

**APPLE**

APPLE

**PEAR**

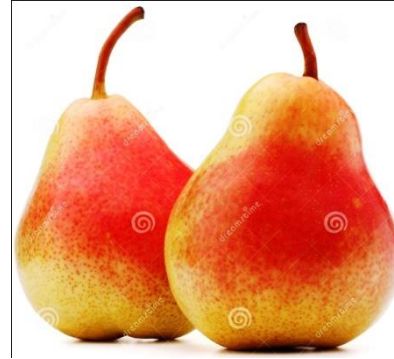
PEAR

**PLUM**

PLUM

**PEACH**

PEACH





**APPLE**



## Important diseases

1. White root rot : *Dematophora necatrix*
2. Collar rot : *Phytophthora cactorum*
3. Stem cankers : Many
4. Scab : *Venturia inaequalis*
5. Powdery mildew : *Podosphaera leucotricha*
6. Fruit rots : Many
7. Fire blight : *Erwinia amylovora*
8. Crown gall : *Agrobacterium tumefaciens*
9. Mosaic : *Apple mosaic virus*

## Stem cankers:

- a. Black canker : *Sphaeropsis malorum*
- b. Pink canker : *Corticium salmonicolor*
- c. Brown canker : *Botryosphaeria dothidea*
- d. Silver leaf canker : *Stereum purpureum*
- e. European canker : *Cylindrosporium mali*
- f. Nail head canker : *Nummularia discreta*
- g. Stem black : *Coniothecium chomatosporum*

## Fruit rots:

- a. Brown rot : *Sclerotinia fructigena*
- b. Soft rot : *Penicillium expansum*
- c. Bitter rot : *Glomerella cingulata*
- d. Whisker's rot : *Rhizopus arrhizus*
- e. Pink mould rot : *Trichothecium roseum*
- f. Core rot : *Alternaria alternata*

## White root rot / Root rot

Etiology : *Dematophora necatrix*

- The **mycelium** is hyaline, branched, septate .
- **Mycelial web** is seen on affected roots as mass of white strands.
- **Perithecia is in clusters**, globose, black and septate. **Asci** are cylindrical , long stalked, 8 spored (ascospores).
- **Conidia** are solitary, simple, ellipsoid hyaline to pale brown, 1-celled and smooth.

Symptoms:

- Trees gives a sickly appearance with **bronze coloured** leaves during August-September is the most important diagnostic symptom.
- It affects the plant parts under the soil and **causes rotting of roots.**

➤ Initially, **bark rots**.

➤ During rainy season white **mycelial growth** of fungus can be seen in the soil attached to roots.









## Management:

🍏 **Fumigation** on infected sites with formalin 3.0 % should be done before planting.

🍏 The basin of the tree is brought to a moisture level of 30 to 40 % and 15 to 20 cm deep holes at a distance of 30 cm are dug with the help of a crow bar all over the basin.

These **holes are closed** after filling with **Carbendazim** 0.1 % solution or **Aureofungin-sol**.

🍏 ***Trichoderma viride*** has been shown to reduce the incidence. **Soil solarization** by polyethylene trapping of the soil.

🍏 **Antagonistic bacteria like *Enterobacter aerogenes*** have also been found to protect the plants from *D. necatrix* upto 45 days.

## Collar rot

Etiology: *Phytophthora cactorum*

**Sporangia** are papillate, spherical or broadly ellipsoidal.

**Oospores** wall is hyaline and thick.

Symptoms:

- Production of **rough patches** on the stem around the **collar** or **crown** region of the tree at soil level, develops into **cankers**.
- Cankered area extend in lateral and vertical directions, results in girdling of the tree.
- Attacked trees have lighter foliage.

White root rot: primary symptoms start from finer roots and spread upwards up to collar region

Collar rot: primary infection is at the collar region which spreads downwards to the roots.



## Mode of spread and survival:

The pathogen survives as oospores in the soil.

## Epidemiology:

Soil temperature of 12 to 20°C with pH of 5 to 6.

## Management:

🍏 **Grafting** of rootstocks 30 cm above the ground level reduces initial infection.

🍏 **Painting the wounds** with **Copper** paints and **drenching** the area around the trees with fungicides like difolatan or **Mancozeb** or **Metalaxyl**.

🍏 Bacterial antagonists, *Enterobacter aerogenes*, *Bacillus subtilis* and fungal antagonist, *Trichoderma viride* reduces the incidence of the disease.

🍏 Use resistant root stocks like M2, M4, MM105, MM113 and MM114.

# Stem Cankers

## Black canker

It is also known as **black rot / die-back / smoky blight canker**.

