

Resistance of Commercial Watermelon (*Citrullus lanatus*) to *Pseudomonas pseudoalcaligenes* subsp. *citrulli*

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ABSTRACT

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Thirty-eight watermelon cultivars were tested in the greenhouse for resistance to *Pseudomonas pseudoalcaligenes* subsp. *citrulli*. All cultivars showed some resistance, but only the cultivar Garrisonian was immune. Kleckley Sweet No. 6 was the most susceptible.

Additional key words: bacterial disease

In 1965, Webb and Goth (6) isolated a nonfluorescent, pathogenic bacterium that was later named *Pseudomonas pseudoalcaligenes* subsp. *citrulli* Schaad et al (4). The bacterium, which was isolated from seedlings of two watermelon (*Citrullus lanatus* (Thunb.) Matsum. and Nakai) plant introductions, was found to be seedborne in the field (2,5). Sowell and Schaad reported different responses of plant introductions to infection by this bacterium (5). The purpose of this study was to determine the resistance of various watermelon cultivars to infection by this bacterium in the greenhouse.

MATERIALS AND METHODS

The strain originally isolated by Webb and Goth, C-42 (ATCC 29625), was used throughout the study (6). Bacteria from diseased watermelon cotyledons were isolated using the method of Goth (1) and were maintained on King's medium B (3).

Two-week-old seedlings of 38 watermelon cultivars were inoculated with water suspensions of the bacterium that had grown on the medium for 48 hr. The bacteria were washed from the agar surface with deionized, distilled water, and the concentration was adjusted to about 10^6 colony forming units per milliliter. Inoculations were made by rubbing cotyledons with an inoculum-saturated cotton gauze pad. Seedlings were immediately incubated in a mist chamber at 100% relative humidity and 25 ± 3 C for 96 hr. The plants were then removed to a shaded section of a greenhouse where the relative humidity ranged from 60 to 90% and ambient temperatures from 20 to 25 C. Ten days

later, the seedlings were scored on the basis of a five-point disease index, with 1 = no symptoms, 2 = margins of cotyledons water-soaked, 3 = one cotyledon collapsed, 4 = both cotyledons

collapsed, and 5 = stem collapse. The experiment was a randomized block design with four replications. Plants with a score of 1 or 2 were considered to be resistant, and each cultivar was rated according to the percentage of resistant plants. The pathogen was recovered from infected plants using the method of Goth (1).

RESULTS AND DISCUSSION

The cultivars varied significantly in their resistance to *P. pseudoalcaligenes* subsp. *citrulli* (Table 1). The test was effective in identifying susceptible cultivars: 77 percent of the plants of susceptible Kleckley Sweet No. 6 were

Table 1. Disease reactions of watermelon cultivars following greenhouse inoculation with *Pseudomonas pseudoalcaligenes* subsp. *citrulli*

Cultivar	Plants tested (no.)	Disease index ^a (mean + SD)	Resistant plants ^b (%)
Garrisonian	32	1.0 ± 0.00	100
Mountain Hoosier	52	1.1 ± 0.31	100
Wilhite Wonder	17	1.1 ± 0.48	100
Summit	40	1.3 ± 0.80	95
Fairfax	48	1.3 ± 0.57	94
New Hope	26	1.3 ± 0.66	93
New Hampshire Midget	30	1.5 ± 1.04	94
White Seeded Watson	41	1.7 ± 1.35	93
Verona	50	1.8 ± 0.93	84
Charleston Gray	49	1.8 ± 0.79	84
Yellow Flesh Black Diamond	48	1.8 ± 1.06	84
Tendersweet	53	1.8 ± 1.01	87
Tom Watson	46	1.9 ± 1.24	83
Congo	45	1.9 ± 0.99	80
Dixie Queen	43	1.9 ± 0.92	79
Orange Glo	37	1.9 ± 1.22	84
Royal Golden	43	1.9 ± 1.46	77
Jubilee	44	2.0 ± 0.96	75
Dessert King Yellow Flesh	49	2.1 ± 1.07	86
Clara Lee	35	2.1 ± 1.31	75
Charleston Gray No. 133	36	2.1 ± 1.37	81
Black Diamond	36	2.2 ± 1.00	78
Chris Cross	45	2.2 ± 0.98	80
Yellow Belly Black Diamond	46	2.3 ± 1.27	70
Orange Flesh Tendersweet	38	2.4 ± 1.29	69
Blacklee	43	2.4 ± 1.13	75
Stone Mountain	48	2.4 ± 1.26	53
Cob Gem	37	2.5 ± 1.17	68
Peacock	45	2.8 ± 1.46	49
Blackstone	46	2.8 ± 1.23	59
Shipper	45	2.9 ± 1.45	52
Kleckley Sweet	46	3.0 ± 1.10	48
Texas Giant	45	3.0 ± 1.38	49
Texas Giant No. 10	40	3.0 ± 1.44	45
Sugar Baby	44	3.6 ± 1.46	28
Halbert Honey	49	3.6 ± 0.88	27
Crimson Sweet	48	3.6 ± 1.18	39
Kleckley Sweet No. 6	50	4.0 ± 0.83	23

^a 1 = no symptoms, 2 = margins of cotyledons water-soaked, 3 = one cotyledon collapsed, 4 = both cotyledons collapsed, 5 = stem collapsed.

^b Plants with a score of 1 or 2 were considered resistant.

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indexed 4 or 5. Garrisonian, Mountain Hoosier, and Wilhite Wonder were the most resistant of the cultivars that were tested.

In this study and field tests with large standard deviations (*unpublished data*), the germ plasm of watermelon cultivars included considerable genetic variation for reaction to *P. pseudoalcaligenes* subsp. *citrulli*. Present results, combined with those of Sowell and Schaad (5), will be useful in establishing horticulturally

acceptable parental lines that are resistant to the bacterium.

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