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Research Article

From Tradition to Trend: Development, Acceptability and Marketability of Classic Heirloom Rice-Veggie Chips

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ABSTRACT

Heirloom rice is part of the culture and heritage of the Cordillera Administrative Region. It is the heart and soul of its terraces. Heirloom rice varieties are now known to be nutrient-dense, thus elevating heirloom rice's status as a specialty rice. The production of processed products from heirloom rice lacks standardization of the processing procedures as most of the processed products are done by small-scale entrepreneurs in the locality. Thus, this study aims to develop a new variety of chips out of heirloom rice of Ifugao, fused with additional vegetables like Moringa Oliefera (Horse Radish Leaves) and Mamordica Charantia (Bitter Gourd Leaves). The developmental research design was used to develop the Classic Heirloom Rice-Veggie Chips. In contrast, the quantitative-descriptive research design among 315 randomly selected consumers in Lagawe, Ifugao, was used to determine the acceptability and marketability aspect of the product developed. After a series of formulations, the study developed a standardized process and procedures for making Heirloom Rice- Veggie Chips. On the other hand, using weighted means, findings revealed that the product received high acceptability ratings across all attributes, with texture scoring 5.86 and overall acceptability reaching 5.92, indicating strong positive appeal to respondents. Thus, heirloom rice with vegetables is generally acceptable for sensory evaluation. Lastly, The Classic Heirloom Rice Veggie Chips demonstrated high marketability across various aspects, with strong scores in purchase likelihood (5.79), recommendation (5.93), recognition (5.94), and packaging (5.98) while maintaining consistent appeal across different price points.

Keywords: *Heirloom Rice, Food Development, Food Acceptability, Food Marketability, Ifugao*

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Introduction

The United Nations approved the 2030 Agenda for Sustainable Development 2015 to shape our world. It consists of 169 targets and 17 goals that must be accomplished by 2030. Because food production is directly related to several SDGs, the food industry's commitment to the SDGs has been a topic of great attention since the targets' inception. Eight of the seventeen goals—namely, SDGs 2 (no hunger), 3 (excellent health), 6 (clean water and sanitation), 8 (economic growth), 10 (responsible production), 14 (life below water), 15 (life on land), and 17 (partnership)—are tied explicitly to food production. However, food production can also be more loosely associated with the remaining seven goals, resulting in the food industry contributing to or influencing all of the SDGs (Arora et al., 2023)

Nevertheless, despite the advancements made over the previous five years, reaching the SDGs is complicated. Furthermore, the COVID-19 pandemic has worsened this problem by adversely affecting most objectives (Herrero et al., 2021). One of the Sustainable Development Goals (SDG) is to end malnutrition, including stunting, wasting, and overweight among children under five by 2030. Target 2.2 is specifically focused on this goal. The triple burden of malnutrition, which has a detrimental impact on society and human health and is currently being made worse by the COVID-19 pandemic, is caused by these circumstances coexisting more and more in communities (Mensi & Udenigwe, 2021)

In the Philippines, the Ambisyon Natin 2040- The vision for prosperity by 2040, is anchored in the Sustainable Development Goals, where Filipinos aspire to have a life that is firmly rooted, comfortable, and secure (Malinao, 2022). One way to help achieve a firmly rooted, comfortable, and secure life, the Philippine Development Plan for 2023-2028 includes strategies ensuring that Filipino individuals and families will have secure access to sufficient, affordable, safe, and nutritious food to sustain a productive and healthy life (National Economic Development Authority [NEDA], 2024).

