Potassium deficiency in soya beans

By Fred Miller, FarmProgress

Potassium is the most important yield-limiting nutrient in soya beans, and the plants can suffer a deficiency at multiple stages of growth.

A new video produced by the University of Arkansas System Division of Agriculture explains the importance of potassium, also called potash, and how growers can make certain they are providing the fertiliser their crops need.

Potassium aids in water regulation in plants, says Trent Roberts, associate professor of crop, soil and environmental sciences for the Division of Agriculture. "It is essential for a lot of the pathways tied to water and water regulation, including transpiration, canopy temperature, carbon dioxide capture, and others."

Nitrogen fertiliser is often the focal point of most row-crop systems. However, soya beans are different in that they are legumes, which absorb nitrogen from the air and convert it into a nitrogen metabolite through a symbiotic relationship with soil microbes. The process is called biological nitrogen fixation.

Since soya beans essentially make their own nitrogen fertiliser, Roberts says, potassium becomes the most limiting fertiliser nutrient for yields.

Deficiency in light-textured soil

Light-textured soils – sandy, sandy loams and silt loams – tend to be potassium deficient. Clay soils normally have adequate soil test potassium levels, which makes soil sampling key to successful potassium management.

"The first step to detecting and correcting potassium deficiency is soil testing," Roberts explains.

Decades of research by the Arkansas Agricultural Experiment Station, the Division of Agriculture's research arm, have resulted in calibrated soil test-based data that allow the Soil Testing and Research Laboratory to provide accurate fertiliser recommendations. Soil testing, available from the Division of Agriculture's Soil Testing Program, can help growers know how much potash they need to apply before planting their crops.

"This is the first step to ensuring that potassium will not be limiting and helps get the crop off on the right foot," Roberts says. Farmers should contact their local extension offices to obtain soil testing information, supplies and services.

Growers should follow up during the growing season by scouting their fields to look for symptoms of potassium deficiency. In the video, Roberts shows where to look for common symptoms and what they look like.

Hidden hunger for potassium

But beware of 'hidden' hunger, he says. "I think there is the potential that hidden potassium hunger may be robbing soya bean yields on our lighter textured soils." Hidden hunger refers to nutrient deficiencies that can reduce yields before visible symptoms appear in the plants.

In the video, Roberts shows where and how soya bean tissue samples should be taken to make sure the plants have sufficient potassium throughout the growth and reproductive stages. Current interpretations of tissue-sample data are based on the R2 growth stage. However, research data from the Arkansas Agricultural Experiment Station permits nutrient interpretations across a broader range of plant growth, from the vegetative stages through the end of the growing season.

Roberts says that data was used to develop the Dynamic Critical Concentration Threshold, a graphed curve that indicates the ideal potassium concentrations as they change throughout a soya bean plant's vegetative and reproductive stages. Tissue samples can show whether potassium concentrations fall above or below the curve at every stage.

Greater flexibility and accuracy

"Our system allows greater flexibility and accuracy to identify possible potassium deficiencies and corrective measures that can be taken, to assure maximum yield potentials," Roberts says.

This means that farmers can adjust potassium concentrations with applications of up to 60 pounds (around 27kg) per acre (0,4ha) of potash through the R5 stage, or to about nine weeks past the R1 stage.

These soya bean plants show symptoms of potassium deficiency in the upper canopy.

The video can be viewed online at the following link: *https://youtu.be/s9aKOfcc4UE.*

For more information regarding potassium management for soya beans and other crops, visit *www.uaex.edu/farm-ranch/crops-commercial-horticulture.*