farmtalk

This article contains information most relevant to the less than 350 mm rainfall mallee farming region

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Mallee Sustainable Farming Inc. SA NSW VIC

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Rainfall, yield and gross margin probabilities for non-cereal crops in low rainfall southern Australia

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The issue

Non-cereal crops make up a very small proportion of crop production in the low rainfall cropping areas of southern Australia (defined as <350mm annual rainfall). However, there is a need for non-cereal crop options to provide profitable rotational crops, disease breaks and weed control opportunities for cereal production. In some areas, they are also important as an alternative to the continued use of long fallowing with its attendant environmental costs.

Morgan field peas in cropping rotation trial, 2005

What we know

The suitability of current non-cereal crop options declines as the total and reliability of growing season rainfall and commodity prices declines. This is also often correlated with shorter growing seasons and increased frost probabilities.

In the majority of years, whole farm profit and productivity may increase with pulse crops such as field peas and lupins, or multipurpose crops such as vetch. Mustard will require further evaluation before it can be considered. However, the risk factor associated with pulse crops will continue to ensure that continuous cereal, pasture-livestock and long fallow systems will continue to be supported.

Thus the development of non-cereal crop options requires pulse crops with:

- low agronomic input;
- high commodity prices;
- shorter growing seasons; and
- dual grazing and grain production capacity.

What this means

Non-cereal crop options

- Field peas are considered most suitable for widespread adoption as they are the most probable to achieve profitable non-cereal grain yields;
  or
- Vetch and lupins.

An alternative to non-cereal field crops would be a livestock enterprise, as part of a wheat/legume/pasture rotation.

Climate

Growing season rainfall amount and reliability are a major determinant of non-cereal crop yield.

- At Minnipa and Pinnaroo the most frequent growing season rainfall totals are higher than the average.
- At Euston, Balranald and Walpeup, the most frequent growing season rainfall is below the average.
- At Werrimull and Waikerie the most frequent growing season rainfall is very similar to the average (Table 1).

The length of the crop growing seasons will also determine suitability for non-cereals:

- Walpeup (145 days)
- Balranald (138 days)
- Minnipa (108 days)
- Werrimull (96 days)
- Waikerie (90 days)

Table 1: Average and most frequent April - October rainfall totals (mm)

Site	Average	Most frequent
Minnipa	246	260
Waikerie	166	160
Pinnaroo	235	280
Werrimull	185	180
Walpeup	225	200
Euston	201	160
Balranald	203	160

GRDC Grains Research & Development Corporation
Natural Heritage Trust
CSIRO
NSW Department of Primary Industries
University of South Australia
NSW Government Department of Natural Resources
Victoria Department of Primary Industries
Rural Solutions SA
Grain & Graze
Australian Government Department of Agriculture, Fisheries and Forestry Natural Landcare Program

Early sowing is essential for attaining maximum yields for all crops in these environments. The probability of receiving the amount of rain needed for non-cereal sowing (25mm over 3 days by June 1) ranges from a frequency of one in three at Walpeup to one in four years at Minnipa and Waikerie.

Yields
While early sowing usually increases the yield of crops, it can also place flowering earlier in the season when frosts are more likely, which can cause considerable yield reduction through flower and pod abortion. The frost risk is least at Minnipa, with an average of <3 days below 2.2°C. Balranald and Euston, with an average >15 days below 2.2°C, have the greatest risk of frost damage.

In assessing the grain yields likely to be achieved, observed grain yields were correlated with growing season rainfall as an average of all sites. Rainfall use efficiency was estimated for:
- field peas at 10kg/ha/mm of rainfall;
- lupins 10.2kg/ha/mm of rainfall;
- canola at 7.3kg/ha/mm of rainfall;
- mustard at 6.4kg/ha/mm of rainfall; and
- wheat 15.6kg/ha/mm of rainfall.

Gross Margins
Grain yield probabilities were estimated using observed grain yields (20 years) and long-term rainfall records (1902-2001). Using a range of commodity prices and 2003 regional fixed costs, gross margins were calculated for crops at sites where adequate observed data was available.
However, there was approximately a 90% probability of making a profit from wheat at all three sites if the price was >$140/tonne.

The use of non-cropped land for prime lamb and wool production was shown to be profitable in all seasons over a range of prices evaluated.

Inspecting rotation trials at Mallee Research Station Field Day 2004

Table Two shows estimated chance of making profit from field peas and lupins at an on-farm price >$200/tonne and > $300/tonne respectively.

Table 2: The estimated chance of making a profit from field peas or lupin at on-farm price of >$200 & >$300

	Field Pea		Lupin	
	$200/tonne	$300/tonne	$200/tonne	$300/tonne
Walpeup	90%	95%	90%	93%
Minnipa	80%	90%	95%	99%
Balranald	60%	90%	70%	90%

Where to next

The field-based validation of this desktop study is continuing at research sites in the Mallee.

Results from this research supports this desktop study in that over several years at a range of sites and rainfall conditions a forage field pea has been more productive (forage and grain yield) than lupin or vetch.

The current questions are:
- What are the opportunities to integrate non cereal crops into a mixed farming system?
- Can it be successfully sown with a forage cereal or oilseed to ensure soil stability under a grazing or fallow system?
- What economic and sustainability options does it provide for Mallee agriculture?

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