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Opportunities and Challenges in Cultivating Underutilized Field Crops in Moneragala District of Sri Lanka

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Abstract

Cultivation and use of underutilized crops is gradually popularizing in many countries since they create several benefits for the man and the environment. Same as in many other countries, a large number of useful underutilized crop species are available in Sri Lanka as well. Although traditional people had used them in a great deal in many different aspects of their life, the present generation has moved away from using them due to lack of knowledge and interest. In this context, finding of the real potential of cultivating and using them in the country is timely important. Thus the aim of this research is to study the opportunities and challenges of cultivation of underutilized field crops in Sri Lanka. This research is based on the findings of the field survey using 120 farm families in Thanamalwila divisional secretariat division of the Moneragala district during January-October 2012. Results revealed that there are several opportunities such as availability of traditional knowledge, land resource, labor for cultivation etc. However, several constraints like unavailability of seeds and planting materials, lack of market infrastructure, lack of knowledge on processing and value addition, competition from modern crops, negative attitude of consumers are also affecting the cultivation and use of these crops.

Keywords: Underutilized crops, opportunities, challenges, food security, Sri Lanka

Introduction

Underutilize crops

The term underutilized crops referring to the crops or plants that have been traditionally used for their food, fiber, fodder, oil or medicinal properties, but which have been overlooked by scientific research and development workers

(Jaenicke, 2006) Although these crops are in a position to play a crucial role in food security, income generation and overcome culture of the rural poor, providing income to rural small business, unfortunately the lack of attention has meant that their potential value is under-exploited, and they are in danger of continued or leading to disappearance in future.

The huge numbers of those underutilized species represent massive unused commodity resources which can help to

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meet the increasing demand for food, energy, medicines and industrial desires. Some of these unused assets are either partly or fully domesticated but most stay wild and unevaluated. With the development of modern agriculture practices the potential of many of these commodity resources have been neglected. Some have been so neglected and the erosion of their gene pools so severe that they are often regarded as “lost crops”. Nevertheless, in much of the world underutilized crops and commodities play a vital role in the lives of the rural and urban poor, because they contribute to livelihoods, poverty alleviation and sustaining the environment. Many of these species are included in traditional subsistence farming systems particularly in marginal areas and, in many cases, these crops and commodities are life-savers for millions of resource poor people in regions where food and nutritional security are significant problems (Williams & Haq, 2010).

Underutilized crops cultivation in Sri Lanka

Sri Lanka is an agricultural country which has been identified as one of the countries in Asia with a very high degree of biodiversity. The wide variation in temperature, rainfall, topography and soils in the country has provided a wide diversity of ecosystems resulting in a rich diversity of plant species, which the Sri Lankan farmers have been able to maintain over thousands of years. Thus, there are nearly 3400 species of flowering plants (26 percent endemic), 300 species of ferns and related species (57 percent endemic) 575 species of mosses, 110 lichens, 896 algal and 1920 fungal species. However, genetic erosion of cultivated indigenous varieties and wild relatives of crop plant species in Sri Lanka has been occurring rapidly in natural habitats during the period of the last century (Muthukudaarachchi & Wijeratne, 2007).

According to the studies, Sri Lanka is rich with around 60 varieties of underutilized crops. Most of these underutilized species have lost their significance among the present generation due to many reasons such as urbanization and changing food habits. There is no organized or proper cultivation of these crop species. Most of these underutilized plant species are fruit crops and found in wild or in home gardens, which are 100 m² to 1 000 m² in extent and are commonly found in many rural areas of Sri Lanka. As altitude increases, the extent of home gardens becomes smaller with greater diversity of plant species and lesser diversity within the species. Very little inventory work has been done so far on the state of diversity of crops in home gardens (Muthukudaarachchi and Wijeratna, 2007).

