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Research Article

POTENTIALITY OF NEGLECTED AND UNDERUTILIZED FRUITS AND VEGETABLES AT GOLAPGANJ UPAZILA IN SYLHET DISTRICT FOR NUTRITIONAL, FOOD AND INCOME SECURITY

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Abstract

Neglected and Underutilized Fruits and Vegetables (NUFV), as recognized by the UN Food and Agriculture Organization, play a significant role in addressing food security, biodiversity conservation, and climate change resilience. The study provides a situational analysis of NUFV use in four unions (Golapganj, Fulbari, Bhadeshwar and Lakshanaband) of Golapganj Upazila under Sylhet District. A survey using structured questionnaires was conducted with 200 respondents; the data were analyzed descriptively. Results indicated 25 NUFV species were identified, with the majority of producers (52.5%) producing these plants predominantly for home consumption, compared to 29% who produced these plants commercially. The most commonly cultivated species was bamboo Korol (14.9%) and the least was rattan/cane fruit (0.2%). The agricultural production activity was dominated by women as most of plant planting (60.5%) is done by them while men are mainly engaged on soil preparation (55.5%), mulching (56%) and marketing (77.5%). The Benefit-Cost Ratio (BCR) ranged between 6.1 and 26.1, with an average of 9.7 demonstrating high economic feasibility. Moreover, the cultivation of NUFV contributes significantly to six Sustainable Development Goals (SDGs) No Poverty (SDG 1), Zero Hunger (SDG 2), Good Health and Well-being (SDG 3), Gender Equality (SDG 5), Climate Action (SDG 13), Life on Land (SDG 15). The study draws to the conclusion that it is imperative that policy measures can sharpen up the sustainability and economic viability of NUFV in the region through focused policy actions, better market access as well as skill development programs for farmers.

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Introduction

A limited number of plant species are the backbone of global food security and economic growth (Kour et al., 2018). In many parts of the world diets have become more similar, centering more and more around some main staple food produced crops that heavily depend on wheat, rice, maize. Yet, supported by many local governments, this replacement has resulted in a lack of attention paid to other important staples such as sorghum, millets, rye, cassava, sweet potato and yams which are both nutritional and agriculturally valuable (Hunter et al., 2019). The Global Food Security Index shows that more than 42.2% of the world's population does not have access to healthy food, and in some regions (Central and East Africa, South Asia and the Caribbean) this figure is further confirmed the situation here is the worst (Syhyda & Bondarenko, 2021). Human beings face what might be considered the gravest dilemma of our times, excessive reliance

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on a handful number of crops. The estimated variety of plant species is about 25,000 to 30,000, while only a very small fraction (150–200) is consumed as edible plants (Joshi et al., 2019). The high dependence of the population on a handful of staple food crops is a serious threat to global food and nutrition security in a world where climate change challenges traditional agricultural systems. Normal agriculture, which is based on stable operating conditions with predictable patterns of temperature and rainfall, gets the full force of variations (Li & Siddique 2020). Nevertheless, some NUS have been shown to perform well under extreme environments which are the same conditions where several of our staple food crops do not fare so well (Dansil et al., 2012).

Incorporate NUS into food systems to improve nutritional quality and climate resilience. These crops are rich in nutrients, suited to local climates and provide great economic value while enduring harsh climate. Indigenous fruits and vegetable species themselves can greatly enhance diet diversity as well as promote the concept of sustainable agriculture. Indigenous and underutilized crops are typically plant species that originate from a specific geographical region, but have not been fully utilized in contemporary farming practices. These crops may have greater significance to food security, nutrition, and environmental sustainability (Akinola et al., 2011). al., 2020).

Indigenous spices, fruits, and vegetables that can be an indication of exotic species; since they are a whole different entity that have nothing to do with the usual crops. But it is crucial to note that indigenous peoples often depended on these species for their descendants, using them as part of traditional agri-food systems (Padulosi et al., 1999). They consist of both non-wood forest species and wild or semi-domesticated types that are well-suited to local environmental conditions (Padulosi et al., 2013). These low-input farming practices have enabled the greater resistance of these crops to diseases and environmental stresses than those encountered with other staple crops, especially in marginal and challenging environments where they have been genetically selected for over thousands of years (Conti et al., 2019).

