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Message from the Editor

The Editorial Panel takes this opportunity to wish all readers a Merry Christmas in this edition of the newsletter. We hope you enjoy good health in the New Year.

This edition may appear a bit mango centric but mangoes are usually one of the main themes at this time of the year in the Top End. This year was special, as the Top End of the Northern Territory was the location for the International Mango Symposium and associated Darwin and Katherine tours. It was a major coup for this Symposium, which is only held every 3 or 4 years, to be staged in Darwin.

After a dry start to the wet in most of the Top End, significant falls have been received in recent weeks. The outlook is for median rainfall for the Top End. Most of the Top End has 75% chance of getting 500mm of rainfall in the December to February period.

Cheers from the Editor,

Arthur



Just some of the NT grown mangoes being sent to market this season



MERRY
CHRISTMAS
from the Editorial Team,
Arthur and Paige

The XI International Mango Symposium

Teagan Alexander, Technical Officer, Katherine, Paige Richter, Technical Officer and Mila Bristow, Senior Research Scientist, Darwin

The XI International Mango symposium was recently held in Darwin, showcasing the latest in mango research and technology. Hosted at DoubleTree by Hilton between 28 September and 2 October, the event comprised of plenary sessions, discipline focused sessions, workshops, a poster session and sponsor displays. As a joint initiative of the Northern Territory Department of Primary Industry and Fisheries (DPIF) and the International Society for Horticultural Science (ISHS), the Symposium was attended by the world's leading mango scientists across a number of disciplines and researchers and students from all mango growing nations. The XI International Mango Symposium had many sponsors, the major ones being the NT Government, Australian Centre for International Agricultural Research, The Crawford Fund and Horticulture Innovation Australia

The International Mango Symposium is held every three to four years and allows delegates to formally present, promote and discuss their work and products with other experts in their fields. For the first time at this event, a series of Master Classes were held in a range of disciplines to foster the development of mango-related scientific knowledge and skills in early career researchers and post-graduate students. The Master Classes, held prior to the Symposium, were facilitated by world renowned, well established professional scientists with decades of experience in mango research fields. Such fields included plant pathology, entomology, biotechnology and flowering manipulation. The scientific program spanned over three days and covered 23 concurrent sessions and included six plenary speakers. In total, there were 188 participants from 26 countries.

The Symposium also included field trips to the Darwin and Katherine mango growing regions, giving NT farms the opportunity to demonstrate their technology, management and operations of harvesting and packing mangoes in Australia. Delegates were able to see the trial site for the National Mango Breeding Program at the DPIF's Katherine Research Station, and discussed the new Lady Jane and Lady Grace mango varieties being released by Katherine mango farm Sevenfields. They were shown harvest aids in use and learned about management techniques such as irrigation and fertilisation methods used in Australia. Among all this they practiced farm biosecurity and visited farms growing different varieties of mangoes, being able to see Kensington Pride, Calypso, R2E2 and Honeygold orchards.

The mango industry is important to the NT economy, producing more than 33,000 tonne of fruit worth upwards of \$70 million. As it continues to expand, events like the International Mango Symposium give Australia the opportunity to share knowledge and skills with international experts and strengthen industry ties across the globe.



Symposium delegates and organisers gathered at the front of DoubleTree by Hilton

2015 Screening of Fragrant Rice Lines at Tortilla Flats, Adelaide River

Nick Hartley, Senior Technical Officer, Darwin

For a number of years there has been interest to see how fragrant rice lines (Jasmine and Basmati) perform in the NT. This commodity is highly prized by rice consumers globally and countries that produce aromatic rice obtain higher financial returns, generally reaching an extra \$200-300/t in the international rice market.

