

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

Specific Biophysical Crop Information - Cabbage

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Cabbage

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

Crop Matrix:-

	Annual Crop	Cabbage
Currently Grown (Y/N)	Qld	Y
	QMDB	Y
	NSW	Y
	Vic	Y
Frost Sensitivity (N or Deg C)	Seedling	Moderate
	Growth	N
	Reproductive	- 5°C
Low Temp Sensitivity (Y/N or Deg C)	Seedling	N
	Growth	N
	Reproductive	N/A
High Temp Sensitivity	Seedling	N
	Growth	N
	Reproductive	N/A
Rainfall Sensitivity	Y/N	Y
	Growth Phase	Heading
Special Soil Requirements	Y/N	N
	Requirement	
Chilling Req.	Y/N	
	Amount (hrs)	
Water Quality	Sensitivity (dS/m)	1.2 (1.9)
First Planting Date	(Month)	Feb/March
Last Planting Date	(Month)	May
Consecutive Plantings	(Y/N)	Y
First Harvest	(Month)	May
Last Harvest	Month)	Aug
Length of harvest	(weeks)	16
QMDB	Y/N	Y

Biophysical Requirements and Limiting Factors (climate)

Cabbages belong to the Cruciferae family and are related to turnips, cauliflowers and brussels sprouts. The origin of the cabbage is rather obscure as it is one of the oldest vegetables grown, being well known by the ancient Greeks. Cabbages are easily grown under a wide variety of conditions and are adaptable to most areas. Although cool moist weather results in the best quality heads, some varieties produce acceptable heads during the warmer period of the year.

Low Temperature

In cabbage (*Brassica oleracea L. var. capitata*.) the relative freezing tolerance of organs is petiole < upper pith (stem) < middle pith < lamina < lower pith (Manley and Hummel 1996). Inner and outer petiole tissues were killed at -8°C but pith and lamina tissues survived. At -12°C only the lower pith survived without injury and at -16°C all tissues were killed. (Tan et al 1999)

High Temperature

Cabbage is a cool season crop and studies have shown that a 10% potential yield loss will be incurred for every 10 days that the temperature exceeds 30°C during plant growth (Warland et al 2006).

The detrimental effect of days with high temperatures can be attributed to the low optimal temperatures for growth of these “cool season” crops and the physiological problems associated with high temperatures. The optimum average temperature for cabbage production is $16\text{--}18^{\circ}\text{C}$ (Sundstrom and Story 1984), although cultivars have been developed with optimum temperatures as high as 26°C . Hot humid conditions in summer make cabbage growing difficult as this favours disease development.

Rainfall

Excessive in crop rainfall may favour disease development

Irrigation

Cabbages require regular irrigation to ensure rapid growth and evenness of maturity. Cabbages grown on beds will require more irrigation than those grown on the flat. Soil type and weather will also influence requirements.

Soils

Soils are not critical, although with the majority of vegetable crops, well drained soils are an advantage, but especially critical if production occurs in the wet season. Cabbages grow well on a wide range of soils from light sand to heavier clays. Soils with high organic matter content give the best yields. The soil pH should be in the range 6.0–6.5 for ideal growth. Cabbages are less demanding than cauliflowers, and good crops can be produced on most soils. Alluvial soils on major river flats are excellent for cabbage production, provided drainage is satisfactory.

Varieties

Cabbages are sold by type, shape and head colour rather than by individual variety. Green cabbage is the most common, with red cabbage varieties also available. The shape of the cabbage head can be classified in three groups:

- Ballhead (or roundhead). This is the most common type, with a soccer-ball-sized head, and smooth white-veined leaves tightly packed together.

- Sugarloaf (conical). This type has a smaller pointed head and sweeter in taste, more common on the Queensland market than interstate.
- Large drumhead types. These are a larger cabbage with a flatter head shape.
- Chinese cabbages (known as 'wong bok') are a finer leaved more perishable type, even more susceptible to high temperature issues.

A wide range of varieties is available and their suitability for a particular area should be discussed with your local seed supplier.

Markets

Cabbages are grown for both the fresh and processing market with specialist growers supplying to the food processing (coleslaw) market. Recent years has seen a decline in the volume of traditional cabbage moving through the central marketing system. Chinese cabbage volume for the fresh market has remained stable in recent years – though production areas have changed.

Crop Lifecycle

Guide to number of weeks from transplanting to harvest

Season	Cabbage		Cauliflower		Broccoli	
	Lockyer & coastal	Highland areas	Lockyer & coastal	Highland areas	Lockyer & coastal	Highland areas
Autumn/spring	10 – 12	12 – 14	10 – 12	12 – 14	8 – 10	10 – 12
Winter	13 – 16	*	12 – 14	*	10 – 13	*
Summer	*	9 – 11	*	9 – 11	*	8 – 9

*not commercially viable at these times of the year

Comparison Region(s)

Commercial cabbage is grown across a large number of regions, soil types and climates in Australia. Temperature (and to some extent seasonal rainfall) is the determining factor in the location and seasonal production of cabbage in Australia.

In Queensland, summer production occurs on the Darling Downs and in the cooler highland areas of the Granite Belt. Winter production occurs mainly in the Lockyer Valley. Excessive heat or extreme cold conditions severely impact marketable yield.

Prime Growing Areas



Main planting and harvesting times in the major production districts

District	Crop	Plant	Harvest
Lockyer and Fassifern Valleys and Eastern Darling Downs	Cabbage	Mid February to August	Late April to early November
	Cauliflower	Mid February to July	Late April to September
	Broccoli	Mid February to August	Mid April to mid October
Highland regions	Cabbage	Mid August to February	Mid November to May
	Cauliflower	September to February	December to May
	Broccoli	Mid August to early March	November to May
Southern coastal areas	Cabbage	February to mid August	Mid April to September
	Cauliflower	Mid March to June	May to mid September
	Broccoli	February to mid August	April to early October

Source: Agrilink - Brassica Growers Handbook (2004).

Cabbage in the QMDB Region.

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

References

- Agrilink - Brassica Growers Handbook (2004). Heisswolf, S., Carey, D., Walsh, B., Lovatt, J., Rigden, P., Chapman, L., Davis, R., Henderson, C., and Bagshaw, J. Department of Primary Industries and Fisheries, Queensland.
- D. Tan, A. Wearing, K. Rickert, C. Birch and D Joyce. Freeze-induced reduction of broccoli yield and quality. Australian Journal of Experimental Agriculture, 1999, 39, 771–80
- J.Murison, T. Napier. Cabbage growing July 2006, NSW Department of Primary Industries PRIMEFACT 90
- J. Warland, A. McKeown, and M. McDonald., Impact of high air temperatures on Brassicaceae crops in southern Ontario. Canadian Journal of Plant Science (2006)

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.
