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1) Breeding for resistance to yellow mosaic virus through interspecific hybridization in soybean.

Yellow mosaic is one of the major diseases of soybean in the northern part of India and in Bangladesh and Sri Lanka. It is more serious in the Tarai region of Uttar Pradesh and has caused a setback to its cultivation. The virus is transmitted through white fly (*Bemisia tabaci* Genn). Resistance to this disease was reported from this breeding program by Singh et al. (1974) in PI 171443 (UPSM-534) and *Glycine formosana*. Resistance in UPSM-534 is due to two recessive gene pairs (Singh and Malick, 1978) and in *Glycine formosana*, probably due to one dominant gene. These two donors are frequently being used in our ongoing soybean breeding program. Here, we wish to examine the prospects of new breeding lines having yellow mosaic resistance from *Glycine formosana*.

Glycine formosana is a typical wild-looking soybean. It was introduced by B. B. Singh, ex-soybean breeder of this university through the courtesy of K. L. Chan, Taiwan Agricultural Research Institute, Taipei. It has very narrow leaves and indeterminate growth habit. It matures in about 130 days and pods shatter easily. It is resistant to yellow mosaic and susceptible to bacterial pustules. It can be crossed easily with cultivated soybeans (Singh et al., 1974). *Glycine formosana* was crossed with 'Bragg' (susceptible to yellow mosaic and resistant to bacterial pustules). The F_1 was back-crossed with Bragg and the BC_1 progenies were handled through pedigree method of breeding, selecting for yellow mosaic resistance and other desirable economic traits. Straight F_1s advanced to F_2 and F_3 failed to generate agronomically superior lines and were rejected. The performance of yellow mosaic resistant lines developed through this program is given in Table 1. In 1980 evaluation, all the six breeding lines demonstrated resistance to yellow mosaic and outyielded Bragg (check), although the yield difference was not significant. In 1981 evaluation, all 19 lines outyielded Bragg. PK-502, PK-505, PK-507, PK-508, PK-510, PK-520 and PK-522 gave significantly higher yield than Bragg. In 1982 evaluation, all the six breeding lines outyielded Bragg significantly. Thus, these newly developed soybean breeding lines derived from (*Glycine formosana* x Bragg) x Bragg crosses had resistance to yellow mosaic and gave better yield than Bragg.

Some of these lines (PK-486 and PK-515), when tested at various locations under all India coordinated soybean research program, gave better yield performance across the locations (AICRPS, 1983). PK-486 is in the final stage of evaluation in the coordinated elite varietal trial and is likely to be released for the northern plains of India.

Therefore, it is obvious that *Glycine formosana* can be successfully utilized in a soybean breeding program to develop varieties resistant to yellow mosaic. Only one back-cross is adequate, and further handling of BC_1 progenies in pedigree method was found to be satisfactory. Some of the newly derived lines from (*Glycine formosana* x Bragg) x Bragg crosses were prone to shattering and lodging. This was due to the fact that *Glycine formosana* is a shattering type and has prostrate growth habit. The stem is viny and weak. Hence, while handling segregating lines derived from crosses involving *Glycine formosana*, care has to be taken to eliminate such lines during selection.

Table 1. Yield performance of soybean lines having yellow mosaic resistance gene from *Glycine formosana*

Year of evaluation	Line	Days to flower	Days to maturity	Plant height (cm)	Pods per plant	Seeds per pod	100-seed weight (g)	Seed yield (kg/ha)
1980	PK-496	52	119	65	88	1.90	11.2	2100
	PK-487	52	119	72	84	2.15	8.1	1806
	PK-488	52	120	70	76	2.05	13.0	2030
	PK-489	52	120	71	87	1.90	12.7	1961
	PK-490	52	119	66	92	1.95	13.7	2187
	PK-491	52	119	71	78	2.00	12.0	2014
	Bragg	48	120	66	91	2.10	16.7	1875
CD 5%								N.S.
CV (%)								21.59
1981	PK-502	46	116	70	101	2.20	9.0	2315
	PK-504	49	119	87	64	2.30	11.0	2100
	PK-505	53	118	77	79	2.40	11.8	2534
	PK-506	52	119	74	79	2.25	13.0	1961
	PK-507	49	118	79	76	2.25	11.1	2292
	PK-508	48	118	76	73	2.25	13.0	2759
	PK-509	48	117	87	104	2.15	12.3	2031
	PK-510	49	117	72	104	2.40	13.1	2483
	PK-511	47	116	92	70	2.20	10.5	1858
	PK-512	49	117	67	83	2.30	8.5	1597
	PK-514	47	117	81	99	2.25	9.2	1996
	PK-515	53	120	88	95	2.35	8.0	2170
	PK-516	49	118	87	92	2.10	14.5	2031
	PK-517	48	120	72	70	2.12	10.5	2083
	PK-518	49	118	104	94	2.10	15.3	1770
	PK-519	47	121	71	88	2.50	10.7	2535
	Bragg	45	119	69	98	2.15	15.3	1563
CD 5%								643
CV (%)								22.42

Table 1. *Continued*

Year of evaluation	Line	Days to flower	Days to maturity	Plant height (cm)	Pods per plant	Seeds per pod	100-seed weight (g)	Seed yield (kg/ha)
	PK-520	46	117	69	88	2.60	10.4	2674
	PK-521	46	118	71	120	2.26	10.1	2362
	PK-522	46	116	77	124	2.30	10.4	2622
	Bragg	46	117	70	86	2.20	15.0	1753
CD 5%								619
CV (%)								19.83
1982	PK-699	52	118	62	54	2.30	16.9	2083
	PK-700	60	129	63	49	2.30	12.5	2361
	PK-701	54	123	85	68	1.80	13.5	2083
	PK-702	52	117	55	76	2.20	13.9	2291
	PK-703	53	120	50	45	2.40	15.7	2152
	PK-704	54	120	70	49	2.20	16.2	2291
	Bragg	51	117	63	72	2.20	13.1	1388
CD 5%								479
CV (%)								18.40

NB: Bragg susceptible to yellow mosaic.

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