As a result of baseline surveys on underutilized fruit crops in Sri Lanka, around 400 accessions, belonging to 25 species have been noted in home gardens. A great diversity of underutilized crops was found in these crops. They are; *Citrus aurantium*, *Syzygium* spp, *Baccaurea motleyana*, *Pouteria campechiana* *Flacourtia inermis* *Citrus reticulata* *Citrus grandis* *Atalantia ceylanica* *Pometia pinnata* *Annona reticulate*, *Dialium* spp, *Euphoria longana* *Manilkara zapota*, *Ziziphus mauritiana*, *Garcinia quaesita*, *Citrus crenatifolia*, *Elaeocarpus serratus*, *Psidium cattleianum*, *Syzygium cumini*, *syzygium* spp, *anona* spp. *Limonia acidissim*, *Angle marmelos*, *Phyllanthus emblica*.

When the home gardens are concerned, other food crop species are very important. As rural people value these crops, they cultivate them in their home gardens at least in small-scale for their own use. Examples for commonly grown underutilized crops are; Cereals (*Panicum sumatrense*, *Paspalum scrobiculatum*, *Setaria italica* and *Proso* millet, *Panicum miliaceum*), Legumes *Macuna pruriens*,

Phaseolus lunatus, *Vigna umbellata*, *Lablab purpureus*, *Canavalia gladiata*, Roots & Tubers crops (*Dioscorea alata*, *D. bulbifera*, *D. esculenta*, *D. koyamae*, *D. oppositifolia*, *D. pentaphylla*, *D. spicata*, *D. tomentosa*, *D. trimenii*, *Colocasia esculenta*, *Alocasia Cucullata*, *Amorphophallus paeoniifolius*, *Canna indica* and Vegetables (*Solanum macrocarpon*, *Solanum torvum*, *Solanum violaceum*, *Solanum capsicoides*, *Coccinia* spp, *Celosia argentea*, *Talinum traingulare*) (Muthukudaarachchi and Wijeratna, 2007).

Currently same as in other countries, Sri Lankans also depend on a very few crops species to meet the needs of staple diets and on very narrow major non-food crops to meet associated needs. However, in the past people depended on a much wider range of species for food, fiber, health security and other needs. This large array of plant species spans those recognized to be underutilized to those that are recognized as important minor crops. With modernization of agricultural practices, many have become neglected due to low esteem. It has been identified that poor level of cultivation and poor usage of underutilized crops in Sri Lanka. Further, there is no available literature about this type of research studies.

Research objectives

The main objective of this study was to evaluate the opportunities and challenges of cultivating underutilized field crops in Moneragala district of the country. Thus, finding out the socio-economic characteristics of the farmers cultivating these crops, underutilized crops cultivated in the study area during the studied period and opportunities and challenges of cultivating underutilized crops were the objectives of the study.

Research method

Moneragala district, the second-order administrative division in Uva province has been selected for this study. The researchers purposely selected this area as it has suitable climate and agro-ecological conditions for the cultivation of these crops. Furthermore, majority of the people in this area are rural farmers and cultivate underutilized crops up to some extent. Out of the six divisional secretariat portals in the district, Thanamalvila divisional secretariat division (Figure 1) was selected for the study by using simple random sampling technique. Finally, a sample of 120 farm families was selected randomly for the study as 60 families from each division.

Primary data was collected through a field survey of these 120 farm families in January-October 2012. Other than the survey, few group discussions were conducted to get the detailed information. Farm families were visited with the help of Agriculture Instructor (AI) of the division. Secondary data was obtained from Agrarian Services Center and Divisional secretariat office at Thanamalwila, library books and some online sources. Collected data was coded and entered into an excel worksheet. Since this is an exploratory type of research, descriptive statistics such as frequency and percentage analysis were conducted to obtain the results.

Results and discussion

Socio economic characteristics of the farmers

Socioeconomic information of the farmers was important to analyze different dimension of them. Socioeconomic characteristics were studied and presented in the Table 1.

