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1. Inheritance of chlorotic lesion resistance to Helminthosporium turcicum in the Australian inbred NN14.

Chlorotic-lesion resistance to northern leaf blight (H. turcicum) has been described in previous communications from this laboratory. It has been found in numerous pop, sweet, white dent, yellow dent, and flint corns and in teosinte. Usually resistance is inherited as a single dominant gene in each source, although a slightly different form of chlorotic-lesion resistance is apparently recessive in inheritance.

Inbred NN14 is unique in that it contains two dominant genes for resistance. This hypothesis is supported by the following data from crosses involving several susceptible inbreds and NN14:

Cross	Greenhouse or Field Test	Observed Res.	Seg.	Susc.	Expected Ratio	X	P Value
NN14 x B14 F_2	Greenhouse	92		4	15:1	0.7111	0.30-0.50
NN14 x Syn A F_2	"	93		5	15:1	0.2204	0.50-0.70
(NN14 x Syn A) x 168	"	74		26	3:1	0.533	0.80-0.90
R168 x NN14 F_2	Field	95		9	15:1	1.0256	0.30-0.50
		Res.	Seg.	Susc.			
NN14 x B14 F_3	Greenhouse	58	59	7	2:8:1	0.4770	0.30-0.50

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2. Apparent reversal of dominance of a gene in corn for resistance to Puccinia sorghi.

Necrotic flecks develop on seedlings of the resistant inbreds NN14 and M16 when inoculated with P. sorghi culture 901aba whereas small pustules surrounded by chlorotic margins develop when these inbreds are inoculated with culture 933a. Well developed pustules without chlorosis form on the susceptible inbreds B14 and R168 when inoculated with either culture.

On single crosses between the resistant and susceptible inbreds, necrotic flecks developed when the seedlings were inoculated with 901aba but well developed pustules formed when inoculated with 933a. On the basis of F_1 data, resistance was dominant over susceptibility to 901aba but recessive to 933a.

In the first experiment involving segregating plants, F_2 progeny were tested for reaction to the two cultures.

Cross	Rust Culture	Observed Ratio Res.	Observed Ratio Susc.	Expected Ratio	X^2	P Value
M16 x B14	901aba	76	23	3:1	0.16	0.50-0.70
M16 x B14	933a	15	64	1:3	1.52	0.10-0.25
NN14 x B14	901aba	100	32	3:1	0.04	0.80-0.90
NN14 x B14	933a	19	84	1:3	2.36	0.10-0.25

In the second experiment, individual F_2 seedlings from the cross NN14 x B14 were inoculated sequentially with cultures 901aba and 933a. All seedlings were inoculated at the three-leaf stage; the third leaf was covered with a thin paper envelope so that only the first and second leaves were exposed at inoculation with the first culture. Three days later, paper envelopes were removed and the plants were inoculated with the second culture. Half of the plants were inoculated with culture 901aba followed by 933a and the other half with 933a followed by 901aba.

In this experiment, 21 seedlings were resistant to both rust cultures and 36 seedlings were susceptible to both cultures. The remaining 61 seedlings were resistant to culture 901aba but susceptible to 933a. The observed ratio fits an expected 1:2:1 ratio ($X^2 = 3.949$, P = 0.10-0.20).

In the third experiment, F_2 plants were selfed and approximately 20 seedlings in each progeny were inoculated with each culture. The following data were obtained:

Cross	P. sorghi Culture	Observed Ratio Res.	Seg.	Susc.	X^2	P Value (1:2:1)
NN14 x B14	901aba	36	67	22	3.784	0.10-0.25
NN14 x B14	933a	36	67	22	3.784	0.10-0.25
M16 x B14	901aba	17	41	15	1.219	0.50-0.75
M16 x B14	933a	17	41	15	1.219	0.50-0.75

No progeny in the F_3 was uniformly resistant or susceptible to one culture and segregating for the other or uniformly resistant to one but susceptible to the other.

The dominant gene has previously been designated as $\underline{Rp_3}$. Gene $\underline{Rp_3}$ acts as a dominant in conferring resistance to culture 901aba of P. sorghi and as a resessive in conferring resistance to culture 933a. The apparent reversal of dominance may be accounted for on the basis of dosage effect of a single allele or on the basis of two alleles being closely linked.

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1. Preferential pairing in chromosome 10 structural heterozygotes.

Rhoades (1952, in Heterosis, Iowa State Press) has observed at diakinesis a high degree of preferential pairing of structurally alike homologs in chromosome 10 trisomes which were duplex or simplex for abnormal chromosome 10 (K10). Results indicating preferential pairing of chromosome 10 are reported here for duplexes (K10/K10/k10/k10) derived from K10-carrying asynaptic diploids crossed as females with an established tetraploid stock. The duplex heterozygotes were backcrossed to the tetraploid parent and the resulting progeny were scored for K10 in dividing root tip cells prepared by a modified Feulgen squash technique. The data obtained are presented below.