Overall, the dry and sunny conditions of this season have resulted in fewer fruit rots for pumpkin and winter squash—especially compared to the 2011 season. Nonetheless, some fruit rots may show up, and it is useful to identify what’s there. Fusarium and Pythium Fruit Rot can pose as look-alikes for Phytophthora Fruit Rot, but don’t have the same serious implications for future cucurbit crops on the farm. Symptoms differ on various winter squash and 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. The list of fungi that can cause fruit rots is long and includes Alternaria Rot (Alternaria alternata), Anthracnose (Colletotrichum orbiculare), Blue Mold (Penicillium species), Crater Rot (Myrothecium roridum), and Rhizopus Soft Rot (Rhizopus stolonifer) as well as the pathogens discussed below. 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. Many of these diseases show up in storage, and it is important to know which disease is present and dispose of the infected fruit properly. Dumping rotting fruit in your fields or compost pile may result in higher inoculum and more disease the following year, and in the case of Phytophthora capsici it could be devastating for years to come. Find out more about identification & management of cucurbit diseases with the UMass Cucurbit Disease IPM Field Guide; contact us for a hard copy or find an electronic copy at www.umassvegetable.org/publications/cucurbit-disease-scouting-management-guide.
It should be noted that chemical treatments alone can not be relied on to give adequate control of this disease, especially in wet years.

**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. It does not survive for more than 1-2 years in seed and does not affect the 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 by 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, triflumizole, 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 Prisine.

**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, soil, and 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 diseasefree seed or treat below 70˚ F. Start with diseasefree 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 as the pathogen overseasons very well. 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. Lesn 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 trifloxysrobin
Planting Considerations for Garlic

Without a certification program in place some growers are wondering how they should treat new seed introduced onto the farm. Many growers have been able to find sources of nice, healthy-looking seed from sources who have tested negative for Garlic Bloat Nematode, but this result is not a guarantee that every bulb that the grower produced is GBN free; it is only a guarantee that the garlic used in the test is GBN free! Additionally, new seed may come with Fusarium or surface molds. To minimize risk of infesting established seed stock, and to promote healthy and vigorous garlic next year, include a few safeguards and best practices in your fall plans.

1. **Map it out** Create a planting map for the garlic, and separate the new seed from your existing seed stock. The separation doesn’t have to be large, since GBN can move no more than one foot in soil. However, if your soil moves, the GBN can move with it, so make sure you plant new seed down hill from established seed to prevent movement with erosion. Also place your new garlic where you will be able to plant and cultivate it last. Avoiding movement of soil around GNB infested plants to areas with uninfested plants with your cultivation equipment is a key preventative action during the growing season. Label the new garlic clearly in the field for reference next year.

2. **Cull bulbs or cloves with symptoms or damage when cracking:** Carefully feel and look at each clove during this process, and remove anything that looks suspect. Discard cloves with unhealthy looking basal plates, with dents or lesions on or under the wrapper leaf, and any cloves that feel unusually light. Do not compost these cloves—either bury them away from the field or throw them away.

3. **Treat all seed with a surface sterilizer:** Sterilizing the surface of the cloves will NOT control GBN! However, it will reduce issues with surface molds such as aspergillus and will kill surface penicillium. This is a best practice for all garlic. You can either use a 10% commercial bleach solution (1 part bleach and 9 parts water) or you can use an OxiDate dip (23 oz per 25 gallons water). Remember to test bleach and OxiDate dips for activity if treating large amounts of seed, and replace solution when activity decreases. Plant cloves immediately after dipping, not after they have dried back out.

4. **Optimize pre-planting soil fertility:** See Table 1 for Cornell fertility recommendations. All phosphorus and potassium should be applied at planting. Slow release organic forms of N such as alfalfa and soybean meal can be applied at planting. Quick release synthetic or soluble forms of N should be reserved for use in the spring. Optimum fertility and soil conditioning will help keep garlic healthy, and healthy garlic will withstand everything from GBN to Fusarium better than stressed, unhealthy garlic.

5. **Next year, watch new seed closely:** During the growing season, cull suspicious looking plants and have them tested for GBN. Selecting the most suspicious plants gives you the highest probability of detecting GBN, if present. If a seed certification program is developed, farm inspectors will take this step for you. Until then, you can act as your own informal inspector.

