

# Solutions for Control

## Greenhouse



Volume VIII





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# Product Description

Description of products listed for management of insects, mites and plant pathogens

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## Insecticides, Miticides

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### Azatin® XL – Insect Growth Regulator

Signal Word: Caution

REI: 4 hours

Application rates: 8-16 fluid ounces per 100 gallons; 21 fluid ounces per acre.

Azatin XL is a botanical insecticide/insect growth regulator containing azadirachtin. It can be applied as a foliar spray or drench. Azatin XL can be used alone as an insect growth regulator or in a tank mix with products such as Decathlon or Marathon.

*Azatin is a registered trademark of Certis USA.*

### Decathlon® 20 WP – Synthetic Pyrethroid

Signal Word: Caution

REI: 12 hours

Application rates: 1.3 to 1.9 ounces per 100 gallons.

Decathlon is a wettable powder formulation and is also available in water soluble packaging. Decathlon can be used alone for control of a wide range of crawling and flying insect pests on ornamental crops, or in a tank mix with products such as Azatin XL or Marathon for additional activity.

*Decathlon is a registered trademark of OHP, Inc.*

### Deliver® – Biological Insecticide

Signal Word: Caution

REI: 4 hours

Application rates: 1/4 to 1 1/4 pounds per 100 gallons.

Deliver is a microbial insecticide containing *Bacillus thuringiensis* subspecies *kurstaki*. That is effective for control of caterpillar pests such as loopers, leafrollers, European corn borer and cutworms.

*Deliver is a registered trademark of Certis USA.*

### Judo™ – Greenhouse and Nursery Ornamental Miticide/Insecticide

Signal Word: Caution

REI: 12 hours

Application rates: 2 to 4 fluid ounces per 100 gallons.

Judo is a liquid flowable translaminar miticide/insecticide that is applied as a foliar spray. Judo is active against all development stages of a wide range of mites and whiteflies. Residual activity is 30 or more days.

*Judo is a trademark of OHP, Inc.*

### Marathon® 1% G – Systemic Insecticide

Signal Word: Caution

REI: 0–12 hours (read label)

Application rates: See label for application rates.

Marathon 1% Granular systemic insecticide is applied topically to the growing media or incorporated prior to planting. Marathon has systemic activity (8–10 weeks control).

*Marathon is a registered trademark of OHP, Inc.*

## Marathon® 60WP G&N in WSP – Systemic Insecticide

Signal Word: Caution REI: 0–12 hours (read label)

Application rates: **Foliar:** 1 20-gram packet per 100 gallons. **Drench:** One 20-gram packet can be used to drench varying numbers of containers based on diameter, volume or plant size.

Marathon 60WP is a wettable powder formulation in water soluble packaging. It is applied as a drench, via chemigation and subirrigation. Marathon 60WP has systemic activity (8–10 weeks control) when applied to the root zone.

*Marathon is a registered trademark of OHP, inc.*

## Marathon® II – Systemic and Translaminar Insecticide

Signal Word: Caution REI: 0–12 hours (read label)

Application rates: **Foliar:** 1.7 fluid ounces (50 ml) per 100 gallons. **Drench:** 1.7 fluid ounces (50 ml) can be used to drench varying numbers of containers based on diameter, volume or plant size.

Marathon II is a liquid flowable formulation. It can be applied as a drench, via chemigation, subirrigation and as a foliar spray. Marathon II has systemic activity when applied to the root zone (8–10 weeks control) and translaminar activity when sprayed (14–28 days control).

*Marathon is a registered trademark of OHP, Inc.*

## Pylon® – Miticide/Insecticide

Signal Word: Caution REI: 12 hours

Application rates: 2.6 -20 fluid ounces per 100 gallons.

Pylon is an excellent miticide to be used as the foundation of your mite program and to be used as a rotational miticide in your existing miticide program. Pylon provides mite control for 14 to 28 days with excellent residual. Pylon has excellent translaminar systemic activity and is tank mix compatible with fungicides and insecticides. Pylon is also an excellent insecticide, and will control thrips, fungus gnat larvae and many species of caterpillars. In addition, Pylon is labeled for control of foliar nematodes.

*Pylon is a registered trademark of BASF Corp.*

## Triact® 70 – Clarified Hydrophobic Extract of Neem Oil

Signal Word: Caution REI: 4 hours

Application rates: 1/2 to 1 gallon per 100 gallons.

Triact 70 is an effective insecticide and fungicide used as a rotational component of an insect, mite or plant disease control program.

*Triact is a registered trademark of Certis USA.*

## Fungicides

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### OHP Aliette® WDG – Fungicide

Signal Word: Caution REI: 12 hours

Application rates: **Foliar:** 1 1/4 to 5 pounds per 100 gallons. **Drench:** 6.4-12.8 ounces per 100 gallons, applied to 400 square feet.

Aliette is a wettable powder formulation containing aluminum tris (fosetyl – AL). Aliette is a systemic preventive and curative fungicide that controls several major diseases of ornamental plants. Aliette also enhances the relationship between the plant's root system and beneficial soil organisms. Aliette can be applied as a foliar spray, soil drench, or incorporated into the soil.

*Aliette is a registered trademark of Bayer*

## OHP Chipco® 26019 N/G – Fungicide

Signal Word: Caution

REI: 12 hours

Application rates: **Foliar:** 1-2 pounds per 100 gallons. **Drench:** 6 1/2 ounces per 250 gallons, and apply 1-2 pints per square foot.

OHP Chipco 26019 N/G is a wettable powder formulation containing iprodione. OHP Chipco 26019 N/G is a contact curative and preventive fungicide that inhibits germination of fungal spores and growth of fungal mycelium. OHP Chipco 26019 N/G may be applied to a wide range of ornamental plants as a foliar spray, drench or dip.

*Chipco is a registered trademark of Bayer.*

## Compass® O 50WDG – Strobilurin Fungicide

Signal Word: Caution

REI: 12 hours

Application rates: **Foliar:** 7-14 ounces per 100 gallons. **Drench:** 1/2 - 2 ounces per 100 gallons.

Compass O 50WDG prevents or controls a wide range of foliar and root diseases of ornamental crops. Compass O is absorbed by the waxy layer and moves within the treated leaves. It is also active through vapor movement.

*Compass is a trademark of Bayer.*

## FenStop™ – Fungicide

Signal Word: Warning

REI: 12 hours

Application rates: **Foliar:** 7-14 fluid ounces per 100 gallons. **Drench:** 7-14 fluid ounces in 50-100 gallons of water applied to 400 square feet.

