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Resistance in Muskmelon Cultivars to Melon Aphid

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The melon aphid (*Aphis gossypii* Glover) causes direct-feeding damage on muskmelon (*Cucumis melo* L.) plants and vectors plant viruses (Kishaba et al., 1992), which can result in plant death. The melon aphid also excretes honeydew on the fruit, which serves as a growth medium for sooty mold (*Capnodium* sp.) (Goff and Tissot, 1932). Fruit with more than slight amounts of sooty mold are considered unmarketable (U.S. Dept. of Agriculture Marketing Service, 1981).

Use of insect-resistant cultivars can be useful in integrated pest management programs to minimize pesticide applications. Melon cultivars bred for melon aphid resistance have been released (McCreight et al., 1984) with limited commercial success. Preliminary data indicated natural resistance among commercially important muskmelon cultivars. The objective of this study was to identify commonly grown muskmelon cultivars having tolerance or resistance to melon aphid.

'Hymark' (Petoseed, Saticoy, Calif.), 'Magnum 45' (Petoseed), and 'Mission' (Asgrow, Kalamazoo, Mich.) muskmelon were evaluated for resistance in 1990; 'Sweet Surprise' (Sakata Seed America, McAllen, Texas) was evaluated only in 1991. In both years, plants were grown in field plots at the South Central Agricultural Research Laboratory, Lane, Okla. Each cultivar was grown under naturally aphid-infested conditions [treated with (3-phenoxyphenyl)methyl 3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropanecarboxylate (permethrin) (Pounce 25wp; FMC Corp., Philadelphia) at 0.11 kg·ha^{-1} to kill aphid predators and parasitoids] and noninfested regimes [treated with oxydemeton-methyl (Metasystox; Miles, Kansas City, Mo.) at 0.55 kg·ha^{-1}]. A split-plot design was used with insecticide treatments as main plots and cultivars as subplots. Each subplot consisted of five transplants replicated in four blocks (a total of 20 plants). The number of aphids on five leaves per plot was counted weekly beginning at the four true-leaf stage and ending at first harvest. All plots were treated at 10- to 14-day intervals with tetrachloro-isophthalo-nitrile (chloro-thalonil) (Bravo; Fermenta ASC Corp., Mentor, Ohio) for foliar disease protection. Melon aphid resistance was verified in a greenhouse study in 1993. Twenty plants each of 'Mission', 'Magnum 45', 'Sweet Surprise', and 'Hymark' were infested with five to 10 aphids per plant. Plants were covered with a ventilated cylindrical cage made of polycarbonate plastic. Aphid counts were made 12 days after infestation.

Melons free of cracking or decay were harvested from plots twice weekly. The fruit were considered unmarketable if sooty mold covered >25% of the melon's surface. Fifteen marketable, yellow fruit were evaluated for flesh color; titratable acidity; and sugar, soluble solids, and β-carotene concentrations (Collins and Perkins-Veazie, 1993; Dionix Corp.; Zscheile and Porter, 1947). Data were subjected to analysis of variance, and means were separated by LSD.

Aphid counts were higher on all nontreated plants in field plots, except for those of 'Sweet Surprise' (Table 1). Nontreated 'Sweet Surprise' and 'Hymark' plants had lower aphid counts than 'Magnum 45' or 'Mission' plants. In the greenhouse study, 'Sweet Surprise' plants were more resistant to aphids (99 ± 10 SE aphids per five leaves) than 'Mission' or 'Magnum 45' plants (312 ± 45 SE, 452 ± 80 SE aphids per five leaves, respectively). 'Hymark' plants were intermediate in resistance (194 ± 38 SE aphids per five leaves). No visible evidence of virus transmission was found.

Yields, expressed as weight (Table 1), and number of fruit of 'Magnum 45' and 'Mission' were reduced in nontreated plots (5296 ± 782 SE and 3558 ± 742 SE fruit/ha, respectively) compared to yields from 'Sweet Surprise' and 'Hymark' (7015 ± 1042 SE and 6601 ± 634 SE fruit/ha, respectively). Nontreated plants of 'Magnum 45' and 'Mission' had 38% fewer marketable fruit due to surface sooty mold than plants sprayed for melon aphid control (Table 1). 'Hymark' and 'Sweet Surprise' nontreated plants had few aphids; therefore, honeydew on fruit was slight, and the percentage of marketable fruit was only slightly decreased. Flesh quality, defined as color, β-carotene, soluble solids, or sugar concentrations were not affected by aphid infestation.

These results indicate that 'Sweet Surprise' and 'Hymark' muskmelon plants exhibited aphid resistance as defined by a reduced number of insects present on plants relative to the other cultivars. To our knowledge, the occurrence of natural aphid resistance with these commercially important cultivars has not been previously reported.

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Table 1. Effect of aphid populations on number of marketable muskmelons from plants nontreated or treated for aphids in 1990 and 1991.

Cultivar	No. aphids/five leaves		Yield (kg·ha^{-1}·10^{-3})		% Marketable fruit	
	Treated[z]	Nontreated	Treated	Nontreated	Treated	Nontreated
Hymark	2.8	24.4*	18.3	16.3	100	91.5
Magnum 45	13.4	178*	16.9	13.0	93.6	60.8*
Mission	5.2	160*	17.9	8.7*	98.7	62.1*
Sweet Surprise[y]	1.5	7.7	13.1	17.3	100	98.9
LSD[x]	7.5	103	4.9	5.4	4.7	16.3

[z]Treated with oxydemeton-methyl aphicide.
[y]No data for 1990.
[x]Mean separation in columns by LSD; no interactions were significant ($P \leq 0.05$).
*Indicates significant differences ($P \leq 0.05$ LSD) between treated and nontreated within cultivars.

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