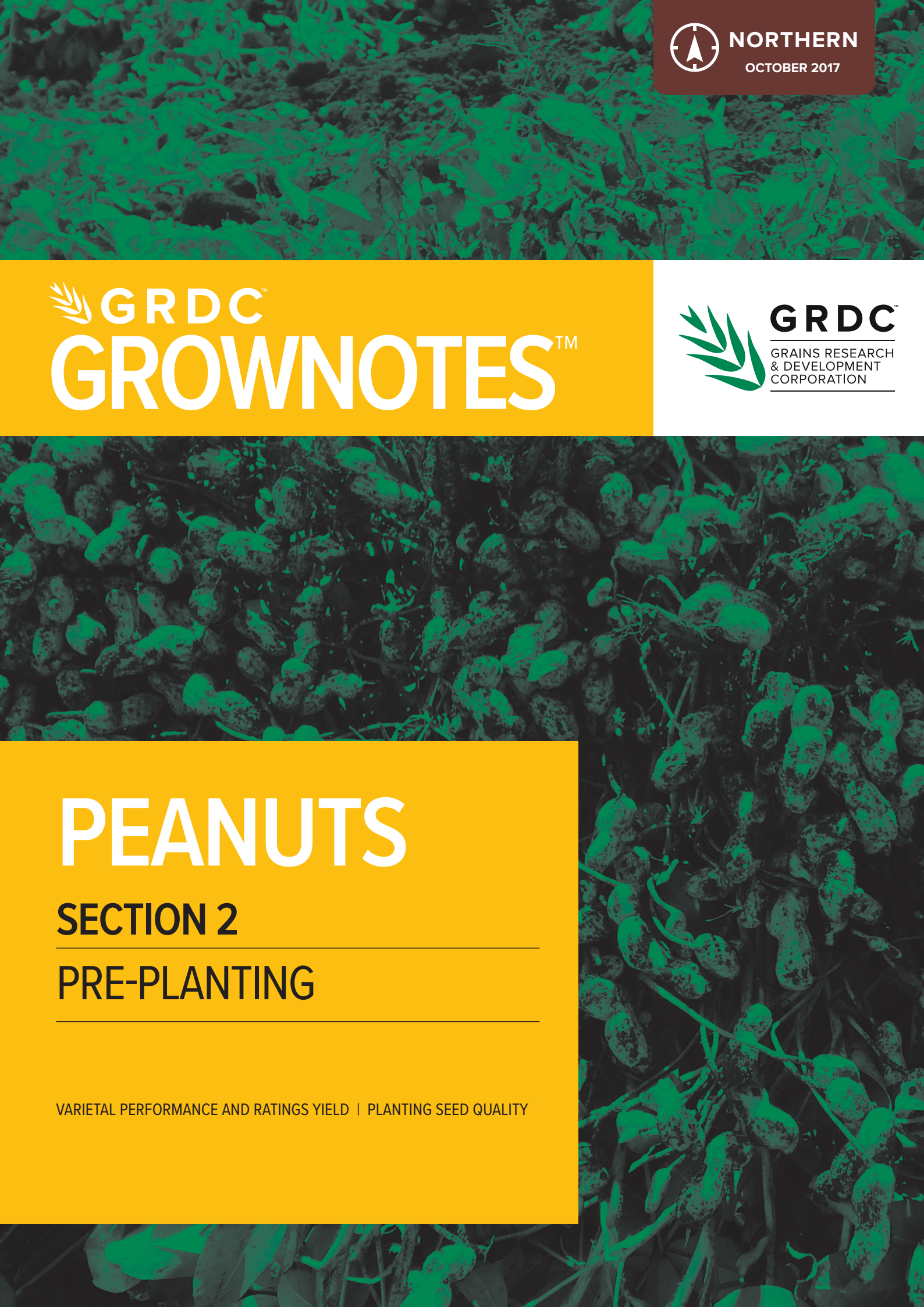


NORTHERN
OCTOBER 2017

GRDC
GROWNOTES™

GRDC
GRAINS RESEARCH
& DEVELOPMENT
CORPORATION

PEANUTS

SECTION 2

PRE-PLANTING

VARIETAL PERFORMANCE AND RATINGS YIELD | PLANTING SEED QUALITY

Pre-planting

2.1 Varietal performance and ratings yield

In 2014, a 5-year license agreement was implemented between the processors Peanut Company of Australia (PCA) and G. Crumpton and Son, and PCA and Clifton Farming.