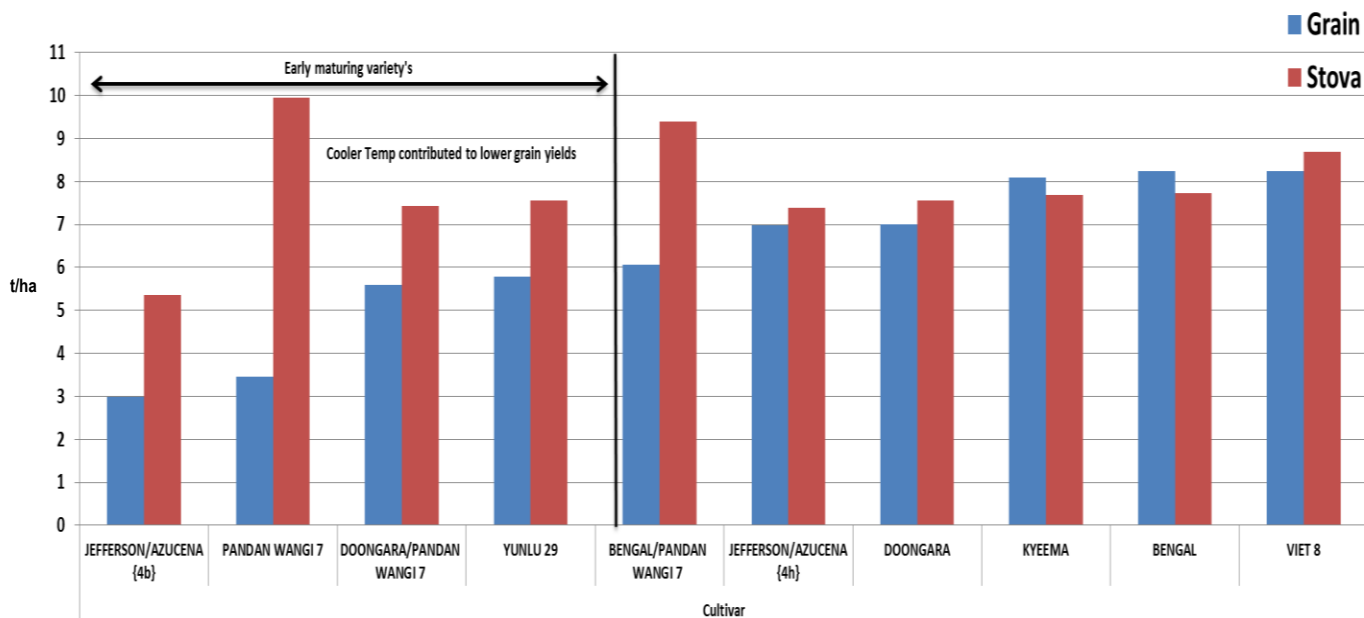
In the 2015 dry season a trial was conducted at Tortilla Flats, Adelaide River. This trial was designed to compare 10 fragrant/aromatic rice varieties for their overall performance. The area was planted mid-May and grown under lowland (paddy/anaerobic) conditions. During the season constant measurements and recordings were taken to monitor growth characteristics between each variety. Due to variance in crop maturity the harvest period ranged from 118 Days after Sowing (DAS) on 17 Sept to 150 DAS on 20 October. All grain needs to be harvested when the moisture content measures between 20-25%. This is then slowly reduced to 14% moisture prior to processing, which helps to retain the aroma and quality. All varieties are then de-hulled and sent away to NSW DPI for a number of quality assessments.

Some rice varieties are susceptible to cooler dry season temperatures, especially at panicle formation and flowering. This was noticeable in the early maturing varieties in this trial which had the coolest temperatures at the most critical part of plant growth. Final yields were affected in these lines, as highlighted in the graph over page.



Rice trial at Tortilla Flats

2015 Tortilla Grain and Stova Yields



Overall the top three fragrant lines have shown good potential during the 2015 season. Both grain and stova yields are comparable to southern counterparts.



Nick Hartley machine harvesting rice

NT Fodder and Seed Production 2014

Arthur Cameron, Principal Pastures Agronomist, Darwin

Plant Industries Development Group of DPIF conducted a survey to estimate hay, silage and seed production in the Northern Territory during 2014. These figures include the mulching hay made in the Darwin Rural area. The figures are tabulated below.

The hay production in 2014 at 84,370 tonnes increased from the 50,570 tonnes produced in 2013 on the back of the higher numbers of live cattle exported from Darwin in 2014. This year's production is the highest recorded in the Northern Territory, exceeding the 2010 total by 1050 tonnes.

Seed production at 75.5 tonnes was higher than in 2013.



Sabi grass hay at Katherine Research Station

The value of the hay produced in 2014 is estimated at \$23.02 m and the seed at \$1.29 m. High demand for hay following the increased numbers of live cattle exported during the year pushed up the average price of hay.

These figures represent the majority of the production in the NT in 2014.

The production is presented in the table below by the Australian Bureau of Statistics district.

Hay and Seed Production in the NT by District (tonnes)

District	Feed Hay	Mulch Hay	Seed
Alligator	750		
Barkly and Central NT	7450		
Daly	23200		43.5
Litchfield Shire	18920	2000	
Lower Top End	32050		32
Total	82370	2000	75.5

These figures were compiled with the assistance of Departmental Officers Casey Collier (Tennant Creek), Peter Shotton (DDRF) and Coral Allan (AZRI).



