

3. Inheritance of resistance to *P. sorghi* in three sources of resistance from Mexico.

Rust resistant inbreds Mex 185-1 (Queretaro V 260-1-2-1), Mex 189 (Queretaro VI 366) and Mex 212 (Queretaro V 231-5-2-1) were obtained by crossing the Mexican sources with corn belt inbreds, backcrossing to the corn belt inbreds, and selfing. These inbreds were crossed with the susceptible inbreds B14, R168, and W153R. F₂ populations and backcrosses to the susceptible inbred were evaluated with rust culture 901aba. Single major gene ratios were obtained as indicated in the following data:

Cross	No. of plants observed		Expected ratio	P Value
	Res.	Susc.		
(Mex 185-1 x R168) F ₂	84	43	3:1	.02-.05
(Mex 185-1 x R168) x R168	62	65	1:1	.70-.80
(Mex 185-1 x B14) F ₂	92	32	3:1	.80-.90
(Mex 185-1 x B14) x B14	34	38	1:1	.10-.20
(Mex 189 x R168) F ₂	82	38	3:1	.05-.10
(Mex 189 x R168) x R168	63	63	1:1	>.99
(Mex 189 x W153R) F ₂	191	55	3:1	.30-.50
(Mex 189 x W153R) x W153R	67	63	1:1	.70-.80
(Mex 212 x R168) F ₂	95	33	3:1	.80-.90
(Mex 212 x R168) x R168	68	60	1:1	.30-.50
(Mex 212 x B14) F ₂	84	27	3:1	.80-.90
(Mex 212 x B14) x B14	58	58	1:1	>.99

Inbreds Mex 185-1 and Mex 189 were crossed with Syn. A, Mex 212 crossed with B. Y. Dent, and Mex 185-1 crossed with Mex 212. These single crosses were advanced to the F₂ and crossed with R168 or B14. The following data were obtained in greenhouse tests with rust cultures 901aba and 928b which are avirulent to the resistant inbreds:

Cross	No. of plants obtained		Expected ratio	P Value
	Res.	Susc.		
(Mex 185-1 x Syn A) F ₂	100	12	15:1	.05-.10
(Mex 185-1 x Syn A) x R168	95	36	3:1	.50-.70
(Mex 189 x Syn A) F ₂	132	0	1:0	
(Mex 212 x B.Y. Dent) F ₂	127	0	1:0	
(Mex 212 x B.Y. Dent) x R168	484	1	1:0	
(Mex 185-1 x Mex 212) F ₂	95	5	15:1	.50-.70
(Mex 185-1 x Mex 212) x B14	84	14	3:1	.01-.02

These data indicate that the gene for rust resistance in Mex 185-1 assort independently of genes at the Rp locus (Syn A and B.Y. Dent) and that the genes in Mex 189 and Mex 212 are either at or closely linked to the Rp locus.

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4. A gene in P.I. 163558 (Guatemala Flint) for resistance to P. sorghi.

Inheritance studies involving F_1 , F_3 , and backcross progenies derived from a cross of a rust-resistant inbred selected from P. I. 163558 with the susceptible inbred B14 indicate that P. I. 163558 contains a single dominant gene for resistance to P. sorghi. This is indicated by the following number of resistant, segregating, or susceptible progenies obtained following the selfing of F_2 and backcross populations:

Cross	No. progenies observed			Expected ratio	P Value
	Res.	Seg.	Susc.		
(B14 x P1163558) F_3	24	44	18	1:2:1	.50-.80
(B14 x P1163558) x B14 selfed	0	16	13	0:1:1	.50-.80

P. I. 163558 was crossed with K148 containing Rp^3 , advanced to the F_3 generation and tested with cultures 904d, 908R, and 928b of P. sorghi. P. I. 163558 and the F_1 were resistant to all 3 cultures while K148 was resistant to culture 928b but susceptible to cultures 904d and 908R. The following data indicate that the gene in P. I. 163558 is either at the Rp locus or closely linked to it.

Cross	Rust Culture	No. progenies observed			Expected ratio	P Value
		Res.	Seg.	Susc.		
(K148 x P1163558) F_3	904d	15	22	10	1:2:1	.50-.80
"	908R	15	22	10	1:2:1	.50-.80
"	928b	47	0	0	1:0:0	

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