The agreement allows access to all current and future PCA varieties (Table 1). The only exclusion will be for a 2-year period for any 'introduced' variety commercially released that was part of the PCA program prior to 1 July 2007.

All growers need a Sub-License Agreement to grow any PBR variety.

VIDEOS

Varieties

Table 1: *Peanut variety summary 2015–16.*

						Generally recommended for:			Susceptible to:	
Variety	**Type**	**Weeks (days) to maturity South Qld (approx)**	**Growth habit**	**Peg strength**	**Seed size**	**Dryland – South Qld**	**North Qld irrigated & high rainfall dryland**	**Irrigated Central & South Qld**	**Leaf diseases**	**Soilborne diseases**
Wheeler	Virginia	20 (140)	Erect	Medium	Large	Yes	No	Yes	Yes (Highly susceptible to net blotch)	Yes, maybe some tolerance to CBR
Middleton	Virginia	19 (135)	Semi-erect	Medium	Large	Yes	No	Yes	Yes (Highly susceptible to net blotch)	Some tolerance to Aflatoxin incidence
Fisher	Virginia	20 (140)	Semi-erect	Medium	Large	Yes	No	South Qld only CQ – No	Yes (Some tolerance to net blotch and leafspot)	Some resistance to CBR. Tolerance to Sclerotinia
Menzies	Runner	20 (140)	Semi-prostrate	High	Medium	No	Yes	No	Yes	Some tolerance to CBR and White mould
Holt	Runner	20 (140)	Semi-prostrate	High	Medium –large	Yes (consult agronomist)	Yes	Yes	Yes	Some resistance to CBR. Some tolerance to Sclerotinia and White mould
Page	Runner	19 (135)	Semi-prostrate	High	Medium	Yes (consult agronomist)	Yes (consult agronomist)	Yes	Yes	Some resistance to CBR. Tolerance to Sclerotinia, White mould & Fusarium
Redvale	Ultra Early	15 (105)	Erect	High	Medium	Yes (consult agronomist)	Yes (consult agronomist)	Yes (consult agronomist)	Yes. Limited tolerance to rust (susceptible to net blotch)	Susceptible to CBR

This table is a guide to varietal selection. Consult your local peanut agronomist for specific recommendation on varieties for your farm. PBR, Plant Breeder's Rights: these varieties are protected under the Australian Plant Breeders Rights Act 1994 and the regulation therein

Seed is not a part of the license agreement. When a variety is commercially released, PCA will provide pure seed to the other processors based on their share of the crop. Each party will then be responsible for the provision of seed to their contracted growers.

Redvale is a valuable variety option for growers in all regions. In dryland areas in southern Queensland, Redvale can avoid end-of-season drought and hence aflatoxin risk, yet can still produce a high-yielding crop with good grades in above-average seasons.

In coastal regions, Redvale offers an early-maturing option for early or late planting to allow a legume break-crop to better fit into a cane system. It will use up to 30% less water and fungicides than other varieties, yet still yield >5 t/ha if managed properly.

In North Queensland, Redvale has performed very well under wet conditions. It is worth considering where a grower wants to minimise crop inputs (irrigation, fungicides) yet still have the potential for yields of >4.5 t/ha. [1]

2.1.1 Hi Oleic varieties

'Hi Oleic' is a reference to the relative levels of oleic and linoleic acid (or O/L ratio) in the peanut kernels. The balance of these two oils determines the increase in rancidity over time, i.e. keeping-quality or shelf life. Older peanut varieties have an O/L ratio in the range 1–2. Newer varieties have an O/L ratio in the range 20–40. This greatly improves their shelf life and flavour. All varieties available from PCA are Hi Oleic. [2]

2.1.2 Short-season (early maturing) varieties

A succession of short-season peanut varieties through the Australian peanut-breeding program has recast the legume as a profitable sequencing option that allows growers to avoid late-season drought.

Advances in peanut pre-breeding over the past 18 years have seen short-season varieties achieve about 90% yield parity with their long-season counterparts. This yield lift is significant because in the past the benefit that early maturing varieties provided in helping growers avoid severe yield losses due to drought late in the growing season also meant reduced overall pod yields compared with full-season varieties.

