

# Crop Profile for Fuchsia in Ohio

Prepared: November, 2000

## General Production Information

(Not Available)

- Area of production in Ohio: sq. ft - % for wholesale market
- Percent of US Acreage/Rank:
- Number of Growers:
- Wholesale Price Per Basket: \$
- Value of Wholesale Production in Ohio: \$

## Cultural Practices

Fuchsia is propagated by cuttings normally from vegetative stock plants. Cuttings are placed in a well-drained medium with a pH between 6.0-6.5. Three to five cuttings are placed in each hanging basket. As the cuttings set roots, the medium is kept at 20 to 22° C and exposed to short days. Rooting usually takes about 3 weeks during which time the growth medium is kept moist but well drained. After a few weeks of growth, 8-9 weeks before the projected sale, the plants are pinched to 4-5 leaf pairs removing 1-2 cm of stem tissue. Beginning 1-4 weeks after pinching the plants are exposed to long day light hours until the plants begin to flower and are ready to be sold. Growth regulators can be applied at this time to control height. Hanging baskets of fuchsia are marketed when the plant reaches full bloom. As with all ornamental plants, managing pests and diseases is a critical component of fuchsia production since any damage usually renders a plant unsaleable

## Insect Pests

**Thrips**

Thrips are often the most serious insect pest in greenhouses. They are very difficult to control once a population becomes well established. Thrips feed on leaves and flowers of a wide variety of host plants. The feeding injury can render a plant unmarketable and the act of feeding by the Thrips can transmit viruses to a susceptible host plant. The lifecycle of a thrips begins as an egg is deposited in plant tissue. After the larvae emerge they begin feeding on the plant. Thrips pass through 2 larval and transformation stages before becoming an adult. Feeding injury is done by the larvae and adults but only the adults can transmit viruses. The lifecycle of the thrips is temperature dependant with development occurring between 50 – 90° F. The egg to adult cycle lasts between 10-38 days at these temperatures. At temperatures below 50° F thrips can survive but no development occurs.

## **Aphids**

There are many species of aphids that can attack greenhouse plants but the two most common species are the green peach aphid (*Myzus persicae*) and the melon/cotton aphid (*Aphis gossypii*). Both of these species are green in color but it can vary from light to dark green for the melon aphid and from light green to nearly pink for the green peach aphid. Aphids have small soft bodies with piercing-sucking mouth parts which they use to insert into the phloem tissue of plants and remove fluid. Aphids cause problems from injury by feeding, the transmission of viruses and by spreading sticky honeydew over the surface of leaves and flowers. In the greenhouse most aphids are female and they produce live young called nymphs. An average female produces between 50 to 200 nymphs during her lifetime. The nymphs, that are all female, begin reproducing in 7-10 days. Adult aphids appear in 2 forms, winged and wingless, depending on population density and /or host plant conditions. Winged aphids are troublesome because they are able to disperse throughout the greenhouse and are also able to fly into the greenhouse from outdoors.

## **Whiteflies**

Whiteflies are a very common pest in greenhouse production. The most common species are the greenhouse whitefly (*Trialeurodes vaporariorum*) and the silverleaf whitefly (*Bemisia argentifolii*). The adult silverleaf whiteflies are smaller, more yellow and active than the greenhouse whiteflies. In the pupal state the silverleaf whiteflies are flat without spines or fringes whereas the greenhouse whitefly pupae have vertical sides with spines. The adult whitefly lifecycle lasts from 21-36 days. Each female produces 60 to 100 eggs that hatch in 7-10 days. The newly emerged crawlers move for a short distance before settling down to feed. After molting 3 times the pupae emerge and in 6 days will grow into adults. During development whiteflies are usually found on the underside of leaves. The adult and immature stages of whiteflies use their piercing-sucking mouth parts to extract fluid from plant tissue. A few adult whiteflies on plants are a nuisance. However, feeding by a large number of adults and especially immatures can weaken or kill a plant. Whiteflies also produce a sticky honeydew that can be a growth medium for black sooty fungus.

