

# WATERMELON DISEASE CONTROL

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In Florida there are a number of diseases that attack the watermelon (*Citrullus vulgaris*), but fortunately their severity is seldom very great. However, certain of the diseases may destroy the crop under conditions favorable for their development, and it is seldom that a field is observed in which one or more of the several diseases of watermelons are not doing some damage. Interestingly enough, we have no serious bacterial or virus diseases of melons of Florida, for the angular leaf spot of cucumber, *pseudomonas lachrymans* (E. F. Sm. and Bryan) Ferraris, Bacterial wilt, *Erwinia tracheiphila* (E.F.Sm.) Holland, and cucumber mosaic do not attack melons with any certainty. For the most part the watermelon grower has to fight fungus diseases and rarely the nematode *Heterodera marioni* which causes root-knot. My talk today therefore, will be confined to the fungus diseases that confront a watermelon grower in Florida and their control.

The first disease we shall consider is *Fusarium wilt*, caused by *Fusarium oxysporum f. niveum* (E.F.S) Snyder and Hansen, sometimes erroneously called "blight" by the melon grower. This fungus disease attacks susceptible varieties through the roots, which then cease to function, the water conducting system gets plugged and the melon vines wilt, at first temporarily, later permanently, and then die. Plants may be attacked early in their life, or may grow in an apparently normal manner, even bear fair sized melons, and then suddenly wilt and die. Losses may be as low as 30 percent or as high as 100 percent. Growers

have learned, through hard experience that wilt lives in the soil from year to year, and that a period of at least 5 years, better 8 to 10 years, should elapse between crops of melons on the same ground. I am speaking of varieties that are susceptible to wilt, such as the now predominant Cannon Ball, also called Florida Giant, Clara Lee, or Black Diamond, the formerly predominant Tom Watson, the Dude Creek, Dixie Queen, Garrison, and so on. In order to develop a variety that would withstand wilt, that could be planted on so called "old" melon land without a long wait between crops, the present watermelon laboratory at Leesburg was started in 1930, with Doctor Marion M. Walker in charge of the research. Doctor Walker worked at Leesburg from 1930 to 1942, and was able to develop a number of varieties that are highly resistant to wilt, namely the Leesburg, the Blacklee, and two unreleased varieties that we call the Improved Leesburg and the Brownlee. The Leesburg was a selection out of the variety Kleckley Sweet, which showed some resistance when studied first in 1932, and it looks like the Kleckley Sweet. Released to melon growers for trial in 1935-36, the variety while highly resistant to wilt and of superb quality was not liked by growers who considered it to be too small, it sunburned, and its white seeds were rather frowned upon. It would, however, make a crop if planted on old melon land. Undaunted, Dr. Walker crossed the white seeded, dark rind Leesburg with the black seeded, rather light colored Hawkesbury which had been developed by the Australians. Out of the Leesburg x Hawkesbury cross has come the wilt resistant Blacklee, the Brownlee, and the Improved Leesburg all appreciably larger than the Leesburg, and like the Leesburg of superb quality. The Blacklee was released

in 1943-44; since then it has been planted less and less each year in Florida because it is somewhat small by comparison with Cannon Ball, but more damaging it is 7 to 10 days, sometimes 14 days, later to mature than the wilt susceptible Cannon Ball. The melon grower in Florida is a gambler, he is betting his money against Florida frost, rain, drought, disease, and last but not least the weather in Georgia. If he gets an early crop he sells his cars of melons, roughly 900 to a car, for \$800.00 to \$1800.00 a car; if the crop is delayed for any reason, the price can drop 25 to 50 percent. Why should he add a certainty to late maturity, a late maturing variety? So, despite top quality and wilt resistance, the Florida melon grower shies away from Blacklee and continues to plant Cannon Ball. Where does he get new land, or 8-10 year old land? He is pushing farther and farther back into the woods; his trucking bill is getting rather large and soon he may be forced to use old land on which the Cannon Ball cannot grow. In other words he may be forced to plant Blacklee. We may be able to get him a wilt-resistant Cannon Ball before that happens; we are rushing that phase of our research at Leesburg.

