Gummy Stem Blight (GSB) of Cucurbits

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Cause and Symptoms

Gummy stem blight (black rot) is caused by the fungus *Mycosphaerella citrullina*. In Florida, watermelons are infected annually. Cucumbers, muskmelons, cantaloupes and other melons and citrons are infected frequently. Squash, pumpkins, gourds, chayote, balsam pear, other members of the cucurbit family and opuntia (a member of the cactus family) may become infected with gummy stem blight. Cucurbit plants may be infected at any growth stage from seedlings to mature vines with fruit. Infection and symptoms can occur on all plant parts except roots. Winter squash types (butternut, hubbard etc.) are likely to exhibit symptoms in the fruit only or in older leaves.

Symptoms in seedlings occur as light to dark brown spots on the seed leaves (Fig. 1) (cotyledons) or as a light to dark brown to black colored, sometimes gummy, lesions on the main stem (Fig. 2). Prior to the occurrence of tissue yellowing (chlorosis) or browning (necrosis), the same tissue may appear watersoaked. Wilting, followed by death of the young plant, can occur. Main stem lesions enlarge and slowly girdle the main stem resulting in a red-brown-black canker that cracks and may exude a red to amber gummy substance (Fig. 3). Vine wilting is usually a late symptom (Fig. 4). Individual lesions on vine stems can also occur (Fig. 5) and they may exude a gummy substance. Embedded in older diseased tissue, small, clear white (when young) to black (when old), pimple-like structures (pycnidia) will swell and release clear to white tendrils of spores if the tissue is wetted with water. A hand lens or stereoscope may be used to see this phenomenon easily. Generally, this disease progresses from the central stem of the plant to growing tips. Because other plant disorders can cause exudation of a gummy substance, "gummyness" should not be relied upon entirely for diagnosis of gummy stem blight. Anthracnose (another fungus disease) and inadequate liming can cause stem lesions and gumming.

Leaf spots are variable in shape, red-brown in color and initially associated with portions of leaves that retain moisture for long periods of time, such as veinal areas and leaf margins (Fig. 6). Pycnidia (mentioned earlier) will form in leaf lesions also.

Fruit rot in watermelons usually is not a problem if vine tissues are not diseased from gummy stem blight. Lesions in fruit of watermelon, cucumber and muskmelon are first oval to circular and greasy-green in color. Later these lesions will become dark brown-black with coalescing of individual lesions. Older lesions will appear depressed in the center. Internally, the rind will become dark brown to black and cracked. (Figs. 7 & 8). Butternut squash fruit can be infected with the vines being healthy. A dark

yellow to brown, crusty appearing lesion occurs on large areas of the butternut fruit (Fig. 9).

The fungus causing gummy stem blight can be seedborne or it can survive in weeds such as citron, balsam pear and other volunteer cucurbit plants or on organic debris from previous infected cucurbits. The gummy stem blight fungus produces two spore stages, a sexually produced spore (ascospore) and an asexually produced spore (pycnidiospore). Both spore types are produced within enclosed structures. The ascospore is more apt to serve as primary inoculum as it is windborne and can be disseminated from field to field. The pycnidiospore (formed in pycnidia mentioned earlier) functions in secondary spread primarily. Pycnidiospores are released in a mucilaginous (gummy) substance that make them more adaptable for short distance spread by splashing water. Often growers remark about a disease occurring "overnight." What they are actually seeing are the results of secondary spread, which is more difficult to control than primary spread simply because of increased spore numbers with increased diseased tissue.

Moisture and temperature influence the infection process and spore production. A moisture film from dew, rain or irrigation is necessary for spore germination. The optimum temperature for infection is 61 to 75°F. Nighttime temperatures and moisture conditions are ideal during much of the crop growing season in Florida. After a spore germinates on a susceptible host, the fungus penetrates the plant tissue and with optimum temperatures, symptoms can appear in 7 to 12 days. Wounding of host tissue promotes infection. Harvest wounds on fruit can be a point of entry. The fungus is capable of growing from 40 to 90°F but temperatures below 45° F retard fungal growth. Thus storage or holding of cucurbit fruit should be done using temperatures near 45-50°F. Avoidance of chilling damage necessitates a compromise in storage temperature. Cantaloupes can be held or stored safely at slightly lower temperatures.

Control

Gummy stem blight can be controlled if the grower utilizes several control measures in a sequence. First and foremost, the primary source of inoculum (spores) in seed and the field must be reduced. Seed can be infected without expressing symptoms. Because no certification program is established, the grower should purchase seed from companies that produce seed fields where gummy stem blight is kept under control. Seed from healthy fruit will be free from gummy stem blight. Do not use transplants that have gummy stem blight or other diseases.

The second source of primary inoculum, and the most important, is on organic debris from previous cucurbit crops. As soon as a cucurbit crop is harvested, the decaying debris from that crop should be disced and plowed under with a mold board plow, thereby reducing inoculum. Wild citrons, balsam pear or volunteer cucurbits are a third source of inoculum. Crop rotation and destruction of weed hosts are important for gummy stem blight control. The more growers that utilize these cultural tactics, the more effective will be your control efforts by reducing primary sources of inocula.

Varietal differences in susceptibility to gummy stem blight exist in cucumbers. It is noteworthy that gummy stem blight on watermelons became a more serious problem in Florida about the time the Charleston Grey variety was released.