## **CHEMICAL INSECT CONTROLS (4)**

(all chemicals applied at an average rate of 200 gal/A unless otherwise noted)

### **Imidacloprid (Marathon)**

- Percent of total area treated: 75%
- Target pests: Aphids and White Flies

Average rate and frequency of application of most common formulations: (2)

- Marathon 1% - ½ tsp (2 grams)/10 inch pot, once
- Marathon 60 WSP– 4 (20gram) packets/100 gal (5 oz drench/10 inch pot), once
- Application method: top dress for 1% and drench for 60 WSP
- REI: 12 hours
- Efficacy rating: Very Good

### **Fluvalinate (Mavrik Aquaflow)**

- Percent of total area treated: 53%
- Target pests: Aphids, Thrips, and Whiteflies

Average rate and frequency of application of most common formulations:

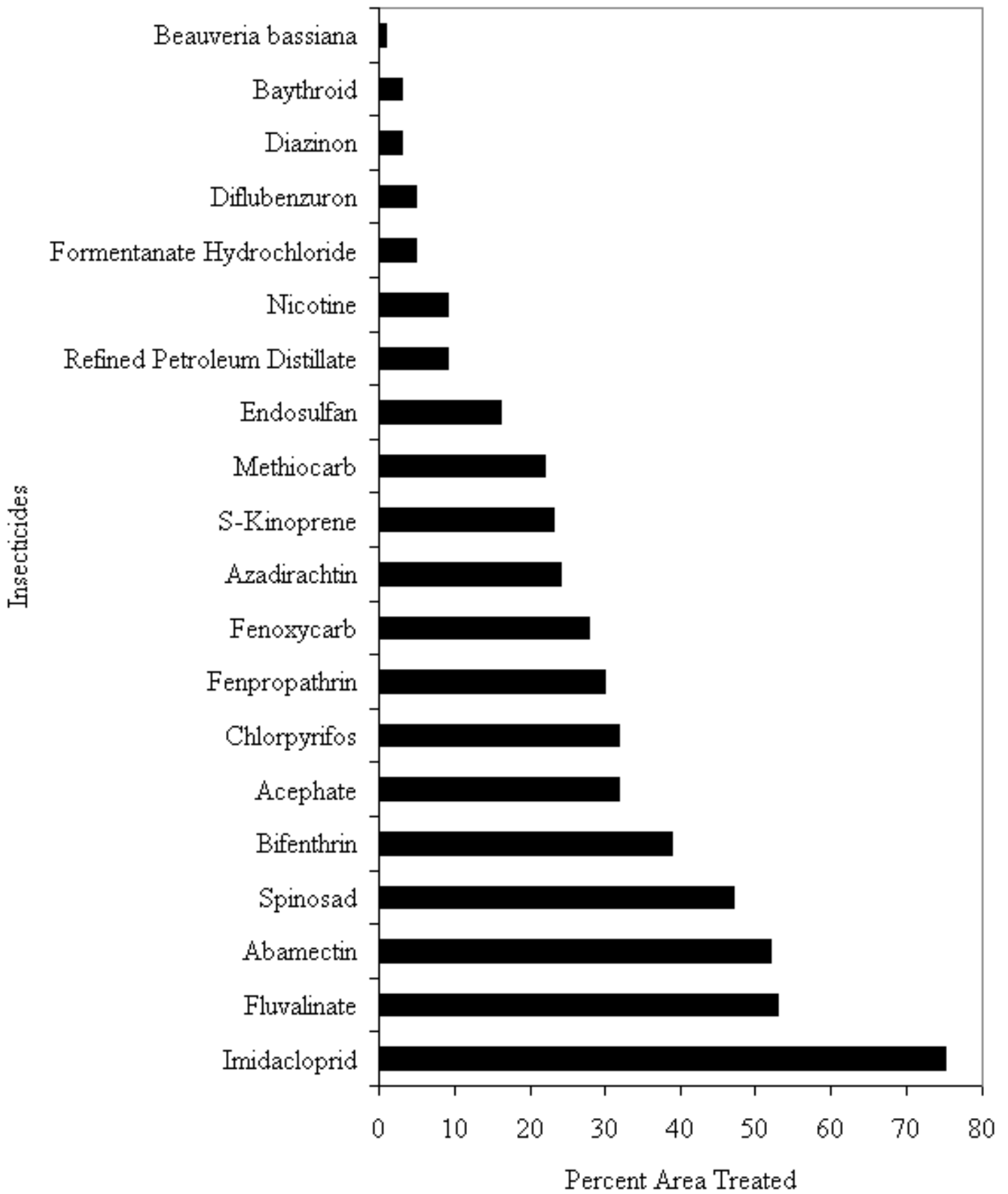
- Mavrik Aquaflow –7.5 oz/100 gal, twice
- Application method: High Volume and Low Volume Spray
- REI: 12 hours
- Efficacy rating: Good

