Chapter 7. Rare micronutrient deficiencies

MOLYBDENUM DEFICIENCY OF PEANUT (*Arachis hypogaea* L.)

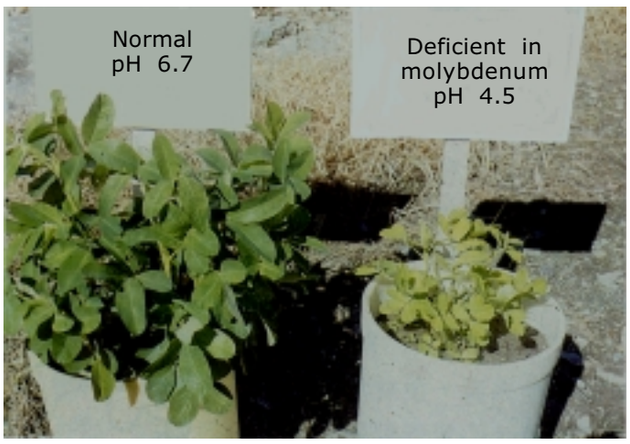

Plate 135. Peanut with molybdenum deficiency (left: normal peanut; right: acid soil pH 4.5)

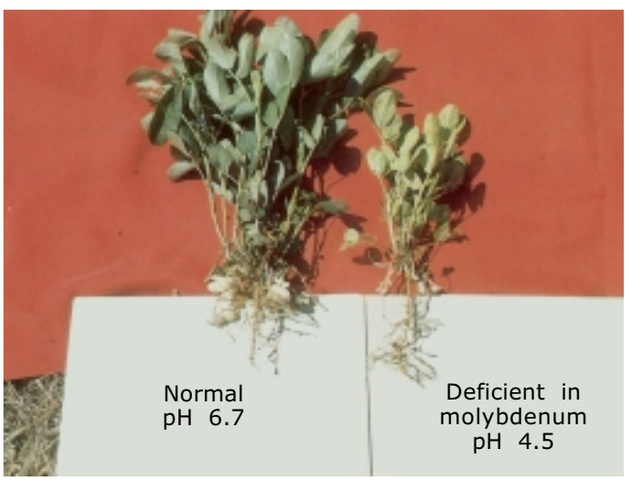

Plate 136. Same plants as in Plate 135, showing root system and peanut pods

Photos by Mr. Ching-Hsee Lin, Taiwan ROC

Taiwan ROC: Subtropical climate

Description of symptoms

Symptoms of molybdenum deficiency resemble those of nitrogen deficiency, i.e. overall chlorosis, stunted growth, and low yields.

Climatic conditions likely to produce molybdenum deficiency

The condition is often seen in high-rainfall areas with high temperatures (more than 33°C) and coarse, acidic soils.

Soil conditions likely to produce molybdenum deficiency

Molybdenum deficiency is found in peanut growing in sandy soils, and in very acidic soils (pH lower than 5.5). It is also found in soils with a very high iron content, and in peat soils with a

very low iron content. It is found in soils to which excessive phosphate fertilizer has been applied, and in soils with high levels of calcium, manganese, iron and copper.

Diagnosis by soil analysis

Soil with 0.02 mg/L or less of water soluble molybdenum (Mo) (about 3.5 mg/kg or less of total molybdenum in soils, or 0.4 mg/kg or less of exchangeable Mo in soils) probably cannot supply enough to support normal peanut growth and yield.

Diagnosis by plant analysis

In peanut, a level of molybdenum in plant tissue of 0.3-5 mg/kg is considered adequate for normal growth.

How to correct molybdenum deficiency

The problem of molybdenum deficiency can be easily solved by applying this element, usually in the form of ammonium molybdenum or sodium molybdenum salt.

The quantities needed for the crop are very small. As little as 300 to 600 mg/ha of ammonium molybdenum can correct the disorder.

Liming materials (eg. calcium carbonate) should be applied to acidic soils to increase the soil pH to 6.0 to 6.5.

Alternatively, a foliar spray of 0.01-0.05 % ammonium molybdenum solution should be applied repeatedly every 10 days untill the deficiency is corrected. The total quantity is about 1000 L/ha.

Information from Dr. Zueng-Sang Chen, National Taiwan University

MOLYBDENUM DEFICIENCY OF CAULIFLOWER (*Brassica oleracea* L. var. *botrytis*)

Plate 137

Plate 138

Plate 139

Plate 137. Molybdenum deficiency of cauliflower (var. Nozakiwase), 25 days after transplanting. Leaves are concave and chlorotic.

Plate 138. Deficiency symptoms 45 days after transplanting. Leaves are concave and elongated.

Plate 139. Effect of molybdenum applica-tion. On the left is a normal cauliflower, grown in soil to which molybdenum has been applied, and the pH adjusted to 6.5. On the right is a cauliflower deficient in molybdenum, grown in an acid soil with a pH of 4.3. The curd is very small and dark brown in color.

Japan: Temperate climate

Soil conditions likely to produce molybdenum deficiency

The condition is usually found in soils with a low pH (less than 5.0).

Diagnosis by plant analysis

Molybdenum content at harvest time (mg/kg)

	Leaf	Curd
Normal	2.22	1.92
Deficient	0.39	0.35

How to correct molybdenum deficiency

The soil pH should be maintained at about 5.5 - 6.5. The deficiency can be corrected by a basal application of 1 kg/ha sodium molybdenum.

Photos and information from Dr. Susumu Eguchi, Ferro Enamels (Japan) Ltd.

COPPER DEFICIENCY OF TOMATO (*Lycopersicon esculentum* Mill.)

Plate 140. Tomato plants with copper deficiency. They were grown in a plastic greenhouse by hydroponic culture, without copper nutrition.

Korea: Temperate climate

Description of symptoms

Copper deficiency in tomato produces symptoms of reduced or stunted growth of shoots. Young leaves are distorted, and there is necrosis of the apical meristem. The upper leaves and stem wilt.

How to correct copper deficiency

The condition can be corrected by applying a foliar spray of 0.1% copper sulfate pentahydrate ($CuSO_4.5H_2O$) solution with lime. The pH of the soil, and any nutrient solution used, should be adjusted to 5.5-6.5.

Photo and information from Dr. Byoung-Choon Jang, National Institute of Agricultural Science and Technologyj, Korea