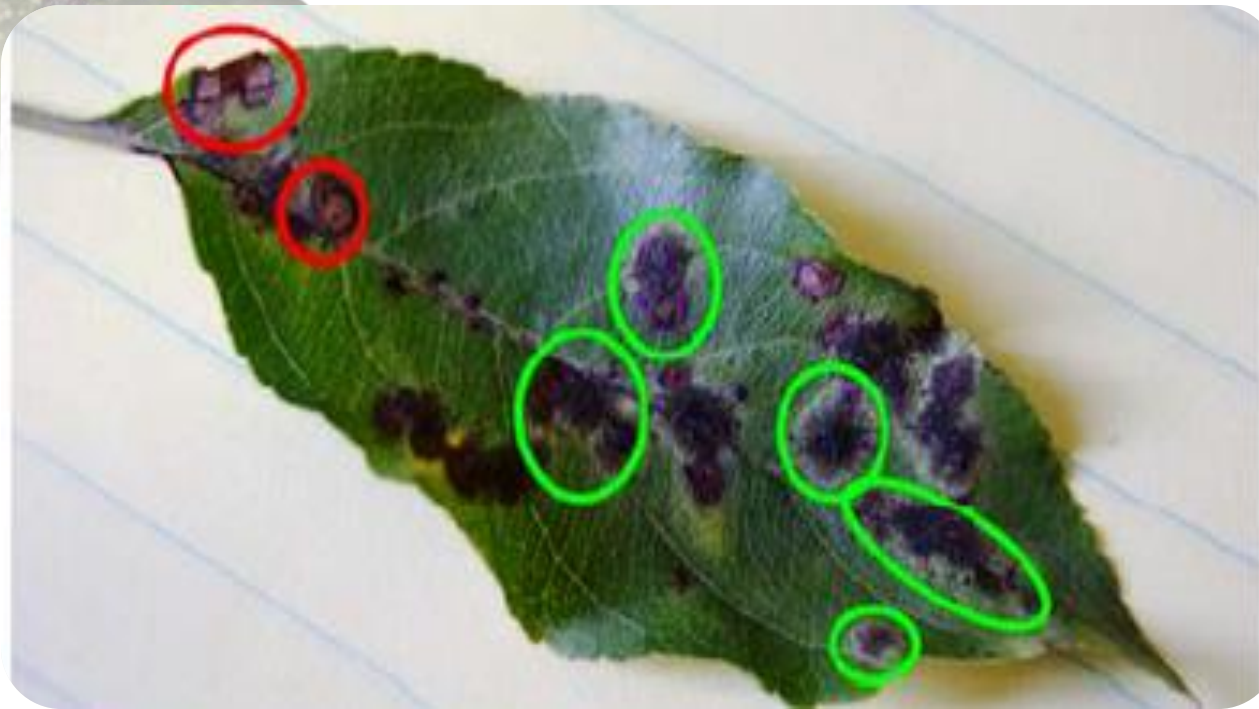
Etiology: *Sphaeropsis malorum*

- **Perithecial stage**: *Physalospora obtusa*
- **Mycelium** is branched, septate, hyaline at first and becomes later olivaceous to dark brown.
- **Pycnidia** are globose or sub-globose. **Conidia** are hyaline but becomes greenish-brown at maturity, ellipsoidal, pyriform or globose.
- **Ascospores** are produced inside the **Asci** within the perithecia.

## Symptoms:

- Three phases, *i.e.*, stem canker, leaf spot (frog eye leaf spot) and fruit rot (black rot).
- Canker phase is the most destructive. In this, reddish brown sunken lesions develop on trunk and branches.
- The lesions turn smoky with alternate rings.
- The wood below is stained reddish brown.
- Spurs, branches and twigs above the canker are killed.
- Numerous pimple-like protuberances appear over the bark of the blighted twigs or along the margins of the canker.

Mode of spread and survival: Survives in the form of dormant mycelium and fruiting structure in cankered, mummified fruits and on dead wood.





Epidemiology: RH > 75 % and a temperature of 20 to 22°C  
favour the disease development.

## Pink canker

Etiology: *Corticium salmonicolour* ( *Pellicularia salmonicolor* )

- The **mycelium** appears at first **silvery-white** with feathery or cottony margins, later the colour changes to pink, except at the margins which continue to remain white.
- Pathogen produces **pycnidia**.

Symptom:

- It appears on trunk and twigs and **causes canker, blight** and **die-back** symptom.
- Usually the lesions are sunken, dull brown in appearance with cob web like appearance.



## Silver leaf canker

Etiology: *Stereum purpureum* *Chondrostereum purpureum*

### Symptom:

- The foliage show **silvery metallic lusture** during the early stages.
- The fungus is present in the wood causes **histopathological** changes in the leaves, leading to **silvery appearances**.
- **Cankers** on branches appear as blistered areas.
- Outer layer of **bark peels** off and gives **paper bark** condition and the tissues underneath become **discoloured**.



## Management of Canker:

🍏 **Removal** and destruction of diseased plant parts.

🍏 Avoid mechanical injuries.

🍏 **Cut and remove** the cankered area and paint the wounds with **fungicidal paste**.

🍏 Balanced **fertilization**.

# *Nectria* canker in Apple



# Brown canker in Apple





# Nail head canker in Apple



# Scab

Most widespread disease of apple

## Etiology: *Venturia inaequalis*

- Mycelium is septate.
- The **ascospores are 2-celled**, yellowish with the upper cell shorter and somewhat wider than the lower cell.
- The **unequal size of the two cells gives the species name.**

## Symptoms:

- Commonly observed on leaves, fruits and rarely on shoots.
- In severe cases, petioles, pedicels and blossoms also exhibit **scab** symptoms.

➤ Lesion appear as **olivaceous spots** which turn dark brown to black.

➤ On leaves, lesions first **develop on the lower side**. Most of these lesions do not have a definite margin in contrast to those on the upper side of the leaf.





Apple Scab

Apple Scab



## Mode of spread and survival:

**Pseudothecia** formed in autumn and winter mature in spring to **produce ascospores**, the chief inoculum for **primary** infection. The **secondary spread** is through **conidia**.