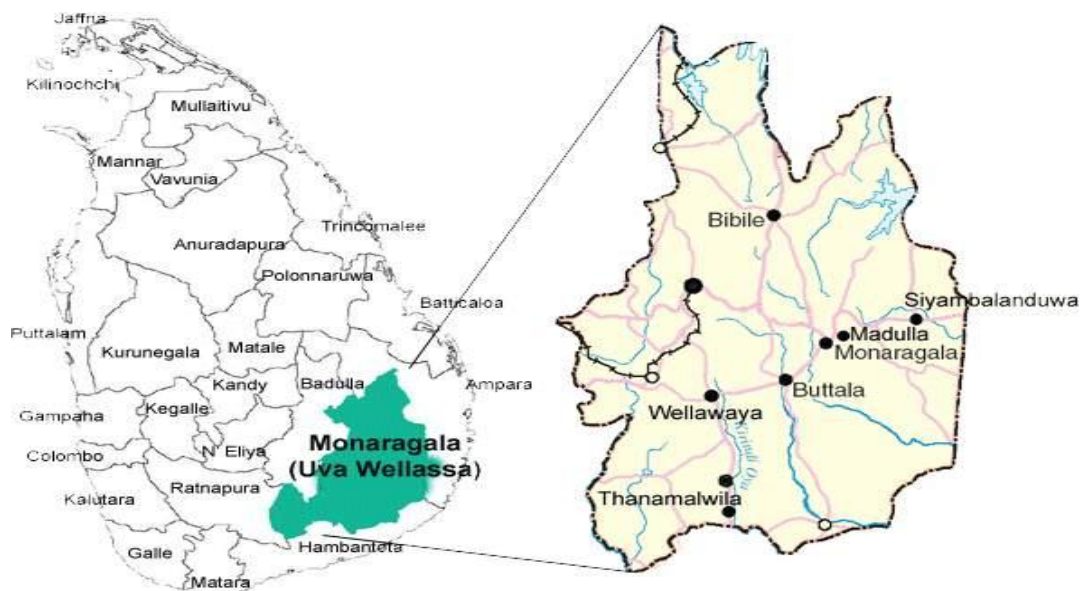


Figure 1: A map of Sri Lanka locating Thanamalwila divisional secretariat of Moneragala District

Table 1: Socioeconomic characteristics of farmers (n=120)

Socio Economic Factor	Frequency	Percentage (%)
Age (in years)		
20-30	08	07
31-40	33	28
41-50	47	39
51-60	28	23
61-70	04	03
Gender		
Male	68	57
Female	52	43
Marital status		
Married	97	81
Unmarried	23	09
Educational level		
Up to primary	14	12
Primary to Ordinary level	85	71
Ordinary level to Advanced level	16	13
Other	05	04
Main Occupation		
Farming	109	91
Businessmen	04	03
CTB Technicians	01	01
Policeman	02	02
Tailors	03	03
Family size		

Below 4	16	14
4-5	46	38
Above 5	58	48
Total family income (per season¹)		
Below Rs 50,000 (< 385 US \$)	22	18
Rs 50,000-75,000 (385 - 577 US \$)	86	72
Rs 75,001- 100,000 (578 - 769 US \$)	09	08
Above Rs 100,000 (>769 US\$)	03	02
Income from underutilized field crops (per season) (from selling extra production after family consumption)		
Below Rs 5,000 (<39 US \$)	37	31
Rs 5,000 – 10,000 (39-77 US \$)	49	41
Rs 10,001-15,000 (78-115 US \$)	16	13
Rs 15,001-20,000 (116-154 US \$)	11	09
Above 20,000 (<154 US \$)	07	06

¹Season = 4 months, US \$ 1=Rs or LKR 130)

Source: Field survey, 2012

According to the Table 1, majority of the respondents in the sample (39%) were in the middle age category. These people are mature and had considerable level of traditional knowledge. Comparatively less contribution from younger and elderly generation for the cultivation of underutilized crops could be seen.

Most of the respondents (57%) were male farmers. However, significant number of female respondents (43%) was also there. As most of the male farmers are working at farm lands away from home garden during the day time, it is difficult to meet them. This is the reason for meeting of many female farmers during the study.

When concern the marital status of the respondents, majority of them (81%) were married while only 9% was unmarried. Since this is a rural area, people engage in education up to a certain level and after that, they enter to marriage life at very young stages.

