PHOTO- AND THERMO-SUSCEPTIBLE CHLOROPHYLL MUTANTS OF PISUM SATIVUM

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The penetrance and expressivity of many mutant genes controlling chlorophyll content of plants depends on temperature. Examples are known in Avena, Hordeum, Tagetes, and Arabidopsis, among others. In other cases, light intensity influences the action of chlorophyll genes. Examples of this may be found in mutants of Lupinus, Lycopersicon, Antirrhinum, and Arabidopsis.

The X-ray induced mutant 159 of our collection belongs to the first group. The plants are almost free of chlorophyll when grown under normal field conditions. They die after having formed four small leaves, behaving like typical lethal mutants. The lethal effect of the recessive gene, however, can be overcome by growing the mutant under higher temperatures. In phytotron trials, mutant plants were chlorotic at temperatures below 17C whereas normal chlorophyll synthesis occurred at 19C and higher.

A representative of the second group is mutant 11A of our collection which appears identical with Lamprecht's albina terminalis (alt) mutant (1). When grown in the field, the lowest three or four foliage leaves have normal dark green chlorophyll content. The fourth leaf is light olive green and the leaves above are almost free of chlorophyll. The plants form 9-10 leaves but die before flower buds are formed. Degeneration of chlorophyll typically occurs above the fifth foliage leaf.

However, the pattern of chlorosis just described appears only under normal insolation. When the plants are grown in pots in dim light, they also produce normal leaves in the upper region of the shoot. If these plants are returned to normal light, the newly formed leaves again show chlorosis. Thus, light conditions strongly influence the expression of mutant 11A.

Lamprecht, H. 1955. Agri Hort. Genet. 13:103-114.

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