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1. Sources of resistance to rust, Puccinia sorghi Schw.

An effort is being made to assemble as many sources of resistance (expressed in the seedling stage) to P. sorghi as possible from all regions of the world for a comprehensive genetic study of host: parasite interactions. Sixty-four resistant strains were located between 1953 and 1957 (Phytopathology 47:187-191). Subsequently 14 additional resistant strains have been located or received from other workers. To date sources of resistance have been obtained from Argentina, Australia, Canada, Ethiopia, Guatemala, Kenya, Mexico, Peru, South Africa, Turkey, U. S., and Yugoslavia. Many of these sources of resistance are available for exchange with other workers. Receipt of resistant types from indigenous varieties outside of the U. S. and Mexico would be greatly appreciated.

The genes for rust resistance from the various sources are being transferred to inbreds B14 and R168 by backcrossing. These "nearly isogenic" lines will be used for genetic studies with the fungus P. sorghi.

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2. Another locus for resistance to P. sorghi located in Australian inbred lines.

Studies involving F_1 , F_2 , and backcross progenies derived from crosses of rust-resistant Australian inbreds 25, M16, and NN14 with the rust-susceptible inbreds B14, Oh07K, R168, and W153R revealed single dominant genes for resistance in each of the resistant inbreds. This is illustrated by the following data obtained from tests with rust culture 901aba.

Cross	No. of plants observed		Expected ratio	P Value
	Res.	Susc.		
(25 x W153R) F ₂	94	34	3:1	.10-.20
(25 x W153R) x W153R	64	70	1:1	.10-.20
(25 x R168) F ₂	104	19	3:1	.01-.02
(25 x R168) x R168	63	64	1:1	.90-.95
(M16 x B14) F ₂	76	23	3:1	.50-.70
(M16 x B14) x B14	73	61	1:1	.20-.30
(M16 x Oh07K) F ₂	92	26	3:1	.30-.50
(M16 x Oh07K) x Oh07K	60	73	1:1	.20-.30
(NN14 x R168) F ₂	97	40	3:1	.20-.30
(NN14 x R168) x R168	67	73	1:1	.50-.70
(NN14 x B14) F ₂	100	32	3:1	.80-.90
(NN14 x B14) x B14	66	61	1:1	.50-.70

The three rust-resistant inbreds were crossed with Syn A having gene Rp³ for rust resistance and advanced to the F₂ generation. The F₁ was also crossed with R168. Tests with rust culture 90laba, giving resistant reactions with Syn A and the Australian inbreds, indicated that the gene(s) in the Australian inbreds assort independently of Rp³. The following data were obtained:

Cross	No. of plants observed		Expected ratio	P Value
	Res.	Susc.		
(25 x Syn A) F ₂	121	13	15:1	.05-.10
(25 x Syn A) x R168	99	35	3:1	.70-.80
(M16 x Syn A) F ₂	120	9	15:1	.70-.80
(M16 x Syn A) x R168	103	28	3:1	.30-.50
(NN14 x Syn A) F ₂	116	4	15:1	.10-.20
(NN14 x Syn A) x R168	111	19	3:1	<.01

It is interesting to note that tests conducted at Grafton, New South Wales with these Australian inbred lines indicate that they all have the same recessive gene for resistance to certain Australian cultures of P. sorghi (K. S. McWhirter, Personal Communication).

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