FenStop is a liquid flowable formulation that is effective against downy mildews, aerial phytophthora, phytophthora and pythium root rots.

*FenStop is a trademark of Bayer.*

## OHP 6672™ – Ornamental Fungicide

Signal Word: Caution

REI: 12 hours

4.5 L application rates: **Foliar:** 10-20 fluid ounces per 100 gallons. **Drench:** 20 fluid ounces per 100 gallons of water applied to 800 square feet.

50 W application rates: **Foliar:** 8-24 ounces per 100 gallons **Drench:** 12-16 ounces per 100 gallons of water applied at 1-3 pints per square foot.

OHP 6672 controls a broad range of ornamental diseases including anthracnose, black spot, botrytis, leaf spot, powdery mildew and scab to name a few.

*OHP 6672 is a trademark of OHP, Inc.*

## OHP 26 GT®-O or Sextant™ – Fungicide

Signal Word: Caution

REI: 12 hours

Application rates: **Foliar:** 1-2.5 quarts per 100 gallons. **Drench:** 13 fluid ounces per 100 gallons of water applied using 1-2 pints per square foot.

OHP 26 GT-O and Sextant are liquid flowable formulations containing iprodione. They are contact curative and preventive fungicides that inhibits germination of fungal spores and growth of fungal mycelia. Both products may be applied to a wide range of ornamental plants as a foliar spray, drench or dip.

*GT is a trademark of Bayer.*

*Sextant is a trademark of OHP, Inc.*

## SoilGard™ 12G – Microbial Fungicide

Signal Word: Caution

REI: 4 hours

Application rates: **Drench:** 1/2 to 2 pounds per 100 gallons. Also may be incorporated prior to planting.

SoilGard is a greenhouse, nursery and interiorscape microbial fungicide containing *Trichoderma virens* CL21. SoilGard controls damping-off and root rot pathogens on ornamental and food crops. SoilGard works as a preventative and will protect noninfected plants for months.

*SoilGard is a trademark of Certis USA.*

## **Strike® 50 WDG – Greenhouse and Nursery Systemic Fungicide**

Signal Word: Caution

REI: 12 hours

Application rates: 1-2 ounces per 100 gallons, except as noted for specific diseases.

Strike will control or prevent many fungal diseases on ornamental plants in the greenhouse and nursery environments. Diseases include flower blight, leaf blight/spot, powdery mildew, rusts and tip blights. Strike works from inside the plant to actively control diseases before symptoms occur and will provide residual control for 30 days or more.

*Strike is a registered trademark of OHP, Inc.*

## **Triact® 70 – Clarified Hydrophobic Extract of Neem Oil**

Signal Word: Caution

REI: 4 hours

Application rates: 1/2 to 1 gallon per 100 gallons.

Triact 70 is an effective insecticide and fungicide used as a rotational component of an insect, mite or plant disease control program.

*Triact is a registered trademark of Certis USA.*

## **Specialty Products**

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### **Cycocel® – Plant Growth Regulant**

Signal Word: Caution

REI: 12 hours

Application rates: 200-4000 ppm (0.22-2.17 fluid ounces per gallon); general rate is 750-1500 ppm (0.87-1.63 fluid ounces per gallon)

The most experienced and reliable plant growth regulator on the market today, Cycocel (chlormequat) may be used on any crop in the greenhouse. Cycocel is most commonly used on poinsettias, hibiscus, azaleas and geraniums to reduce stem elongation, for inducing early flowering, for improving flowering, for compacting plants or for producing earlier budded plants with multiple buds per shoot.

Cycocel alone (or tank mixed with B-Nine®) will help to create beautiful plants in any setting.

*Cycocel is a registered trademark of BASF Corp.*

*B-Nine is a registered trademark of Chemtura Corp.*

### **Suffusion™ – Wetting, Penetrating, Re-Wetting Agent**

Signal Word: Caution

REI: N/A

Application rates: May be incorporated, drenched, or applied in irrigation water -see label.

Suffusion offers uniformity to the water media relationship. Growing media that receives water uniformly also effectively creates air to water ratios that are also consistent. All this helps to provide the optimum growing environment for your plants, avoiding plant stress and enhancing utilization of the complete growing media volume.

*Suffusion is a trademark of Amega Sciences.*

### **Triathlon™ – Greenhouse Disinfectant**

Signal Word: Warning

REI: N/A

Application rates: 1 1/2 teaspoons to 1 tablespoon per gallon of water.

Triathlon is used to sanitize and disinfect greenhouse hard surfaces, work areas and benches, pots, tools, walkways and evaporative coolers. Triathlon controls fungi, bacteria and algae, and should be used as part of an integrated plant disease management program.

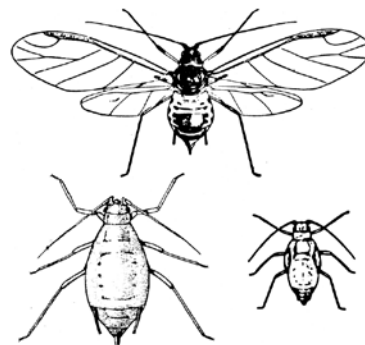
*Triathlon is a trademark of OHP, Inc.*

# Aphids

Order Homoptera, Family Aphididae

Aphids are sucking insects that feed on plant fluids. The presence of aphids or white cast-off skins on leaves or flowers may reduce plants value. Heavy infestations will reduce plant growth. Honeydew produced by aphids makes leaves and fruits sticky and is a substrate for black sooty fungus. Many aphid species transmit viruses affecting vegetable and ornamental plants.

Aphid developmental stages are egg, nymph and adult. In greenhouses and tropical areas, adults are all females that produce live young. Outdoors, aphids overwinter as eggs, which hatch in the spring as females. Adult aphids may or may not have wings. The best temperatures for development vary with the species. For example the chrysanthemum aphid develops best at 68°F (20°C), the green peach aphid at 73°F (23°C), and the melon aphid at temperatures above 75°F (24°C). Plant nutrition affects aphid development and size. Moisture stress often increases aphid numbers. Temperatures above 86°F (30°C) and humidities above 85% reduce green peach aphid longevity and reproduction.



## Marathon® 60 WP G&N in WSP – Systemic and Translaminar Insecticide

Mix one 20 gram packet in 100 gallons of water as a foliar spray, OR one 20-gram packet in the appropriate amount of water for drenching containers of different sizes (see label).

## Marathon® 1% Granular – Systemic Insecticide

See label for application rates for different container sizes; OR Apply 15 ounces per 1000 ft<sup>2</sup>.