Highlights Indigenous fruits and vegetables have a natural role in nutrition security, food sustainability, and income generation for rural communities. These underutilized crops have a practical means for addressing dietary diversity and economic resilience in Bangladesh where huge numbers are afflicted with micronutrient deficiencies and face food insecurity (BBS, 2021). Many indigenous fruits and vegetables have been growing traditionally in the local agricultural systems Golapganj upazila of Sylhet district, mainly due to their much valued nutrients, better adaptation capabilities and economic significance. However, these crops have not yet been fully utilized or exploited in commercial agriculture and remain neglected mainly because of limited market opportunity, a lack of awareness among consumers and close competitors with high-yielding hybrid varieties (Rahman & Karim, 2022). Indigenous fruits and vegetables supply vitamins, minerals, and antioxidants — which help fight malnutrition. Shatkora (*Citrus macroptera*) is very high in vitamin C, Amlaki (*Phyllanthus emblica*) provides many antioxidants (one of the highest concentrations), leafy green such as Pui Shak (*Basella alba*) and Helencha (*Enhydra fluctuans*) contains good quantities micronutrients including iron, beta-carotene reduction of iron-deficiency anaemia and vitamin A deficiency have been conclusively proven according to Zihad et al., 2019. Although these crops are often abundant and nutritious, their potential contribution to local diets is not being realized due to low consumer awareness of them as healthy foods and strong preferences for hybrid and exotic varieties (FAO, 2022).

Indigenous neglected and underutilized fruits and vegetables play a significant role in food security as well, beyond their nutritional value. They are usually drought resistant, pest tolerant and low input — not like commercial crops — making them suitable for sustainable agriculture in climate vulnerable areas. In Golapganj upazila the majority of indigenous vegetables are cultivated small by smallholder farmers for

home use or existence purpose but still have huge potential as commercial production (Department of Agricultural Extension, 2022). In addition, traditional crops provide avenues farmer diversification income. Farmers that are integrating indigenous vegetables into their cropping systems have been observed to enjoy increased profit because input costs are lower and consumers demand organic (Export Promotion Bureau, 2023). Despite all these benefits, numerous obstacles such as insufficient post-harvest management, underdeveloped market infrastructure and missing storage conditions hamper their commercialization and/or wider adoption (FAO, 2022).

Since indigenous fruits and vegetables are increasingly recognized for their food and nutritional security, rural livelihood, and economic potential [15], it is important to evaluate the role of indigenous fruits and vegetables in enhancing dietary diversity among the resource-poor sections of society, particularly at Golapganj upazila in sync with improving the livelihoods of smallholder farmers. This study attempts to evaluate the nutritional profile, agronomic aspects and economic & potential constraints faced these with the opportunities presented by indigenous crops in sustainable food systems. The findings of this research will help to fill these gaps and this study will lead to policy recommendations and practical solutions for the increase of cultivation, consumption and commercialization of indigenous fruits and vegetables in Bangladesh.

The objectives of this study are:

- i) To identify and prioritize the neglected and underutilized crop species that is grown in Golapganj upazila of Sylhet district have the potentiality as climate smart food,
- ii) To ascertain the use of the identified neglected and underutilized crop species which are used as human food,
- iii) To explore the extension policy to disseminate those identified neglected and underutilized crop species to the local farmers.

Materials and methods

Location of study area

The research was carried out in Golapganj upazila of the Sylhet district. Figure 1, located at geographical coordinates of 24°41' to 24°55' north latitudes and 91°55' to 92°06' east longitudes. The study area is bordered by Sylhet Sadar, Jaintapur, and Kanaighat upazilas to the north; Fenchuganj and Borolekha upazilas to the south; Biaibazar and Borolekha upazilas to the east; and Sylhet Sadar upazila to the west. Golapganj comprises eleven unions. For this study, four unions were specifically selected: Golapganj, Fulbari, Bhadeshwar, and Lakshanaband.

Climatic Condition of the Study Area

Sylhet has a skill which is hot and wet summer or cooler and drier winter. August is the hottest month with an average of 27°C, January the coldest (17.3°C on average, sometimes as cool as 7°C.) Monsoon rains are extremely heavy from May till September, totalling an average of 5048 mm a year over these months, with June being also the wettest month (956mm) and January being the driest one (12 mm). The month with the highest humidity level is June at 88.1% whereas it reaches its lowest in February at 66.85%. It receives about 2800 sunny hours a year.

