

The *st* gene is located on chromosome 3 so *en* is also a member of this linkage group. We detected no linkage with *en* which may indicate that *en* lies on the far side of *st* [M side-- Ed.]. Our data with *f* is incomplete but a greater number of parental types than expected was found in the segregation of *en* and *f*, thus suggesting that *en* may lie on the same side of *st* as *f*.

Editor's Note:

The results reported in the above paper are in accord with unpublished results secured by I). W. Barton in 1959. Barton obtained negative evidence for linkage with markers on chromosomes 1, 2, 4, 5, 6, and 7 but positive evidence for linkage with *M* and *st* on 3. The CrO estimates between *En-M* and *En-St* were calculated as 33 and 38, respectively. In the case of the *En-M* linkage, a combined population of over 2200 plants was involved, but the population size for the *En-st* linkage was only 171 plants. The estimate of linkage with *b* was 45% but the Chi-square was not significant. He concluded that *En* probably lies between *M* and *St*.

WITHIN-LINE HETEROGENEITY FOR GENE *sbm* IN THE U.S. PISUM COLLECTION

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During a recent search (1) for sources of immunity to pea seedborne mosaic virus [gene *sbm* (2)] among 668 untested U.S. Plant Introduction accessions of *Pisum*, 16 lines homogeneous for immunity were identified. The 16 lines were released to U.S. plant breeders by special memorandum in October, 1976. Having been selected specifically for PSbMV-immunity, these lines represented the usual gamut of non-horticultural plant characteristics. Numerous other lines, however, consisted of obvious mixtures of seed and plant type, but contained a majority of immune plants, and still others contained a minority of immune plants.

These results prompted the question: is the *sbm* allele relatively common in the USDA collection of *Pisum*? If so, might a diverse source of *sbm* provide breeders with a better choice of horticultural characteristics for breeding purposes than is available in the released lines?

I therefore examined data from the above 668 lines to identify those that were previously excluded on the basis of either seed or plant type mixtures, or heterogeneity for gene *sbm* (not pure for *sbm/sbm* plants). Resistance was found in 160 lines in addition to the 16 previously released to

plant breeders. Some of these (Table 1) offered plant characteristics generally superior to those of lines already released and consequently might serve as good sources of resistance.

Table 1. Characteristics of Plant Introduction accessions that were heterogeneous for gene *sbm* or for seed type, thus constituting additional sources of PSbMV immunity. ^{1/}

PI accession	Selected plant characteristics ^{2/}										
	Reaction to PSbMV inocul'n	Uniformity	Habit	Ht (cm)	Nodes to first flower	Days to first flower	Maturity	Flower color	Seed		Days to harvest
								surface	color		
314795	0,4 ^{3/}	7	Dw	42	9	56	4	White	Smooth	Green	88
343305	0	7	Dw	56	8	55	6	Purple	-	Green	93
343328	0,1	7	Dw	35	10	52	6	White	Smooth	Green	81
343333	0,1	6	Dw	60	9	46	5	Purple	Smooth	Brown	91
347329	0	6	Int	85	12	55	4	White	Smooth	Mix	95
347422	0	8	Dw	55	9	53	9	Purple	Smooth	Mix	84
347464	0	6	Dw	50	2	50	9	Purple	Smooth	Mix	84
347466	0	7	Dw	45	7	50	7	Purple	-	Mix	91
347467	0	7	Dw	55	9	50	8	Purple	Smooth	Mix	88
347482	0,1	7	Dw	55	10	55	7	White	Wrinkled	Mix	91
347492	0	6	Dw	60	7	41	9	Purple	Smooth	Mix	83
347528	0,1	6	Dw	40	7	53	9	White	Wrinkled	Green	91
357005	0,1	7	Dw	55	9	52	8	Purple	Smooth	Mix	85

^{1/} In addition to 16 released

^{2/} Described in Northeast Regional Plant Introduction Station Service Publication No. 22

^{3/} 0 = immune response (no virus multiplication), 1 = slight leafroll, 4 = whole-plant necrosis

It must be stressed, however, that if accessions such as PI 314795, 347795, and 347528, which were found to contain mixtures of susceptible and immune types, were selected as a source of *sbm*, then the persons attempting to utilize this source would need to be equipped to detect and eliminate susceptible plants from the stock prior to use. Less than stringent measures, in this case, would permit introduction of PSbMV into a program, predisposing susceptible materials to infection.

1. Hampton, R. O. and S. W. Braverman. 1979. Plant Dis. Repr. 63:95-99.
2. Hagedorn, J. and E. T. Gritton. 1973. Phytopathology 63:1130-1133.