## Marathon® II – Systemic and Translaminar Insecticide

Apply 1.7 fluid ounces (50 ml) per 100 gallons as a foliar spray; OR mix 1.7 fluid ounces in the appropriate amount of water for drenching containers of different sizes (see label).

## Azatin® XL – Insect Growth Regulator

Apply 10 to 16 fluid ounces per 100 gallons to target nymphs. Tank mix with Decathlon to target nymphs and adults.

## Decathlon® 20 WP – Synthetic Pyrethroid

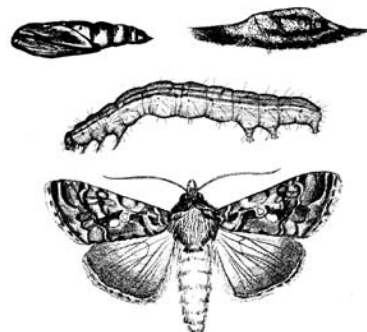
Apply 1.9 ounces (54 grams) per 100 gallons as a foliar spray.

# Caterpillars (worms)

Order Lepidoptera, Several families such as Noctuidae, Tortricidae, Pyralidae, Arctiidae

Plant injury is caused only by the larval (worm) stages. Larvae are chewing insects and can eat entire leaves and flowers, bore into stems and roll/tie leaves. Nearly all parts of the plant can be infested. Cutworm larvae may be in the growing media or beneath pots.

Lepidoptera developmental stages are egg, larva (number of instars depends on the species), pupa, adult (moth). Development from egg to adult is about 30 days, but varies depending upon the species and temperature. Plants high in nitrogen may be more heavily damaged.





## Azatin® XL – Insect Growth Regulator

Apply 10 to 16 fluid ounces per 100 gallons to target larvae. Tank mix with Decathlon to target larvae and adults.

## Decathlon® 20 WP – Synthetic Pyrethroid

Apply 1.9 ounces (54 grams) per 100 gallons as a foliar spray.

## Deliver® – Biological Insecticide

Apply 0.25 – 1.5 pounds per 100 gallons as a foliar spray.

## Pylon® – Miticide/Insecticide

Apply 2.6 – 6.4 fluid ounces per 100 gallons as a foliar spray.

# Fungus Gnats

*Order Diptera, Family Sciaridae*

Fungus gnat adults are small midge-like flies that cause no direct plant damage. However, the larvae can feed on roots or root hairs, stunting or killing young plants. Fungus gnats have been associated with several plant pathogens. Larval feeding damage may provide an entry point for plant pathogens.

Fungus gnat developmental stages are egg, larva (four instars), pupa, adult. Development from egg to adult takes about 12 days (80°F, 27°C) to 27 days (55°F, 13°C). High growing medium moisture and organic matter (composted manure, bark, leaf litter) are most favorable for fungus gnats. Adults are usually seen near the growing medium surface, but may be seen resting on plants. Larvae are in the growing medium or in plant stems below the medium surface.



## Marathon® 60 WP G&N in WSP – Systemic and Translaminar Insecticide

Mix one 20 gram packet in the appropriate amount of water for drenching containers of different sizes (see label).

## Marathon® 1% Granular – Systemic Insecticide

See label for application rates for different container sizes; OR Apply 15 ounces per 1000 ft<sup>2</sup>.

## Marathon® II – Systemic and Translaminar Insecticide

Mix 1.7 fluid ounces in the appropriate amount of water for drenching containers of different sizes (see label).

## Azatin® XL – Insect Growth Regulator

Apply 8 fluid ounces per 100 gallons as a drench to target larvae. Tank mix with Decathlon and apply as a srench to target larvae and adults.

## Decathlon® 20 WP – Synthetic Pyrethroid

Apply 1.9 ounces (54 grams) per 100 gallons as a foliar spray.

## Pylon® – Miticide/Insecticide

Apply 5.2 – 10 fluid ounces per 100 gallons as a srench to target larvae.

# Shore Flies

*Order Diptera, Family Ephydriidae*

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Shore fly adults are small flies that resemble fruit flies in size and shape, but have black bodies with red eyes. When at rest white spots can be seen on the wings. Both adults and larvae feed on algae, bacteria and protozoa. Direct feeding injury to plants is rare, but adults may help to spread plant pathogens.

Shore fly development stages are egg, larva, pupa and adult. Development time from egg to adult is about 10 days (93°F, 34°C) to 16 days (73°F, 23°C). Larvae and adults are found in areas with algae – growing media surfaces, benches and floors. Adults often occur in large numbers, and will produce black fecal spots on leaves, plug tray surfaces, etc. This is unsightly at best, and the fecal spots can contain one or more plant pathogens.



## Azatin® XL – Insect Growth Regulator

Apply 8 fluid ounces per 100 gallons as a drench or srench to target larvae. Tank mix with Decathlon and apply as a srench to target both larvae and adults.

## Decathlon® 20 WP – Synthetic Pyrethroid

Apply 1.9 ounces (54 grams) per 100 gallons as a foliar spray to target adults.

## Triathlon™ – Greenhouse Disinfectant

To remove algae from walkways and other hard surfaces use 1 1/2 teaspoons Triathlon per gallon of water. To disinfect and sanitize evaporative cooling pads, treat every other week with one fluid ounce Triathlon per 30 gallons of water.

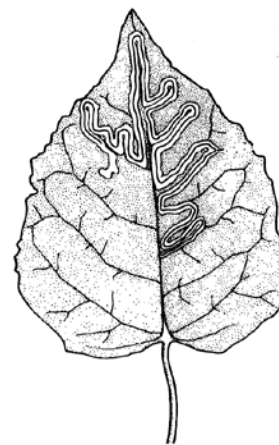
# Leafminers

*Order Diptera, Family Agromyzidae*

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Primary leafminer injury is from the larvae feeding within leaves, making a narrow winding trail, or mine. Larval mines disfigure ornamental plants and vegetable plants may have reduced yields if populations are high. During heavy infestations, larvae may produce leaf mines in flowers. Adult leafminer flies puncture leaves for feeding and egg-laying, and the small white spots will indicate leafminer activity. Leafminers have a very wide host plant range.

Leafminers develop from egg to adult in 14 days (95°F, 35°C) to 64 days (59°F, 15°C). Other species have different lower and upper limits for development, but development trends are similar. The developmental stages are egg, larva (three instars), and pupa (depending on the species, this stage may occur on or off the plant). Leafminers generally do best when plants are high in nitrogen.