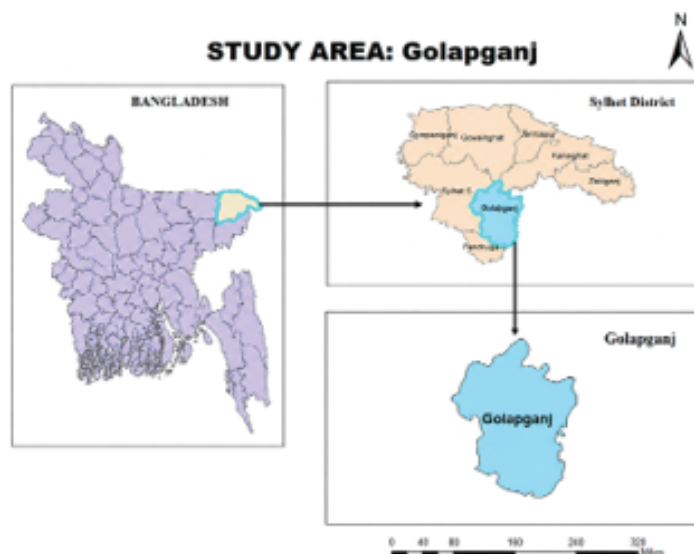


Figure 1. Location of the study area.

Demography and baseline information of the study area

Table 1 Demography and baseline information of Golapganj upazila, Sylhet district, Bangladesh.

Table 1. Demography and baseline information of Golapganj upazila, Sylhet district, Bangladesh

Category	Area/No.
Area	278.33 sq.km
Number of villages	285
Total no. people	3,16,149
Male	1,54,249
Female	1,81,900
Density	1,200/km ²
Family no.	42570
Tea garden	0
Total land	278.33 sq.km
Total agricultural land	68777 acres

Source: (Statistics & District, 2011)

Sampling Procedures and Data Collection

Because local farmers do not keep formal registers, a survey approach was adopted. The methodological part of it was choosing the study area, taking notes on factors that were important to consider, using a systematic sampling method for selection, finding out the period in which this investigation would cover and setting up an interview schedule. Four unions were selected from Golapganj, Fulbari, Lakshanaband and Bhadeshwar which represent 50 respondents were randomly chosen from each of the unions yielding a full sample size of 200. Data were collected through a semi-structured questionnaire developed, amended, and finalized with suggestions from the research supervisor. The researchers explained the study purpose to participants prior to data collection so that answers reflected a vignette.

Selection of Variables

The dependent variable (NUFV cultivation) of the study was analyzed based on independent variables, i.e. specific socioeconomic characteristics of the farmers. Independent variables were age (50 years), education (none, primary level, secondary level, tertiary level), family size (3ha), monthly income (40K BDT). The effective NUFV status (usefulness category) was recorded based on field observations and open interviews focused on farming practices, challenges, and socio-economic impacts. Farmers perspectives focused on production, gender, economic viability and Sustainable Development Goals.

Data Processing and Analysis

The gathered informations were consolidated coded and analysed. We used descriptive statistics, which included frequencies, percentages and means to describe the socio-economic and demographic characteristics of respondents. For comparison of mean differences among variables, inferential statistical tests such as t-tests and one-way ANOVA were used, with $p < 0.05$ and $p < 0.01$ as significant values, respectively. Test results are reported in table and graph form. In addition, we calculated the Benefit-Cost Ratio (BCR) at the respondent level to assess the economic viability of growing NUFV. Given that farmers usually grow multiple NUFV species, total production costs (inputs, family labor and land preparation) and gross returns were summed by farmer. Gross returns were determined as the sum across all price points of products of harvested quantity and market price for each respective NUFV. To calculate the BCR for farmers, their aggregate gross income was divided by the total production costs. Lastly, the overall average BCR was computed as arithmetic mean of such farmer-level BCRs.

Indicators for SDG Assessment

The study evaluated NUFV based on six Sustainable Development Goal (SDG) indicators: No Poverty, Zero Hunger, Good Health and Well-being, Gender Equality, Climate Action, and Life on Land. This assessment was conducted through data review and value surveys. To validate these indicators, focus group discussions were conducted following open conversations with participants and their family members.

