2 to 4 lb/acre).	***
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**OR**

thiamethoxam (Actara 25WG, 5.5 oz/acre) only <b>one application per season</b> ; low dermal toxicity to humans (REI = 12 hours); <b>may be useful before thinning</b> ,	***
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**OR**

esfenvalerate (Asana 0.66EC, 11.6 fl oz/acre) a good general insecticide, but use only where weeds are well controlled and mites have NOT been a problem. Can aggravate mite problem,	****
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**OR**

permethrin (Pounce 3.2EC, 8.0 fl oz/acre or Ambush 2EC, 12 fl oz/acre) good general insecticides, but may also aggravate mite problem,	****
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### Mites:

bifenazate (Acramite 50WS, 0.75 to 1.0 lb/acre).  
 Only 1 spray per season, 3 day PHI and 12 hr REI. \*\*\*

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## PREHARVEST

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*Before applying any pesticide at this time, check the pesticide label for the minimum number of days between application and harvest.*

Preharvest period usually begins about 3 weeks before expected harvesting of the fruit. Thus it is very important to know the expected ripening dates of each variety grown and whether ripening time during the current season may be normal, early, or late.

### Diseases

**Brown rot.** This is the most critical period for losses from brown rot and also for control of this disease. As fruit ripen, susceptibility increases. If brown rot is present in or near ripening fruit and rainfall occurs during the preharvest period, the risk of brown rot is very high. Under such conditions, protecting fruit from infection is of utmost importance. If weather conditions are dry during the 2- to 3-week period before and during harvest, brown rot usually is not a problem. If weather conditions are wet during this period and/or green fruit rot or blossom blight occurred, it is important to begin using the most effective fungicides 2 to 3 weeks (first sign of fruit color development) before anticipated harvest.

**Rhizopus rot.** Mostly a postharvest problem, rhizopus rot usually occurs in the field when fruit are allowed to become overripe and weather conditions are hot and wet.

<b>Controls</b>	<b>Effectiveness</b>
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1. Preventing brown rot in or near the orchard is very important. A season-long program is necessary when cultivars of differing ripening times are grown in the same orchard. Do not allow fruit to become overripe before harvesting. At the last picking, harvest all fruit regardless of quality and discard non-salable fruit away from the orchard so it does not serve as a source of inoculum for later ripening fruit or for the next growing season.	**
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Recommended fungicides include:

azoxystrobin (Abound 2.08F, 12.0 fl oz/acre) --- may be used up to day of harvest,	****
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**OR**

fenbuconazole (Indar 75WSP, 2.0 oz/acre) --- may be used up to day of harvest,	*****
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<b>Controls</b>	<b>Effectiveness</b>
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**OR**

propiconazole (Orbit 3.6EC, PropiMax 3.6EC, Bumper 41.8EC, 4.0 fl oz/acre) --- maximum of two (2) preharvest applications per variety; may be applied through day of harvest,	*****
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**OR**

tebuconazole (Elite 45DF, Trisum 45WDG, Orius 45WP, 4.0 to 8.0 oz/acre) ---may be applied through day of harvest.	*****
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**OR**

pyraclostrobin + boscalid (Pristine 38WG, 10.5 to 14.5 oz/acre) ---may be applied through day of harvest,	*****
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In orchards that have NOT had any history of resistance, thiophanate-methyl (Topsin-M 70WP, 1.5 lb/acre) tank-mixed with captan (Captan 50WP, 4.0 lb/acre or Captan, Captec 4L, 2.0 qt/acre) could be used in the **first preharvest spray**.

Use of sulfur for brown rot control during this period generally gives very poor results, especially when the weather is wet and it is not recommended for control of brown rot.	*
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2. Rhizopus rot can be managed by practicing good sanitation in the orchard, packing house, and sales stand. And by not allowing fruit to become overripe.

dichloran (Botran 75WP, 2.75 lb/acre)--- may be applied up to 10 days before harvest, but likely would have very little use under North Carolina conditions.