## Marathon® 60 WP G&N in WSP – Systemic Insecticide and Translaminar

Mix one 20 gram packet per 100 gallons as a foliar spray, OR one 20-gram packet in the appropriate amount of water for drenching containers of different sizes (see label).

## Marathon® 1% Granular – Systemic Insecticide

See label for application rates for different container sizes; OR Apply 15 ounces per 1000 ft<sup>2</sup>.

## Marathon® II – Systemic and Translaminar Insecticide

Apply 1.7 fluid ounces (50 ml) per 100 gallons as a foliar spray; OR mix 1.7 fluid ounces in the appropriate amount of water for drenching containers of different sizes (see label).

## Azatin® XL – Insect Growth Regulator

Apply 12 to 16 fluid ounces per 100 gallons to target larvae. Tank mix with Decathlon to target larvae and adults.

## Decathlon® 20 WP – Synthetic Pyrethroid

Apply 1.9 ounces (54 grams) per 100 gallons as a foliar spray.

# Mealybugs - Soft Scales - Armored Scales

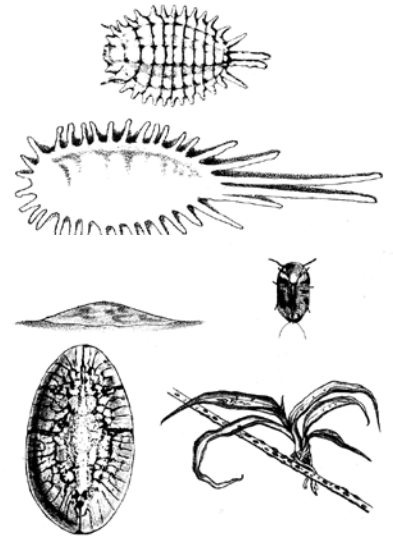
*Order Homoptera, Family Pseudococcidae – Order Homoptera, Family Coccidae – Order Homoptera, Family Diaspididae*

Mealybugs are sucking insects that feed on plant fluids. Feeding weakens and may kill plants. Honeydew produced by mealybugs can cover leaves and flowers, and is a substrate for black sooty fungus.

Mealybug developmental stages are egg, nymph (females, four instars; males, five instars), and adult. Egg to adult development takes about 60 days, but varies widely with individual species. It may take up to one year in cool temperatures. Adult males are totally different looking than females, resembling small midge-like insects.

Soft and armored scale insects are sucking pests that feed on plant fluids. Feeding weakens and may kill plants. Honeydew produced by soft scales can cover leaves and flowers, and is a substrate for black sooty fungus. Armored scales do not produce honeydew.

Soft and armored scale developmental stages are egg (or live nymph), nymph (females, three instars; males, five instars), and adult. Adult males are totally different looking than females, resembling small midge-like insects. Females of some species reproduce without mating (parthenogenesis). Soft scale development from egg to adult is about 60 days, and armored scale development is about 180 days, but varies widely with individual species.



## Marathon® 60 WP G&N in WSP – Systemic and Translaminar Insecticide

Mix one 20 gram packet in 100 gallons as a foliar spray, OR mix one 20-gram packet in the appropriate amount of water for drenching containers of different sizes (see label).

## Marathon® 1% Granular – Systemic Insecticide

See label for application rates for different container sizes; OR Apply 15 ounces per 1000 ft<sup>2</sup>.

## Marathon® II – Systemic and Translaminar Insecticide

Apply 1.7 fluid ounces (50 ml) per 100 gallons as a foliar spray; OR mix 1.7 fluid ounces in the appropriate amount of water for drenching containers of different sizes (see label). *The addition of a surfactant to the spray mixture may improve control.*

## Azatin® XL – Insect Growth Regulator

Apply 12 to 16 fluid ounces per 100 gallons to target nymphs. Tank mix with Decathlon to target nymphs and adults.

## Triact® 70 – Clarified Hydrophobic Extract of Neem Oil

Mix 1 – 2 gallons per 100 gallons and apply as a foliar spray.

## Decathlon® 20 WP – Synthetic Pyrethroid

Apply 1.9 ounces (54 grams) per 100 gallons as a foliar spray.

# Root Mealybugs

Order Homoptera, Family Pseudococcidae

Root mealybugs are in the Genus *Rhizococcus*. They are sucking pests similar to other mealybugs that feed on stems and leaves, but are adapted to feed on plant roots. Adults resemble small insects that have been rolled in white flour. Adults and their cottony egg masses are usually on the outside of the root ball, and can be seen when the plant is lifted from the container.



Damage symptoms are non specific and usually involve slow or stunted plant growth, resulting in generally unhealthy looking plants. Plants that are root bound or under environmental or nutritional stress seem to be more susceptible to root mealybugs.

Females (there are no males) lay eggs in cottony masses, which hatch into tiny crawlers. The crawler stage is the most important for root mealybug dispersal among plants – often in irrigation water, but also in potting media. The initial infestation is often from purchasing infested plants. The life cycle from egg to adult is from 2–4 months. Adults can live nearly 60 days and produce three batches of eggs.

## Marathon® 60 WP G&N in WSP – Systemic and Translaminar Insecticide

Mix one 20 gram packet in 150 gallons of water for drenching containers of different sizes (see label).

*Using a soil wetting agent such as Suffusion prior to a drench application may improve control.*

## Marathon® II – Systemic and Translaminar Insecticide

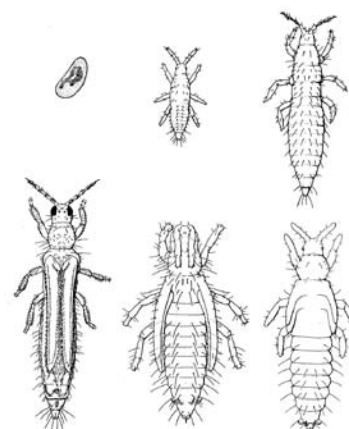
Mix 1.7 fluid ounces in 150 gallons of water for drenching containers of different sizes (see label). *Using a soil wetting agent such as Suffusion prior to a drench application may improve control.*

# Thrips

Order Thysanoptera, Family Thripidae

Thrips feed by rasping and sucking plant fluids. Feeding injury distorts and discolors leaves and flowers. Feeding on pollen by some thrips species (e.g. western flower thrips) causes premature senescence. Several species transmit viruses, including tomato spotted wilt virus (TSWV) and impatiens necrotic spot virus (INSV). Western flower thrips prefer to feed in flowers, but will also feed on and injure leaves. The chilli thrips, a pest new to the United States, feeds only on leaves. Different species of thrips can occur and cause problems on nearly all greenhouse plants.

