

# INVESTIGATING THE AGRONOMICS OF LUPIN PRODUCTION – A NEW HIGH PROTEIN PULSE CROP FOR ALBERTA

The sustainability of cropping systems can be improved by increasing diversity and incorporating pulse crops into rotation. Pulses are important in human nutrition as sources of proteins, vitamins, and minerals. Recently, pulse crops have gained a lot of attention as consumers demand a transition towards plant-protein based diets to ensure global food security and address concerns around climate change and the environment. Pulses are well-known for their ability to fix atmospheric nitrogen, thus reducing energy consumption and making them particularly suitable for low-input systems. As a rotational option, they provide a source of diversification to break insect, disease, and weed cycles as well as optimize nutrient management.

Robyne Davidson and her research team at Lacombe have been trialing lupin in their pulse crop plots for the past five years. She has a three-year project funded by Results Driven Agriculture Research (RDAR) and Alberta Pulse Growers (APG) to study the agronomics of lupin production in Alberta. Davidson and her research

team moved from Alberta Agriculture and Irrigation to Lakeland College in 2021. Their pulse projects moved with them.

Narrow-leaf lupin is a cool season legume crop native to the Mediterranean area that is grown in many parts of the world and well established in Australia and Europe. The potential for success in certain areas of Alberta is high. As a cool season crop, lupin performs well in temperatures below 25°C and in areas that receive an average of 10 inches (250 mm) of precipitation spread throughout May to July. Drier conditions throughout August promotes timely and even maturity for harvest. Lupins prefer the neutral to slightly acidic soil pH values (5.5-7.0) found across most of central Alberta.

Lupin is a competitive choice for producers as it can be seeded early, has excellent nitrogen fixing abilities, lodging resistance, easy to harvest, no major disease or insect issues, intercropping benefits and adapted to areas of Alberta not suitable to other pulse crops.

“The beneficial effect on subsequent crops reinforces lupin’s suitability for crop rotations,” Davidson explained. “Preliminary research shows lupin has resistance to *Aphanomyces euteiches* - a devastating pathogen of other pulse crops such as field pea and lentil.”

To ensure success, producers would need to choose clean, well-drained fields as broadleaf herbicide options are currently limited and, despite the large woody root, lupin doesn’t tolerate water-logged conditions for more than a few days. Seeding early and applying pre-seed herbicides would give the crop a competitive advantage and ensure timely maturity.

There are two important lupin species of interest to commercialization companies for growth in Alberta: *Lupinus angustifolius* (narrow-leaf blue lupin) and *Lupinus albus* (white lupin). These types are considered domestically bred and are known as ‘sweet lupins’ containing low levels of harmful alkaloids that have been removed for human consumption and livestock feed. Narrow-leaf blue lupin is currently the type of most interest

for its suitability to the Alberta climate. In addition, the agronomics are good, and this type is easier to grow than the white type due to similar seed size and handling practices as field pea. White lupin is harder to handle due to its larger seed size and late maturity. This type, however, is preferred for use in industry and has much potential in the southern area of the province where soil pH is lower, and the season is longer, as long as water isn't limiting.

There are tremendous prospects for lupin in the fractionation industry where components are separated and used for ingredients in snack foods, non-dairy milk substitutes, high-energy drinks, desserts, pet food, and cosmetics. The crop is high in fibre, low in starch, and very high in protein. Of all pulse crops available to Alberta producers, lupin has the highest percentage of protein, ranging from 32-40%. Field pea, the current crop choice for protein fractionation, averages around 25%, whereas faba bean, the previously highest protein crop, ranges from 28-32%. As a plant-based protein source, lupin protein concentrate has reliable water and oil absorption and high levels of gelation properties for use in many food applications. Lupin is an excellent choice for aquatic feed, and because the protein is so high can be used with great success in livestock feed rations.

The lupin crop has unique attributes that have gained the attention of major commercialization companies and food ingredient corporations. These companies are providing investments and offering grower contracts to assist in market growth and offer incentives to producers to incorporate lupin into crop rotations as an alternative or additional pulse crop to improve cropping systems in this province and western Canada.



*Above: Lupin growing at Lakeland College's plots near at Lacombe, AB in July 2022.  
Right: Lupin ice cream.*



**Project**

Adaptability and management of lupin varieties for Alberta

**Industry Funder**

Alberta Pulse Growers

**Cost**

\$211,300

**Project Completion Date**

Complete 2024