Results

Respondent's general information

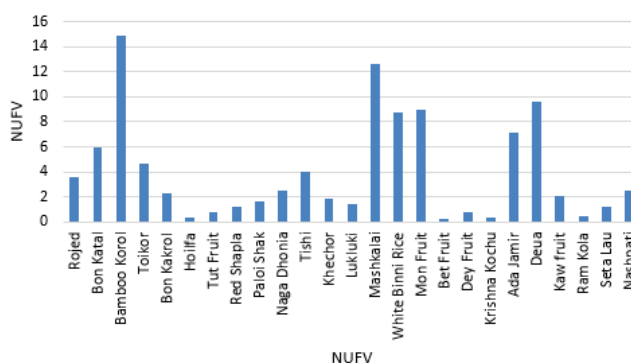
As shown in Table 2, majority of the respondents (41%) were from older age group whereas very few of them (20%) belonged to younger and others (39%) to the middle-aged individuals. Regarding education, over half of the subjects in this study attained only primary schooling (37.5%), compared with 25.5% of individuals who received no formal education. As for family size, most families ($n = 57.5\%$) were small and medium and large ones made up —31.5% and 11%, respectively. Most people (82.5%) had never previously been trained on NUFV. Agricultural organizations and training such as agriculture provide education on staple crops such as between Bangladesh, which focus significantly made in developing countries. The majority (57%) had small homesteads (<1 ha) compared with medium (33%) and large (10%). NUFV are cultivated in marginalized areas mainly for traditional and cultural reasons by homestead farmers, sometimes with female participation. The majority of the respondents (51%) from medium-size families, also reported the highest monthly income in the study area.

Table 2. Respondent's general information

Characteristics	Categories	Frequency	Percentage (%)
Age	Young	40	20
	Middle	78	39
	Old	82	41
Education	No formal education (0)	51	25.5
	Primary (1-5)	75	37.5
	Secondary (6-10)	67	33.5
	Tertiary (>10)	7	3.5
Family Size	Small (<6)	115	57.5
	Medium (6-8)	63	31.5
	Large (>8)	22	11
Experience of training	Received	35	17.5
	Not received	165	82.5
Homestead Area	Small (<1)	114	57
	Medium (1.1-3)	66	33
	Large (>3)	20	10
Annual income of the family ('000 BDT per month)	Low (< 20)	78	39
	Medium (20-40)	102	51
	High (> 40)	20	10

Frequency of NUFV production

In the study area, a total of 25 species were identified as neglected and underutilized fruits and vegetables (NUFV). The findings (Figure 2) indicated that Bamboo korol was the most widely cultivated species (14.9%) of the total cultivation. In contrast, Bet fruit was the least cultivated (0.2%). Besides Bamboo korol, eight other species were regularly cultivated, with the following proportions: Mashkalai (12.6%), Deua (9.6%), Mon Fruit (9.0%), White Binni Rice (8.7%), Ada Jamir (7.1%), Bon kathal (6.0%), Toikor (4.7%), Tishi (4.0%), and Rojed (3.6%). The remaining species were grown in smaller quantities, such as Bon Kakrol (2.3%), Red Sapla (1.2%), Holifa (0.4%), Tut Fruit (0.8%), Paloi Shak (1.6%), Naga Dhonia (2.5%), Khacor (1.9%), Naspatti (2.5%), Lukluki (1.4%), Dey Fruit (0.8%), Krishna Kochu (0.4%), Kaw Fruit (2.1%), Ram Kola (0.5%), and Seta Lau (2.1%).

**Figure 2.** Frequency of existing NUFV cultivation in Golapganj upazila.

Habit of NUFV

NUFV were observed (Figure 3) to exhibit four distinct growth forms: herb, shrub, tree, and climber. The majority of the species (64%) were categorized as trees (32%) and herbs (32%). Climbing species were found to constitute the smallest proportion (8%), while shrubs accounted for 28%.

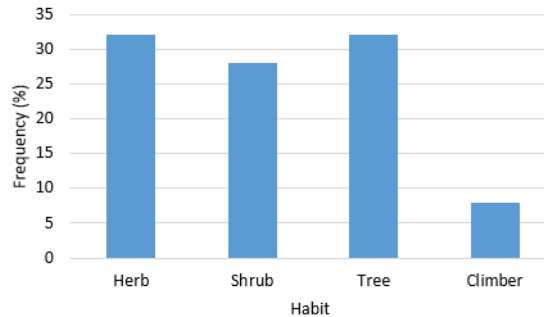


Figure 3. Habits of NUFV.