## Epidemiology:

- **Cool and moist climatic** conditions due to rain or shower at higher elevations and in shady portions of the orchards are congenial for the development **of pseudothecia** in the overwintering leaves.

- Fungus starts producing **pseudothecia** even at low temperatures of **4 - 8°C**. but develop slowly throughout the winter, attain full size and mature at an **optimum temperature of 15°C**.

■ Prolonged dry weather during winter and spring does not allow normal **development of pseudothecia** and even the **ascospore** maturity gets delayed by a month or so.

### Management:

- 🍏 **Clean cultivation** and destruction of pruned materials.
- 🍏 Spraying of **Captan** 0.2 % or **Dodine** 0.25 % at short intervals after petal fall stage.
- 🍏 Single application of **Difolatan** 0.3 % at green bud stage followed by captan 0.2 % at petal fall stage.
- 🍏 If rains prevail during spring and summer, number of sprays have to be increased.
- 🍏 Use resistant varieties like **Emira** and **Red free** and hybrids like **Ambstarking, Ambroyal, Ambrich and Ambred.**



<b>Spray programme</b>	<b>Crop stage</b>	<b>Fungicide and dose</b>
1 <sup>st</sup> spray	Silver tip stage	Captafol 0.2% / Captan 0.3% / Mancozeb 0.4%
2 <sup>nd</sup> spray	Pink bud stage	Captan 0.2% / Mancozeb 0.3%
3 <sup>rd</sup> spray	Petal fall stage	Carbendazim 0.5%
4 <sup>th</sup> spray	After 10 days	Captan 0.2% / Mancozeb 0.3%
5 <sup>th</sup> spray	15 days after fruit set	Captafol 0.15%

## Powdery mildew

### Etiology: *Podospaera leucotricha*

- **Mycelium** is ectophytic. **Conidiophores** bear a long chain of hyaline, oval or ellipsoidal **conidia**.
- **Sexual stage- Cleistothecia-** dichotomously branched .
- **Asci -8 spores**

### Symptom:

- The disease appears soon after the buds develop into new leaves and shoots.
- Small patches of **white or grey powdery masses** on the under surface.
- **Twigs** also covered with **powdery mass**. Infected leaves turn brown from tip downward continued with partial **defoliation**.
- Fruits remains **small or deformed** with rough surface.





## Mode of spread and survival:

The fungus **overwinters** in the form of mycelium in diseased vegetative buds and fruits. **Secondary spread** is through **wind-borne conidia**

## Epidemiology:

The **conidial germination** takes place when air is saturated and the temperature is between **10 and 25°C**.

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## Management:

- 🍏 **Pruning** after shedding of leaves.
- 🍏 **Removal** and destruction of all diseased parts.
- 🍏 **Pre-bloom spray** of lime sulphur from the dormant stage, continuing at fortnightly intervals
- 🍏 **Dusting with powdered Sulphur** three times gives effective control. (New shoot stage, before blossoming, 40-50 days later)
- 🍏 Spraying with **Wettable sulphur** 0.2 %
- 🍏 Application of **Carbendazim** at the rate of 500 g/ha is also effective.
- 🍏 Use **resistant** varieties.

## Fruit rots

### Brown rot

Etiology: *Sclerotinia frunctigena*

Symptoms:

Fruits which may be attacked at any stage on the trees.

Fruits may **fall down** or dry.

**Mummified fruits** which remain on the trees.

Brown spots appear on the fruits. On these spots, yellow or buff coloured, **tiny pustules** develop.

These **cushiony pustules** are full of fungal spores.





## Mode of spread and survival:

The fungus overwinters in fruit mummies on the trees, in twig cankers and as **pseudosclerotia** in rotten fruits.

## Management:

Infected spurs and cankers should be pruned during summer.

Affected fruits should be collected and destroyed.

## Soft rot

Soft rot is responsible for major loss to apple in India

Etiology: *Penicillium expansum*

- **Conidia** are formed in chains. **Conidia are green or bluish green** in mass.
- They are elliptical or globose.

Symptoms:

- The rot in a fruit lot is indicated by a peculiar and **characteristic musty odour**.
- The rotted area of the fruit turns soft and watery, light or yellowish brown in colour.
- In lesions, the **skin becomes wrinkled in** a concentric manner.

- Spots start from stem-end of the fruit.
- Green fruits are not infected.
- Under humid conditions a bluish green sporulating growth appears which develops into minute black tufts of conidiophores.

### Mode of spread and survival:

- Spores are spread by air.
- Infection of the fruit usually takes place through wounds in the skin or through natural openings like lenticels.