Cutting Jamba grass hay at Manildra

Nitrogen Management of Tropical Pasture Grasses Field Day

Paige Richter, Technical Officer and Arthur Cameron, Principal Pastures Agronomist, Darwin

The Plant Industries Development Group (PID) recently held the 'Nitrogen Management of Tropical Pasture Grasses' Field Day on 12 November at Katherine Research Station (KRS). The Field Day showcased a variety of tropical grasses currently being trialled at KRS and presented results from a number of recent and past trials conducted by the department. It was a successful event attracting 19 participants comprising hay growers and contractors, agribusiness, pastoralists and primary producers. There were also representatives from NT Farmers Association and Charles Darwin University.

The Department's Senior Research Scientist Mila Bristow, Senior Extension Officer Callen Thompson and Principal Pastures Agronomist Arthur Cameron presented at this event.

Mila joined PID earlier this year and updated attendees on the results of nitrous oxide emissions from grass pastures from the Action on the Ground project she now leads.

Callen joined the KRS team in October and presented on the economic implications of nitrogen fertiliser applications for hay producers based on results from the Action on the Ground project.

Arthur presented the results from his current Cool Season Grasses Trial and numerous grass fertiliser trials conducted between 1984 and 1990.

Extension Officer Ben Beumer and Technical Officers Paige Richter, Teagan Alexander and Kae Wegman also contributed to the success of this event. Kae is another new member to PID having joined the team earlier this year.

With many new staff members on the PID team, the Field Day provided a valuable opportunity to learn about nitrogen management of grass hay crops, and to meet and talk with participants from the greater Katherine and Douglas-Daly communities.



Arthur Cameron inspects pasture during his presentation in field



Ben Beumer (*left*) talks with Greg Owens (NT Farmers Association) about pasture production

The team enjoyed a successful day of collaboration and discussion, with some excellent positive feedback from hay producers about the direction of their industry, offering promising opportunities for the future. What participants found most relevant was information on the type and timing of nitrogen applications to benefit grass nitrogen uptake and hay yield. The handout summarising grass fertiliser trial results was well received. Most attendees had learnt about the Field Day either from an email from DPIF or through the NT Farmers Newsletter.

The attendees indicated the types of research they would like to see conducted. The topics included grass/legume rotations, new fertilisers (including slow release), alternative grasses and legumes for hay production and improving grass hay quality.

Deed to Transfer Rights for New Mango Cultivars Finalised

Cameron McConchie, Research Leader, Darwin

At last, legal agreement has been reached between the National Mango Breeding Program partners to transfer commercialisation rights for three selections to Newmanco, a company formed by the Australian Mango Industry Association, to advance the development of these new hybrids in Australia.

These new cultivars were recently on show at the International Mango Symposium in Darwin to enthusiastic attendees. These selections are progeny from controlled crosses between colourful Florida types and Kensington pride. They all have distinctive red-purple skins when ripe and strong Kensington pride flavour, and bring significant improvements to the characteristics to parent such as earlier harvesting windows, greater productivity and consistency in fruit set.

The commercialisation licence requires Newmanco to establish grower evaluation trials in the six major production regions across Australia. Participating growers will be required to evaluate all three hybrids, meet certain production standards, and market within the parameters of Newmanco.

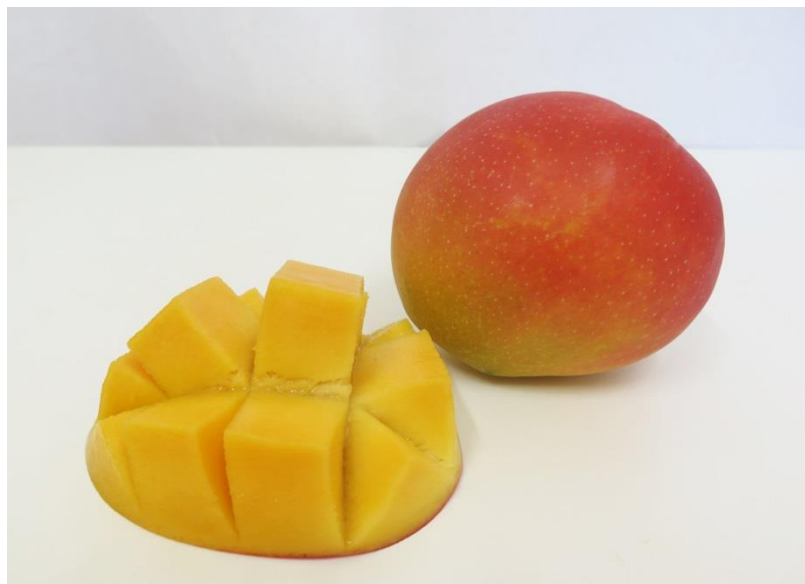
Staff at NT DPIF Darwin worked with industry to assist in getting seed to commercial nurseries to propagate this material for growers in this region. Growers wanting to be involved in the evaluation should contact Trevor Dunmall, Industry Development Officer, AMIA, by phone at 07 3278 3755 or email ids@mangoes.net.au



