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Perceptions and Challenges in Commercialising Underutilised Crop Derived Products among B40 Women Entrepreneurs in Malaysian Urban Food Enterprises

Advina Julkifle[1], Hilda Hussin[2], Susan Azam-Ali[3], *Ong Sze Pheng[4], Cheng Shi Hui[5], Nurul'Ain Azizan[6], Anita Chakrabarty[7], Lim Yin Sze[8]

[1]School of Biological and Environmental Sciences, Faculty of Science and Engineering, University of Nottingham Malaysia, 43500, Semenyih, Selangor, Malaysia; advina.j@gmail.com;
[2]School of Biological and Environmental Sciences, Faculty of Science and Engineering, University of Nottingham Malaysia, 43500, Semenyih, Selangor, Malaysia; hbxhh1@nottingham.edu.my;
[3]School of Biosciences, University of Nottingham, Sutton Bonington Campus, Nr Loughborough, LE12 5RD, UK; Susan.Azamali@nottingham.edu.my
[4]Department of Chemical and Environmental Engineering, Faculty of Science and Engineering, University of Nottingham Malaysia, 43500, Semenyih, Selangor, Malaysia; Sze-Pheng.Ong@nottingham.edu.my
[5]School of Biological and Environmental Sciences, Faculty of Science and Engineering, University of Nottingham Malaysia, 43500, Semenyih, Selangor, Malaysia; ShiHui.Cheng@nottingham.edu.my;
[6]School of Biological and Environmental Sciences, Faculty of Science and Engineering, University of Nottingham Malaysia, 43500, Semenyih, Selangor, Malaysia; Ain.Azizan@nottingham.edu.my;
[7]Nottingham University Business School, Faculty of Social Sciences, University of Nottingham Malaysia, 43500, Semenyih, Selangor, Malaysia; Anita.Chakrabarty@nottingham.edu.my
[8]School of Biological and Environmental Sciences, Faculty of Science and Engineering, University of Nottingham Malaysia, 43500, Semenyih, Selangor, Malaysia; YinSze.Lim@nottingham.edu.my

*Corresponding Author

Abstract:

Malaysia's food system is increasingly reliant on imported food and a narrow range of staple crops, making it vulnerable to climate change, global supply disruptions, and economic volatility. While underutilised local crops, valued for their nutrient density and climate resilience, offer a promising pathway toward more sustainable food systems, their adoption remains limited due to low consumer awareness and market barriers. Small-scale food entrepreneurs may help promote these crops within local markets, yet their perspectives remain underexplored, particularly among women from low-income urban households. This study examines the potential role of women entrepreneurs from low-income (Bottom 40, B40) urban households in Malaysia in the commercialisation of underutilised crop-derived products by analysing their perceptions, market-related product attributes and challenges in business integration. A mixed-method approach was employed combining qualitative and quantitative data collected through semi-structured interviews and surveys from 25 participants in a community-based intervention programme. The analysis of perspectives on underutilised crops indicates that participants reported general awareness of the crops, knowledge of their roles and benefits, and critically, their appreciation for the crops' commercial potential. Participants valued these crops for their perceived health, medicinal, functional, and practical benefits, a perception reinforced by 75% who believed the incorporation of underutilised crops could enhance their household nutritional status, showing a viable market opportunity for health-focused consumers. In terms of product attributes, participants associated the marketability of underutilised crops-based products with sustainable packaging and high-quality ingredients (mean=4.65), reflecting emerging consumer preferences for environmentally responsible and premium products. Additionally, taste, perceived health benefits, and affordability (mean=4.5) were identified as key drivers of consumer expectations. However, several challenges hinder the integration of underutilised crops into business ventures. These include consumer scepticism (40%), low market familiarity (30%), and operational constraints such as supply limitations and processing difficulties (30%). The findings highlight the role of women entrepreneurs in linking underutilised crops with modern food markets, emphasising the need for

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entrepreneurship training, consumer awareness, and supply chain support to commercialise underutilised crops in urban food enterprises.

Keywords: Women Entrepreneurs; B40; Underutilised Crops; Diet Diversification

INTRODUCTION

Malaysia faces significant challenges in ensuring sustainable nutrition for its population, with an estimated 5.4 to 5.7 million people still experiencing food insecurity (FAO, 2025). This situation is compounded by a food system that is increasingly dependent on imported food and a local dietary pattern that is shifting towards a limited range of staple crops (Goh et al., 2020). Such reliance makes the system vulnerable to climate change, disruptions to global supply, and other shocks, exacerbating malnutrition risks while accelerating biodiversity loss and food system fragility (FAO, 2019; IPES-Food, 2016). Addressing these structural vulnerabilities is essential to ensure both nutritional adequacy and long-term resilience.

Underutilised traditional crops, which are rich in nutrients and resilient to regional climatic conditions, offer a promising solution to strengthen dietary diversity and food system sustainability (Gregory et al., 2019; X. Li et al., 2020; Massawe et al., 2015). Despite these advantages, their adoption remains limited due to several factors, including low consumer awareness and market access barriers (Aliah & Ikram, 2018; FAO, 2019). Since institutional interventions can be slow and resource-intensive, focusing on actors at the community level, such as small-scale food entrepreneurs, can provide valuable insights into locally feasible strategies for promoting these crops.

