LUPIN AS AN ALTERNATIVE ORGANIC FEED GRAIN
Interim Research Report E2006-05

Why Lupins?

The viability of grain farms throughout the Maritimes depends on the successful production of high-value crops. Premiums are available for organic producers but cropping options are needed that provide good value and can be reasonably produced. The organic feed grains market is potentially lucrative. At the same time, there is a local shortage of affordable feed with high protein content. Lupins are being grown in Australia and the UK and are being tested in western Canada. The potential of white lupins as a feed crop for the Maritimes was first studied in Charlottetown in the 1980s. The crop showed good potential as a silage feed, however, grain production was difficult due to late maturity and susceptibility to disease and heat stress. With the development of the organic sector, there is a growing need for a high-protein alternative to soybean. The high price of organic feed is limiting the development of the organic poultry and dairy industry. A resurgence of interest in lupins has resulted. Lupins are now a common part of feed rations in Australia and production is growing in the UK. Lupins have the advantage of not requiring roasting prior to feeding. Trials have been established in Alberta and new cultivars have been developed from species of yellow lupin (Lupinus luteus) and blue lupin (L. angustifolius) in addition to white lupin (L. albus). White lupins are most common in the UK. They have high yield and protein content but are late to mature and susceptible to seed-borne anthracnose. Blue lupins are best suited to light, slightly acidic soils, but are of lower yield and protein.

Opportunities

- high protein (30 – 38%)
- good yields (1.5 – 4 t ha⁻¹, depending on cultivar)
- cold tolerant
- roasting not required for feeding
- most cultivars are shorter season than soybean
- can be good for silage or grain

Constraints

- susceptible to disease
- cannot save seed due to disease, risk of crop failure
- no Canadian seed supplier
- unfamiliar to local feed market
- must select appropriate species (white or blue) depending on soil

Organic Cultivar Trials

Three species of lupins (white, narrow-leaved / blue, and yellow) totaling 13 cultivars were imported from the UK and Australia. Cultivar trials were planted at NSAC and on two farms. Preliminary results are summarized in Table 1. Yield ranged from < 1 t ha⁻¹ for yellow lupins to over 4 t ha⁻¹ in white lupins. Protein content was >40% in the yellow lupins, 36% in white lupins and 29-33% in blue lupin cultivars as compared with 38-40% typically found in soybean. Protein yield ranged from 1.5 t ha⁻¹ for white lupins to <0.6 t ha⁻¹ for yellow. White lupins produced the highest yields but were late maturing (~140 days). Disease, heat stress, wireworm and late planting date limited yield of some cultivars. Several cultivars of blue lupin matured in 110 days, but yielded poorly.

Disease may be the biggest limitation for lupins in the Maritimes. Saving lupin seed has been restricted by the industry in the UK in order to reduce the threat of crop failures and retain lupins as a viable protein alternative. Wireworm is a growing problem, especially in fields following long-term pasture or forage. The wireworms killed seedlings after they had emerged, destroyed nitrogen-fixing nodules, and removed the outer tissue of the roots which stopped the flow of nutrients.
Table 1. Lupin days to maturity, yield, crude protein at Brookside and Knoydart Farm in 2005.

<table>
<thead>
<tr>
<th>ID</th>
<th>Name</th>
<th>Species</th>
<th>Days to Maturity&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Yield (kg/ha)&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Crude Protein (% dry)</th>
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</table>

<sup>a</sup> Maturity was measured as >95% of pods being brown (ripe) and seed could just be dented with the thumbnail

<sup>b</sup> Grain yields standardized to 13% moisture content

Next Steps

The cultivar trials will be repeated in 2006 at three locations. Many organic farmers have expressed interest in lupins, and we are investigating field scale trials of promising cultivars such as Dieta, Quilinock, or Tallerack at 6 farms in the Maritimes depending on available funding. A 4<sup>th</sup> year student project at the NSAC is being planned which would study the use of lupins in rations for dairy, pork and poultry production, in combination with other Maritime feeds. We may conduct preliminary trials on intercropping lupins with a cereal such as barley.

The Bottom Line...

Lupins are showing reasonable potential, but will be a high risk crop if diseases are managed poorly. Further small plot and farm trials are planned for 2006.

Acknowledgements

**Industry Cooperators**: Av Singh (AgraPoint NS)
Todd Grant (Speerville Mill, NB)

**Farmer Cooperators**: Orville Pulsifer (McFetridge Farms, Middle Musquodoboit, NS)
Frazer Hunter (Knoydart Farms, Merrigomish, NS)

**Seed Suppliers**: George Morrison (UK)
Paul Hardy (Department of Agriculture, Australia)
Edward Willmott (Premium Crops Ltd., UK)

**Technicians**: Pamela Craig, Lloyd Rector and Mathieu Quenum

Funding

Nova Scotia 2000 Technology Development Program
New Brunswick Department of Agriculture, Fisheries and Aquaculture
Prince Edward Island Department of Agriculture, Fisheries and Aquaculture

Credits

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