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MEKONG SUSTAINABLE RICE

Message from the project leader

Dr Jaquie Mitchell

Towards the end of 2023 there was a flurry of research activity, conference presentations by various team members and representation at high level meetings. Thanks to everyone for your strong contributions this year and I hope that continues and strengthens in 2024.

What has been great to see is the active use of the COE at SunRice Lap Vo Mill by AGU students and staff and the data emanating from such activity. The last item of equipment was installed and staff and students have been trained in the use of the very important 'test dryer' in December. I expect this will also generate lots of good data to provide evidence on the importance of postharvest management to optimise high quality export rice product.

Australian Centre for International Agricultural Research | Australian Aid | SunRice Group | VIET NAM NATIONAL UNIVERSITY HO CHI MINH CITY | ĐẠI HỌC CẦN THƠ | VIỆN LÚA ĐỒNG BẰNG SÔNG CỬU LONG CLRRI | THE UNIVERSITY OF QUEENSLAND AUSTRALIA CREATE CHANGE

It has been great to see the cooperation between the various project entities (largely CTU/SunRice/UQ) with quite a number of groups/individuals conducting focus group discussions and interviews with rice value chain stakeholders and I congratulate all those involved for their willingness to share information across the multiple themes and ensure strong interdisciplinary connections.

I was thrilled to see that CLRRI had evaluated a number of short grain varieties that may fit the niche that SunRice requires. Further evaluation in the coming seasons in multi-location trials will confirm their yield and quality performance. Each entity in the project had representation at the 6th IRC conference and our work was highlighted and well received across several themes by the international audience of rice experts– I congratulate you all for the high standards of research outputs delivered, the strong engagement that your presentations resulted in and I strongly encourage you to utilize the subsequent opportunities that may come your way.

With the close of 2023 and in preparation for our projects mid-term review, it's a good time to think about our overall activities, progress and impact that each individual, group or entity has had and how these tie into the overall project goals and deliverables. This is certainly a good time to prioritise what is next for the year ahead.

IN THIS ISSUE

Photo
Drones in action applying fertilizers and pesticides on rice fields in the Mekong Delta.

Innovative drying technology towards enhanced Mekong rice quality

SunRice Group

The Centre of Excellence (COE) at Lap Vo Mill has recently been equipped with the Satake_TDR24F rice test dryer, marking a pivotal moment in the project's journey towards transforming rice quality and sustainability in the Mekong Delta. This addition represents a significant investment in the future of rice processing, showcasing a commitment to adopting cutting-edge technologies.

Unlike conventional drying methods, the Satake_TDR24F introduces a revolutionary approach to preserving the integrity of rice grains. It gently circulates warm air within a sealed drum, replicating natural drying processes. This technology is particularly beneficial for the delicate medium grain Japonica rice, which requires meticulous handling to maintain its distinctive qualities.

The introduction of the Satake_TDR24F at the COE is a substantial leap in rice quality research and processing technology. Its precise control of temperature and airflow will enable accurate determination of the effect of temperature and moisture in enhancing grain quality. Evidence collected from this instrument will provide strong scientific basis working towards meeting the stringent quality requirements of international markets, including the SunRice market standards.

Photo
QC staff of SunRice and students of An Giang University during a training course on the Satake_TDR24F rice test dryer, 12 December 2023.

Integrating this technology at the COE in Lap Vo Mill is a strategic move towards training the next generation of scientists (students from AGU) on the post-harvest requirements to produce rice that meets the highest standards of quality and sustainability. With the addition of the Satake_TDR24F rice test dryer to the COE at Lap Vo Mill, we are not only embracing advanced technology but also reinforcing our dedication to the betterment of rice production practices. This step forward in technology and innovation is a significant stride towards enhancing the Mekong Delta's rice value chain, contributing to a sustainable, efficient, and high-quality rice production landscape.