These entrepreneurs possess strong community ties, market adaptability, and innovative capacity that uniquely position them to bridge production-consumption gaps while promoting dietary diversity and cultural preservation (Michel-Villarreal et al., 2021; Nurseto et al., 2023; Ossowska et al., 2024). Studies from other regions have demonstrated that entrepreneurs have demonstrated success in revitalising neglected crops through value chain development (Ghione et al., 2025; Samarawickrama et al., 2023; Vernooy, 2022). However, their potential remains understudied in upper-middle-income countries such as Malaysia, where rich agro-biodiversity coexists with limited crop commercialisation (Aliah & Ikram, 2018).

Furthermore, the role of urban women entrepreneurs, particularly those from low-income households (Bottom 40, B40), in promoting and commercialising underutilised crops is frequently overlooked. Existing studies and initiatives have primarily focused on rural communities (Ahmad Ishak et al., 2015; Chew, 2023), creating a knowledge gap regarding the perceptions and challenges faced by urban B40 women entrepreneurs who are strategically located within communities vulnerable to food price fluctuation and food insecurity.

To address these gaps, this study examines the potential role of women entrepreneurs from low-income urban households in Malaysia, who operate small-scale food businesses, in the commercialisation of underutilised crop-derived products. Specifically, it investigates their perceptions of underutilised crops, product attributes associated with market readiness, and the challenges they face in incorporating these crops into their businesses. This study extends the findings of the ASSESSCROP Phase 2 project (Julkifle et al., 2024) by highlighting the views and barriers associated with urban B40 women entrepreneurs in relation to the commercialisation of underutilised crops. By exploring these perspectives, the study aims to provide insights into pathways for increasing awareness and utilisation of underutilised crops, thereby contributing to more diverse and resilient local food systems in Malaysia.

LITERATURE REVIEW

Malaysia Food System

Malaysia demonstrates strong overall food availability through local production and imports, with dietary energy supply exceeding basic requirements by 25% and an average protein intake of 92.2 grams per capita per day (FAO, 2025). Despite this, an estimated 5.4 to 5.7 million Malaysians, about one-sixth of the population, remain food insecure between 2020 and 2023 (FAO, 2025), highlighting persistent nutritional insecurity. High import dependence makes the country vulnerable to external shocks, exemplified by a drop in Malaysia's Global Food Security Index ranking from 28th to 43rd during the COVID-19 pandemic due to supply chain disruptions, despite having stable agricultural production (Economist Intelligence Unit Limited, 2021). Financial constraints further drive adults toward inadequate dietary patterns, including limited variety, low fruit and vegetable intake, meal skipping, and reduced portions, with female-headed and single-income households especially at risk (Institute for Public Health (IPH), 2014; UNICEF & UNFPA, 2020a, 2020b). This trend toward calorie-dense, uniform diets contributes to ongoing malnutrition and a rapid rise in non-communicable diseases (Goh et al., 2020).

Opportunities for Underutilised Crop-Derived Products

A promising approach to diversification involves integrating traditional, underutilised crops into modern agricultural systems (Ghosh et al., 2023; X. Li et al., 2020). These traditional local crops often exhibit climate-resilience and require low-input, which is essential in supporting food security, mitigating climate risks, and reducing dependence on a limited range of staple crops. At the consumer level, incorporating underutilised species could help mitigate malnutrition prevalence, enhance dietary diversity, and stimulate local economies and livelihoods (X. Li et al., 2020; Massawe et al., 2015; Sangpuii & Malhotra, 2016; Yukiootoyoda & Johnson, 2018). For example, nutrient-dense crops, such as moringa (*Moringa oleifera*), split gill mushroom (*Schizophyllum commune*), lablab bean (*Lablab purpureus*), and butterfly pea (*Clitoria ternatea*), show strong market potential in health, functional, and culinary products.

However, these crops remain underutilised due to several factors, including limited knowledge and awareness of their usage and benefits (Hunter et al., 2019; Ravindran et al., 2024). For example, split gill mushrooms, rich in beta-glucan and with an umami flavour, can serve as healthier seasonings and meat substitutes in plant-based foods and functional beverages (Hiranpradith et al., 2023; Kumar et al., 2022; Thumrongchote & Mongkontanawat, 2022), but many people are still not aware of this. From producers' and entrepreneurs' perspectives, the ability to capitalise on these crops is further hindered by a lack of expertise to process these crops into value-added products and concerns about market demand (Baldermann et al., 2016; Samarawickrama et al., 2023). These concern is justified, as some crops, such as mature lablab bean, may contain toxic compounds which require proper treatment before consumption (Chetia et al., 2025), whereas others, such as moringa, may look or taste unacceptable (Teke et al., 2023; Yadav & Yadav, 2024). In addition, the cost of processing and value addition can be high, presenting an additional challenge to entrepreneurs with limited capital, as it increases operational expenses (Samarawickrama et al., 2023). In Sri Lanka, moringa processing is costly and contributes to higher final prices, which affect market competitiveness and acceptance by low-income communities (Samarawickrama et al., 2023).