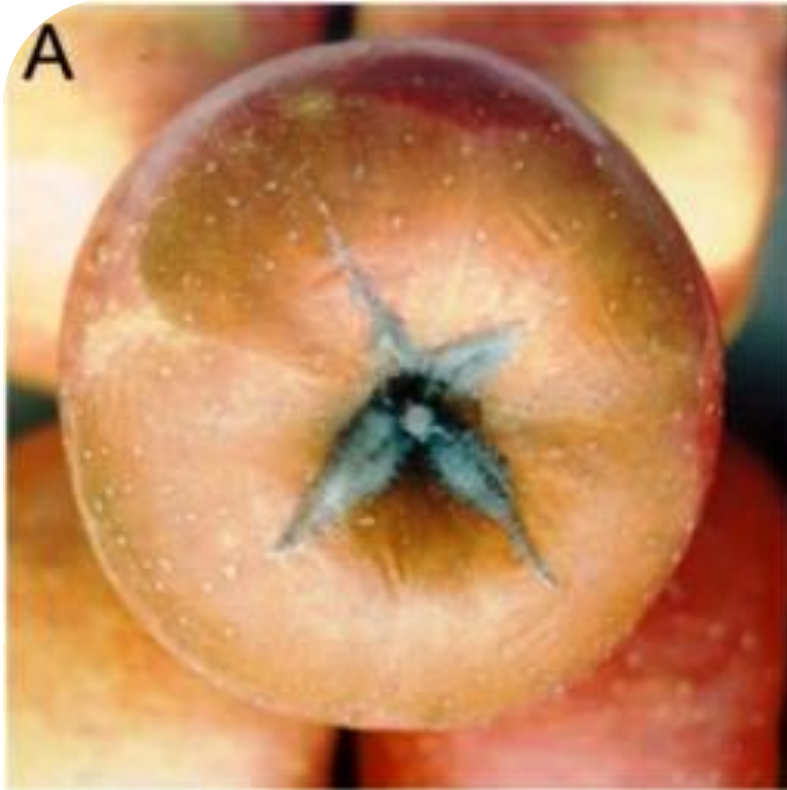
## Management:

- 🍏 Handle carefully to avoid wounds.
- 🍏 The fruits should be placed in **cold storage** after packing.
- 🍏 Sulphur dioxide fumigation by **Metabisulphite** is very effective in checking the deterioration of fruits.
- 🍏 Apples coated with **paraffin oil and pungent mustard oil** **withstand rotting**.
- 🍏 Fruits wrapped **with SOPP (Sodium Ortho Phenyl Phenate)** impregnated wrappers provided protection against the fungus.
- 🍏 Dipping fruits in **Diphenylamine** 1,000 ppm for 5 min or Aureofungin sol 500 ppm for 20 min provide maximum control of soft rot in apple.

# Bitter rot in Apple



# Whisker's rot in Apple





## Fire blight

### Etiology: *Erwinia amylovora*

- The bacterium is rod-shaped motile with peritrichous flagella.
- Bacterium usually single. Each bacterial cell is enclosed in a capsule.

### Symptom:

- The affected flowers become water-soaked, then shrivel rapidly, turn brownish to black and fall or remain hanging.
- Then the symptoms spread to the leaves, starting as brown to black blotches along the midrib and main veins or along the margins and between the veins.
- The leaves curl, shrivel, hang downward and usually cling to the curled, blighted twigs.

- Terminal twigs are usually infected and wilt from the tip downward. Leaves and bark turns brownish black, shrinks and hardens.
- From fruit spurs and terminals the symptoms progress down to the supporting branches, where they form cankers.
- The fruits becomes water-soaked, turns brown, shrivels, mummifies and finally turns black. Dead fruits cling to the tree for several months.
- Under humid conditions, droplets of a milky-coloured, sticky ooze may appear on the recently infected parts. The ooze turns brown soon after exposure to the air. The droplets coalesce to form large drops which may run off on plant parts.





A. R. Biggs



## Mode of spread and survival:

- The bacterium **overwinters** at the margin of cankers formed.
- They **survive in large branches**.
- **Flies, wasps, honey bees** and rain splashes spread the bacteria.
- Sucking insects like **aphids and leaf hoppers** act as inoculating agents.
- Young, tender twigs are infected by bacteria through their **lenticels, through wounds made by various agents**.

## Epidemiology:

Temperature above **24°C** and **heavy rain** favour infection and rapid spread of the disease.

## Management:

- 🍏 During winter all the blighted twigs, branches and cankers should be cut off 10 cm below the point of infection and burnt.
- 🍏 Cutting of blighted areas 30 cm below the point of infection in summer reduces the inoculum.
- 🍏 The tools should be disinfested properly.
- 🍏 Bordeaux mixture / Streptomycin 550 to 100 ppm are the effective blossom sprays.
- 🍏 Four sprayings of streptomycin should be applied.
- 🍏 Best insect control should be followed.
- 🍏 Resistant varieties should be planted in new areas.

## Crown gall

Etiology: *Agrobacterium tumefaciens*

It is a Gram-negative, rod.

Symptom:

- Small outgrowth appears on the stem and roots.
- At the young stage, the galls are soft Spherical, white or flesh coloured.
- The galls are hard and corky on woody stems.
- They are generally knobby and knotty and become more cleft, as they grow older.
- The affected plants are stunted with chlorotic leaves.





Mode of spread and, survival:

The bacterium is soil-borne.

Management:

🍏 Crop sanitation is necessary.

🍏 Avoid the introduction of infected material in the nursery stocks.

# Mosaic

Etiology: *Apple mosaic virus* (ApMV)

The virus particles are isometric.

Symptoms:

➤ Symptoms include mottling of leaves with small irregular creamy white or yellow spots which may coalesce to form large chlorotic tissue.

➤ The mottling may take the form of a light and dark green patches.

Mode of spread and survival:

It is transmitted by natural root grafting, budding and tap root grafting.

It is possibly transmitted by pollen to the pollinated plant.



