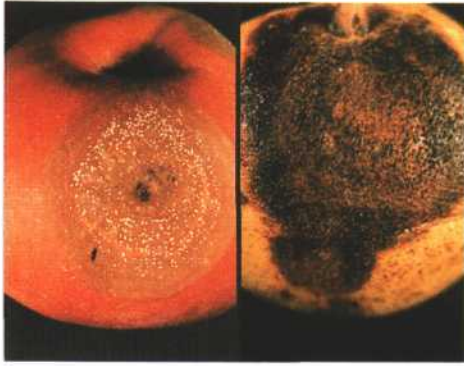
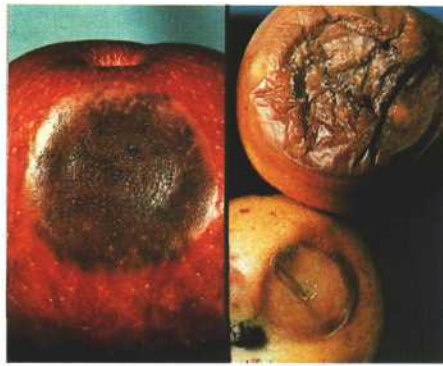


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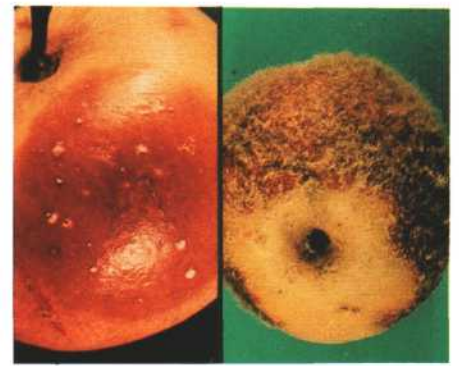
APPLE DISEASES I



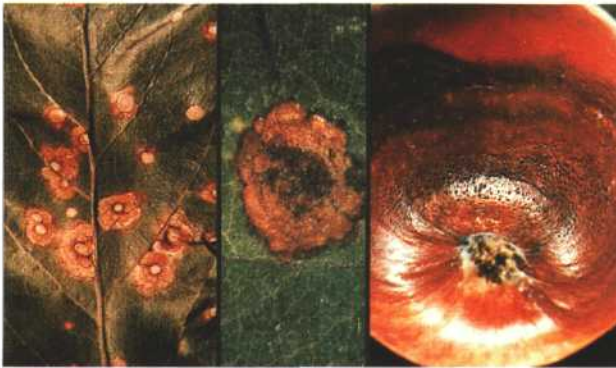
1. Northwestern anthracnose or bull's-eye rot



2. Bitter rot



3. Botrytis rot



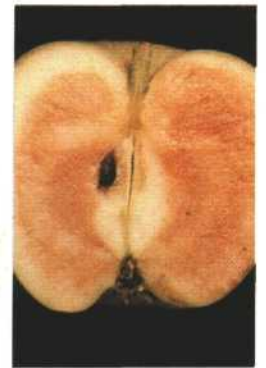
4. Black rot or frog-eye leaf spot



5. Sooty blotch and flyspeck



6. Soft rot or blue mold rot



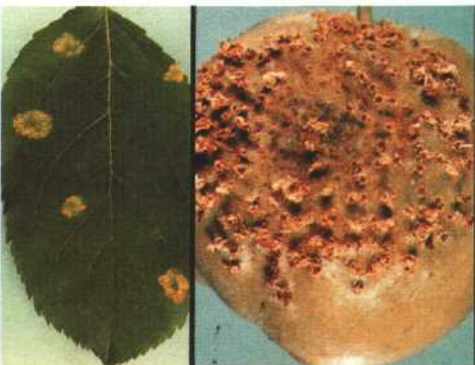
7. Internal breakdown



8. Apple scab



9. Soft scald



10. Cedar-apple rust



Quince rust



11. Nectria canker

APPLE DISEASES I

1. **Northwestern anthracnose or bull's-eye rot**, caused by the fungus *Neofabraea malicorticis*, is a rot primarily of stored fruit and a branch canker disease found mostly in northern areas (chiefly the Pacific Northwest) with a heavy autumn rainfall. The centers of the concave fruit lesions are light brown with a dark brown margin. Later, two or more concentric rings, alternating tan and brown, give a bull's-eye appearance to the rot. Enlarging, elliptical, dark sunken cankers with concentric rings, form in the younger branches. The causal fungus, which can only invade injured tissue, overseasons in cankered limbs and fruit.

2. **Bitter rot** is a fairly firm rot that starts as a small, circular, light brown spot which enlarges rapidly, darkens, and eventually turns almost black. Characteristic of this rot is the saucer-shaped depression in the center and later the concentric rings of tan fungus fruiting structures that form inside the spot. The bitter rot fungus, *Glomerella cingulata*, attacks a wide range of woody plants during warm moist weather in the southern two-thirds of the United States. The source of most infections are mummified fruit and broken limbs.

3. **Botrytis rot** is fairly common on injured mature fruit. The causal fungus, *Botrytis cinerea*, attacks a wide range of plants in cool damp weather. Characteristic of this disease is (1) a small, quarter- to half-inch, somewhat sunken, shallow dry rot at the blossom end of the fruit, (2) a moldy core rot, and (3) a tan-to-medium brown rot covered by a dense, tan-to-gray mold that forms under damp conditions. The fungus overseasons in plant debris.