NMBP1243



NMBP 4069



NMBP1201

New Mango Orchard at Katherine Research Station

Teagan Alexander, Technical Officer, Katherine, and Constancio Asis, Research Agronomist, Darwin

Recognising the significance of the mango industry to the horticultural economy of the Northern Territory, the Department of Primary Industry and Fisheries (DPIF) is boosting its research on mango rootstocks. Bob Williams, Director of the DPIF Plant Industries Development Group, organised the establishment of new a mango orchard at Katherine Research Station (KRS).

The orchard is an offshoot from the National Mango Breeding Program (NMBP) which was established at KRS in 2012. It will be used to further test the performance of grafted mango trees developed from the NMBP. Based on three years of data, Kensington Pride performed well as a rootstock while NMBP 1201, NMBP 1243 and NMBP 4069 were the best performing scions. Chris Kelly of Berrimah Agricultural Research Centre (BARC) grafted NMBP 1201, NMBP 1243 and NMBP 4069 on Kensington Pride rootstocks in May 2015.



Planting mangoes at Katherine Research Station

On 22 September, staff from Berrimah Agricultural Research Centre (Chris Kelly, Constancio Asis and Lorenzo Meschiari) joined with the KRS team (Teagan Alexander, Kae Wegman, Karl Bourne and Chiara Zraggen) in planting 170 grafted mango trees. The team whizzed through planting far quicker than expected but not without a few moments of excitement in the form of grubs with nasty pincers.

The orchard has since been showcased to international guests on the 2 October as part of the 11th International Mango Symposium, held in Darwin from the 26 September to 2 October. About 60 mango researchers viewed the site during the field trip visiting the mango orchards in the Katherine region.



Preparing the ground

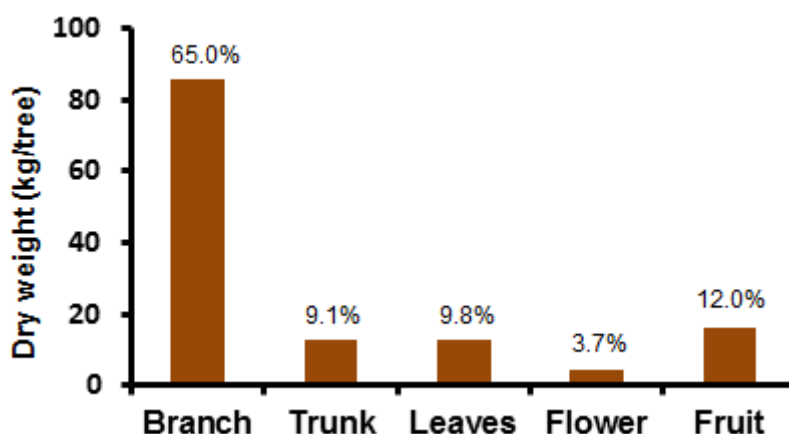
Above-Ground Tree Nitrogen Content in Mango Trees

David Hamilton, Plant Biosecurity Officer and Constancio Asis, Research Agronomist, Darwin

Of the essential nutrients needed by mango nitrogen (N) has the greatest effect on growth and development due to its morphological and physiological functions. External application of N is important to meet the crop's needs. The response of mango to N application is influenced by various factors such as amount, timing of application, and method of fertiliser application, as well as agro-climatic conditions and phenological stages of the tree. Knowledge about the partitioning of biomass and nutrient content within a mango tree can provide insight on the physiology, growth and fruit yield.

