



# *Insect & Disease Management in Annual Flower Beds*

Cooperative Extension Service ■ The University of Georgia  
College of Agricultural and Environmental Sciences

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Flower beds provide year-round beauty and fragrance for Georgia gardeners. Seeds or transplants of hundreds of annual plant varieties can be planted in spring for color from spring to fall. Cool-season flowers such as pansies and snapdragons grow throughout the winter months.

When properly planted and maintained, annuals are less prone to pest problems than other plants under stress. In the home landscape, disease control is achieved primarily by good practices that help prevent problems before they start. When they do occur, you can reduce disease, insects and related pests using management strategies particularly suited to the home gardener.

In this publication, you will learn signs and symptoms of common disease and insect problems of annual flowers. You will learn how to prevent and/or control pest problems using integrated pest management techniques including the use of disease-resistant plant varieties, beneficial insects, cultural controls and, when necessary, selective use of pesticides. Many insect and disease problems can be avoided or controlled without chemical pesticides.

## **Prevention**

### **Site and Plant Selection**

Location of the flower bed will influence your choice of plants. Sun-loving varieties will not grow well in shade and shade-loving varieties will not grow well in sun. Soil drainage is critical. Annual flowers must have well-drained soils. They cannot tolerate extreme fluctuations in soil moisture that will stress the plants and make them more susceptible to insect and disease problems. If you

suspect poor drainage, elevate the bed with additional well-drained topsoil.

Many plant varieties have been bred for resistance to certain diseases and nematodes (microscopic roundworms that attack roots or foliage). Purchase vigorous plants from a reputable source. Select young plants with well-developed root systems, good color and strong stems. Your county extension agent has several publications that discuss site selection in more detail and annual plant varieties best suited for Georgia gardens.

### **Site Preparation**

Once the location and size of the flower bed have been selected, prepare the site properly before planting. If the bed is new, remove and compost any sod. Dig or till the soil at least 12 inches deep and make the bed wide enough to accommodate mature plants. Have the soil tested for pH and nutritional needs before planting. Your county extension agent can tell you how to collect a soil sample and will process it for a minimal fee. Soil analysis indicates what fertilizer amendments are needed. The pH level – acidity or alkalinity – of the soil may need adjusting with lime or sulfur. If soil drainage is a problem or if nematodes have been identified at the site, incorporate 4 inches of com-posted pine bark mulch into the bed to a depth of 12 inches. Adding this mulch improves soil drainage and aeration and helps prevent root diseases. It also appears to help reduce nematode problems. Avoid incorporating undecomposed mulch into the soil as an amendment because nutritional problems may occur.

Gently remove plants from their containers and use your hand to loosen the root ball. This encour-

ages new root growth. Pinch off blooming flowers to direct energy to the root system during establishment. When planting, make certain the top of the root ball is level with the soil surface. When spacing plants, keep in mind their size at maturity and leave enough room between plants for adequate air circulation when they are full size. This allows moisture on the foliage to dry quickly, reducing leaf spots and other diseases. Two to four inches of mulch such as pine bark or pine straw over the soil surface helps maintain soil moisture, reduces weed problems and prevents spread of pathogens by water-splash on bare soil.

## Water and Fertilizer

The most common disease problems of annual flowers are caused by over-watering. Soil should be moist to dry, not wet. Strong root systems are encouraged by two deep soakings per week instead of light frequent watering. Avoid overhead watering to keep flowers and foliage dry. Early morning watering (before 9 a.m.) is best so any moisture on the leaves will soon dry. Over-fertilization, including excess levels of certain elements such as nitrogen, can also cause plant stress and promote disease.

Table 1 lists some common fertilizers and suggested application rates. If you choose to use a slow-release fertilizer, follow the manufacturer's recommendations on the label.

**Table 1. Fertilizers for Annual Flower Beds**

Analysis	Pounds/100 sq. ft.
8-8-8	2.0
10-10-10	2.0
16-4-8	1.5
12-4-8	1.5

Broadcast fertilizer evenly over the bed and rake in lightly before planting. A liquid fertilizer applied at planting and at monthly intervals throughout the growing season is recommended.

## Working in the Flower Garden

Avoid working in the flower bed when plants are wet. Disease organisms are easily transported on clothing and hands in a thin film of water or by splashing water droplets. Bruising or otherwise injuring plants predisposes them to invasion by disease organisms and insects. Use sharp, clean tools.

