Australian Native Rice Newsletter

March 2024

Australian Native Rice Newsletter, 2024, Edition 6.

Welcome to our Australian Native Rice Newsletter.

We produce a newsletter once or twice a year to communicate recent research on the commercialisation of Australian native rice. If you have questions, or wish to unsubscribe from the newsletter, please email: sean.bellairs@cdu.edu.au, or pennywurm@cdu.edu.au

Acknowledgement of Traditional Owners

We acknowledge the Traditional Owners of the lands where the Australian native rice project team undertake research, and we pay our respects to their Elders past, present, and emerging. This includes the Ang Gnarra, Larrakia, Turrbal, Yuggera and Wulna peoples.

Australian native rice project background

In April 2020 we commenced a substantial project investigating the agronomy of Australian native rice. This project aims to lay the foundations for commercialisation of Australian native rice, particularly by Indigenous people and businesses, as a high-value, low-volume, culturally identified, nutritious food. Our goal is to develop agronomic knowledge about native rices for Indigenous enterprises interested in cultivation and commercialisation of native rices. Australian native rice has potential as a high value product suited for tourism, gourmet food, First Foods and restaurant markets, and value-added products.

The project will:

- Collect samples of wild grown populations of three species of Australian native rice, *Oryza meridionalis, O. rufipogon* and *O. australiensis*, from wetlands in the NT and Queensland, for cultivation trials,
- Investigate the agronomy of native rice using controlled trials to develop and validate optimum approaches to cultivating Australian native rice,
- Scale-up native rice cultivation trials with CRC partner Indigenous enterprises and communities in the NT and Queensland,
- Analyse and compare nutritional values of Australian and Canadian wild rice species,
- Develop new milling techniques for Australian native rice, and
- Apply learnings from the Canadian Indigenous wild rice industry to commercialise Australian native rice as a gourmet/health food/First Food and inputs to nutritional supplements.

You can read more about the project at:

Future Food Systems CRC Website https://www.futurefoodsystems.com.au/commercialisation-of-native-rice-for-indigenous-enterprise-development-agronomy-and-value-adding/ and the

CDU Project website https://www.cdu.edu.au/riel/research/australian-native-rice-commercialisation

Update on FFS CRC project status

Sean Bellairs (Project Leader, Charles Darwin University)

The Future Food System Cooperative Research Centre project, "Commercialisation of native rice for Indigenous enterprise development: Agronomy and value-adding" is approaching the original completion date of 31 March 2024. However, some trials are still being processed due to harvest being later than anticipated. Therefore, we have obtained an extension until 30 June 2024 to complete the project milestones and submit the final technical report to FFS CRC.

After submission of the final report to the FFS CRC, we will continue work for 12 months producing a publication on our findings so that the research findings and protocols that we have developed for growing Australian native rice are broadly available.

We will also be presenting the outcomes of the project at the field day at Coastal Plains Research Farm near Darwin at the NT DITT field day in May 2024. If you would like further details on the field day please contact: chelsea.moore@nt.gov.au

We appreciate the interest and support that we have received from many people while carrying out this project, and thank you all.

We have identified some other project areas to follow up with research studies, and a PhD scholarship supported by NT DITT and CDU on Australian native rice research is currently available at Charles Darwin University. FFS CRC has also provided a top up scholarship for that PhD student (see below).

Details of the final report will be communicated on the Charles Darwin University native rice website and through the Australian Native Rice email list.

Doctor of Philosophy (PhD) paid study opportunity – Commercialisation of native rice for Indigenous enterprise development: Agronomy and value-adding

Charles Darwin University's (CDU) Research Institute for the Environment and Livelihoods (RIEL) and the Northern Territory Government (NTG) are offering a scholarship for a PhD candidate to undertake a project, based at CDU's Casuarina campus in Darwin, titled 'Commercialisation of native rice for Indigenous enterprise development: Agronomy and value-adding'.

About the project: CDU and NTG are seeking a PhD student for a project investigating the agronomy and commercialisation of native rice. This project builds on a previous research project, on the 'Commercialisation of native rice for Indigenous enterprise development', which was funded by the Future Food Systems CRC. This project will investigate agronomic issues associated with planting, nutrition, water efficiency, harvesting and/or milling of Australian native Oryza species. There is flexibility in the specific areas of focus, depending on the interests of the student. Project outcomes will support First Nations enterprises interested in the commercialisation of Australian native rice through cultivation.

