V. RESEARCH NOTES

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1) Tolerance/resistance to soybean mosaic virus.

A natural epiphytotic of soybean mosaic virus (SMV) occurred at the Harrow Station in 1976. The disease, which was noted in early July, reduced plant growth. Advanced lines from 'Corsoy' x 'Chippewa 64' were being tested in the field in relation to their flavonol glycoside classification. Plants were rated for severity of leaf symptoms and seeds were rated for mottling.

The parents differed in degree of leaf symptoms and in seedcoat mottling; there were differences among the lines also (Table 1). Although the gray-pubescent Corsoy had a higher mottling rating than the brown-pubescent Chippewa 64, the *TT* lines had a higher average rating than *tt*. Wilcox and Laviolette (1968) reported greater mottling for *T* vs. *t*.

Table 1. Test results from Corsoy (*t*) x Chippewa 64 (*T*)

		Ratings (1 =none; 9 = severe)		
	n	Min.	Average	Max.
		Leaf symptoms Aug. 4, 1976		
Corsoy	4	4.0	5.4 a	7.0
Chippewa 64	4	1.0	1.5 b	2.0
Lines	48	1.0	2.8	6.2
		Seedcoat mottling		
Corsoy	4	1.0	2.7 o	4.0
Chippewa 64	4	1.0	1.9 p	3.0
Lines	48	1.0	3.0	5.8
T	24	1.5	4.1 x	5.8
t	24	1.0	2.0 y	5.0

n = number in each of 4 replicates.

a, b; o, p; x, y significant differences for each pair, P = 0.01.

Broad-sense heritability was 92% for leaf ratings and 97% for seedcoat ratings. However, ratings for mottling were not closely correlated with the leaf ratings (r = +0.52**; P = 0.01). The 48 lines were separated into three equal groups of those with the lowest, intermediate, and highest mean ratings for leaf symptoms. The three groups differed (P = 0.01) for yield in 1976 but not in 1974 (a year when SMV was not a problem). Although direct comparisons of magnitude cannot be made between the years, the relative performance of the groups can be assessed. In 1976, the groups with lowest, intermediate, and highest ratings yielded 84, 69, and 58% of their yield in 1974, which indicates that some of the lines were more tolerant to SMV than others.

In addition, 'Raiden' and some of its progeny were free of leaf symptoms and seedcoat mottling in 1976, which suggested resistance to the virus. The resistance was attributed to a single dominant gene. Kiihl and Hartwig (1979) have reported an *Rsv* gene for SMV resistance; the gene from Raiden is different from it (Buzzell and Tu, unpublished) and is not linked to a gene (probably Rps_1^c) for phytophthora resistance (Table 2).

Table 2. Test results from OX613 (rsv_2 *rps*) x OX615 (Rsv_2 *Rps*)

Genes	a	b	c	d	Sum	R%	SE	Phase
Rsv_2 rsv_2 *Rps rps**	54	12	20	7	93	43.7	7.2	C

*Probably Rps_1^c.

Rsv_2 (OX615) and rsv_2 (OX615-S) isolines derived from an F_4 plant of 'Harcor' x OX315 (Harcor x Raiden) were tested for yield in 1978 and 1979 in a field where SMV was prevalent. The susceptible isoline yielded 19% less than the resistant isoline. OX615 was free of leaf symptoms, was taller, and had no seedcoat mottling. Leaf symptoms were not severe on OX615-S but maturity was delayed; seedcoat mottling was rated as 2.7 (1 = none; 5 = considerable).

References

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Wilcox, J. R. and F. A. Laviolette. 1968. Seedcoat mottling response of soybean genotypes to infection with soybean mosaic virus. Phytopathology 58:1446-1447.

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2) Soybean cultivar response to manganese.

Manganese deficiency of soybeans, *Glycine max* (L.) Merr., commonly occurs in southwestern Ontario. Observation of soybean fields indicated that cultivars differed in degree of Mn-deficiency symptoms. To test this observation, 'Harosoy 63' and 'Harman' were grown in 3-replicate tests at six locations in 1963; and, in 1964 and 1965, these cultivars were grown along with 'Hawkeye 63' and 'Lindarin 63' in 4-replicate tests at one location. The soils were Brookston clay with phosphate-extractable Mn (Hoff and Mederski, 1958) between 2.7 and 4.8 ppm. Soil pH ranged from 6.0 to 6.7 and the acid soluble plus absorbed phosphorus (Bray and Kurtz, 1945) ranged from 56 to 124 ppm. Manganese sulfate was applied at the recommended rate of 9 kg/ha as a foliar spray around the first of July for comparison with unsprayed plots. We sampled newly expanded upper leaves 3 to 4 weeks after spraying (i.e., during pod set) and determined Mn content colorimetrically. Bean yield was measured. Mn content of the 1965 seed was determined.

Jones (1967), using samples taken prior to pod set, arrived at the following categories for soybean leaf Mn: 14 ppm and less as deficient, 15 to 20 ppm as low, and 21 to 100 ppm as sufficient. Using Jones' classification with the reservation that our leaf Mn values may be lower than would have been obtained prior to pod set, our results (Table 1) show that there are differences among soybean cultivars in Mn nutrition. Harman and Hawkeye 63 are more likely to be in the deficient category than are Harosoy 63 and Lindarin 63. Also, Harman and Hawkeye 63 are more likely to show yield responses in the low category than are Harosoy 63 and Lindarin 63. Cox (1968) indicated that 20 ppm of Mn in the leaf and the seed was the critical level for Mn deficiency. The untreated Harman and Hawkeye 63 averaged 2 ppm less Mn in the seeds than in the leaves, whereas Harosoy 63 and Lindarin 63 averaged 4 ppm less.

Table 1. Soybean cultivar response to managaese

	Mn++ ppm in leaves			Bean yield (kg/ha)		
Cultivar	0		Mn	0		Mn
			1963			
Harosoy 63	17		18	1650		1720
Harman	12	*	15	1530	*	1770
			1964			
Harosoy 63	14	*	17	2170	*	2800
Harman	13	*	16	1580	*	2410
Hawkeye 63	10	*	16	1950	*	2770
Lindarin 63	14		16	1650	*	2410
			1965			
Harosoy 63	19		22	2500		2470
Harman	18		22	1800	*	2670
Hawkeye 63	17		22	1930	*	2720
Lindarin 63	19		22	2020		2300

*Treated differed significantly (P = 0.05) from untreated.

References

Bray, R. H. and L. W. Kurtz. 1945. Determination of total, organic and available forms of phosphorus in soils. Soil Sci. 59:39-45.

Cox, F. R. 1968. Development of a yield response prediction and manganese soil test interpretation for soybeans. Agron. J. 60:521-524.

Hoff, D. J. and H. J. Mederski. 1958. The chemical estimation of plant available soil manganese. Soil Sci. Soc. Amer. Proc. 22:129-136.

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