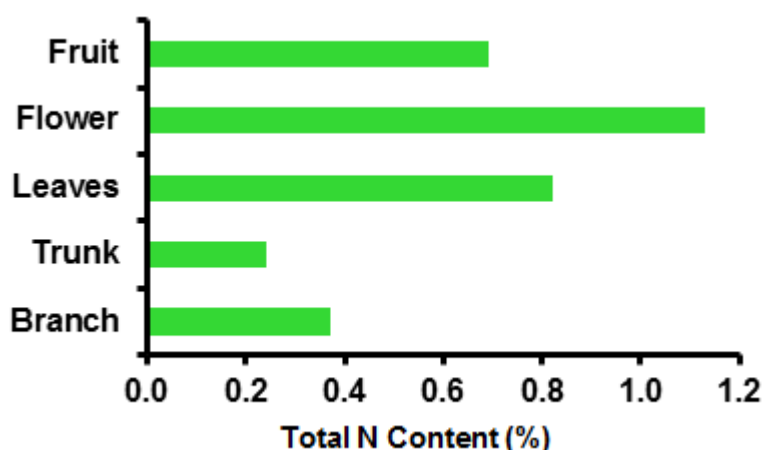
We determined the above-ground biomass, total N content and N accumulation in the different parts of mango cv. Kensington Pride trees. Six trees from the 12-year-old commercial mango orchard at Fly Creek, Northern Territory were selected in the 2008-2009 cropping season. The trees received 200g of urea which was applied at postharvest (December 2008) or pre-flowering stage (April 2009). In October 2009, the trees were harvested and partitioned into branches, trunk, leaves, flowers, and fruit. Subsamples were obtained from each part and oven-dried until constant weight to obtain the dry weight. Samples were analysed for total N content.

The average weight of the 12-year-old mango was 132 kg/tree. Branches had the highest biomass (65.0%), followed by fruit (12.0%), leaves (9.8%), trunk (9.1%), and flowers (3.7%) (Graph 1, below).



Graph 1: Biomass of the different part of 12-year-old mango tree cv. Kensington Pride. Number on top of the bar represents percent biomass of the plant part over total dry weight of 132 kg/tree.

Nitrogen content significantly varied between the plant parts. The highest average concentration of N was in the flowers (1.13%) followed by the leaves (0.82%), and fruit (0.69%). The trunk had the lowest N content at 0.24% (Graph 2, below).



Graph 2. Total N content of the different part of 12-year-old mango tree cv. Kensington Pride.

The average total N accumulation in the above-ground biomass of the trees was 627g N/tree. Nitrogen accumulation also differed with plant part. The branches of the trees had the highest N accumulation at 291g N/tree because of their high total biomass. The low N content of the trunk contributed to its low N accumulation (Figure 1, below).

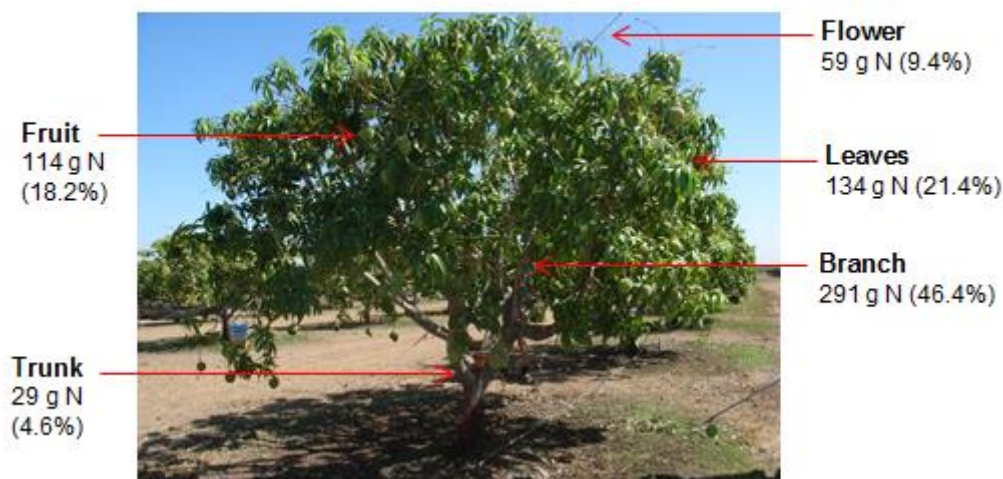


Figure. 1. Nitrogen accumulation in the different parts of 12-year-old mango tree cv. Kensington Pride. The number in parenthesis represents percent N accumulation of the plant parts over total tree N uptake of 627 g N/tree.

This information is a valuable input in developing and improving N fertiliser management in mango. However, there are still questions that need to be answered, such as how much N is derived from the applied N fertiliser and what proportion of the accumulated N is stored and mobilised to meet the plant's needs. To provide answer to these questions, a study is currently being conducted to document the N economy of mango. Knowledge of this will be used to refine and develop N fertiliser practices.



More efficient use of nitrogen fertiliser could see an increase in the productivity of NT mango trees

Is Post Harvest Treatment of NT Mangoes Necessary?

Mary Finlay-Doney, Extension Entomologist and Natasha Burrows, Entomologist, Darwin

Fruit flies are costing Territory mango growers hundreds of thousands of dollars each year through the application of both pre and post-harvest insecticides. The current requirements have a zero tolerance for fruit flies in consignments of mangos for international and interstate markets.

