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CROP MANAGEMENT

You can have healthy alfalfa

by Rosalie I. Tennison

Adding phosphorus to alfalfa ensures a long-lasting, healthy crop – and it has nutritional benefits, too.

Despite the desire for a long-lasting, healthy alfalfa crop, many growers see their stands decline after a couple years. However, with additional phosphorus fertility, the life-span of those stands can be extended. Researchers at Agriculture and Agri-Food Canada have conducted a study on the effects of phosphorus on stand longevity and nutritional profile. The key, as it turns out, is phosphorous.

"The reason alfalfa dies off after a few years is due to a lack of phosphorus," says Dr. Fernando Selles, a research scientist at the Semi-arid Prairie Agricultural Research Centre at Swift Current. "It's also due to its lack of competitiveness with grasses in mixtures," he adds.

In the five year study, Selles and Dr. Paul Jefferson, a specialist in forage agronomy, looked at numerous combinations of crop and fertility programs. The researchers seeded alfalfa alone and as a mix with Russian wild ryegrass. In the latter combination, they seeded the two crops in alternate rows and also as a mixture in the same row. Then, they set up fertility trials using phosphorus as triple super-phosphate (0-45-0) which was banded in soil annually at rates of zero, 9, 18, or 36 pounds per acre, or applied as a pre-plant treatment at rates of 18, 36, or 72 pounds per acre. Depending on the precipitation, cuts were taken once or twice a year and the yield was measured.

The two crops have the ability to complement each other. Alfalfa establishes itself quickly but will die off after three or four years due to its lack of competitiveness with other crops.



Close-up of experimental plot showing alternate rows of alfalfa and Russian wild ryegrass soon after first cut of hay.

Russian wild rye is slow to establish, giving alfalfa a head start, but then will reduce alfalfa yield once it becomes established itself. The addition of phosphorus gives the alfalfa the strength it needs to compete, and allows the ryegrass to get established, according to the researchers.

"After seven years of the research, we had no winter-kill of the alfalfa in any of the scenarios," says Jefferson. "After three years, the alfalfa reduced to about 50 percent of the harvested hay crop, but held there, and even in the alfalfa only stand, the crop remained at 90 percent."

The proof is in the addition of phosphorus to the crop because the check was not as hardy. "Phosphorus is needed to reduce die-off of the plants," Selles explains. With no die-off, yields are better than average and remain constant throughout the life of the stand, providing phosphorus levels remain consistent.

Selles says that the pre-plant application of phosphorus offers the most response because the value of the nutrient appears earlier in the establishment of the stand. "Applying phosphorus during establishment will increase the amount the plant will take up in the initial year, and will maintain a reserve of available phosphorus within the soil for subsequent years," he explains.

Other interesting aspects of the research determined how much phosphorus is needed to prevent alfalfa from dying and the impact on the environment of the various applications. In the latter case, the researchers found no evidence of phosphorus leaching into water, which means the nutrient is not moving in the soil. Despite the optimum levels that provide value to the hay stand, over application will not harm the environment because the extra nutrient is not leaching away.

The highest yields were achieved with annual applications of 36 pounds per acre of phosphorus. The next highest yields were realized with pre-plant banded treatments of 36 and 72



Close-up of experimental plot with the pure alfalfa treatment soon after first cut of hay. Metal pipe seen on a row is an access tube for non-destructive measurement of soil water content.

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pounds per acre. Without a doubt, Dr. Selles believes that hay production is increased and the quality is improved with the addition of phosphorus. "The only difficulty is waiting for the crop to grow into the area where the fertilizer is placed, which makes a good root system imperative," he adds.

Growing a good stand of high yielding hay is not the only goal. Good nutrition is also needed and Jefferson says there are even more benefits from the phosphorus application when it comes to the nutritional quality of the hay. "We did intensive screening of the forage quality during this research and we learned the application of phosphorus increased the phosphorus content of the hay," he says. "For growers, this is a cheaper form of getting phosphorus into the feed and reduce the need to add phosphorus supplements to the ration."

The research also documented a two percent increase in digestibility of the fertilized product. An agricultural economist is currently considering the numbers to determine the cost effectiveness of adding phosphorus to the feed during the hay growing stage as opposed to mixing a supplement into the ration.

For growers who believe that growing a hay crop is one way to cut back on the fertilizer bill, they may be doing themselves a disservice. While alfalfa will fix its own nitrogen, it still requires other nutrients in order to maintain yield and quality. Those growers who expect to see their hay stand decline over time, may want to consider maintaining it with an application of phosphorus.

Economically, an annual application of 36 pounds per acre of phosphorus gives the crop a needed boost. For many years,



Close-up of experimental plot showing the rows with a mixture of alfalfa and Russian wild ryegrass soon after first cut of hay.

alfalfa has been a staple hay crop on the prairies, a crop that could be seeded and forgotten about until the acres were needed for another crop. However, the Swift Current research proves that by giving the crop a little more attention, the benefits are measurable. ■