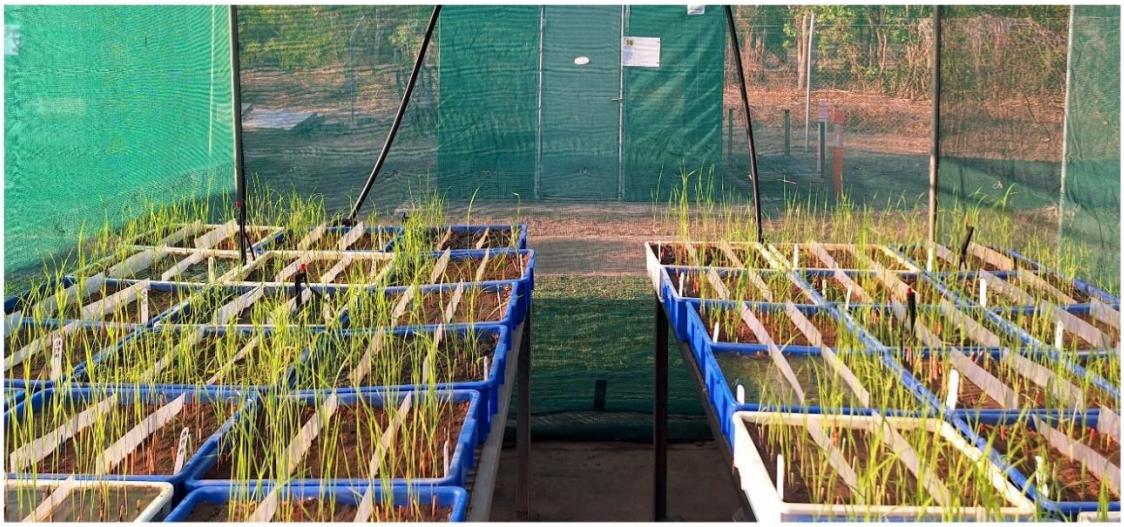
The opportunity will include a minimum 3-month higher degree by research (HDR) internship with a research end-user to gain industry experience and develop connections.

Scholarship and financial support: The successful applicant will receive an Australian Government Research Training Program Scholarship valued at $32,192 per annum (from 2024; indexed annually) and an RTP Fee Offset for tuition fees. An additional top up scholarship of $6,000 pa will be provided by the Future Food Systems CRC, to create a total annual scholarship of $38,192 pa (tax exempt), for 3 years. Open to Australian citizens or permanent residents or New Zealand citizens. For further information about the PhD study contacts: Penny.Wurm@cdu.edu.au (CDU) or MuhammadSohail.Mazhar@nt.gov.au (NT DITT).

Effects of soil type and seed treatment on emergence of *Oryza australiensis, O. meridionalis* and *O. rufipogon* plants.

Sonam Adhikari Rana (Research Officer, Charles Darwin University)

At CDU a nursery trial was carried out to investigate the emergence and seedling growth from the seeds of three species of native rice with three types of pre-treatment, grown in three different types of soil. One treatment is with husk removed, second is with in-tact husks and third is the seedlings germinated in incubator and transplanted as germinants. Three types of soil used were black clay from the Beatrice Hill floodplains, savanna topsoil and red earth soil from CPRF. The experiment was conducted in 10 cm deep trays and the seeds sown in September 2023. Data on survival, death and growth of seedlings was recorded. The black soil tended to become waterlogged and pool water on the surface of the trays. Additional black soil treatments were evaluated in November 2023 to compare the effect of waterlogged soil (that resulted in submergence of the seedings every few hours), compared to soil that drained once the water was at the level of the soil. The collection of data on the emergence, survival, leaf numbers and heights of the seedlings has been completed and analysis of the data is still underway.



Emergence trial 2023: CDU shade house. (Source: Sonam Adhikari Rana).

Effects of soil type on growth and yield of *Oryza australiensis, O. meridionalis* and *O. rufipogon* plants.

Sonam Adhikari Rana (Research Officer, Charles Darwin University)

Another nursery trial was completed at CDU to investigate the growth and total yield of three native rice species, in two different types of soil - Beatrice Hill black clay and savanna topsoil. Seedlings were planted out in 250mm pots, at three seedlings per pot. Three pots were placed into each of six 80 cm wide tubs per species. The trial was planted in mid-August 2023. Frames to catch seeds as they dispersed were set up around each tub of three pots. Plant height, tiller number and yield were regularly measured and an aphid infestation was managed through biological control using lady beetles. We have completed collecting data at the tillering stage, flowering stage, initial seed maturation stage and final seed maturation stage. Sample processing and data entry is complete. Data analysis is underway.