The Philippines has abundant agricultural resources owing to its geographic position. The unique geographic characteristics, which include its terrain and tropical climate conditions, make farming one of the largest agrarian subsectors. Additionally, many Filipinos are engaged in the farming industry for their livelihood and employment; therefore, local resources are sustainable (Patacsil et al., 2023). Due to the commonness of this industry in the Philippines, most Filipinos have innovated crops into processed food products that are healthy and new to consume. Some processed food innovations include fruits, rice, vegetables, and blended chips processed in various ways (Mohidem et al., 2022; Kari et al., 2023)

In the Montane areas of Cordillera, the Philippines, the IP (indigenous people) have cultivated native rice for generations on their rice terraces, which were designated a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Cultural Heritage site in 1995 and a Food and Agriculture Organization (FAO) World Agricultural Heritage site, Globally Important Agricultural Heritage System (GIAHS) in 2011 (Sekine, 2021). Rice terraces are found across the CAR, which includes Ifugao, Mountain, and Kalinga provinces. The rice terraces of Ifugao province in the Philippine Cordilleras constitute a world-famous human-made landscape and tourist destination cherished by Filipinos and foreign tourists alike (Sajise et al., 2012). This heirloom rice was registered as a collective trademark in 2018 and will be registered as a sui generis geographical indication (GI) (Sekine, 2021). For several decades, the rice terraces have been home to heirloom kinds of rice passed down from generation to generation, along with traditional wisdom well-adapted to the local ecosystem. These terraces are home to hundreds of different types of rice. However, the most notable are the traditional highland cultivars: tall, low tillering, aromatic, low-yielding, and morphologically diversified. These cultivars are adapted to higher elevations. The Ifugao name for these landrace rice, Tinawon, literally translates to "once a year" and comes from the fact that they are long-season types that are only grown once a year. Modern, short-season, lowland cultivars, frequently cultivated twice a year, have joined or, in many cases, supplanted these

landraces, except in the highest elevations, in recent decades (Glover et al., 2020)

Following traditional/organic rice farming methods in the terraces, the Ifugao rice types considered heirlooms have preserved their purity and individuality for generations. These types of rice are already well-liked both domestically and internationally. Small-scale producers have also made rice wine, rice cookies, rice cakes, and other processed heritage items, as well as its by-products, especially the broken grains. Heirloom rice is known for its colored grains (red, violet/purple, brown, and off-white), flavorful aroma, delectable taste, and nutritional value, hence commanding a premium price and generating high demand from health-conscious consumers (Bairagi et al., 2021). Tinawon rice contains higher amounts of iron and zinc than other varieties of commercially grown rice. Also, its lower glycemic index and complex carbohydrates make it preferable for diabetic patients and people seeking better control over their blood sugar levels. Due to its unique flavor, aroma, and peculiarity in comparison to other crop varieties that Ifugao people are farming, Tinawon rice indeed stands out, showing its essentiality in the lives of the Ifugao people (Food and Agriculture Organization [FAO], 2022)

The pandemic has changed consumers' lifestyles, increasing the demand for organic and plant-based products (Cahero- Martinez, 2020). Innovations in food science are giving rise to fresh strategies that can help achieve several sustainable development objectives. However, there is an urgent need to step up applied food science and technology research to address all forms of malnutrition (Acuin et al. 2020). Additionally, this study also stems from limited research on the development of innovative, nutritious, and sustainable food products that support both health and cultural preservation. Thus, this study developed an alternative snack primarily made from heirloom rice, horse radish (Malunggay) leaves, and bitter gourd (Ampalaya) leaves. The development of Classic Heirloom-Rice Veggie Chips offers substantial nutritional and health benefits. Creating convenient and healthy snack options promotes better dietary habits and helps prevent lifestyle-related diseases. Heirloom rice from Ifugao is a significant part of the region's agricultural heritage and is known for its unique nutritional profile and cultural importance. However, its utilization remains largely traditional, limiting its potential for wider consumption and economic impact. By developing a new variety of chips infused with Moringa and Bitter Gourd—both rich in essential vitamins and minerals—this study aims to create a healthy, nutrient-dense, and culturally significant snack option that aligns with the increasing consumer demand for organic and functional foods. This research seeks to promote local agricultural sustainability by providing farmers with alternative ways to utilize heirloom rice, thus expanding market opportunities and increasing its economic value. The study also responds to the global push for healthier snack alternatives, particularly in addressing malnutrition and promoting wellness through plant-based, nutrient-rich food options. Ultimately, this research aspires to contribute to food innovation, sustainable agriculture, and the preservation of indigenous food traditions while offering consumers a healthy and accessible alternative to conventional snacks.

