Growing Dual-Purpose Peanut in the Northern Territory

Department of Agriculture and Fisheries

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| Acronyms | Full form |
| AG | Anastomosis Group |
| CSIR | Council for Scientific and Industrial Research (1926-1949) |
| CSIRO | Commonwealth Scientific and Industrial Research Organisation (1949-Present) |
| CRCNA | Cooperative Research Centre for Developing Northern Australia |
| DDRF | Douglas Daly Research Farm |
| KRS | Katherine Research Station |
| NT | Northern Territory |
| NIS | Nut In Shell |
| PAW | Plant Available Water |
| PCA | Peanut Company of Australia |
| SSA | Sub‐Saharan Africa |
| TSMK | Total Sound Mature Kernels |

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*Key messages:*

*1. Cultivation of peanut crops for human consumption and livestock feed (dual-purpose) is widely practised in semi-arid tropical and subtropical regions.*

*2. Queensland contributes the majority of Australia’s peanut production, while peanut historically was grown in Douglas Daly and Katherine areas in the Northern Territory from 1920s to 2011.*

*3. Trial results from the dual-purpose peanut varieties bred by Peanut Company of Australia (PCA) have shown promising yields of both forage and nut.*

# Introduction

Peanut (*Arachis hypogaea* L.), also commonly known as groundnut for its pods with a subterranean habit, is a legume crop growing between latitudes 40° N and 40° S in ~100 countries (D. V. R. Reddy & Thirumala-Devi, 2003; Stalker, 2013). Originally from South America with a long history of domestication, the crop has evolved into two varietal groups that are either two or three-seeded (Stalker, 1997). Peanut contains all the 20 essential amino acids which makes it an excellent source of protein despite being rich in oils, fibre and many bioactive compounds suitable for both human and livestock (Arya et al., 2016; Hill, 2002).

Globally, 45 megatonnes (Mt) of peanut is produced from over 26 million hectares (Mha) landmass, 80% of which comes from rainfed regions of semiarid tropics reporting low yields of < 1 t/ha in > 50% of the countries surveyed (Rachaputi et al., 2021; A. L. Singh, 2011). Cultivating peanut grain for both human consumption and fodder for livestock feed (dual-purpose) is widely practiced in semi‐arid Sub‐Saharan Africa (SSA) and America (Akplo et al., 2023; Witt et al., 2023). Consequently, most of the current research on dual-purpose peanut is concentrated on smallholder rain-fed mixed crop-livestock systems in SSA countries.

Ninety percent of Australia’s peanuts come from Queensland, particularly the Burnett and the Atherton Tableland regions (Haerani et al., 2023). The peanut industry in Queensland began in 1920 when farmers in the South Burnett area, including Young Brothers, BJ Johansen of Memerambi, and Sam Long of Tingoora, planted 2-5 acres of peanuts, demonstrating their commercial potential (Laverty, 1954). By 1922, the Marrackville Margarine Company's expansion into oil production created a reliable market for a larger quantity of peanuts, coinciding with the proven suitability of the South Burnett area for peanut cultivation (Laverty, 1954). Historically, peanut was grown in the Northern Territory (NT) and the northern coast of New South Wales, but the industry declined over the last century (Boyd & Gardiner, 2005; Phillips, 1960). In response to climate change that was causing yield reduction in traditional dryland farming regions of Queensland, Peanut Company of Australia (PCA) purchased a total of 17,000 ha of land near Katherine (Florina Road: 500 ha; Taylors Park: 12,000) in attempt to relocate the peanut production, but this effort was abandoned in 2011 due to several challenges (Jakku et al., 2016; Marshall et al., 2014). Five major challenges were recognised by Jakku et al. (2016).

1. Logistics and high transport costs due to the “tyranny of distance”, adapting to new agronomic and climatic conditions, establishing viable and profitable rotation crops etc and difficulties to find and keep suitable staff labour.
2. Annual water allocation from the Oolloo Dolostone Aquifer creating planning delays and uncertainty around future investments.
3. Significant start-up costs, market volatility and profitability.
4. Mitigating environmental impacts, e.g. water extraction, fertiliser and pesticide use, soil erosion and spread of plant pathogens.
5. Social licence to operate.

Internally, PCA also faced pressure to maximise production with limited resources, and disruptive turnover among its senior management (Jakku et al., 2016).

Conventionally, peanut varietal selection focused on nut production for human consumption as oilseed and confection, determined by the percentage of total sound mature kernels or “grade” (TSMK) obtained from shelling a specific quantity of peanut pods (Pattee et al., 1980; Tillman & Stalker, 2010). Due to rising temperatures, decreasing rainfall, and severe droughts in the Burnett region since the 1980s, peanut yields have declined, and aflatoxin contamination has increased (Jakku et al., 2016). Consequently, PCA developed new varieties to tackle the challenges of climatic variability and aflatoxin contamination, while bringing potential crop options for dry season production in the northern Australia (Chauhan et al., 2022). At present, the peanut varieties have been bred for high oleic content (for long shelf life), high yield, disease resistance and early maturation, increasing drought resilience and minimising the risk of aflatoxin contamination and accumulation (G. Wright et al., 2017). The summary of peanut yields from various varieties previously trialled in the NT can be found in Appendix 1.

# Peanut Production in the Northern Territory

Peanut production for grain in the Northern Territory began in 1912, when the first Agriculture Department was established under William Clarke at the Batchelor Demonstration Farm (Hillock, 2005). However, peanut hay provides high‐quality feed for livestock (Song et al., 2023), while the nuts can be utilised for human consumption providing diversified revenues for pastoralists and farmers. Grain and dual-purpose peanuts share the same growing conditions [[*Growing Peanuts in the Top End of the NT* (Agnote Number: C9)](https://www.nt.gov.au/__data/assets/pdf_file/0008/232928/177.pdf) and [*Peanuts Northern Region – GrowNotes*](https://grdc.com.au/__data/assets/pdf_file/0020/315308/GRDC-GrowNotes-Peanuts-Northern.pdf)], and the research and environmental requirements are similar.

## Climate

Peanut crop requires relatively warm conditions, abundant sunshine, and at least 500–600 mm well-distributed rainfall during the growing period (Halder et al., 2020; Phillips, 1960). The optimal temperature for peanut vegetation growth is 27.5 °C, and 23.5 °C for fruiting and podding (Cox, 1979). In the Northern Territory, peanuts are usually grown in the dry season, and irrigation is required for keeping adequate soil moisture. While a temperature range of between 22 °C – 28 °C is optimal, temperatures above 35°C and lower than 15 °C have an inhibitory effect on peanut development including heat and chilling stress that can lead to reduction of flowers producing pegs (Bell et al., 1994; Ketring, 1984; Prasad et al., 1999). Katherine and Douglas Daly regions of the Northern Territory represent perfect conditions for peanuts as they have a tropical savannah climate (Köppen *Aw*) with distinctive dry winters and hot humid summers (Duvert et al., 2022).

## Soil

Peanut is ideally grown in loamy, moderately aerated, well-drained soil with good water and fertility retention (Zhao et al., 2015). Soils in the NT are generally suitable for growing peanut crops, particularly Kandosols and Dermosols in the Katherine and Douglas Daly regions (Blain, Oolloo, Tippera and Tindal soil types) (Smith & Hill, 2011).

## Irrigation

Although peanuts are considered relatively drought-tolerant, irrigation during germination and emergence, at the pegging stage and at harvest time in the dry season is required to ensure good yields (G. Wright et al., 2017). Dual-purpose peanuts grown during the dry season typically require between 600 to 700 millilitres of water per hectare (ml/ha) throughout the growing season, depending on soil and weather conditions.

## Nutrients

To produce one tonne of peanut pods, peanut crops require 38.4 kg N/kg, 4.3 kg P/kg, and 14.0 kg K/kg in total (Xie et al., 2020). Removal of peanut forage for hay production will lead to higher input requirements. For example, one tonne of peanut forage removed will take a high content of Potassium (20 kg) requiring 40 kg of muriate of potash (or equivalent) to replace it (GRDC, 2017). Soil analysis should be done prior to planting to fertiliser requirements, however general nutrient recommendations for the peanut production are given in Table 1.

