Identification and Control of Common Apple Diseases in Missouri

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This interactive guide is designed to help extension specialists, fruit growers and homeowners identify and determine control measures for apple diseases that commonly occur in Missouri. Not all apple diseases can be identified in this manner. You may need to send samples to a plant disease diagnostic lab for verification or identification.

Plant diseases can often be identified by their **symptoms** or **signs**. This guide uses these as a key to help identify apple diseases. Pictures of each disease are included to help users with identification.

Once the disease is identified, suggestions for both **non-chemical control** and **chemical control** measures are given where applicable. Because early season fungicide (a chemical used to control fungal plant diseases) sprays must be applied according to **bud stages**, photos are available to aid in spray timing.

To begin the process of identifying your apple disease, choose the affected plant area on the **Tree Diagram page** of this guide.

Text in blue or **bold** type indicates a link to another page or section in this guide. Click on the link to jump to that section or page. In addition, you may return to previous steps in the identification process by clicking one of the "Return to:" buttons at the bottom of each page.
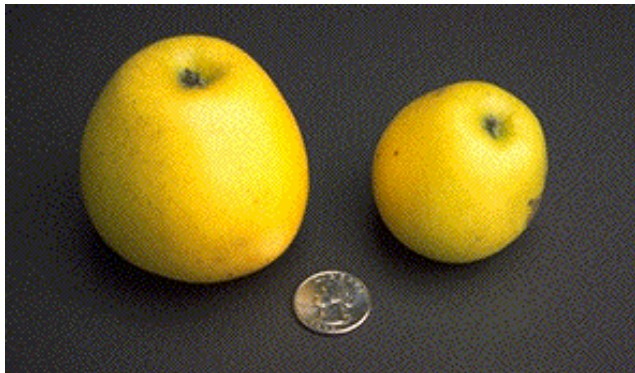
For more information on apple production, see the **MU publications listed here**.

Plant disease symptoms

   Plant disease symptoms are visual changes in the plant. Symptoms are grouped together in several broad categories. See the photos for examples. (Continued on **next page**.)

Abnormal increase in tissue.

Color changes.

Undersized fruit.

Wilting.

Plant disease symptoms, continued

Death of tissues.

Unusual organ development.

Disintegration of tissues.

Excessive gum formation.

Plant disease signs

A sign such as fungus on roots can show physical evidence that a plant pathogen is present.

This apple tree root shows signs of white root rot, a disease caused by a fungus.

Non-chemical plant disease control

Eradication:

1. Prune away infected plant parts.
2. Remove and destroy infected plant debris from under and around trees.

Resistant varieties:

Prima: Very resistant to apple scab; moderately resistant to fire blight; resistant to powdery mildew.

Priscilla: Very resistant to apple scab and cedar apple rust; resistant to fire blight; moderately resistant to powdery mildew.

Resistant varieties, continued:

Jonafree: Very resistant to apple scab; moderately resistant to cedar apple rust, fire blight and powdery mildew.

William's Pride: Very resistant to apple scab and cedar apple rust; resistant to fire blight and powdery mildew.

Liberty: Very resistant to apple scab and cedar apple rust; resistant to powdery mildew and fire blight.

For more information:

See MU publication
G06026, Disease-Resistant Apple Cultivars

Chemical control of plant diseases

Chemicals that control plant pest problems are called pesticides.

Fungicides control fungus growth. Because early season fungicide sprays must be applied according to bud stages, please see the **bud stage photos** in the next section to aid in spray timing.

Bactericides control bacterial infections.
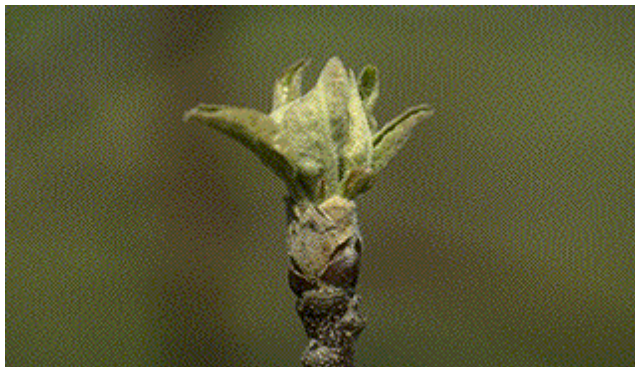
Nematicides control plant nematodes.