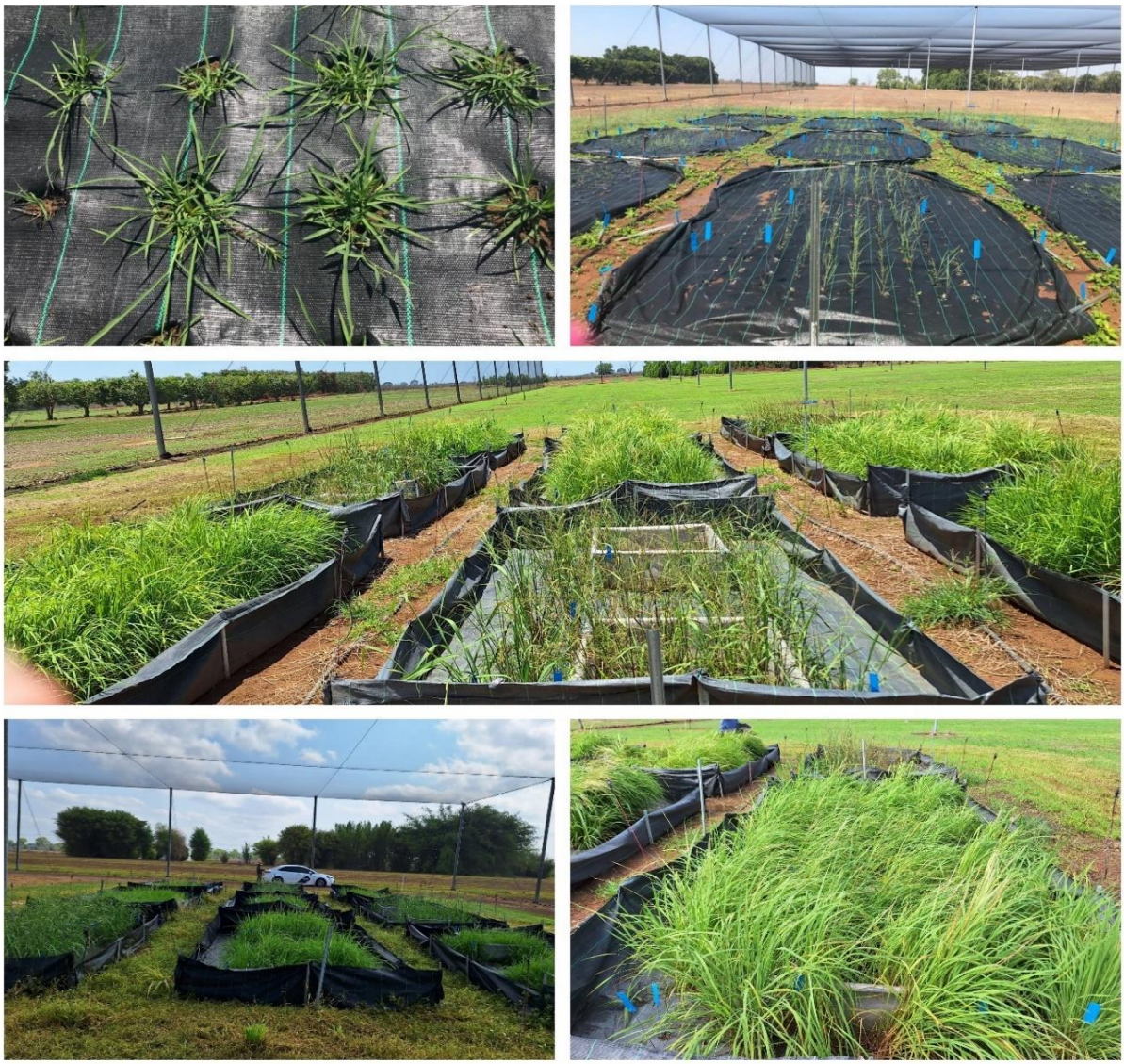
Native rice performance and soil type**: Top**: *O. australiensis* at flowering stage with the frames installed for catching seeds. **Bottom** L-R: preparation of frames for catching seeds of *O. meridionalis* at the CDU shade house; monitoring the overall trial area; lady beetle larva eating the aphids in the *O. australiensis* (Source: Sonam Adhikari Rana).

Dry season yield trial for *Oryza australiensis, O. meridionalis* and *O. rufipogon*, at NT DITT Coastal Plains Research Farm.

