Activity # 1- Assessing Horticultural Crop Suitability for the Queensland Murray Darling Basin Study Area

Specific Biophysical Crop Information – Almond

(1 August 2014 to 30 June 2016)

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This publication has been compiled by David Carey of Agri-Science, Department of Agriculture and Fisheries.

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Table of contents

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Almond

Based on the biophysical requirements and limiting factors, **Almonds are not recommended as a potential crop** for the Balonne-Border Rivers Region of the QMDB. The most critical limiting factor is the need for dry summers for the development, maturation and harvesting of Almonds.

Crop Matrix:-

	Perennial Crop	Almond
Currently Grown (Y/N)	Qld	N
	QMDB	N
	NSW	Y
	Vic	Y
Frost Sensitivity (Y/N or Deg C)	Seedling	N
	Growth	-4 to -6
	Reproductive	-2
Low Temp Sensitivity (Y/N or Deg C)	Seedling	N
	Growth	N
	Reproductive	Y
High Temp Sensitivity	Seedling	N
	Growth	N
	Reproductive	N
Rainfall Sensitivity	Y/N	Y
	Growth Phase	Harvest
Special Soil Requirements	Y/N	Y
	Requirement	Well drained
Chilling Req.	Y/N	Y
	Amount (hrs)	300-500
Water Quality	Sensitivity (dS/m)	1.0 (1.4)
Harvest Months	(Months)	Feb-March
Length of harvest	(weeks)	8
First Harvest	(Years)	3
Full Production	(Years)	8
QMDB	Y/N	N

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Biophysical Requirements and Limiting Factors (climate)

Temperature

Almonds require cold winters and hot summers with little rain during the harvest period in February to April. The preferred climate is one with relatively mild winters with no severe spring frosts and warm dry summers.

Almonds prosper where summer temperatures are hot and dry, but they require chilling during dormancy (McGregor 1976).

Almonds need deep well drained soils. They are very susceptible to waterlogging and they develop root rots that usually kill the trees.

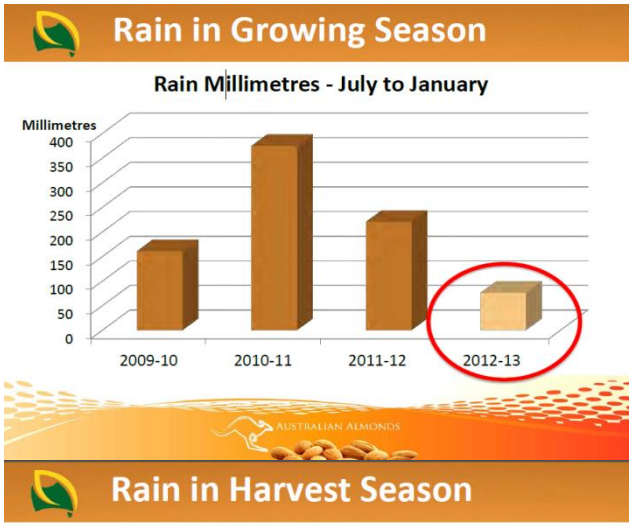
Almonds rarely have insufficient chill, but floral buds may drop before bud swell if the winter has been mild.

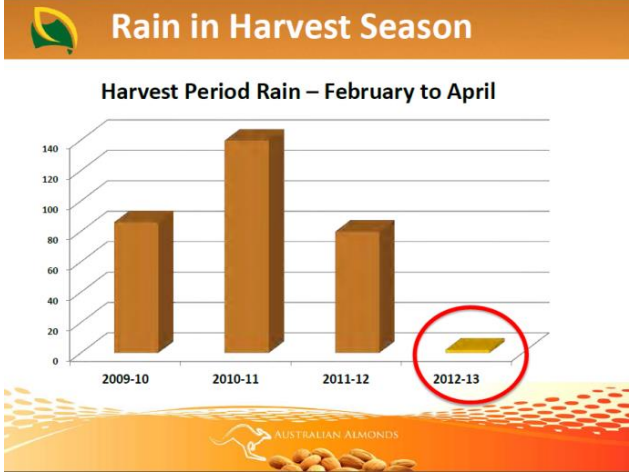
Although the vegetative buds may not drop under similar conditions, they often develop abnormally with an extended leaf out period and weaker shoots.

Late frosts may kill buds, flowers or cause early abortions, depending on their developmental stage, and the duration and severity of the frost.