### **Abamectin (Avid)**

- Percent of total area treated: 52%
- Target pests: Thrips

Average rate and frequency of application of most common formulations: (2)

- Avid 0.15 EC – 7 oz/100 gal, 3 times
- Application method: High Volume Spray or Fogger
- REI: 12 hours
- Efficacy rating: Good to Very Good
- Rational for use: Only Acceptable Alternative



**Spinosad (Conserve)**

- Percent of total area treated: 47%
- Target pests: Thrips

Average rate and frequency of application of most common formulations: (2)

- Conserve SC – 6 oz/100 gal, 2-3 times
- Application method: High Volume Spray or Fogger
- REI: 4 hours
- Efficacy rating: Very Good
- Rational for use: Best Alternative

### **Bifenthrin (Talstar)**

- Percent of total area treated: 39%
- Target pests: Thrips, Aphids, and Whiteflies

Average rate and frequency of application of most common formulations: (2)

- Talstar F – 20 oz/100 gal, twice
- Application method: High Volume Spray and Fogger
- REI: 12 hours
- Efficacy rating: Good

### **Acephate (Orthene)**

- Percent of total area treated: 32%
- Target pests: Aphids, Thrips, Whiteflies

Average rate and frequency of application of most common formulations: (2)

- Orthene TT&O – 9 oz/100 gal, twice
- PT1300 Orthene – 1 can/3000 ft<sup>2</sup>, 3 times
- Application method: High Volume Spray
- REI: 24 hours
- Efficacy rating: Good

### **Chlorpyrifos (DuraGuard)**

- Percent of total area treated: 32%
- Target pests: Aphids, Whiteflies and Thrips

Average rate and frequency of application of most common formulations: (2)

- DuraGuard ME – 53 oz/100 gal, twice
- Application method: High Volume Spray
- REI: 12 hours
- Efficacy rating: Good to Very Good

## **Fenpropathrin (Tame)**

- Percent of total area treated: 30%
- Target pests: Thrips and Whiteflies

Average rate and frequency of application of most common formulations: (2)

- Tame 2.4 EC – 9 oz/100 gal, twice
- Application method: High Volume Spray and Fogger
- REI: 24 hrs.
- Efficacy rating: Good
- Used with Orthene TT&O for best results.

## **Fenoxycarb (Precision, Preclude)**

- Percent of total area treated: 28%
- Target pests: Thrips

Average rate and frequency of application of most common formulations: (2)

- Precision – 4 oz/100 gal, twice
- Preclude TR – 1 (2oz) can/3000 sq ft, 4 times
- Application method: High Volume Spray
- REI: 12 hours
- Efficacy rating: Good to Very Good

## **Azadirachtin (Azatin and Neemazad)**

- Percent of total area treated: 24%
- Target pests: Thrips and Whiteflies

Average rate and frequency of application of most common formulations: (2)

- Azatin XL – 15 oz/100 gal, twice
- Neemazad
- Application method: High Volume Spray or Fogger
- REI: 12 hours
- Efficacy rating: Good to Very Good

## **S-Kinoprene (Enstar)**

- Percent of total area treated: 23%
- Target pests: Thrips, Whiteflies, Aphids

Average rate and frequency of application of most common formulations: (2)

- Enstar II – 7.5 oz/100 gal, twice
- Application method: High Volume spray
- REI: 4 hours

- Efficacy rating: Very Good

### **Methiocarb (Mesurol)**

- Percent of total area treated: 22%
- Target pests: Thrips and Aphids

Average rate and frequency of application of most common formulations: (2)

- Mesurol 75W – 32 oz/100gal, 3 times
- Application method: High Volume Spray and Fogger
- REI: 24 hours
- Efficacy rating: Good to Very Good

### **Endosulfan (Thiodan)**

- Percent of total area treated: 16%
- Target pests: Thrips, and Aphids

Average rate and frequency of application of most common formulations: (2)

