1. Mutation at the Dt locus.

Facilitated by the a^m-1 allele at the *a* locus, which is very effective in expressing the action of the *Dt* gene, mutation experiments have been conducted to determine the frequency, direction, and extent of *Dt* mutation. Crosses of a^s a^s *Dt Dt* and a^m a^m *Dt Dt* by a^m *dt* have been made for this purpose with the following results:

Table 1. *Dt* mutation rate from crosses by a^m a^m, *dt-sh-wx*

Culture	Genotype	Total No.	dt	Low Dt 1-75 dots	Med. Dt. 75-150 dots	Dt+
536	a^s a^s Dt Dt	3,930	3 + 1*	3	4	0
537	"	6,420	3	5	1	0
Total		10,350	6	8	5	0

*This case is *dt sh*, *Wx*, therefore probably a deficiency of the *Dt Sh* segment, and does not enter into the frequency.

The data from the 536, 537 cultures are still subject to remote possibility of a change at the a^m locus which might simulate *Dt* → *dt* mutation. However, mutations of a^m in the absence of Dt have not been previously found and whole seed changes of a^m to a^s after fertilization must indeed be rare.

Additional evidence (Table 2) was obtained from crosses (a^m a^m *Dt Dt* and *a a Dt Dt* x a^m a^m *dt sh wx*) which exclude this possibility by providing two mutable or dottable *a*'s in each seed to test its Dt constitution. The additional a^m, since it comes with *Dt*, can mutate however to a^s giving an a^s a^s a^m *Dt Dt Dt* seed which will simulate an intemediate Dt mutant. Therefore, Table 2 gives evidence only on mutation to the dt level.

Table 2. Mutation from crosses by a^m a^m, *dt-sh-wx*

Culture	Genotype	Total No.	dt
532	a^m a^m Dt Dt	4,830	0
533	"	1,740	0
534	"	1,290	0
535	"	4,005	0
		11,865	0
506	*a a Dt Dt*	2,305	1
Total		14,270	1

The total frequenoy of *Dt* → *dt* mutation (7/24520) compares favorably with that of other genes. Also the above data indicate wide variation in frequency in different stocks.

A low dotting mutant previously found and designated *Dt*-2 has been tested and found to be rather peculiar. It occurred on an ear from a cross of A^d/a^m *Dt dt* x a^s a^s *Dt Dt*. It had 5 dots while sib seeds had 500 or more. When outcrossed on a^m a^m *dt dt* it gave seeds ranging in dots from 1 to 6, and also

occasional seeds with sectors of heavy *Dt* tissue as though *Dt*-2 itself were mutating quite frequently back to the parent *Dt* allele. When 3 doses of *Dt*-2 are present, with d^m, the seeds have a patch-like, mosaic appearance with areas of low, intermediate, and very high dotting.