

8. Mutations affecting carotenoid synthesis in the endosperm and seedling.

In these mutants the endosperm is white or pale yellow and the seedlings which are produced upon germinating in the light are a chalky-white with no evidence of chlorophyll or carotenoid pigments being present. We have been interested in these mutants for the past several years and have attempted to bring together all such mutants that have been reported. In all a total of eleven different mutants have been obtained. Five of these (vp-2, vp-5, vp-9, ps and w-3) besides having an altered pigment synthesis also have a tendency to be viviparous. The other six show little viviparous tendency. Included in this six are three previously described mutants which proved to be allelic to mutants found in our stocks. They are lw-1, lw-2 (See-Tulpule, Am. Jour. of Bot. 41:294, 1954) and cl-1 (See, Everett PNAS 35:628, 1949) which were respectively allelic to our mutants 6474, 7752, and 7716. The three remaining types are lw-3, lw-4 and 7748. Two new mutants (one from Dr. Brunson and the other from Dr. Chase) were tested last summer against our stocks. On the basis of endosperm color these mutants appear to be allelic to each other and to lw-2. Seedling test will be needed to confirm this. Our tests have placed to chromosome vp-2, vp-9, w-3, and cl-1 and have confirmed the placement of vp-2, ps, lw-1, and lw-2. The known linkage relationships for the eleven genes are as follows:

Mutant	Chromosome
vp-2	5
vp-5	1 short arm
vp-9	7 long arm
ps	5
w-3	2
lw-1 (6474)	1
lw-2 (7752)	5
lw-3	5
lw-4	4
cl-1 (7716)	3
7748	unknown

The cl-1 mutant has two modifiers (Cl-2 and Cl-3) described by Everett. When cl-2 is present in cl-1cl-1 plants they are pale green. Our mutant 7716 which proved to be allelic to cl-1 was also modified by a gene carried in our stocks which was similar in action to Cl-2. Crosses are being made between Cl-2 and the other mutants to determine if any of them are modified by this gene.

An interesting mutant which belongs to this group is a mutable allele of vp-2. This allele shows back mutation to normal in both the endosperm and seedling. The endosperm is pale yellow with patches of yellow. The seedlings are white with a mosaic of green tissue. Further studies to determine the nature of this mutability have been handicapped by the vivipary and small seed size that is associated with vp-2.

These mutants if grown in the dark produce a faint green pigment. This has been shown to be protochlorophyll in w-3 (See Koski and Smith, Arch. Bioch. and Bioph. 34:189-195, 1951). So far we have found that the following

mutants show this greening: w-3, lw-1, vp-2, vp-5, vp-9, 7748, cl-1 and 7752. The results were inconclusive for ps, lw-3 and lw-4.

Two other mutants which differ slightly from those above probably belong to this class. The seeds of these mutants have pale endosperms that give rise to pale green seedlings which do not survive past the seedling stage. No albino plants have ever been observed. As yet these mutants have not been placed.

We would be glad to receive seed of any mutants of this type, for allele tests with our series.

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