Pesticide alternatives are being sought because the Australian Pesticides and Veterinary Medicines Authority has recently cancelled the registration for the use of fenthion and is reviewing the use of dimethoate by the mango industry. The Department of Primary Industries and Fisheries is conducting research in an attempt to demonstrate that post-harvest insecticidal treatment is not necessary.

Funded through Horticulture Innovation Australia (MG12017 New fruit fly systems for mangoes and market access), entomologists at Berrimah Farm are currently conducting laboratory studies to investigate the relationship between fruit fly oviposition and the ripeness of mangoes.

Previous field work by the NT DPIF has demonstrated that when mangoes are harvested at the hard green mature stage they are extremely unlikely to be stung by fruit flies. This laboratory investigation is with two species of fruit fly *Bactrocera tryoni* (Queensland fruit fly) and *Bactrocera jarvisi*. Individual flies are caged with individual pieces of fruit so that all the significant variables can be observed and measured.

When the observations are complete the flies are dissected to count their egg load, and the fruits are measured for sugar content, dry matter and hardness. Each fruit is individually observed for a period of two hours. So far this season we have tested over 100 fruit (KP and Calypso varieties). Of the hundred individual fruit and flies tested, only three flies have successfully laid eggs. The three pieces of fruit that were laid into all had dry matters above 17%. Observations like this conform with the previous results from the field trials to suggest that there may be a window when mangos are a conditional non-host for fruit fly oviposition.

The entomologists will continue replicating these trials to help to understand why fruit flies oviposit in one fruit and not another, and at which point the fruit characteristics change to make them attractive. Ultimately, the results of this research, combined with the field data, will help us understand the host status of hard green mangoes and quantify the risks of fruit flies to mango production.



Female *Bactrocera jarvisi*



Female *Bactrocera tryoni*

NT Pastoral Feed Outlook

Dionne Walsh, Rangeland Program Coordinator, Darwin

Summary of current situation & trends - all districts – September 2015

KEY Green = low risk Orange = watch Red = high risk

KEY ↑ = increasing trend ↓ = decreasing trend ↔ = steady

	Northern Territory Pastoral Districts											
Indicator	Darwin	Katherine	VRD	Sturt Plateau	Roper	Gulf	Barkly	Tennant Creek	Northern Alice Springs	Plenty	Southern Alice Springs	Comments
2014/15 total pasture growth	↔	↔	↑	↔	↔	↓	↑	↑	↑	↓	↓	Arrows indicate trend compared to the long-term median.
Current estimated standing biomass	↔	↔	↔	↔	↔	↔	↓	↔	↔	↔	↔	Arrows indicate trend since previous quarter.
Current seasonal outlook	↑	↑	↑	↔	↔	↔	↑	↑	↑	↑	↑	Arrows indicate the trend since previous quarter and taking into account the forecasted model predictions.
Current fire risk	↑	↑	↔	↔	↑	↑	↓	↔	↔	↓	↓	Arrows indicate the trend since previous quarter.

Northern Territory Seasonal Outlook – as at September 2015

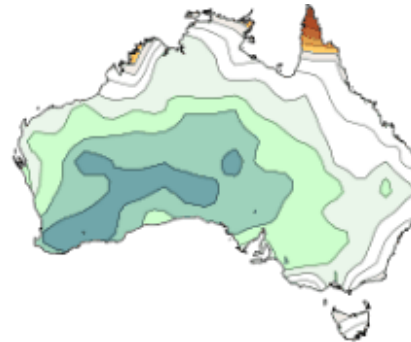
Sourced from the Australian Bureau of Meteorology

<http://www.bom.gov.au/climate/outlooks/>

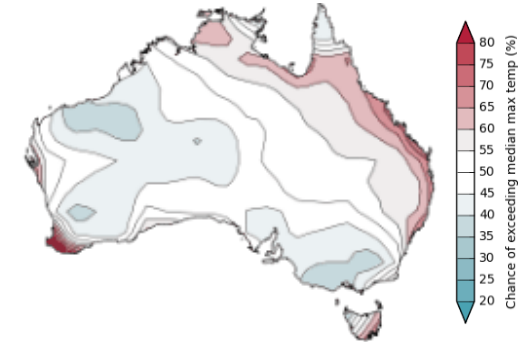
The national outlook for September to November 2015 indicates that:

- **Wetter** than normal spring is more likely across the southern NT
- **Warmer** than normal days more likely across the northern NT
- **Warmer** than normal nights more likely across the entire NT