**Table 1.** General nutrient recommendations for dual-purpose peanut production by the Peanut Company of Australia (PCA) (G. Wright et al., 2017).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Macronutrients | Rate (kg/ha) |  | Micronutrients | Rate (kg/ha) |
| Phosphorus | 45-135 | Zinc | 0.92 |
| Potassium | 100 | Copper | 3.68 |
| Calcium | 147-294 | Magnesium | 0.4 |
| Boron | 5 | Manganese | 1.08 |
|  |  |  | Molybdenum | 0.156 |

## Land preparation and sowing

It is recommended to perform deep ploughing to a depth of 45 cm to create a weed-free and even seed bed.. The seeds are treated with rhizobium inoculant and planted at a density of between 160,000 - 180,000 plants per ha with a row spacing of 90 cm. Soil moisture in the seeding zone (approximately 5 cm deep) is crucial for peanut germination. However, in rain-fed regions, peanuts are typically sown at optimal water status when plant available water (PAW)>0 or into dry soil followed by irrigation (25 mm for the first three weeks in West Bengal of Eastern India) (Bandyopadhyay et al., 2005; Rachaputi et al., 2021). In sandy loam soils with light clay content like at Katherine Research Station, peanut crops are sown either in February or March ([*GRDC GrowNotes – Peanuts Section 2 Pre-Planting*](https://grdc.com.au/__data/assets/pdf_file/0026/370547/GrowNote-Peanuts-North-02-Pre-planting.pdf)  and [*GRDC GrowNotes – Peanuts Section 3 Planting*](https://grdc.com.au/__data/assets/pdf_file/0027/370548/GrowNote-Peanuts-North-03-Planting.pdf) ).

## Common weeds

The predominant weed species recorded at KRS trial in 2023 season included sicklepod (*Senna obtusifolia*, Figure 1), pigweed (*Portulaca* spp*.*, Figure 2), and nutgrass (*Cyperus rotundus*, Figure 3). For more information, please refer to [*Weed Control in Peanuts in the Top End of the NT* (Agnote Number: C10)](https://www.nt.gov.au/__data/assets/pdf_file/0007/232945/180.pdf).

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| **Figure 1.** Sickle pod (*Senna obtusifolia*) | **Figure 2.** Pigweed (*Portulaca* spp.) | **Figure 3**. Nutgrass (*Cyperus rotundus*) |

## Common pests

In past seasons, armyworms (*Helicoverpa* spp.), particularly Corn earworm (*Helicoverpa armigera*), cowpea aphid (*Aphis craccivora*) (Northern Territory Government, 2003) and to a lesser extent cluster caterpillars (*Spodoptera litura,* Figure 4) were recorded at KRS. Other pests observed were Rutherglen bug (*Nysius vinitor*, Figure 5), vegetable jassid (*Austroasca viridigrisea*), lucerne Leafhopper (*Austroasca* *alfalfae*), brown mirids (*Creontiades* *pacificus*), green vegetable bug (*Nezara viridula*), redbanded shield bug (*Piezodorus hybneri*), Lucerne seed moth (*Etiella behrii*) and false wireworms (*Gonocephalum carpentariae* and *Caedius sphaeroides*) (Brown, 2023). Other pests including Northern Armyworm (*Mythimna separata*), green looper (*Chrysodeixis eriosoma*), and bean podborer (*Maruca vitrata*) have also been recorded (Hanabar & Hegde, 2018; Shepard et al., 1983; Waterhouse, 1993). Some common insect pests of peanuts are summarised in Table 2. In a survey carried out from May to June 2024, giant northern termites (*Mastotermes darwiniensis)* were found attacking the roots of peanut crops in Katherine; alongside a high density of lucerne seed web moth (*Etiella behrii*) (Northern Territory Government, 2004) ([*GRDC GrowNotes – Peanuts Section 7 Insect Control*](https://grdc.com.au/__data/assets/pdf_file/0022/370552/GrowNote-Peanuts-North-07-Insect-control.pdf) and *Peanut Pests and Beneficials in the NT (Factsheet ENT-24)*.

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| **Figure 4**. Cluster caterpillar (*Spodoptera litura*) | **Figure 5**. Rutherglen bug (*Nysius vinitor*) |

**Table 2**. Common pests of dual-purpose peanut in the Northen Territory, source: Wright et al. (2015).

|  |  |  |
| --- | --- | --- |
| Types of insect pests | Insects | Economic threshold level |
| Chewing insects | *Spodoptera* spp. | Seeding stage @ more than 6 larvae per metre |
| *Helicoverpa* spp. | Flowering and pegging @ 2 larvae per metre |
| Sucking insects | Vegetable jassid and Lucerne Leafhopper (*Austroasca* spp.)  Mirids (*Creontiades* spp.), Rutherglen bugs (*Nysius vinitor*) | 25% crop leaves have small yellow spots or leaf tips and margins turning yellow |

## Common diseases

Seedling diseases, such as *Aspergillus* crown rot (Figure 6), early leaf spot caused by *Cercospora arachidicola* (Figure 7) and late leaf spot caused by *Cercosporidium personatum* (sexual spores: *Mycosphaerella berkeleyi*), found for the first time in 1989 (Northern Territory Government, 1989), are common and can cause more than 50% pod yield loss when fungicides are not applied (M. P. Singh et al., 2011). Other leaf diseases include leaf scorch caused by *Leptosphaerulina crassiasca*, peanut rust caused by *Puccinia arachidis*, and a pytoplasmid called “little leaf”, “witches’ broom” or phyllody. Stem and limb rots caused by *Rhizoctonia solani* can occur from planting to harvest and are more prevalent in dry season irrigated crops. The strain from Katherine and Douglas Daly regions has been positively identified as the Anastomosis group (AG) 2-2. *Diplodia gossypina* has been isolated from limb tissue associated with scab-like pustules on young limbs; and conidia of *Alternaria* sp. has also been isolated. Stem rot of peanut, also known as white mould or *Sclerotium* rot, is also a late-season disorder in the Katherine Daly Basin.

*Pythium aphanidermatum* and *P. myriotylum* cause damping off, vascular wilt, and root rot. Peanut peg and pod rots that are common near the end of the growing season were found to be associated with at least three fungi: *R. solani* (AG 2-2), *Pythium* spp. and *Fusarium* spp. (often referred to as pod rot complex). Soil fauna plays a role in the pod rot complex, and it is suspected that injuries caused by nematodes and insect larvae make the pods more susceptible.

Root lesion nematodes (*Pratylenchus* species) were first observed in Darwin in 1980, in Alice Springs in 1985 and then in the Katherine Venn Blocks in 1992. In 2003 they were identified in small numbers at a peanut farm near Katherine (Northern Territory Government, 2003), however, current varieties have a higher resistance to nematodes and their presence was not deemed to pose a significant risk (  [*Common Diseases of Peanuts in the Top End of the NT* -Agnote Number: I62)](https://daf.nt.gov.au/__data/assets/pdf_file/0003/233589/820.pdf).

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| **Figure 6***. Aspergillus* crown rot | **Figure 7.** Early leafspot (*Cercospora arachidicola*) |

## Harvest timing

Peanut hay may be harvested when the canopy cover is approximately at 60%-70% (Figure 8 and Figure 9), or when it is at final harvest (ideally at 12-16% moisture content). Nuts are harvested 24 weeks after planting (Figure 10).

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| **Figure 8.** In-season biomass cut. | **Figure 9.** Forage harvesting in field. | **Figure 10.** Nut digging operation. |

## Harvest and Postharvest handling

A peanut digger is employed to unearth the bushes and flip them over, turning the peanuts to ensure that they are evenly exposed to the air rather than resting in the soil. Pods are cleaned and gently dried to a safe moisture content (5 – 10 %); then stored in dry conditions to protect against postharvest insect pests.