Furthermore, this new product's development, adoption, and marketability are crucial in protecting cultural heritage and biological diversity. This works to conserve agricultural diversity and maintain traditional farming practices. More importantly, it preserves the cultural heritage of indigenous communities. Promoting the cultivation and consumption of heirloom rice and other vegetables will sustain their presence in the face of current/intense agricultural trends, contributing to maintaining plant resources that are essential for food security. However, from an economic standpoint, developing the product and acceptability of marketability opens new markets and provides another income source to local farmers or producers. Increasing the demand for primary raw materials directly benefits the income of smallholder farmers and rural communities. Lastly, creating Classic Heirloom-rice Veggie Chips achieves several sustainable development objectives. This helps achieve SDG 3 (Good Health and Well-Being) and SDG 2 (Zero Hunger) by encouraging nutrient-rich dietary options to fight malnutrition and enhance

general health outcomes. Moreover, supporting sustainable agricultural methods and using locally sourced raw materials is consistent with SDG 12 (Responsible Consumption and Production). As a result, the creation, acceptability, and commercial viability of Classic Heirloom-Rice Veggie Chips serve broader social and economic goals in addition to satisfying consumer demand for a healthy snack.

Materials and Methods

Materials

A good quality of Tinawon heirloom rice was purchased from Rice Terraces Farmers' Cooperative (RTFC), Banaue. The other raw materials were also purchased from the local market. The ingredients used for making Classic include Tinawon Rice, Flour, Horse Radish (*Malunggay) Leaves*, Bitter Gourd (Ampalaya) leaves, Black pepper, salt, and eggs. Other tools and equipment are a mixing bowl, frying pan, weighing scale, strainer, 2in1 stainless oil straining rack, food processor, manual kneading machine, shaped cutting tools, food trays, and containers. A big mixing bowl is employed for thorough ingredient incorporation, while a frying pan serves as the tool for frying the chips to perfection. The weighing scale ensures precise measurements, guaranteeing consistency in flavor and texture. Strainers are pivotal in removing excess oil from the fried chips, promoting a crispy finish. The Stainless Oil Straining Rack streamlines the oil straining and filtering process, enhancing efficiency. A food processor aids in grinding vegetable leaves, enriching the chips' flavor profile. The manual kneading machine ensures the dough attains the desired consistency before shaping it with shaped cutting tools. Kitchen tissue is handy for blotting excess oil post-frying, while food trays facilitate air-drying, ensuring optimal texture. Lastly, containers store flavorings, which are used in the flavoring process. Each tool contributes indispensably to making the product, ensuring consistency and quality throughout the preparation process.

Recipe Formulation Process

The process of developing the Classic Heirloom Rice-Veggie Chips was divided into structured phases, ensuring a systematic approach to formulation, testing, and refinement. *Phase 1* involved planning, initial tryouts, and revisions, where the research team, composed of student and faculty researchers from Ifugao State University, worked on identifying the most suitable recipe formulation. The preparation and production stages required careful selection of ingredients, precise measurements, and adherence to standardized cooking procedures. During the experimental and developmental stages, multiple formulations were tested, varying the proportions of Tinawon heirloom rice, Moringa (Malunggay) leaves, and Bitter Gourd (Ampalaya) leaves to determine the optimal combination for taste, texture, and nutritional value. Each batch underwent iterative adjustments, where factors such as crispiness, flavor balance, and structural integrity of the chips were carefully analyzed—feedback from initial sensory trials guided modifications, allowing the team to refine the formulation progressively.

Phase 2 focused on producing the final product for comprehensive evaluation and consumer testing. Standardized recipes, expressed in grams for accuracy, ensured consistency across batches. Survey questionnaires were administered to participants who evaluated the product based on appearance, taste, smell, texture, and overall acceptability. The collected data provided valuable insights, leading to further fine-tuning of the formulation to achieve the perfect balance of flavor, crispness, and aroma. The researchers meticulously adjusted ingredient ratios and cooking times based on participant feedback to enhance the product's sensory qualities while maintaining its nutritional integrity and market potential.