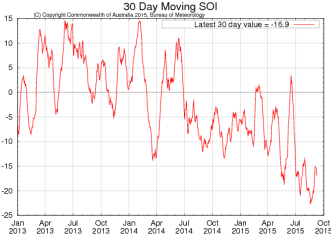
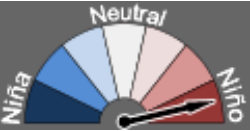
The current outlook reflects the record warm sea surface temperatures in the Indian Ocean, and the El Niño in the Pacific

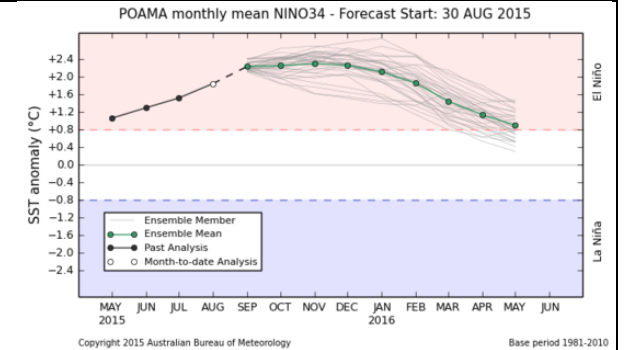


Chance of exceeding the median rainfall
September to November 2015

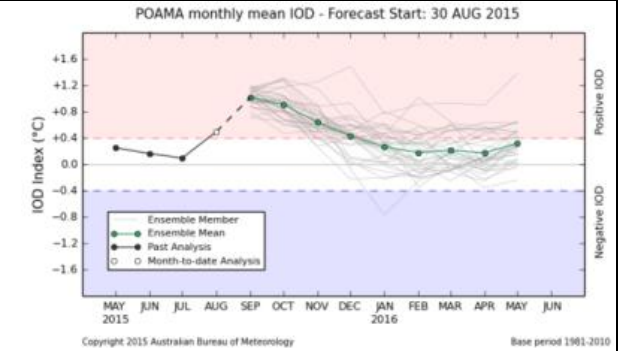


Chance of exceeding the median max. temp.
September to November 2015

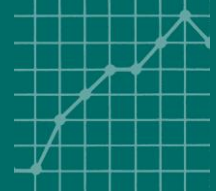
Seasonal Indicators	Comments (sourced from the Australian Bureau of Meteorology)	
<p>El Niño Southern Oscillation (ENSO) http://www.bom.gov.au/climate/enso/#tabs=Overview</p> <p>Current outlook: Warmer & Drier</p> <p>El Niño Alert</p>  <p>El Niño ALERT Level (El Niño status)</p> 	<p>The 2015 El Niño is now the strongest El Niño since 1997–98.</p> <p>The tropical Pacific Ocean and atmosphere are fully coupled, with sea surface temperatures well above El Niño thresholds, consistently weak trade winds, and a strongly negative Southern Oscillation Index.</p> <p>El Niño is often associated with below-average winter–spring rainfall over eastern Australia and above-average daytime temperatures over the southern half of Australia.</p> <p>ENSO tracker raised to El Niño status on the 12 May 2015.</p>	
<p>Indian Ocean Dipole (IOD) http://www.bom.gov.au/climate/enso/#tabs=Indian-Ocean</p> <p>Current outlook: Neutral</p>	<p>Values of the IOD index have been at or above the threshold level of +0.4 °C for four weeks.</p> <p>Sea surface temperatures (SSTs) in the Indian Ocean are warmer than average over much of the basin, and the Indian Ocean as a whole has been at near-record temperatures in recent months.</p> <p>For a positive IOD event to be considered, the IOD would need to remain at or above +0.4°C through September 2015.</p> <p>A positive IOD is typically associated with reduced winter and spring rainfall over parts of southern and central Australia.</p>	