Sonam Adhikari Rana (Research Officer, Charles Darwin University)

A field trial was planted in the 2023 dry season to investigate the yield and potential of commercial small plot harvest. Replicated plots were established at the NT DITT Coastal Plains Research Farm. The trial is also investigating the growth of the plants in the field, weed control, herbicide and pesticide application. The yield was obtained by collecting the grain from within 1 m x 1 m frames. A similar trial was conducted in the 2022/2023 wet season (mentioned in the June 2023 newsletter). This dry season trial was established in August 2023 at CPRF, using the same protocols at for the wet season trial. We collected plant growth data at the tillering and flowering stages. Grain was harvested from October 2023 to January 2024, and the final biomass was collected in January 2024. Data has been entered for analyses and will be reported on in our next newsletter and the final research report.

Pest infestations occurred at various stages and one previously unknown pest was identified, with the help of DITT Pathology staff, as a stink bug *(Eysarcoris trimaculatus)*. CPRF farm manager, Jarred Sack was able to control this pest using Fipronil.



CPRF dry season field trial 2023-24. **Top left**: 2 week-old *O. meridionalis* seedlings planted out in holes cut into weed mat; **Top Right**: 3 week-old seedlings of the three species; **Middle**: Sides of the weed mat lifted and frames installed to capture seeds during flowering; **Bottom**: General photos of the trial. (Source: Sonam Adhikari Rana).

Wet Season field trial at Redlands Research Farm, Brisbane QLD

Brett Williams[1], Alam Cheng[1] Linh T.M Hoang[1,2]
([1]Queensland University of Technology, [2]Univerisity of Queensland)

A field trial was established by QUT researchers in September 2023 at the Redlands & QCDF Research Facility, Cleveland, located 30 km from the Brisbane CBD. This trial included six plots of *Oryza australiensis* and six plots of *O. meridionalis*. The trial aims to investigate the yield and commercial potential of replicated small plot harvests for comparison with the NT trials. This trial used the same protocols that were used at the NT DITT Coastal Plains Research Farm trial, 65km south-east of Darwin. Similarly to the NT trials, it is also investigating the yield and growth of the plants in the field, weed control, herbicide and pesticide application.

The yield will be obtained by collecting the grain from within 1 m x 1 m frames in each plot. Of the two species only the *O. australiensis* plants have matured and produced seeds, however the yield was deeply impacted by the heavy rainfall and strong winds during seed formation. As of late March 2024, *O. meridionalis* has failed to produce any seeds in the field trial. The trial is ongoing, and data will be processed and analysed for the final report.

QUT native rice trial 2023-2024. *O. australiensis* and *O. meridionalis* at Redlands and QCDF Research Facility. (Source: Alam Yen Cheng).

Influences of planting density and nitrogen rates on yield, CDU Campus NT
Gehan Abdelghany (Charles Darwin University)

Gehan Abdelghany is completing the writing up of her PhD for submission. Gehan's key chapter titles are:

- Commercial cultivation of Australian wild *Oryza* spp.: a review and conceptual framework for future research)
- Effects of dense planting on the yield performance of rice (*Oryza sativa* L.): A meta-analysis of field trials
- Density and Nitrogen Effects on Grain Yield and Quality of native *Oryza* species in tropical Northern Australia

Full details will be reported on in the final research outputs from the project.

Reference: Abdelghany, G., Wurm, P., Hoang, L. T. M., & Bellairs, S. M. (2021). Commercial cultivation of Australian wild Oryza spp.: a review and conceptual framework for future research needs. *Agronomy*, *12*(1), 42.

Gehan Abdelghany, PhD student, at a recent supervisory meeting, before submitting in early April.

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Volunteers and Casual Staff, CDU campus, NT

We would like to express our thanks to the following people who worked with us in the last 6 months, and for their support and enthusiasm for the project:

Farechah (Ary) Brown

Dr Mohamed Rashwan

Dr Nataliya Kandyba

Ruby Hatfield

2nd National Sovereign Food and Botanicals Symposium - Darwin November 2023
Penny Wurm (Charles Darwin University)

Members of the project team attended this fantastic National Symposium (organised by FNBBAA) at the end of last year. It was held at the same time and venue as the Aboriginal Economic Development Forum (hosted by NTIBN). This meant a feast of tough choices about which session to go to!

