Australian Native Rice Newsletter

November 2021

Australian Native Rice Newsletter, 2021, Edition 2.

We anticipate producing a newsletter two to three times 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: nativerice@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

Charles Darwin University native rice activities in 2021

Yield trial under shade house conditions (Charles Darwin University /NT DITT)

To get an estimate of the amount of grain produced per square metre for each of the species of native rice, the amount of grain produced from twelve pots in 0.7 m x 1.8 m trays was recorded. We also used the trial to develop techniques for harvesting the native rice grains. The collection of grains is difficult or time consuming if inflorescences are to be individually bagged or require mature grains to be manually stripped from them regularly. In this experiment we trialled a grain collection using flywire mesh held in frames. The plants were grown in pots and protruded through larger holes in the mesh. This enabled clean grain to be collected when it gradually matured and was shed over six weeks.

Native rice yield trial at Charles Darwin University, being undertaken by CDU staff in collaboration with NT Department of Industry, Tourism and Trade researchers. Clockwise from bottom right: pots ready for planting; vegetative growth underway and mesh frames in place ready for seed collection; mesh attached to frames and collecting seed as it is gradually shed over a 6-week period. (Source: Sonam Adhikari Rana).

Mesh to collect and contain the seeds is potentially a technique which could be modified and adapted to a larger scale. Hand and vacuum collection of grains were trialled. Pest management was an issue due to aphids. After initially trialling chemical pesticides, we switched to biological control using lacewings and ladybeetles. This was highly effective.

Wild harvest of native rice (Charles Darwin University /NT DITT)

The commercialisation of native rice project is fortunate to have permission to access abundant wild stands of native rice on beautiful Limulngan-Wulna country (Adelaide River floodplain, NT). April-May each year marks the gradual end of the wet season, when floodplain water levels are falling. This is also when abundant native rice seeds are being shed. In natural populations seed falls onto wet soil or directly into the water – depending on the local topography and the amount of rain that fell in the preceding wet season. So this is a busy time on the floodplains for research staff from Charles Darwin University (CDU) and NT Government Department of Industry, Tourism and Trade (DITT).

The Parks-CDU shared airboat, piloted by NT Parks Service Ranger, David McLachlan, with CDU Technical Officer, Sonam Adhikari Rana and Master's student, Vamshi Lenkala in the saddle and ready to go. In the distant background and top-right you can see the shimmering inflorescences of native rice stands (Source: Penny Wurm).

The 2020/2021 wet season produced a bumper "crop" of native rice. Thanks to an above average wet season rainfall, water levels were just right for airboat launching well into April. This enabled us to collect over 20 kg of unprocessed seeds (which will yield close to 10 kg of grain). The CDU team made

five airboat trips onto the floodplains in the Fogg Dam Conservation Reserve, to identify populations of two native rice species during flowering, and to track the progress of grain filling. We had never seen anything like it. After travelling through hectares of native rice, with pollen at peak production, we looked like we'd had saffron thrown all over us by the end of the day – pollen everywhere!

Figure 3. Sonam Rana with freshly collected bags of rice; the airboat is surrounded by rice here. (Source: Penny Wurm).

Eventually airboat access becomes impossible due to falling water levels and other access is dangerous due to crocodiles. The team waited until early May for water levels to drop enough for seed to be safely accessed on foot. This phase of collection is done within the NT DITT Beatrice Hill Research Farm, not far from Fogg Dam. Peak seed production had finished by this stage but we managed to collect by hand into late May.

"Safely" refers to the fact that the vast floodplains are also home to healthy populations of saltwater crocodiles, so wild harvest has to be supported by access to an airboat. The airboats used in this project are shared under an agreement between CDU and the NT Parks Service, which provides the equipment fuel and pilot for the project. Parks staff have been enthusiastic supporters of this and other project collaborations with researchers provide mutual benefits for researchers, Parks staff and Traditional Owners, who jointly manage all NT Parks. This wild harvest contributes to other aspects of the commercialisation of native rice project. The seed we have collected will be used in ongoing bulking up of seed, grain quality analysis, and the suite of agronomic studies that are the focus of this research!

Alan Niscioli (NT DITT) and Sonam Adhikari Rana (CDU) hand collecting native rice in the 2021 late-wet/early-dry season, Beatrice Hill Research Farm, Anzac Parade, Middle Point, NT. (Source: Penny Wurm).

The shimmering inflorescences of *Oryza meridionalis* at Fogg Dam, NT in mid-April 2021. (Source: Penny Wurm).

Vale Mr Williams

The native rice project team extend their heartfelt condolences to the family, friends and colleagues of Mr Williams who passed away suddenly this September. He was a Senior District Ranger with the NT Parks Service and a great supporter of native rice research over many years. He had a gift for making things seem doable and bringing people together, across cultures, organisations and generations. We acknowledge him for his encouragement, skilled facilitation and qualities as a terrific human being.

