Table 2

Segregation for flower color

Crosses	Observed number		Segregation 3:1		Segregation 9:7	
	Purple	Green	χ^2	P	χ^2	P
Mikawashima x Wells	51	16	0.044	0.90-0.75		
Mikawashima x SRF 150	106	35	0.002	0.95-0.90		
Mikawashima x XK 505	20	15	5.952	0.02-0.01	0.011	0.95-0.90
Mikawashima x Beeson	57	17	0.162	0.75-0.50		
Mikawashima x Caloria	93	21	2.632	0.25-0.10		
Mikawashima x Corsoy	46	15	0.005	0.95-0.90		
Traverse x Extra Early	75	35	2.727	0.10-0.05		

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1) Changing the maturity of soybean cultivars using EMS.

This study was conducted to determine if the mutagenic agent, ethyl methane sulfonate (EMS), could be used to change the maturity of a soybean line while still maintaining the yielding ability and other morphological characters of the line. Mutants with changes in maturity have been reported

in several experiments (Kawai, 1970); however, there are few reports where soybeans have been used in studies of this kind.

In the study 1000 seeds of the cultivar 'Williams' were allowed to imbibe water for 16 hours by being soaked in distilled water that was aerated. The seeds were then soaked in a .05M EMS solution (buffered with NaOH to pH 7.0) for 8 hours with continuous aeration (Constantin et al., 1976). The seeds were then washed in distilled water and planted immediately. In addition, control seeds were planted that had been soaked in aerated distilled water for 24 hours.

The M_1 seeds were harvested in bulk and planted the next year along with untreated controls. In the fall single plant selections were made of the plants maturing later than the control. Over 100 plants were selected that appeared to be later than Williams. The seeds of each single plant selected were grown in individual rows the next year and the rows evaluated for maturity, yield and other characters. Those selections which had later maturity, equivalent yields, and were similar to Williams in other characteristics, were planted in four-row plots for further evaluation. A few of the selections had some sterile plants in the plots so they were not evaluated further. Thirty selections that were later maturing than Williams were grown in four-row plots at two locations with three replications per location. The comparison of Williams and 12 late maturing selections for yield, physiological maturity, 95% brown pods, and plant height is shown in Table 1. Notes were taken on other characters such as flower color, pubescence color, and hilum color and all plants in each selection were the same as Williams for these characters.

There were no significant differences in yield or plant height among the lines; however, lines which were significantly later in physiological maturity and 95% brown pods than Williams were found. Thus it appears that the maturity of a line can be changed, at least to a later maturity, while maintaining yield.

This technique may have application in breeding programs, particularly where one may want later maturing selections in lines with disease, insect or pest resistance. Finding mutations for lateness may be easier than finding mutants with earlier maturity, although both types have been found (Gustafsson and Lundqvist, 1976). When using this method it is advisable to grow the M_1, M_2, and M_3 generations in isolation and remove any sterile plants to reduce the possibility of outcrossing.

Table 1

Yield, physiological maturity, 95% brown pods, and plant height of late maturing selections from EMS-treated Williams seed

Selection	Yield (bu/acre)	Physiological maturity	95% brown pods	Plant height (in.)
Williams	47.3	26 Sept.	6 Oct.	39
301	46.5	2 Oct.	17 Oct.	36
405	50.3	7 Oct.	20 Oct.	40
603	46.3	6 Oct.	17 Oct.	37
707	45.5	5 Oct.	17 Oct.	38
709	48.0	3 Oct.	17 Oct.	40
713	47.0	3 Oct.	15 Oct.	39
913	45.4	3 Oct.	12 Oct.	37
1205	46.5	5 Oct.	18 Oct.	41
1214	49.2	6 Oct.	20 Oct.	41
1302	46.9	4 Oct.	18 Oct.	38
1309	47.6	2 Oct.	10 Oct.	36
1406	47.9	4 Oct.	15 Oct.	37

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