*Forage*

Peanut hay is highly nutritious, containing high amounts of crude protein (105 g/kg dry matter) and has a lower level of neutral detergent fibre (466 g/kg dry matter). It is rich in calcium (12 g/kg dry matter) and phosphorus (1.7 g/kg dry matter) (Khan et al., 2013). Trial results showed that substituting wheat straw with peanut hay can significantly improve intake, digestibility, and nitrogen retention in sheep (Khan et al., 2013). In addition, peanut silage has been shown to be an effective feed for cattle and dairy animals due to its in vitro digestibility, high crude protein content, and aerobic stability (Foster et al., 2011; Song et al., 2023). It can lower rumen fluid pH, reduce the acetate: propionate ratio, and decrease ammonia nitrogen levels, thereby improving ruminal fermentation efficiency compared to dry hay (Zhang et al., 2022). When fermented with peanut stover and heated corn, the fermentation efficiency improves, resulting in higher production of nonfibre carbohydrates, lactic acids, and nonproteins, as a result, it enhances the accumulation of volatile fatty acids in ruminal microorganisms and reduce ammonia levels in vitro (Yang, 2005).

*Nut*

In the NT, nut maturity is estimated by either the number of days after planting, or through evaluation of the internal hull colour. Estimating nut maturity using a predetermined length of time after planting may be shortsighted and tends to lower crop yield and value because of varying environmental factors during each season (Sanders et al., 1982). Determination using the internal surface colour of the hull (tan to brown inside the hull and pink to dark pink seed coats), also known as the ‘shellout method’, is possibly the oldest method to determine peanut maturity (Sanders et al., 1982). It is generally recommended that 60%-80% of nuts attain the desired colour before initiating harvest.

# Peanut Research Overview

In Australia, climatic variability plays a dominant role in dryland agriculture, particularly for peanut production in north-eastern Australia (Meinke & Hammer, 1995). Australian peanut production is susceptible to unfavourable weather conditions including drought and excessive rainfall (Meinke et al., 1996). Drought, particularly mid-season drought in early reproductive stage and terminal drought, poses the major threat to peanut production (Jongrungklang et al., 2013). Research on peanuts has concentrated on how the crops physiologically respond to different levels of drought stress at various stages of physiological growth, aiming to enhance peanut yield performance (T. Y. Reddy et al., 2003; G. C. Wright et al., 1991).

Much prior research on peanuts in the NT has focused on variety trials, with particular emphasis on nut varieties for oil production, such as Natal Common (a short season “Spanish type”), Virginia Bunch, Red Spanish, Coriante and Spantex for use in Katherine (Norman & Begg, 1973) in 1950s-60s, and Florunner in 1980s; but variety trials ended in the 1987/88 season in Douglas Daly (Northern Territory Government, 1992). Forage peanuts (*Arachis* spp*.*) were researched in the mid-late 1990s and variety trials resumed in 1998 (Basinski et al., 1964; Northern Territory Government, 2000; Phillips, 1960; Thiagalingam et al., 1991). Since the early 2000s, with investments from PCA, a range of candidates for peanut rotation systems were also trialled, such as sorghum at Douglas Daly, maize at Taylor’s Park in 2008, Ingrid Pearl millet, and cotton (Northern Territory Government, 2003, 2004, 2005, 2006, 2009, 2010; O’Gara, 2007). Historical research on peanut in the NT is listed in Appendix 2. The subsections 3.1 and 3.2 detail the recent research projects undertaken by the Department.

## Peanut Varieties for Northern Australia

**Funding**: Northern Territory Government, Queensland Department of Primary Industry (QDPI), the Grains Research and Development Corporation (GRDC) and the Peanut Company of Australia (PCA)

**Duration**: 3 years (2002-2004), 2005

**The project aim**: To evaluate and identify suitable peanut varieties for production in the NT.

**Summary:**

In 2002, eleven genotypes of peanuts were evaluated, and in 2003 and 2004, the research expanded to nineteen genotypes. The peanut crops were planted under centre pivot irrigation at DDRF. The crops were sown in mid-late March and harvested in late August. Totally 11 genotypes were evaluated in 2002 and 19 genotypes in 2003 and 2004. Across the three years, the trial results show that the clean Nut in Shell (NIS) yields ranged between 4.65 t/ha and 7.9 t/ha, and the average kernel yields range between 3.53 t/ha to 6.3 t/ha. Overall, the genotypes ChifleyA blue and green logo

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In 2005 following the three years project, four high oleic varieties (MenziesA blue and green logo

Description automatically generated, DeakinA blue and green logo

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Description automatically generated, and HoltA blue and green logo

Description automatically generated) selected by PCA were trialled under Flame® and no-Flame® treatments. It was found that all of these four varieties produced better in no-Flame® treatment and HoltA blue and green logo

Description automatically generated had yielded in the highest (7.93 t/ha), the highest proportion of Jumbo, combined kernels in both treatments, and gave the highest theoretical gross returns.

## Grain and Graze North: Dual purpose peanuts for Northern Australia – Katherine site trials

**Project timeframe**: 3 years (2021-2024)

**Funding agency**: Cooperative Research Centre for Developing Northern Australia (CRCNA).

**Leader**: CQ University

**Collaborators**: Queensland Department of Agriculture and Fisheries, Burdekin-Bowen Integrated Floodplain Management Advisory Committee, Vanderfield, AgForce Queensland - Grain Producers Australia, Rockhampton Regional Council, Central Highlands Development Corporation

**The project aims**: To assess new peanut varieties as dual purpose for kernel in combination with different fodder production options in five agro-ecological regions across Northen Australia.

**Research questions***:*

1. What are the potential kernel and fodder yields and what is the resulting kernel and fodder quality?
2. What are the trade-offs in dual purpose peanuts between kernel yield and quality on one hand, and different fodder options via biomass cutting and post-harvest hay on the other?
3. What are the most promising traits for dual purpose use of peanuts for Northern Australia?
4. How do dual purpose peanuts best fit in tropical farming system?
5. How do the economics of dual peanuts work out in different tropical farming systems?
6. What are the best technologies and agronomic management practices for dual purpose peanuts?

**Summary of annual trial activities**

Three runner types of peanuts were trialled in Katherine Research Station (KRS) and Douglas Daly Research Farm (DDRF) during the 2022 and 2023 growing seasons. Peanut genotypes were assigned as main-plot and in-season fodder removal (cut/un-cut) were assigned as split-plot treatment. The early maturing runner type varieties AllowayA blue and green logo

Description automatically generated, KairiA blue and green logo

Description automatically generatedand HoltA blue and green logo

Description automatically generatedwere planted in May 2022, while AllowayA blue and green logo

Description automatically generated, KairiA blue and green logo

Description automatically generated and TaabingaA blue and green logo

Description automatically generated were planted in March in 2023 growing season. Across all genotypes, 0.88 t/ha to 2.5 t/ha of dry matter were removed in season, which resulted of 0.50 t/ha to 0.87 t/ha of dry matter yields by the end of the season. For average NIS yields, 3.05 t/ha -3.63 t/ha can be harvested in the in-season cut plots in comparison with 4.3 t/ha – 5.89 t/ha in the uncut plots.

**In-season forage removal effect on nut yields**

Pod yield loss due to in-season forage harvest ranges between 11% and 44%, and in-season dry matter is more than double that of end-season dry matter. Similar trial results were obtained in Sorensen et al. (2009). It was suggested that the minimal midyear forage harvest of irrigated peanut would have to be around 1.2 t/ha to be profitable, and by the second year of this trial we have achieved above this recommended base line for in- season hay harvest.

**Key recommendations**

Research to-date suggests that Alloway is a suitable dual-purpose variety, providing the maximum yields for forage and nut, while Kairi produces the best yields for nut over two years period of trials.

# Future recommendations

We recommend further research on economic feasibility and animal weight gain by feeding peanut forage. It is also important to investigate the new breeding lines for dual-purpose peanuts to minimise yield loss due to in-season forage harvest.

# References

Akplo, T. M., Faye, A., Obour, A., Stewart, Z. P., Min, D., & Prasad, P. V. V. (2023). Dual‐purpose crops for grain and fodder to improve nutrition security in semi‐arid sub‐Saharan Africa: A review. *Food and Energy Security*, *12*(5), e492.

