

PROGRESS REPORT ON THE WATERMELON WILT PROJECT IN ILLINOIS

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The soil fungus *Fusarium niveum* E. F. Sm. that causes the disease of watermelons known as "wilt" has become established in all the chief watermelon-growing sections of Illinois as well as in other melon-producing areas throughout the United States. In many sections it has become so serious that it is now a limiting factor in the commercial production of watermelons, and because it is characteristic of the wilt fungus that it can survive in the soil for a period of from fifteen to twenty years in the absence of melons, its control has presented many difficulties.

Such control measures as seed treatment and the application of chemicals to the soil have been tried out with negative results. The only effective method of control has been a period of rotation sufficiently long to permit the dying out of the fungus. It has long been apparent that the most promising control method lies in the production of a variety of watermelon which is sufficiently resistant to the wilt disease to enable the grower to produce a profitable crop on wilt infected soil.

In 1926 the Illinois State Department of Agriculture inaugurated the Watermelon Wilt Project, which had as its primary purpose the development of a wilt-resistant variety of watermelon. An experimental station was established in a large watermelon producing section of the State where the wilt disease had been causing severe losses.

At the outset seeds of all available watermelon varieties were collected, including the citrons, preserving melons, and stock melons. All of these were planted and tested for any possible wilt resistance. It was found that none of the commercial varieties possessed any visible resistance, but that the stock melons were highly resistant. Consequently it was thought that by crossing desirable commercial varieties with the stock melons, a hybrid melon might be evolved which would be wilt-resistant and which could be developed into an edible melon by inbreeding and back-crossing. This had previously been done by

W. A. Orton when he developed the variety "Conqueror," a variety which was not very successful in this State. Although much emphasis has been placed upon this method, the possibility of securing a resistant strain by selection from hills in commercial varieties which have "stood up" on wilt-infected soil has not been overlooked. Unfortunately, however, we have not been able to secure a strain which has proved resistant when later planted on thoroughly wilt-infected soil.

In hybridizing we have been more successful. Out of hundreds of crosses between the Kansas stock melon and commercial varieties, several strains now in the 3F and 4F generations have been secured which possess varying degrees of resistance as well as marked variation as regards to shape, color of flesh, seeds, rind, taste, time of ripening, etc.

At present seven of the hybrid strains appear from all standpoints to be superior to the others. Three of them are the result of crosses between the Kansas stock melons and the variety Halbert Honey, three others are crosses between the Kansas stock melon and the variety Tom Watson, and the seventh is a cross between the varieties Conqueror and Thurmond Grey. All of these strains have been inbred for at least three generations, but certain visible characters have not become "fixed," and with the exception of one strain, each strain includes at least two distinct types. In 1930 these varieties produced from 25 to 50 per cent of a normal crop under the most adverse circumstances where 100 per cent of the standard commercial varieties which were used for checks succumbed to the disease.

Some of the qualities possessed by these strains are very promising but others need much improvement. The flesh color ranges from a light to a deep red, and in the Kansas stock-Halbert Honey crosses the flesh is exceptionally sweet. The rind color ranges from light, striped, and mottled melons to a solid, deep green. The rind is heavy and well adapted for shipping. In shape they range from round to long melons of the Conqueror and Tom Watson types. The two most undesirable qualities are a more or less stringy flesh and lateness in maturing. It is hoped that by back-crossing the hybrids upon the commercial parent and by continued selection these undesirable qualities may be overcome. Whether this can be done without destroying the wilt resistance remains to be seen.

Back-crossing was begun in 1930, but the unusually hot, dry weather severely handicapped the artificial pollination work and only a few melons were secured.

It is interesting to note that the green coloring found in the seeds of the Kansas stock melon is carried over to some extent in the hybrid melons and it is thought that the degree of resistance may be judged by the amount of green coloring found in the seeds of the hybrid melons. Hundreds of hybrid melons whose seeds lack this coloring have shown no resistance to the wilt disease.

At the present time it is not known whether different strains of the causal organism exists in different sections of the country, but we have some slight evidence that such may be the case. If this be true the problem will be even more difficult to bring to completion.

It is believed that great headway has been made towards breeding a new variety of watermelon which will be sufficiently resistant to the wilt disease to enable the growers to produce a profitable crop upon wilt infected soil. As in all work of this nature progress is usually slow and it takes a number of years to work out to a satisfactory conclusion new varieties which possess all the necessary requirements for commercial purposes. However, from what has already been accomplished it would seem that the ultimate aim of this project is not an impossibility and that it may be attained in the near future.