- Thiodan 50 WP – 16 oz/100 gal, twice
- Thiodan 3EC – 48 oz/A, twice
- Fulex Thiodan – 16oz/100 gal, once
- Application method: High Volume Spray
- REI: 24 hours
- Efficacy rating: Good

### **Refined Petroleum Distillate (Sunspray Ultra-Fine)**

- Percent of total area treated: 9%
- Target pests: Whiteflies, Aphids and Thrips

Average rate and frequency of application of most common formulations: (2)

- Sunspray Ultra-Fine – 1.5 gal/100 gal, twice
- Application method: Cold Fogger
- REI: 4 hours
- Efficacy rating: Good

### **Nicotine (Fulex, Plant Products)**

- Percent of total area treated: 9%
- Target pests: Aphids, Thrips and Whiteflies

Average rate and frequency of application of most common formulations: (2)

- Fulex Nicotine – 1 can/20,000 cu. ft, 1-2 times

- Plant Products Nicotine – 1 can/20,000 cu. ft, 1-2 times
- Application method: Smoke
- REI: 4 hours
- Efficacy rating: Good

### **Formentanate Hydrochloride (Carzol)**

- Percent of total area treated: 5%
- Target pests: Thrips

Average rate and frequency of application of most common formulations: (2)

- Carzol – 12 oz/A, once
- Application method: High Volume Spray
- REI:
- Efficacy rating: Good

### **Diiflubenzuron (Adept)**

- Percent of total area treated: 5%
- Target pests: Fungus Gnats (larvae) and Whiteflies

Average rate and frequency of application of most common formulations: (2)

- Adept 25 WP – 1 oz (1 bag)/100 gal, twice
- Application method: Drench
- REI: 12 hours
- Efficacy rating: Very Good

### **Diazinon (Knox Out)**

- Percent of total area treated: 3%
- Target pests: Thrips

Average rate and frequency of application of most common formulations: (2)

- Knox Out GH – 48 oz/100 gal, once
- Application method: Spray to potting mix surface
- REI: 12 hours
- Efficacy rating: Average

### **Baythroid (Decathalon)**

- Percent of total area treated: 3%
- Target pests: Thrips

Average rate and frequency of application of most common formulations: (2)

- Decathalon 20WP – 1.9 oz/100 gal, twice



- Application method: High Volume Spray
- REI: 12 hours
- Efficacy rating: Good

### **Beauveria bassiana (Naturalis-O)**

- Percent of total area treated: 1%
- Target pests: Aphids, Thrips and Whiteflies

Average rate and frequency of application of most common formulations: (2)

- Naturalis-O – 40 oz/100 gal, twice
- Application method: High Volume Spray
- REI: 4 hours
- Efficacy rating: Good to Very Good

### **CULTURAL CONTROLS (2,3,5)**

Quarantine new plant material for at least one week. Use screens on ventilation system and doors to exclude pests. Practice proper sanitation and weed control in and around the greenhouse. Avoid excessive fertilization since some pests thrive on plant tissue high in nitrogen.

### **BIOLOGICAL CONTROLS (2,3,5)**

Some new and effective biological control products are available for the greenhouse grower. Most growers are taking a cautious approach to these new products and only applying them to small portions of their operations.

## **Diseases**

### **Botrytis Gray Mold**

The most common disease of greenhouse floral crops is gray mold. Gray mold is caused by the fungus *Botrytis cinerea*. It is a common fungus, with a very wide host range and can persist in the greenhouse year-round. The fungus produces a large amount of spores that move throughout the greenhouse via air currents. Under environmental conditions of relative humidity at or above 85%, little or no air circulation and free water on the leaf surface, the fungal spores land on plant surfaces, germinate and penetrate the host. The symptoms of gray mold vary depending on the host and the environmental conditions associated with the host. In most cases the disease is characterized by the production of leaf spots, flower blight, bud rot, stem canker, stem and crown rot, cutting rot, damping off and in extreme cases, plant death. The fungal growth is

characterized by the presence of fluffy gray/brown mycelium that produces a cloud of spores if disturbed. Affected tissue is soft and brown, and sometimes has a water soaked appearance. This disease can be anything from a common nuisance to an economic disaster depending on the host and the conditions under which the crop is grown.

