

A Little-Known Nutrient

by Darrell Smith

Molybdenum—or more precisely the lack of—may be robbing yields from a surprising number of fields.

Research conducted by Matt Hagny, who runs Pinnacle Crop Tech (www.agronomypro.com), a consulting service based in Wichita, Kan., discovered deficiencies of molybdenum, an essential micronutrient, while searching for the cause of pale green plants despite adequate nitrogen levels in clients' wheat fields.

“Ordering molybdenum testing was a shot in the dark,” Hagny says.

Ward Laboratories, an ag testing and consulting service based in Kearney, Neb., analyzed plant tissue samples from more than 20 soybean fields and 30 wheat fields in central and north-central Kansas. “Around half of the soybean fields were acutely molybdenum deficient,” Hagny says.

Some samples were below the detectable limit of 0.01 parts per million (ppm) molybdenum. The deficiencies were found in soils with a pH ranging from 4.7 to 8.0. Deficiencies also showed up in sunflower, field pea and sorghum fields. (In sunflowers, the symptom is deformed plants, rather than pale color.)

“Some areas had only a few deficient fields,” Hagny says. “But in some townships, counties and soil types, nearly every field we looked at was deficient. In some cases, the deficiencies were spotty within a field.”

Hagny conducted a study using replicated, randomized plots. He found that soil-applying less than \$1.50 per acre of sodium molybdate fertilizer improved soybean yield by an average of 5.7 bu. per acre in deficient fields. Foliar-applied rescue applications turned many fields from pale green to normal dark green in a couple days, he says.

Molybdenum fertilizer can also be applied to the soil or sprayed on plants at rates of 0.02 lb. to 0.04 lb. per acre, Hagny says. It also can be applied to seed as a seed treatment, notes Dave Mengel, a soil fertility specialist at Kansas State University.

“Crops most sensitive to low molybdenum include sunflowers, soybeans, peas and canola,” Hagny says. “But alfalfa, wheat, corn and sorghum also can be affected.”

A plant's requirement for molybdenum is so small, seeds grown in molybdenum-adequate soil usually contain enough of the micronutrient for normal crop growth.

“For symptoms to show up, not only the soil but also the seed must be deficient,” Hagny explains. “Many of the soybean fields I examined were grown from seed produced at diverse locations in Illinois. Some of the molybdenum-deficient sunflowers were grown from seed produced in California and Puerto Rico. That suggests soils over a wide area may be deficient in molybdenum.”

Mengel recalls hearing of molybdenum-deficient fields in Indiana when he was at Purdue University. “Those deficiencies occurred on acid soils,” he says. “Symptoms disappeared when a seed treatment containing molybdenum was applied or when fields were limed. But I also know of situations in Alabama where low molybdenum could not be cleared up by liming.”

Too much molybdenum is toxic to plants and animals that consume the forage or grain. Identify deficient soils before applying molybdenum fertilizer.

“Handle samples carefully to avoid contamination,” Hagny says. “Wear vinyl or latex disposable gloves when

handling tissue samples. Make sure the laboratory you choose is capable of testing for molybdenum to levels of 0.01 ppm or less.”

Fast Facts

- Molybdenum deficiencies were found in a number of soybean and wheat fields in Kansas.
- For symptoms to show up, the seed and the soil must be deficient—suggesting there are more deficiencies in the states where the seed was grown.
- In deficient soils, applying molybdenum fertilizer paid off.
- Excess molybdenum is toxic to crops and the animals that consume the forage or grain. Test soils before applying fertilizer.

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Correction/Update by Hagny: Since these articles were written, Hagny has discovered that soil applications of Mo are totally ineffective on the types of clays found in Kansas soils, except where the Mo is applied in a band with P fertilizer. Apparently in some parts of the world, soil Mo applications (with water as a carrier) are effective, as stated by several authorities on the subject.