Majority of the respondents (71%) had completed ordinary level education and 12% of them had not completed the ordinary level examination. Small percentage (13%) of respondents had education above ordinary level and a very

few number of them (4%) had done vocational training, diploma and so on. When the education is concerned, the overall level of education of the area is comparatively lower.

Farming was the main occupation of most of the respondents (91%). In addition to that small percentages of respondents were working as businessmen, CTB technicians, policemen and tailors. Since this a rural area with people having lower level of education, farming is the way of life of the majority.

The responses regarding their family size were obtained to see the number of family members in the study area, as it has a significant impact on farm labour. Majority of the farm families (48%) had more than five members. Also there was a considerable percentage (38%) of the farm families having 4-5 members.

Majority of the respondents (72%) were having family income of Rs 50,000-75,000 per season (for four months). This is a very low level of income. Furthermore, a significant percentage of respondents (18%) were getting less than Rs. 50,000 per season. This shows that the people in this

area are getting comparatively low level of income.

When the income from underutilized field crops is considered, it was also at a very poor level. Out of all, 94% of the respondents were getting income below Rs 20,000 per season. 31% was getting even below Rs 5, 000. The main purpose of cultivating these crops is to use for the home consumption. As they cultivate in small-scale, after using home consumption, only a little portion of the production is remained and they sell that portion and earn some money.

Underutilize crops cultivated at present in Moneragala district

Climate and the topography of Moneragala district, is favorable for cultivation of most of the underutilized field crops such as Menery, Thanahal, Finger millet, Sesame, Kollu, Undu, Rata kaju, Gahala, Raja ala, Innala, etc. However, in this research, mainly seven major underutilized field crops as three varieties of grain namely Finger millet, Menery and Thanahal, an oil crop called Sesame, a minor legume called Kollu, two root and tuber crops called Welala, and Gahala were studied in detail. Cultivating statistics of these crops is shown in the table 2.

Table 2: Cultivating statistics of the selected crops (n = 120)

Crop	Scientific name	Number of farmers	Total land extent (acres ²)	Percentage of farmers
Finger millet	<i>Eleusine coracana</i>	104	88.93	86.7
Menery	<i>Panicum sumatrense</i>	28	39.50	23.0
Thanahal	<i>Panicum miliaceum</i> ,	31	23.35	25.8
Sesame	<i>Sesamum indicum</i>	68	58.39	56.7
Kollu	<i>Macrotyloma uniflorum</i>	42	34.75	35.0
Welala	<i>Dioscorea spp</i>	14	05.49	11.6
Kiriala	<i>Colocasia spp</i>	36	21.44	30.0

²1 hectare = 2.5 acres

Source: Field survey, 2012

As shown in the Table 2, finger millet had been cultivated by 86.7% of farmers of the sample covering the land extent of 88.93 acres. It was the crop cultivated in the largest extent. It is one of the main foods of the people of this area. 23% of the farmers had cultivated Menery within 39.5 acres. Further, Thanahal had been cultivated by 25.87% of the farmers in 25.8 acres of land. Land area under the crop Sesame or Gingerly was 58.39. It had been cultivated by 56.7% farmers. Kollu had been cultivated by 35% of the farmers in 34.75 areas of land. 11.6% of the farmers had cultivated Welala in 5.49 areas of land and 30% of the farmers had cultivated Kiriala within 21.44 acres of land.

When compare with the available land in the two divisions, land extend used for underutilized field crops is small. As mentioned before, since unavailability of good marketing facilities, farmers told that they didn't have motivation to cultivate these crops in large extents. So they cultivate these crops mainly in their home gardens in small-scales.

Opportunities and challenges of cultivation of underutilized crops

• Opportunities of cultivation of underutilized crops

Several opportunities for the cultivation of underutilized crops were identified in the area. They are presented in the Table 3.