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## AFTER HARVEST

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### Arthropods

Spider mites may become a serious problem in late summer. These populations are cyclical and usually decline sharply before fall but can cause significant defoliation if untreated.

Peachtree borers are active as adults in August and early September. The larvae of these moths burrow into the tree trunk near the soil line and excavate galleries under the bark. Infestations can be identified by jelly and frass oozing from the base of a tree.

<b>Controls</b>	<b>Effectiveness</b>
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1. Miticides can be used to control spider mites	
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during the current year, and ground cover management strategies should be implemented to suppress populations in subsequent years.

---effective, but does not kill mites as quickly as other materials do.

Recommended miticides include:

pyridazen (Pyramite 60WSP, 6.6 oz/acre), \*\*\*  
**OR**  
 formetanate (Carzol 90SP, 1.0 lb/acre) \*\*  
 ---also controls catfacing insects,

**Controls** **Effectiveness**  


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**OR**  
 hexakis (Vendex 50WP, 1.5 lb/acre) \*\*  
 to 14 days before and after September 1.

2. For control of peachtree borers, saturate the trunk and scaffold limbs with insecticide during the first week of September (the period of peak hatch). established infestations may also require treatments 10

**Controls** **Effectiveness**  


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**OR**  
 esfenvalerate (Asana XL 0.66EC, 12 oz/100 gallons water) \*\*\*  
**OR**  
 endosulfan (Thiodan or Phaser 3EC, 6.0 pt/ 100 gallons water) \*\*  
 ---use only as a preventive; some borer populations may be resistant.

Recommended insecticides include:

chlorpyrifos (Lorsban 4EC, 4.0 pt/100 gallons water) \*\*\*\*  
 --- gives best control on established populations.

**RELATIVE EFFECTIVENESS AND SAFETY OF VARIOUS INSECTICIDES FOR PEACH INSECTS**

(--- = ineffective ; +++++ = very effective; n/a = does not apply)

Insecticide formulation and rate/100 gal water	Days PHI and (REI) *	Plum Curculio	Oriental Fruit Moth	Peachtree Borer	Catfacing Insects	Scales (White peach & San Jose)	Beetles (June, Japanese)	Safety**
carbaryl 80SP- 1.25 lb	3 (12 hr)	+	++	+	+	++	++++	C
chlorpyrifos 4EC - 3.0 qt	14 (4 days)	++++	++++	++++	+++	++	+++	D, R
endosulfan 50WP- 1.0 lb	30 (24 hr)	+++	++	++	+++	++	+	W
esfenvalerate 0.66EC - 5.8 oz	14 (12 hr)	+++++	++++	+++	+++	+	++	D, R
malathion 25WP- 3.0 lb	7 (12 hr)	++	++	+	+	+	++++	C
methomyl 2.4L - 1.0 pt	4 (4 days)	++++	++++	+	+++	+	++	D, R
oil superior - 2.0 gal	n/a	---	---	---	---	+++++	---	C
permethrin 2.0EC - 6.0 oz	14 (12 hr)	+++++	++++	+++	+++	+	++	D, R
phosmet 50WP - 1.5 lb	21 (14 days)	+++	+++	+	+	---	+++	W
thiamethoxam 25WG - 2.75 oz	14 (12 hr)	+++	++++	---	+++	++	+++	C,R

\* PHI = preharvest interval (time between last spray and harvest); REI = reentry interval (time between last spray and reentry without using personal protective equipment (PPE)). **ALWAYS CHECK LABEL BEFORE USE**

\*\* Relative Toxicity (Safety):

D=Danger (most toxic to humans)  
 W=Warning

C=Caution (least toxic to humans)

R=Restricted (restricted-use compound, may be bought and applied only by licensed pesticide operator)

**RELATIVE EFFECTIVENESS OF DISEASE CONTROL CHEMICALS FOR PEACHES AND NECTARINES**

(--- = ineffective ; +++++ = very effective; n/a = does not apply)

