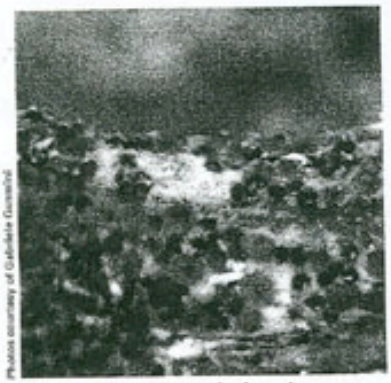
Combating Gummy Stem Blight

A grower's best line of defense against this disease is early detection in the field.

By Gabriele Gusmini and Todd C. Wehner

ASK watermelon growers which disease is the worst, and they will probably tell you "gummy stem blight." There are other important diseases, such as Fusarium wilt, Anthracnose, mosaic viruses, and fruit blotch, but those are mostly under control in the U.S. Gummy stem blight can destroy acres of watermelons in a few days, especially under warm and humid conditions. Caused by the fungus *Didymella bryoniae* and its anamorph *Phoma cucurbitacearum*, the disease is prevalent in the Southern U.S. where most watermelons are grown.



Photos courtesy of Gabriele Gusmini

This photo shows diagnostic signs of gummy stem blight on a watermelon stem. The markings are the reproductive structures of the causal agent of the disease.

A gummy stem blight lesion on watermelon leaves shows a dry and necrotic spot with a circular concentric pattern overlapping the veins.

Early detection of gummy stem blight in the field is the best chance that growers have to avoid an epidemic and subsequent loss of their crop. Nevertheless, growers busy managing a large farm might not notice a few diseased plants and may discover the danger too late for effective chemical control.

Gummy stem blight is also a problem in transplant production greenhouses. The disease organism may already be in the greenhouse from a previous crop, or sometimes, it may be carried on the seeds being planted. In fact, the source of the disease may lead to legal disputes between growers, transplant producers, and seed companies.

Identify The Problem

Gummy stem blight can be easily recognized on transplants as circular brown spots on the leaves with black dots that are the fungal reproductive structures visible to the naked eye. On mature plants, symptoms sometimes are mistaken for wind damage, mechanical injuries, or similar diseases like Anthracnose. Correct diagnosis is important so that the most effective control measures can be used.

Although rapid diagnosis in the field by the grower is important, the presence of gummy stem blight should be verified by collecting the diseased leaves and stems for diagnosis by a plant pathologist. In many cases, the assessment can be done in the field directly with a hand lens, but sometimes the help of a microscope and other equipment in a disease clinic is required. Until the reproductive structures of the fungus and its spores are identified, the diagnosis cannot be certain.

Fungicides, such as Quadris (azoxystrobin, Syngenta Crop Protection), Bravo (chlorothalonil, Syngenta Crop

The Auburn University Cultivars

THE Auburn University (AU) Series was the first attempt that watermelon breeders made to defeat gummy stem blight using genetic resistance. In 1986, AU-Producer and AU-Jubilant were released as developed from the following crosses: AU-Producer from Crimson Sweet and PI 189225, and AU-Jubilant from Jubilee and PI 271778.

In 1993, AU-Golden Producer was released as a yellow-fleshed mutant of AU-Producer. Finally, in 1995, AU-Sweet Scarlet was developed from a complex cross involving AU-Producer, Allsweet, Calhoun Gray, and Wilt Resistant Peacock, along with PI 362515 as a source of resistance to Anthracnose race 2.

Protection), or Pristine (boscalid and pyraclostrobin, BASF), will provide disease control, but resistance of the pathogen to some fungicides has been reported in the past.

Developing Resistant Cultivars

Since the 1960s, watermelon breeders have been working to develop cultivars resistant to gummy stem blight to eliminate the disease, or at least to reduce the need for fungicide applications. Early efforts by researchers led to the identification of two resistant accessions: PI 189225 and PI 271778. Both are wild watermelons that were collected in Africa and added to the USDA-ARS watermelon germplasm collection.

From those, cultivars were developed at Auburn University by researcher John Norton that have higher resistance than Charleston Gray, the market leader at that time. Unfortunately, the Auburn University cultivars were not resistant enough to control gummy stem blight during the production season.

This field plot shows watermelons susceptible to gummy stem blight in the front with the resistant breeding lines in the back during a natural epidemic of the disease. To avoid an epidemic, early detection of the disease is key.

Todd Wehner, professor at North Carolina State University (NCSU), and co-workers began their research at NCSU in the late 1990s to find higher resistance to gummy stem blight in watermelon. They collected additional lines of wild watermelons from Africa and Asia, obtained seeds of the entire USDA-ARS watermelon germplasm collection (totaling 1275), developed more reliable methods of testing for resistance, and finally evaluated the entire collection for resistance in four years of field and greenhouse tests. As a result, additional accessions have been identified that have higher resistance than those available to researchers in the 1960s.

In crosses of the most resistant accessions with the most susceptible accessions, it was determined that resistance was inherited as a single gene as reported by Norton, plus several modifier genes. The modifier genes must be incorporated into cultivars to obtain the high resistance.

Currently, the authors are developing molecular markers that will allow researchers to identify lines carrying the highest level of resistance. Eventually, the hope is to provide growers with highly resistant and adapted cultivars for use in the Southern U.S. **AVG**

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