A study of the inheritance of awnedness, aleurone color, growth habit, and spike density in barley
by John M Green

A THESIS Submitted to the Graduate Committee in partial fulfillment of the requirement for the degree of Master of Science in Agronomy
Montana State University

Abstract:
The objective of this study was to determine the mode of inheritance and linkage relationships of four characters in barley. The mode of inheritance was determined by observing the F1 generation plants and by studying segregation in the F2 and F3 generations. Linkage intensities were calculated by the product method using the combined F2 and F3 data.

The inheritance of awnedness and growth habit ms studied in crosses of Arlington Aimless, C. I. 702, with the two Atrada varieties, C. I. 6641 and C. I. 5638. In addition the inheritance of aleurone color and spike density was studied in the cross with Atrada, C. I. 6638.

Although a two-factor difference for awnedness was observed in each cross, a total of three different factor pairs affecting awnedness were present in the two crosses studied. A factor pair for normal versus reduced lateral awns, which affected length of central awns also, was carried in the dominant condition in each Atrada variety and in the recessive condition in Arlington Awnless. Two factor pairs for awn length were carried in the dominant condition in Arlington Awnless; one was dominant in Atrada, C. I. 5638, and recessive in Atrada, C. I. 5641; and the other was recessive in Atrada, C. I. 5638, and dominant in Atrada, C. I. 5641.

Normal lateral awns were partially dominant over reduced and long awns were apparently completely dominant over short. Growth habit, aleurone color, and spike density were each inherited on a single-factor basis, although additional modifying factors not detected in this study may have affected growth habit in the cross Arlington Awnless x Atrada, C. I. 5638. Blue aleurone color was dominant over white and xenia was observed in the inheritance of this character. Erect growth habit was dominant over decumbent , and lax spikes were dominant over dense.

In Arlington Awnless x Atrada, C. I, 5641, the two factors for awnedness were inherited independently of each other and independently of growth habit. In Arlington Awnless x Atrada, C. I. 5658, long versus short awns were linked with lax versus dense spikes with 24.18±6.30 percent crossing over. The linkage relationships of growth habit in this cross were not determined because the ratio observed for this character did not fit a monohybrid ratio, although segregation in the Fg generation indicated a single factor difference. All other characters segregated independently of each other.

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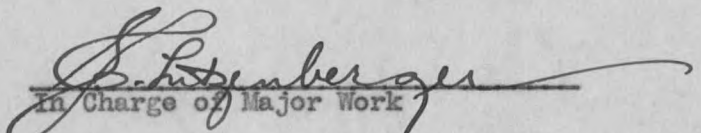
Approved:



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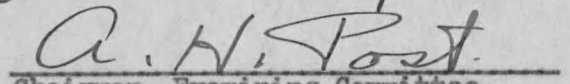

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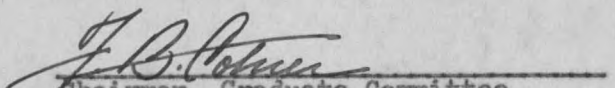

Chairman, Graduate Committee

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