Fungicide or Bactericide and Product/Acre	DAYS for* PHI and HOURS (REI)	Leaf Curl	Blossom Blight	Brown Rot	Scab	Rhizopus Rot	Bacterial Spot
azoxystrobin (Abound) 2.08F – 12 fl oz	0 (4)	n/a	+++	++++	++++	n/a	n/a
captan (Captan, Captec) 50WP, 4L – 5 lb, 2.5 qt	0 (24-96)	n/a	++	+++	++++	---	---
chlorothalonil (Bravo Weather Stik, Equus) 6F – 4.0 pt	n/a (12)**	++++	+++	n/a	++++	n/a	---
coppers (Kocide DF, 2000, Cuprifix Disperss) – 6-10 lb***	n/a (24)	+++	n/a	n/a	n/a	n/a	+++
cyprodinil (Vangard) 75WG – 5.0 oz	n/a (12)	---	+++	n/a	---	n/a	---
dichloran (Botran) 75WP – 3.0 lb	10 (12)	---	++	+++	---	+++	---
dodine (Syllit) 65WP – 2 lb + captan (Captan) 50WP – 4 lb	15 (96)	++	++	+++	++++	n/a	++
fenbuconazole (Indar) 75WSP – 2.0 oz	0 (12)	---	++++	++++	+++	n/a	---
fenhexamid (Elevate) 50WDG – 1.5 lb	0 (4)	---	++	+++	---	---	---
ferbam (Ferbam Granuflo) 76DF – 4.5 lb	21 (24)	++++	n/a	n/a	n/a	n/a	n/a
iprodione (Rovral) 50WP, 4L – 1.5 lb, 1.5 pt	n/a**** (24)	---	++++	n/a****	---	n/a	---
myclobutanil (Nova) 40WP – 5.0 oz	0 (24)	---	++++	+++	---	n/a	---
oxytetracycline (Mycoshield, FlameOut) 17WP – 1.0 lb	21 (12)	n/a	---	---	---	---	+++
propiconazole (Orbit, PropiMax, Bumper) 3.6EC – 4.0 fl oz	0 (24)	---	++++	++++	+	n/a	---
pyraclostrobin+boscalid (Pristine) 38WG – 14.5 oz	0 (12)	n/a	++++	++++	++++	n/a	---
sulfurs (numerous formulations) – 10– 12 lb	0 (24)	---	++	++	+++	---	---
tebuconazole (Elite, Trisum, Orius) 45DF – 5.0 oz	0 (12)	---	++++	++++	++	n/a	---
thiophanate-methyl (Topsin M) 70WP, WSP – 1.5 lb + captan (Captan, Captec) 50WP, 4L – 4.0 lb, 2.0 qt	1 (12) (24-96)	---	++++	++++	++++	n/a	---
trifloxystrobin (Flint) 50WG – 4.0 oz	1 (12)	n/a	n/a	n/a	++++	n/a	n/a
ziram (Ziram) 76DF – 4.0 lb	14 (48)	++++	+	+	+	---	+

\* PHI = preharvest interval (DAYS between last spray and harvest); REI = reentry interval (HOURS between last spray and reentry without using personal protective equipment (PPE). ALWAYS CHECK LABEL BEFORE USE

\*\* REI is 12 hours for chlorothalonil, but see label for precautions related to risk for eye damage and required protection.

\*\*\* This rate of copper is for use only as a dormant spray. See information on copper (Dormant Spray) for use against bacterial spot. \*\*\*\* Rovral is not registered for use after petal fall.

**Reducing the Risk of Fungicide Resistance**

Of the fungicides registered to control diseases on peaches and nectarines, several have different mechanisms of action. This allows for the development of resistance management strategies based on proper alternation of fungicides with different mechanisms. The chart at the right is useful for selection of fungicides to minimize the risk of developing fungicide resistance in brown rot and peach scab. Some fungicides, although different in name and formulation, have similar mechanisms of action. If continually exposed to fungicides with one mechanism of action, pathogens (i.e., fungi and bacteria) may develop resistance to that entire group of chemicals. To reduce the risk of developing resistance, fungicides with one mechanism of action should be alternated or tank-mixed with fungicides having a different mechanism of action. Where an X occurs on the chart, the fungicide listed at the top of the column has a mechanism of action similar to that of the chemical listed at the left. These fungicides are therefore not suitable mixing companions or alternatives. It should be noted, however, that even if two fungicides do not have similar mechanisms of action, they may not necessarily be appropriate mixing companions or rotational materials.

