

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

Specific Biophysical Crop Information – Desert lime

(1 August 2014 to 30 June 2016)

Activity 1 — Project Team

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Desert Lime

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

Desert lime is one of several Australian natives that are true citrus, and is also known as bush lime, wild lime and native cumquat. Desert lime is endemic to the semi-arid regions of south west Queensland, western New South Wales and South Australia.

The fruit is small, round and green, about the size of a small grape, with a very distinctive piquant lime flavour. Desert lime is one of the foods traditionally collected by Indigenous Australians.

British colonists in New South Wales made jams, tarts, jellies and preserves, as well as an agreeable beverage. Native lime recipes were published in cookbooks as early as 1898.

Crop Matrix:-

	Perennial Crop	Desert Lime (<i>Citrus glauca</i>)
Currently Grown (Y/N)	Qld	Y
	QMDB	Y
	NSW	Y
	Vic	SA
Frost Sensitivity (Y/N or Deg C)	Seedling	N
	Growth	N
	Reproductive	N
Low Temp Sensitivity (Y/N or Deg C)	Seedling	N
	Growth	N
	Reproductive	N
High Temp Sensitivity	Seedling	N
	Growth	N
	Reproductive	N
Rainfall Sensitivity	Y/N	Y
	Growth Phase	Maturation & Harvest
Special Soil Requirements	Y/N	Y
	Requirement	Well drained
Chilling Req.	Y/N	N
	(Hours)	
Water Quality	Sensitivity (dS/m)	1.1
Harvest Months	(Months)	Nov-Dec
Length of harvest	(Weeks)	8
First Harvest	(Years)	3
Full Production	(Years)	3-10
QMDB	Y/N	Y

Biophysical Requirements and Limiting Factors (climate)

The natural distribution of desert lime is in the semi-arid regions in eastern Australia. This extends from Rockhampton to Winton in Queensland, south to Dubbo in central New South Wales, and west to Quorn in the Flinders ranges of South Australia. The climatic range of desert limes is extensive. Commercial plantings of grafted desert limes have been established near Roma in south-west Queensland, Gympie in south-east Queensland, Glenrowan in north-east Victoria, and in southern South Australia and Western Australia.

Temperature

Desert lime can withstand extreme temperature conditions from minus 4° C to 45° C.

Rainfall

The natural distribution of desert lime is in the semi-arid regions in eastern Australia. Desert lime is a drought hardy plant and was named as a potential crop for future commercial production, being a native and more resilient to climate change impacts than many other fruiting crops.

Soils

Desert lime grows naturally in inland woodlands and brigalow scrubs in a range of soil types and is tolerant of heat, frost, drought and salinity. The soil preference is a sandy loam however grafted desert limes will also grow well on clay-based soils when these are mounded

Irrigation

Plantation-grown trees have been shown to respond well to both irrigation and fertiliser. Desert lime is currently being grown commercially in locations from Townsville and Winton through to Roma in Queensland, in western New South Wales, Victoria and into Port Augusta in South Australia.

Grafting

Grafting is the only recommended propagation method for commercial desert lime production. Budding has been tried by many who are well experienced in this technique but without success. A wedge graft is used, firm taping applied and plastic bags tied over newly grafted plants. These remain until shoots appear on the scions (grafted stems). Desert limes are compatible with a wide range of rootstocks and those successfully grafted include Troyer, Trifoliata, Benton, Cleopatra and Flying Dragon. No rootstock trialled has proved incompatible. The root stock should be selected to suit the soil type. Troyer is a preferred and proven rootstock for most soils although Trifoliata is recommended as the rootstock for heavy clay soils. Troyer is generally preferred while Flying Dragon used recently is producing very vigorous seedlings (Douglas 2014)

Crop Lifecycle

Commercially, grafting is the best way to grow desert limes, as maturity to fruiting age of wild trees is around 10 years. Grafted trees begin bearing fruit within three years.

Desert lime flower-to-fruiting time is the shortest of any citrus species, taking only 10-12 weeks. It flowers mainly in spring and fruits ripen in early summer. The fruit is ripe when the colour changes from green to yellow, although it can be picked when still green.

Harvest is carried out by hand but there is potential for mechanical harvesting of manufacturing product, which is most of the industry's output.

Harvest

Desert lime fruit ripens rapidly with fruit changing colour from green to light green to yellowish green and finally light yellow. When ripe the fruit falls readily. Ripe fruit on the ground quickly deteriorates so only fruit from trees is reliable. The time allocated for harvesting a stand of commercial desert limes is three weeks. This may extend slightly if cool, cloudy weather prevails.

Yield

Yield expectations will depend on securing proven grafted plant selections but under ideal growing conditions trees should produce 1kg in year 3, 3kgs in year 4, with a 1kg year increase per year through to year 12. Fruit yield is directly related to the extent of the tree canopy.

