

IRON AND ZINC DEFICIENCIES

▶ in Field Crops

Carl Gray, Extension Soil Chemist; W.B. Anderson, Assistant Professor, Department of Soil & Crop Sciences; C.D. Welch, Extension Soil Chemist, The Texas A&M University System

It's easier to diagnose nutritional problems in plants if the typical visual symptoms are known. This leaflet illustrates some examples of iron and zinc deficiencies of several crops grown under field conditions. Some variation from these examples can be expected because of the effects of drought stress, poor drainage, soil acidity, insect and disease injury and the deficiency or excess of other plant nutrients that mask the typical symptoms. Iron and zinc nutritional problems with field crops have been

found to occur primarily on neutral to alkaline soils in Texas. The descriptions and color photographs inside this leaflet are provided to aid growers in identifying these problems.

For more detailed information regarding corrective measures for the treatment of iron and zinc deficiencies, refer to leaflets L-721, *Zinc Deficiency and Fertilization*, and L-723, *Identifying and Correcting Iron Deficiency in Field Crops*, which are available from your county agricultural agent.

The financial support of the Texas Plant Food Institute in the initial printing of this report is gratefully acknowledged.

IRON DEFICIENCY SYMPTOMS



GRAIN SORGHUM- *iron-deficient areas are irregular.*



GRAIN SORGHUM- *pronounced striping starts at leaf tips.*



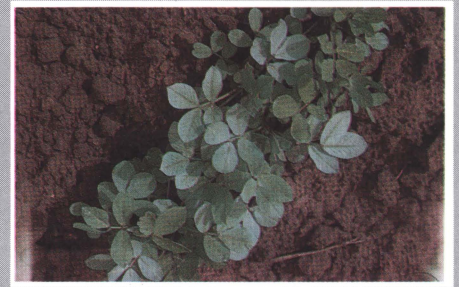
FORAGE SORGHUM- *yellow and green striping similar to grain sorghum.*



FLAX- *note yellowing of tops of plants.*



RICE- *note yellowing and thin stand.*



PEANUTS- *upper leaves are yellow with green veins.*



SOY BEANS- *upper leaves become yellow with veins losing green color.*



OATS- *note irregular yellowed areas in field.*



CORN- *striping pattern is similar to grain sorghum.*

ZINC DEFICIENCY SYMPTOMS



CORN- *stunted plants without zinc in foreground.*



CORN- *note wide, white bands on leaves.*



CORN- *zinc-deficient plants have poorer root systems.*



GRAIN SORGHUM- *mild leaf symptoms are similar to those of corn.*



GRAIN SORGHUM- *heading and maturity are delayed in zinc-deficient plants.*



PEANUTS- *stunted plants with small leaves.*



FLAX- *zinc-deficient plants in foreground.*



RICE- *note thin stand of zinc-deficient rice in foreground.*



COTTON- *note chlorosis between veins.*

Iron Deficiency Symptoms

General field pattern. Commonly appears as irregular-shaped yellow areas sporadically fading in and out of the normal growing area. Abnormal growth may occur in small severely affected areas or "hot spots."

Grain and forage sorghums, Sudangrass and Johnson-grass. Pronounced striping of leaves develops at upper leaf tips and extends to their bases. The symptoms start on young leaves but all leaves may develop symptoms if the deficiency becomes severe. If the deficiency continues to develop, the green of veins disappears and leaves become entirely yellow, then white and soon dying.

Soybeans. Uppermost leaves become yellow with veins remaining green, producing a strongly contrasting netted pattern. Severe deficiency causes stunted plants and a loss of green from veins of affected leaves.

Flax. Upper leaves first become light green, then pale yellow and finally almost white, often developing a brown scorched area at the leaf tips. Newest leaves may emerge green, later becoming yellow. Generally, most of the field looks pale or yellowish green and is easily confused with a nitrogen deficiency.

Oats and wheat. Green and yellow striping appears on tips of upper leaves, extending to the stalk and down the plant as the condition worsens. In more advanced stages, green begins to disappear from veins at the leaf tips, becoming entirely yellow to yellowish white.

Rice. Usually small, irregular areas in the field, called "hotspots," are affected most severely. Characteristic striping at leaf tips is usually not apparent but may be entirely yellow. Plants become stunted in early seedling stages. If the deficiency is severe and prolonged, plants die.

Peanuts. First appears as a chlorosis or yellowing of the newest, uppermost leaves. Midribs of leaves usually remain green. As the deficiency worsens, leaf yellowing moves down the plant. Very severe deficiencies may cause yellowing of most leaves and plant stunting, resulting in reduced formation and filling of nuts.

Zinc Deficiency Symptoms

Zinc deficiencies appear more on plants growing in neutral to alkaline soils. Cut areas resulting from leveling operations usually are quite deficient in zinc, since most of the available form of this nutrient is in the top soil. Where the amount of zinc is near the borderline between sufficient and deficient levels, heavy applications of phosphate fertilizers may cause visual symptoms suddenly. Microbial release of mineral nutrients from the decomposition of organic matter is slow in cold, wet soils causing appearance of deficiency symptoms.

Corn. Stunting and slow, uneven growth are the main effects. More deficient plants develop very poor roots, resulting in a poor stand. A single yellowish-white band on each side of the midrib may develop starting at the base of the upper leaves and extending about half way out to the tip. These bleached bands are several veins wide and are between the green midrib and edges of the leaf. A reddish or purple discoloration may develop in these same areas.

In less severe deficiencies, bleached bands may not be evident but a striping due to interveinal chlorosis may appear on the leaves' base just below the whorl.

Grain Sorghum. Visual symptoms are much less distinct than in corn. White bands at the base of upper leaves may develop occasionally but usually are difficult to see. Most common effects of a zinc deficiency are stunting, delayed heading and blooming date, sometimes as much as 7 to 10 days. The head may not be exerted completely from the flag leaf, causing the grain at the base of the head to rot.

Peanuts. Yields may drop considerably before visible symptoms appear. Severe deficiencies cause spindly, erect or upright plants, consequently with less pegging. Leaves also are reduced in size and may become olive to yellowish green and curl downward.

Cotton. Some stunting of the whole plant with shorter branches and fewer bolls. Leaves in upper half of plant may yellow between green veins, producing a mottled appearance. Indentation between the lobes of leaves usually is deeper than in normal leaves with pronounced upward cupping of leaves.

Flax. Leaves develop chlorosis with light gray areas followed by bronzing and dead spots. Shortening of internodes causes rosetting of leaves on top of main stems. The growing point of the main stem may die generally followed by profuse tillering.

Educational programs conducted by the Texas Agricultural Extension Service serve people of all ages regardless of socioeconomic level, race, color, sex, religion, handicap or national origin.

Issued in furtherance of Cooperative Extension Work in Agriculture and Home Economics, Acts of Congress of May 8, 1914, as amended, and June 30, 1914, in cooperation with the United States Department of Agriculture. Zerle L. Carpenter, Director, Texas Agricultural Extension Service, The Texas A&M University System.