## Management:

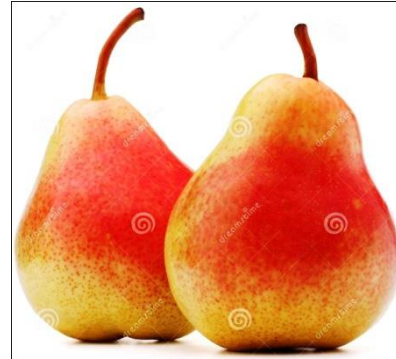
🍏 It is possible to cure infected budding by exposing them to a temperature of 36°C for about 4 weeks.

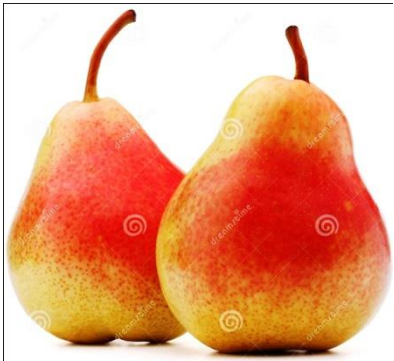
🍏 Apple mosaic virus is inactivated in seedlings maintained at 37 and 40°C for 27 and 20 days respectively.

PEAR

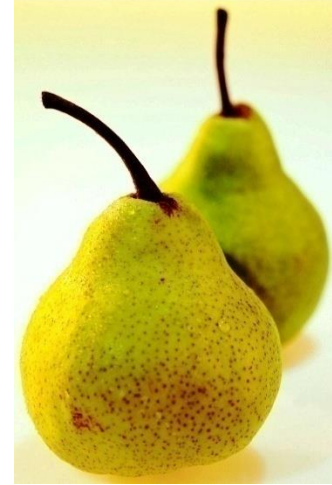
PLUM

PEACH





# PEAR



## Important diseases of Pear

Leaf Blight and Fruit Spot : *Fabraea maculata*  
(*Entomosporium maculatum*)

Leaf spot diseases : *Mycosphaerella chaubattiensis*

Scab : *Venturia pirina*

Rust : *Gymnosporangium sabiniae*

Fruit decay : *Botrytis cinerea*, *Cytospora amoiens*,  
*Glomerella cingulata*, *Monilinia fructigena*,  
*Penicillium expansum*

