ILLUSTRATED CONCEPTS IN TROPICAL AGRICULTURE

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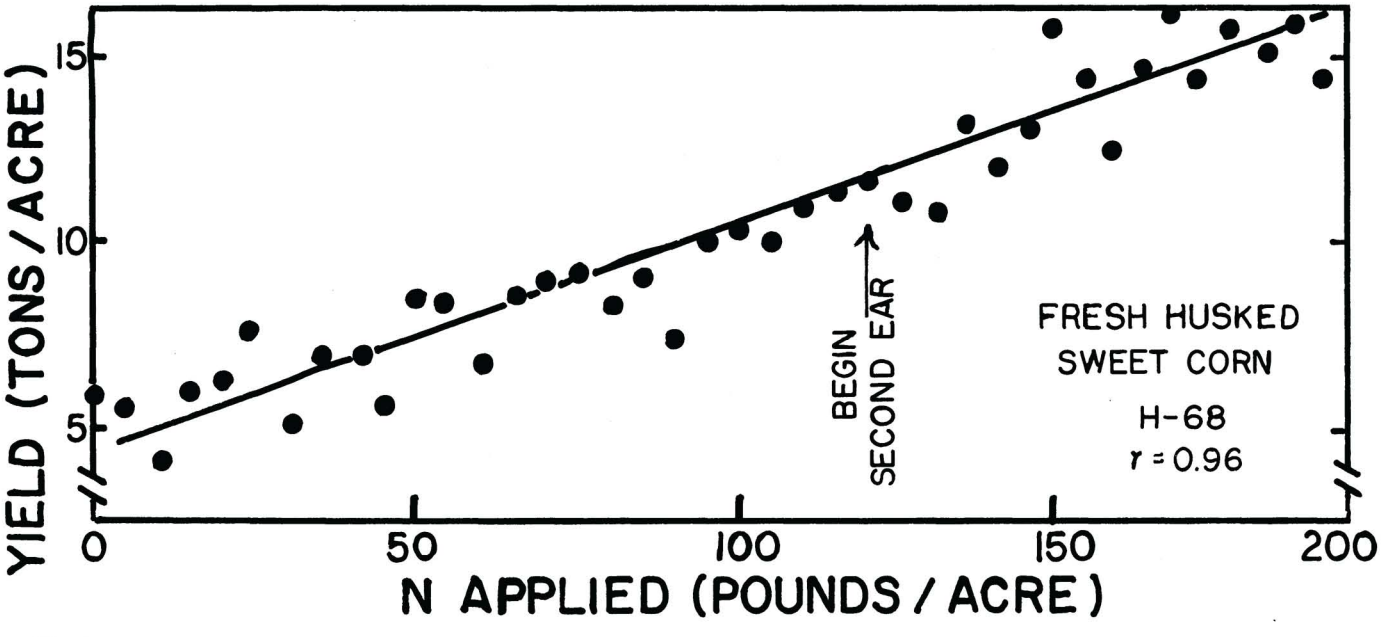
SYMPTOMS OF PLANT NUTRITIONAL DEFICIENCY–VISUAL SYMPTOMS AND INCIPIENT MALNUTRITION



Visual symptoms are useful for diagnosing gross nutritional deficiencies in plants. Obviously this diagnostic method fails when deficiencies are not visually expressed. Unseen deficiency, popularly called "hidden hunger," becomes increasingly important as yields are pushed ever closer to the maximum attainable. For some nutrients, the range from obviously deficient to adequate or even to excess is quite narrow. For other nutrients, nitrogen for example, deficiency symptoms disappear long before maximum yields are attained.

The photograph illustrates the disappearance of nitrogen (N) deficiency symptoms along a row of sweet corn which had been fertilized with increasing amounts of urea. The row contained 41 stalks. The first plant in the row (extreme left) received no N. The second plant received 5 pounds N per acre (5.5 kg/ha) as urea. Each succeeding stalk received an additional 5-pound increment of N until the 41st plant (extreme right) received 200 pounds of N per acre (225 kg/ha).

N is very mobile in plants. When corn (or any other grass) is N deficient, the upper leaves and ears are nourished at the expense of older leaves. If enough N is "translocated," the lower leaves become progressively less green, yellow, or perhaps orange, and then die. Frequently, this "firing" of older leaves is first observed along the midrib. The severity of the deficiency can be judged by the number of lower leaves affected.

In the photograph, obvious N deficiency symptoms disappeared a little past midrow (corresponding to about 120 pounds N/ acre). However, according to the graph, yields continued to increase with increasing increments of added N to the highest rate of N used. The fact that the yield response curve was linear throughout its length is evidence that maximum yield had not yet been attained. Actually, N was applied too late for optimum utilization of applied N. This accounts for the linear yield response curve even at N rates which are usually adequate.

Detection of incipient nitrogen deficiency and successful control of nitrogen nutrition requires more sophisticated approaches than visual diagnosis. Some knowledge of the magnitude of the soil's contribution and the efficiency of utilization of the nitrogen supply is prerequisite to good control. Foliar analyses and simple field trials with varying fertilizer rates provide valuable checks on the adequacy of fertility programs.

Robert L. Fox – No. 4, 1972