Finally, multiple applications of fungicides are necessary to control gummy stem blight. Current recommendations are available from your county Extension office. Begin your fungicide program prior to the first sign of gummy stem blight. In south Florida (below Tampa), the spray program may need

to be initiated soon after emergence. In other areas of the state, fungicide spray programs can be initiated when the vines begin to "run." However, in 1982 a severe epidemic of gummy stem blight occurred on seedlings in central Florida where rainfall was frequent and thus the grower should monitor his fields. Gummy stem blight will be more severe in "wet" years.

Figure 1. GSB lesions in watermelon seed leaves (cotyledons).

Figure 2. Early GSB lesion in watermelon crown tissue.

Figure 3. Late GSB lesion in watermelon stem.

Figure 4. Vine wilting from GSB in watermelon.

Figure 5. GSB lesion in cantaloupe vine.

Figure 6. GSB lesions in watermelon leaves.

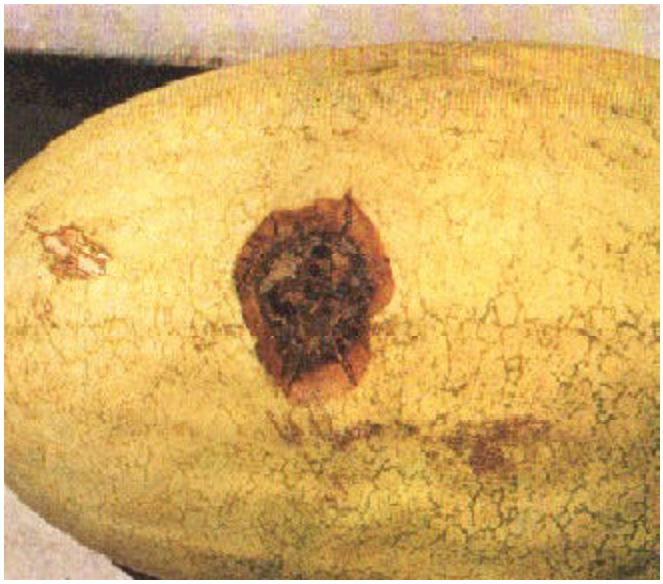

Figure 7. GSB lesion in watermelon fruit.

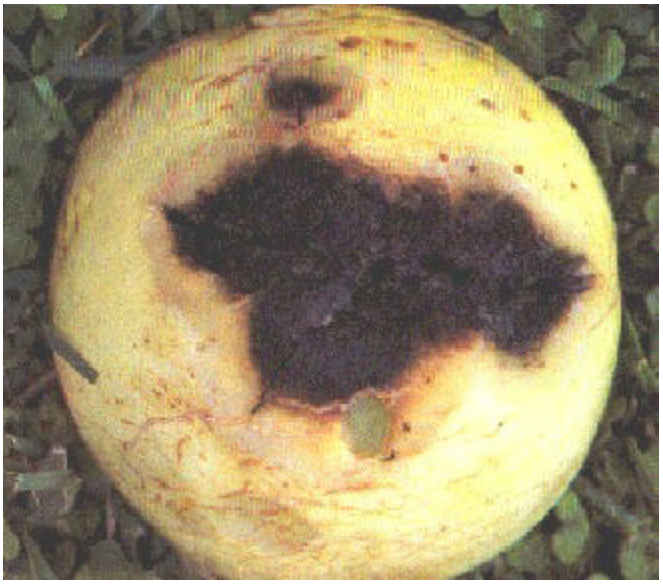

Figure 8. GSB lesions (young and old) in honeydew melon fruit.

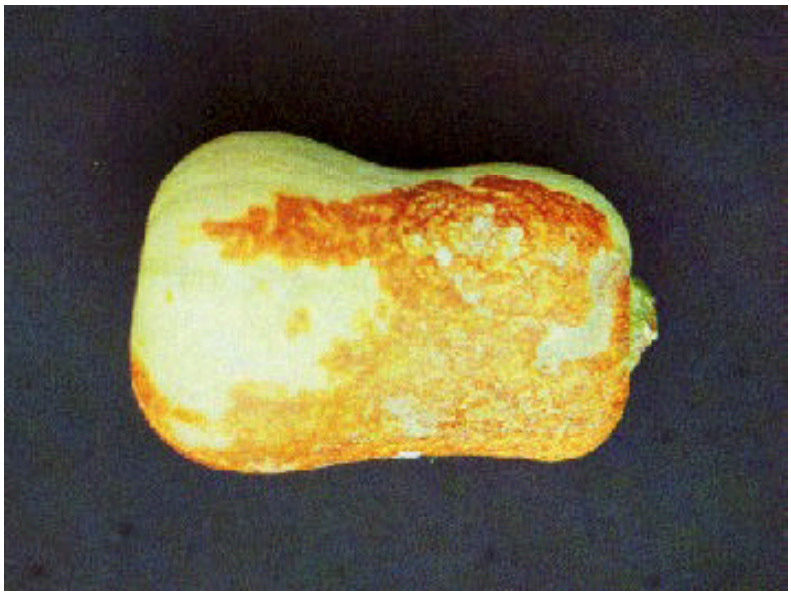

Figure 9. GSB lesions in butternut squash fruit.