Inheritance of SR-89 Accumulation in Wheat and Barley

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A substantial amount of data is available which indicates that species and genotypes within species differ in the quantity of various minerals that they accumulate from solution or soil media. The literature dealing with this subject has been reviewed by Myers (6) and Vose (12). They report differential intraspecific uptake for 11 essential mineral elements and intra- or interspecific differences in uptake for a similar number of non-essential elements.

Studies concerned with inheritance of mineral uptake and utilization have been relatively few. Three studies have demonstrated that single genes may determine efficiency of utilization of mineral elements. Weiss (12) found that a single gene in soybeans (Glycine max (L.) Merr.) controlled efficient vs. inefficient utilization of iron. Classification was based on degree of chlorosis exhibited by seedling plants. Similarly Pope and Munger (7) used degree of chlorosis to classify celery plants for efficiency of use of magnesium. A single gene was postulated to account for observed ratios. These same authors (8) reported that susceptibility to boron deficiency in celery, as judged by cracking of the petioles, was governed by a single gene.

Studies of corn inbreds and their F1 hybrids by various workers (2, 3, 4, 5, 10) have shown that differences in concentration of Al, B, Ca, Cu, Fe, K, Mg, Mn, N, P, Sr, and Zn are under significant genetic control. The studies by Gorsline et al. (2, 3, 4) involved diallel crosses and provide the most critical genetic information. Their studies involved the above listed minerals with the exception of nitrogen. Data were obtained on accumulation in the ear-leaf for all elements and in the grain for all elements except Al, B, Ca, and Sr. Additive gene action was indicated for accumulation of all elements suggesting that progress under selection would be possible. For Sr, the element of concern in the present study, additive effects were generally significant, and for 1 of 2 diallel sets highly significant amounts of nonadditive effects were observed (4). Significant heritabilities were reported by Butler et al. (1) for 9 of 11 minerals studied. Their estimates were