Regularly remove plant debris and spent flower heads, which can harbor fungal spores and insect pests.

## Diagnosis and Control

A list of common symptoms of disease or insect injury on annual plants follows. This list is not comprehensive and you should consider other possible causes of damage. Examine damaged plants carefully; they most obvious symptom actually may be due to a secondary cause.

### Seedlings Die: Stems Blackened and Withered

*Possible Cause and Control:* Commonly called "damping off," this is due to infection by various fungi in the soil. Remove infected seedlings; they will not recover. Let the soil dry between waterings and provide good air circulation by not overcrowding plants in the bed. Make certain that the bed is well drained and do not over-water. Fungicides to reduce root disease are not practical or available for home landscapes.

### Wilting, Discoloration of Stem or Dieback

*Possible Causes and Control Options:*

**1. Not enough water** – Soil should be damp to the touch. If soil drains too quickly, add organic matter to help retain moisture. Adjust watering frequency as necessary.

**2. Root and/or stem rots** – (a) Excess soil moisture can stimulate soil pathogens that cause root and stem rots. Roots can no longer serve their water uptake functions and the plants wilt from lack of water. Remove infected plants; allow the soil to dry; improve drainage and adjust watering frequency. (b) Diseases not necessarily related to moisture can occur when a pathogen in the environment has access to a host plant via natural openings or wounds. Fungi or bacteria may be present in the soil, wind-blown, brought in on the plant, or spread by water-splash or dirty tools.

Follow "Plant Selection" and "Working in the Garden" suggestions to prevent introducing diseases in the flower bed. Remove infected plants and do not replant with annuals within the same plant family to prevent increasing pathogen populations on susceptible host plants.

**3. Insect** – First, make sure the insect is feeding on the plant! If it is actually feeding on another insect, it is probably beneficial and should be left alone. Insects feeding on stem tissue or depositing

eggs in plant stems can cause wilting, distorted growth and die-back. If insects are present and feeding on the plant, knock them into a jar of soapy water. Insecticidal soap can help control soft-bodied insects such as aphids; the spray must contact the insects to be effective. If a chemical insecticide is necessary, your county extension agent can recommend products for your particular problem. Occasionally, termites searching for a moist habitat will infest plant stems. If these or other borers have caused the damage, control measures will be too late by the time you notice the plant wilting. Remove affected plants, check stems and destroy any adults and/or larvae.

### Foliar Spots/Blotches

#### *Possible Causes and Control Options:*

**1. Fungal or bacterial infection** – Individual discolored spots may grow together to form larger blotches. Water spotted, angular spots with a yellow halo are characteristic of many bacterial leaf spots. Fungal leaf spots are characterized by tan to gray circular lesions that are often concentrated along leaf veins and margins. Most leaf spots caused by plant pathogens are not harmful unless the infection is severe. Moisture on foliage is necessary for development of most leaf spots. Avoid overhead watering; remove severely infected foliage to reduce the amount of fungal or bacterial inoculum available to reinfest the plant or nearby plants. Thin plants if necessary for good air circulation. Fungicides can reduce foliar fungal infections. Your county extension agent can recommend a product for your parti-

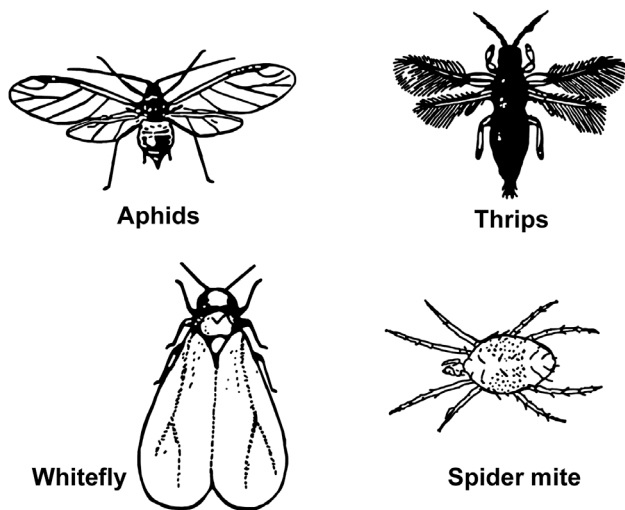


Figure 1. Common pest insects and mites with sucking mouthparts. (not to scale)