### **Black Root Rot**

Black root rot is caused by the common and widespread fungus, *Thielaviopsis basicola*. It is usually spread to the greenhouse through infested plugs, wind blown dust or in growing media. The symptoms of black root rot include yellowing, stunting and under certain conditions wilting or death of the plant. Sometimes plants affected with the disease have black stem lesions at or near the soil line. Black root rot begins by attacking the middle of the root and forms cankers. The fungus can survive in plants without causing disease. These "resting" fungal spores infect host tissue in great numbers. These spores can be splashed about or blown around in dust and as a result be present throughout the greenhouse. The disease is usually expressed when the plant becomes stressed.

### **Leaf Spots**

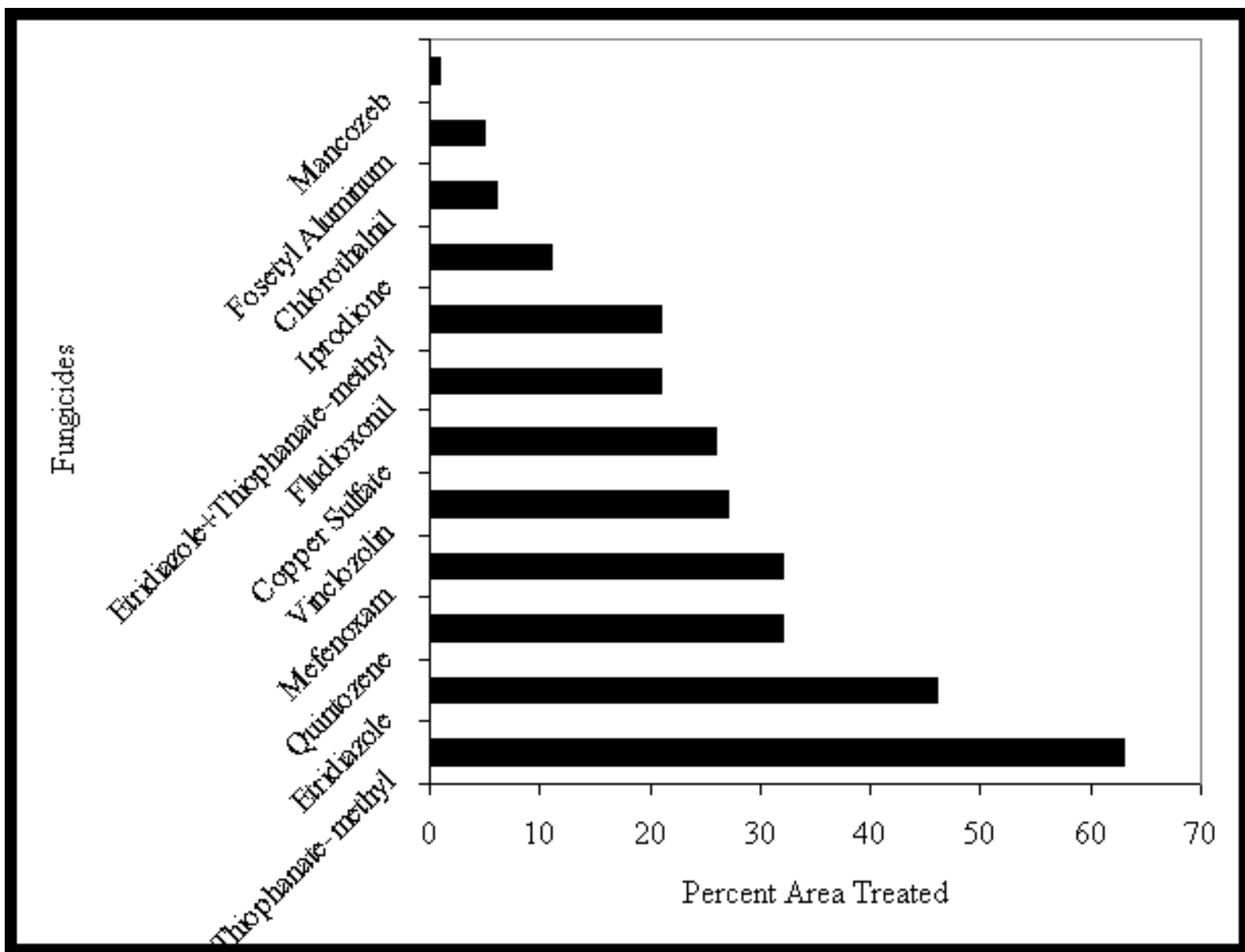
A number of leaf diseases that occasionally damage ornamental plants can be caused by fungi or bacteria. Most of these pathogenic organisms require a wet leaf surface for an extended time, usually 24 hours. The wet leaf surface allows the fungal spores to swell, germinate and penetrate the plant and the bacteria to swim to a natural opening in the leaf surface such as a stomate. Bacterial leaf spots are initially light green and look water soaked. Later these leaf spots turn brown or black and may have definite margins. Fungal leaf spots are characterized by brown or black spots randomly scattered across the leaf. The spots may have the appearance of concentric rings. The margins of the spot can be a different color than the center of the spot.