ALWAYS FOLLOW LABEL DIRECTIONS ON CONTAINER.

For more information:
G06010 Home Fruit Spray Schedules
MP0651 Fruit Tree Spray Guide: Missouri

Bud stages for early season fungicide applications

1. Half-inch green.

2. Tight cluster.

3. Pink.

Return to: ➡ **Main page**

Bud stage photos, continued:

4. Full pink, early bloom.

5. Bloom.

6. Petal fall.

Introduction:

MU publications with apple production information:

G06010 Home Fruit Spray Schedules
G06012 Fruit and Nut Cultivar Nursery Sources
G06020 Fire Blight
G06021 Home Fruit Production: Apples
G06022 Apple Varieties and Their Uses
G06024 The Vertical Axis System: A Training Method for Growing Apple Trees
G06026 Disease-Resistant Apple Cultivars
G07870 Cedar Apple Rust
MP0651 Fruit Tree Spray Guide: Missouri

Choose affected plant area

Blossoms
Fruit
Shoots
Leaves
Limbs and branches
Trunk
Crown or collar
Roots
Generally unhealthy trees

(click on a **symptom** to view a diagnosis)

Generally unhealthy trees

Unthrifty.

Poor terminal growth.

Trees stunted.

Foliage sparse, yellowing, may turn purple prematurely in fall.

Fruit tend to be small and may color early.

Trees may decline progressively over several years.

Probable root problem.

Occurs in low, wet areas.

Occurs in whole orchard, usually where apple trees have been replanted.
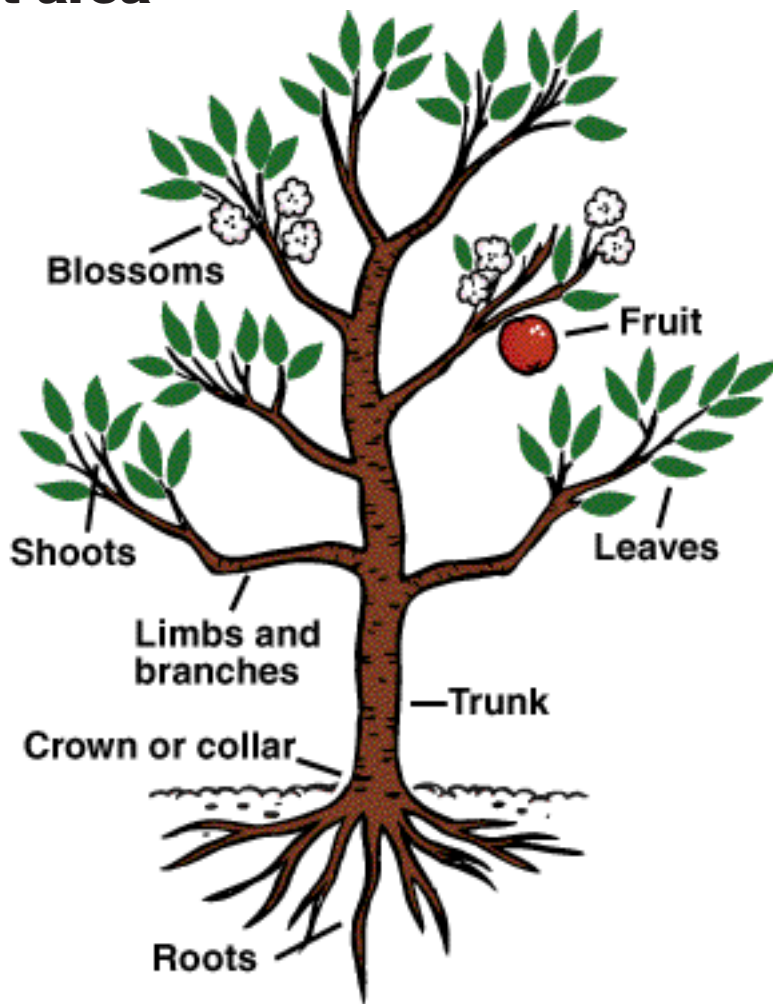
Symptoms:

(click on a **symptom** to view a diagnosis)

Trunk, crown, collar or root problem

No signs of fungus present

Appearance of fungus signs, such as:
White root rot
Black root rot

Symptoms on limbs or branches

Pimples
Cankers

Symptoms on blossoms

Blossoms dead or dying

Symptoms on shoots

Wilted, browning shoot; shepherd's crook at end

Symptoms on leaves

(click on a **symptom** to view a diagnosis)

Spots:

  Velvety olive-green to black.
  Yellow-orange to orange.
  Purple edge, tan center.

Yellowing.
White powdery covering.
Dark velvet covering.
Brown and/or dying.
Blisters.

Symptoms on fruit

(click on a **symptom** to view a diagnosis)

Fruit rotting:

> **Soft brown decay, gray fungus may develop.**
> **Light brown, soft watery rot.**
> **Red specks, turn purple, then dark brown, firm lesions.**
> **Sunken, brown lesions, may have red halo, V-shaped lesions.**
> **Red to light brown area rots around calyx (bottom) then dries.**

Dark, scabby places, cracked and fruit deformed.
Large orange-brown spot.
Olive-green blotches.
Colony of many tiny black dots.
Depression, hard tissue under skin.
Small brown spots, not rotten, especially on Jonathan being stored.
Net russeting.
Brown russet circling fruit.
Large, dark green, puckering on calyx (bottom).
Hard, glassy flesh, watery.
Purplish black spots at lenticels (small brown "freckles" distributed across the apple).
Fruit russetted.
Red to light brown area rots around calyx (bottom) then dries.
Hole in skin with brown sawdust-like material emerging.
White pimples.

Collar rot

Symptoms:

No signs of fungus present.

Cause:

Phytophthora

Non-chemical control:

- Use resistant root stocks.
- Raise graft above soil line at time of planting.
- Do not plant trees in low or wet areas.
- Have well drained soil.
- Make sure water does not collect around collar of tree.

Chemical control:

Treat with either:
- Aliette fungicide WDG (do not use on trees that will have fruit harvested in 12 months), or
- Ridomil 2 E.

ALWAYS FOLLOW LABEL DIRECTIONS ON CONTAINER

Apple replant disease

Symptoms:
- Generally unhealthy trees
- Occurs in whole orchard, usually where apple trees have been replanted

Cause:

Disease organisms remaining in soil

Control:
- Do not plant apple trees after apple trees.
- Sterilize soil.

White root rot

Symptoms:

- Root problem
- Appearance of fungus signs

Cause:

Scytinostroma galactinum

Control:

Sterilize soil.

Black root rot

Symptoms:
- Root problem
- Appearance of fungus signs

Cause:

Xylaria mali

Control:

None.

Fire blight canker

Symptoms:

- Cankers appear on limbs or branches

Cause:

Erwinia amylovora

Non-chemical control:

- Remove all wood from the tree within 12 inches of the infected area. Dispose of wood away from the orchard area.
- Use resistant varieties: Red Delicious, Prima, Sir Prize, Pristine, Goldrush or Liberty.

Chemical control:

Spray streptomycin at first bloom, repeat at 4- to 5-day intervals until petal fall.

ALWAYS FOLLOW LABEL DIRECTIONS ON CONTAINER

For more information:

G06026, Disease-Resistant Apple Cultivars

Measles

Symptoms:
    • Pimples on limbs or branches

Cause:
    Manganese toxicity

Control:
    Raise pH level with lime; work lime thoroughly into soil.

