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.

			Days to Maturity[a]	Yield (kg/ha)[b]		Crude Protein (%, dry)	
ID	Name	Species	Brookside	Brookside	On-Farm	Brookside	On-Farm
L3	Tanjil	blue	131	2298	1460	30	32
L5	Quilinock	blue	126	2100	1692	33	38
L6	Mandelup	blue	119	1856	1210	30	32
L7	Tallerack	blue	126	2454	955	33	35
L8	Bora	blue	119	412	115	29	30
L9	Belara	blue	119	1784	1318	30	30
L11	ADS 102	blue	110	427	380	30	29
L13	ADS 101	blue	110	1441	776	29	27
L1	Dieta	white	141	4156	2845	40	36
L12	Kiev Mutant	white	141	4343	2815	37	34
L10	Wodjil	yellow	126	1138	1100	38	43
L2	WALLU2003	yellow	126	863	559	46	39
L4	Amber	yellow	126	623	484	42	41

[a] Maturity was measured as >95% of pods being brown (ripe) and seed could just be dented with the thumbnail
[b] 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 4th 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.

ADS101 (blue/narrow-leaved) and Dieta (white) cultivars (A. Hammermeister)

CREDITS

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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.

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