Fungicide	A b o u n d	B o t r a n	B r a v o	C a p t a n	E l e v a t e	E l i t e	F e r b a m	F l i n t	I n d a r	N o v a	O r b i t	P r i s t i n e	R o v r a l	S u l f u r	T o p s i n M	V a n g a r d	Z i r a m
Abound *	X							X				?					
Botran **		X															
Bravo, Equus			X														
Captan				X													
Elevate					X												
Elite, Orius, Trisum**						X											
Ferbam							X										
Flint *	X							X				?					
Indar **						X			X	X	X						
Nova **						X			X	X	X						
Orbit, Bumper, PropiMax**						X			X	X	X						
Pristine**	?							?				X					
Rovral **		X											X				
Sulfur														X			
Topsin M *															X		
Vangard																X	
Ziram																	X

\* = high risk for resistance development.

\*\* = moderate risk for resistance development.

? = potentially cross-resistant.

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## Nematode Control on Peaches

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### Rootstock

Trees propagated on Guardian™ rootstock have been very productive under North Carolina conditions when compared with other rootstocks such as Lovell. Guardian™ is resistant to root-knot nematodes and survives well in orchard sites prone to the peach tree short life complex.

### Preplant Soil Fumigation

In light, sandy soil where root-knot and ring nematodes are present, preplant soil fumigation is imperative. If the nematode assay indicates the presence of root-knot or ring nematodes and Guardian™ is NOT being used as the rootstock, it may be advantageous to fumigate the entire orchard site in October to mid-November before planting the trees in late winter to early spring. If the nematode assay does not indicate the presence of root-knot or ring nematodes, a 6- to 8-ft strip to be used for the tree row may be fumigated. If trees on Guardian™ rootstock are to be planted into a site that was in peaches within the last 5 years, strip-fumigation is beneficial.

Materials for preplant fumigation	Rate/treated acre*
1,3-dichloropropene (Telone II) <b>OR</b> sodium methyldithiocarbamate (Vapam HL) tarped	27 to 35 gal  50 to 75 gal

\*Rate will vary depending on soil type. Follow manufacturer's directions for rate and application procedure.

### Postplant Treatment

(Bearing and Nonbearing Trees)

## NO CHEMICALS REGISTERED

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## Spray Application

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The objective of spraying is to distribute a fungicide, insecticide, miticide, or growth regulator over the entire above-ground surface of the tree. Water and air are usually the materials used to carry these to the tree. The amount of water applied to a tree or an acre of trees is related to the nozzle size, the pump pressure, and the ground speed of the sprayer. Thus, simply putting a certain amount of pesticide in the spray tank does not necessarily mean that the pesticide will be applied at the correct rate per acre. To determine the appropriate amount of water and pesticide to put into the tank, the amount of water used per acre must be known.

Pesticides are applied using either a dilute or low-volume (concentrate) spray mixture. **Dilute (1X) spraying** means applying a pesticide with a sufficient amount of water to wet the foliage to the point of runoff. **Concentrate spraying** is the application of a pesticide in an amount of water such that runoff does not occur; this condition is usually met when less than 100 gallons of water per acre are used for mature trees. Thus, with concentrate spraying less water per acre is used to apply the same amount of pesticide per acre as would be applied with dilute spraying.

In North Carolina, with trees pruned to a height of 8 feet, a spray mixture of 150-200 gallons per acre may be considered dilute. For example, if 1 acre is sprayed at dilute (1X = 150 gal per acre) using 4 pounds of pesticide per acre, spraying at 3X would use 50 gallons of water per acre with the pesticide rate per acre, 4 pounds, remaining the same.

