

**Project Title: Race diversity and the biology of the spinach downy mildew pathogen.
CLGRB Progress Report
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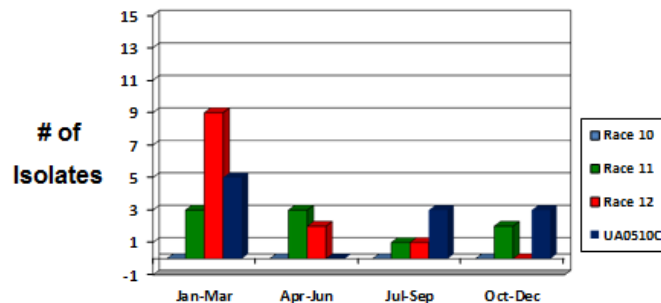
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Summary

The Correll and Koike labs have continued efforts to survey and characterize isolates of the downy mildew pathogen in 2010 and 2011. With regard to the races of the downy mildew pathogen, the IWGP recently (January 2011) sanctioned isolate UA2209, recovered in 2009, as race 12. A coordinated press release in the E.U. and by the UCCE publicizing the race designation occurred in March of 2011. Several additional deviating isolates have been identified and characterized, including UA510C. Isolate UA510C can be distinguished from race 11 by susceptible reactions on the differentials Califlay and Polka in the Correll lab. Other labs, particularly in Europe, have not observed such a clear susceptible reaction on these two differentials. A summary of the disease reactions of the known races and deviating isolates on the differentials and other select lines is listed in **Table 1** below.

A total of 35 isolates from California and Arizona were examined by the Correll and Koike labs in 2010 and early 2011. Two races, race 11 and 12, and deviating isolate UA510C were identified (**Figure 1**). Two additional deviating isolates, UA1210APC and UA4410, also were identified (**Table 1**). UA1210C, from Zebu, is similar to race 11 on differentials, but can overcome the resistance in some additional spinach lines. UA4410, from Pigeon, is similar to race 12, but can overcome the resistance in some lines. In addition, the disease reactions of a larger set of (115 lines) of germplasm has been examined to the various races and deviating isolates and can be viewed at the Spinach Portal website (<http://spinach.uark.edu/>) under “Recent News” or at the CLGRB website. An isolate identified in 2011, UA0811, initially caused infection on all differentials, but subsequent testing indicated it most likely a UA510C type.

**Mildew Races Identified
2010**



Not shown: Zebu isolate UA1210 = “11-like”; and UA4410 = “12-like”

Table 1. Disease reactions of spinach differentials and various lines to a reference isolate of race 10, race 11, race 12, and several deviating isolates.

Race (Isolate)	Race 10 (INT-1)	Race 11 (UA2708PL)	Race 12 (UA2209)	(UA510C)	(UA4410)	(UA1210APC)
NIL1	+	-	+	-	+	-
NIL2	-	+	+	+	+	+
Viroflay	+	+	+	+	+	+
Resistoflay	+	+	+	+	+	+
Califlay	+	-	-	+	-	-
Bolero	+	+	+	+	+	+
Compania	+	-	+	+	+	-
Avenger	+	-	+	-	+	-
Lion	+	-	-	-	-	-
Lazio	-	+	+	+	+	+
Dolphin	+	-	+	-	+	-
Polka	+	-	-	+	-	-
51-704	-	-	-	-	+	-
Zebu	-	-	-	-	+	+
Pigeon	nt	-	-	-	+	-
Charger	nt	-	-	+	nt	+

+ = Susceptible, $\geq 85\%$ of plants, and often closer to 100% show symptoms and sporulation on over 50% of individual cotyledons.

- = Resistant, $\leq 15\%$ of plants, and often closer to 0% show symptoms and sporulation on the cotyledons.

nt = not tested.

NIL1 and NIL2 are “near isogenic lines” that were developed to contain a single resistance locus in an otherwise susceptible background. NIL1 contains the *RPF1* resistance locus and NIL2 contains the *RPF2* resistance locus.