Arya, S. S., Salve, A. R., & Chauhan, S. (2016). Peanuts as functional food: a review. *Journal of Food Science and Technology*, *53*, 31–41. https://doi.org/10.1007/s13197-015-2007-9

Bandyopadhyay, P. K., Mallick, S., & Rana, S. K. (2005). Water balance and crop coefficients of summer-grown peanut (Arachis hypogaea L.) in a humid tropical region of India. *Irrigation Science*, *23*(4), 161–169. https://doi.org/10.1007/s00271-005-0104-7

Basinski, J. J., Phillips, L. J., & Norman, M. J. T. (1964). Some input-output relations in peanut cultivation at Katherine, NT. *Australian Journal of Experimental Agriculture*, *4*(15), 295–299.

Bell, M. J., Gillespie, T. J., Roy, R. C., Micheals, T. E., & Tollenaar, M. (1994). Peanut Leaf Photosynthetic Activity in Cool Field Environments. *Crop Science*, *34*(4), cropsci1994.0011183X003400040035x. https://doi.org/https://doi.org/10.2135/cropsci1994.0011183X003400040035x

Boyd, W. E., & Gardiner, J. E. (2005). Stooking the peanuts: Historical agriculture and the management of a dying seasonal landscape, North-east New South Wales, Australia. *Landscape Research*, *30*(2), 193–220.

Brown, H. (2023). *Peanut Pests and Beneficial in the NT*.

Chauhan, Y. S., Krosch, S., Bell, K. L., Wright, G. C., & Rachaputi, R. C. N. (2022). Agronomic responses of newly bred short season peanut cultivars in a variable subtropical environment. *Proceedings of the 20th Agronomy Australia Conference, 2022*. http://www.agronomyaustraliaproceedings.org/

Cox, F. R. (1979). Effect of temperature treatment on peanut vegetative and fruit growth. *Peanut Science*, *6*(1), 14–17.

Duvert, C., Lim, H.-S., Irvine, D. J., Bird, M. I., Bass, A. M., Tweed, S. O., Hutley, L. B., & Munksgaard, N. C. (2022). Hydrological processes in tropical Australia: Historical perspective and the need for a catchment observatory network to address future development. *Journal of Hydrology: Regional Studies*, *43*, 101194. https://doi.org/https://doi.org/10.1016/j.ejrh.2022.101194

Foster, J. L., Carter, J. N., Sollenberger, L. E., Blount, A. R., Myer, R. O., Maddox, M. K., Phatak, S. C., & Adesogan, A. T. (2011). Nutritive value, fermentation characteristics, and in situ disappearance kinetics of ensiled warm-season legumes and bahiagrass. *Journal of Dairy Science*, *94*(4), 2042–2050. https://doi.org/10.3168/jds.2010-3800

GRDC. (2017). Nutrition and Fertiliser. In *Grownotes Peanuts*.

Haerani, H., Apan, A., Nguyen-Huy, T., & Basnet, B. (2023). Modelling future spatial distribution of peanut crops in Australia under climate change scenarios. *Geo-Spatial Information Science*, *140*, 1–20.

Halder, D., Kheroar, S., Srivastava, R. K., & Panda, R. K. (2020). Assessment of future climate variability and potential adaptation strategies on yield of peanut and *Kharif* rice in eastern India. *Theoretical and Applied Climatology*, *140*, 823–838.

Hanabar, L., & Hegde, D. (2018). Biology of Maruca vitrata (Gayer) on groundnut (*Arachis hypogaea* L.). *Journal of Entomology and Zoology Studies*, *6*(5), 549–552.

Hill, G. M. (2002). Peanut by-products fed to cattle. *Veterinary Clinics: Food Animal Practice*, *18*(2), 295–315. https://doi.org/10.1016/S0749-0720(02)00019-1

Hillock, I. M. (2005). *Rethinking colonial endeavour in relation to agricultural settlement in the Northern Territory, 1863 to 1945: a critical perspective*.

Jakku, E., Thorburn, P. J., Marshall, N. A., Dowd, A.-M., Howden, S. M., Mendham, E., Moon, K., & Brandon, C. (2016). Learning the hard way: a case study of an attempt at agricultural transformation in response to climate change. *Climatic Change*, *137*(3), 557–574. https://doi.org/10.1007/s10584-016-1698-x

Jongrungklang, N., Toomsan, B., Vorasoot, N., Jogloy, S., Boote, K. J., Hoogenboom, G., & Patanothai, A. (2013). Drought tolerance mechanisms for yield responses to pre-flowering drought stress of peanut genotypes with different drought tolerant levels. *Field Crops Research*, *144*, 34–42. https://doi.org/10.1016/j.fcr.2012.12.017

Ketring, D. L. (1984). Temperature Effects on Vegetative and Reproductive Development of Peanut. *Crop Science*, *24*(5), 877–882. https://doi.org/10.2135/cropsci1984.0011183x002400050012x

Khan, M. T., Khan, N. A., Bezabih, M., Qureshi, M. S., & Rahman, A. (2013). The nutritional value of peanut hay (Arachis hypogaea L.) as an alternate forage source for sheep. *Tropical Animal Health and Production*, *45*(3), 849–853. https://doi.org/10.1007/s11250-012-0297-8

Laverty, J. R. (1954). Organized marketing and the development of the peanut industry. *Journal of the Royal Historical Society of Queensland*, *5*(1), 833–840.

Marshall, N. A., Dowd, A.-M., Fleming, A., Gambley, C., Howden, M., Jakku, E., Larsen, C., Marshall, P. A., Moon, K., Park, S., & Thorburn, P. J. (2014). Transformational capacity in Australian peanut farmers for better climate adaptation. *Agronomy for Sustainable Development*, *34*(3), 583–591. https://doi.org/10.1007/s13593-013-0186-1

Meinke, H., & Hammer, G. L. (1995). Climatic risk to peanut production: a simulation study for Northern Australia. *Australian Journal of Experimental Agriculture*, *35*(6), 777–780. https://doi.org/10.1071/EA9950777

Meinke, H., Stone, R., & Hammer, G. (1996). SOI phases and climatic risk to peanut production: a case study for northern Australia. *International Journal of Climatology*, *16*(7), 783–789. https://doi.org/10.1002/(SICI)1097-0088(199607)16:7%3C783::AID-JOC58%3E3.0.CO;2-D

Norman, M. J. T., & Begg, J. E. (1973). Katherine Research Station: a review of published work 1965-72. In *Technical Paper, Division of Land Research, CSIRO* (Issue 33).

Northern Territory Government. (1989). *Technical Annual Report 1988-89*.

Northern Territory Government. (1992). *Technical Annual Report 1991-92*. http://dor.nt.gov.au/divisions/pi/pi/projects/39/Technical Annual Reports/tar 1991-92\_optimised.pdf

Northern Territory Government. (2000). *Technical Annual Report 1999-2000*.

Northern Territory Government. (2003). *Technical Annual Report 2002-03*.

Northern Territory Government. (2004). *Technical Annual Report 2003-04*.

Northern Territory Government. (2005). *Technical Annual Report 2004-05*.

Northern Territory Government. (2006). *Technical Annual Report 2005-06*.

Northern Territory Government. (2009). *Technical Annual Report 2008-09*. http://dor.nt.gov.au/divisions/pi/pi/projects/39/Technical Annual Reports/tar\_2008-09.pdf

Northern Territory Government. (2010). *Technical Annual Report 2009-10*.

O’Gara, F. (2007). *Irrigated Maize Production in the NT*. https://daf.nt.gov.au/\_\_data/assets/pdf\_file/0016/233413/tb326.pdf

Pattee, H. E., Wynne, J. C., Sanders, T. H., & Schubert, A. M. (1980). Relation of the seed/hull ratio to yield and dollar value in peanut production. *Peanut Science*, *7*(2), 74–77.

Phillips, T. L. (1960). The Peanut Industry. *Quarterly Review of the Rural Economy*, *13*(3), 136.