Through this structured approach, the study successfully developed a nutrient-rich, culturally significant, and highly acceptable snack that meets both consumer preferences and nutritional standards. The final formulation represents an optimal blend of heirloom rice and vegetables, offering a healthy, sustainable, and commercially viable alternative to conventional snack foods.

Sensory Evaluation

The 6-point hedonic scale was used to analyze the overall acceptability of Classic Heirloom Rice-Veggie Chips. The study utilized a questionnaire score sheet and presented coded samples for the 315 participants to evaluate the sensory test of appearance, smell, taste, and texture, including its general acceptability. Three replications were provided to respondents to ensure consistency of results.

Marketability Testing

The descriptive research design was used to determine the marketability of the Classic Heirloom Rice-Veggie Chips. Data was collected among randomly selected respondents in Lagawe, Ifugao, Philippines, using a patterned instrument subjected to validation and reliability tests. A total of 315 consumers participated in the study. The data were treated and analyzed using mean scores. The product, price, and packaging were assessed from the perspective of marketability.

Results and Discussions

Development of Classic Heirloom Rice-Veggie Chips

Prepare the raw materials (Tinawon rice, Malunggay leaves, Ampalaya leaves, flour, black pepper, egg, and salt). Then, set aside the dry mixtures (Ground Tinawon rice, flour, black pepper, and salt). Clean and wash the vegetables, then blanch them. After blanching, grind it using the food processor. Pour the ground leaves into the dry mixtures, including the eggs. Mix thoroughly to make a dough. Knead the dough several times until the level of thickness is achieved. Cut the kneaded dough into a triangular shape, then set aside for 10 minutes to air dry to avoid sticking together. After 10 minutes, deep fry. If cooked, rest it in the kitchen tissue for oil extraction to prevent greasiness. Leave it for 5 hours. Pack the chips, then seal them for safety. Figure 1 shows the finished product – Classic Heirloom Rice- Veggie Chips.

Sensory Evaluation of Classic Heirloom Rice-Veggie Chips

Participants provided their assessments across various attributes, including appearance, smell, taste, texture, and general acceptability for classic heirloom rice veggie chips. Figure 1 presents the spider plots of sensory evaluation of Classic Heirloom Rice Veggie Chips representing mean scores.

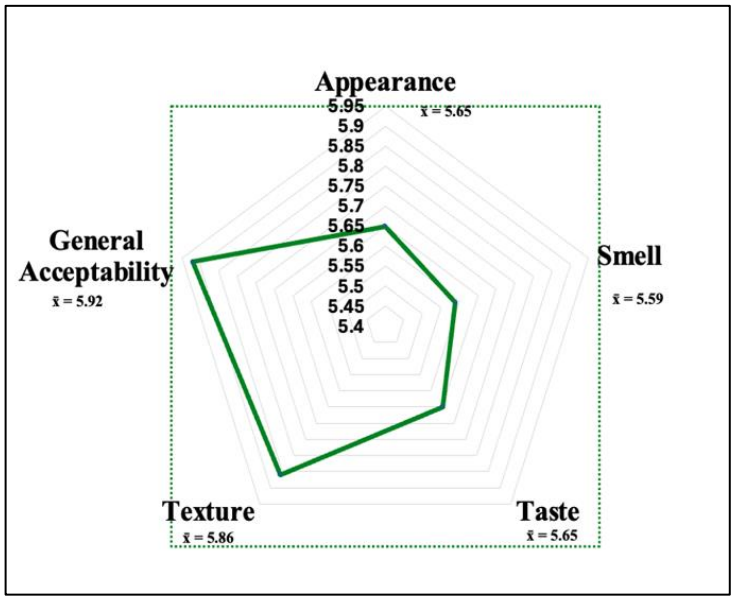

Figure 1. Spider plots of sensory evaluation of Heirloom Rice-Veggie Chips, representing means for n = 315, where score 1 refers to dislike extremely and 6 to like extremely in the six-point hedonic scale