Thrips develop from egg to adult in 10–15 days (76°–86°F, 25°–30°C) to 57 days (54°F, 12°C). Hot and dry conditions are best for development. The developmental stages are egg, larva (two instars), pseudopupa (two transformation stages, usually off the plant), and adult. In general, any environmental stress that weakens plants makes them more thrips-susceptible (e.g. moisture stress, mildew). Wet conditions retard development.



## Marathon® 60 WP G&N in WSP – Systemic and Translaminar Insecticide

Mix one 20 gram packet in 100 gallons as a foliar spray, OR one 20-gram packet in the appropriate amount of water for drenching containers of different sizes (see label).

## Marathon® 1% Granular – Systemic Insecticide

See label for application rates for different container sizes; OR Apply 15 ounces per 1000 ft<sup>2</sup>.

## Marathon® II – Systemic and Translaminar Insecticide

Apply 1.7 fluid ounces (50 ml) per 100 gallons as a foliar spray; OR mix 1.7 fluid ounces in the appropriate amount of water for drenching containers of different sizes (see label).

## Azatin® XL – Insect Growth Regulator

Apply 12 to 16 fluid ounces per 100 gallons to target larvae. Tank mix with Decathlon to target larvae and adults.

## Decathlon® 20 WP – Synthetic Pyrethroid

Apply 1.9 ounces (54 grams) per 100 gallons as a foliar spray.

## Pylon® – Miticide/Insecticide

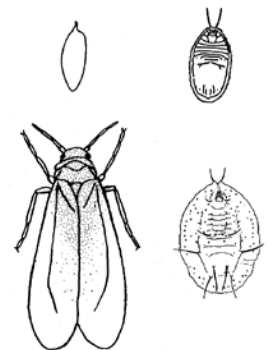
Apply 10-20 fluid ounces per 100 gallons as a foliar spray.

# Whiteflies

*Order Homoptera, Family Aleyrodidae*

Whiteflies are sucking insects as adults and nymphs. Their presence detracts from plants' value, and high numbers can reduce plant growth or vegetable yields. Silverleaf whiteflies can cause leaf spotting, white stem and bract deformation on poinsettia. Honeydew from whiteflies makes leaves and fruits sticky and is a substrate for black sooty fungus. Whiteflies can transmit many plant viruses affecting vegetable and ornamental plants.

The developmental stages are egg, nymph, (three instars), pupa, and adult. Greenhouse whiteflies develop from egg to adult in 21 to 26 days (81 °F, 27°C) and silverleaf whiteflies in 16 days (86 °F, 30°C) to 31 days (68 °F, 20°C). All stages normally occur on undersides of leaves. Infestations are localized at first, spreading to all areas later.



## Judo™ – Greenhouse and Nursery Ornamental Miticide/Insecticide

Apply 2 to 4 fluid ounces per 100 gallons as a foliar spray.

## Marathon® 60 WP G&N in WSP – Systemic and Translaminar Insecticide

Mix one 20 gram packet in 100 gallons as a foliar spray, OR mix one 20-gram packet in the appropriate amount of water for drenching containers of different sizes (see label).

## Marathon® 1% Granular – Systemic Insecticide

See label for application rates for different container sizes; OR Apply 15 ounces per 1000 ft<sup>2</sup>.

## Marathon® II – Systemic and Translaminar Insecticide

Apply 1.7 fluid ounces (50 ml) per 100 gallons as a foliar spray; OR mix 1.7 fluid ounces in the appropriate amount of water for drenching containers of different sizes (see label).

## Azatin® XL – Insect Growth Regulator

Apply 10 to 16 fluid ounces per 100 gallons to target nymphs. Tank mix with Decathlon to target nymphs and adults.

## Decathlon® 20 WP – Synthetic Pyrethroid

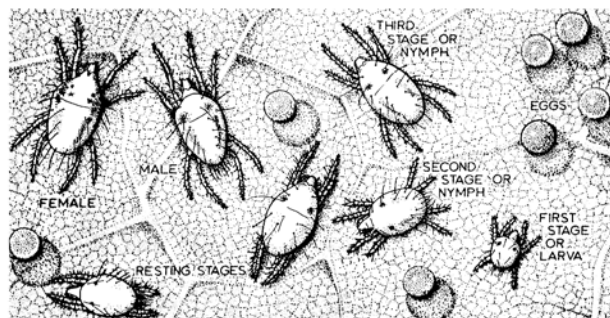
Apply 1.9 ounces (54 grams) per 100 gallons as a foliar spray.

# Spider Mites

*Order Acari, Family Tetranychidae*

Spider mites have rasping–sucking mouthparts. Feeding damage appears as light-colored spots, or stipples on upper leaf surfaces. Spider mites also produce webbing. Heavy infestations can kill plants or cause leaves to drop off, and webbing can cover leaves and flowers resulting in aesthetic injury.

Spider mite developmental stages are egg, larva, protonymph, deutonymph, and adult. Development from egg to adult takes about 8 days (77°–95°F, 25°–35°C) to 28 days (50°–68°F, 10°–20°C). Hot and dry conditions are most favorable. Spider mite development is affected by the host plant, plant nutrition, leaf age, and moisture stress. Moisture stressed plants often have higher spider mite populations. High moisture slows mite dispersal. Spider mites are usually on undersides of leaves, but may be on/in flowers in heavy infestations.



## Judo™ – Greenhouse and Nursery Ornamental Miticide/Insecticide

Apply 1 to 4 fluid ounces per 100 gallons as a foliar spray.

## Pylon® – Miticide/Insecticide

Apply 2.6 – 5.2 fluid ounces per 100 gallons as a foliar spray.

## Triact® 70 – Clarified Hydrophobic Extract of Neem Oil

Mix 1 – 2 gallons per 100 gallons and apply as a foliar spray.

# Tarsonemid Mites (Broad Mite, Cyclamen Mite)

*Order Acarina, Family Tarsonemidae*

Feeding injury by these tiny mites causes leaf distortion, stunting, and sometimes flower bud abortion. Both species have a very wide host plant range. Because these mites are so tiny, an infestation is usually recognized by the feeding injury symptoms. Broad mites are about 0.2mm long and cyclamen mites about 0.3mm long. Both species are colorless to light brown. Broad mites are more active than cyclamen mites. Magnification is necessary to see them.

Female broad mites will lay 30 to 75 eggs and female cyclamen mites about 12 to 16. Developmental stages are egg, larva, resting pupa and adult. The development time from egg to adult ranges from one to three weeks. These mites do best in warm and humid conditions.

