

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

Specific Biophysical Crop Information - Lettuce

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Activity 1 — Project Team

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Lettuce

Based on the biophysical requirements and limiting factors, **Lettuce is a potential crop** for the Balonne-Border Rivers Region of the QMDB.

Crop Matrix:-

	Annual Crop	Lettuce
Currently Grown (Y/N)	Qld	Y
	QMDB	Y
	NSW	Y
	Vic	Y
Frost Sensitivity (N or Deg C)	Seedling	Y
	Growth	Y
	Reproductive	N/A
Low Temp Sensitivity (Y/N or Deg C)	Seedling	N
	Growth	N
	Reproductive	N/A
High Temp Sensitivity	Seedling	Y
	Growth	Y
	Reproductive	N/A
Rainfall Sensitivity	Y/N	Y
	Growth Phase	Heading & Harvest
Special Soil Requirements	Y/N	N
	Requirement	
Chilling Req.	Y/N	N
	Amount (hrs)	
Water Quality	Sensitivity (dS/m)	0.9 (1.4)
First Planting Date	(Month)	March
Last Planting Date	(Month)	June
Consecutive Plantings	(Y/N)	Y
First Harvest	(Month)	June
Last Harvest	Month)	Aug
Length of harvest	(weeks)	12
QMDB	Y/N	Y

Lettuce, (*Lactuca sativa* L.), is an annual of the Asteraceae family and native to the Mediterranean. It is thought to have originated in Europe and Asia and has been cultivated for at least 2500 years. Lettuce is a popular salad vegetable and is grown on all continents throughout the world including Australia.

Lettuce types

There are four main types of lettuce grown in Australia, Iceberg (Crisphead), Butterhead, Cos (Romaine) and Loose leaf. Iceberg lettuce is still the main lettuce type grown commercially in Australia. Iceberg has a firm, compact head (spherical heart); the leaves are crisp and firmly packed. The outer leaves are dark green and gradually lighten off until in the middle of the heart they are a light green colour.

Cos (Romaine) lettuce is the second most commonly grown lettuce type in Australia, with mini cos (short cos varieties) becoming more popular in recent years. Cos types have long, narrow, dark green, crisp, stiff leaves and a coarse texture. Butterhead lettuce has a loose heart, soft leaves and is green or red in colour. All coral, baby leaf and salad mix lettuces belong to the loose leaf lettuce group. This group of lettuce has a great variety of sizes, shapes and colours. Baby leaf crops are mostly direct seeded due to the high planting density used in this production system.

Biophysical Requirements and Limiting Factors (climate)

Lettuce is a cool season crop - temperature and day length experienced throughout the growing period has the greatest influence on how a variety performs. Current lettuce production regions in Queensland adequately supply demand. Over production and poor returns in recent years has seen some growers greatly reduce their production volume.

Temperature

Lettuce grows best at relatively cool temperatures and does not like extreme heat or cold. The optimal growing temperatures are 25°C during day and 8°C during night. High daytime temperatures, greater than 30°C at or near harvest can cause wilting and tip burn. Very heavy winter frosts (3°C and below) will damage heads of established plants and kill young seedlings. Temperature fluctuations throughout the growing period have the greatest impact on a variety's performance. Select varieties suited to the temperatures you expect in the local production period. Lettuce varieties are bred to perform under a distinct temperature range. A cool weather variety grown under warm conditions will tend to run to seed, while a hot weather variety grown under cool conditions will remain small and often not form a heart.

Rainfall

During extended rainy weather plants are more likely to become infected with diseases such as downy mildew, dry leaf spot and sclerotinia. These diseases are difficult to manage once they are established in the field.

Soils

Lettuce can be grown on a wide range of soil types, from light sandy loams through to heavy clay loams. However, the soil must be well drained, regardless of type. Drainage can be improved by raising beds, or installing underground drainage to remove surplus water. The soil acidity should be somewhere between pH 6.0 and 7.0 for optimal plant growth.

Irrigation

Lettuce has a shallow root system and to achieve a marketable yield, a constant supply of moisture is required during the growing season. Variation in soil moisture, especially during the late stage of crop development (from hearting to harvest) may result in yield losses (through weight or quality). It is essential to maintain an even plant growth rate throughout the life of the crop. Sandy soils will require more frequent irrigations than clay soils. A range of irrigation methods are used in lettuce production:

fixed sprinklers, drip, boom irrigators, moveable pipes, guns and furrow irrigation are all used in Australia.