Fire Blight : *Erwinia amylovora*

Mosaic : Virus

## Leaf blight and Fruit spot in Pear

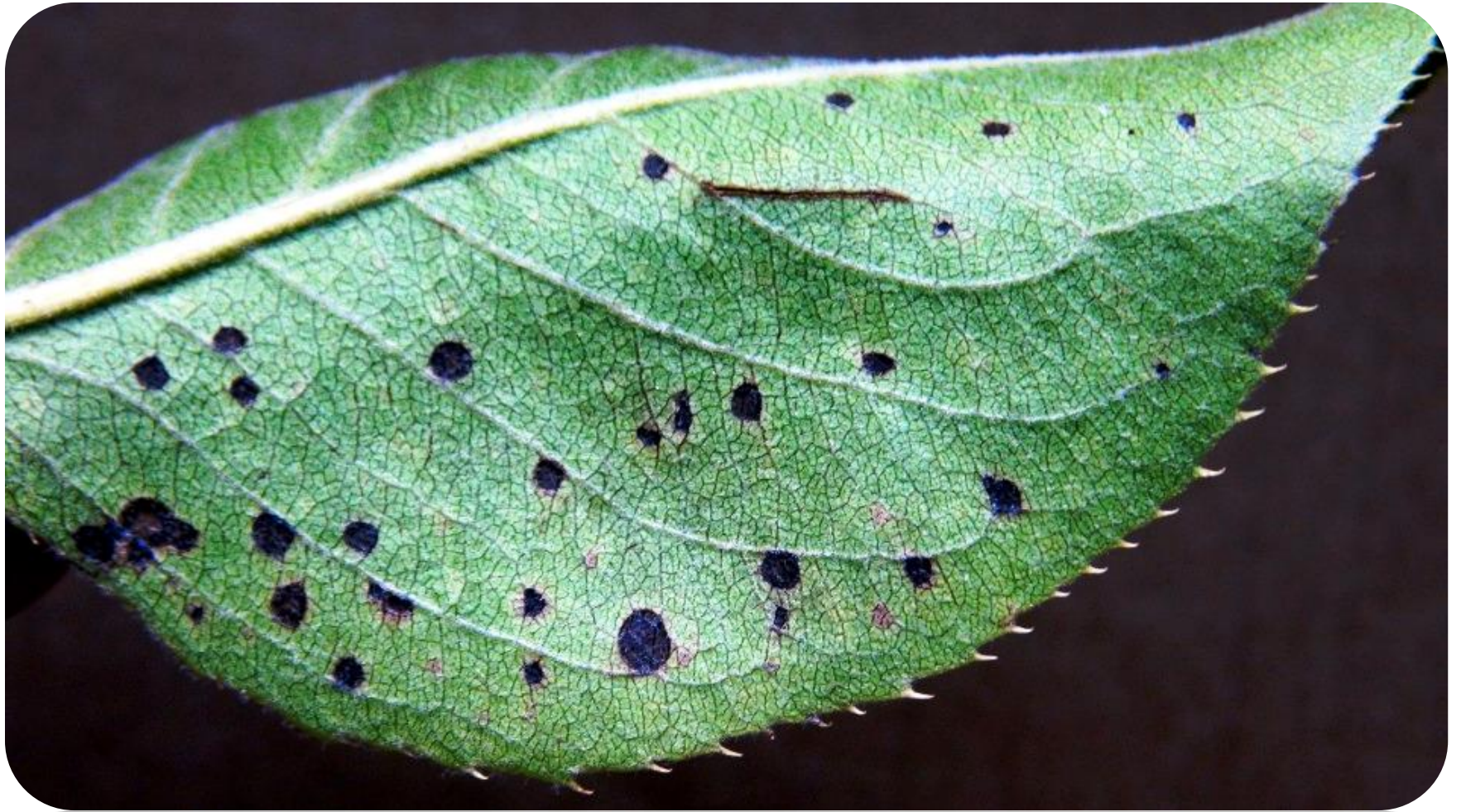
Etiology: *Fabraea maculata*

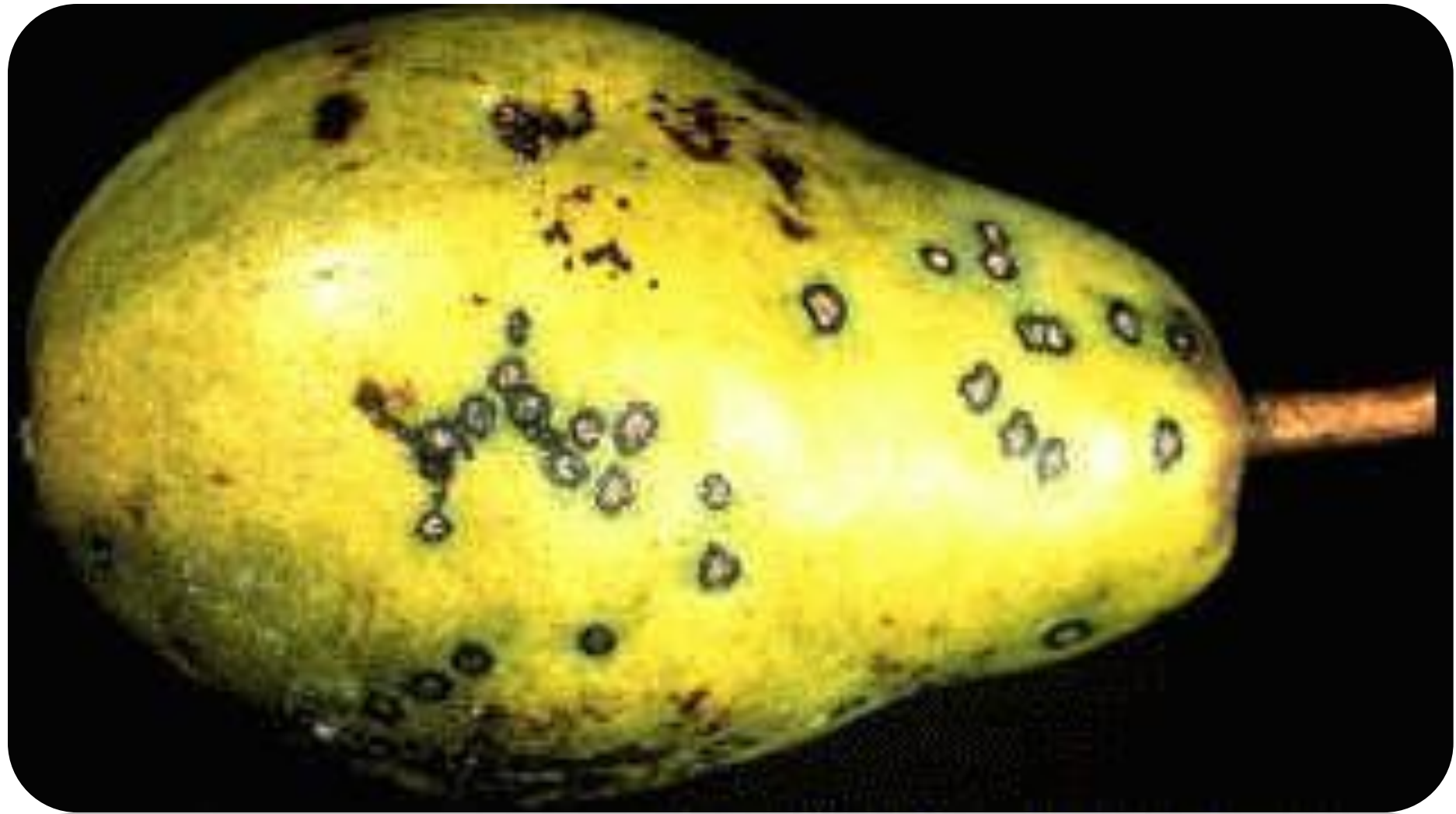
(Imperfect stage: *Entomosporium maculatum* Lev)

Symptom:

- It attacks the leaves, fruits and shoots.
- Circular, dark brown or deep purple spots appear on leaves.
- Intense spotting causes shedding of leaves. Black and slightly sunken spots are produced on the fruits.
- Cracking of fruit is noticed in severe cases.







### Mode of spread and survival:

Primary infection comes more from conidia produced in twig lesions than from ascospores shot from fallen leaves.

### Managment:

🍏 Spraying with ferbam 0.2 % effectively controls the disease.

