Broadacre cropping

Climate Vulnerability Assessment
Lupin Factsheet

Growing lupin in New South Wales: preparing for a changing climate

NSW lupin growing regions are expected to maintain moderate to high climate suitability for lupin production under a changing climate.

Developing industry-informed climate planning information

Climate change is altering the growing conditions for many agricultural commodities across NSW. Primary producers need evidence-based information about the changing climate, and the risks and opportunities it may bring.

Through its Vulnerability Assessment Project, the NSW Department of Primary Industries is enhancing the resilience of our primary industries by providing information and data to help the sector better plan for, and respond to, climate change. The project has assessed climate change impacts for extensive livestock, broadacre cropping, marine fisheries, forestry, horticulture and viticulture, and important cross-cutting biosecurity risks associated with these industries to inform sound planning, risk management and adaptation decisions.

Lupin in NSW

Lupin is an annual legume grown as a winter pulse crop in NSW from late autumn to late spring. Varieties bred for Australia are sweet seeded, have non-shattering pods and a permeable seed coat, and are resistant to disease and low temperatures.

Lupin is grown mainly as animal feed, but there is increased interest in growing lupin for human consumption. Lupin is also used in crop rotations for its ability to add nitrogen and increase the availability of phosphorus in soils. Australia is the world's largest producer of lupin by area grown, with growing regions showin in Figure 1.

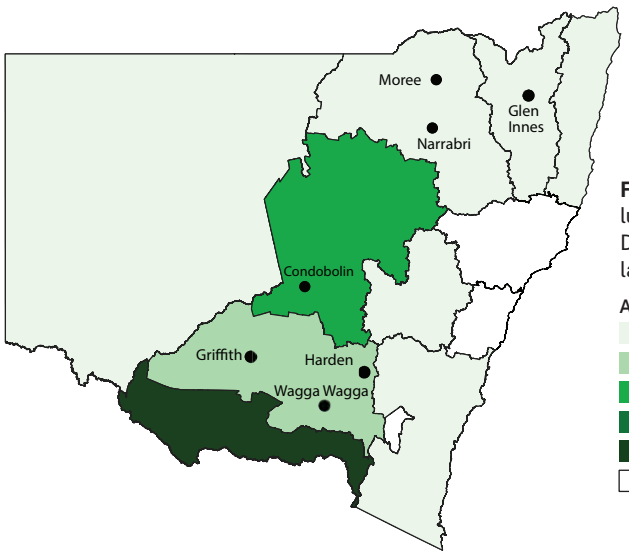

Figure 1. Major NSW lupin growing regions. Darker colours represent larger areas of lupins.

Climate and the lupin industry

Lupin growing regions in NSW are unlikely to change by 2050 under a changing climate. However, a small area of the southern Great Dividing Range may experience a slight increase in suitability.

Climate risks and opportunities include:

Changes in rainfall, especially during the fallow period, will likely impact climate suitability for lupin production across the current growing region (*low confidence*). The direction and magnitude of these changes are uncertain. However, greater changes to rainfall are expected under the the high emissions scenario.

Increased mean temperatures are likely to accelerate plant development (*high confidence*). Temperatures will remain generally suitable for lupin growth across the state, with minimal to moderate improvements in climate suitability in upland areas (*high confidence*).

Climate impacts: what to expect

Vegetative growth may experience minimal increases in climate suitability to the east of the growing region due to higher mean temperatures and less low-temperature damage (*high confidence*).

Reproductive growth is not expected to experience altered climate suitability under future climate conditions (*moderate confidence* across the Great Divide, *high confidence* in the Riverina and Murray regions).

Germination reliability is likely to remain very high across the state (*moderate confidence*). Some western NSW regions may experience reduced germination, leading to lower reliability of lupin growth (*low to moderate confidence*).

Length of growing season

The growing season is likely to be shorter in future, particularly under the high emissions scenario (*high confidence*).

FOR MORE INFORMATION

Please get in touch with vulnerability.assessment@dpi.nsw.gov.au

This work has been produced by the NSW Primary Industries Climate Change Research Strategy funded by the NSW Climate Change Fund.

Adapting to the changing climate

Expansion of lupin growing regions into colder locations such as Glen Innes and Harden may be possible with current varieties under a warming climate. Expansion to the west of the current growing regions may also be possible if lupin varieties can be developed that have accelerated development or are water efficient during reproductive growth.

Later sowing and a later harvest may be necessary if the growing season shortens under a warming climate.

Methodology and data

A dynamic phenology was used to model this crop, with a fixed sowing date of April 15th, after which germination is initiated when 15 mm or more of rain falls in any period of 14 consecutive days. Following germination, the model applies thermal time thresholds to define the start and end dates of each phenological stage of plant development. As a result, these dates varied across the state, with crops maturing faster in warmer areas.

Climate projections were sourced from Climate Change in Australia's 'Application Ready Data'. This dataset is comprised of projections from an ensemble of 8 global climate models, each presenting a plausible future climate. The models differ in their projections, giving rise to uncertainty in our modelling which is reflected in the confidence statements given in brackets in the text. Care should be taken when interpreting these results.

The Vulnerability Assessment Project is intended to highlight potential industry-or regional-level changes. Intermediate and high emissions scenarios were used in the assessments (RCP4.5 and RCP8.5), but these are not the only future scenarios possible. The inclusion of climate variables important to the commodities production was based on published research, expert knowledge and data quality and availability.