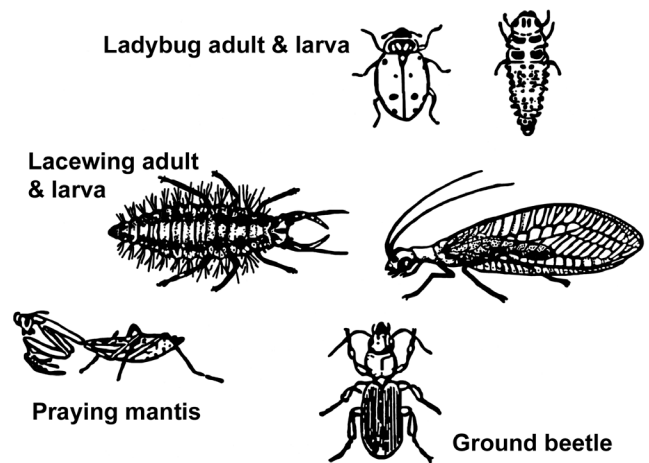


Figure 2. Some common beneficial insects in the home landscape and garden. (not to scale)

cular problem. Fungicides are not effective on bacterial infections.

**2. Virus** – Foliar symptoms may include light green/yellow mottling, yellow spots or light-colored concentric rings. Viruses can be seed-borne or transmitted via insects or infected tools. There is no chemical control for viruses. Choose resistant plant varieties, control insects with sucking mouthparts and disinfect pruning tools after use.

**3. Insect** – Yellowing or chlorotic stippling evident on upper leaf surface; poor vigor. Insects with sucking mouthparts such as aphids, whiteflies and leafhoppers feed on plant sap and excrete the excess as “honeydew,” which attracts ants and also serves as a nutrient source for black, powdery sooty mold (Figure 1). These insects can transmit viruses to susceptible plants and, in addition to chlorotic leaf spots, their feeding causes distorted foliage. Remove and destroy heavily-infested foliage. A strong stream of water directed to the infested area is effective for removing aphids from plants. If necessary, apply insecticidal soap to the infested area.

Learn to identify adult and immature lady beetles and other natural enemies as well as signs of beneficial insects at work, such as brown, bloated aphids that indicate the presence of parasitic wasps (Figure 2). Favorite host plants of sap-feeding insects include Hibiscus, Petunia and Nicotiana among others. Mites and thrips do not produce honey dew as they feed; their feeding damage does cause small chlorotic spots on leaves. Insecticidal soaps can be used to control these pests as well. Mites and thrips are tiny; the damage they cause is more noticeable than the organisms themselves.

**4. Over-watering or nutrient problem:** General chlorosis (foliage is light green to yellow). See “Water and Fertilizer” suggestions.

**Powdery White Coating on Foliage**

*Possible cause and control option:*

**Powdery mildew** – Infects many annuals including zinnias, snapdragons and pansies. Choose resistant varieties. Promote good air circulation, remove severely-infected foliage, and practice good sanitation. Fungicides labeled for control of this disease can help prevent infection of new growth.

**Waxy White Substance on Foliage**

**Mealybugs; wooly aphids** – These insects produce white, waxy filaments that cover and protect their bodies (Figure 3). As the materials accumulate, it may adhere to the plant. Control measures are the same as for insects causing foliar spots and blotches described above.

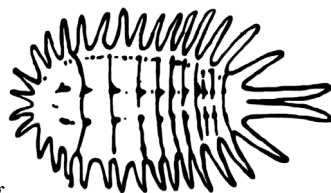


Figure 3. Mealybug

**Powdery Black Coating on Foliage**

*Cause and Control Options:*

**Sooty mold** – Sooty mold is a fungal growth on honeydew, a sugary substance excreted by some insects that feed on plant sap. To eliminate sooty mold, you must control these insects. Refer to “Insects” under “Foliar spots/blotches” for information.

**Gray Fungal Growth on Flowers; Drooping Flowers and/or Stalk**

*Possible Cause and Control Options:*

**Botrytis blight** – Botrytis blight is promoted by humid conditions and moisture on flowers. Remove infected flowers/stems. Improve air circulation and avoid wetting flowers and foliage.

