Field Resistance to Root-knot Nematode in Muskmelon[1]

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Abstract. **Significant differences in relative field resistance to root-knot nematode (*Meloidogyne* spp.) were found among 21 muskmelon (*Cucumis melo* L.) cultivars and breeding lines.**

Root-knot nematodes can cause severe galling of roots, dwarfing of aboveground growth, and wilting in hot, dry weather. The root-knot disease is a serious problem in muskmelon. Bergeson (1) reported that nematode control by fumigation resulted in an average muskmelon yield increase of 89% over an 8-year period.

Non-chemical control of root-knot nematode with resistant cultivars would be desirable. In greenhouse tests no resistance was found in muskmelon (2, 3, 4). In this study, we evaluated field resistance to root-knot disease among 21 muskmelon cultivars and breeding lines.

In 1971 and 1972, muskmelon lines (Table 1) were grown in a randomized complete block design with 4 replications in fields in which crop plants had not been grown for at least 8 years. Soil type was Scranton fine sand. Seeds were planted in March in hills spaced at 0.8 or 0.9 m in rows spaced at 3 m. Twenty plants of each line, 5 per replicate, were randomly selected and dug in June following the final harvest. Root-knot infection was rated from 1 to 5: 1 = no galls, 5 = severe galling (Fig. 1).

In both years of the test, the mean root-knot index of most of the cultivars and breeding lines was less than 2.0, indicating that most of the cultivars and lines had a nearly equal level of field resistance (Table 1). However, VBL C880, 'Southland', and 'Burpee Hybrid' had an index rating significantly greater than the majority of the other muskmelon lines, indicating a lower level of field resistance.

Although a high level resistance to root-knot nematodes is not readily available to the muskmelon breeder (4), the significant differences between the 3 highly susceptible lines - VBL C880, 'Southland', and 'Burpee Hybrid' - and the other cultivars and selections in this test reflect tolerance differences that could be important to the muskmelon breeder. These differences should be considered in selecting and evaluating breeding lines under various field conditions and locations so that the available level of tolerance is maintained.

Fig. 1. Root-knot galls on muskmelon root systems. Infection symptoms ranged from no galls (left) to severe galling (right).

Table 1. Response of 21 muskmelon cultivars and breeding lines to root-knot nematode under field conditions.

Cultivar or line[z]	Root-knot index[w,x,y] 1971	1972
AC 68-55	1.0 a	1.8 a
Planters Jumbo	1.3 ab	1.6 a
VBL 67-2	1.2 ab	1.7 a
Gulfcoast	1.2 ab	–
Del 24-5954	1.2 ab	–
Edisto 47	1.2 ab	1.9 a
AC 68-52	–	1.7 a
Samson Hybrid	1.4 ab	1.8 a
VBL 67-7	1.4 ab	–
AC 68-51	–	1.9 a
AC 67-17	1.6 ab	1.9 a
AC 67-59	1.6 ab	2.1 a
Saticoy Hybrid	1.8 b	1.8 a
Gulfstream	–	2.1 a
Fla 84	–	2.1 a
Harvest Queen	–	2.2 ab
Fla 45	–	2.3 abc
Harper Hybrid	2.0 b	–
Burpee Hybrid	–	2.9 bcd
Southland	3.0 c	3.0 cd
VBL C880	2.8 c	3.4 d

[z]AC lines from J. D. Norton, Auburn University, Alabama; Del line from E. R. Brasher, University of Delaware, Newark; Fla lines from Agricultural Research Center, Leesburg, Florida; and VBL lines from U. S. Vegetable Breeding Laboratory, Charleston, South Carolina.

[y]Mean of 4 replications, 5 observations per replication.

[x]1 = no galls, 5 = severe galling.

[w]Mean separation in columns by Duncan's multiple range test, 5% level.

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Watermelon Root Development Affected by Direct Seeding and Transplanting[1]

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Abstract. **A dominant tap root was apparent in nearly all direct-seeded watermelon plants, *Citrullus lanatus* (Thunb.) Mansf., but was lacking in those that had been transplanted. Transplants were characterized by a shallow, extensive root system and superior yield in contrast to direct-seeded plants.**

Watermelon and muskmelon (*Cucumis melo* L.) yields are earlier and usually higher from transplants than from direct-seeded plants (1, 7, 8). Increased early yield due to transplanting has been explained by the headstart these plants received from the rapid early growth made in the greenhouse.

Normal root development is altered by physical and chemical conditions of the soil, cultural and management practices, diseases, insects, and genotype (6, 9, 10, 12). Attempting to reduce winter frost heaving by severing the tap root of alfalfa (*Medicago sativa* L.) in the field, Klebesadel (5) significantly increased the no. of lateral roots on the upper 10 cm of the tap root without affecting dry wt of top growth. Direct-seeded watermelon plants are deep rooted and characterized by a dominant tap root exhibiting positive geotropism. Secondary or lateral roots are generally plagiotropic or geotropically insensitive. Mature triploid watermelon root systems were reportedly unaffected by transplanting (3) although Tewfik and Sakr (11) noted retarded root growth of transplanted watermelon. Relatively

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