Propagation method of NUFV

It was observed (Figure 4) that various propagation materials used by the participants, including seeds, stem cuttings, corms, tubers, suckers, rhizomes, culms, and branches. The findings revealed that seeds were the most commonly used propagation material, accounting for 54.4%. In contrast, culms and branches were the least frequently used, with a proportion of 2.7%. The frequency distributions of corms, suckers, and rhizomes were found to be at 8.9%, 11.2%, and 15.5%, respectively.

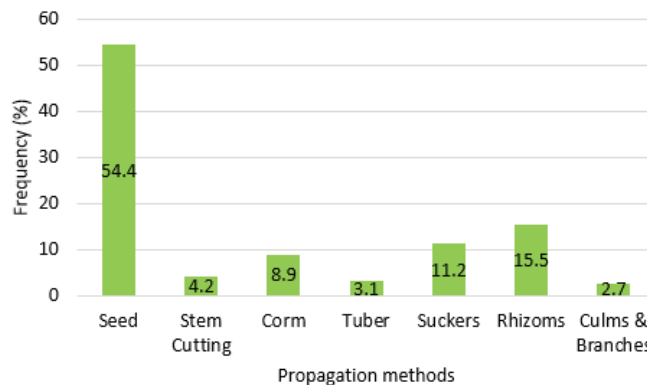


Figure 4. Propagation Method of NUFV.

Respondents' opinion regarding uses of NUFV

The researchers identified (Figure 5) a range of uses for NUFV within the study region, including medicinal, horticultural (Fruits and vegetables), aesthetic, and other applications. The study indicated that 58% of NUFV are utilized as fruits for dietary purposes. Conversely, the use of NUFV for aesthetic reasons was found to be the least common, comprising only 4% of the total utilization. Additionally, 18% of NUFV were used as vegetables, while 14% served medicinal purposes. The remaining 6% of NUFV were employed for various other uses.

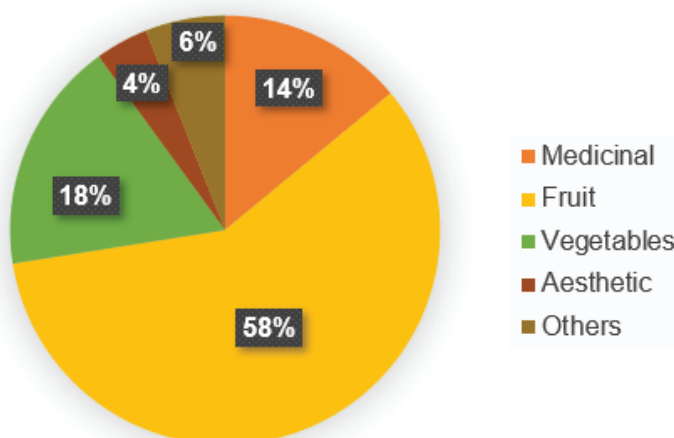


Figure 5. Utilization of NUFV according to Respondents.

Purpose of NUFV farming

Throughout the study, the researchers found that the respondents primarily cultivate NUFV for three distinct purposes: home/self-consumption, recreational activities, and economic gain (Table 3). The findings showed that approximately 52.5% of the participants cultivate NUFV mainly for personal consumption. In contrast, 29% of the respondents engage in the commercial cultivation of NUFV. Additionally, 18.5% of the respondents grow NUFV for recreational purposes.

Table 3. Purpose of NUFV Farming

Categories/Purpose	Frequency	Percentage (%)
Home consumption	105	52.5
Commercial	58	29.0
Recreational	37	18.5
Total	200	100.0

Gender participation in NUFV production activities

In NUFV cultivation higher female participation was observed (Figure 6), though males dominated specific tasks like soil preparation (55.5%), mulching (56%), pest management (58.5%), and marketing (77.5%). Females were more engaged in planting (60.5%), sowing (56%), seedling production (71%), weeding (48.5%), water management (72%), fertilizer management (60.5%), and harvesting (63%), while children participated minimally in sowing (7.5%), weeding (5.5%), water management (4%), harvesting (7.5%), and marketing (22.5%). Notably, females were absent in marketing.