Lynette Kenyon and Graham Kenyon held a booth for Pudakul Aboriginal Cultural Tours (Pudakul ACT) in the trade hall – even we had to queue to say howdy to them! They were pleased with the interest in their business. Before the symposium, we caught up with Jacob Birch, a Gamilaraay man, who is actively reviving and researching the use and potential commercalisation of native grains on-country in western NSW, through Yaamarra and Yarral. We were excited to give Jacob a tour of native rice trials underway on CDU campus at the time.

CDU Nursery visitors November 2023**. L-R:** Jacob Birch (Yaamarra and Yarral), Professor Stephen Xu (Research Institute for Northern Agriculture, CDU), Jason Davidson (Figjam & Co, in town for the symposium), and Sonam Adhikari Rana (RIEL, CDU, and backbone of the native rice project trials). *O. australiensis* plants in the photo, with the plants (to the right) heavy with beautiful dark grains.

Highlights of the Symposium included a presentation by Daniel Robinson and Mirri Raven, from University of New South Wales, on intellectual property and benefit sharing. They presented on models of sharing benefits from the use of native plants, from the Pacific and Australia, information about the risks of patents, the importance of consumers understanding what they are buying and asking questions, and the social license of businesses to commercially use native plants, without paying keen attention to these issues.

Paul Saeki of North Australian Aboriginal Kakadu Plum Alliance (NAAPKA) presented on the history of the Indigenous Kakadu Plum industry in northern Australia. NAAPKA currently has projects on: Indigenous certification (developing an Indigenous Certification mark to authenticate Indigenous supply); provenance and source traceability of fruit using technology (in collaboration with ANSTO); establishing a small scale processing facility; and, ongoing collaborations for research into Kakadu plum medicinal, nutraceutical and food properties.

We also had a lovely chat over coffee with Bruce Pascoe during a morning tea break. As a keynote speaker Bruce presented on native grains and tubers in the Australian diet. We have appreciated Bruce's ongoing interest in our native rice research. We also met up with one of the staff from Dumu Balcony Café (Bright VIC) which has a partnership with Thamarrurr Youth (Wadeye, NT) for training and education exchanges around food culture.

Project visitors - Bidjipidji School Camp 2023 for Indigenous middle schoolers

Penny Wurm (Charles Darwin University)

We were excited to host a visit to campus by an energetic and curious group of Indigenous NT middle students from schools in Tennant Creek, Alice Springs and Katherine. The students were taking part in the annual CDU Bidjipidji School Camp. The purpose of the camp is to provide Indigenous middle school students with a taste of university life. It was a great joy to demonstrate and explain the native rice project for three different groups of engaged students, who were full of great questions.

We met in the seed laboratory, where the native rice germination studies have been carried out, and where we house the research scale Satake rice mill and hand thresher. We looked at interim research results presented on posters and discussed findings of field trials and nursery studies.

We also discussed a wonderful collection of ethnobotanical books written over the last 35 years, under the coordination of NT Government botanist, Dr Glenn Wightman. Glenn has collaborated with cultural experts and elders from the many NT languages groups (there are around about 45 books in the series). The *Commercialisation of native rice project* team is using this book series as a resource for a review of the traditional use of native rices in the NT. We have found around 25 names for native rice among NT languages.

The books were of also great interest to the Bidjipidji students. They include wonderful photographs of the cultural and language authorities who collaborated with Glenn. One young person from Elliot, NT, studying at St Joseph's College in Katherine, recognised her grandfather in the book on Mudburra ethnobotany. We are now organising for copies of the book series for the school, and looking forward to the 2024 Bidjipidji School Camp.

For further information about the Camp program, contact the coordinator at Charles Darwin University, Barbara Baugh (Manager First Nations Pathways and Engagement; barbara.baugh@cdu.edu.au)
Bidjipidji Camp 2023 video https://youtu.be/SR0wBHtjz3c).

Reference: Wightman, G. (1992). *Mudburra ethnobotany: Aboriginal plant use from Kulumindini (Elliott), northern Australia*. Issue 14 of Northern Territory botanical bulletin, Northern Territory, ISSN 0314-1810.

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Core research team, NT and QLD

QUT

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CDU

Dr Sean Bellairs (Project Lead)

Dr Penny Wurm

Sonam Adhikari Rana

Gehan Abdelghany (PhD student)

NT DITT

Dr Edward Mwando

Nick Hartley

Jarred Sack

Pudakul Aboriginal Cultural Tours

Graham Kenyon

Lynette Kenyon

Further information

You can read more about the CDU native rice project activities at https://www.cdu.edu.au/riel/research/australian-native-rice-commercialisation