Necrotic leaf blotch

Symptoms:

- Yellowing of leaves

Cause:

Physiological

Control:

None

Powdery mildew on leaves

(See also **Powdery mildew on fruit**)

Symptoms:

White powdery covering on leaves

Cause:

Podosphaera leucotricha

Non-chemical control:

Use resistant varieties: Prima, Sir Prize, Pristine, Goldrush or Liberty.

Chemical control:

Spray with sulphur, Bayleton or Benlate. (Applications of sulphur above 85 degrees F may result in fruit injury.)

ALWAYS FOLLOW LABEL DIRECTIONS ON CONTAINER

For more information:

G06026, Disease-Resistant Apple Cultivars.

Shoot fire blight

Symptoms:
- Wilted, browning shoots, shepherd's crook on end
- Leaves brown and/or dying

Cause:

Erwinia amylovora

Non-chemical control:

Use resistant varieties: Red Delicious, Prima, Sir Prize, Pristine, Goldrush or Liberty.

Chemical control:

Spray streptomycin at first bloom, repeat at 4- to 5-day intervals until petal fall.
ALWAYS FOLLOW LABEL DIRECTIONS ON CONTAINER

For more information:

G06026, Disease-Resistant Apple Cultivars.

Blossom fire blight

Symptoms:

Blossoms dead or dying

Cause:

Erwinia amylovora

Non-chemical control:

Use resistant varieties such as Red Delicious.

Chemical control:

Spray streptomycin at first bloom, repeat at 4- to 5-day intervals until petal fall.

ALWAYS FOLLOW LABEL DIRECTIONS ON CONTAINER

Insect damage —
Leaf miner

Symptoms:
Blisters on leaves

Cause:
Leaf miner

Control:
Insecticide

For more information:
G06010, Home Fruit Spray
Schedules

Apple scab on fruit

(see also **Apple scab on leaves**)

Symptoms:

Dark, scabby places; cracked, fruit deformed

Cause:

Venturia inaequalis

Non-chemical control:

Use resistant varieties: Prima, Priscilla, Sir Prize, Jonafree, Red free, Dayton, Pristine, Goldrush, Enterprise or Liberty.

Chemical control:

Use fungicide such as Captan.
ALWAYS FOLLOW LABEL DIRECTIONS ON CONTAINER

For more information:

G06026, Disease-Resistant Apple Cultivars.

Apple scab on leaves

(see also **Apple scab on fruit**)

Symptoms:
- Dark velvet covering on leaves
- Velvety olive-green to black spots on leaves

Cause:
Venturia inaequalis

Non-chemical control:
Use resistant varieties: Prima, Priscilla, Sir Prize, Jonafree, Red free, Dayton, Pristine, Goldrush, Enterprise or Liberty.

Chemical control:
Use fungicide such as Captan.
ALWAYS FOLLOW LABEL DIRECTIONS ON CONTAINER

For more information:
G06026, Disease-Resistant Apple Cultivars.

Cedar apple rust on leaves

(see also **Cedar apple rust on fruit**)

Symptoms:

Yellow-orange to orange spots on leaves

Cause:

Gymnosporangium juniperi virginianae

Non-chemical control:

- Use resistant varieties: Red Delicious, Jonafree, Liberty or Red free.
- Remove galls from cedar trees within 2 to 3 miles (usually not practical).

Chemical control:

Use fungicide such as Ferbam. Begin spray applications at pink bud stage. Or, during early spring, monitor mature galls on cedars. Begin spray applications before rain causes gelatinous orange spikes (telia horns) to form.

ALWAYS FOLLOW LABEL DIRECTIONS ON CONTAINER

For more information:

G07870, Cedar Apple Rust.

Mature cedar apple rust galls on a cedar tree.

