

## Fruit Rots of Pumpkins

Many pathogens- fungi, bacteria, and viruses- cause fruit rot, fruit spotting, and other fruit abnormalities in pumpkins that render them unmarketable. The vast majority of fruit rotting organisms are fungal, although several bacteria can also cause soft rots. Viruses lead to fruit deformities and wild discolorations. Successful management of pumpkin fruit rots depends on accurate identification of the causal organism so that the appropriate control measures can be employed.

### ***Phytophthora* Fruit Rot (*Phytophthora capsici*)**



Perhaps the most serious fruit rot in wet years, *Phytophthora* fruit rot begins as a water-soaked or depressed spot, most often on fruit undersides which are in contact with the soil. The pathogen produces a white, yeast-like growth that contains



many fruiting bodies (sporangia) and affected fruit may be completely covered. The disease can develop and spread rapidly with the correct environmental conditions and entire fields may be lost. *Phytophthora* persists in the soil for many years; no effective crop rotation interval has been determined. Saturated soil conditions are conducive to disease initiation and development. Manage soil moisture by sub-soiling, avoiding over irrigating, selecting well-drained fields, and avoiding areas of fields that do not drain well. Destroying diseased areas at the start of disease development can be effective. Planting pumpkins into cover crop mulch has shown promise in research trials. Chemical treatment options include seed treatments with metalaxyl (Allegiance) or mefenoxam (Apron XL LS) and fruit/foliar sprays with copper sulfate (CuproFix Disperr), cymoxanil (Curzate 60 DF), dimethomorph (Forum 4.18 SC), potassium salts of phosphorous acid (ProPhyt), or famoxadone plus cymoxanil (Tanos).

### ***Fusarium* Fruit Rot (*Fusarium solani* f.sp. *cucurbitae*)**



Pumpkin fruits are attacked by *Fusarium* at the soil line and the severity of infection varies with soil moisture and the age of the rind when infection occurs. The pathogen can be seed-borne-both internally and externally. It does not survive for more than 1-2 years in seed and does not affect germination or viability of the seed. *Fusarium* produces abundant resting spores (chlamydospores) in the soil, but only persists there for 2-3 years. Cultivars vary in their

resistance with larger pumpkins being generally more susceptible. Wounding is not necessary for infection to occur. A four year rotation out of pumpkins will eliminate soil

propagules and fungicide treated seed will reduce initial inoculum. Culling of unmarketable fruit can reduce the risk of spread during the post harvest period.

### **Black Rot (*Didymella bryoniae*)**

Also called Gummy stem blight when it occurs on other plant parts, Black Rot produces a distinctive black decay. Initially, a brown to pink, water-soaked area develops in which numerous, conspicuous black fruiting bodies are embedded. The pathogen is soil and seed borne and can overwinter in infected crop



debris as dormant mycelium or chlamydospores. Both

temperature and moisture influence disease development, but high relative humidity, rainfall and wetness duration are most critical. Wounding is not required for disease initiation, but wounding, striped cucumber beetles, aphid feeding, and powdery mildew infection enhance susceptibility. Control of Black fruit rot starts with control of gummy stem blight. Start with certified, disease-free seed. A two year rotation out of

cucurbits can reduce field inoculum. Crop debris should be plowed under promptly after harvest. Control of Powdery mildew can significantly reduce black rot infection of pumpkins. Fungicides registered for Powdery mildew on pumpkins include myclobutanil (Nova 40 W), triflumizole (Procure), and pyraclostrobin plus boscalid (Pristine). Powdery mildew populations rapidly develop resistance to fungicides; be sure to alternate fungicide treatments among chemical class and to include a broad spectrum protectant (chlorothalonil, copper) in your program. Nova and Procure have a narrow spectrum of activity; control of Black Rot requires different fungicides such as azoxystrobin (Quadris, Armistar), thiram, or Pristine.



### **Scab (*Cladosporium cucumerinum*)**

This pathogen attacks all parts of the plants, but is most serious because of the disfiguring scab lesions that develop on fruit. The disease is widespread in North America and can occur annually if rainfall is abundant and temperatures cool. The spores (conidia) are borne in long chains, are easily dislodged, and spread long distances on wind. On foliage, the first sign of the disease is pale-green, water-soaked lesions which turn gray and become angular. On fruit, spots

first appear as small sunken areas which can be mistaken for insect injury. The spots may ooze a sticky liquid and become crater-like as they darken with age. Dark green, velvety layers of spores may appear in the cavities and secondary soft-rotting bacteria can invade. Severity of symptoms varies with the age of fruit when it becomes infected. C.