The **advantages** of concentrate spraying are that it requires less water, labor, and time; fewer refills; and possibly less pesticide. **Disadvantages** are the greater care required to accurately calibrate the sprayer, the need to maintain a constant ground speed, and the necessity to spray when conditions are optimal. Remember: as spray volume is reduced, errors become more critical. **For control of some pests such as scale, mites, and the leaf curl fungus, or when severe brown rot, scab, or bacterial spot pressure occurs, best results are achieved with dilute applications.**

Regardless of whether a dilute or concentrate spray is used, best spray coverage is achieved if the ground speed does not exceed 3 mph.

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# Orchard Weed Management

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## Prior to Orchard Establishment

Prior to planting a young orchard take time to evaluate the site for problem weeds. Woody perennial weeds, like blackberry, can be difficult to control in peach orchards. Glyphosate may be used the summer and fall prior to planting for woody perennial weed control the following spring. August and September is a good time to apply glyphosate for controlling many woody perennial weeds. Weed species specific information is available on glyphosate product labels.

## Newly Planted Orchards

A good weed management program during the first three years after planting is important to total tree development and yield. Weed management in young orchards has been a considerable challenge in previous years. However some herbicides not previously registered for use in newly planted and non-bearing orchards are now registered. In addition to Prowl and Surflan, Sinbar and Chateau may be used too. Both Chateau and Sinbar provided better control of larger seeded broadleaf weeds than Surflan or Prowl. Using Sinbar (0.5 lb/A) or Chateau (6 to 8 oz/A) followed by a second application once control from initial application deteriorates provides excellent preemergence weed control in newly planted or non-bearing orchards. In newly planted orchards paraquat will most likely need to be applied at some point during the growing season. Newly planted trees must be shielded from paraquat, as well as, Chateau or serious injury will occur. Trees can be shielded by painting trunks with white latex paint. Using a physical structure around the trunk like a wax coated milk carton is also an option. Fusilade, Poast, or Select can be used for postemergence annual and perennial grass control.

## Established Orchards

Traditional peach orchard weed management programs have consisted of a single application of a herbicide in the spring followed by one or two applications of paraquat. However, the ideal weed management program begins in the fall with a preemergence herbicide application. The fall preemergence herbicide controls winter annual weeds, which serve as hosts to cat-facing insects. The fall application maintains the herbicide strip bare through spring, maximizing the radiant heat benefit during freeze events. It delays the need for a

spring preemergence herbicide application for several weeks, extending residual weed control later into the summer. With the migration of camphorweed into the southern piedmont of North Carolina, a fall preemergence herbicide is necessary for its control. Camphorweed germinates in mid-October to Mid-April and will overwinter in peach orchards.

A 2,4-D application (in row middles – areas not affected by fall preemergence herbicide application) 6 weeks prior to bloom eliminates winter annual weeds growing on the orchard floor. This is recommended as part of an integrated approach to managing cat-facing insect populations overwintering on winter annual broadleaf weeds. In areas where row middles do not have an established ground cover glyphosate may be used to control winter weeds. However this practice should only be used in orchards where all vegetation in the row middles can be killed and growers have appropriate application equipment for applying glyphosate in peach orchards (see label for details). When residual weed control from the fall preemergence application ends follow with another preemergence herbicide application. The spring application will provide residual weed control into the summer. Tank mixing preemergence herbicides will broaden the summer weed control spectrum.

## Perennial Grass Weeds

Perennial grasses, like bermudagrass, cause significant reductions in yield, fruit size, and tree growth. These species can be controlled with timely applications of Fusilade, Poast, or Select (nonbearing only). Regardless of the herbicide choice, the initial application should be applied to bermudagrass having 4 to 6 inch runners. A second application should be applied when **REGROWTH** occurs. Refer to product labels for rate and adjuvant information. These products also control johnsongrass and annual grass weeds. See labels for details.