4. **Black rot or frog-eye leaf spot** is caused by the fungus *Physalospora obtusa*, which infects the leaves, fruits and wood. Small purple specks on the leaves enlarge to form round to angular spots with a dark margin and brown or yellowish-brown centers (called frog-eyes). Twig, limb and trunk cankers are slightly sunken and reddish brown. Some cankers enlarge each year until they cover several feet. The canker margins are lobed. Diseased fruit develop a brown-to-black rot containing alternating light and dark bands. Such fruit often shrivel into black "mummies" that hang in a tree overwinter. The black rot fungus overwinters in mummified fruit and dead wood.

5. **Sooty blotch and flyspeck** normally occur together on the same fruit. Sooty blotch is caused by the fungus *Gloeodes pomigena*; flyspeck by the fungus *Microthyriella rubi*. Sooty blotch gives a superficial smudgy appearance to affected fruit due to large numbers of minute, black fungus structures (pycnidia) connected by thread-like hyphae. Flyspeck consists of shiny, black dots in groups of 10 to 50 that resemble true flyspecks. Both fungi are superficial and can be removed by vigorous rubbings. They overwinter on the twigs of many woody plants.

6. **Soft rot or blue mold rot** is the most common storage rot. This soft to watery, tan-to-brown or gray rot is most prevalent in fruit with a bruised or broken skin handled roughly at harvest time and later. When humidity is high, gray-to-bright blue cushion-like structures form on the surface of the rot. The primary cause of soft rot is the fungus *Penicillium expansum*.

7. **Internal breakdown** characterizes the gradual transition from the normal to the senescent fruit; the end of normal storage life. The fruit flesh becomes off-white to yellow, then brown and mealy. In advanced stages, the skin is also discolored and the flesh slowly softens. Large apples, late picking, delayed cooling, and high storage temperatures are primary factors that lead to early breakdown. It commonly follows water core and freezing and may be associated with a very low calcium and/or phosphorus status in the tree.

8. **Apple scab** occurs wherever apples and crabapples are grown. Scab infects primarily the leaves and fruit. Velvety, green-to-brown spots, that blacken with age, appear on the leaf. Infection causes the leaves to drop early greatly weakening the tree. Fruit infections resem-

ble leaf infections when young; later becoming brownish-black and corky. Early fruit infections give the fruits a scabby, knotty, misshapen appearance. Such fruit commonly crack and drop early. Small, rough, black, circular, lesions may develop on stored fruit. The scab fungus, *Venturia inaequalis*, overwinters in dead leaves on the ground.

9. **Soft scald** is a physiological or noninfectious disease that attacks fruit picked when immature and stored under unfavorable conditions. The degrees of scald are classified as common scald, soft scald, and soggy breakdown. Common scald first appears as a diffuse browning of the skin, which is most pronounced on light colored varieties. Usually a sharp line exists between affected and normal fruit tissue. Soft scald is characterized by irregular, burn-like brown areas with definitely outlined edges. The flesh beneath these areas is often soft and discolored to a slight depth. In advanced stages, a deep brown flesh rot develops that may extend to three-fourths of the fruit. Sometimes the brown areas in the flesh remain small and firm; at other times large, soft and watery (soggy breakdown). Apple varieties differ markedly in the scald symptoms they express.

10. **Cedar-apple rust**, caused by the fungus *Gymnosporangium juniperi-virginianae*, commonly occurs on leaves and fruit, and occasionally the twigs. Leaf infections appear as pale yellow spots on the upper surface which enlarge, turn orange and exude an orange exudate in the center. Later, black fruiting bodies (pycnia) appear within the spot. On the underleaf surface, a number of orange-yellow, tube-like structures (aecia) form in each spot. When severe, leaves may turn yellow and drop early. Fruit lesions appear usually near the calyx end. They resemble leaf lesions, but are much larger. Aecia sometimes appear on the fruit. The rust fungus overseasons on red cedars and other *Juniperus* species where brown to reddish brown galls are formed that produce gelatinous masses of yellow to bright orange spore-horns during spring rains.

Two other rust fungi attack apples: hawthorn rust (*Gymnosporangium globosum*) and quince rust (*G. clavipes*). Hawthorn rust may infect apple foliage and fruit, producing symptoms similar to those of cedar-apple rust. Quince rust infects apple fruit but not the leaves. Fruit lesions are somewhat similar to those of cedar-apple rust except that they are usually larger, dark green, and commonly produce deep, crater-like depressions. Both the hawthorn and quince rust fungi overseason on *Juniperus* species. The quince rust fungus produces somewhat swollen, spindle-shaped swellings on juniper twigs, branches, and trunks that are covered with orange gelatinous masses during and following spring rains.

11. **Nectria canker**, caused by the fungus *Nectria galligena*, attacks a wide range of woody plants especially in northern areas with a maritime climate. Slowly enlarging, sunken or flattened areas of bark, usually centered around the base of a dead side shoot or wound, form on the twigs and branches. The girdling cankers slowly enlarge, becoming conspicuous and somewhat targetlike with the bark later sloughing off to expose concentric rings of callus. Small, bright red fungus fruiting bodies (perithecia), that later blacken, are clustered on the bark or wood at the margin of older cankers in autumn. When twigs and branches are encircled, the parts beyond the canker wilt and die.

Nectria twig blight, caused by a closely related fungus (*N. cinnabarina*), is cosmopolitan on hundreds of woody plants. It mostly occurs on dead wood but may be weakly parasitic. It produces small, sunken cankers that girdle and kill infected twigs. In mid to late summer, bright-pink or coral-red globular structures (sporodochia) form in the dead bark. Later, the pustules turn chocolate-brown. Both *Nectria* fungi overwinter in dead wood.

For chemical and cultural control suggestions consult the Extension Plant Pathologist at your land-grant university, or your county extension office.