Rainfall

The 2011 and 2012 crops were the most challenging encountered in the Riverland (SA). 2011 heavy rain at harvest led to shell staining. Humid weather led to a severe increase in disease and pest pressure. 2012 consistent light rains and cool summer conditions led to difficulty in drying the crop (Australian Nut Conference - March 2013 - Brendan Sidhu, Almond Board of Australia).





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Flooding across major growing regions presented growers with a new set of challenges throughout 2011/12, as significant rain events across the Murray Valley prolonged harvest, resulting in widespread pest and disease pressure, staining of nuts, and processing delays due to high moisture contents and product inconsistency. (HAL Industry Annual Report 2011/12).

Soils

Almonds need deep well drained soils. They are very susceptible to waterlogging and they develop root rots that usually kill the trees.

Irrigation

Almond is considered a drought-tolerant tree, and although almonds are irrigated in Australia, irrigation is critical in terms of almond production levels.

Almond trees pass through annual development stages in which water-stress sensitivity varies. The most water-stress sensitive stages are flowering, fruit set and early stages of fruit growth (July to early Sept). The almond harvest (February to April) coincides with the floral bud initiation period, and the post-harvest period (April/May) coincides with the floral bud development.

Pollination

Fruit setting and pollination have been described as the most influential limiting factors for almond production (Hill et al. 1985).

Honey bees are recognised as the most efficient and practicable pollinating insects of almond blossom and are in huge demand worldwide for their pollination service.

A profitable almond crop depends upon the cross-pollination of practically all flowers.

During flowering, fair weather with daytime temperatures above 12°C is essential to permit flight of pollinating insects with flight of honey bees maximised above 19°C (Somerville 2007; McGregor 1976).

Several studies have shown increased fruit set and resultant increased production when using managed honey bee colonies for pollination services. With very few exceptions, cross-pollination is essential for fruit set in almonds and honey bees have been recognised as the most efficient pollinators time and time again.

Web references accessed August 2016

Pollination Aware Fact Sheet and **RIRDC Info Services**

Almond Lifecycle

Dormancy - May to July in Australia.

Blossom - late July to early September – bee pollination requirements.

Maturing Crop - September to December.

Hull Split - early January to February – hot and dry climate requirements – irrigation essential.

Harvest - February to April - dry climate requirements – irrigation essential.

Processing - following harvest.

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Comparison Region(s)

Where-are-almonds-grown-in-Australia

Commercial almond orchards are located in three Australian states and are predominantly grown along the Murray River corridor in South Australia, Victoria and New South Wales.

Almonds are commercially produced in very few locations around the world. **They require a Mediterranean climate: cold winters during dormancy and warm, dry summers to develop the nut**.

Australia's Murray Darling Basin, provides the perfect combination of growing conditions, with four major producing regions: Sunraysia (Vic); Riverland (SA); Riverina (NSW); Adelaide (SA).

Almonds have been grown along the River Murray over the years, and in the 1960's and 1970's the industry expanded significantly in the River Murray irrigated areas.

Why the move? Suitable land was cheaper and more plentiful, the drier climate was even more suitable for almonds with less disease problems, warmer and sunnier spring weather gave more reliable setting of nuts, adequate water for irrigation was available, potential yields were higher, larger holdings allowed greater economies of scale and the Australian market was grossly under supplied at the time.

Almonds in QMDB Region.

- Because of the essential requirement for a dry climate during Hull Split and Harvesting (January to April), it is unlikely that commercial almond production in the Balonne-Border Rivers Region of the QMDB will be able to achieve the high yields necessary for profitability.
- Almonds are particularly suited to a Mediterranean environment, (cold winters during dormancy and warm, dry summers to develop the nut). This is the environment in which all current commercial production in Australia and the majority of the world's almond production occurs.
- Additionally, significant irrigation requirements for almonds occur in the summer and autumn – the period when peak irrigation demand for cotton occurs in the QMDB.

Based on the biophysical requirements and limiting factors described above, **Almonds are not recommended as a potential crop** for the Balonne-Border Rivers Region of the QMDB.

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Disclaimer: The candidate crop information presented in this QMDB study area report (Activity 1) are based on the analysis of the published biophysical needs of the crops (e.g. temperature, frost sensitivity, chill requirement, water quality, etc.) and current climate records for the QMDB study area. The candidate crops are deemed suited to the study area where the biophysical needs are met either year round or for portion of the year and will allow crop production.

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