## Yellow and Purple Nutsedge

Nutsedge is an increasing problem in orchards. Yellow nutsedge can be controlled in nonbearing orchards with Basagran or MSMA. MSMA has activity on purple nutsedge also. Sequential application will be necessary. In established orchards Solicam or Sinbar can be used to suppress yellow and purple nutsedge. Paraquat will burn down above ground growth, however, regrowth will occur.

# CHEMICAL WEED CONTROL IN PEACH ORCHARDS

W.E. Mitchem, Horticultural Science Extension

## Preemergence and Directed Underneath Tree

Weed	Herbicide and Formulation	Amount of Formulation Per Acre	Pounds Active Ingredient Per Acre	Precautions and Remarks
Annual grasses and broadleaf weeds	flumioxazin (Chateau) 51WDG	6 to 12 oz	0.19 to 0.38	Trees planted less than 1 year must be protected from spray contact using a non-porous wrap or wax container. <b>DO NOT</b> apply more than 6 oz/A per application to orchards established 3 years or less when soils have a sand and gravel content of 80% or more. Best results have been obtained when initial application of Chateau is applied in late winter followed by a second application when control from initial application deteriorates. <b>DO NOT</b> make two applications within 30 days. Apply in combination with paraquat for post-emergence weed control. Chateau has a 60 day PHI. <b>DO NOT</b> tank mix with glyphosate after trees break dormancy.
Annual grasses and some broadleaf weeds	diuron (Direx) 4L (Karmex DF) 80 DF	1.6 to 4 qt 2 to 5 lb	1.6 to 4	Apply in spring to trees at least 3 years old. Rate is soil texture dependent. May be tank-mixed with Sinbar, Solicam, glyphosate, or paraquate. Supplemental labels for Karmex DF and Direx 4L have a 20 day PHI for peaches all other formulations have a 90 day PHI.
	(Karmex XP) 80 DF	2 to 2.75 lb		
	norflurazon (Solicam) 80WDG	2.5 to 5 lb	2 to 4	Can be tank-mixed with Karmex, Goal, paraquate, Prowl, glyphosate, simazine, Sinbar, or Surflan. Rate is soil texture dependent. See label for details. Do not apply within 6 months of transplanting. PHI is 60 days.
	oryzalin (Oryzalin or Surflan) 4AS (Surflan) 85DF	2 to 4 qt 2.4 to 4.7 lb	2 to 4	Allow soil to settle around newly transplanted trees before application. Surflan may be tank-mixed with Goal, glyphosate, paraquate, simazine, or Solicam. Sequential applications permitted. See label for details. In <b>newly planted</b> orchards, may be tank-mixed with Gallery for broad spectrum preemergence control.
Annual broadleaf and some grass weeds	oxyfluorfen (Goal 2 XL) 2EC (Galigan) 2E (OxiFlo) 2EC (GoalTender) 4E	5 to 8 pt 5 to 8 pt 5 to 8 pt 2.5 to 4 pt	1.25 to 2	Apply to dormant trees until just before buds start to swell. Do not apply when foliage or fruit are present. Do not apply more than 8 pt per acre in one season. May be tank-mixed with Devrinol, Kerb, glyphosate, paraquate, simazine, Solicam, or Surflan.
Annuals and cool-season perennial grasses such as fescue, orchardgrass, and quackgrass	pronamide (Kerb) 50WP	2 to 8 lb	1 to 4	Apply in winter when temperatures do not exceed 55°F but prior to soil freezing. See label for application time relative to planting date. Rate is soil texture dependent.
Broadleaf and grass weed control for <b>NEWLY PLANTED ORCHARDS</b>	terbacil (Sinbar) 80WP	0.5 to 1 lb	0.4 to 0.8	Apply once soil has settled after transplanting. Apply no more than 1 lb per acre per year. For best results, apply 0.5 lb in spring followed by another 0.5 lb when control from initial application fails. Do not apply on soils coarser than sandy loam having less than 2% organic matter.
Annual broadleaf and grass weeds	simazine (Princep, Simazine) 4L 90WDG	1.6 to 4 qt 1.8 to 4.4 lb	1.6 to 4	Apply in spring before weed emergence. Use only on trees established 1 year or more. Do not use on sand or loamy sand soils.
Annual broadleaf and grass weeds plus many perennial grasses	terbacil (Sinbar) 80WP	2 to 4 lb	1.6 to 3.2	Use on trees established 3 years or longer and soils with at least 1% organic matter. Do not use on sand or loamy sand soils.
Annual broadleaf weeds	isoxaben (Gallery) 75DF	0.66 to 1.33	0.5 to 1	<b>Nonbearing peach ONLY.</b> Apply in minimum of 10 GPA spray volume. Do not apply until soil has settled after transplanting.