Staff changes in DITT project team

We would like to thank Dr Tony Asis (Research Scientist, Horticulture) and Alan Niscioli (Senior Technical Officer, Horticulture) for their work on the project to November 2021. Due to staffing movements within the Division of Plant Industries, DITT, Tony will be taking up a new position with the DITT Biosecurity Team and Alan will be focusing on horticultural projects after a period of long service leave.

We welcome Dr Alireza Houshmandfar (Cropping Group Leader) and Nick Hartley (Senior Technical Officer, Cropping) who joined us on the project from November 2021. We look forward to reporting on the new experimental trials that we are developing with Alireza and Nick.

Daminmin Festival (Charles Darwin University/NT DITT)

Pudakul Aboriginal Cultural Tours held their inaugural Daminmin Cultural Festival on Wulna-Limulngan Country, Lambells Lagoon, NT. The festival is named after the creator turtle who created the landscape on the Adelaide River floodplains where we collected native rice for the project. This was a chance for the Native Rice Commercialization Project team to update interested visitors on developments and support Pudakul, the project's long term enterprise partner, in this new venture. Some 30 visitors stopped by the stall for a chat to ask about native rice.

The most common question asked was, "*What does it taste like?"* We are pleased to report Australian native rice has an attractive nutty flavor and aroma, and changes from a red brown to lavender-brown when cooked. The second most common questions was, *"Where can you buy it?"* Our answer was, "Nowhere yet, but that's what we are working on." We also had on display the bespoke grain thresher – which proved a hit with young children wanting try their hand.

Penny Wurm (Project Researcher) and Sonam Rana (Project Technical Officer) represented the Commercialisation of Native Rice project at Daminmin Cultural Festival, Lambells Lagoon, NT, in July 2021. (Source: Penny Wurm).

Pudakul Demonstration Time of Sowing trial (Pudakul/Charles Darwin University/NT DITT)

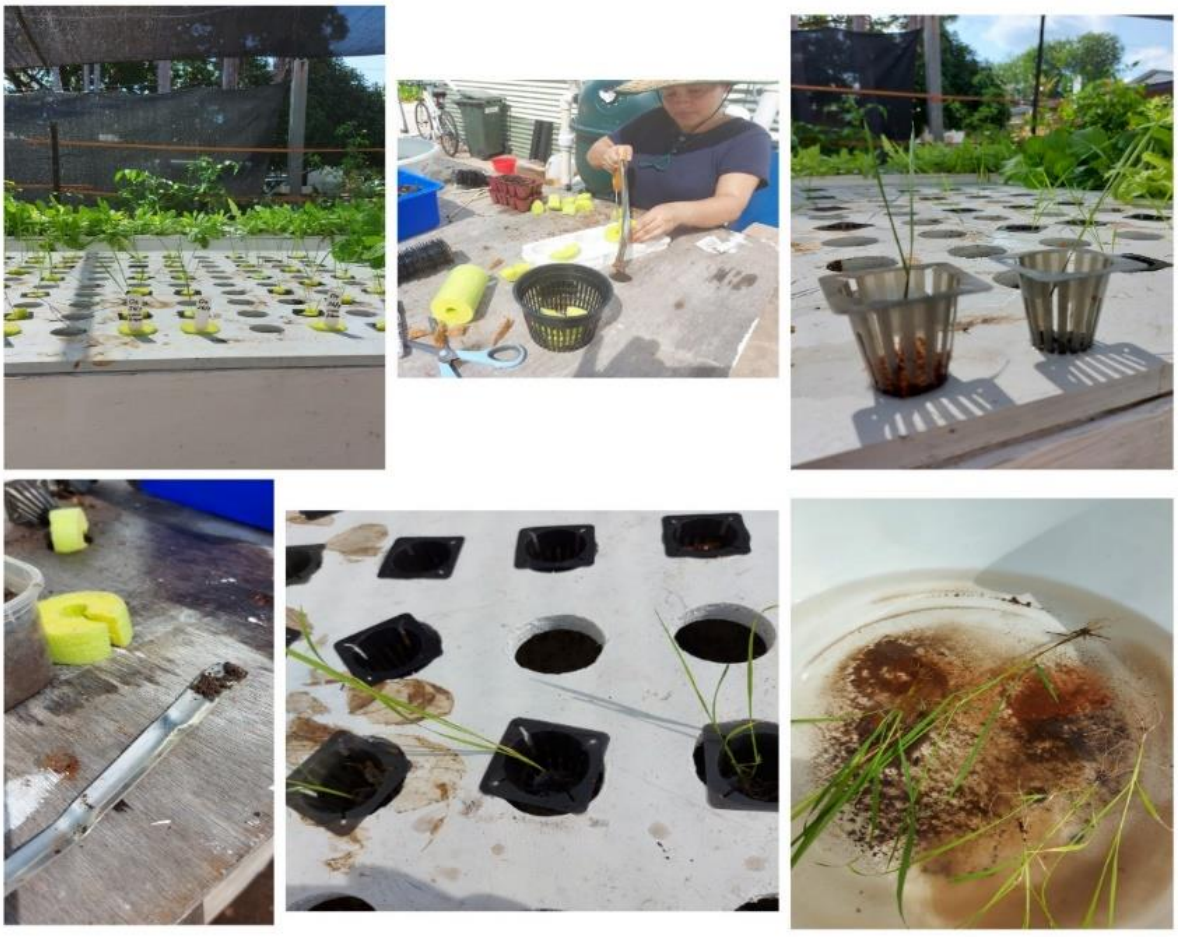
In September, CDU and DITT researchers established a native rice demonstration trial at Pudakul Aboriginal Cultural Tours visitor reception, situated 50km southwest of Darwin. As well as being a demonstration for visitors, we aim to observe whether sowing of native rice seeds at different times of year influences the growth and yield. Weather patterns and seasonal changes in temperature, humidity, sunlight, and day length can all influence crop growth and performance. *Oryza meridionalis*, a native rice species endemic to the area was directly sown into pots filled with local savanna topsoil and immersed into water-filled trenches that were constructed to simulate typical wetland conditions. This trial will help researchers identify optimum growing seasons and gain better understanding of the behavior of native rice grown in an outdoor potted environment. The demonstration trial also provides an opportunity for the collaborating Aboriginal enterprise, Pudukal, to showcase native rice through cultural tours and promote their plans to grow native rice in the future.