The mean scores for each attribute were calculated on a scale ranging from 1 to 6, with higher scores indicating greater acceptability. The overall appearance scored 5.65, while smell received a mean score of 5.59, suggesting that it was perceived as very acceptable. Similarly, taste garnered a mean score of 5.65, indicating a high level of acceptability. The texture, with a mean score of 5.86, was also deemed very acceptable by the evaluators. The overall general acceptability of the product, reflected in a mean score of 5.92, indicated that participants found it to be highly likable. These findings suggest that the sensory qualities of the food product were well-received by the respondents, demonstrating a high level of acceptability across all assessed attributes. Sensory attributes, such as appearance, taste, smell, and texture, are vital in shaping consumer choices. These findings align with the attributes evaluated in this study, demonstrating the importance of considering these factors when developing and marketing new food products. Furthermore, the success stories of novel snack alternatives, such as vegetable-based chips, as highlighted in RRS, provide evidence of the market potential and consumer acceptance of innovative products like rice-veggie chips. Healthy snack options have gained traction in the market, creating opportunities for similar ventures to succeed.

Marketability Aspect of Classic Heirloom Rice-Veggie Chips

Figure 2 presents the spider plots of the marketability aspect of Classic Heirloom Rice Veggie Chips representing mean scores. The evaluation of the Classic treatment indicated high marketability across various dimensions, encompassing Likeness to Purchase, Likeness to Recommend, Product Recognition, Packaging, and Price at different weight categories.

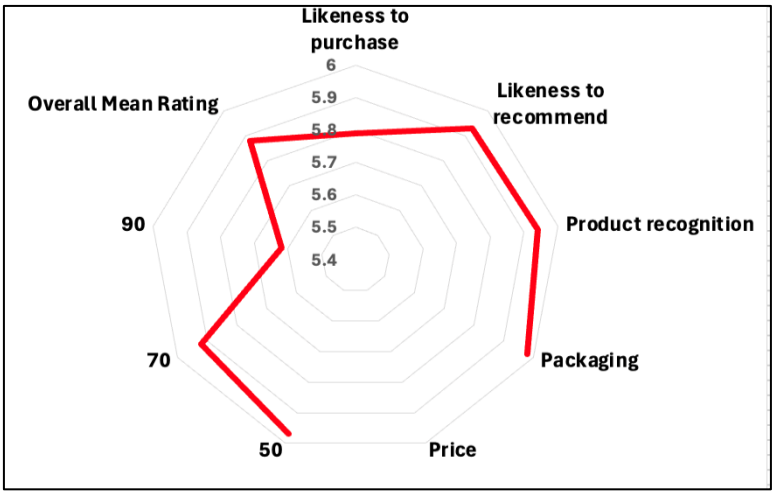

Figure 2. Spider plots of the marketability aspect of Heirloom Rice-Veggie Chips, representing means for n = 315, where score 1 refers to most unlikely and 6 to most likely in the six-point Likert scale

Likeness to Purchase received a commendable mean score of 5.79, categorizing the Classic product as highly marketable. Similarly, Likeness to Recommend achieved an even higher mean score of 5.93, reinforcing its strong market appeal. The high recommendation score indicates that consumers perceive the product as a desirable and shareable snack, further contributing to its potential commercial success.

On the other hand, Product Recognition obtained the highest mean score of 5.94, highlighting widespread acknowledgment and desirability in the market. This suggests that consumers find the product familiar and appealing, which is crucial for repeat purchases and brand loyalty. Additionally, Packaging received a high mean score of 5.98, indicating that the product's visual appeal, labeling, and branding effectively attract consumer interest.