Cedar apple rust on fruit

(see also **Cedar apple rust on leaves**)

Symptoms:

Large orange-brown spot on fruit

Cause:

Gymnosporangium juniperi virginianae

Non-chemical control:

- Use resistant varieties: Red Delicious, Jonafree, Liberty or Red free.
- Remove galls from cedar trees within 2 to 3 miles (usually not practical).

Chemical control:

Use fungicide such as Ferbam. Begin spray applications at pink bud stage. Or, during early spring, monitor mature galls on cedars. Begin spray applications before rain causes gelatinous orange spikes (telia horns) to form.

ALWAYS FOLLOW LABEL DIRECTIONS ON CONTAINER

For more information:

G07870, Cedar Apple Rust.

Rain causes formation of cedar apple rust telia spikes on cedar trees.

Alternaria blotch

(see also **Frogeye leaf spot**)

Symptoms:

Leaf spots with purple edge, tan center

Cause:

Alternaria mali

Non-chemical control:

Recommended sanitation procedures:
• Destroy diseased shoots by pruning.
• Plow fallen leaves into the soil.

Chemical control:

Use fungicide such as Captan. Begin 2 to 3
weeks after petal fall.

ALWAYS FOLLOW LABEL DIRECTIONS ON CONTAINER

Frogeye leaf spot (black rot)

Symptoms:

Leaf spots with purple edge, tan center

Cause:

Botryosphaeria obtusa

Non-chemical control:

- Prune out dead wood in tree, mummified apples and shoots infected with fire blight.
- Remove piles of pruning from orchard and burn.

Chemical control:

Spray with fungicide such as Captan.

ALWAYS FOLLOW LABEL DIRECTIONS ON CONTAINER

Sooty blotch

Symptoms:

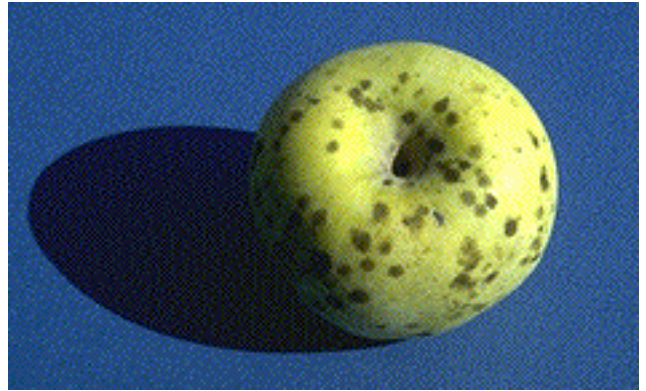Olive-green blotches on fruit

Cause:

Gloedes pomigena

Non-chemical control:

Proper pruning of trees and thinning of fruit is
important.

Chemical control:

Spray with fungicide, such as Captan or
Benlate, during summer.

ALWAYS FOLLOW LABEL DIRECTIONS ON CONTAINER

Brown rot

Symptoms:
- Fruit rotting
- Soft brown decay
- Gray fungus may develop

Cause:

Monilinia fructicola

Non-chemical control:
- Remove all dead limbs, fire blight strikes, cankers and mummies from trees.
- Remove debris from orchard.

Chemical control:

Use fungicide such as Captan.

ALWAYS FOLLOW LABEL DIRECTIONS ON CONTAINER

White rot (Bot rot)

Symptoms:

- Fruit rotting
- Light brown, soft, watery rot.

Cause:

Botryosphaeria dothidia

Non-chemical control:

- Remove all dead limbs, fire blight strikes, cankers and mummies from trees.
- Remove debris from orchard.

Chemical control:

Spray with fungicide such as Captan, Benlate or Topsin-M.

ALWAYS FOLLOW LABEL DIRECTIONS ON CONTAINER

Black rot

Symptoms:
- Fruit rotting
- Red specks turn purple, then dark brown
- Firm lesions

Cause:

Botryosphaeria obtusa

Non-chemical control:
- Remove all dead limbs, fire blight strikes, cankers and mummies from trees.
- Remove debris from orchard.