Role of Women Entrepreneurs from Low-Income (B40) Urban Households

Women entrepreneurs from low-income B40 urban communities have significant potential to promote dietary diversity and the use of local underutilised crops, leveraging their proximity to local markets,

knowledge of community food preferences, and adaptability to emerging food trends (Kapelari et al., 2020; Michel-Villarreal et al., 2021; Nurseto et al., 2023; Ossowska et al., 2024). Small-scale food entrepreneurs have a crucial impact on the community, as they culturally and nutritionally tailor food products in low-income urban areas (Murdad et al., 2022; Vilar-Compte et al., 2021). Despite challenges such as limited resources, funding, training, and access to technology (Dumlao et al., 2020; Wahid et al., 2021), women entrepreneurs from low-income B40 urban communities are central to food systems as producers, processors, and caregivers, particularly in informal or community-based settings (Fanzo et al., 2020). While previous initiatives in Malaysia, such as the Syntropic Farming project with the Jakun community and sago-based products by Melanau women, highlight the potential of indigenous crops (Ahmad Ishak et al., 2015; Chew, 2023), there is a gap in research and practice targeting urban women entrepreneurs, who often have limited prior exposure to these crops.

METHODOLOGY

Study Design and Participant Selection

This study employed a mixed-methods approach, combining qualitative and quantitative and qualitative methods through data from semi-structured interviews and surveys to assess awareness, perceptions, and challenges related to the use of underutilised crops among low-income (B40) urban women entrepreneurs in the small-scale food business.

A total of 25 participants were enrolled for 6 months in a community-based intervention programme designed to raise awareness of underutilised crops and enhance entrepreneurial and technical skills through workshops, training, sports groups and learning materials. Participants also received capital loans and raw materials, including moringa leaf powder, dried split gill mushroom, and dried butterfly flower, to address resource gaps. The programme framework is detailed in Julkifle et al., (2024). All participants enrolled in the programme were included in this study, and without a non-intervention comparison group, as it was designed as a single-group programme.

Participants were selected based on predefined inclusion criteria. Eligible participants were women entrepreneurs residing in low-cost flats in Taman Medan Cahaya, Petaling Jaya, Malaysia, with household incomes below RM 4,850 (equivalent to USD 1,164 in 2021) and operating small-scale food and beverage businesses. Participation was voluntary, and informed consent was obtained in accordance with ethical guidelines.

In addition, ethical approval involving human subjects was obtained from the Science and Engineering Research Ethics Committee of Nottingham University Malaysia, SEREC reference AJ130323 and HH300623.

Data Collection Instruments

Interview

The semi-structured interviews employed open-ended questions to explore multiple aspects of participants' experiences, including (i) knowledge of underutilised crops and (ii) perceptions of the market value of products derived from these crops. Each question included three to four probing questions to elicit detailed responses. Interviews were conducted face-to-face in Malay, audio-recorded, transcribed, and analysed in the same language, then translated into English for reporting.

Each interview lasted approximately 50–60 minutes. Data collection took place for one week in October 2023 at Taman Medan Cahaya, Petaling Jaya, Malaysia.

Surveys

Participants completed surveys assessing three key aspects: (1) the nutritional benefits of underutilised crops, (2) product attributes, and (3) challenges in integrating these crops into business ventures. The survey included an open-ended question on nutritional value, a multiple-choice question on beliefs about family nutrition, and a "select all that apply" question on implementation challenges (Shah et al., 2023). Participants who had developed products using underutilised crops also evaluated specific product attributes using a Likert scale.

Data Analysis

Qualitative data were analysed through thematic analysis, utilising NVivo software and Excel to identify key themes and insights.

Quantitative data were analysed using descriptive statistics and frequency analysis using SPSS version 29. Means ranking analysis was used to assess the relative importance of various items based on participants' responses. Each item was rated using a Likert scale, and the mean score for each item was calculated by summing all responses and dividing them by the number of respondents. The items were then ranked in descending order of their mean scores. This process allowed for a clear comparison of participant preferences and highlighted which items were perceived as most important.

All qualitative and quantitative data were analysed separately, and the findings were integrated during interpretation through triangulation.

RESULTS AND DISCUSSION

Participants shared similar demographic characteristics with our earlier cohort (see Julkifle et al., 2024), comprising of middle-aged women (45.8% aged 30-39; 33.3% aged 40-49) with secondary education (75.0%), typically supporting large households (62.5% with 5-7 members). Most participants (79.2%) served as primary home food preparers while simultaneously managing their businesses, which primarily involved selling baked goods, desserts or local snacks (50.0%).

Overall perspectives of underutilised crops

The results presented in Figure 1 highlight a positive shift in participants' perspectives of underutilised crops. The findings are categorised into three key themes: (1) Benefits and Roles of Underutilised Crops, (2) Knowledge and Awareness About Underutilised Crops, and (3) Challenges and Potential of Underutilised Crops. Participants demonstrated the ability to describe underutilised crops from a broader perspective and more distinctive opinions. This indicates that the programme effectively influenced and expanded participants' awareness and insights into the value and potential of underutilised crops.

