INHERITANCE OF COUMARIN IN SWEET CLOVER

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The desirability of developing a strain of sweet clover, *Melilotus alba*, free from or relatively low in coumarin content has been emphasized by several plant breeders. Coumarin and its related compounds are the substances largely responsible for the “bitter principle” which tends to make sweet clover unpalatable to animals. It is also the substance which is indirectly responsible for the “sweet clover disease of cattle.” The symptoms of this disease are a lengthening in the clotting time of the blood and internal hemorrhaging. This condition frequently results in death of the animals.

Investigations had been conducted for several years by various workers at Minnesota in an attempt to develop a strain of sweet clover which was low in coumarin content and possessed desirable agronomic characters for this region. Inbred lines were developed which appeared different in coumarin content and agronomic characters. Some of these lines were crossed and the inheritance of coumarin in various generations of one of these crosses is reported in this paper.

LITERATURE REVIEW

White and Horner (11, 4) using material that showed extreme variation, obtained a highly significant r value for coumarin content of plants tested in the fall of the first year and again at early bud stage the following year. A non-significant correlation coefficient was obtained when the plants tested did not show a wide deviation in coumarin content.

Stevenson and White (10) crossed a high (average coumarin content of progeny 0.41%) by a low (average coumarin content of progeny 0.01%) coumarin plant. The F1 was intermediate in coumarin content and the F2 had a bimodal distribution with only a few of the plants being intermediate. A P value of .65 was obtained when the F2 generation was tested for a 3:1 segregation.

Horner and White (4) tested F3 progeny from F2 plants testing 0.00 to 0.05% and found that they usually fell within this range. F2 progeny from F2 plants testing above 0.10% either tested uniformly above 0.10% or segregated for high and low. Consequently, they considered plants having 0.05% coumarin as low and those testing 0.10% or more as high.

Horner and White (4) crossed low-coumarin content strains with four strains of high-coumarin content. The F1's were high in coumarin. They concluded that low-coumarin F2 plants bred true in F3, one-third of the high-coumarin F2 plants gave progeny only of high coumarin content, and two-thirds of the high-coumarin plants were heterozygous for coumarin content. They suggested a one factor differentiation of low from high and also one or more modifying factors which influence coumarin content of the major factor pair.

The alpha type, or sometimes called branch dwarfing type sweet clover, was found in a field of Arctic sweet clover (5) and probably is the result of a mutation.

1Contribution from the Division of Agronomy and Plant Genetics, University of Minnesota, St. Paul, Minn. Paper No. 2222, Scientific Journal Series, Minnesota Agricultural Experiment Station. Abstracted from thesis submitted to the faculty of the Graduate School of the University of Minnesota in partial fulfillment of the requirements for the degree of Doctor of Philosophy. Received for publication March 19, 1945.

2Assistant Professor. The writer wishes to express his sincere appreciation to Dr. H. K. Hayes, Chief of the Division of Agronomy and Plant Genetics, for his direction and guidance in conducting this study. Thanks are also due to Dr. I. J. Johnson, formerly Assistant Professor in the same division, for his advice and guidance during the early phases of this investigation.

3Figures in parenthesis refer to “Literature Cited”, p. 642.