Copyright 2015 Australian Bureau of Meteorology Base period 1981-2010



Copyright 2015 Australian Bureau of Meteorology Base period 1981-2010



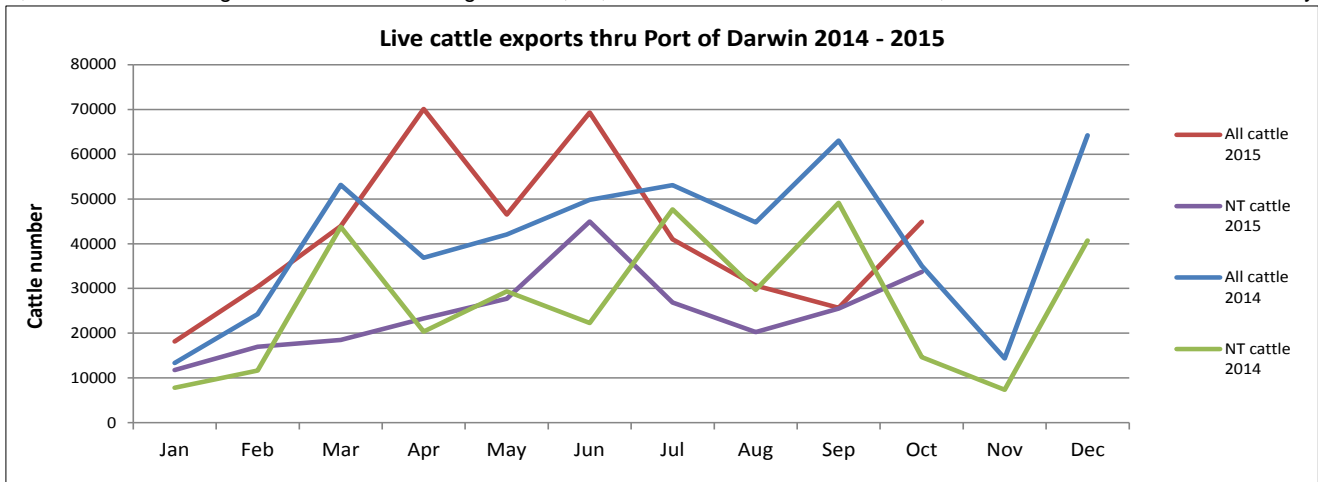
Live Cattle Exports via Darwin Port – OCTOBER 2015

Please note: figures are for cattle exported through the Port of Darwin only; some NT cattle are exported through interstate ports.

Destination	Export of ALL CATTLE (including interstate) from Darwin Port							Export of NT CATTLE from Darwin Port (estimate only)						
	2013	2014	Last year to 31/10/14	YTD to 31/10/15	October	Last month	Difference	2013	2014	Last year to 31/10/14	YTD to 31/10/15	October	Last month	Difference
Brunei	4,043	4,925	4,132	3,249	0	0	0	4,043	4,925	4,132	1,450	0	0	0
Indonesia	282,022	386,183	325,016	279,692	38,924	7,000	31,924	243,978	251,232	211,565	155,969	29,193	5,250	23,943
Philippines	22,403	16,080	16,080	21,561	3,857	2,431	1,426	15,063	11,221	11,221	12,103	2,893	1,823	1,070
Sabah	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sarawak	800	0	0	300	0	0	0	800	0	0	0	0	0	0
Malaysia	14,952	22,309	19,521	11,503	0	0	0	12,094	15,708	14,920	7,499	0	0	0
Vietnam	35,396	64,461	50,629	96,682	2,134	16,227	-14,093	32,806	41,391	34,559	61,558	1,601	12,170	-10,570
Egypt	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thailand	0	0	0	6,154	0	0	0	0	0	0	3,610	0	0	0
TOTAL	359,616	493,958	415,378	419,141	44,915	25,658	19,257	308,784	324,477	276,397	242,190	33,686	19,244	14,443

OCTOBER at a glance

- 44,915 cattle through the Darwin Port during October; 19,257 more than last month and 3,763 more than at the same time last year.
- 33,686 NT cattle through the Darwin Port during October; 14,443 more than last month and 34,207 less than at the same time last year.



OTHER LIVESTOCK EXPORTS VIA DARWIN PORT

Includes NT and interstate stock.

Destination	Buffalo		Goat		Camel	
	YTD	October	YTD	October	YTD	October
Brunei	625	0	1,000	0	0	0
Indonesia	0	0	0	0	0	0
Philippines	0	0	0	0	0	0
Sabah	0	0	0	0	0	0
Sarawak	0	0	0	0	0	0
Malaysia	0	0	0	0	0	0
Vietnam	4,468	908	0	0	0	0
Egypt	0	0	0	0	0	0
Thailand	0	0	0	0	0	0
TOTAL	5,093	908	1,000	0	0	0

NT CATTLE MOVED INTERSTATE

Destination	Number
NSW	1,201
QLD	6,443
SA	5,180
VIC	771
WA	5,324
Total	18,919

NATIONAL CATTLE PRICES

www.mla.com.au/prices-and-markets

CURRENCY EXCHANGE RATES

www.oanda.com/currency/converter

of any of the information provided.

Total Cattle, Port of Darwin								NT Cattle, Port of Darwin							
2007	2008	2009	2010	2011	2012	2013	2014	2007	2008	2009	2010	2011	2012	2013	2014
283,046	364,944	347,314	295,605	269,617	246,990	359,616	493,958	247,281	295,539	304,818	272,749	253,797	234,249	308,784	324,477

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