Prasad, P. V. V., Craufurd, P. Q., & Summerfield, R. J. (1999). Sensitivity of peanut to timing of heat stress during reproductive development. *Crop Science*, *39*(5), 1352–1357.

Rachaputi, R., Chauhan, Y. S., & Wright, G. C. (2021). Peanut. In *Crop physiology case histories for major crops* (pp. 360–382). Elsevier. https://doi.org/10.1016/B978-0-12-819194-1.00011-6

Reddy, D. V. R., & Thirumala-Devi, K. (2003). *Virus and Virus-like Diseases of Major Crops in Developing Countries* (G. Loebenstein & G. Thottappilly (eds.); pp. 397–423). Springer Netherlands. https://doi.org/10.1007/978-94-007-0791-7\_16

Reddy, T. Y., Reddy, V. R., & Anbumozhi, V. (2003). Physiological responses of groundnut (*Arachis hypogea* L.) to drought stress and its amelioration: a critical review. *Plant Growth Regulation*, *41*(1), 75–88. https://doi.org/10.1023/A:1027353430164

Sanders, T. H., Schubert, A. M., & Pattee, H. E. (1982). Chapter 16 Maturity methodology and postharvest physiology. In H. E. Pattee & C. T. Young (Eds.), *Peanut science and technology* (pp. 624–654). American Peanut Research and Education Society.

Shepard, M., Lawn, R. A., & Schneider, M. A. (1983). *Insects of grain legumes in Northern Australia: a survey of potential pests and their enemies*. University of Queensland Press.

Singh, A. L. (2011). Physiological basis for realizing yield potentials in groundnut. *Advances in Plant Physiology*, *12*, 131–242.

Singh, M. P., Erickson, J. E., Boote, K. J., Tillman, B. L., Jones, J. W., & van Bruggen, A. H. C. (2011). Late Leaf Spot Effects on Growth, Photosynthesis, and Yield in Peanut Cultivars of Differing Resistance. *Agronomy Journal*, *103*(1), 85–91. https://doi.org/https://doi.org/10.2134/agronj2010.0322

Smith, S., & Hill, J. (2011). Supporting Sustainable Development – Risks and Impacts of Plant Industries on Soil Condition. In *Technical Bulletin No. 340* (Issue July). https://dpir.nt.gov.au/\_\_data/assets/pdf\_file/0005/233258/tb340.pdf

Song, H., Huang, Y., Ding, L., Duan, Z., & Zhang, J. (2023). Arachis species: High-quality forage crops—nutritional properties and breeding strategies to expand their utilization and feeding value. *Grassland Research*, *2*(3), 212–219. https://doi.org/https://doi.org/10.1002/glr2.12059

Sorensen, R. B., Nuti, R. C., & Butts, C. L. (2009). Yield and Plant Growth Response of Peanut to Midseason Forage Harvest. *Agronomy Journal*, *101*(5), 1198–1203. https://doi.org/https://doi.org/10.2134/agronj2009.0047

Stalker, H. T. (1997). Peanut (Arachis hypogaea L.). *Field Crops Research*, *53*(1), 205–217. https://doi.org/10.1016/S0378-4290(97)00032-4

Stalker, H. T. (2013). Peanut. In M. Singh, H. D. Upadhyaya, & I. S. Bisht (Eds.), *Genetic and genomic resources of grain legume improvement* (pp. 203–235). Elsevier Insights.

Thiagalingam, K., McNamara, T., & Gould, N. S. (1991). No-till technology and legume rotation for sustainable crop production in the Douglas Daly region of the Northern Territory, Australia. *Soil and Tillage Research*, *20*(2–4), 285–292.

Tillman, B. L., & Stalker, H. T. (2010). Peanut. In J. Vollmann & I. Rajcan (Eds.), *Oil Crops* (pp. 287–315). Springer New York. https://doi.org/10.1007/978-0-387-77594-4\_9

Waterhouse, D. F. (1993). *The major arthropod pests and weeds of agriculture in Southeast Asia: distribution, importance and origin*. Australian Centre for International Agricultural Research.

Witt, T., Northup, B., Ojha, M., & Puppala, N. (2023). Forage accumulation and nutritive value of four peanut (*Arachis hypogaea* L.) market types in the US Southern Great Plains. *Legume Science*, *5*(4), e198.

Wright, G. C., Hubick, K. T., & Farquhar, G. D. (1991). Physiological analysis of peanut cultivar response to timing and duration of drought stress. *Australian Journal of Agricultural Research*, *42*(3), 453–470.

Wright, G., Wieck, L., & Harden, P. (2015). *Peanut production guide*. https://www.pca.com.au/wp-content/uploads/2016/11/PWH-Peanut-Production-Guide-2015.pdf

Wright, G., Wieck, L., & Harden, P. (2017). *Peanut Production Guide*. https://pca.com.au/wp-content/uploads/2017/12/Peanut-Production-Guide-2017.pdf

Xie, M., Wang, Z., Xu, X., Zheng, X., Liu, H., & Shi, P. (2020). Quantitative estimation of the nutrient uptake requirements of peanut. *Agronomy*, *10*(1), 119.

Yang, C.-M. J. (2005). Proteolysis, Fermentation Efficiency, and In Vitro Ruminal Digestion of Peanut Stover Ensiled with Raw or Heated Corn. *Journal of Dairy Science*, *88*(8), 2903–2910. https://doi.org/10.3168/jds.S0022-0302(05)72971-4

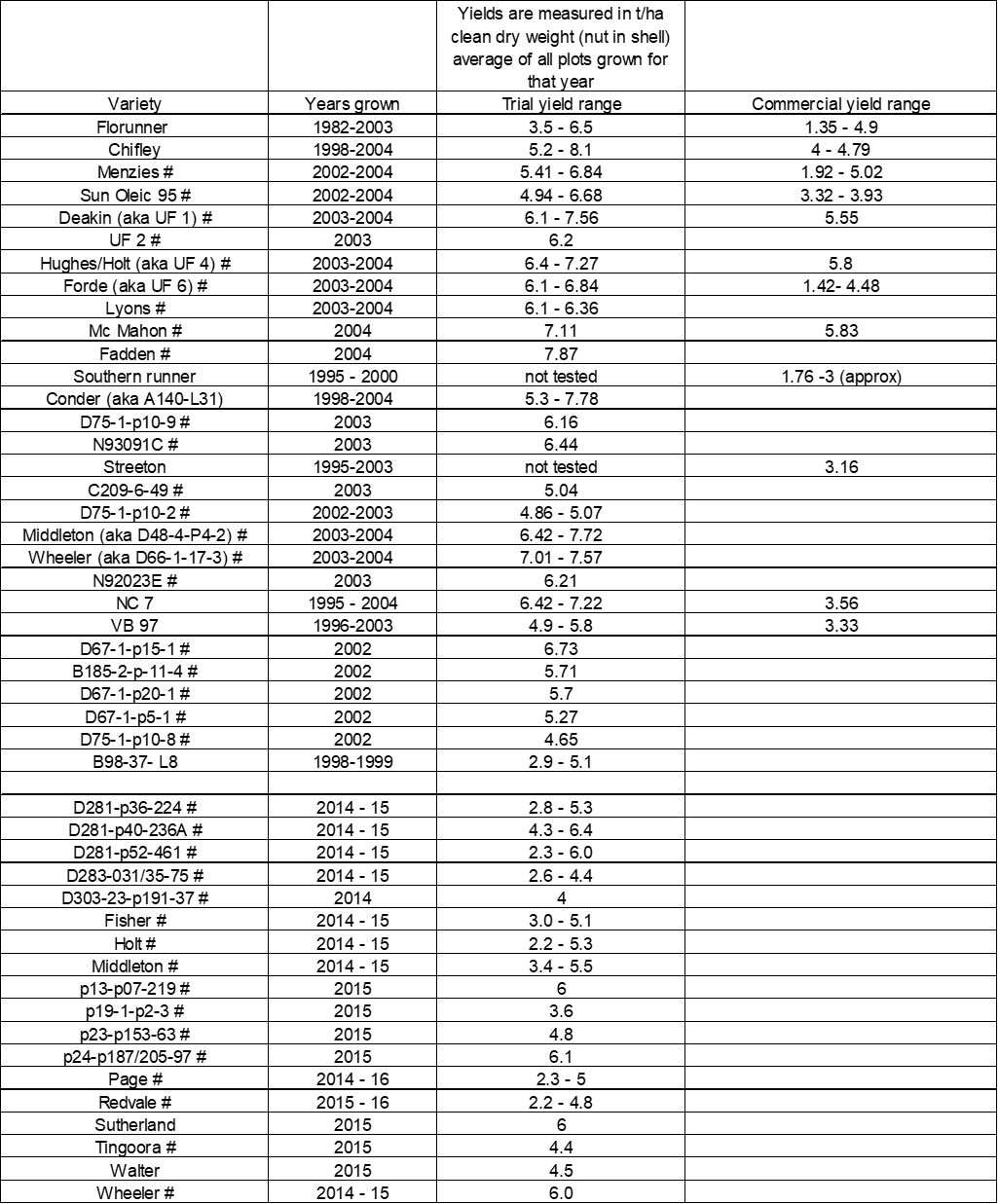
Zhang, L., Shang, Y., Li, J., Fu, T., Lian, H., Gao, T., Shi, Y., & Li, M. (2022). Comparison of feeding diets including dried or ensiled peanut vines as forage sources on the growth performance, ruminal fermentation, and bacterial community in young Holstein bulls. *Animal Science Journal*, *93*(1), e13675. https://doi.org/https://doi.org/10.1111/asj.13675