A lettuce crop requires between three and four megalitres (ML) of water per hectare from planting to harvest. Lettuce is sensitive to chloride toxicity as well as high total soluble salts, and good quality irrigation water is required to produce quality heads.

Ideally, lettuce should be irrigated with water containing less than 400 mg/L (milligrams per litre, parts per million) chloride to avoid toxicity problems. Conductivity in the irrigation water above 1200 $\mu\text{S}/\text{cm}$ (microSiemens per centimetre) may cause crop damage.

The impact of irrigation timing is an important factor in the potential development of disease in the crop. Periods of prolonged leaf wetness can influence the incidence of diseases such as downy mildew, sclerotinia and anthracnose.

Planting

Today close to 95% of commercially grown iceberg, butterhead and cos lettuce are grown using transplants, the balance is direct sown. Lettuce seedlings (transplants) are mostly purchased from commercial nurseries and planted on farm using transplanting machines. Some specialist growers produce their own seedlings. Crops of iceberg, butterhead and cos lettuce can be grown by direct seeding, however this ties up ground for longer and plant maturity tends to be more variable than transplants. Transplanting overcomes many establishment problems including germination failure and the cost of thinning.

Pests and diseases

Pests and diseases will be a problem at some stage in the life of the crop.

Bacterial leaf spot, downy mildew, virus, septoria, sclerotinia and downy mildew are some common disease issues encountered by lettuce growers. Insect pests such as *Helicoverpa sp* (heliothis) and aphids can cause problems but can be controlled with strategic sprays of insecticide.

To obtain good yields of high quality lettuce, growers must carefully manage four key steps; manage pests and diseases, monitor soil moisture and irrigation, manage crop nutrition and control weeds.

Oversupply

Oversupply has become more common over the past four to five years. Varietal improvements are only one of many factors that have combined to create this supply situation. Many local growers striving to survive in a more competitive market have increased their production or supply direct to the supermarket chains.

Some have duplicated their operations in another locality for part of the year to attempt to supply the market year round.

Highly efficient communication, refrigeration and modern road transport facilities mean that a shortfall in one production area is quickly met from other districts. This reduces periods of undersupply (and hence high prices) in any production region. For example, interstate lettuce quickly appears on the Brisbane market if the market perceives a shortfall in local supply.

Crop Lifecycle

Baby leaf lines can be harvested within 21 – 30 days of seedling

Iceberg, Cos and Butterhead types are slower; Transplant to harvest: 35 (summer) to 84 (mid-winter) days

Comparison Region(s)

Queensland Region	Production Season
Lockyer Valley	Autumn/winter/spring
Granite Belt	Summer
Eastern Darling Downs	Summer/autumn

Winter production in the Lockyer Valley commences with the first plantings in mid-summer, followed by consecutive weekly plantings until mid-winter. First harvest occurs in late April/early May with final harvest in October, harvest peaking from June to August. Lower yields and quality are often produced in October, especially in warmer years. In the Granite Belt, production is summer only. Cold and frosty winters prevent all year round production. First transplanting occurs in late August, with harvests commencing in November; and final transplanting occurring in March, with harvest completed by May, after which frosts will affect head quality (Harper, et al., 1997).

Victoria Region	Production Season
Werribee	All year
East Gippsland	All year

Lettuce can be grown all year around in southern Victoria, but the main growing season is from September to May, while in northern Victoria the season runs from May to October.

NSW Region	Production Season
Riverina	Autumn/winter/spring
Sydney Basin	All year
Central West	Spring and Autumn

Lettuce production is centred in the three main growing areas of Sydney Basin, Riverina and Central West. In the Sydney Basin lettuce is sown and harvested all year round, but declines through summer due to the warm conditions. In the Riverina, lettuce is sown from early February through to late July for harvesting from April to the end of October. Production through summer is not possible due to high temperatures. In the Central West, lettuce is only scheduled for harvesting during spring and autumn. Production outside these times is difficult due to harsh climatic conditions (Napier T, 2004).

Western Australia Region	Production Season
Perth	All year

Lettuce production is centred in the main growing areas north of Perth. Although lettuce is sown and harvested all year round, production declines through summer due to the warm to hot conditions.

Crop in the QMDB Region.

Based on the biophysical requirements and limiting factors, Lettuce is 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.