Table 3: Opportunities of respondents for the cultivation of underutilized crops (n = 120)

Opportunities	Frequency	Percentage (%)
Availability of knowledge on cultivation	112	93
Availability of land for cultivation	106	88
Availability of labor for cultivation	82	69
Favorable attitude of the farmers	73	61

Availability of knowledge on cultivation

Considerable percentage of respondents (93%) had enough knowledge on cultivation of underutilized crops. As most of the respondents are middle aged farmers, they have sufficient level of traditional knowledge about these crops and some of their uses. Only a small number of respondents (7%) said that they did not have enough knowledge on cultivation of these crops. Although respondents have sufficient knowledge for the cultivation, they did not have good knowledge on value addition, processing and marketing of them. If respondents can improve their knowledge on these aspects, they can get maximum returns from their products.

Availability of land for cultivation

The result revealed that 88% of the respondents have enough land for cultivation. In this area, population density is low due to many reasons such as poor infrastructure facilities, distance from the main cities, and hot climatic condition. Although there are enough lands for the cultivation, respondents did not have enough knowledge on good land management practices to get maximum utilization of these lands.

Availability of labor for cultivation

69% of the respondents mentioned that there were enough labors for various cultural practices like land preparation, planting, protecting and harvesting of underutilized crops. As there are more than five members in many families, majority of respondents used family labour for the cultivation of these crops. Also they used "Attam" method (helping each other) when need extra labor and rarely hire labors for the cultivations.

Favorable attitude of the farmers

When the attitude of the respondents is concerned, 61% respondents said that they had positive attitude to cultivate underutilized field crops. If they have basic facilities and needs, they are willing to cultivate them. They have better knowledge on nutritional, medicinal, and cultural values of these crops. Further, they hope that there will be a better market for these crops in future.

- **Challenges for the Cultivation of Underutilize Crops**

Other than several opportunities, some challenges were also associated with the cultivation of underutilized crops. These challenges affect the reduction in cultivation of these crops by the farmers. Identified challenges are shown in the Table 4.

Table 4: Challenges of respondents for the cultivation of underutilize crops (n = 120)

Challenges	Frequency	Percentage (%)
Unavailability of seeds and planting materials	102	85
Lack of knowledge on processing and value addition	98	82
Lack of access to affordable credit	94	78
Unavailability of extension service	83	69
Competition from modern crops	92	77
Negative attitude of consumers	85	71
Poor level of market facilities	80	67

Unavailability of seeds and planting materials

Results revealed that 85% of respondents have the problem of getting seeds and planting materials. On one hand, seeds are not available for some crops and on the other hand, for some varieties, qualities of available seeds are in poor level. Since good quality seed is one of the main requirements of a successful cultivation, this is a major challenge face by the farmers at present. According to (Williams & Haq, 2010) also, access to good quality planting materials is a major constraint of the farmers. There should be sustainable sources for the supplement of quality seeds/planting materials. As a solution for this problem (Engels, Rao, Brown, & Jackson, 2002) some remedies had been suggested in their book “Managing plant genetic diversity”. It is the responsibility of the government to provide training and consultancy to the farmers to maintain the local seed banks, village nurseries and keeping the quality of seeds. Further, actions such as obtaining improved planting materials from traditional varieties, initiation of programmes to obtain clean planting materials and improved varieties should be promoted by the government.

Lack of knowledge on processing and value addition strategies

Results showed that 82% of the respondents have faced challenges due to the lack of knowledge on processing and value addition strategies. Poor knowledge of rural farmers on value addition strategies cause some valuable crops to still remaining as less used crops. Rural farmers don't have good level of know-how on value addition of underutilize crops. (Engels, Rao, Brown, & Jackson, 2002) have also mentioned about lack of value addition gives limited income for the respondents. Need to focus on development of improved low cost processing techniques suitable for rural farmers. There should be facilitating the

small entrepreneurs to the setting up of new enterprises that process underutilized crops. Needs to provide necessary training, information and technology required for food processing. Although underutilize crops had been processed manually on farms using family labor using more time in the past (Mabille & Probt, 2005), development of time saving quick methods for a large scale cultivations is crucial.