The study found that the Classic product maintained high marketability across different price points, but consumer willingness to purchase varied slightly based on cost. The 50.00 PHP price point (60 grams) received a high mean score of 5.97, suggesting that consumers strongly preferred this option as an affordable and reasonable choice for casual snacking. The 70.00 PHP price point (100 grams) scored 5.92, reflecting continued strong appeal for consumers willing to pay a slightly higher price for more quantity. However, at the 90.00 PHP price point (150 grams), the score dropped slightly to 5.62, indicating a potential price sensitivity threshold where consumers may begin to reconsider their purchase decision. This decline suggests that while consumers perceive the product as valuable, pricing beyond a certain range may impact demand.

The slight decline in consumer preference at the highest price point suggests that while Classic Heirloom Rice-Veggie Chips are highly marketable, pricing strategies should be carefully considered to optimize consumer demand. Price sensitivity analysis indicates that consumers respond favorably to moderate price points but may hesitate at higher costs, potentially due to budget constraints or comparison with competing snack products. To maximize sales potential, manufacturers should consider promotions, bundle pricing, or introductory discounts to encourage trial and repeat purchases at higher price points.

Conclusions and Recommendations

The development, acceptability, and marketability assessment of the three replication treatments of Classic heirloom rice-veggie chips yielded highly positive outcomes across all the sensory attributes. This result can be attributed to its familiar and traditional taste, likely appealing to the range of consumers and participants. Additionally, combining heirloom rice and multi-benefit vegetables such as Malunggay and Ampalaya contributed to its appeal as a healthy snack option. With affirmative evaluations across various sensory attributes, they have the potential to be well-accepted by consumers and could be successful in the market.

The marketability assessment supported the products' acceptability evaluation and revealed highly positive outcomes across the dimensions of likeness to purchase, likeness to recommend, product recognition, packaging, and price. The likeness to purchase showed that the product is highly marketable, as evident in other aspects like product recognition, packaging, and pricing. Thus, the developed product has the potential to be recommended to different consumers. Thus, Classic heirloom-rice veggie chips have the potential to grow and thrive in the market. These findings suggest that food entrepreneurs and local farmers can commercialize heirloom rice-based snacks by leveraging their high marketability.

Future researchers may develop more heirloom rice—and vegetable-based alternative snacks. They may use this study as the basis for future research on rice and vegetable chips to diversify heirloom rice —and vegetable-based products, including various flavors and formulations. Such innovation in product offerings can cater to different consumers' tastes and preferences. In addition, a comprehensive market study or feasibility study may be developed for possible external funding. A physiochemical property analysis may be the follow-up study. Furthermore, researchers may broaden the scope of the study.

Additionally, sharing information about the nutritional benefits and sustainable aspects of Tinawon heirloom rice-veggie chips through organizing programs is also suggested. This can help create demand for this product in the market. Lastly, this output may be extended to partner communities/organizations as another source of income.

To maximize the potential economic and social impact of Classic Heirloom Rice-Veggie Chips, policymakers and stakeholders in agriculture, food processing, and public health should implement targeted actions. Also, government agencies such as the Department of Trade and Industry (DTI) and the Department of Agriculture (DA) can provide funding, training, and business incubation programs to support small-scale entrepreneurs engaged in heirloom rice-based product development. Additionally, policymakers can introduce tax incentives or subsidies for companies investing

in health-focused, organic, and locally sourced food innovations. Providing food innovation grants will encourage further research on heirloom rice-based processed foods, ensuring continuous product improvement and diversity in offerings. Lastly, Policymakers should consider supporting initiatives that promote heirloom rice production and processing through subsidies or local trade programs.

References

Arora, N. K., & Mishra, I. (2023). Responsible consumption and production: A roadmap to sustainable development. *Environmental Sustainability, 6*:1), 1–6. https://doi.org/10.1007/s42398-023-00266-9

