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Report of a deviating mildew strain

An isolate of the spinach downy mildew pathogen was recovered from spinach in May of 2009 from the Salinas Valley and designated UA2209. The isolate was recovered from the cultivar Mississippi and amplified on the cultivar Lazio.

The isolate was examined on a set of differentials and on a wide range of contemporary spinach germplasm. Based on disease reactions on a set of differential lines, the isolate was distinct from those previously reported. The isolate also was able to infect many of the newer cultivars that have reported resistance to races 1-11 (see **Table 1** below). However, it appears that lines or hybrids that have the *Pfs-3* resistance locus (Califlay type resistance to race 1,3,5,8,9, and 11) are resistant to strain UA2209. More work is underway to examine a wider set of germplasm susceptibility to this deviating strain. A second strain, that gave the same disease reactions on the international set of differentials as UA2209, also has been identified.

The International Working Group on Peronospora (IWGP) recently discussed the overall concern about the potential economic impact of this new strain as well as the rate at which new strains of the pathogen continue to appear. The appearance of multiple new strains of the spinach downy mildew pathogen in recent years, and their apparent rapid global spread, is impacting growers, seed producers, and the ability to release new cultivars with the necessary resistance. The IWGP discussed developing a forum to evaluate factors that might be contributing to the rapid development of new mildew strains, and most importantly, management practices that might help reduce the rate at which new strains are developing in both conventional and organic spinach production.

A potential opportunity for a meeting to discuss downy mildew research and concerns is being tentatively planned for the month of October, 2009. Additional information on this meeting will be announced in the near future.

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Table 1. Disease responses of spinach germplasm to downy mildew race 11 and a novel strain (UA2209 - recovered from the cv. Mississippi) in May/June 2009.

Entry	Cultivar	Race 11	UA2209	Entry	Cultivar	Race 11	UA2209
12	Amazon	-	+	83	Grandi	+	+
13	Carmel	-	+	84	Marabu	+	+
14	Hunter	-	+	85	Missouri	-	+
15	Misano	+	+	86	Ohio	+	+
16	Mississippi	-	+	87	Ottowa	+	+
17	Missouri	-	+	88	Pelican	+	+
18	Tasman	-*	-*	89	Pol. Bear	+	+
19	Thames	-*	-*	90	Slv. Whale	-	-
20	Waitiki	-	-	91	Squirrel	-	+
23	El Patriot	-	-	92	Whale	-	-
24	Tbird	-	+	93	Yabi	+	+
25	Corvette	-*	+	107	Indurain	-	-
27	Cook	-	+	111	Amazon	-	+
28	Bahamas	-	+	112	Missouri	-	+
29	Tonga	-	+	113	Mississippi	-	+
30	Wallis	-	+	123	Fallgreen	+	+
31	Squirrel	-	+	124	97-154	+	+
54	Bahamas	-	+	125	04-103	+	+
55	Bonbini	+	+	126	03-316	+	+
56	Corfu	+	+	127	91-227	+	+
57	Emu	+	+	128	88-310	+	+
58	El Forte	+	+	129	88-212	+	+
59	El Grinta	+	+	130	88-130	+	+
64	Grandi	+	+	131	Viroflay	+	+
65	Ibiza	+	+	132	Resistoflay	+	+
66	Marabu	+	+	133	Califlay	-*	-
67	Squirrel	-	+	134	Clermont	+	+
68	Swan	-	+	135	Campania	-*	+
69	Tonga	-	+	136	Boeing	-	+
70	Yabi	+	+	137	Lion	-	-
71	Flamingo	-	-	138	Lazio	+	+
72	Amazon	-	+	139	Whale	-	-
74	Bonbini	+	+	141	Rebris	-	+
75	Corfu	+	+	142	Resistoflay	+	+
76	Dolphin	-	+	143	Califlay	-	-
77	Eagle	-	+	144	Bolero	+	+
78	Ebro	+	+	145	Campania	-	+
79	El Forte	+	+	146	Avenger	-	+
80	Emilia	+	+	147	Lion	-	-
81	Emu	+	+	148	Lazio	+	+
82	Giraffe	-	+	149	Dolphin	-	+
				150	Polka	-	-

“+” = susceptible response.

“-” = resistance response.

“-*” = susceptible plants observed in resistant lines.

Note that the reactions do not include or imply disease reactions to races 1 through 10.