## Pylon® – Miticide/Insecticide

Apply 2.6 – 5.2 fluid ounces per 100 gallons as a foliar spray.

## Judo™ – Greenhouse and Nursery Ornamental Miticide/Insecticide

Apply 1 to 4 fluid ounces per 100 gallons as a foliar spray.

## Triact® 70 – Clarified Hydrophobic Extract of Neem Oil

Mix 1 – 2 gallons per 100 gallons and apply as a foliar spray.

# Foliar Nematodes

*Order Tylenchida, Family Aphelenchoididae*

Foliar nematodes are tiny (0.5 to 1.0 mm) colorless roundworms in the Genus *Aphelenchoides*. The four major species are: *A. besseyi*, *A. blastophthorus*, *A. fragariae*, and *A. ritzembosi*. Foliar nematodes are free-living and can be found on plant leaves, stems, buds, and crowns of numerous host plants. They also occur in the soil. Feeding injury causes a variety of symptoms that are often difficult to diagnose and can be confused with bacterial diseases. Injury to leaves begins as water-soaked areas and proceeds to brown dead tissue. Damage usually occurs between leaf veins, so depending on the plant species may be striped or patterned.

Two peak population periods are March – May and Nov – Jan. Female nematodes can produce more than 100 eggs, which will hatch into larvae. Larvae can mature and begin reproducing in about 2 weeks. Older larvae can become dormant in dry conditions and can remain that way for months or years, resuming development when conditions become favorable. Nematodes move when there is a thin film of water on the plant surfaces. Spread is by splashing water, and is made easier by close plant spacing.

General cultural controls are: disposing of infected plants; avoid overhead watering; use proper spacing; no watering during darkness; reduce humidity; discard fallen leaves and use resistant varieties.

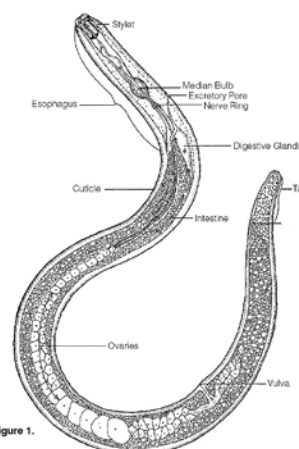


Figure 1.  
A plant parasitic nematode

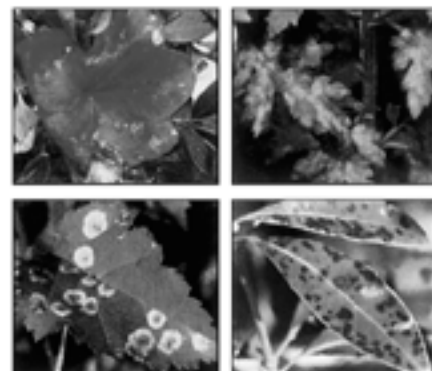
## Pylon® – Miticide/Insecticide

Apply 5.2 – 10 fluid ounces per 100 gallons as a foliar spray.

# Foliar Diseases

**Botrytis blight or gray mold** can develop on any above ground plant part. Favorable conditions for *Botrytis* development are cool wet weather, high humidity (85%+), plant crowding and poor sanitation. Affected areas are tan, brown or gray dead spots with the fungus often forming fuzzy masses of spores. Spores are called conidia and are released with watering or simply by taking cuttings. These spores move in the air and infect other plants when conditions are right.

To control *Botrytis*, avoid long periods of leaf wetness. This is a key to avoiding most of the foliar diseases. *Botrytis* can occur all year round but can be a real problem in late winter on many greenhouse crops. Disease problems can be reduced by modifying irrigation, increasing air movement by modifying plant spacing to reduce humidity. Sanitation is also critical. Remove all dead and dying plant tissues from the area prior to starting another crop.



Fungicides for control:

### **OHP 26 GT®-O, Sextant™ or OHP Chipco® 26019 N/G – Fungicide**

Apply 1–2.5 quarts per 100 gallons as a foliar spray (OHP 26 GT-O, Sextant);  
Apply 1–2 lbs per 100 gallons as a foliar spray (OHP Chipco 26019 N/G)

### **Compass® O 50 WDG – Strobilurin Fungicide**

Apply 2–4 ounces per 100 gallons as a foliar spray.

### **OHP 6672™ 4.5L or OHP 6672™ 50W – Ornamental Fungicide**

Apply 10 fluid ounces per 100 gallons as a foliar spray (OHP 6672 4.5L); Apply 12 – 16 ounces per 100 gallons as a foliar spray (OHP 6672 50W)

### **Triact® 70 – Clarified Hydrophobic Extract of Neem Oil**

Apply 0.5 to 1 gallon per 100 gallons as a foliar spray.

**Powdery mildews** are fungal pathogens that will form a white powdery growth on the surface of plant parts. This white powdery fungal growth can be found on the flowers, leaves and stems of many plants. Young foliage is more often the site of infection, rather than older tissue. Alternating periods of leaf wetness followed by warmer and drier conditions will promote powdery mildew development. Different species of powdery mildew generally infect different host plants, although some species have a large host range.

Powdery mildew management can be improved by providing good sanitation, and by increasing plant spacing to increase air movement and minimize leaf wetness.

Fungicides for control:

### **Strike® 50 WDG – Greenhouse and Nursery Systemic Fungicide**

Summer, apply 2 ounces per 100 gallons as a foliar spray.  
Winter, apply 1 ounce per 100 gallons as a foliar spray.

### **Compass® O 50 WDG – Strobilurin Fungicide**

Apply 1–2 ounces per 100 gallons as a foliar spray.

### **OHP 6672™ 4.5L or OHP 6672™ 50W – Ornamental Fungicide**

Apply 10 fluid ounces per 100 gallons as a foliar spray (OHP 6672 4.5L); Apply 12 – 16 ounces per 100 gallons as a foliar spray (OHP 6672 50W).

### **Triact® 70 – Clarified Hydrophobic Extract of Neem Oil**

Apply 0.5 to 1 gallon per 100 gallons as a foliar spray.

**Rust diseases** are highly specialized fungi and can only infect closely related plants. Some rust pathogens require a second host for a complete life cycle. Leaf wetness encourages rust spore germination. Spores spread by splashing water and through air movement. Symptoms appear as orange–yellow to rusty–red colored leaf spots made up of rust pustules, generally on the lower leaf surface.

To help control rust diseases, water plants only when leaves will dry quickly. Remove infected leaves or entire plants from the nursery.