6. **If the seed turns out to be positive** you can still sell it as food. Use your planting maps to help you avoid planting the area with infested seed into any allium for four years. This is a best practice for garlic in general, so if you can move the whole garlic planting out of alliums for four years that is the best option. After that time you should be able to safely plant garlic back into that ground. –CLS

### Table 1: Cornell Fertility Guidelines

<table>
<thead>
<tr>
<th>Garlic</th>
<th>Nitrogen (N) Lbs/A</th>
<th>Phosphorus (P2O5) Lbs/A</th>
<th>Potassium (K2O) Lbs/A</th>
</tr>
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<tr>
<td>Soil Test Results</td>
<td>Very low &lt;3lbs/A</td>
<td>Low 3-6</td>
<td>Medium 7-13</td>
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<td>Incorporate at planting</td>
<td>0</td>
<td>200</td>
<td>150</td>
</tr>
<tr>
<td>Sidedress before emergence</td>
<td>25-50</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sidedress 2-3 times, 3-4 weeks apart</td>
<td>25-50 divided among side-dressings</td>
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<td>0</td>
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<tr>
<td>TOTAL</td>
<td>50-100</td>
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<td>100</td>
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Pythium fruit rot (Cottony Leak) is caused by several different species of Pythium and can affect all parts of cucurbit plants at any stage of plant development. Pythium is a natural inhabitant of the soil, survives there indefinitely, and is present all cucurbit production areas. Cucumber is the most susceptible species; watermelon, pumpkin, melon, and squash may also be affected. Symptoms of Pythium fruit rot start as brown, water-soaked lesions generally where the fruit is in contact with the soil. Lesions rapidly develop into a watery, soft rot with copious white, cottony mycelium. Pythium is considered to be a weak parasite, but can cause disease where conditions are extremely favorable, through wounds, or in fruit in contact with wet soil. Pythium is favored by high fertility and high moisture; avoid overwatering and over-fertilizing. The best strategy for preventing Pythium fruit rot is planting in well-drained sandy soil and providing adequate drainage to allow rapid soil drying after a heavy rainfall. Barriers between fruit and soil such as mulch or cover crop residue can help. The most successful chemical control is a systemic fungicide (Ridomil, Aliette, ProPhyt, Forum, Presidio, Revus, and Previcur Flex) applied in enough water to soak the top quarter inch of soil. The first application should be made when plants start to vine. OMRI approved options include Actinovate, Kodiak, Mycostop, Plant Shield, and SoilGard.

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), atermelon 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.

- Prepared by M. Bess Dicklow, UMass Plant Diagnostic Lab, University of Massachusetts, mbddicklo@umext.umass.edu.
- Special thanks to Dr. Thomas Zitter and Dr. Meg McGrath for photos. Updated 9/29/2011

Early Potato Storage Management

Take time to clean up and tune-up the storage. Pathologists remind us that 95% of sanitation is cleaning off visible debris, so use high pressure air to clean debris from boxes, equipment and corners within the storage. Check to see that storage insulation is sufficient and intact, especially in the ceiling, to prevent condensation and drip. If drip occurs install ceiling fans to “air brush” the ceiling but plan to increase the insulation. Check your air re-circulation, ventilation system to avoid “dead air” spaces, with tools for measuring air flow, with cigarette/artificial smoke, or with a 2 ft. strip of toilet paper. Clean fans, louvers and air ductwork and check to see that they’re working properly.

- If you wash potatoes going into storage the basic treatment to reduce disease is the use of AgClor 310, a chlorine formulation designed for produce washwater. It can reduce the spread of pathogenic bacteria in the water. It will not control infections which have already occurred. For potatoes the chlorine level should be maintained between 65—125 ppm, in water with a pH adjusted between 6.0 – 7.5.

(Continued on page 5)
This chlorine level is much higher than that in municipal water! Recheck the chlorine level frequently as soil and organic matter quickly tie it up. Use new clean foam rollers to reduce as much moisture as possible from potatoes and use air circulation to speed drying.

- For the following pre-storage treatments it’s important to use spray nozzles that produce very fine droplets for even coverage and minimal wetting. Keep tubers moving and rotating on the belt. Afterwards, ensure good air movement to promote tuber drying before packing or storing.