Zhao, C. X., Jia, L. H., Wang, Y. F., Wang, M. L., & McGiffen Jr, M. E. (2015). Effects of different soil texture on peanut growth and development. *Communications in Soil Science and Plant Analysis*, *46*(18), 2249–2257.

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# Appendix 1: Summary table of peanut yields from various varieties previously trialled in the NT

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*# high oleic acid genotypes*

# Appendix 2: Overview of peanut research conducted in the NT

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Duration | Topics | Personnels | Locations | Fundings | References |
| 1938 | *Some characteristics of soils used for the cultivation of peanuts (*Arachis*) in the Northern Territory of Australia* | JA Prescott / CSIR Division of Soil | Katherine, Daly River, Adelaide River, Mataranka | CSIR | [Prescott, 1938](https://www.cabidigitallibrary.org/doi/full/10.5555/19381902329) |
| 1946\*-47  The beginning of peanut research at KRS | Trials of vegetable oil plants | CSIR | KRS (Home Farm) | CSIR | [*21st CSIR Annual Report for the Year Ended 30th June 1947*](https://csiropedia.csiro.au/wp-content/uploads/2020/05/21st-CSIR-Annual-Report-Year-Ended-30th-June-1947.pdf) *p. 14* |
| 1954-55 | *Studies in tropical crop production: the Katherine (Northern Territory) environment and its influence on crops of cotton, peanuts and grain sorghum* | RO Slatyer (1952-53) | KRS | CSIRO | [Slatyer, 1955](https://doi.org/10.1071/AR9550365) |
| CSIRO Land Research and Regional Survey Section | CSIRO | [*7th CSIRO Annual Report 1954 – 1955*](https://csiropedia.csiro.au/wp-content/uploads/2020/05/1955-7th-CSIRO-Annual-Report-Year-Ending-30th-June-1955.pdf) *(p. 76)* |
| *The influence of sowing date on the yield of peanuts in a short summer rainfall environment* | WR Stern (1951-57) | CSIRO | [Stern 1968](https://doi.org/10.1071/EA9680594) |
| 1955-56 | *Factors influencing cropping in a tropical environment: some factors affecting the yield of peanuts and sorghum, under natural rainfall at Katherine, Northern Territory* | WR Stern | KRS | CSIRO | [Stern 1958](https://www.cabidigitallibrary.org/doi/full/10.5555/19591700724) |
| CSIRO Land Research and Regional Survey Section | CSIRO | [*8th CSIRO Annual Report 1955 – 1956*](https://csiropedia.csiro.au/wp-content/uploads/1991/10/1955-56-8th-CSIRO-Annual-Report-for-Year-1955-56.compressed.pdf)*(p. 72)* |
| Cultivation practices | [Phillis 1956](https://www.cabidigitallibrary.org/doi/full/10.5555/19571701552) |
| 1952-53; 1956-57; | *The influence of crop sequence/land preparation on the yield of peanuts, sorghum, and cotton at Katherine* | LJ Phillips (1948-84)/ CSIRO Division of Land Research and Regional Survey | KRS | CSIRO | Phillips (1959) *Technical papers* [*no. 1*](http://hdl.handle.net/102.100.100/376114?index=1) *&* [*no. 2*](http://hdl.handle.net/102.100.100/368331?index=1)*; Katherine Research Station Progress Report 1946-56* |
| 1957-59 | *The influence of inter-row spacing and plant population on the yield of peanuts at Katherine, NT* | LJ Phillips,  MJT Norman (1956-59) | KRS | CSIRO | [Phillips & Norman 1962](https://doi.org/10.1071/EA9620054) |
| 1952-1966 | *The continuous cropping of peanuts;*  *Traffic compaction of soil and tillage requirements* | W Arndt (1947-59),  CW Rose | KRS | CSIRO | [Arndt 1961](http://hdl.handle.net/102.100.100/376003?index=1);  [Arndt 1966](https://www.sciencedirect.com/journal/journal-of-agricultural-engineering-research/vol/11/issue/3) (I-IV) |
| 1957-58 – 1960-61 | *Peanut-crop (sorghum) crop sequences* | LJ Phillips,  MJT Norman | KRS | CSIRO | [Phillips & Norman 1961](https://doi.org/10.1071/EA9610144) |
| 1958-62 | *Fodder crop (bulrush millet, Sudan grass, cowpea)-cash crop (groundnuts, cotton and grain sorghum) sequences at Katherine, NT* | LJ Phillips,  MJT Norman | KRS | CSIRO | [Phillips & Norman 1962](http://hdl.handle.net/102.100.100/376000?index=1) |
| 1962 | *The relation between kernel development and time of harvesting of peanuts at Katherine, NT* | HD Barrs | KRS | CSIRO | [Barrs 1962](https://doi.org/10.1071/EA9620106) |
| 1963 | *Comparative performance of crops on three soils of the Tipperary region, NT* | W Arndt, LJ Phillips, MJT Norman | Tipperary | CSIRO | [Arndt et al. 1963](http://hdl.handle.net/102.100.100/375998?index=1) |
| 1957-63 | *Arable crop variety trials at Katherine, NT 1957-63* | LJ Phillips,  MJT Norman | KRS | CSIRO | [Phillips & Norman 1964](http://hdl.handle.net/102.100.100/376085?index=1) |
| 1964 | *Some input-output relations in peanut cultivation at Katherine, NT* | JJ Basinski, LJ Phillips,  MJT Norman | KRS | CSIRO | [Basinski et al. 1964](https://doi.org/10.1071/EA9640295) |
| 1959-65 | *The response of peanuts to phosphate fertilizers at Katherine, NT* | LJ Phillips,  MJT Norman | KRS | CSIRO | [Phillips & Norman 1965](https://doi.org/10.1071/EA9650470) |
| 1965 | *The impedance of soil seals and the forces of emerging seedlings* | W Arndt | KRS/Canberra | CSIRO | [Arndt 1965](https://doi.org/10.1071/SR9650055) |
| 1966 | *Katherine Research Station. 1956-64: A review of published work* | MJT Norman | Canberra | CSIRO | [Norman 1966](http://hdl.handle.net/102.100.100/376086?index=1) |
| 1965-67 | *The effects of seed size, seed treatment, method of shelling, and organic matter on the establishment of peanuts (*Arachis hypogaea*) at Katherine, NT* | IMW Wood (1964-69) | KRS | CSIRO | [Wood 1968](https://doi.org/10.1071/EA9680081) |
| 1965-67 | *Chemical weed control in peanut crops at Katherine, NT* | IMW Wood | KRS | CSIRO | [Wood 1968](https://doi.org/10.1071/EA9680762) |
| 1967 | *The effect of temperature at early flowering on the growth and development of peanuts (*Arachis hypogaea*)* | IMW Wood | KRS/Canberra | CSIRO | [Wood 1968](https://doi.org/10.1071/AR9680241) |
| 1965-68 | *The effect of seeding rate and row spacing on yields of Spanish peanuts at Katherine, NT* | IMW Wood | KRS | CSIRO | [Wood 1970](https://doi.org/10.1071/EA9700095) |