Short-season peanut varieties have shown they can sprint through the growing season, maturing about 30 days earlier, and still compete with both the yield and quality of traditional, long-season cultivars.

Trials at five Queensland sites have shown the potential for a new short-season variety, to be released in 2018, to outperform full-season peanut lines. In these long-term trials (2008–15), the new variety, Taabinga, had a pod yield potential of up to 6 tonnes per hectare, which is nearing the yield potential of 'elite' full-season lines.

Quality and grade improvements have seen the new Taabinga variety yield large, flavoursome kernels with a large proportion of 'Jumbo' grade peanut kernels. Better kernel grades in the Taabinga variety should further increase gross returns from the crop, estimated at more than $3,000/ha (for irrigated crops in central and coastal Queensland).

Compared with the first early maturing Australian peanut variety, Walter, released in 2007, trials have shown Taabinga can return an extra $1,000/ha.

Other short-season genetic gains that have implications for processing efficiency and market acceptance are a lower ratio of shell to peanut and high blanchability (cooking to remove kernel skin).

MORE INFORMATION

GCTV Extension Files: Redvale in a Nutshell

MORE INFORMATION

Hi Oleic peanuts are simply the best peanuts yet!

New peanut showcases 'speed breeding'. GRDC Ground Cover Issue 92.

1 G Wright, L Wieck, P Harden (2015) Peanut production guide, August 2015. Peanut Company of Australia, http://www.pca.com.au/wp-content/uploads/2016/11/PWH-Peanut-Production-Guide-2015.pdf

2 G Wright, L Wieck, P Harden (2015) Peanut production guide, August 2015. Peanut Company of Australia, http://www.pca.com.au/wp-content/uploads/2016/11/PWH-Peanut-Production-Guide-2015.pdf

Australia produces about 35,000 t of peanut pods per year, which is just 0.1% of the global crop, estimated at 35,000 million tonnes, indicating the potential to increase Australia's market share.

The varietal improvements have also extended the planting window for about 30% of the Australian crop grown under dryland conditions in the Burnett region of Central Queensland.

In dryland situations when opening rains do not arrive in time for the traditional sowing window from November to December, early maturing varieties can be late-sown in January. The ability to plant the crop very early and harvest in early autumn opens up new opportunities to grow peanuts in sequence with sugarcane planted in autumn instead of spring.

Fast-maturing varieties could also benefit the other 70% of the national crop grown under irrigation in Queensland, northern NSW and the Northern Territory. Where irrigation water is limited, early maturing crops help increase water use efficiency, lifting the crop's overall productivity and profitability in dry seasonal conditions. [3]

2.1.3 Yielding ability

A peanut grower's income is determined largely by the yield and quality achieved. Like many crops, substantial variations in yield may exist. Climatically, some areas may have different yield potential, and differences do exist among varieties. However, management factors are often a major determinant of final yield, so care must be taken with all aspects of growing the crop.

Similarly, kernel quality can be influenced by management factors. Growers are directly paid on kernel quality; therefore, it is important that they understand which management factors can directly affect kernel quality.

These include:

- good crop rotation and freedom from disease
- good nutrition, especially calcium (Ca) and boron
- good irrigation/moisture management
- optimum maturity determination
- good harvesting conditions
- controlled drying.

On-farm yield is normally measured in tonnes per hectare (t/ha) of farmers' stock peanuts, which means unshelled pods (in-shell) cleaned of extraneous matter and at the moisture content used for grower payment calculation.

Under excellent conditions, the Runner and Virginia varieties are capable of yields >7 t/ha. The ultra-early varieties tend to yield less, but are still capable of yields of 5 t/ha.

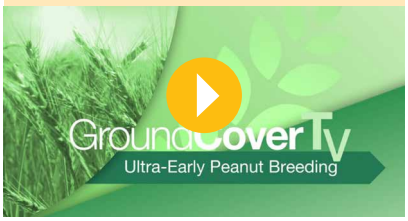
The different varieties produce different levels of shell; growers should be aware of this because they are not paid for their shell. Runner types produce 19–22% shell and Virginia types, 22–25% shell. Well-grown, irrigated crops will be at the lower end of shell percentage, whereas immature and drought-affected crops generally exhibit higher shell percentages. [4]

Ultra-early varieties, such as Tingoora, can escape end-of-season droughts and give reliable yield. Ultra-early maturity also provides a short-rotation option for high-input growers (i.e. irrigated regions in southern and North Queensland) where commercial pod yields of >5 t/ha have been achieved.