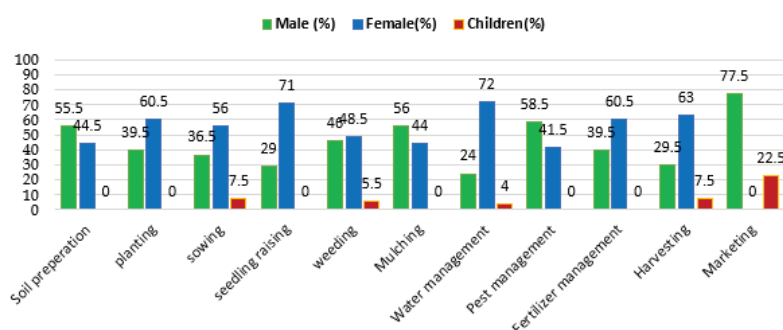


Figure 6. Gender Participation in NUFV Production Activities.

Cost & income from NUFV production

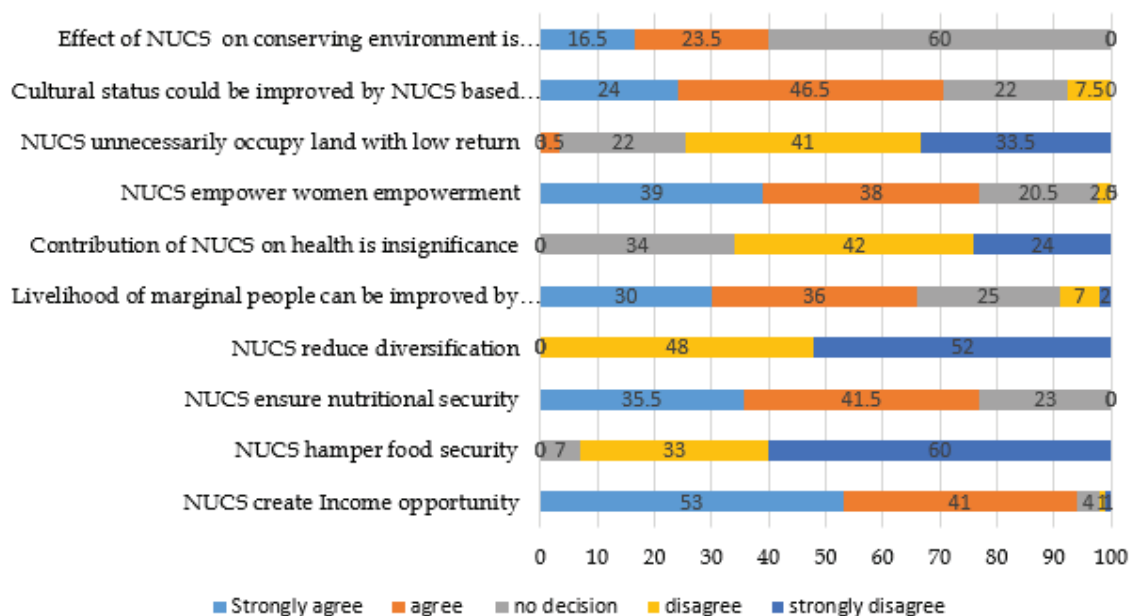
The production costs and income for NUFV across the four unions were evaluated and presented in table 4. Participants reported the highest NUFV production at 312 kg, while the lowest output was recorded at 169 kg. The market survey revealed that the price of NUFV per kilogram ranged from 246 taka to 42 taka. The gross income from NUFV ranged between 76,752 taka and 7,098 takas, while the total cost ranged from 2,945 taka to 1,168 taka. Statistical analysis showed BCR values spanning from 26.1 to 6.1, with an average value of 9.7.

Table 4. Costs and earnings from NUFV production

Subject	Maximum	Minimum	Mean	Standard Deviation (SD)
Amount of edible NUFV product (Kg)	312	169	246	58.44
Price (Tk/Kg)	246	42	75	69.41
Gross Income (Tk)	76752	7098	18450	4056.32
Gross Cost (Tk)	2945	1168	1895	529.44
BCR	26.1	6.1	9.7	7.7

Respondent's attitude on NUFV

In the selected unions, respondents' perceptions of NUFV production were assessed using a Likert scale. Results (Figure 7) showed that 53% strongly agreed NUFV generate income, while 60% strongly disagreed that they harm food security. Most respondents agreed that NUFV enhance nutrition, livelihoods, women's empowerment, and cultural value, but disagreed with claims that they limit diversity, harm health, or waste land. However, 60% were unaware of NUFV's environmental benefits.