| 1965-1969 | Peanut variety trials | IMW Wood | KRS | CSIRO | [*Technical Memorandum 69/15*](https://doi.org/10.25919/7nmy-n950) |
| 1967-69 | *Herbicides for the control of grass weeds in peanut crops at Katherine, NT* | IMW Wood | KRS | CSIRO | [Wood 1970](https://doi.org/10.1071/EA9700462) |
| 1969 | *Peanut introductions at Katherine Research Station, 1967-1969* | IMW Wood, MJ Gray | KRS | CSIRO | [*Technical Memorandum 69/17*](https://doi.org/10.25919/86ht-st86) |
| 1969 | *Peanuts in the Northern Territory: A guide to production practices* | IMW Wood | KRS | CSIRO | [*Technical Memorandum 69/18*](https://doi.org/10.25919/vh1g-8916) |
| 1969 | *The profitability of peanut production at Katherine, NT* | KD Cocks | KRS/Canberra | CSIRO | [*Technical Memorandum 69/19*](https://doi.org/10.25919/resd-v425) |
| 1965-72 | *Katherine Research Station: A review of published work, 1965-72* | MJT Norman,  JE Begg | KRS/Canberra | CSIRO | [Norman & Begg 1972](http://hdl.handle.net/102.100.100/312120?index=1) |
| 1973 | Peanut rust (*Puccinia arachidis*) in Australia | RN Pitkethley | NT | CSIRO | [Pitkethley, 1973](https://books.google.com.au/books?id=l_x9Ejs7v1wC&pg=PA803#v=onepage&q&f=false)  *p. 803* |
| 1979-80 | Varietal trial and examination for 130 lines (Virginia Bunch, White Spanish and Red Spanish),  Weeds, calcium nutrition, and insecticide trial | Crops Group | Douglas Daly Experimental Station (DDES) | Internal | [*Technical Annual Report 1979-80*](https://nt.gov.au/__data/assets/pdf_file/0011/1497575/technical-annual-report-1979-80.pdf) *(pp.2-3)* |
| 1982 | Evaluate and compare the yield of six peanut cultivars under supplementary irrigation (RS, WS, VB, EB, FR, FG) | Crops Group | DDRF | Internal | Flint, C (1995) *Peanut Research in the Northern Territory 1980-87* |
| 1982-83 | Cultivar evaluation of four peanut cultivars (Virginia Bunch, Early Bunch, Florunner, Florigiant) under “irrigated” and “rainfed” treatments | Crops Group | DDRF | Internal |
| Phosphorus and Sulphur nutrition of peanuts on a Blain sandy loam | Crops Group | DDRF | Internal |
| Effect of rate and source of calcium on cv Virginia Bunch | Crops Group | DDRF | Internal |
| Micro-nutrient effects on peanut growth | Crops Group | DDRF | Internal |
| Investigation of the soil moisture profile under a peanut crop in Blain sandy loam and its response to irrigation | Crops Group | DDRF | Internal |
| 1983-84 | Evaluation of six peanut cultivars (FR, EB, VB, FG, NC, SH) | Crops Group | DDRF | Internal |
| Phosphorus nutrition of peanuts | Crops Group | DDRF | Internal |
| Evaluation of the impact of irrigation and hilling or bedding on the efficiency of peanut digging | Crops Group | DDRF | Internal |
| An investigation into the effects of the growth regulant Daminozide (Alar®) on the morphology and yield of peanuts (Virginia Bunch, Florunner, Early Bunch) | Crops Group | DDRF | Internal |
| 1984-85 | Cultivation evaluation of eight peanut cultivars (FR, VB, EB, Shulamith, Tifrum, NC 17209, NC 343, NC 14) | Crops Group | DDRF | Internal |
| 1985-86 | Gypsum and Dolomitic lime as Calcium fertiliser for peanuts on Blain soil | Crops Group | DDRF | Internal |
| 1985-86 | Evaluation of growth regulant (Daminozide, Alar®) on two peanut cultivars (Virginia Bunch & Florunner) | Crops Group | DDRF | Internal |
| 1985 | Fungicidal Influence on Peanut Seed Germination | PG Harrison, Seeds Agronomist | Unknown | Internal | [*Fungicidal Influence on Peanut Seed Germination*](https://nt.gov.au/__data/assets/pdf_file/0017/233414/tn041.pdf) |
| 1986-87 | Investigation of Calcium nutrition of peanuts grown on Blain sandy loam | Crops Group | DDRF | Internal | Flint, C (1995) *Peanut Research in the Northern Territory 1980-87* |
| Evaluation of the yield response to cultivars (Virginia Bunch, Florunner) to irrigation and Alar® application | Crops Group | DDRF | Internal |
| Evaluation of nine peanut cultivars (FR, VB, EB, FG, Trifrun, Shulamit, NC343, NC7, NC FLA14) grown under rainfed conditions and effects of growth regulant (Alar®) | Crops Group | DDRF | Internal |
| 1987-88 | Peanut tillage systems trial | Crops Group | DDRF | Internal |
| Monitoring a Commercial Crop | Unknown | Unknown | Internal | [*Technical Annual Report 1987-88*](https://nt.gov.au/__data/assets/pdf_file/0004/232870/tb150.pdf) *(p. 50)* |
| 1988-89 | Tillage Rotation and Nitrogen – Sorghum/Peanut Rotation on Blain soil | Unknown | Douglas Daly | Internal | [*Technical Annual Report 1988-89*](https://nt.gov.au/__data/assets/pdf_file/0011/232886/tb165.pdf)  *(p. 68)* |
| Vesicular-Arbuscular Mycorrhizae (VAM) | Unknown | Douglas Daly | Internal | [*Technical Annual Report 1988-89*](https://nt.gov.au/__data/assets/pdf_file/0011/232886/tb165.pdf)  *(p. 71)* |
| 1991-92 | Field Crop Disease Surveys (inc. PMV) | Barry Condé,  Lois Ulyatt | Berrimah Agricultural Research Centre (BARC), DDRF | Internal | [*Technical Annual Report 1991-92*](https://nt.gov.au/__data/assets/pdf_file/0009/232884/tb193.pdf)  *(p. 116)* |
| 1995-98 | Monitor Peanut Crops for Peanut Mottle Virus Freedom | B Condé,  M Connelly,  L Ulyatt | Darwin-Katherine | Internal | [*Technical Annual Report 1995-96*](https://nt.gov.au/__data/assets/pdf_file/0005/232880/tb250.pdf) *(p. 96)* |
| [*Technical Annual Report 1997-98*](https://nt.gov.au/__data/assets/pdf_file/0009/232866/tb273.pdf) *(p. 227)* |
| 1995-2000 | Index *Arachis* Introductions for Peanut Mottle Virus Freedom | B Condé,  M Connelly,  R Pitkethley | Darwin | Internal | [*Technical Annual Report 1995-96*](https://nt.gov.au/__data/assets/pdf_file/0005/232880/tb250.pdf) *(p. 98)* |
| [*Technical Annual Report 1996-97*](https://nt.gov.au/__data/assets/pdf_file/0017/232910/tb266.pdf) *(p. 150)* |
| [*Technical Annual Report 1997-98*](https://nt.gov.au/__data/assets/pdf_file/0009/232866/tb273.pdf) *(p. 227)* |