VIDEOS

GCTV4: Peanuts 'Tingoora'

GCTV14: Ultra Early Peanut Breeding



3 GRDC (2016) Pre-breeding gains lift peanut fortunes. Ground Cover Issue 122, May–June 2016, https://grdc.com.au/resources-and-publications/groundcover/ground-cover-issue-122-may-jun-2016/prebreeding-gains-lift-peanut-fortunes

4 G Wright, L Wieck, P Harden (2015) Peanut production guide, August 2015. Peanut Company of Australia, http://www.pca.com.au/wp-content/uploads/2016/11/PWH-Peanut-Production-Guide-2015.pdf

2.1.4 Peanut breeding

The need for productivity and efficiency gains in any industry is essential and growing peanuts is no different. In the 2015–16 year PCA and GRDC signed a new 5 year agreement to continue the development of new peanut cultivars for the Australian industry. This breeding program has also been supported by another 5 year agreement with QDAF.

The breeding program continues to target two different maturity groups: full-season types (20 to 22 weeks) and ultra-early types (approximately 16 to 18 weeks). Varieties are selected within these groups based on their ability to meet a market need, Hi Oleic oil composition, high yield, low shell and high blanchability traits and enhanced resistance to a range of foliar and soil borne diseases.

Over the next few years PCA plans to have the following varieties commercially released to Australian peanut growers.

Kairi

The new full-season maturity line (D281-p40-236A, to be called 'Kairi') performed very well again during 2015–16 and is highly likely to progress to commercial release in 2017–18. Kairi has 5–15% higher kernel yield than Holt, Middleton and Fisher, a larger Runner grade out superior to Holt and enhanced foliar disease tolerance (leaf spot, leaf rust and net blotch). It has shown very good broad adaptation with consistent superior performance against commercial checks in dryland (Burnett) and irrigated (North Queensland, Brisbane Valley, Bundaberg, Central Queensland) environments. [5]

Taabinga

The first early maturity line developed by PCA in the joint breeding program ('P' lines) for potential commercial release is P23-p153-63 (to be called 'Taabinga'). This line has continued to perform very well in all regional variety trials over the past 3 years, with superior kernel yield performance (20% higher than Redvale), kernel size (>50% runner Jumbos) and excellent foliar disease tolerance (leaf spot, leaf rust, net blotch). [6]

However, ultra-early varieties will have lower yield potential than full-season varieties in seasons with good rainfall.

The peanut variety Sutherland has demonstrated significantly higher levels of resistance to rust (caused by *Puccinia arachidis*) and late leaf spot (caused by *Cercosporidium personatum*) than currently grown varieties such as Menzies and Holt. It gives growers another method of managing leaf disease in peanut crops. [7]

2.2 Quality of planting seed

Peanut seed is easily damaged and must be treated as gently as possible. Once a seed is split, the two halves will not germinate.

Seed is treated with fungicide before planting to reduce seedling diseases. It is not worthwhile for farmers to plant untreated seed, because germination rates will drop to <40%.

Planting can start any time after the soil temperature reaches 18°C at planting depth (50–70 mm). This is measured at 9 a.m. for 3 days in a row. Planting is delayed if rain is expected within 3–4 days. Planting is also timed to ensure that the crop is ready for harvest before frosts begin and when there is a low risk of rain.

In high-rainfall areas, formation of raised beds prior to planting may be necessary. [8]

5 Peanut Company of Australia (2016) Annual report 2016. PCA, http://www.pca.com.au/wp-content/uploads/2016/11/annualreport2016.pdf

6 Peanut Company of Australia (2016) Annual report 2016. PCA, http://www.pca.com.au/wp-content/uploads/2016/11/annualreport2016.pdf

7 GRDC (2010) Managing leaf disease in peanuts. GRDC Fact Sheet, https://grdc.com.au/__data/assets/pdf_file/0030/207687/managing-leaf-disease-in-peanuts.pdf.pdf

8 PCA. Soil preparation. Peanut Company of Australia.

2.2.1 Growing peanuts for seed

Peanut seed is more delicate than most other seed and needs care and attention from planting of the seed crop through harvesting, drying, shelling and seed preparation.