As a sidelight on the Blacklee, this variety has been accepted and is liked in states such as Virginia, Missouri, Delaware, Maryland, Texas, Oklahoma and New Mexico which are places less interested in earliness. This summer I saw many melons in Michigan and Indiana that were without doubt our Blacklee. So, the work of Doctor Walker has not been entirely in vain. Brownlee and Improved Leesburg do not seem to be much earlier than the Blacklee and I doubt if Florida growers will like them or use them until they have to. We are attempting to improve the Blacklee by making selections for earliness. In summation, for control of Fusarium wilt, use wilt-resistant varieties or land that has not supported melons for 8 to 10 years if susceptible varieties are used. Our work at Leesburg has shown that if wilt resistant

varieties are planted on old melon land, do not do so until 2-3 years have elapsed since melons were last planted.

Watermelon anthracnose and watermelon gummy-stem blight are 2 important stem, leaf, and fruit diseases that can be discussed together, for initial steps in their control are based upon seed treatment. The spores of the fungi that cause these diseases, *Colletotrichum lagenarium* (anthracnose) and *Mycosphaerella citrullina* (C.O. Sm.) (Gross. (gummy-stem)), are carried on watermelon seeds and establish the 2 diseases in or around the melon hills, from there spreading rapidly throughout the field.

I have seen gummy-stem blight cause losses in melon stands of 30-90 percent, simply because the grower was ignorant of the necessity of seed treatment or just too stubborn to follow instructions. A grower told me in 1946 that gummy-stem blight cost him \$9000.00, yet the following year he forgot to treat his seed! While anthracnose usually does not cause seedling losses in melon plantings in Florida, if carried into the field on seeds the disease can be found early in the growth of the melon vine and builds up as it defoliates the plant and finally the young fruits are infected. It is the worst disease of melons in our state. Under favorable weather conditions, particularly rainy spells, anthracnose is to be feared and inspectors quickly reject mature melons that show the characteristic bumps on the skin that we know are latent anthracnose infections. Such infected melons carry poorly, and they rot or decay before final disposition by the consumer. The simple, easy, and cheap seed treatment with Spergon or Semesan, at 3 tenths of 1 percent, or 1/3 pound per 100 pounds of seed, takes care of anthracnose and gummy-stem blight spores and the melon vines get a good start. Some seed houses in Florida are now selling melon seed already treated; this is a good practice and should be more widely adopted. The seedsman often has more time and facilities to treat seed than the farmer, who will faithfully treat seed

for the first 2 plantings but be in too much of a hurry to take the time to treat subsequent plantings if they are needed.

Even if treated seed is planted there is no guarantee that anthracnose and gummy-stem blight will not come into the melon plantings. They come from fields of growers who did not treat their seed, or they can be blown by the wind from last year's melon soil in which the fungi live as saprophytes. To control the diseases once they appear in the field can be done fairly satisfactorily by spraying or dusting with any one of a number of fungicides. To name a few, good control of anthracnose has been obtained in Leesburg with Ferriate, Dithane, copper-lime, or tribasic copper sulfate, applied as dusts. Fairly satisfactory control has been obtained with Copper A and Zerlate. Spergon has not been tried. We have not worked with sprays because we feel that dusting is more adapted to watermelon culture than spraying, but this is a point we do not have the time to discuss here now. The question has come up very forcibly, "Does it pay to apply fungicide?", and in my 1947 trials while I obtained very nice control of the leaf diseases anthracnose and downy mildew, the latter of which I will refer to later in more detail, when data were converted to dollars and cents there seemed to be no great value obtained by dusting. In fact, with earliness a distinct advantage to the melon grower, it was noted that melons matured more slowly on dusted vines than on the undusted checks. The reason for this is that the fungi were knocking down the leaves on the checks and the melons were maturing faster. Even though the dusted vines produced more melons in aggregate than the check vines, the grower made as much money off the checks as he did off the dusted vines. This may be due to chance, 1947 was peculiar in other respects, but it does illustrate what I wish to bring out, how is one to decide if one should recommend the application of a fungicide? Research, year after year, alone will answer