Chemical control:

Spray with fungicide such as Captan, Benlate or Topsin-M.

ALWAYS FOLLOW LABEL DIRECTIONS ON CONTAINER

Bitter rot

Symptoms:
- Fruit rotting
- Sunken, brown lesions
- May have red halo, V-shaped lesions

Cause:

Colletrotrichum gloeosporioides

Non-chemical control:
- Remove all dead limbs, fire blight strikes, cankers and mummies from trees.
- Remove debris from orchard.

Chemical control:

Use fungicide such as Captan.
ALWAYS FOLLOW LABEL DIRECTIONS ON CONTAINER
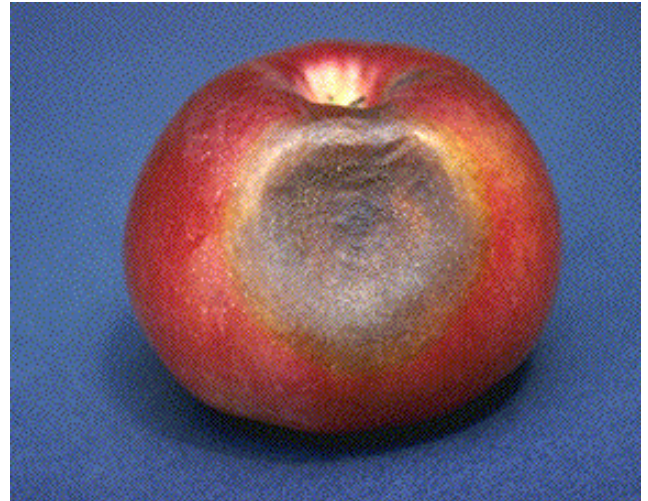
Cork spot

Symptoms:
Depression, hard tissue
under skin of fruit

Cause:
Calcium-related disorder

Control:
None

Fly speck

Symptoms:

Colony of many tiny black dots on fruit.

Cause:

Schizothyrium pomi

Non-chemical control:

Proper pruning of trees and thinning of fruit is important.

Chemical control:

Spraying with fungicide, such as Captan or Benlate, during summer.

ALWAYS FOLLOW LABEL DIRECTIONS ON CONTAINER

Johnathan spot

Symptoms:
- Small brown spots on fruit
- Not rotten, especially on Johnathan being stored

Cause:

Calcium-related disorder

Non-chemical control:

Proper harvest date, quick cooling, low temperature storage.

Chemical control:

None

Powdery mildew on fruit

(see also **Powdery mildew on leaves**)

Symptoms:

Net russeting on fruit

Cause:

Podosphaera leucotricha

Non-chemical control:

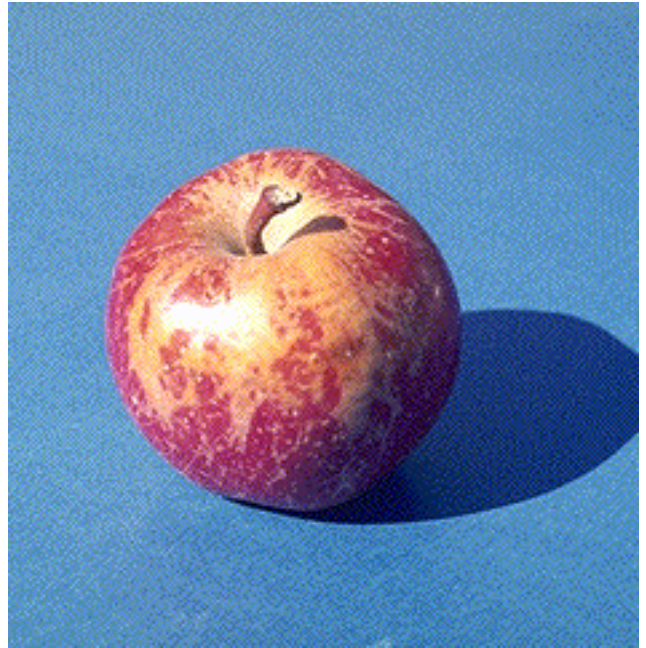Use resistant varieties: Prima, Sir Prize, Pristine, Goldrush or Liberty.