Food uses

The industry is on the cusp of transition from niche to commercial production, with the future appearing to lie in the provision of reasonably priced puree for use in gourmet manufactured products. Desert lime has a distinct lime flavour but with that unique difference found in native foods, and can be used in any product or process where 'normal' limes are used. This includes traditional jams and preserves, cordial and cider. Desert lime powder is gaining a place as an attractive additive in herb and spice mixes and as a coating for nuts such as macadamias.

Desert lime has a very thin rind which is virtually tasteless, is often seedless and can be used whole in cooking, making it an extremely versatile and excellent processing and culinary fruit.

Intensely flavoured desert limes require only a fraction of the volume of other limes. Consequently manufacturers can afford to pay a premium for the cachet of a native, 'desert' fruit.

Marketing and Consumption

Desert lime can be consumed immediately after the fruit has been picked, and if not should be refrigerated almost immediately. It can be stored in the fridge for 3-4 days.

The fruit is well suited for freezing as it retains form and flavour very well when thawed and can be stored frozen for long periods.

Premium grades are sold in a frozen whole form. Medium and large blemish-free fruit is sold to chefs and restaurants, who use them whole, sometimes preserved in syrup. Small and second quality desert limes usually processed into puree. Desert lime can also be stored as a dried powder.

Health Benefits

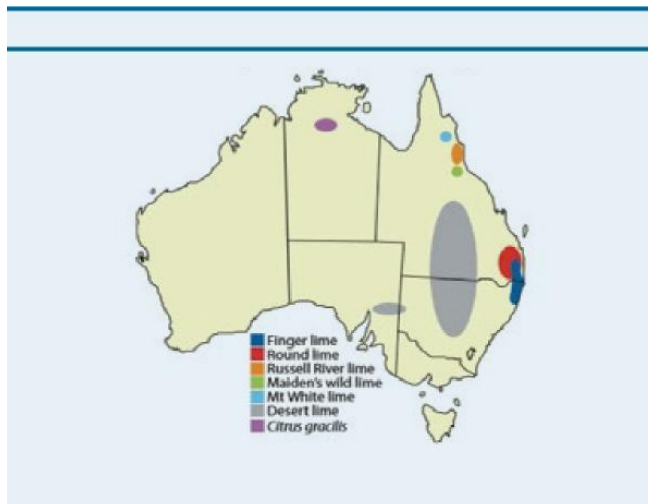
Desert lime is a very rich source of calcium and contains high levels of Vitamin C, folate (Vitamin B9), Vitamin E and lutein (a compound that plays an important role in eye health and wellbeing). It also has a high potassium : ratio, which may help to reduce blood pressure.

Nutritional Value.

Desert lime has high levels of vitamin C, folate and antioxidants.

Frozen puree (per 100grams)		Dried powder (per 100 grams)	
Energy	198 Kj	Zinc (Zn)	1.060 mg
Protein	0.1 g	Magnesium (Mg)	94.5 mg
Total fat	2.7 g	Calcium (ca)	384.2 mg
Total saturated fatty acids	1.0 g	Iron (Fe)	4.74 mg
Carbohydrates	4.0 g	Phosphorus (P)	127.8 mg
Sugar (total)	4.0 g	Sodium (Na)	2.24 mg
		Potassium (K)	1287.8 mg
		Manganese (Mn)	0.8775 mg
		Copper (Cu)	0.641 mg
		Molybdenum (Mo)	17.7 µg
		K : Na ratio	574.9

Comparison Region(s)



Source: Crop Industries Handbook

Desert lime tree

Pests and Diseases

Birds are not likely to be a problem in commercial production, although in a drought year at Roma there was some slight red-winged parrot and rosella damage but this did not recur the following year when the season improved and the parrots had more preferred food sources available. No other birds or fruit bats have been seen eating fruit. Given the opportunity emus may well eat fruit and should be excluded.

Seedling leaves will be readily eaten by rabbits, hares and wallabies causing severe damage and these animals must be excluded. In the wild desert lime stands throughout Queensland and NSW a gall fly is endemic. The gall occurs in the leaves and stems without any great detrimental effect. However when fruit is developing the gall fly lay its eggs within maturing fruit which quickly develop as galls containing pupae in lime fruit. There is natural control of this insect through a parasitising fly and care should be taken in timing of insecticide applications.

Fungal infestations such as sooty mould and phytophthora can be a problem, especially in extended wet periods. Management techniques for control are well known and available. Mounding to promote drainage is a useful preventative.

Crop in the QMDB Region.

Based on the biophysical requirements and limiting factors, Desert lime is a potential crop for the Balonne-Border Rivers Region of the QMDB. Desert lime is a crop identified by CSIRO as having future potential in a climate change environment.

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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.