## Leaf spot in Pear

Etiology: *Mycosphaerella chaubattiensis*

Symptom:

Necrotic spots seen on the leaves which leads to premature defoliation.



## Rust in Pear

Etiology: *Gymnosporangium sabinae*

Symptom: Rusty pustules which leads to severe defoliation. Alternate host – *Juniper sabiana*

Management:

- 🍏 Removal of alternate hosts within 150 m



## Scab in Pear

Etiology: *Venturia pirina*

Symptom: As like Apple scab.



## Fruit decay in Pear

### Etiology:

*Botrytis cinerea*


*Cytosporam & tens*

*Glomerella cingulata*

*Monilinia fructigena*

*Penicillium expansum*

### Management:

 Pre harvest spray with carbendazim and post-harvest dipping of fruits in vincozoline or storage of fruits at 6°C are the recommended measures for the control of fruit decay.

## Bitter Rot in Pear

Etiology: *Glomerella cingulata*

Symptoms:

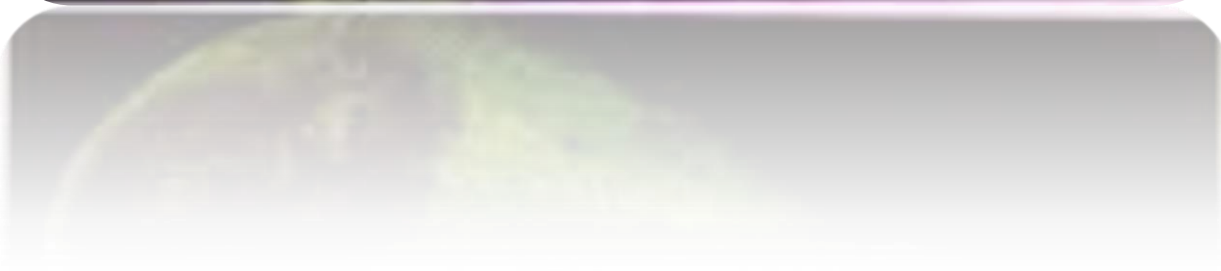
- Infection is characterized by a firm rot which forms a circular light brown spot.
- Then spots become almost black and have a saucer-shaped depression.

Mode of spread and survival:

The organism overwinters in decayed fruit and in cracks on the old bark. A broken limb or twig will serve as an overwintering site.

Epidemiology: A temperature of 29<sup>0</sup>C and light rain favor development of the rot.





## Management:

🍏 Good sanitation will help to reduce losses from this disease.

🍏 Remove all broken limbs and decayed fruit.

## Black Rot in Pear

Etiology: *Physalospora obtusa*

### Symptoms:

- Black rot is a firm-textured rot.
- Infection generally takes place at the blossom end of the fruit as it reaches maturity.
- The spot at first is light brown but darkens with age. A circle of raised dark pustules are formed in the center of the spot.



## Mode of spread and survival:

The organism overwinters in cankers, decayed fruit, and dead wood. In the spring spores are formed in the cankers.

Epidemiology: A temperature of 27<sup>0</sup>C and rainfall encourage disease development.

## Management:

🍏 Sanitation is one of the more important means of control.

🍏 Remove all dead twigs, limbs, and decayed fruit.

🍏 Fungicides must be applied when the fruit is beginning to expand in the spring.



**Blue mould**  
in Pear

Etiology: *Penicillium expansum*

## Fire Blight in Pear

Etiology: *Erwinia amylovora*. Rod shaped, motile with peritrichous flagella. Each bacterial cell is enclosed in a capsule.

### Symptoms:

- The bacterium overwinters at the margins of the cankers formed on twigs and branches in the previous season.
- Active bacteria are in the healthy tissue next to the cankered tissues.
- In the spring the bacteria begin to multiply. As the bacterium increases, ooze is formed at the margin of the canker.

- Insects are attracted to the ooze and it is carried to the open blossoms.
- Once bacteria enter a blossom, the blossoms are blighted within 7-10 days.
- After blossom infection, bacteria spread into the fruit peduncle and finally into the twig.







## Mode of spread and survival:

During periods of high humidity, the bacteria can enter into young leaves. Splashing rain can also spread the bacterium.

## Management:

- 🍏 Maintain balanced fertilizer level.
- 🍏 Do not use excess levels of nitrogen.
- 🍏 Remove over wintering bacteria cankers by pruning.
- 🍏 Make pruning cuts 8 to 12 inches below visible sign of disease.
- 🍏 Prune during dormant months.
- 🍏 Summer pruning may encourage tender succulent growth which is more susceptible to disease.

## Mosaic in Pear

Etiology: *Pear mosaic virus*

Symptom:

- Mottle, chlorotic spots or rings, feathery oak leaf pattern.
- Transmissible through wedge grafting





# PLUM



## Important diseases of Plum

- Wilt : *Verticillium albo-atrum*  
Brown Rot : *Monilinia fructicola*  
Leaf curl : *Taphrina deformans*  
Bacterial Canker : *Pseudomonas syringae*  
Bacterial Spot : *Xanthomonas campestris pv. pruni*  
Plum mosaic : *Plum line pattern virus*  
Creamy-white spot : *Creamy-white spot virus*

## Brown Rot in Plum

Etiology: *Monilinia fructicola*

### Symptoms:

- This fungus can cause blossom blight or fruit rot.
- Infected blossoms are brown and water-soaked.
- The fungus grows down the pedicel into the stem which may cause twig dieback.
- Diseased blossoms and fruit generally become covered with "tufts" of brown fungal material.