Chemical control:

Spray with sulphur, Bayleton or Benlate. (Applications of sulphur above 85 degrees F may result in fruit injury.)

ALWAYS FOLLOW LABEL DIRECTIONS ON CONTAINER

For more information:

G06026, Disease-Resistant Apple Cultivars.

Frost ring

Symptoms:
Brown russet circling fruit

Cause:
Spring frost injury

Control:
None

Quince rust

Symptoms:

Large, dark green puckering on calyx (bottom)

Cause:

Gymnosporangium clavipes

Non-chemical control:

- Use resistant varieties: Jonafree, Liberty or Red free.
- Remove galls from cedar trees within 2 to 3 miles (usually not practical).

Chemical control:

- Use fungicide such as Ferbam.
- Captan, Benlate and Topsin-M will not control this disease.
- Begin spray applications at pink bud stage through second cover.
  ALWAYS FOLLOW LABEL DIRECTIONS ON CONTAINER

For more information:

G06010, Home Fruit Spray Schedules.
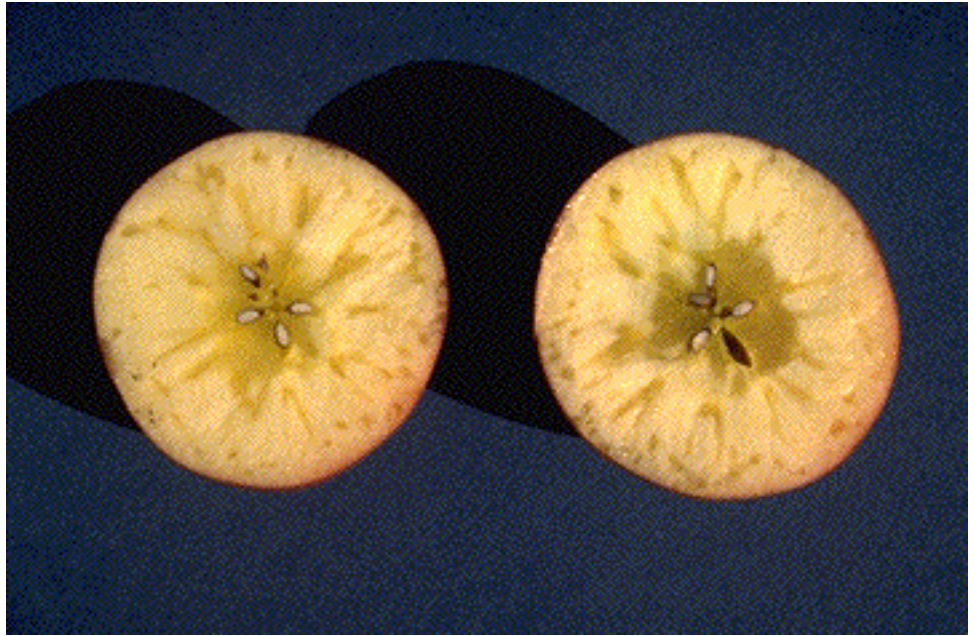MP0651, Fruit Tree Spray Guide: Missouri.

Water core

Symptoms:
Hard, glassy flesh; watery

Cause:
Physiological

Control:
Harvest early

Water core in a Johnathan apple.

Blister spot

Symptoms:

Purplish-black spots at lenticels (small brown "freckles" distributed across the apple)

Cause:

Pseudomonas syringae

Non-chemical control:

Choose a variety other than Mutsu (Crispin).

Chemical control:

- Use fixed copper in early season.
- Spray with Streptomycin.
- Occurs especially on Mutsu variety.