**Distorted Growth; Buds Die**

*Possible Causes and Control Options:*

**1. Insect** – Feeding by aphids, thrips, plant bugs or mites can cause leaves to curl and wrinkle. Remove infested leaves or stems. Apply insecticidal soap.

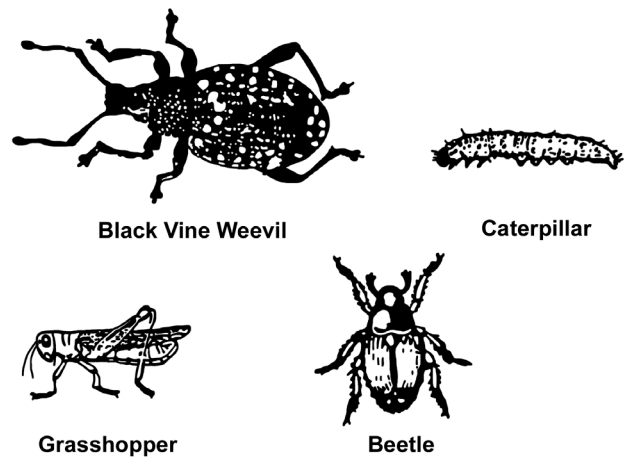


Figure 4. Common insect pests with chewing mouth parts.

**2. Chemical injury** – Applying a chemical product not labeled for use on a particular plant or at the wrong application rate can cause these symptoms. Chemicals do not necessarily have to be applied directly to the plant to cause damage; drift from materials applied to plants or turf in the vicinity can also injure sensitive plants. Use chemical pesticides only when absolutely necessary. Follow the Pesticide Precautions at the end of this publication. Water plants prior to application and only apply products during cooler times of the day when plants are not in direct sunlight.

**3. Virus** – If insects or chemicals are not the cause of damage, the plant may be infected with a virus. Symptoms of viral infections are variable and there are no remedies for viruses. Choose resistant varieties, control insects with sucking mouthparts (see “Insects” under “Foliar spots/blotches”), and keep tools clean.

**Foliage with Holes and/or Jagged Edges; Plants May Be Partially Defoliated**

*Possible Causes and Control Options:*

**1. Insect** – Feeding by insects with chewing mouthparts such as beetles, caterpillars, crickets or grasshoppers produce holes in leaves (Figure 4). Scouting for and hand picking caterpillars off plants will effectively reduce their populations. If this is not practical, products containing the bacterium *Bacillus thuringiensis* (Bt) are safe and effective. Different strains of Bt control specific insect pests. Some are formulated for control of caterpillars, others for control of beetles, mosquitoes or flies. Be sure to use the right product to control your particular pest problem. Beetles, including weevils, and grasshop-

pers are more difficult to catch and destroy because they can move quickly or they feed at night. Dust or liquid insecticides can help control these types of pests. Some plants are sensitive to these materials, so always check the label for complete information.

**2. Slugs or snails** – Snails and slugs are nocturnal. Clues to their presence include silvery slime trails on the ground and plants. They are susceptible to predation by birds, insects and small rodents. To

avoid dehydration, snails and slugs will seek shelter under boards or other protective cover. You can use these behavior to trap and destroy these pests under boards or flower pots. Snails and slugs will avoid crossing copper screen or banding. Metaldehyde baits are effective traps; place the bait under a board or pot. If the problem is severe enough to warrant pesticide use, apply a product labeled for control of snails and slugs.



**Slug**



**Snail**

Figure 5. Slugs and snails.

# Attention!

## Pesticide Precautions

1. It is the responsibility of the pesticide user to observe all directions, restrictions and precautions on pesticide labels. It is dangerous, wasteful and illegal to do otherwise.
2. Store all pesticides in original containers with labels intact and behind locked doors. **KEEP PESTICIDES OUT OF THE REACH OF CHILDREN.**
3. Use pesticides at correct label dosage and intervals to avoid illegal residues or injury to plants and animals.
4. Use pesticides carefully to avoid drift or contamination of non-target areas.
5. Surplus pesticides and containers should be disposed of in accordance with label instructions so contamination of water and other hazards will not result.
6. Follow directions on the pesticide label regarding restrictions as required by State or Federal Laws and Regulations.
7. Avoid any action that may threaten an endangered species or its habitat. Your county extension agent can inform you of endangered species in your area, help you identify them and, through the Fish and Wildlife Service Field Office, identify actions that may threaten endangered species or that habitat.

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