Sensory training course for the rice quality sector in the Mekong Delta

An Giang University

For the Vietnamese rice industry, the Ministry of Science and Technology (MOST) first announced the white rice quality standard in 1999 under code TCVN 5644:1999. This standard was subsequently updated by MOST in 2008 (TCVN 5644:2008) and again in 2017 (TCVN 11888:2017). These standards are now widely applied by rice processing, trading, and inspection companies in Vietnam. However, the sole standard for cooked rice quality is TCVN 8373:2010, which classifies cooked rice quality based on sensory evaluation. This standard is somewhat limited and challenging for non-specialists to apply. To address this, a training course on sensory evaluation of cooked rice was organized by AGU team to enhance the sensory evaluation skills of rice industry personnel in the Mekong Delta.

Photo
Participants evaluate the quality of cooked rice at AGU's laboratory in Long Xuyen City, September 2023.

The AGU research team, in collaboration with Dr. Sangeeta Prakash from the University of Queensland (UQ), delivered this course from September 27-29, 2023. It had 30 participants, including 5 AGU lecturers, 11 AGU students, 7 SunRice Lap Vo Mill employees, 5 Cuu Long Rice Research Institute staff, and 2 members from Can Tho University. The course covered:

- Basic principles of sensory evaluation in rice quality assessment.
- Techniques like the Overall Difference Test, Affective test, Attribute Difference Tests, and Paired Preference Test.
- Practical sessions on tasting and evaluating different rice samples using the Triangle test, Ranking, and Paired Comparison Test.
- Data analysis using JAMOVI software.
- American and Australian rice sensory standards.

Photo
The Vice President of AGU, Assoc. Prof. Ho Thanh Binh, and Dr. Sangeeta Prakash (UQ) issue certificates to participants at AGU's hall in Long Xuyen City, September 2023.

After completing the course, the 30 participants received certificates. The training not only provided valuable knowledge and skills but also fostered connections among the project's participating units. Looking forward, these units plan to form a professional sensory evaluation team, with Dr. Sangeeta's support.

Multi-environment Trials (METs): Evaluation of short-grain lines in four provinces of the Mekong Delta, Vietnam

Cuu Long Delta Rice Research Institute

Typically, a recognized new rice variety must exhibit high stability and adaptability across various environments, coupled with substantial yield factors and desirable agronomic traits to enhance its reliability. When grown in different locations to assess their stability and adaptation, some yield and agronomic traits of these varieties may alter. The primary cause of variability in adaptability and stability among rice varieties is the interaction between their genotype and the environment. This interaction often complicates the process of demonstrating a rice variety's superiority. An individual's phenotype is determined by the interplay of genotype and environment.

Experiments to evaluate adaptation and stability were conducted under different environmental conditions, varying in space (location) and time (crop season), or both. During the Summer-Autumn crop season of 2023, multi-environment trials (METs) were conducted to evaluate the interaction between genotype and environment for an advanced short-grain line (ACIAR_1) and a check variety (DS1). These trials were carried out on a large scale at four locations in the Mekong Delta, representing rice-growing areas: Can Tho (CT), An Giang (AG), Bac Lieu (BL), and Tien Giang (TG).

Photo
Advanced rice lines tested for METs seven days after germination.

Photo
Rice trials progressing to the ripening stage in the MET testing field at CLRRI.

The results from the trials are as follows:

- Grain yield: Averaged across locations, the ACIAR_1 line produced lower yield (4.47 t/ha), than the 4.87 t/ha yield of the DS1 variety. The highest average yield of ACIAR_1 line was 5.30 t/ha in TG, followed by AG and CT with yields of 4.97 and 4.99 t/ha, respectively. BL had the lowest average yield at 3.63 t/ha.
- Stability index (s^2di): No stability value (s^2di) = 0 was found. However, both ACIAR_1 and DS1 varieties had stability index s^2di approaching the value (0), which showed that the stability of both varieties.
- Adaptation index (bi): Both varieties demonstrated broad adaptability, with adaptation indices of 1.36 for ACIAR_1 and 0.64 for DS1.
- Grain quality:
    - Amylose content (%): Both varieties had stable amylose contents at all four locations, with average amylose was 15.9% for DS1 variety and 17.8% for ACIAR_1 line, classifying them in the low amylose content group.
    - Protein content (%): Both varieties maintained high and stable average protein content at all testing locations, with 7.0% for DS1 and 6.7% for ACIAR_1.
    - Head rice (%): The head rice rate was high and stable in both varieties across all locations, averaging 57.5% for ACIAR_1 and 55.0% for DS1.
    - Chalkiness: The chalkiness rate, significantly influenced by genetic traits, environmental conditions, and weather, was high in both varieties during the rainy blooming and harvesting stages of the Summer-Autumn 2023 crop. Specifically, the ACIAR_1 line had high chalkiness rates at CT, BL, AG, and lower at TG, whereas DS1 exhibited high chalkiness at BL, medium at AG, and low at CT and TG.
    - Grain dimensions: The grain length and width of white rice was 5.3 mm and 2.8mm forACIAR_1and 4.8 mm and 2.9mm for DS1.

In summary, both the ACIAR_1 line and DS1 variety demonstrated stable yields, adaptability, and grain quality at most of the four testing locations during the Summer-Autumn 2023 crop season. These rice lines/varieties will continue to be evaluated and compared in subsequent seasons.

Photo

MET samples of the ACIAR_1 line (seeds and white rice) from four provinces (AG, CT, TG, BL) during the summer-autumn of the 2023 crop season.

Empowering women: Gynecological health amidst climate change and agricultural practices

Mekong Delta Development Research Institute, Can Tho University

Photo
Trainees asking questions and Dr. Nguyen Huu Thanh sharing information during the training session.

Women play an integral role not only in agricultural production but also as the cornerstone of social activities and household management. Against the backdrop of climate change, prioritizing women's health emerges as imperative. Women, facing increased vulnerability, confront elevated risks due to direct exposure to chemical fertilizers and water pollution from intensive rice farming. This underscores the urgent need for heightened awareness of gynecological health, which fortifies women's capabilities and promotes gender equality as well.

Addressing these challenges within the ACIAR project framework, a trilogy of training sessions titled 'Women's Gynecological Diseases and Healthcare in the Context of Climate Change and Rice Intensification' was orchestrated across three provinces - An Giang, Kien Giang, and Dong Thap. The primary objective was to augment the capacities of stakeholders, including technical officers, agricultural extension workers, and core female farmers. These sessions concentrated on fostering awareness about the impacts of climate change and agricultural pollution on gynecological health. Simultaneously, they aimed to establish a network for women involved in managing gynecological issues, adapting to climate change, and overcoming agricultural challenges. These sessions drew the active participation of over 200 women, with their positive feedback invigorating the project and underscoring its significance.

Women's gynecological health is crucial, especially amidst climate change and intensive rice farming. A deep understanding of these issues is vital for better disease prevention, accurate diagnosis, and effective treatment. Generally, these sessions went beyond mere education, creating an environment for sharing and discussion, and cultivating an informed and active community focused on women's health. This effort is not just about understanding — it's a crucial step in building community strength and driving positive change from the ground up.

Furthermore, the project actively champions an inclusive environment that encourages women's active participation and expression of their perspectives. This endeavor facilitates the exchange of invaluable information, empowering women to articulate their viewpoints. The project aims to cultivate a supportive community that values the diverse contributions and insights of all its members. This inclusive approach not only amplifies the overall effectiveness of the sessions but also aligns with the broader goal of empowering rural women to actively engage in discussions and decision-making processes concerning their health and overall well-being."

Photo
Trainees in a commemorative photo.

PaddyVision® transforms quality assessment in rice

The University of Queensland

The quality of rice plays a pivotal role in the global rice trade, with a particular focus on mitigating yield losses caused by grain quality damage, including the dreaded cracks. This study takes centre stage by investigating cracks in short-, medium-, and long-grain rice varieties, offering a comprehensive comparative analysis of crack detection methods.