### Preemergence Tank Mixes

Weed	Herbicide and Formulation	Amount of Formulation Per Acre	Pounds Active Ingredient Per Acre	Precautions and Remarks
Many annual and perennial grasses and broadleaf weeds	diuron (Direx, Karmex) 80 WDG	1 to 2 lb	0.8 to 1.6	Use only under trees established in the orchard for at least 2 years. Apply to soils having at least 1% organic matter. See label for details.
	+ terbacil (Sinbar) 80 WP	+ 1 to 2 lb	+ 0.8 to 1.6	
	oryzalin (Oryzalin, Surflan) 4 AS	2 to 4 qt	2 to 4	Tank-mix for use before weed emergence. Trees must be established at least 1 year.

	simazine (Princep, Simazine) 4L 90WDG	1.6 to 4 qt 1.75 to 4.4 lb	1.6 to 4	
	norflurazone (Solicam) 80WDG + simazine (Princep, Simazine) 4L 90WDG	2.5 to 5 lb + 2 to 4 qt 2.2 to 4.4 lb	2 to 4 + 2 to 4	See labels for details.
	norflurazone (Solicam) 80WDG + diuron (Diuron or Karmex) 80WDG	2.5 to 5 lb + 2 to 4 lb	2 to 4 + 1.6 to 3.2	See labels for details. Trees must be established at least 3 years.