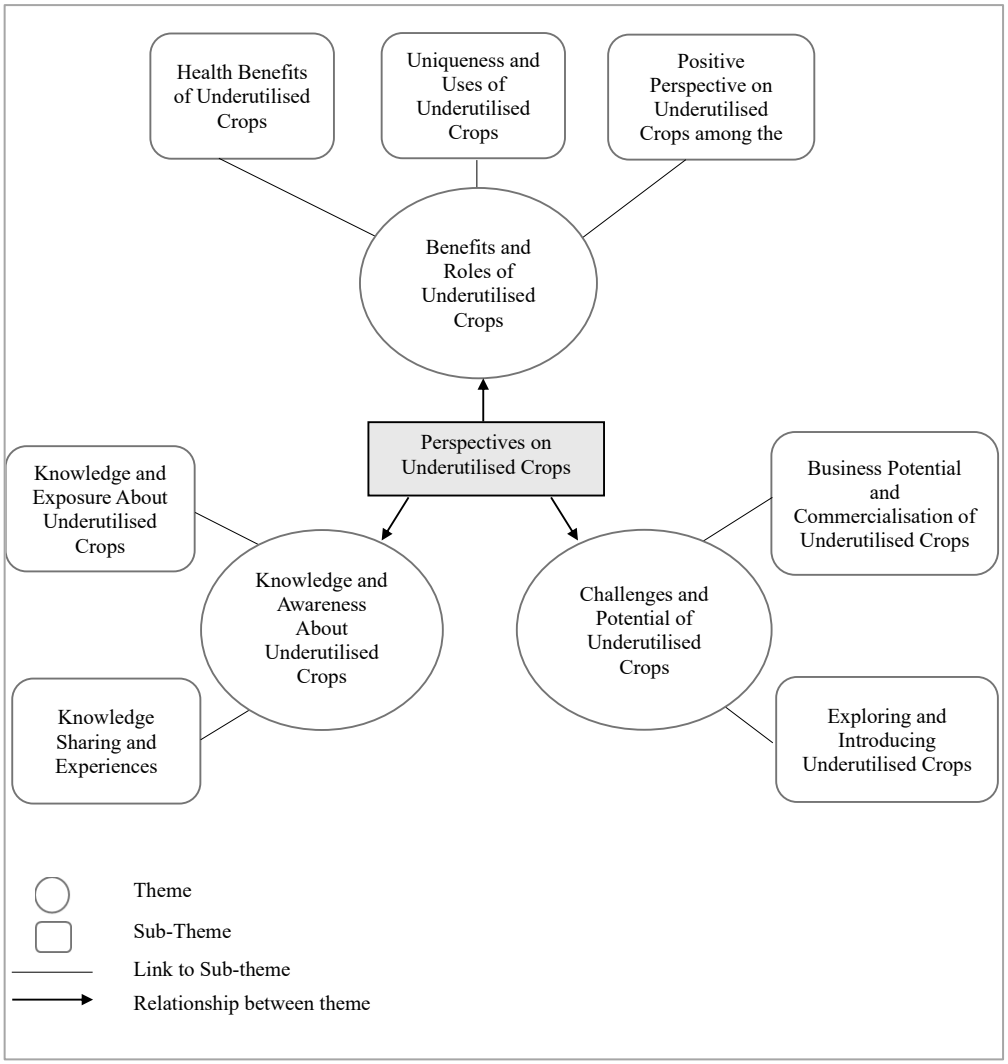

Figure 1: Participants' perspectives on underutilised crops (n=24)

Theme 1: Benefits and Roles of Underutilised Crops

Three sub-themes were identified under this core theme: (1a) Health Benefits of Underutilised Crops, (1b) Uniqueness and Uses of Underutilised Crops, and (1c) Positive Perspectives on Underutilised Crops Among the Community. These sub-themes highlight the multi-dimensional value of underutilised crops. Participants recognised their health advantages, noting their potential to contribute to healthier diets. Additionally, the crops' uniqueness and versatility were emphasised, as they can be used to create innovative dishes that attract interest. Furthermore, participants observed that underutilised crops have a positive appeal when people taste them, suggesting their latent popularity could be unlocked with appropriate exposure and promotion. Examples of statements provided by the participants are presented in Table 1.

Table 1: Sample statements provided by the participants for theme 1

Sub-theme	Participant No.	Statement
1a	17	"Underutilised crops have many benefits, such as helping to relieve bloating and improving digestion."
1b	8	"Underutilised crops are extremely beneficial. Previously, we might not have known, but it turns out that many unique dishes can be made from these plants."
1c	12	"People are actually attracted to and like underutilised crops. Many do not actively seek them out or explore them, but when given the chance to taste them, they really enjoy them."

Theme 2: Knowledge and Awareness About Underutilised Crops

The programme significantly enhanced participants' knowledge and awareness of underutilised crops. Participants showed an understanding of underutilised crops. This was indicated by two sub-themes identified in this study: (2a) Knowledge and Exposure about Underutilised Crops; (2b) Knowledge Sharing and Experiences. The participants were able to explain different types of underutilised crops and their potential uses. Additionally, the participants highlighted that the knowledge they gained is not only useful but also valuable for future experimentation and growth, particularly in the context of underutilised crops. Examples of statements provided by the participants are presented in Table 2.

Table 2: Sample statements provided by the participants for theme 2

Sub-theme	Participant No.	Statement
2a	3	"Through this programme, our knowledge about underutilised crops has greatly expanded. The more we learn, the more we understand the different types of underutilised crops and their uses."
2b	13	"The knowledge we've gained is really useful for us to try out and further develop. This is new knowledge, especially for me, about underutilised crops"

Theme 3: Challenges and Potential of Underutilised Crops

There are two sub-themes in this main theme as follows: (3a) Exploring and Introducing Underutilised Crops; (3b) Business Potential and Commercialisation of Underutilised Crops. Although the participants acknowledged the challenges in sourcing underutilised crops, such as limited market access and small-scale availability, they also recognised their potential for economic growth. They highlighted the opportunity to commercialise these crops for the food business, finding potential avenues for business development and additional sources of income. Examples of statements provided by the participants are presented in Table 3.