In our study, PaddyVision®, a computer vision-based technology that promises to reshape the rice quality assessment landscape, was tested alongside the traditional grain scope method to detect cracks in rice samples.

Experimental analyses were carried out on short-grain (DS1), medium-grain (Reiziq), and long-grain (Topaz) rice varieties. PaddyVision® exhibited remarkable stability and accuracy when assessing samples with crack rates below 50%, showcasing its effectiveness in detecting cracks in these grains. A comprehensive comparison between PaddyVision® and the grain scope method unveiled consistent trends.

In conclusion, this study spotlights the critical role of crack detection in rice quality assessment. PaddyVision® has proven to be a fast and non-destructive tool for crack detection. However, the journey doesn't end here. Further research across all rice types is required. Enhancing crack detection capabilities can bolster agricultural productivity, fortify food safety, and elevate market competitiveness in the global rice industry.

Stay tuned for more exciting updates on PaddyVision® in the ever-evolving world of agriculture and technology.

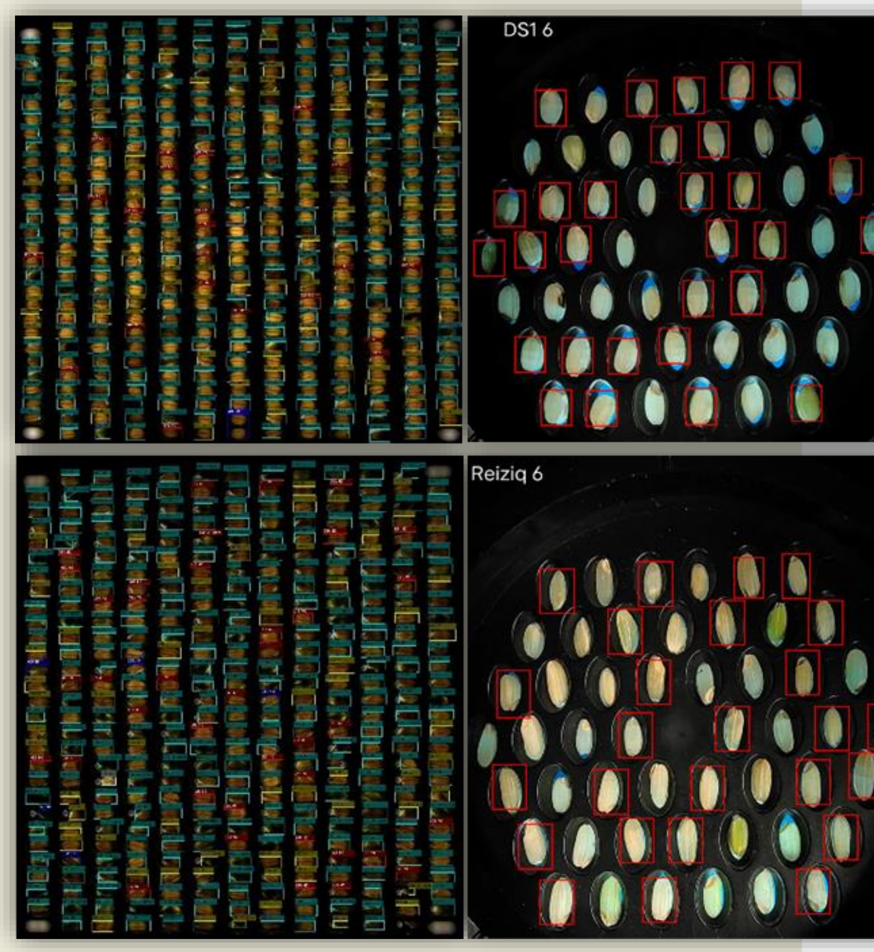

Photo
PaddyVison® image (left) and Grain Scope image (right) for 50% crack rate in DS1 and Reiziq rice varieties.

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