Lack of access to affordable credit

According to the results, 78 % of the farmers had mentioned that they have the problem of access to credit. This is also a main problem. Although there are credit schemes for main crops like paddy, maize etc, it is very difficult to get credit for these crops. Williams & Haq, (2010) also pointed out about this problem. Lack of access to credit is also commonly cited as a constraint to small-scale production. The majority of small-scale farmers and processors face a variety of problems when seeking credit, including lack of information, high interest rates, lack of collateral, bureaucratic difficulties and misunderstandings, and lack of government support in accessing credit.

Unavailability of extension service

69% of the respondents had faced the problem in extension service. These crops are not familiar to government officers or extension workers. So they don't have good knowledge on these crops to help the farmers regarding the cultivation and processing of these crops. This is a problem in many countries. Underutilized crops receive little attention from research, extension services, farmers, policy and decision makers, donors, technology providers and consumers (Williams & Haq, 2010).

Competition from modern crops

Results revealed that 77% of the respondents had challenges due to the competition from modern crops. It is major challenge for cultivation of underutilize

crops. Farmers prefer to cultivate modern crops than underutilized crop varieties due to the short lifetime of cultivation, higher productivity, and good demand for those crops. Using improved varieties, modern crops can get higher productivity than the underutilized crops. With the globalization of agricultural markets, limited number of crop varieties has been commercialized. Underutilized crops remaining as subsisting farming. Consumers' uses underutilized crops less because these crops get less attention among other crop species (Padulosi *et al.*, 2006).

Negative attitude of the consumers

Results have shown that 71% of the respondents face challenge of the negative attitude of the consumers. The main contributing factors to low consumption of underutilized crops are the negative perception towards them. Consumers have different myths about these crops. Underutilized crops were associated with the poor and backwardness. Consumers have less awareness on the nutritional value; medicinal properties and other special characteristics of underutilized crop products. Indigenous traditions and local specialties may be dismissed as 'old-fashioned' or 'paupers' food' (Mabille and Probt, 2005). Local populations of past generations have used these species effectively. However, the increasing ignorance of new generations of the traditional uses of these crops contributes to create a misleading image on underutilized crops (Padulosi *et al.*, 2006). The younger generations don't have the knowledge about edible natural food and skills to recognize climatically adapted food sources to supplement their food supplies. They view them as unfashionable when compared to fast foods (Peter, 2008).

Poor level of market facilities

As per the results, 67% of the respondents face the challenges of lack of marketing facilities. There is no proper marketing mechanism, other than selling the excess

production to the middlemen at very low price by the respondents. Non-availability of improved storage facilities, pack houses would create problems in marketing the production. (Mayes *et al.*, 2011) have pointed that many farmers suffer from poorly developed market and lack of value added products which may limit crop's value. Lack of access to market information, experiences in running businesses, business management skills are also prevent in achieving a good market.

Conclusion and recommendations

Based on the findings of the study it can be concluded that the majority of the farmers cultivating underutilized crops comes under middle-aged married group and education up to a lower level (below ordinary level). Most of them use family labor for the cultivation. The total seasonal income levels received by these farmers are low and also the seasonal income of farmers from underutilized crops is very low.

There are good potential to cultivation of underutilized crops in this area. Major identified opportunities to cultivate underutilized crops of the area are; traditional knowledge on cultivation of these crops, enough lands for cultivations, ability to use family labor for cultivation and favorable attitude of the respondents towards cultivation of these crops.

Although there are opportunities, due to many challenges on cultivation of these crops, they are still remaining as neglected crops. Major challenges identified were; unavailability of seeds and planting materials, poor level of market facilities, lack of knowledge on processing and value addition strategies, lack of access to affordable credit, unavailability of extension service, competition from modern crops and negative attitude of consumers. They are affecting for the reduction of cultivation of these crops. If it is possible to find solutions for these

challenges by respective authorities in the country, there is a good potential to cultivate underutilized crops in this area successfully.

In order to overcome these challenges, government support to receive improved quality seeds and planting materials, arrange marketing facilities and provision of the improved technologies in processing value addition are vital. Facilitating for access to credit and efficient and effective extension service are also essential. Provision of positive image in consumers by improving knowledge on potential benefits of using these crops, nutritional and medicinal value can also play an important role to popularize these crops among people in the country.

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