Table 3: Sample statements provided by the participants for theme 3

Sub-theme	Participant No.	Statement

3a	2	"Underutilised crops are indeed hard to find, and people don't often commercialise their sales. Sometimes, we don't even realise that a certain plant is actually an underutilised crops"
3b	17	"Underutilised crops can be transformed into various products for sale, such as traditional cakes and dishes. This shows that rare plants have great potential to be turned into a business."

Nutritional perspectives of underutilised crops

The analysis of perceived nutritional benefits of underutilised crops revealed three themes (Figure 2).

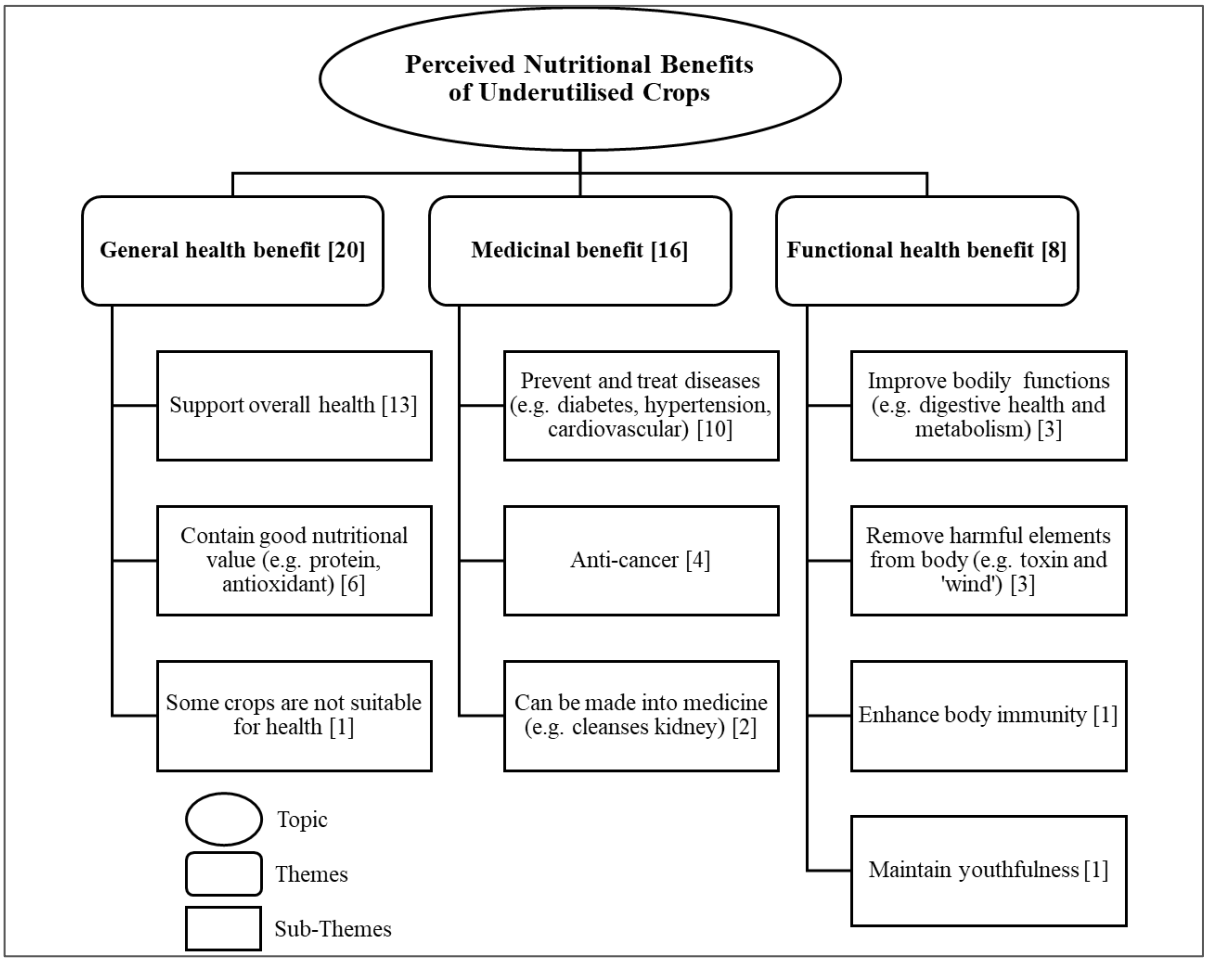

Figure 2: Perceived nutritional benefits of underutilised crops. [ ] = frequency cited by participants (n = 20)

Theme 1: General Health Benefit

Participants commonly perceived underutilised crops as beneficial to general health, with 20 individuals expressing this view. A substantial proportion (13/20 participants) specifically noted that these crops contribute to overall bodily wellness. Additionally, six participants highlighted the nutritional quality of underutilised crops, particularly their high protein content and antioxidant properties. These findings are consistent with evidence in the literature demonstrating the nutritional richness of these crops that can contribute to general well-being (Hussin et al., 2020; Ibrahim et al., 2022; Koubala et al., 2018; Sethuraman, Mohd Nizar, et al., 2020). Despite the generally positive health-related perceptions, one participant expressed caution, noting that not all underutilised crops

may be inherently beneficial. Like many known crops, some underutilised crops may contain toxic compounds that require careful preparation before consumption to prevent toxicological effects (Anju et al., 2022; Tharmabalan, 2023). This indicates that participant's perceptions are shaped by both the nutritional-associated health benefits and potential safety risks of the underutilised crops. Examples of statements provided by the participants are presented in Table 4.