### Postemergence and Directed Underneath Tree

Broadleaf weeds and yellow nutsedge	bentazon (Basagran) 4SL	1.5 to 2 pt	0.75 to 1	Apply as postemergence-directed spray to emerged weeds. <b>NONBEARING TREES ONLY.</b> Apply to yellow nutsedge 6 to 8 inches tall. Make a second application 7 to 10 days later. Include crop oil concentrate of 1 qt per acre.
Broadleaf weeds including morningglory, pigweed, lambsquarter, cocklebur, smartweed, and dayflower	carfentrazone-ethyl (Aim) 2EC	0.5 to 2 oz	0.008 to 0.031	Apply alone or tank-mix with other herbicides. Apply in a minimum spray volume of 20 gpa. Applications can be made with boom equipment, hooded sprayers, or shielded sprayers. Do not allow Aim to contact green bark, flowers, or fruit of desired crop. Contact with fruit or foliage will result in spotting and leaf necrosis. Do not apply within 7 days of harvest. Best results are obtained when applied to weeds in the 2- to 3- leaf stage. Apply in combination with a non-ionic surfactant (1 qt/100 gal spray solution) or crop oil concentrate (1 gal/100 gal of spray solution).
Kills all green foliage on contact	paraquate (Gramoxone Inteon) 2 SL  (Firestorm) 3 SL	2.5 to 4 pt  1.75 to 2.7 pt	0.66 to 1	Apply when grass and weeds are 1 to 6 in. high and succulent for best results. Direct spray with low pressure to avoid contact with tree foliage or bark less than 1 year old. Add surfactant at 0.25% by volume (2 pt per 100 gal) or 1% crop oil concentrate (1 gal per 100 gal) for best results. Paraquate may be tank-mixed with Goal, Karmex, simazine, Sinbar, Solicam, or Surflan. Paraquate is a restricted use pesticide. Newly planted trees can be severely injured by paraquate, use a shield or wrap to protect the tree from spray. Do not make more than 3 applications per year. Paraquat has a 14 PHI.
Nonselective weed control	glyphosate (various brands and formulations)	See labels	1.0	<b>Do not apply in orchards established less than 2 years. Applications must be made with shielded sprayer. Low hanging limbs and suckers must be removed at least 10 days prior to application. DO NOT use glyphosate 90 days past bloom. DO NOT allow glyphosate to contact foliage or bark. EXTREME care must be taken to prevent injury.</b> See labels for details. Some formulation may require addition of a surfactant.
Grasses	clethodim (Arrow or Select) 2EC	0.375 to 0.5 pt	0.094 to 0.25	Apply to actively growing grasses not under stress. See label for rate and optimum grass size to treat. Multiple applications may be necessary to control perennial grass weeds. Add crop oil at 1% by volume (1 gal per 100 gal). <b>NONBEARING TREES ONLY.</b>
	fluazifop (Fusilade DX) 2EC	0.5 to 1.5 pt	0.125 to 0.38	Apply to actively growing grasses not under stress. See label for rate and optimum grass size to treat. Multiple applications may be necessary to control perennial grass weeds. Add crop oil at 1% by volume (1 gal per 100 gal). Do not apply more than 72 fl oz per acre per year.
	sethoxydim (Poast) 1.5EC	1.0 to 2.5 pt	0.19 to 0.47	Apply to annual grasses up to 12 in. tall. Always add oil concentrate. For perennial grasses apply early in the growth cycle at the high use rate. Multiple applications may be necessary for perennial grass weeds. Add Dash adjuvant at 1 pt per acre or crop oil concentrate at 1 qt per acre. Do not apply within 25 days of harvest. Do not apply more than 5 pt per acre per year.
Broadleaf weeds	2,4-D amine (Various generic formulations) 3.8SL	2 to 3 pt	0.95 to 1.4	Do not apply within 40 days of harvest. Do not apply more than twice a year. Trees must be at least 1 year old. Use when trees are dormant. Some formulations limit rate to 2 pt per acre. See labels for details.
	clopyralid (Stinger)	0.33 to 0.66 pt	0.125 to 0.25	Multiple applications can be used as long as amount does not exceed maximum rate. Use at least 10 gpa of spray solution. Stinger may be tank-mixed with preemergence herbicides. Do not apply within 30 days of harvest.

**Early Season  
Growth Stages**

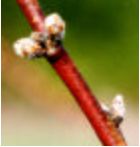
**NOTES**

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Dormant bud



Bud swell  
(bud break)



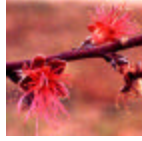
Pink bud



Full bloom



Petal fall



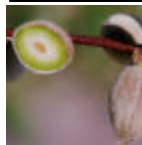
Shuck split



Just before  
Shuck off



2 weeks after  
shuck off



Recommendations of specific chemicals are based on the manufacturer's label and performance for some chemicals in a limited number of experiments. Because environmental conditions and methods of application by growers may vary widely, performance of a chemical may not always conform to the safety and pest control standards indicated by experimental data.

Recommendations for the use of agricultural chemicals are included in this publication as a convenience to the reader. The use of brand names and any mention or listing of commercial products or services in this publication does not imply endorsement by North Carolina State University nor discrimination against similar products or services not mentioned. Individuals who use agricultural chemicals are responsible for ensuring that the intended use complies with current regulations and conforms to the product label. Be sure to obtain current information about usage regulations and examine a current product label before applying any chemical. For assistance, contact your county North Carolina Cooperative Extension Service.

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This Guide also is available in PDF format on the "web" at <http://ipm.ncsu.edu>  
When you arrive at this web site, from the left menu select Crop Production then click on Peaches

Additional information on peach production and disease and pest management also may be found at the University of Georgia web site "The Georgia Peach" – [www.griffin.peachnet.edu/caes/gapeach/](http://www.griffin.peachnet.edu/caes/gapeach/)