**Figure 7.** Perception of respondents toward NUFV.

Respondent's opinion regarding decadal trend of NUFV

The decadal trend in the availability and production of NUFV was evaluated based on the respondents' perspectives. From figure 8, the majority of the participants (69%) reported a decline in the availability and output of NUFV over the past decade. 18% of respondents stated that NUFV availability and production remained unchanged during this period, while 13% claimed that NUFV availability and output had increased in the past decade. Globally, NUFV are typically limited to specific cultural groups or regions, making accurate mapping of production trends more challenging. Nevertheless, in most instances, NUFV have experienced a decrease due to various factors.

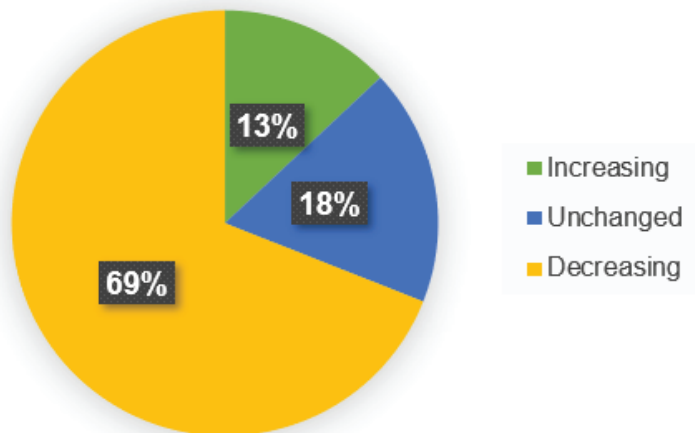


Figure 8. Respondents' Views on the Decadal Trend of NUFV.

Respondent's knowledge regarding importance of NUFV

The study revealed (Figure 9) that only 9.5% of respondents had a basic understanding of NUFV, while 43% showed limited awareness. Knowledge levels varied, with 24% having low and 23.5% moderate understanding. Seeds came mainly from farmer exchanges (50%) and saved harvests (19%), with minimal NGO support (1%) and some market purchases (21%). The lack of commercial farming practices may contribute to low NUFV awareness, suggesting national promotion could help bridge this knowledge gap.

NUFV & SDGs

NUFV in the study area had a range of multifunctional impacts on the respondents. Families involved in NUFV cultivation reported a gross annual income between BDT 76,752 to 7,098. The nutritional value of the identified NUFV contributed to both nutritional and food security in the region. Additionally, some NUFV were used for medicinal purposes within the local culture. The majority of NUFV species exhibited climate resilience, largely due to their wild nature. It was observed that women played a prominent role in NUFV production activities compared to men. The biodiversity of the study area was enhanced by the presence of NUFV. From these perspectives, achieving Sustainable Development Goals (SDGs) related to income generation (SDG 1- No Poverty), food and nutrition security (SDG 2-Zero Hunger), medicinal benefits (SDG 3- Good Health and Well-Being), women's empowerment (SDG 5- Gender Equity), climate action (SDG 13), and biodiversity conservation (SDG 14- Life Below Water), SDG 15-Life on Land) can be facilitated through NUFV production in the study area.

Discussion

For 41% of respondents, they were older than the previous generation, compared to younger 20% and middle-aged 39%, suggesting a much stronger participation of old generations in NUFV-related tasks.