Growing peanuts for seed is a specialist activity because high-quality seed is essential to ensure optimum plant populations. The industry requires quality seed with high germination rates, vigour and purity.

Peanut germination and vigour can be affected any time through the growing season. Particular attention must be paid to crop nutrition, management of weeds and diseases, minimising moisture stress, and correct harvesting and drying techniques.

Clean land

Land must be free of weeds and volunteer peanuts. Preferred paddocks have not grown peanuts for at least 3 years and do not have a history of soil-borne diseases. Contamination of seed crops from peanut volunteers of a different variety is a major concern.

Good rotations are needed to achieve clean land status. Preferred rotations include pastures, sugarcane, and grain crops such as maize, sorghum, wheat and barley.

Clean machinery

Peanut seed must be kept separate from all other peanuts. All handling equipment should be cleaned to avoid contamination.

All machinery must be free of kernels and pods. This includes planters, diggers, threshers, elevators, drying bins, silos and trucks.

Irrigation

If water is available, irrigation can ensure good yields and dramatically improve seed quality but needs to be considered in terms of budget and risk.

Supplementary calcium

Peanuts, especially seed crops, have a high requirement for Ca. Low seed Ca results in poor germination.

Supplementary Ca can be applied as lime or gypsum, and in combination with irrigation, it can make a big difference to germination.

Lime is preferred if the soils are acidic. Ideally, the lime should be applied and lightly incorporated before planting. Rates are usually 2.5–3.5 t/ha.

Gypsum is the preferred option for applying Ca because it is more soluble and more available than lime. Gypsum is best applied close to flowering at 1 t/ha over the whole crop or banded over the row at 400–600 kg/ha. Lime can also be applied over the row where soils are acidic, but it must be applied soon after emergence.

Maturity

Check crops regularly as harvest nears. The hull scrape method will help to determine the best time to dig. Slightly immature kernels give better physical quality than over-mature ones.

Digging and threshing

Diggers that invert peanuts are preferred for seed crops because inverted peanuts dry uniformly and quickly.

Threshing is one of the most critical aspects of seed production. The impact received during improper threshing may damage peanuts, making them unsuitable for seed. Mechanical injury causes broken or bruised seed tissue. Such damage leads to seed deterioration in storage, increasing the chance of fungal invasion of the seed.

MORE INFORMATION

QDPI/CSIRO. Managing cadmium in summer grain legumes for premium quality produce.

Cadmium. Nuts2u.

Incitec Pivot Fertilisers. Gypsum.

Physical damage to the seed is one of the causes of the 'J-shaped' root system that can develop when peanuts are trying to establish. Plants with deformed root systems do not yield as well as those with a normal root system.

Slow cylinder speeds are essential. As conditions change throughout the day, the harvested crop should be checked for loose shell kernel and hull damage.

Allow the peanut bush to dry sufficiently in the windrow before threshing. Green bushes are tough and require aggressive threshing action to separate the pods from the bush. Moisture content of 18–22% is ideal (Table 2).

Table 2: *Effect of seed moisture at threshing on germination.*

Threshing moisture	Average germination
<20%	89%
20–25%	84%
>26%	75%

Source: Six steps to high quality peanut seed. North Carolina Agricultural Extension Service

Drying

Peanuts for seed should generally be pre-cleaned before drying.

Seed can be easily damaged by over-drying, rapid drying and/or drying at overly high temperatures. Drying damage can result in poor germination and poor shelling quality, with an increase in splits and skin slippage.

Peanuts for seed should be dried at a maximum of 35°C, and no more than 7°C above ambient air temperature. The minimum relative humidity for seed is 65%, compared with 50% for commercial crops. Moisture should not be removed faster than 0.5% per hour.

Peanut seed contracts

PCA has a program to produce seed peanuts. This aims to provide the industry with quality seed with high germination rate and varietal purity. Growers are contracted to produce this seed and must meet specific conditions including paddock and machinery clean-down inspections, calcium application and preferably irrigation. [9]

9 PCA/DPIF (2007) Peanut seed production. Peanut Company of Australia/Department of Primary Industries and Fisheries Queensland, http://www.pca.com.au/bmp/pdfs/7a_other_seed.pdf