## Compass® O 50 WDG – Strobilurin Fungicide

Apply 2–4 ounces per 100 gallons as a foliar spray.

## Strike® 50 WDG – Greenhouse and Nursery Systemic Fungicide

Summer, apply 2 ounces per 100 gallons as a foliar spray.  
Winter, apply 1 ounce per 100 gallons as a foliar spray.

## Triact® 70 – Clarified Hydrophobic Extract of Neem Oil

Apply 0.5 to 1 gallon per 100 gallons as a foliar spray.

**Fungal leaf spots and blights** include *Alternaria*, *Cercospora*, *Septoria*, *Didymellina* and *Colletotrichum* (*Botrytis* as well). Symptoms often appear as necrotic spots and dead areas on leaves and stems. Fungal leaf spots are typically round to angular with tan to gray centers and dark colored borders (black, brown or purple). Some spots may have yellow or reddish halos surrounding the spots. Leaf wetness, plant crowding and poor air circulation will encourage infections of fungal leaf spots.

Cultural controls include inspecting plants upon arrival and discarding any with symptoms. Remove infected plant material and plant debris from the production area. Increasing plant spacing improves air circulation around the plants, reduces humidity levels and aids in plant drying. Avoid prolonged periods of leaf wetness by watering early in the day.

Fungicides for control:

## OHP 26 GT®-O, Sextant™ or OHP Chipco® 26019 N/G – Fungicide

Apply 1–2.5 quarts per 100 gallons as a foliar spray (OHP 26 GT-O, Sextant);  
Apply 1–2 lbs per 100 gallons as a foliar spray (OHP Chipco 26019 N/G).

## Compass® O 50 WDG – Strobilurin Fungicide

Apply 2–4 ounces per 100 gallons as a foliar spray.

## OHP 6672™ 4.5L or OHP 6672™ 50W – Ornamental Fungicide

Apply 10 fluid ounces per 100 gallons as a foliar spray (OHP 6672 4.5L); Apply 12 – 16 ounces per 100 gallons as a foliar spray (OHP 6672 50W).

**Downy mildews** (*Peronospora*, *Plasmopara*, *Bremia*, *Bremiella*, *Basidiophora spp.*) can become active with cool temperatures, wet conditions and high humidity. Downy mildews are in the same pathogen class as *Pythium* and *Phytophthora* (water molds). Symptoms are not always easy to recognize and may appear as other plant problems. There may be microscopic sporangia (spore sacs) on the bottom of the leaf with a darker blotch on the upper surface. Some downy mildews are more aggressive than others. The fungus grows within the plant tissue and not on the surface and symptoms may not appear until conditions are perfect for spore formation, when they emerge on the underside of the leaf. On some plants, symptoms include distortion, stunting and curling of new leaves that appears much like damage from aphids.

To control downy mildews it is important to remove and dispose of any diseased plant tissue. Control is difficult and most fungicides only offer protection.

Fungicides for control:

## OHP Aliette® 50WDG – Fungicide

Apply 1.25–5 pounds per 100 gallons as a foliar spray.

## Compass® O 50 WDG – Strobilurin Fungicide

Apply 1–2 ounces per 100 gallons as a foliar spray.

## FenStop™ – Fungicide

Apply 7-14 fluid ounces per 100 gallons as a foliar spray.

## Triact® 70 – Clarified Hydrophobic Extract of Neem Oil

Apply 0.5 to 1 gallon per 100 gallons as a foliar spray, or 7-14 fluid ounces per 50-100 gallons per 400 sq. ft. as a drench.

## Phytophthora Aerial Blight

Many Phytophthora species can cause disease on leaves and stems when spores are moved from potting media or containers by splashing irrigation water or contaminated overhead irrigation water. Plants may be killed even though roots remain healthy.

To help minimize problems avoid excessive overhead irrigation and ensure that the irrigation water is pathogen free.

Fungicides for control:

## Compass® O 50 WDG – Strobilurin Fungicide

Apply 1–2 ounces per 100 gallons as a foliar spray.

## FenStop™ – Fungicide

Apply 7-14 fluid ounces per 100 gallons as a foliar spray.

# Damping–Off and Related Root Rots

Damping off can destroy seeds and young seedlings through infection by soil borne pathogens. Pre–emergence damping–off occurs when germinating seeds are attacked and rot before they emerge from the soil. Post emergence damping–off occurs when newly emerged seedlings wilt or collapse. Stems often have necrotic or water–soaked lesions at the soil interface. A pattern of collapsed plants appears as the fungus move out from the area of initial infection.



Several pathogens can cause these diseases, including the water molds (more closely related to algae than fungi) Phytophthora, and Pythium. Root rots are also caused by the true fungi, including Fusarium, Rhizoctonia, Thielaviopsis and Cylindrocladium. It is important to identify the pathogen(s) causing the disease (e.g. Pythium, Phytophthora or one of the true fungi) because the fungicides used for control are different. Many diseases can be caused or spread by an increase of circulated water, sub–irrigation (ebb and flood) systems and over fertilization.

## Root Rots caused by Water Molds

Phytophthora root rot infections appear to be lacking water because the pathogen is destroying the plants' water conducting ability. Phytophthora diseases affect both woody and herbaceous plants. Spores can remain dormant for a long time just waiting for conditions to be right.

Fungicides for control:

## OHP Aliette® 50WDG – Fungicide

Apply 6.4–12.8 ounces per 100 gallons as a drench at 1–2 pints per square foot.

## **Compass® O 50 WDG – Strobilurin Fungicide**

Apply 1 – 2 ounces per 100 gallons as a drench to wet the upper one-half of the container media.

## **FenStop™ – Fungicide**

Apply 7-14 fluid ounces in 50 to 100 gallons of water to 400 square feet (= 1 - 2 pints of solution per square foot).

## **Damping Off and Root Rots caused by True Fungi**

Rhizoctonia stem and root rot diseases are caused by soil borne fungal pathogens. Rhizoctonia can be especially damaging to seedlings causing damping off. Cankers and moist lesions form at the base of infected petioles at the soil interface or on the stems. Rhizoctonia is most severe with high temperatures and moist conditions.

Fungicides for control:

## **Compass® O 50 WDG – Strobilurin Fungicide**

Apply 0.5 ounce per 100 gallons as a drench to wet the upper one-half of the container media.