Time of sowing demonstration at Pudakul, on site activities carried out by Graeme Kenyon and Lynette Kenyon (Pudakul), Tony Asis and Alan Niscioli (DITT), and Sonam Adhikari Rana (CDU). (Source: Alan Niscioli and Sonam Adhikari Rana).

Aquaponics trial (Charles Darwin University/NT DITT)

An aquaponics trial was set up with three species of Australian native rice, using wastewater from barramundi aquaculture tanks at CDU. The three main Australian species, *Oryza australiensis*, *Oryza meridionalis* and *Oryza rufipogon*, were used in the pilot trial at Charles Darwin University. Morris Pizzutto, a VET lecturer/workplace assessor in environmental studies at CDU, provided information that in aquaponics, plants are provided with nutrients rich pond water from a fish aquaculture system, then circulated in the growing bed. Fish produce ammonia in the aquaponics system, which is converted to nitrate that the plants use. Miguel Tovar-Valencia was a technician monitoring the aquaponics at CDU where native rice trial was initiated. According to Miguel 4-12mg/L oxygen level is required to be maintained at aquaponics bed for the healthy growth of plants which is maintained by using air pumps with the air stone to pump air from the atmosphere and supply into the water.

However the outcome of the pilot study was that nutrient deficiencies were observed, and more detailed investigation would be required to adapt the nutrient levels. We also found that the aquaponic plant holders used in the growing system would need to be modified to hold a grassy plant (native rices). This may be investigated in the future as a student research project.



Native rice at aquaponics trial activities at CDU aquaponics being undertaken by Sonam Adhikari Rana. (Sources: Miguel Tovar-Valencia and Sonam Adhikari Rana).

STEAM Spectacular Science Week Demonstration (Charles Darwin University)

The STEAM Spectacular@CDU program was a part of a celebration of National Science Week in the NT. It was held on Saturday 4th September 2021 at CDU, Darwin, and attended by 405 children and their families. There were number of stalls displaying activities for children, including a high-tech bear hunt, making your own essential oil, a shark dissection, and discovering browsing ants. At the native rice project display we had an activity about native rice threshing where the attendees discovered information about the native rice and used the thresher to separate the awns from the rice seeds. Plants of three different species were displayed, along with their grains.

Approximately 60 people tried the thresher and learned about the native rice. None of them had heard anything about the native rice previously. Children from 5 to 17 years of age waited in line to get their turn to use the thresher. People were keen to know more about the native rice project and were directed to the web page and other information.

Participants at STEAM Spectacular during science week at CDU standing in front of the native rice stall and very happy to know about native rice. (Sources: Sonam Adhikari Rana; Patch Clapp).

Newsletter articles by: Penny Wurm, Sonam Adhikari Rana, Sean Bellairs, Alan Niscioli

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

To subscribe to our Australian native rice newsletter, or if you have any questions, please email:
nativerice@cdu.edu.au