| [*Technical Annual Report 1998-99*](https://nt.gov.au/__data/assets/pdf_file/0008/232865/tb278.pdf) *(p. 179)* |
| [*Technical Annual Report 1999-2000*](https://nt.gov.au/__data/assets/pdf_file/0006/232899/tb286.pdf) *(p. 220)* |
| 1998-99 | Fertiliser Placement and its Effect on Yield and Quality of Irrigated Peanuts | C Martin,  C Ham,  S Lucas | DDRF | Internal | [*Technical Annual Report 1998-99*](https://nt.gov.au/__data/assets/pdf_file/0008/232865/tb278.pdf) *(pp. 17-18)* |
| 1998-2000 | Herbicides for Peanut Production | C Ham,  R Eastick,  N Hartley,  S Lucas,  F O’Gara | DDRF | Internal | [*Technical Annual Report 1998-99*](https://nt.gov.au/__data/assets/pdf_file/0008/232865/tb278.pdf) *(pp. 19-20)* |
| C Ham,  R Eastick,  N Hartley,  S Lucas,  F O’Gara,  C Wright | DDRF | Internal | [*Technical Annual Report 1999-2000*](https://nt.gov.au/__data/assets/pdf_file/0006/232899/tb286.pdf) *(pp. 43-45)* |
| 1998-2000 | Evaluation of Four Peanut Varieties (VB 97, B98-37 L8, A140 L31, Florunner) | C Ham,  R Eastick,  N Hartley,  S Lucas,  F O’Gara,  C Wright | DDRF | Internal | [*Technical Annual Report 1998-99*](https://nt.gov.au/__data/assets/pdf_file/0008/232865/tb278.pdf) *(pp. 21-22)* |
| [*Technical Annual Report 1999-2000*](https://nt.gov.au/__data/assets/pdf_file/0006/232899/tb286.pdf) *(pp. 47-48)* |
| 1999 | Survey of Insects in Field Crops | GR Brown | DDRF  Katherine – Douglas Daly | Internal | [*Technical Annual Report 1998-99*](https://nt.gov.au/__data/assets/pdf_file/0008/232865/tb278.pdf) *(pp. 193-194)* |
| 1999-2001 | Management System for Diseases of Peanuts | S Bellgard,  A Daly | Katherine/Douglas Daly  Two commercial properties, Early Storms | Internal | [*Technical Annual Report 1999-2000*](https://nt.gov.au/__data/assets/pdf_file/0006/232899/tb286.pdf) *(pp. 229-230)* |
| S Bellgard | [*Technical Annual Report 2000-01*](https://nt.gov.au/__data/assets/pdf_file/0004/232879/tb295.pdf) *(p. 202)* |
| 2000-01 | Examination of Varying Rates of Three Macro Elements (K, Ca, Mg) for Peanuts on Ruby Blain soil | C Ham,  S Lucas,  F O'Gara | DDRF | Internal | [*Technical Annual Report 2000-01*](https://nt.gov.au/__data/assets/pdf_file/0004/232879/tb295.pdf) *(pp. 16-19)* |
| The Entomofauna of Peanuts (*Arachis hypogaea*) | GR Brown,  M Hoskins | Two commercial properties in Katherine and Douglas Daly | Internal | [*Technical Annual Report 2000-01*](https://nt.gov.au/__data/assets/pdf_file/0004/232879/tb295.pdf) *(pp. 226-227)* |
| 2000-01 | EXNUT - Evaluation of an Expert Management Program for  Irrigated Peanuts | C Ham,  S Lucas,  F O'Gara | DDRF | Internal | [*Technical Annual Report 2001-02*](https://nt.gov.au/__data/assets/pdf_file/0006/232872/tb304.pdf) *(pp. 18-20)* |
| 2001-04 | Peanut Entomology | M Connolly,  GR Brown | Katherine and Douglas Daly | Internal | [*Technical Annual Report 2001-02*](https://nt.gov.au/__data/assets/pdf_file/0006/232872/tb304.pdf) *(pp. 288-289)* |
| [*Technical Annual Report 2002-03*](https://nt.gov.au/__data/assets/pdf_file/0006/232881/tb313.pdf) *(pp. 264-266)* |
| Broadacre Field Crop Entomology | M Hoskins | [*Technical Annual Report 2003-04*](https://nt.gov.au/__data/assets/pdf_file/0005/232871/tb319.pdf) *(pp. 217-218)* |
| 2001-03  (3 years) | Peanut Varieties for Northern Australia (inc. disease rating) | C Ham,  S Lucas,  S Bellgard,  M Hearnden,  F O'Gara,  P Shotton | DDRF | DPIFM, QDPI, the Grains Research and Development Corporation (GRDC) and the Peanut Company of Australia (PCA) | [*Technical Annual Report 2003-04*](https://nt.gov.au/__data/assets/pdf_file/0005/232871/tb319.pdf) *(pp. 36-42)* |
| P Shotton,  C Ham,  S Lucas,  C Collins,  F O’Gara | [*Technical Annual Report 2004-05*](https://nt.gov.au/__data/assets/pdf_file/0003/232887/tb323.pdf) *(pp. 39-43)* |
| P Shotton,  C Collins,  S Bhuiyan,  M Boyd,  F O'Gara | [*Technical Annual Report 2005-06*](https://nt.gov.au/__data/assets/pdf_file/0007/232882/tb325.pdf)  *(pp. 244-247)* |
| 2003-04 | Weed Management in Peanut Production Systems | C Ham,  R Eastick,  N Hartley,  S Lucas,  M Hearnden | Florina Road property, PCA Katherine | Internal | [*Technical Annual Report 2003-04*](https://nt.gov.au/__data/assets/pdf_file/0005/232871/tb319.pdf) *(pp. 80-83)* |
| 2005-07 | Management of Leaf Spot Disease in Peanuts | S Bhuiyan,  M Bennett,  M Kahl | PCA Katherine | Internal | [*Technical Annual Report 2005-06*](https://nt.gov.au/__data/assets/pdf_file/0007/232882/tb325.pdf)  *(p132)* |
| [*Technical Annual Report 2006-07*](https://nt.gov.au/__data/assets/pdf_file/0008/232874/tb327.pdf)  *(pp.66-68)* |
| 2014-16 | Diversification Program – Peanut Variety Trials (D281-p36-224, D281-p40-236A, D281-p52-461, D283-p31/35-75, Fisher, Holt, Middleton, Page, Sutherland, Wheeler, P13-p07-219, P19-1-p2-3, P23-p153-63, P23-p157-68, P24-p187/205-97, Redvale, Tingoora, Walter) | Ian Biggs – Senior Research Agronomist,  Callen Thompson,  Kae Wegman, Teagan Haby, Johnny Cooper, Karl Bourne,  Mike Kahl | KRS | Peanut Company of Australia | [*Technical Annual Report 2015-16*](https://nt.gov.au/__data/assets/pdf_file/0006/392019/TB355.pdf)  *(p. 58)* |
| 2015-17 | Intensive Cropping Systems in the Douglas-Daly District | Peter Shotton – Farming Systems Research Officer,  Robert Parker, Cameron Heeb, Callen Thompson, Ian Biggs. | DDRF | Internal | [*Technical Annual Report 2015-16*](https://nt.gov.au/__data/assets/pdf_file/0006/392019/TB355.pdf)  *(p. 46)* |
| [*Technical Annual Report 2016-17*](https://nt.gov.au/__data/assets/pdf_file/0015/462030/TB356.pdf)  *(p. 51)* |
| 2016-17 | Integrated Mixed Farming Systems | Ian Biggs – Senior Research Agronomist,  Callen Thompson,  Ali Sarkhosh, Peter Shotton, Nick Hartley, Kae Wegman, Teagan Haby, Karl Bourne, Johnny Cooper. | KRS | Internal | [*Technical Annual Report 2016-17*](https://nt.gov.au/__data/assets/pdf_file/0015/462030/TB356.pdf)  *(p. 53)* |
| 2021-24 | Grain and Graze North: Dual purpose peanuts for Northern Australia | Cropping Group | KRS | CRCNA | *To be published* |