## **OHP 26 GT®-O, Sextant™ or OHP Chipco® 26019 N/G – Fungicide**

OHP 26 GT-O, Sextant, apply 13 fluid ounces per 100 gallons as a drench at 1–2 pints per square foot.  
OHP Chipco 26019 N/G, apply 6.5 ounces per 100 gallons as a drench at 1–2 pints per square foot.

## **OHP 6672™ 4.5L or OHP 6672™ 50W – Ornamental Fungicide**

OHP 6672 50W, apply 12–16 ounces per 100 gallons at 1–3 pints per square foot.  
OHP 6672 4.5L, apply 20 fluid ounces per 100 gallons at 1–2 pints per square foot.

## **SoilGard™ 12G – Microbial Fungicide**

Mix 1 – 1.5 pounds per cubic yard of container media and incorporate; OR add 0.5 – 2 pounds to 100 gallons of water and drench at 100 gallons per 400 square feet.

**Thielaviopsis** is another soil borne fungal pathogen. Symptoms can include chlorotic foliage and stunted growth above-ground and the typical decayed roots that exhibit a black or very dark appearance (black root rot). Thielaviopsis can produce basal lesions (generally not as wet as Rhizoctonia). This disease is problematic with plant stress including high pH, cool soil, poor drainage and excess fertilization.

Fungicides for control:

## **Compass® O 50 WDG – Strobilurin Fungicide**

Apply 1 – 2 ounces per 100 gallons as a drench to wet the upper one-half of the container media.

## **OHP 6672™ 4.5L or OHP 6672™ 50W – Ornamental Fungicide**

OHP 6672 50W, apply 12–16 ounces per 100 gallons at 1–3 pints per square foot.  
OHP 6672 4.5L, apply 20 fluid ounces per 100 gallons at 1–2 pints per square foot.

# Greenhouse Disinfectants

## Triathlon™ – Greenhouse Disinfectant

To use as a disinfectant, use 1 to 1 1/2 teaspoons Triathlon per gallon of water. To control plant pathogens use 1 tablespoon Triathlon per gallon of water. To remove algae from walkways use 1 1/2 teaspoons Triathlon per gallon of water. To disinfect and sanitize evaporative cooling pads, treat every other week with 1 fluid ounce Triathlon for every 30 gallons of water.

See the label for additional information and precautions.

# Plant Growth Regulators

## Cycocel® – Chlormequat

For Use on Ornamentals

Rates: Refer to label

Cycocel should be used on healthy plants and is not a replacement for good cultural practices. If any adjuvant or other chemicals are applied with Cycocel, testing is advised. Cycocel is labeled to be tank mixed with B-Nine®.



| Concentration (ppm)* | Cycocel (fl. oz./ gal) |
|----------------------|------------------------|
| 460                  | 0.50                   |
| 800                  | 0.87                   |
| 1,000                | 1.08                   |
| 1,250                | 1.36                   |
| 1,500                | 1.63                   |
| 2,000                | 2.17                   |
| 3,000                | 3.25                   |

\*ppm calculations based on total Cycocel product.

Cycocel is a registered trademark of BASF Corp.  
B-Nine is a registered trademark of Chemtura Corp.

Always read the label

# Soil Media Wetting Agent and Moisture Management

## Suffusion™ Liquid – Alkoxyether Surfactants

For Soil Applications in Greenhouse, Nursery and Interiorscapes.  
Rate: Varies – 2.0 – 15.0 fluid ounces per 100 gallons – Refer to label.

## Suffusion™ Granules – Alkoxyether Surfactants

For Soil Applications in Greenhouse, Nursery and Interiorscapes.  
Rate: Varies – 0.5 – 2.0 Pounds per Cubic Yard of Soil Media – Refer to label.

## Suffusion™ Tablets – Polyhydroxyethyl Alkoxy Alkylene Oxides

For application to potting media prior to shipping and/or while at retail outlets.  
Applications made through specialized applicators. Refer to label.

### SMALL VOLUME APPLICATION RATES FOR OHP, Inc. PRODUCTS

| Fungicides              | Rate per gallon<br>(tsp or gm/ml)  | Rate per 100 gallons |
|-------------------------|------------------------------------|----------------------|
| Aliette®                | 1 1/4 - 4 4/5 tsp., 5.7 - 22.7 gm. | 1 1/4 - 5 lbs.       |
| OHP Chipco® 26019 N/G   | 1 1/3 - 2 2/3 tsp., 4.5 - 9 gm.    | 1 - 2 lbs.           |
| OHP 26 GT®-O, Sex-tant™ | 1 3/4 - 4 1/2 tsp., 9 - 23 ml.     | 1 - 2.5 qts.         |
| Compass™ O              | 1/10 - 1/3 tsp., 0.3 - 1.1 gm.     | 1 - 4 oz.            |
| FensStop™               | 2/5 - 4/5 tsp., 2 - 4 ml.          | 7 - 14 fl. oz.       |
| OHP 6672™ 50WP          | 1 2/3 - 5 tsp., 2.3 - 6.8 gm.      | 8 - 24 oz.           |
| OHP 6672™ 4.5L          | 1 1/5 tsp., 5.9 ml.                | 20 fl. oz.           |
| SoilGard®               | 1/2 - 2 tsp., 2.3 - 9 gm.          | 1/2 - 2 lbs.         |
| Strike® 50              | 1/10 - 1/5 tsp., 0.3 - 0.6 gm.     | 1 - 2 oz.            |
| Triact® 70              | 3 3/4 - 7 1/2 tsp., 19 - 38 ml.    | 0.5 - 2 gal.         |

| Insecticides/Miticides | Rate per gallon<br>(tsp or gm/ml) | Rate per 100 gallons |
|------------------------|-----------------------------------|----------------------|
| Azatin® XL             | 1/3 - 1 tsp., 1.5 - 5 ml.         | 5 - 16 fl. oz.       |
| Decathlon®             | 1/5 - 1/4 tsp., 0.4 - 0.5 gm.     | 1.3 - 1.9 oz.        |
| Deliver®               | 1/4 - 1 1/4 tsp., 1.2 - 5.7 gm.   | 1/4 - 1 1/4 lbs.     |
| Judo™                  | 1/10 - 1/5 tsp., 0.5 - 1.2 ml.    | 2 - 4 fl. oz.        |
| Marathon® II           | 1/10 tsp., 0.5 ml.                | 1.7 fl. oz., 50 ml.  |
| Pylon®                 | 1/5 - 3/5 tsp., 0.8 - 3.1 ml.     | 2.6 - 10 fl. oz.     |
| Triact® 70             | 3 3/4 - 7 1/2 tsp., 19 - 38 ml.   | 0.5 - 2 gal.         |





