Additional Sources of Resistance to Gummy Stem Blight of Muskmelon

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ABSTRACT

Sowell, G., Jr. 1981. Additional sources of resistance to gummy stem blight of muskmelon. Plant Disease 65:253-254.

Approximately 600 muskmelon plant introductions were tested for resistance to *Mycosphaerella melonis*; 266935 and 436533 were highly resistant in greenhouse and field tests.

The resistance of plant introduction (PI) 140471 to gummy stem blight caused by *Mycosphaerella melonis* (Pass.) Chiu & J. C. Walker (=*M. citrullina* (C.O.Sm.) Gross. [6]) was used by Norton to develop Gulfcoast (1) and Chilton (2) muskmelons (*Cucumis melo* L.). M. G. Hamilton, Blackville, SC, and P. E. Nugent, Charleston, SC (*personal communication*), reported that PI 140471 did not have adequate resistance in their plots when the disease was severe. "A higher level of resistance" to gummy stem blight is one of the specific goals for cantaloupe breeding programs, according to Sitterly (3).

The purpose of my research was to determine whether significant levels of field resistance could be found in muskmelon PIs that previously had not been screened for resistance.

MATERIALS AND METHODS

Greenhouse tests. Seeds were planted in single row plots in flats of growing medium as in previous tests (6). A randomized block design with four replications was used in all tests. Plants, 3 to 4 wk old, were inoculated by spraying them with a suspension containing approximately 2×10^5 conidia per milliliter of isolate 675-5 of *M. melonis*. The plants were incubated in a moist chamber for 48 hr at 25 ± 2 C. An index (5) of necrotic tissue on a 0–5 scale of increasing severity was recorded 2 wk after inoculation. Duncan's multiple range test was used to separate means.

Approximately 600 muskmelon PIs not previously screened for resistance were included in preliminary tests. All PIs with a disease index of 1.0 or less in preliminary tests were retested in the greenhouse (greenhouse test 1). The four superior PIs in the 1979 field tests were tested in greenhouse tests 2 and 3. The methods used were the same as for the preliminary tests except that the disease index was recorded 1–2 wk after removal of plants from the moist chamber. PMR 45 was included as a susceptible check in test 3.

Field tests. PIs with a disease index of less than 3.0 and in the same statistical grouping in greenhouse test 1 were included in the 1978 field test. PI 321005 was included because it had shown small cankers in previous tests (4). Four plants were transplanted to each plot to make a total of 16 plants for each entry. PIs with a disease index of 1.8 or less and in the same statistical grouping in the 1978 field test were retested in 1979. Eight plants were transplanted to each plot to make a total of 32 plants for each entry.

Plants in all field tests were inoculated with approximately 2×10^4 conidia per milliliter when some of the runners were 3 ft long. Disease indices were recorded 2 wk later.

RESULTS AND DISCUSSION

Greenhouse tests. In the preliminary tests, 28 entries had a disease index of 1.0 or less. Mean disease indices for entries in greenhouse test 1 ranged from 1.2 to 5.0 (Table 1). Twelve PIs had a disease index of less than 3.0 and were in the same statistical grouping.

In greenhouse tests 2 and 3, PI 296345 was significantly inferior to PI 140471, PI 266935, and PI 436533. Other PIs were equal to PI 140471 in resistance.

Field tests. In 1978, disease indices of the PIs ranged from 1.0 to 4.5, with only four entries having an index of less than 2.8 (Table 1). PI 321005 and several other PIs were superior to Planter's Jumbo and Gulfcoast, but they were inferior to the three PIs with the lowest disease indices. In the 1979 field test, PIs 140471, 266935, 296345, and 436533 were superior to the susceptible cultivars Planter's Jumbo and Mainstream by statistically significant amounts.

This research has identified two sources of resistance to gummy stem blight of muskmelon in addition to the previously reported source, PI 140471 (6). The availability of new sources of resistance is important because they may be used in areas where PI 140471 has not been resistant. The resistance in the new sources may be controlled by different genes from those of PI 140471, and these genes may transfer more easily to

Table 1. Severity of gummy stem blight on muskmelon entries

Entry	Disease index[a]
Greenhouse test 1[b]	
PI 378064	5.0 a[b]
PI 242907	4.8 ab
PI 378059	4.5 abc
PI 381797	4.5 abc
PI 323427	4.2 abcd
PI 275633	4.0 abcde
PI 381781	4.0 abcde
PI 353452	3.8 abcdef
PI 385965	3.8 abcdef
PI 244713	3.5 abcdefg
PI 378171	3.5 abcdefg
PI 381793	3.5 abcdefg
PI 255479	3.2 bcdefgh
PI 255478	3.0 cdefgh
PI 357758	3.0 cdefgh
PI 436532	3.0 cdefgh
PI 436533	2.8 defghi
PI 313969	2.5 efghi
PI 390452	2.5 efghi
PI 140471	2.2 fghi
PI 266935	2.2 fghi
PI 381802	2.2 fghi
PI 266928	2.0 ghi
PI 296345	2.0 ghi
PI 266931	1.8 hi
PI 266936	1.8 hi
PI 381775	1.8 hi
PI 323498	1.2 i
1978 field test	
Planters Jumbo	4.8 ab[c]
Gulfcoast	4.5 ab
PI 381775	4.5 ab
Ga. 47	4.0 ab
PI 266936	3.5 bc
PI 313969	3.2 bc
PI 266928	3.2 bc
PI 381802	3.2 bc
PI 390452	3.0 cd
PI 321005	3.0 cd
PI 266931	2.8 cd
PI 323498	2.8 cd
PI 436533	1.8 de
PI 266935	1.2 e
PI 296345	1.2 e
PI 140471	1.0 e

[a] 0 = no disease, 5 = 80–100% of leaf area necrotic. Means not followed by the same letter are significantly different ($P = 0.05$) according to Duncan's multiple range test.
[b] Data are averages from four replications with approximately 20 plants each.
[c] Data are averages from four replications with eight plants each.

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breeding lines and thus accelerate the development of resistant varieties.

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LITERATURE CITED

1. Norton, J. D. 1971. Gulfcoast—A sweet cantaloupe for the produce chain store market. Auburn Univ. Agric. Exp. Stn. Leaf. 82.
2. Norton, J. D. 1972. Chilton, a high quality fruit for the commercial market. Auburn Univ. Agric. Exp. Stn. Leaf. 84.
3. Sitterly, W. R. 1973. Cucurbits. Pages 287-306 in: Breeding Plants for Disease Resistance. The Pennsylvania State Univ. Press, University Park.
4. Sowell, G., Jr., and Corley, W. L. 1974. PI 321005 (Tainan #2), a high-quality source of resistance to three cantaloupe diseases. Plant Dis. Rep. 58:899-902.
5. Sowell, G., Jr., and Corley, W. L. 1974. Severity of race 2 of *Sphaerotheca fuliginea* (Schlecht.) Poll. on muskmelon introductions reported resistant to powdery mildew. HortScience 9(4):398-399.
6. Sowell, G., Jr., Prasad, K., and Norton, J. D. 1966. Resistance of *Cucumis melo* introductions to *Mycosphaerella citrullina*. Plant Dis. Rep. 50:661-663.