Table 4: Sample statements provided by the participants for theme 1

Sub-theme	Participant No.	Statement
1a	20	"Good for health."
1b	21	"High in protein."
1c	22	"The benefits of underutilised crops, some are good for health, and some are not suitable for health."

Theme 2: Medicinal Benefit

Most participants (16) attributed medicinal properties to underutilised crops, citing their role in disease prevention and traditional medicine. Specifically, 10 participants referred to their use in preventing and treating chronic conditions such as diabetes, hypertension, and cardiovascular diseases. Several participants (4) believed the crops have anti-cancer benefits. Two participants believed that these crops can be made into medicine, such as for kidney detoxification and cleansing. This perception reinforced the participants' belief in the health benefit of underutilised crops, consistent with studies reporting the wide use of underutilised crops in managing various health conditions by different communities worldwide (Anju et al., 2022; Gohain et al., 2022; Pieroni et al., 2007; Tharmabalan, 2023). Examples of statements provided by the participants are presented in Table 5.

Table 5: Sample statements provided by the participants for theme 2

Sub-theme	Participant No.	Statement
2a	7	"Prevents the triad of diseases [diabetes, hypertension and heart disease] (Garlic tree fruit/Moringa)."
2b	5	"Can be anticancer, for diabetes, for high blood pressure."
2c	8	"Makes medicine (cleanses kidneys)."

Theme 3: Functional Benefit

Participants also associated underutilised crops with functional health benefits (8), highlighting the role of these crops in the maintenance of daily bodily regulations rather than solely medicinal use. This includes their reported ability to improve bodily functions (3 responses), particularly in enhancing digestive health, the immune system, and metabolic regulation. Three participants specifically mentioned detoxifying effects, such as the ability to expel bodily toxins or "gas" (commonly referred to as '*angin*' in local terms). One participant even believed in their anti-ageing benefits. Several studies have also documented the functional benefits of underutilised crops, including blood sugar regulation and skin-whitening properties (Ismail & Ridzuan, 2023; Yadav & Yadav, 2024). Examples of statements provided by the participants are presented in Table 6.

Table 6: Sample statements provided by the participants for theme 3

Sub-theme	Participant No.	Statement
3a, 3b, and 3c	3	"The consumption of underutilised crops has many benefits, such as facilitating bowel movement, removing toxins and 'angin', boosting metabolism, and strengthening immunity."
3b and 3d	18	"My view is that underutilised crops have benefits for body health, removing 'angin' in the body, preventing cancer, maintaining youthfulness..."

The qualitative finding is further supported by the survey, which shows that a majority of participants (75%) believe consuming underutilised crops could improve their households' nutritional status (Figure 3), thus reflecting a strong level of confidence in the nutritional benefits of these crops. Understanding entrepreneurs' perceptions is important, as their knowledge can influence how underutilised crops are incorporated into food products and promoted to consumers. Examining these perceptions also helps identify knowledge gaps, which can inform targeted training and effective information dissemination to strengthen their capacity to promote these crops and support a healthier, more diversified food system.

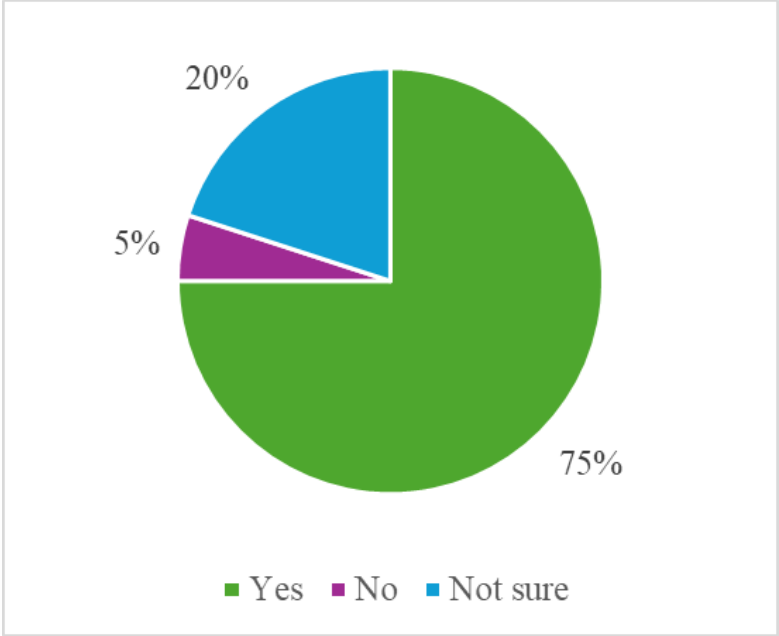

Figure 3: Perceived household nutritional improvement for consuming underutilised crops (*n = 20*)

Perceived Attributes of Underutilised Crop-Derived Food Products

Among the recruited participants, 14 had developed, produced, or sold food products made from underutilised crops during the programme intervention. Table 7 shows the participants' perceptions of the underutilised crop-derived food products they produce and sell. The mean scores for product attributes are presented as descriptive indicators due to the small number of respondents.