- Bio-Save is a biological treatment which has been shown to reduce the spread in storage of Fusarium dry rot and Helminthosporium silver scurf (SS). Apply 17.6 oz/30 gallons of water, to treat 3,000 hundred-weight (cwt) of potatoes. Continuously agitate the spray to keep the material in suspension.

- Mertect 340-F is a treatment against Fusarium but resistance makes disease control unpredictable. Fusarium gets started on harvest wounds so be sure skins are set before harvest, temperatures are moderate and the harvester has been adjusted to limit bruising, and that proper curing occurs.

- Phostrol and many other phosphorous acid products, are labeled for suppressing the spread of late blight (LB) and pink rot (PR) in storage. Not recommended for fresh market potatoes, especially if enlarged lenticels are present, as skin darkening can occur.

The keys to early storage management of healthy potatoes are to cure the crop to promote suberization and wound healing, and to cool slowly to reduce the risk of condensation. Cuts and bruises heal most rapidly under high relative humidity (90%) at 50 - 60°F for 2 - 3 weeks after harvest which reduces the development of decay and reduces shrink. Higher temperatures promote disease and lower temperatures slow curing. Be sure there’s a high air recirculation rate. After curing the air recirculation rate can be decreased and the temperature gradually lowered to 40°F for tablestock or seed; 50°F for chipstock like Atlantic; or 45°F for Kanona, Monona or Snowden. When frost, LB or PR are present, the curing period should be eliminated, the temperature dropped as soon as possible, and the air recirculation rate kept high to limit spread of disease from tuber to tuber. SS is a common disease which is worse when tubers remain in the field too long after vine killing, but it can also develop in storage. If it’s a regular problem, or on high risk lots, lower the storage temperature as soon as possible. For all these diseases maintain relative humidity no higher than 85%. (Carol MacNeil, Cornell Vegetable Program. VegEdge Vol. 8, Issue 25)

Now that the weather has finally cooled off and we’ve had a couple of soaking rains, some growers have started to notice papery brown patches on the leaf edges some of their field lettuce. If you look at the undersides of the leaves you may be able to find some patches of white, fuzzy mats of spores that are a tell-tale sign of downy mildew (DM). The brown, papery areas are where the disease has killed the leaf tissue so by the time you see them, it is well established in your planting.

Romaine and oakleaf types are especially vulnerable but I also found some on some bib type heads as well. In one planting there was a triple row; the Romaine and oakleaf types were the outer two rows and were heavily infested while a curly red-leaved type in the center row was clear.

That grower is going to want to make a special note of the (Continued on page 6)
name of that variety and be sure to order more of that for next fall’s crop.
Downy mildew prefers cool, damp weather so it tends to be much worse in spring and fall. It can also occur throughout the year in high tunnels. It is caused by a fungus-like pathogen, Bremia lactucae and there are many strains, or races, of this disease. If you look at seed catalogs for resistant varieties, they will note which races of DM each variety is resistant to, from 1 to 25, if any. If you’ve had DM before, make sure you choose varieties that specifically note resistance to DM, not just a general ‘disease resistance.’ Because this pathogen produces new strains so readily, it is challenging to keep producing new DM resistant varieties. -ADI
Spraying is an option but be sure to consider days to harvest, and be careful to avoid pesticide resistance. Check the lettuce chapter of the Vegetable Production Guidelines to consider your options:  http://www.nysaes.cals.cornell.edu/recommends/20frameset.html

Other references:
The Royal Horticultural Society: http://apps.rhs.org.uk/advice/search/profile.aspx?pid=216#section1
Dr. Chris Smart, Plant Pathologist at Geneva

These papery brown patches are the most visible stage of DM on lettuce, but this is a later stage of the disease, after white patches of spores formed on the lower sides of the leaves

At first glance this head of Romaine lettuce looks lush and healthy, but note the dead, brown patches appearing on the leaf tips.
Websites of Interest

Diagnose pest and disease problems using color pictures: [http://vegetablemdonline.ppath.cornell.edu/](http://vegetablemdonline.ppath.cornell.edu/)

Cornell Guidelines for fruit and vegetables: [http://www.nysaes.cals.cornell.edu/recommends/](http://www.nysaes.cals.cornell.edu/recommends/)


USDA Fruit and Vegetable Market News: [www.marketnews.usda.gov/portal/fv](http://www.marketnews.usda.gov/portal/fv)


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Sweet Corn Trap Counts: Week of September 19

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**Weekly and Seasonal Weather Information**

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