

Pathogenicity of Erysiphe cichoracearum to cucurbits

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Powdery mildew is a devastating disease of cucurbits throughout the world. The two largely reported causal agents are Sphaerotheca fuliginea (Schlecht. ex Fr.) Poll. and Erysiphe cichoraceatum DC ex. Merat (5,8). The distribution of different Erysiphaceae (including Leveillula taurica (Lev.) Arn.) on cucurbits in the world was reviewed by Khan (5). He stated that S. fuliginea (=Sf) and E. cichoracearum (=Ec) may singly or together attack Cucumis, Cucurbita and Citrullus. Other workers (see below) reported on cross-susceptibility of cucurbits and species of other families to powdery mildews. Molot and Lecoq (9) reported that both Sf and Ec are economically important on cucurbits in France. Ec from tobacco, Aster sp. and Senecio vulgaris, but not from Lactuca serriola, was pathogenic to Cucurbita pepo (Diamant). Cucumis sativus (Marketer) became infected with Ec from Aster sp. or L. serriola but not from tobacco, whereas C. melo (Verndrais) was resistant to all Ec's. Molot et al. (10) further showed that Ec from other cucurbits or tobacco was pathogenic to squash and cucumber. In Hungary Ec and Sf were found in the field on cucumber, squash, melon and watermelon (12). Ec was able to overwinter on Aster dumosus (11). In Germany all 12 greenhouse cucumber cultivars were highly susceptible to both Ec and Sf (19). Lebeda, in Yugoslavia, failed to transfer Ec from L. serriola to cucumber (7). Stone (20) suggested that Sonchus aspen (Compositae) is a very probable source of reinfection for cucurbits with Ec in the UK. In New Zealand Sf and Ec can each attack Cucurbitaceae, Compositae and Solanaceae (1). In Israel Sf was recognized as the causal agent of powdery mildew in cucurbits (2,3,13,16,18) although earlier reports claimed for Ec as a causal agent (14,17). Eshed and Whal (3) found that powdery mildew from Hibiscus esculentum, Xanthium stramanium and Verbena hybrida was infective to melons. Khan (5) observed both Ec and Sf on cucurbits in India. While Sf attacked most of the cucurbits, Ec was confined to Benincasa hispida and Coccinia cordifolia in the field but produced perithecia on muskmelon in the greenhouse. In the USA since 1900 up to 1963 powdery mildew in cucurbits was assigned to Ec (5). In 1979 Sf was found on C. pepo (6). Kontaxis (6) suggested that the causal agent of powdery mildew in California and possibly in all USA is Sf in spite of the fact that perithecia of Ec were reported on cucurbits before (15). Indeed, perithecia of Sf were reported on various cucurbits in North Carolina in 1986 (4). McCreight et al. (8) observed Sf only on muskmelons in both the USA and France in 1964-67 and 1981-86. In Canada, Ec was reported on cucurbits (5), but cleistothecia of Sf were found in 1983 in Ontario on glasshouse-grown cucumbers (4a).

The present study was aimed at elucidating the pathogenicity of Sf from muskmelon and Ec from tobacco to various cucurbits. Plants were grown in the greenhouse to the 2-3 true leaf stage and inoculated with powdery mildew in growth chambers at 23 C. Results are given in Table 1. They show that Ec was highly infective to Cucurbita pepo, Cucurbita maxima and Lagenaria vulgaris, moderately infective to Citrullus lanatus and Citrullus colocynthis, but not infective to Cucumis sativus or Cucumis melo var. reticulatus. C. melo var. makuwa and C. melo var. acidulus were highly susceptible. Ec from Cichorium pumillum and L. serriola was infective on tobacco and C. pepo (yellow zucchini cv. Goldy) but Ec from Senecio vernalis, S. vulgaris, Erigeron crispus and

Crepis sp. was not infective to C. pepo (Goldy) or tobacco. Susceptibility to Sf varied according to plant species, cultivar and fungal race (Table 1). All cultivars of C. lanatus were resistant to Sf race 1 (although became slightly infected on hypocotyls and stems) and susceptible to race 2. All cultivars of C. pepo and C. maxima were susceptible to both races 1 and 2. In Cucumis species reaction to Sf ranged from resistance to susceptibility to either race.

We concluded that Nicotiana tabacum, C. pumillum and L. serriola are potential sources for infection of cucurbits with Ec.

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Table 1. Infectivity of Erysiphe cichoracearum from tobacco (cv. KY-16) to cucurbits.

<u>Species</u>	<u>cultivar</u>	<u>origin</u>	<u>Disease severity</u>		
			<u>Sf race 1</u>	<u>Sf race 2</u>	<u>Ec</u>
<u>Citrullus lanatus</u>	Adom	Israel	-	++	+
	Karmit	Israel	-	++	+
	Talmor	Israel	-	++	+
	Hazera - 2	Israel	-	+++	+
	Dafna	Israel	-	++	-
	Malali	Israel	-	+	+
	Charleston Gray	USA	-	++	-
	Shin-Yamato	Japan	-	-	-

<u>Citrullus colocynthis</u>		Israel	-	-	+
<u>Curcubita pepo</u>	Goldy	Israel	+++	+++	+++
	Lavan	Israel	+++	+++	++
	Maayan	Israel	+++	+	+
	Bareketh	Israel	+++	+++	++
	Beiruti	Israel	+++	+++	+
<u>Cucumis sativus</u>	Dalila	Israel	+++	++	-
	Poinsett-76	USA	+	+	-
	Marketer	USA			-
	Aonagao	Japan	++		-
	Sagami-hanjiro	Japan	++		-
	Howay GOGIO	Japan	+		-
	Jomaki	Japan	+		-
<u>Lagenaria vulgaris</u>	-	Israel	+++	++	-
<u>Lagenaria sp.</u>	Williams	USA			+++
<u>Lagenaria siceraria</u>	Oomatu-yungao	Japan			-
<u>Benincasa hispida</u>	Naga-tougan	Japan			+++
<u>Cucurbita maxima</u>		Israel	+++	+++	+++
<u>Luffa cylindrica</u>		Israel		+	-
<u>Luffa acutangula</u>		USA	-	-	-
<u>Cucumis melo</u>					
var. makuwa	Kinpyo	Japan			+++
var. conomon	Honen-ao	Japan	+++		-
var. acidulas	Kinpyo	Japan			+++
var. reticulatus	Sunrise	Japan			-
	Ananas				-
	Yokneam	Israel	+++	+++	-
	Ein-dor	Israel	-	++	-
	Galia	Israel	+	++	-
	Charantais-T	France	+++	++	-
	PMR-45	USA	-	++	-
	PMR-5	USA	-	-	-
	PMR-6	USA	-	-	-
	PI124111	USA	-	-	-
	PI124112	USA	-	-	-
	Seminole	USA	-	+	-

- no disease; + to +++ increasing amount of disease.