## Epidemiology:

Fruit infection usually occurs near maturity. Surface moisture and moderately warm temperatures encourage its development.

## Mode of spread and survival:

Fruit damaged by wind, hail, insects, or mechanical means is more susceptible to this organism.

The fungal organism overwinters in mummies, stem cankers and old fruit peduncles.

## Management:

 Repeated fungicide applications and sanitation.

# Bacterial canker / Bacterial gummosis

in Plum

Etiology: *Pseudomonas syringae*

Symptoms:

- Cankers develop at the base of infected buds on trunk and scaffold limbs.
- Cankers spread more rapidly above the point of infection. This results in a long, narrow canker.
- Cankers develop during the rain fall and winter but are not visible until late winter and early spring.
- Damaged areas are slightly sunken and somewhat darker in color than surrounding bark.
- After the dormancy in the spring, gum flows down the outside of the tree.
- Cankers have a soured smell.



➤ The bacterium is a weak pathogen and causes serious damage only when a tree is in a near dormant condition or weakened due to unfavorable growing conditions.

### Management:

🍇 Avoid using high fertilizer rates in late summer. Prune when trees are fully dormant (January and February).

🍇 Trees showing signs of bacterial canker should be left and pruned after all other trees have been completed to avoid spread and contamination.



## Bacterial Spot in Plum

Etiology: *Xanthomonas campestris pv. pruni*

Symptoms:

- Symptoms are observed first as small, irregularly shaped lesions.
- The spots are pale green in contrast to the dark green surrounding tissue.
- Angular lesions are formed, surrounded by a halo of lighter colored tissue.
- The inner portion of the lesion turns black and drops out.
- This gives the leaf a "ragged" or "shot hole" appearance. Leaves heavily infected with bacterial spot turn yellow and fall.

➤ Leaf spots are concentrated toward the distal end of the leaf.

➤ Fruit infection is not as common. In fruit small spots may develop , gum may flow from these spots.

➤ When it occurs, small spots develop and gum may flow from these spots.

The bacterium overwinters on infected twigs.





## Management:

- 🍇 Chemical control is not highly effective.
- 🍇 Early and late dormant copper sprays will aid in control.
- 🍇 Optimum nutrition is also important.



# PEACH



## Important diseases of Peach

Leaf curl : *Taphrina deformans*

Rust : *Puccinia pruni-spinosae*

Scab : *Venturia carpophila*

Powdery mildew : *Sphaerotheca pannosa*



## Leaf curl in Peach

Etiology: *Taphrina deformans*

Mycelium is intercellular and it **does not produce ascocarp. But asci are produced individually. Each ascus bears 8 ascospores.**

Symptoms:

- Appears in the early spring as the leaves begin to unfold. The leaf blade thickens, puckers and curls.
- Changes to yellow and finally to a reddish purple tint.
- The reddish velvety surface covered with a whitish grey bloom of fungus.
- Both the leaves and petioles may curl.
- Affected leaves die and drop prematurely.

- Twigs become pale green to yellow, swollen, stunted and exude gummy material.
- Flowers and fruits are also infected and drop prematurely.





ISU Plant Disease Clinic



[www.annettemcfarlane.com](http://www.annettemcfarlane.com)

## Mode of spread and survival:

It is considered that the disease is carried over to next season by perennial mycelium on the twigs or as conidia. The conidia remains viable on the twigs for two or more years.

## Epidemiology:

The disease is prevalent in areas where cool mist spring weather prevails and the dry hot weather hastens defoliation.

## Management:

🍅🍆 Removal and burning of infected shoots reduce the spread of the disease.

🍅🍆 A dormant spray with Bordeaux mixture with an adhesive and a winter spray with Bordeaux mixture 1.2 % before bud burst, control the disease.

## Rust in Peach

Etiology: *Puccinia pruni-spinosae*

The uredia are hypophyllous and cinnamon brown. The uredospores are obclavate.

Symptoms:

- Pale yellow spots appear on both the surfaces of leaves. Later the spots become bright yellow.
- On the under surface numerous brown dusty pustules are seen.
- They may be scattered and cover the entire under surface of the leaf.
- When the leaves are severely infected defoliation occurs.
- The fruit is rarely attacked.








### Mode of spread and survival:

The fungus persists as a perennial mycelium in the underground stems of *Anemone* plant. The ascidia produced on this plant during spring infect peach leaves.

### Management:

 Removal of alternate host and spraying with zineb 0.2 % or dusting with sulphur is effective.

## Powdery mildew in Peach

Etiology: *Sphaerotheca pannosa*

Mycelium is white, septate, ectophytic. Conidiopores are short and erect, single celled. Cleistothecia are with myceloid appendages.

Symptom:

- The fungus attacks leaves, young shoots and fruits.
- The young leaves are coated with a thick layer of mycelium. They become narrow and curled.
- White patches appears.
- Terminal portion of the growing shoot may get covered by a white, powdery layer.
- White, round spots develop on fruits and turn pinkish and finally dark brown. Epicarp of the fruit becomes leathery and hard.





### Mode of spread and survival:

The fungus lives in buds. Wind-borne conidia cause secondary infections. The optimum temperature for germination of conidia 21 - 27°C.

### Management:

🍌 Spraying with sulphur compounds.