

## Why Alfalfa is a Key Part of our Rotation

Tim Nerbas, PAg  
Saskatchewan Soil Conservation Association  
Lloydminster, SK

Over the past 6 ½ years I have worked as the NW Agrologist for the SSCA. The most important role I play as a professional in this field is that of “research disseminator” – taking the science from agricultural research and interpreting how it could, would, or should be used on the farm. I get an up-close and personal look at this application. My wife and I also farm south of Waseca, SK, so I am always considering ways to use the research on our farm. Thus I continually wrestle with a dilemma: If I am not able to incorporate these new ideas (and in many cases old ideas renewed) into my own operation, how can I sell these concepts to other producers?

It was this very dilemma that led to a reconsideration of our crop rotations and the use of (or rather lack of) forages. Old paradigms were holding back our operation from incorporating some well-proven research adages.

Over the last 50 years producers have begun to rely more heavily on the use of pesticides to control weed, insect and disease outbreaks in our cropping systems. These products usually do an excellent job of control. But as farmers have come to rely more and more on pesticides, the cost of growing a crop has skyrocketed which means lower net returns for producers. Much of the good husbandry or best management practices (BMP) that could be incorporated into crop rotations have been lost under the weight of pesticide dependence.

As direct seeders we know the importance of both establishing a healthy crop and having a diverse rotation, one which includes pulses, oilseeds, cereals and if possible winter cereals. But forages have always been a crop rotation afterthought. If you have livestock you seed your worst field down to forages for extra grazing or hay. Otherwise, every other arable acre must be in annual grain production. It seems to be an unspoken adage: “I know forages are good for the land but I need a cash crop now”.

The use of alfalfa in a crop rotation is almost a forgotten science. The benefit of nitrogen fixing plants in agriculture has long been recognized. Virgil (70-19 B.C.) made reference to the nitrogen fixing capability of alder:

**“What was designated of old as the dense ‘fat shadows’ beneath which the green grass and the tender herb continued to flourish.”**

The inclusion of alfalfa or alfalfa/grass mixtures in crop rotations has many benefits, including increased soil organic matter. This perk will take on even greater importance now that Canada has ratified Kyoto. Alfalfa also improves soil physical properties, reduces soil erosion, suppresses weeds and provides a disruption to plant disease cycles. Forage legumes have a unique ability to fix their own nitrogen significantly reducing our reliance on non-renewable energy to produce nitrogen fertilizer. Not only do grain crops yield more after forages, but also

the rotational benefit of field peas is greater where alfalfa has been included previously in the crop rotation (Table 1).

**Table 1:** Wheat yields as influenced by previous crop type (University of Manitoba). Note: no nitrogen fertilizer added to any of these rotations over the six-year study period. **W-Wheat; P-Field Pea; B-Barley; A-Alfalfa.**

Crop Rotation	Grain Yield of Wheat (bu/ac)	Nitrogen Uptake by Wheat (lbs/ac)
1. W-P-B-W-W-W	15.8	29.2
2. W-P-B-W-P-W	20.2	43.0
3. A-A-W-W-W-W	24.0	43.7
4. A-A-W-W-P-W	37.5	74.8
5. A-A-A-W-W-W	25.1	41.5
6. A-A-A-A-W-W	33.7	51.4
7. A-A-A-A-A-W	46.1	82.5

A survey of 253 producers in 1992 in Manitoba and Saskatchewan indicated that producers recognized the yield benefits from forages, but few producers were managing forage stands for maximum rotational benefit. Producers tended to maximize forage stand length, only re-establishing when the existing stand had lost productivity. However research has shown that it takes only two to three years to obtain optimum N accumulation and weed suppression benefits from an alfalfa stand. The optimum economic duration in Manitoba was determined to be four to five years.

There are two factors that are thought to discourage producers from cycling forages through their rotation more frequently: 1) problems establishing alfalfa and 2) problems terminating perennial forage stands. However using direct seeding techniques is a proven way to increase the success of forage establishment, and using herbicides improves the ability to terminate forage stands. For instance, terminating forage stands using tillage is expensive (>\$25/ac), is time intensive, uses large amounts of fossil fuel, dries the soil and reduces many of the soil improvement benefits of the forage. Using herbicides typically costs less than \$20/acre.

On our farm, we under-seed alfalfa with Clearfield canola. Typically we seed about 8 lbs of alfalfa with 3 lbs of canola using two air tanks. Side banding liquid fertilizer meets our fertilizer requirements. We spray full rate Pursuit for weed control. The residual nature of Pursuit helps provide a weed free environment for the young seedlings the entire season. We harvest the canola in a normal fashion and so far have had good establishment of the alfalfa. The canola stubble acts as a good insulator for the young alfalfa seedlings and the canola stubble also provides some snow trapping capability.

Our goal is to have alfalfa in the rotation for 4 years (establishment year plus 3 years). This will allow us to maximize the nitrogen benefit from the alfalfa and reduce our weed seed bank. Hopefully this will diminish the likelihood of developing herbicide resistant weeds on our land. Our plan is to under-seed one quarter to alfalfa each year as well as terminate one quarter each year. In 2003 we will terminate our first quarter and bring it back into our regular crop rotation. We will be terminating the stand using herbicides.

Our crop rotation is ever evolving but today we have a 9-year rotation as follows: Clearfield canola under-seeded with alfalfa, alfalfa only for 3 years, oats, canola, barley, peas, and wheat. We are also working at fitting flax, canary seed, dry beans and winter cereals into the crop rotation. The crop rotation allows us to rotate herbicides, use residual herbicides, provide additional forage for our cattle, break disease cycles and minimize the use of wild oat herbicides in cereal crops

One of the unique abilities of forages is to suppress weeds. The competitive nature of forages for light and nutrients, and its frequent cutting reduces the vigour of weeds and their ability to produce seed. Martin Entz at the U of Manitoba reported that wheat grown after alfalfa had reduced wild oat numbers to the same level as using a wild oat herbicide.

In most years we will silage or green feed off areas of wild oat infestations. Not only are we using the wild oats as a feed source, but we are also saving on our herbicide costs. We're trying to see past the paradigm of wild oats as a problem. We hope to make them just an additional source of fodder.

So far our "on-farm" research has proven profitable. We continue to monitor our success with the forage infusion. And in the meantime, we continue to scout for new ways to put more dollars in the producer's pocket.

Best of luck in 2003!