### **Fuchsia Rust**

Fuchsia rust is caused by the fungus *Pucciniastrum epilobii*. The disease first appears as large areas of chlorosis on the upper side of the leaves. On the underside, masses of yellow-orange spores are produced. As the disease progresses, the spores appear on both sides of the leaves and the circular spots become less distinct. Spores sometimes form along the veins. Affected leaves may become deformed and defoliation commonly occurs. Potted plants may recover from the disease but defoliation weakens the plants and may result in death. The initial source of the pathogenic spores may be from the alternative hosts, fireweed and fir trees. Stock kept outdoors during the summer may become infected by air-borne spores.

### **CHEMICAL DISEASE CONTROLS (4)**

(all chemicals applied at an average rate of 200 gal/A unless otherwise noted)



### Thiophanate-methyl (Cleary's 3336, Fungo)

- Percent of total area treated: 63%
- Target pests: Botrytis and Root Rots

Average rate and frequency of application of most common formulations:

- Cleary's 3336 4.5F - 18 oz/100 gal, twice
- Fungo Flo 50WP - 20 oz/100 gal, twice
- Application method: Drench or High Volume Spray
- REI: 12 hours
- Efficacy rating: Good to Very Good

### Etridiazole (Truban)

- Percent of total area treated: 46%
- Target pests: Root Rots

Average rate and frequency of application of most common formulations:

- Truban 30WP – 6 oz/100 gal, once
- Application method: Drench
- REI: 12 hours
- Efficacy rating: Excellent

### **Quintozene (Terraclor)**

- Percent of total area treated: 32%
- Target pests: Root Rots

Average rate and frequency of application of most common formulations:

- Terraclor 75WP – 4 oz/100 gal, once
- Terraclor 400 – 12 oz/100 gal, once
- Application method: High Volume Spray (75% WP), Drench (400)
- REI: 12 hours
- Efficacy rating: Very Good

### **Mefenoxam (Subdue MAXX)**

- Percent of total area treated: 32%
- Target pests: Root Rots

Average rate and frequency of application of most common formulations:

- Subdue MAXX – ¼ oz/100 gal, once
- Application method: Drench
- REI: None
- Efficacy rating: Very Good

### **Vinclozolin (Ornalin, Vorlin)**

- Percent of total area treated: 27%
- Target pests: Leaf Spots

Average rate and frequency of application of most common formulations:

- Ornalin Flo 4.17F – 12 oz/100 gal, once
- Vorlin – 3 Tbs/10 gal, once
- Application method: High Volume Spray
- REI: 12 hours
- Efficacy rating: Good

### **Copper Sulfate (Phyton-27)**

- Percent of total area treated: 26%

- Target pests: Botrytis and other Leaf Spots

Average rate and frequency of application of most common formulations:

- Phyton-27 5.5EC – 16 oz/100 gal, one to two times
- Application method: High Volume Spray
- REI: 12 hours
- Efficacy rating: Good to Very Good

### **Fludioxonil (Medallion)**

- Percent of total area treated: 21%
- Target disease: Botrytis

Average rate and frequency of application of most common formulations:

- Medallion – 1 oz/100 gal, once
- Application method: High Volume Spray
- REI:
- Efficacy rating: Good

### **Etridiazole + Thiophanae methyl (Banrot)**

- Percent area treated: 21%
- Target pests: Root Rots

Average rate and frequency of application of most common formulations:

- Banrot 40WP– 8 oz/100 gal, once
- Application method: Drench
- REI: 12 hours
- Efficacy rating: Very Good

### **Iprodione (Chipco)**

- Percent of total area treated: 11%
- Target pests: Botrytis

Average rate and frequency of application of most common formulations:

- Chipco 26019 50WP – 24 oz/100 gal, twice
- Application method: High Volume Spray or Drench
- REI: 12 hours
- Efficacy rating: Good to Very Good

### **Chlorothalnil (Daconil)**

- Percent of total area treated: 6%

- Target pests: Botrytis and Rust

Average rate and frequency of application of most common formulations:

- Daconil 2787 Flo 4F – 32 oz/100 gal, once
- Exotherm Termil 20 Fum – 1 smoke can (3.5 oz)/1000 sq. ft, once
- Application method: High Volume Spray and Fogger
- REI: 12 hours
- Efficacy rating: Good

### **Fosetyl aluminum (Aliette)**

- Percent of total area treated: 5%
- Target pests: Root Rots

Average rate and frequency of application of most common formulations:

- Aliette WDG – 2 lbs/100 gal, once
- Application method: High Volume Spray
- REI: 12 hours
- Efficacy rating: Very Good

### **Mancozeb (ProtectT/O)**

- Percent area treated: 1%
- Target pests: Botrytis and Leaf Spots

Average rate and frequency of application of most common formulations:

- Protect T/O 80 WP - 1.5 lbs/100 gal, once
- Application method: High Volume Spray
- REI: 24 hours
- Efficacy rating: Good to Very Good

## **CULTURAL CONTROLS (2,3,5)**

Buy resistant varieties whenever possible. Quarantine new plant materials for at least a week. Screen the greenhouse doors and vents. Plant disease free cuttings and seeds. Keep growing area clean. Remove all diseased plants as soon as they have been detected. Periodically disinfect the hose end, especially after touching the growing mix or the contaminated water on the floor or benches. Benches should also be disinfected at the end of each crop cycle. Eliminate all weeds and algae. Fertilize plants judiciously. Adjust the pH of the growing medium appropriately. Control relative humidity of the greenhouse, especially during the evening hours. This can require simultaneously ventilating and heating the greenhouse during critical hours. Providing adequate air circulation will also help. The use of well draining growth mediums will help reduce the incidence of root diseases.

## Weeds

Weeds are a persistent problem in greenhouse production. Weeds are unsightly and can harbor insect pests and diseases. Therefore, weed management in and around the greenhouse is important to assist with pest and disease control and well as to improve aesthetics.

### **CHEMICAL CONTROLS (4)**

(all chemicals applied at a rate of 200 gal/A unless otherwise noted)

#### **Glyphosate (Roundup)**

- Percent of total area treated: 46%, primarily used as a spot spray in the work area.
- Target pests: Annual and Perennial Weeds

Average rate and frequency of application of most common formulations:

- Roundup Pro – 1.4 oz/gal, as needed
- Application method: High Volume Spray
- REI: 4 hours
- Efficacy rating: Good to Very Good

#### **Glufosinate-ammonium (Finale)**

- Percent of total area treated: 13%
- Target pests: Annual and Perennial Weeds

Average rate and frequency of application of most common formulations:

- Finale – 1.5 gal/100 gal, once
- Application method: High Volume Spray
- REI: 12 hours
- Efficacy rating: Very Good

#### **Oryzalin (Surflan)**

- Percent of total area treated: 5% (used on the exterior of the greenhouse)
- Target pests: Annual Grasses and Broadleaf Weeds

Average rate and frequency of application of most common formulations:

- Finale – 2 oz/gal, once
- Application method: High Volume Spray
- REI: 12 hours

- Efficacy rating: Very Good

## **CULTURAL CONTROLS (2,3)**

Use weed block fabric to cover the floor and remove any weeds that grow in along the edges of the fabric. Hand weeding and solarization can also be used to control weeds. Managing weeds outside the greenhouse is important to eliminate the major source of air borne weed seeds and to prevent perennial weeds from growing in under the foundation. Regular mowing can help prevent the most weed seed formation. However, maintaining a weed-free barrier around the greenhouse may be more effective. Adding lime to soil can help too.

## **Contacts**

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