Herrero, M., Thornton, P., Mason-D'Croz, D., Palmer, J., Bodirsky, B., Pradhan, P., Barrett, C., Benton, T., Hall, A., Pikaar, I., Bogard, J., Bonnett, G., Bryan, B., Campbell, B., Christensen, S., Clark, M., Fanzo, J., Godde, C., Jarvis, A., Loboguerrero, A., Mathys, A., McIntyre, R., Naylor, R., Nelson, M., Obersteiner, A., Parodi, A., Popp, K., Ricketts, P., Smith, H., Valin, S., Vermeulen, J., Vervoort, M., Wijk, H., Zanten, P., West, S., Wood, J., & Rockström, J. (2021). Articulating the effect of food systems innovation on the Sustainable Development Goals. *The Lancet Planetary Health, 5*(1), 50–62. https://doi.org/10.1016/S2542-5196(20)30277-1

Mensi, & Udenigwe, C. C. (2021). Emerging and practical food innovations for achieving the Sustainable Development Goals (SDG) target 2.2. *Trends in Food Science and Technology, 111*, 783–789. https://doi.org/10.1016/j.tifs.2021.01.079

Malinao, C. W. (2022). Evaluation of the impact of some factors on coffee producers towards sustainable rural development in Lagawe, Ifugao, Philippines. *Universal Journal of Agricultural Research, 10*(6), 595–609. https://doi.org/10.13189/ujar.2022.100601

National Economic and Development Authority. (2024, May 13). *Philippine Development Plan 2023–2028.*https://pdp.neda.gov.ph/philippine-development-plan-2023-2028/

Patacsil, F., Parrone, J., Brosas, M., & Roaring, B. (2023). Analysis of concerns of the agricultural sector in the Philippines using associative rule. *International Journal of Membrane Science and Technology, 10*(3), 3316–3324. https://doi.org/10.15379/ijmst.v10i3.3293

Mohidem, N. A., Hashim, N., Shamsudin, R., & Che Man, H. (2022). Rice for Food Security: Revisiting Its Production, Diversity, Rice Milling Process and Nutrient Content. *Agriculture*, *12*(6), 741. https://doi.org/10.3390/agriculture12060741

Kari, Z., Sukri, S., Rusli, N., Mat, K., Mahmud, M., Zakaria, N., Wee, W., Hamid, N., Kabir, M., Ariff, N., Abidin, S., Zakaria, M., Goh, K., Khoo, M., Doan, H., Tahiluddin, A., & Wei, L. (2023). Recent advances, challenges, opportunities, product development, and sustainability of main agricultural wastes for the aquaculture feed industry: A review. *Annals of Animal Science, 23*(1), 25–38. https://doi.org/10.2478/aoas-2022-0082

Sekine, K. (2021). The potential and contradictions of geographical indication and patrimonization for the sustainability of indigenous communities: A case of Cordillera heirloom rice in the Philippines. *Sustainability, 13*(1), 4366. https://doi.org/10.3390/su13084366

Sajise, E., Borromeo, T., Altoveros, N., & Bon, S. (2012). Traditional rice in Central Cordillera, Philippines: Dynamics of on-farm varietal diversity management. *Journal of Developments in Sustainable Agriculture, 7*(1), 75–88.

Glover, D., & Stone, G. D. (2018). Heirloom rice in Ifugao: an 'anti-commodity'in the process of commodification. *The Journal of Peasant Studies*, *45*(4), 776-804. https://doi.org/10.1080/03066150.2017.1284062

Bairagi, S., Custodio, M.C., Durand-Morat, A. *et al.* Preserving cultural heritage through the valorization of Cordillera heirloom

rice in the Philippines. *Agric Hum Values* **38**, 257–270 (2021). https://doi.org/10.1007/s10460-020-10159-w

Food and Agriculture Organization. (2024). *Rice.* Food and Agriculture Organization of the United Nations. http://www.fao.org/rice/en/

Cachero-Martínez, S. (2020). Consumer behaviour towards organic products: The moderating role of environmental concern. *Journal of Risk and Financial Management, 13*(12), 1–13. https://doi.org/10.3390/jrfm13120330

Acuin, C., Cope, A., Demont, M., Wanawan, M., & Tapat, V. (2020). *Expanded value chain analysis for heirloom rice in the Cordillera Administrative Region (CAR).* International Rice Research Institute. http://books.irri.org/HRP-Phase-II-VCA-Report-2020.pdf