the question. We will, at the same time, find out which is the best fungicide to use. Also of value in control is keeping out of melon fields when the vines are wet, which spreads the fungi. Research is under way at Leesburg to develop an anthracnose resistant variety of melon. If successful, spraying or dusting will not be necessary for control of this disease. In summation, for gummy-stem blight and anthracnose control, the melon seeds should be treated, with either Spergon or Semesan, before planting. If sprouted seeds are planted, the 1-1000 corrosive sublimate treatment, followed by the thorough washing in running water or several changes of water may be substituted. If it is desirable to dust or spray, present findings advise the use of Dithane-zinc-lime or tribasic copper sulfate for the best control of anthracnose, but we do not yet know when or how often to apply the fungicides under average conditions. Labor should be advised to stay out of the melon fields when the vines are wet with dew or rain.

The next disease we must consider is downy mildew, caused by the fungus *Peronospora cubensis* (B. and C.) Rost., which annually is the worst disease of cucumbers in Florida, and since cucumbers are widely grown during most of the year, there is an abundant source of inoculum for watermelons. The fungus overwinters in the Everglades or farther south on wild cucumbers or volunteer cucumbers or even on cucumbers in small backyard lots and kitchen gardens out of the range of frost. No one has shown that downy mildew in Florida in the spring is not initiated from Cuba. Some years anthracnose precedes downy mildew, other years the reverse is found. In the leaf spot stage it is not always easy to separate the two diseases by outward appearance and for final analysis a microscope may be needed. Downy mildew does not attack the stem or fruit of the melon. Inasmuch as the mildew spores are not carried on the seed, but blown in by the wind, seed treatment is of

no value against mildew. What has been said of dusting or spraying for anthracnose control applies equally well for fungicide application against downy mildew. At Leesburg in 1947 we obtained excellent mildew control but in the final analysis which totals the receipts from dusted versus non-dusted plots, we are not so sure that it paid to apply a fungicide. We know that Fermate, Zerlate, Dithane, Copper A, tri-basic copper sulfate, or copper-lime dust give good control. We have not tried Sperguson which gives good control of downy mildew of cabbage and which might do the same for downy mildew of cucurbits though the same species of fungus is not implicated. In summation for downy mildew control, dusting or spraying can be performed, but more research is needed to show when to apply the fungicide and how often.

It is worthy considering a disease forecasting service for watermelon growers, similar to such services now available to apple growers, cucumber growers, tomato and potato growers, in other parts of the nation. Such a service would tell growers what diseases threatened the melon crop, and whether application of a fungicide was advised. In Lake county alone around 10,000 acres of melons are planted every year. The cost to dust, or spray, one acre of melons is roughly \$1.30 to \$1.50. If only half this acreage is dusted once, the cost is \$6,500.00 at least, possibly \$7,500.00; if dusted twice around \$14,000.00. Most growers dust or spray at least once for dis-

ease control and most dust or spray twice or three times for aphid control and the fungicide could easily be applied with the insecticide. Dusting or spraying for the insects is performed knowing that the insect is there; the same cannot be said of application of the fungicide. If the cost of one fungicide application could be saved the melon growers through accurate knowledge of the fungi, their abundance or inoculum potential and associated factors in their development, the saving would more than pay the salary of the trained personnel needed for the 5-month job of constantly patrolling the melon fields; February thru June should suffice. The idea has been sown before but it has not taken root or borne fruit to the present. There is no good reason why it should not work.

Other diseases present in Florida which are less important are Southern wilt (*Sclerotium rolfsii*), stem-end rot (*Diplodia* sp.) which is easily controlled by treatment of the stem ends of melons before shipment, blossom-end rot (*Pythium debaryanum*) powdery mildew (*Erysiphe cichoracearum*), ground rot (*Corticium vagum*), and several leaf spots associated with species of *Cercospora* and *Macrosporium*. The virus mosaic has been found in Florida but it is irregular in appearance and not considered serious. All of these are well discussed in bulletin 225 of the Florida Agricultural Experiment Station entitled "Diseases of Watermelons in Florida."