ALWAYS FOLLOW LABEL DIRECTIONS ON CONTAINER

Blossom-end rot

Symptoms:

Red to light brown area rots around calyx (bottom), then dries

Cause:

Botrytis cinerea

Control:

None

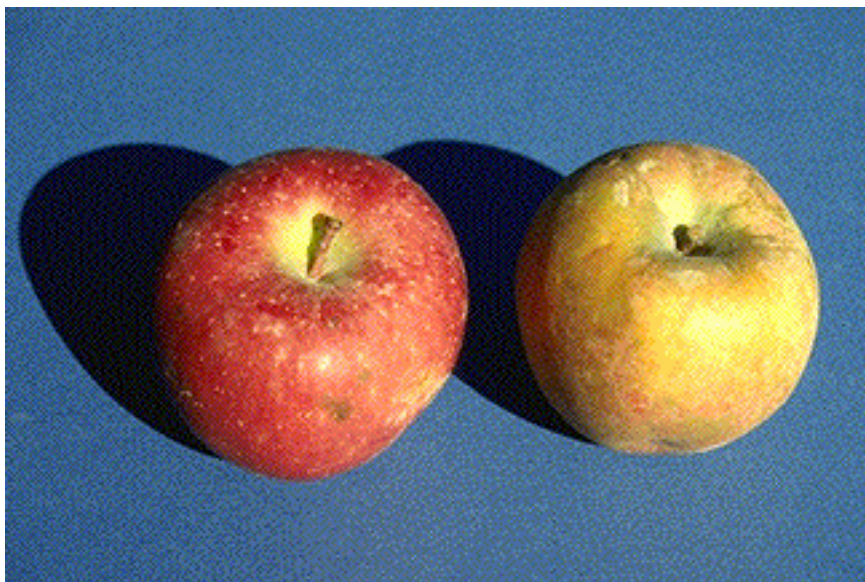# Chemical injury

Symptoms:

Fruit russeted

Cause:

Chemical injury or frost injury

Control:

None. Proper selection and/or timing of sprays help prevent this problem.

The apple on the right has severe chemical russet. The fruit on the left does not exhibit russeting.

Insect injury — codling moth

Symptoms:

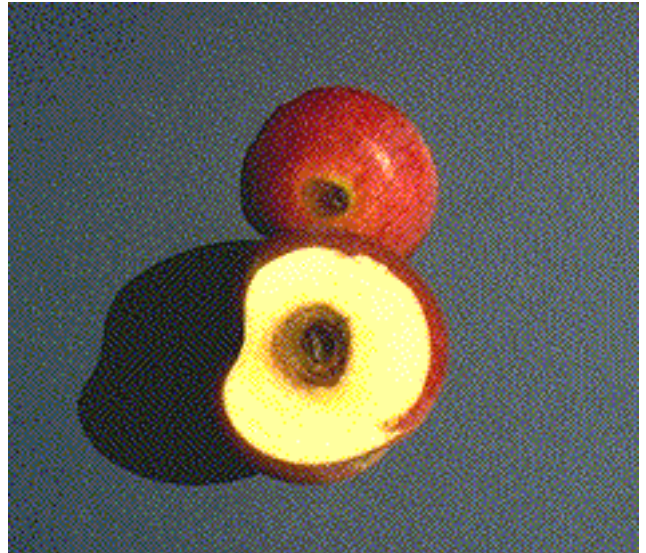Hole in skin with brown sawdust-like material emerging

Cause:

Codling moth

Control:

Insecticide

For more information:

G06010, Home Fruit Spray Schedules.

Insect injury — scale

Symptoms:

White pimples on fruit

Cause:

Scale insect

Chemical control:

- Insecticide spray such as Diazinon.
- Thorough spray coverage of fruit is essential.

ALWAYS FOLLOW LABEL DIRECTIONS ON CONTAINER

For more information:

G06010, Home Fruit Spray Schedules.
MP0651, Fruit Tree Spray Guide: Missouri.