ALFALFA TISSUE SAMPLING TARGETS PLANT NEEDS

Growers Who Forgo Tissue Sampling May Risk Long-Term Loss of Profitability

By Todd Rinkenberger

Alfalfa, like any plant system, requires sufficient amounts of nutrients to maintain quality stands and yields.

To determine those needs, the 'Irrigated Alfalfa Management for Mediterranean and Desert Zones' book published in 2008 by the University of California Alfalfa Workgroup has a chapter dedicated to fertilization strategies for the arid and semi-arid growing areas of the world including many parts of California.

The authors state, "A key aspect of designing a fertilization program is evaluating the nutritional status of the alfalfa crop. Nutritional status can be evaluated by visual observation, soil analysis, or plant tissue sampling. Using all three in combination provides the best results."

At the time of publication, all the authors were either retired or actively working as farm advisors or specialists associated with the University of California Cooperative Extension. The writers: Roland Meyer, Daniel Marcum, Steve Orloff, and Jerry Schmierer represent decades of education, research, knowledge and experience working with alfalfa production.

Properly assessing fertilizer needs, they write, "requires complex and often difficult management decisions. The process includes an analysis of which nutrients are needed, selection of the proper fertilizer, application rate, timing and placement, economics, record keeping and environmental considerations." However, with alfalfa prices taking a downward turn this year, some growers acknowledge they are not likely to conduct tissue sampling until prices improve.

"A lot of alfalfa growers don't tissue sample and they probably should," said Dr. Dan Putnam with the University of California Davis. Besides being an extension agronomist and forage specialist, he worked on the UC alfalfa management book as one of its two editors.

"We encourage growers to tissue sample and in some cases I've been a little surprised that a crop that doesn't look deficient, actually is deficient in a nutrient when you do the tissue sampling," he said, reinforcing the importance of testing.

Putnam also noted that another reason to conduct tissue sampling and apply nutrients when needed is to safeguard against the plants mining the soil for the nutrients and leaving the soil wanting.
Other researchers concur on the value of diagnosing nutrient deficiencies.

"Periods of low prices are not the time to ignore agronomic practices that ensure sustained yields and quality," says Dr. Bruce Roberts, the JG Boswell Chair of Agronomy at California State University Fresno. "A crop that's in the field for three or more years, depending on whether the grower is using flood or subsurface drip irrigation, needs to be properly monitored and maintained nutritionally."

Roberts, who oversees research projects and teaches a variety of classes including forages and range management, cautions that farmers who forgo tissue sampling and ignore the alfalfa plants' nutritional needs risk a long-term loss of profitability from short-term cutbacks, especially in a competitive market.

“There’s a lot of people growing alfalfa, so buyers are going to choose to buy the best quality product on the market,” he said. “Regardless of current market fluctuations, you don’t want to skimp on your inputs and risk losing your market edge of growing quality, high-protein alfalfa hay.” With 17 essential nutrients of various amounts needed to grow a healthy alfalfa crop, both soil and plant testing works cooperatively to identify deficiencies.

According to the manual, alfalfa obtains carbon, hydrogen and oxygen from water and carbon dioxide from air, but the other 14 elements come from either the soil or fixation of atmospheric nitrogen by bacteria in root nodules. If the plant cannot find the minerals it needs then growth can slow down or cease.

“Thus,” say the contributors of the chapter, “all nutrients must be available to the plant in adequate quantities throughout the production season. The nutrients that are most commonly in short supply for alfalfa production are phosphorus, followed by potassium, molybdenum, and boron.” So despite lower returns, growers should consider developing a plan to test nutrient needs to ensure optimal plant growth.

While the majority of California’s alfalfa is still grown using flood irrigation, some farmers have switched to subsurface drip systems.

Francisco Parra is an agronomist and pest control advisor at Burford Ranch in Five Points, CA. The ranch uses drip irrigation to grow alfalfa, and he says one of the beneficial side effects of cleaning the driplines with phosphoric acid is that the plants are able to glean some nutrients from the process. “You definitely see a response in the crop when running a phosphoric acid application through the lines,” Parra said about the process, which is usually performed annually.

Putnam agreed that not only does running phosphoric acid help clean the driplines, but it also provides nutrients. However, he says this should not replace dedicated tissue and soil analysis to find out precisely what the crop needs.

Dennis Hannaford, Netafim’s product application support specialist, works with growers on all aspects of alfalfa production. He offers timely suggestions on testing to safeguard quality and yields. He says alfalfa grown on subsurface drip expedites a grower’s ability to get nutrients right where they are needed in a timely manner. “Drip is a perfect vehicle to be able to apply nutrients right to the root zone - in real time - in order to get a response within a very short period of time,” Hannaford explains.

He suggests getting tissue samples early in the cutting season so if there are any deficiencies to address, the nutrients can be added through the driplines during the next scheduled irrigation. Hannaford says this will give the plants enough time to respond to the necessary inputs to encourage growth before being cut, and help reduce plant stress during the summer.

While tissue sampling is an important tool, the alfalfa manual warns, “tissue tests can determine only the single most limiting nutrient affecting plant growth.”

The writers add that the concentration of other nutrients may actually increase due to reduced growth, so it is best to correct the most severe deficiency first, and then follow up with more tests to determine other deficiencies that need to be resolved.

Correcting weaknesses involves calculating the amount of nutrients that will be removed by alfalfa, the yield potential of the crop, the most current soil and tissue sample levels, and if possible, the crop’s historic responsiveness to fertilization.

Finally, the authors conclude, keeping concise records is an important part of maintaining a successful alfalfa fertilization program. They encourage growers to keep a record for each field that includes the location of permanent benchmark sampling sites, dates sampled, test results, fertilizers applied with dates, rate and eventual crop yields and any other pertinent information. Keeping these records and being able to refer to them, they write, helps growers develop a long-term economical and sustainable program.