Overall, education level was low with 37.5% educated to primary school only and 25.5% uneducated. This result is in line with Osewa et al. Our result contrasts with (2013), who found that 48.3% of respondents had never been educated, implying that the level of illiteracy is high in rural areas and may hinder farmers from asserting innovations. Respondent family size distribution indicated small families (57.5%), medium (31.5%) families, and large (11%). Nonetheless, as noted by Kwon et al (2023), the observation that more than half of the respondents in medium-sized families had the greatest monthly income backs an association between family size and a higher social status. Conversely, Oladele (2011) noted that 44% of the farmers were from medium families which could signify a family composition pattern based on various regions and agricultural involvement. More than three-fourth (82.5%) of the respondents had no training on NUFV, which suggests lack of extension services here and in many other parts of developing countries like Bangladesh where a large proportion of the agricultural programs is directed towards conventional crops [12]. In addition, only 57% of the study population had small homesteads (<1 ha), suggesting that NUFV cultivation occurs more on a smaller scale in less fertile areas. Women play an important role in these systems as supported by Akter et al. (2021), where women play a crucial role in homestead gardening. Taken together, these results demonstrate that resource-constraint is less important in determining large-scale NUFV cultivation and family structure is relatively more important when it comes to household income. The area contained moderate diversity, with 25 NUFV species identified. Bamboo korol was the predominant species cultivated (14.9%) and Bet fruit the most minimal proportion of 0.2%. Most species were cultivated with a relatively low frequency, while Mashkalai (12.6%), Deua (9.6%), Mon Fruit (9.0%) and White Binni Rice Alba were produced in the highest proportions (8.7%) followed by Ada Jamir (7.1%) Bon kathal(6.00) Toikor(4.%), Tishi(4%), Rojed(3%); however, all other remainingspecies each contributed to less than 1%. The diversity is relatively low compared to other studies, but Dansi et al. Identified 41 NUFV among others (Tebkew et al. However, the overall diversity of NUFVs within the geographic range explored is likely low and needs to be promoted and well conserved in this study area (32 species documented by 2014). Results — A major impact of the EU-MonitoringAssessment 51 The NUFV within the study area, was represented by four growth forms herbs, shrubs, trees and climbers and both trees and herbs dominated equally (32% each (total; 64%). With 8 per cent of climbers being the smallest group, shrubs only made up 28 per cent. Tebkew et al. also reported a similar trend In their 2014 paper, 45% of species were trees (bbox). However, Bansal et al. In contrast, hacia Rex et al (2022) found a more even spread among growth forms indicating that the study region has moderate structural diversity but is also less diverse than other areas. Seeds, stem cuttings, corms, tubers, suckers, rhizomes and culms and branches were used as different propagation materials. The most common propagation mode was seeds (54.4%) and culms and branches were utilized the least as a source of propagation (2.7%). Corms (8.9%), suckers (11.2%) and rhizomes (15.5%) were used to a lesser extent than the above strategies. This reliance on seeds aligns with Bączek et al. (2015), highlighting the fundamental role of seeds in propagation practices despite the availability of other propagating materials. NUFV in the study area are used mainly for food (58% fruits, 18% vegetables), followed by medicinal (14%), other uses (6%), and minimal aesthetic purposes (4%). This multifunctional role aligns with Li et al. (2020), Joshi et al. (2019), and Mudau et al. (2022), while the Food and Agriculture Organization emphasizes their importance for food security and nutrition. Most farmers (52.5%) cultivate NUFV for self-consumption, followed by commercial (29%) and recreational (18.5%) purposes. Limited market access, as noted by Gruère et al. (2006), likely explains the low commercialization level. Gender analysis shows higher female involvement in production activities (planting, sowing, harvesting, water management), while males dominate land preparation and marketing (77.5%). Similar patterns were reported by Malkanthi (2016). Economic results indicate strong profitability, with production ranging from 169–312 kg, prices from 42–246 taka/kg, gross income from 7,098–76,752 taka, costs from 1,168–2,945 taka, and BCR values of 6.1–26.1 (average 9.7).

This agrees with findings of Knez et al. (2023), showing higher profitability of underutilized crops compared to rice. Regarding perceptions, 53% strongly agreed that NUFV generate income and 60% disagreed that they harm food security, though 60% lacked awareness of environmental benefits. Similar views were reported by Malkanthi (2017). A declining trend in NUFV production was reported by 69% of respondents, consistent with Dansi et al. (2012), mainly due to weak policies, poor markets, and pest issues. Knowledge levels remain low, with only 9.5% having basic understanding. This aligns with Mondo et al. (2021), indicating limited awareness and small-scale production systems. Overall, NUFV contribute significantly to income (7,098–76,752 taka), nutrition, medicinal use, biodiversity, climate resilience, and women's empowerment, supporting multiple Sustainable Development Goals (SDGs) in the study area.

Conclusion

A total of 25 species of different growth form (herb, shrub, tree and climber) as well as method of propagation (seed, stem cutting, corm etc.) were recorded in Golapganj Upazila made up the NUFV. Production was primarily a female domain, but men and children also participated. With an excellent BCR of 9.7, NUFV cultivation yielded annual incomes of 7,098-76,752 takas with a high BCR of 9.7, supporting nutrition, income, and cultural values. But there were obstacles; training, funding, marketing and climate risks all posed threats to success. Tackling these would improve NUFV's contribution to SDGs that deliver food security, biodiversity, women's empowerment and climate resilience.

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