*cucumerinum* overwinters in infected squash and pumpkins vines, but may also be seedborne. Spores produced in the spring can infect in as little as 9 hours, produce spots by 3 days, and produces a new crop of spores by 4 days. The disease is favored by heavy fog, heavy dews, light rains, and temperatures at or below 70° F. Start with disease-free seed or treat with a seed fungicide. Do not save your own seed if the disease is present. Select well-drained fields with good air circulation to promote rapid drying of foliage and fruit. Rotate out of cucurbits for 2 or more years. During cool, wet weather fungicide sprays may not be entirely effective because of the rapid disease cycle. Spray intervals may need to be shortened to 5 days under these conditions. Fungicides registered on pumpkins for scab control include maneb and chlorothalonil (Bravo).

### ***Plectosporium* Blight (*Plectosporium tabacinum*)**



Like Scab, *Plectosporium* Blight is most damaging when it appears on the fruit. Pumpkins, yellow squash, and zucchini are the most susceptible of the cucurbits. Lens to diamond shaped, white to tan, lesions occur on stems, leaf veins, petioles, peduncles, and fruit. Severe stem and petiole infections can result in death of leaves and defoliation. Infected stems are dry and brittle. On fruit, the pathogen causes white, tan, to silvery russetting; individual lesions can coalesce to form a

continuous scabby layer. *Plectosporium* survives in crop debris and is favored by warm, wet weather. No resistant cultivar of pumpkins has been reported. Rotation with non cucurbit crops can reduce disease. The fungus is readily controlled with protectant fungicides such as chlorothalonil (Bravo), maneb, and trifloxystrobin (Flint).

The list of fungi that can cause fruit rots is long and also includes *Alternaria* Rot (*Alternaria alternata*), Anthracnose (*Colletotrichum orbiculare*), Blue Mold (*Penicillium* species), Crater Rot (*Myrothecium roridum*), *Pythium* Cottony Leak (*Pythium* species), and *Rhizopus* Soft Rot (*Rhizopus stolonifera*).

### **Bacterial Fruit Rot (*Xanthomonas campestris* pv. *cucurbitae*)**

Disease outbreaks of Bacterial leaf spot have been sporadic and occur mainly in warm, humid seasons. Symptoms appear similar to those caused by Angular Leaf Spot, (*Pseudomonas syringae* pv. *lachrymans*), although this bacterium fails to produce the milky exudates that characterize Angular Leaf Spot. Initial lesions on fruit are small, slightly sunken, circular spots with a tan center and dark brown border. The appearance of fruit symptoms varies with the age of the rind and amount of moisture present. The epidermis may split; the spots enlarge, and become sunken. The bacteria can penetrate into the flesh causing fruit rot and other secondary bacteria may invade. The pathogen is seedborne, but there is no evidence of survival in soil. The disease is common in the summer when temperatures are



high and occurs frequently after heavy rainfall. Seed treatments with hot water (50° C for twenty minutes) or 10 % Chlorox reduces the number of bacteria, but does not completely eliminate them. Avoid overhead irrigation and working the fields when they are wet. Rotate out of cucurbits for two years. Repeated applications of copper as a protectant may be helpful; however, it is generally ineffective once an epidemic has begun.

## Viruses



Viruses affecting cucurbits include cucumber mosaic (CMV), squash mosaic (SqMV), watermelon mosaic 1 (WMV-1), watermelon mosaic 2 (WMV-2), and zucchini yellow mosaic (ZYMV). All these viruses, except SqMV are transmitted by aphids in a non-persistent manner. SqMV is seedborne and is spread primarily by spotted and striped cucumber beetles. The virus within the seed can not be eliminated with hot water or chemical treatments.

Control consists of pathogen-free seed and controlling cucumber beetles. Virus diseases cause reductions in plant growth and yield and mottling, distortion, and fruit abnormalities that make the pumpkins unmarketable. There are no chemical treatments and control of aphids will not reduce, but may actually increase, transmission of the other cucurbit viruses. Rogue infected plants and destroy them away from cucurbit fields. Eliminate weed hosts.

## References

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