Table 7: Perceived attributes of food products containing underutilised crops (*n=14*)

No	Attributes	Percentage						
		1	2	3	4	5	Mean	Ranking
1	The food products (containing underutilised crops) I have produced have attractive packaging and are environmentally friendly.	0	0	0	35.7	64.3	4.6	1

2	The food products (containing underutilised crops) I have produced are made from high-quality ingredients.	0	0	0	35.7	64.3	4.6	1
3	The food products (containing underutilised crops) I have produced have tastes and aromas that many customers like.	0	0	0	42.9	57.1	4.5	3
4	The food products (containing underutilised crops) I have produced are nutritious and provide customers with health benefits.	0	0	7.1	28.6	64.3	4.5	3
5	The food products (containing underutilised crops) I have produced have a reasonable price.	0	0	7.1	28.6	64.3	4.5	3

Note. 1 - Strongly Disagree, 2 - Disagree, 3 - Neither Disagree nor Agree, 4 - Agree, 5 - Strongly Agree

All attributes received predominantly high agreement, with most participants responding either Agree (4) or Strongly Agree (5) for the statements. Both product attributes, "attractive packaging and environmentally friendly" and "made from high-quality ingredients", had the highest mean score (4.6) and were ranked as the top attributes. This suggests that participants perceive these as the most important qualities of their products. A study on Malaysian consumers found that green or sustainable packaging design is a significant factor influencing purchase intentions (Rajendran et al., 2019; Tahir, 2020; Wahab et al., 2021).

While food products made from high-quality ingredients, which are often perceived as sustainable, organic and locally grown, can be premium and boost the consumers' willingness to pay (Fan et al., 2019; S. Li & Kallas, 2021). These findings indicate that participants are aware of current consumer needs and demands and are making efforts to meet them through their product offerings.

Meanwhile, the other product attributes that are "tastes and aromas that many customers like; nutritious and provide health benefits; and reasonable price" tied at the third rank with a mean score of about 4.5. The participants perceived positive feedback from customers regarding the taste and aroma of their underutilised crop-derived food products as an indication of consumer acceptance, which aligns with studies on food sold at food outlets and restaurants showing that favourable taste and aroma experiences are key drivers of consumer satisfaction, repeat purchases, and product loyalty (Konuk, 2021; Zahri & Yıldırım, 2022).

The majority of respondents developed food products using moringa and asserted that their products are nutritious and offer various health benefits to consumers. This claim is supported by (Peñalver et al., 2022), which states that moringa leaves are a complete food source, containing proteins, essential amino acids, vitamins A, C, and K, as well as minerals and bioactive isothiocyanates known for their anticancer and antibiotic properties. A study by (Trigo et al., 2023) further demonstrates that the incorporation of various parts of the moringa plant (leaves, seeds, flowers, and pods) into bread, pastries, snacks, beverages, dairy, and meat products enhances the nutritional profile of these foods, as moringa is rich in proteins, essential amino acids, minerals, and dietary fibre. (Wojciech et al., 2023) highlighted that underutilised crops may entail a higher initial investment and are often positioned at a higher price point due to their novelty, sustainability attributes, and nutritional benefits, which contribute to better margins in premium markets. However, the participants emphasised that they have successfully developed underutilised crop-derived food products at reasonable prices, making them accessible and appealing to consumers across all age groups, particularly those who are budget-conscious.

Perceived Challenges in Incorporating Underutilised Crops into Business Ventures

The challenges associated with incorporating underutilised crops into business ventures are summarised in Table 8. These challenges were grouped into four main categories: knowledge and familiarity, practical and operational constraints, consumer perception, and resource limitations.

Table 8: Perceived challenges to incorporate underutilised crops into business ventures (*n=20*)

Category	Challenges	N	%
Knowledge and Familiarity	Lack of knowledge	6	30
	Lack of familiarity	6	30
Practical and Operational Constraints	Difficulty in preparation	6	30
	Time constraints- e.g. childcare and full-time work*	3	15
	Business discontinuation*	1	5
Consumer Perception	Negative consumer perception	8	40
	Unfavourable sensory attributes – e.g. bitterness	4	20
	Lack of consumer demand*	1	5
Resources Limitation	High costs of materials*	1	5
	Lack of equipment – e.g. refrigerator*	1	5
	Lack of marketing support*	1	5
	Difficulty sourcing materials*	1	5

Among the identified barriers, negative consumer perception emerged as the most prominent, reported by 40% of the participants. Unfavourable sensory-related concerns (20%), such as bitterness, were also identified as another barrier which may reduce consumer acceptance. These findings reflect persistent scepticism about the acceptability and appeal of underutilised crops, including doubts regarding taste, texture, and perceived cultural relevance. The observation aligns with previous studies that have identified consumer attitudes as a key bottleneck in the value chain of alternative or novel crops (Mabhaudhi et al., 2017). This perception contrasts with the earlier positive views on the health and commercial potential of underutilised crops presented in this study, indicating a gap between participant's optimism and consumer acceptance. Earlier findings also showed positive consumer reaction after tasting the products, suggesting that the reported negative consumer perception may stem from a lack of awareness and familiarity, which may reduce willingness to even try the products. However, sensory-related concerns might still influence negative consumer perception, highlighting the need for product improvement and innovation.

