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ZINC DEFICIENCY IN CORN

Harold Miller and Shirley Phillips

Status of Zinc Deficiency

Corn is the only field crop presently grown in Kentucky that has shown zinc-deficiency symptoms and that has definitely given a response to zinc applications. Isolated instances of zinc deficiency have been reported from nearly every area of the state. However, the difficulty appears to be more prevalent in soils of the central Bluegrass and the western Pennyrile regions.

Considerable variation in respect to zinc deficiency has occurred within these regions, characterized by no consistent pattern. Corn producers in these areas particularly should watch this crop closely for deficiency symptoms during the period 4 to 6 weeks following planting.

Symptoms

Zinc-deficient corn shows a definite chlorosis (lack of green color) in the early stages of growth. The chlorotic areas generally appear as broad white stripes in the leaves at or near the growing point. In some varieties there is considerable purpling of the lower leaves, but this purpling may not show up in other varieties. This condition will usually be observed when the corn is 10 to 12 inches high and often disappears as the corn makes more growth except under conditions of severe deficiency. If the stalk is split lengthwise, a brown or black discoloration is usually apparent at the base of the stalk and at the first few leaf nodes up the stalk. Unfortunately, other factors cause similar symptoms, and determining the exact cause is difficult.

Maize Dwarf Mosaic, a virus disease of corn, may be easily confused with zinc deficiency since similar leaf chlorosis occurs. Root feeding and pruning by insects may cause similar conditions to exist in growing plants.

Conditions Under Which Zinc Deficiency Is Likely To Occur

An important factor influencing the availability of zinc is soil reaction. Zinc is most soluble, hence more available, in acid soils. Less zinc is available in soils with a high pH. Another factor influencing the fixation of zinc is the phosphate level. Zinc deficiency sometimes occurs as a result of heavy phosphorus fertilization and is more common in naturally high-phosphate soils.

In low-phosphate soils zinc deficiency may occur when pH values are 6.5 or higher. In high-phosphate soils zinc deficiency has been found when soils have pH levels of 6.2 to 6.3. This does not mean that zinc deficiency will always occur when the pH is high, since corn grown in many fields having much higher pH values has shown no evidence of zinc deficiency.

(To simplify information in this publication, trade names of some products are used. No endorsement is intended, nor is criticism implied of similar products not named.)

Zinc deficiency is most likely to be found in eroded areas. Apparently the sub-soil is usually lower in available zinc than is the topsoil of non-eroded areas.

Methods of Treatment

Where zinc deficiency is known to exist, 3 to 6 pounds of elemental zinc per acre should be applied at the row in a starter fertilizer. Except under conditions of severe zinc deficiency, the lighter rate should be sufficient. The placement of fertilizer in the row results in less zinc fixation by the soil.

Heavier applications of zinc should be made when the fertilizer is applied broadcast. A minimum of 10 pounds of elemental zinc per acre is suggested for broadcast applications. Zinc sulfate (27.8 percent of elemental zinc) or zinc oxide (77.2 percent elemental zinc) are satisfactory sources of zinc.

Premium grades of fertilizer may contain a little zinc. If so, the amount is shown in the guaranteed analysis. However, these premium grades of fertilizer will not normally contain a sufficient amount of zinc to correct zinc deficiency.

Side dressing with zinc, once the deficiency has occurred, is not effective in correcting it. The zinc must be applied before the corn is planted or at planting time.

Foliar sprays on zinc-deficient corn have been tried with varying degrees of success. In some instances the deficiency has been corrected, while in others no response has been obtained.

The best method of determining whether observed symptoms indicate a zinc deficiency in fields of corn is to chop out 20 to 30 hills of corn and replant. Apply zinc in only one-half of the replanted hills. By observing the corn 4 to 6 weeks following replanting, the response to zinc can be observed.

When Zinc Should Be Used

When corn is grown on fields where zinc-deficiency symptoms were observed the last year the field was in corn, zinc should be applied.

Since the occurrence of zinc deficiency in certain areas of the Bluegrass and western Pennyryle regions is more frequent, farmers should consider establishing field trials with zinc on fields that have a pH value above 6.2 and are high in available phosphorus or on fields where the pH is above 6.5, on soils low in available phosphorus. This can be done by using a starter fertilizer with zinc on a portion of each field and using the same analysis of a starter fertilizer without zinc on the remainder of the field.

Copies of this article are available on request. Should you desire additional copies fill out the following form, detach and send it to Shirley Phillips or Harold Miller, Agronomy Department, Agricultural Science Building, University of Kentucky, Lexington, Ky. 40506.

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