The second most frequently reported barrier was knowledge-related challenges (30%). These included a general lack of awareness and familiarity with underutilised crops, as well as difficulties in preparation and cooking techniques. These findings suggest that knowledge dissemination, particularly through training and demonstrations, needs to be further improved. Closely related to these issues is the difficulty in preparation (30%), which represents the main operational challenge for entrepreneurs attempting to incorporate underutilised crops into their product lines. In addition, time-related constraints (15%), especially concerning childcare responsibilities and existing work commitments, were also identified as notable barriers. While these were not quantified by a large percentage, qualitative responses indicated that such practical constraints significantly influenced decision-making

In contrast, resource-related limitations, such as access to facilities, were reported less frequently. Similarly, consumer demand, though conceptually linked to perception, was not independently identified as a major limitation by most participants. This may suggest that the market for underutilised crops remains largely untapped, and that demand could be cultivated with the right strategies. One participant reported the discontinuation of their business due to health-related issues, highlighting the vulnerability of small-scale ventures to personal and unforeseen circumstances.

Overall, these findings reveal that the adoption of underutilised crops in entrepreneurial ventures within the target participants is constrained more by capacity and perceptual barriers than by logistical or financial limitations. Similarly, consumer unfamiliarity and limited access to processing technologies are also persistent challenges for smallholder farmers in the adoption of underutilised crops (Mabhaudhi et al., 2017). Nevertheless, overcoming these hurdles will require integrated efforts that include public awareness campaigns, technical support, and targeted market development initiatives.

Limitations

The sample size (n = 25) was limited to the full cohort of programme participants, which restricts the generalisability of the findings beyond this context. Therefore, the results are intended to provide exploratory and context-specific insights rather than population-level inference. In addition, the study did not include a non-intervention comparison group, as it was designed as a single-group programme evaluation, limiting the ability to draw causal conclusions about programme effects. Finally, given that data were collected within a structured programme setting, there is a possibility of social desirability bias, whereby participants may have provided more favourable responses due to their involvement in the intervention. This may have influenced both qualitative responses and self-reported quantitative ratings, and should be considered when interpreting the findings.

CONCLUSIONS

This study demonstrates the potential role of women entrepreneurs from low-income (B40) urban households in supporting the commercialisation of underutilised crop-derived products. Participants demonstrated general awareness and knowledge of these crops, particularly their nutritional and functional benefits, positioning them as strategic agents for promoting traditional crops within their communities. They recognised the commercial potential of underutilised crop-derived products and emphasised key attributes, including attractive, environmentally friendly packaging, high-quality ingredients, favourable taste and aroma, and reasonable pricing, reflecting their understanding of evolving consumer preferences for sustainable, premium, and affordable products. By leveraging the perceived health and nutritional benefits of crops such as moringa, participants aligned their offerings with health-conscious consumer trends, while demonstrating entrepreneurial adaptability to meet both premium and budget-sensitive market demands. These findings suggest that women entrepreneurs from B40 urban households can create a viable niche for product differentiation in competitive urban food markets, bridging traditional underutilised crops with modern consumer expectations.

Several barriers continue to constrain the adoption of underutilised crops. Negative consumer perception, including scepticism regarding taste and texture, was the most prominent challenge, despite participants reporting generally positive consumer feedback. This indicates that the market remains underdeveloped rather than inherently unviable, highlighting the need for marketing strategies such as sampling and taste-testing to enhance consumer exposure and acceptance. Participants also reported the need to improve their knowledge, familiarity, and practical skills in preparing underutilised crops, suggesting a role for further training and recipe-sharing initiatives. Resource-related constraints, including access to facilities, were not significant, indicating that underutilised crop development can often be integrated using existing resources. Promoting the integration of underutilised crops into small-scale food businesses operated by urban B40 women entrepreneurs requires emphasis on market development and capacity building rather than infrastructure support. Coordinated efforts among multiple stakeholders, including government agencies, NGOs and the private sector, can play an important role by increasing the visibility and accessibility of underutilised crops product through promotional activities, community outreach programmes, product showcases (such as through corporate gifts), and partnerships with food entrepreneurs, to improve consumer familiarity and create market opportunities. These

stakeholders can also support capacity-building initiatives through collaboration with chefs, food innovators, researchers, and relevant industry partners, to address the entrepreneurs' knowledge and skills gaps and enhance the products appeal for market viability.

Overall, the findings suggest that women entrepreneurs from B40 urban households can serve as key agents in linking underutilised crops to local food markets. Targeted interventions, including capacity-building, consumer awareness campaigns, and market support, can enable these entrepreneurs to overcome perceptual and knowledge barriers, facilitating the commercialisation of underutilised crops and contributing to more diverse, resilient, and sustainable urban food systems in Malaysia.

SUGGESTIONS FOR FUTURE RESEARCH

Future studies could explore longitudinal impacts of women-led underutilised crop enterprises community nutrition and urban food security. Additionally, research could examine the effectiveness of specific marketing strategies, such as social media campaigns and tasting events, and training programs in improving consumer acceptance and entrepreneurial performance. Comparative studies across different urban regions or countries could also provide insights into context-specific challenges and best practices for scaling underutilised crop commercialisation.

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