Enhancing Entrepreneurship Opportunities through Millet Based Value Added Products to Farm Women of Nagarkurnool District

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Authors' contributions

This work was carried out in collaboration among all authors. Author AJ designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors AJ and RA managed the analyses of the study. Author AJ managed the literature searches. Authors AS, MJMR and TPR provided technical help for three years. All authors read and approved the final manuscript.

ABSTRACT

Millets are known as one of the most important cereal grains as it is good source of phytochemicals and micronutrients. Millets are consumed by more than 1/3rd of the world’s population. It is the 6th cereal crop in terms of world’s agricultural production. Present study was carried out in Nagarkurnool district of southern Telangana zone and sample size is n=30 farm women from economically low background cultivating millets were selected purposively. Nutritional education, skill development programs and awareness camps were organized to encourage for starting value...
added millet based enterprise for livelihood instead of selling raw produce which fetch low profits. The result of present study has shown that Millet value based products has enhanced the enterprise opportunities as the increase in health consciousness of the people. In the present study the cost benefit ratio has increase gradually with the each year 1:1.46 in the year 2018, 1:1.92 in the year 2019 and 1:2.5 in the year 2020. The consumption frequency of millet based value added products has also increased from 66% of sample daily consumption to 92% of daily consumption. As traditional roties (Indian flat bread) were not accepted by young age and unable to chew and swallow by old age. Millet based value added products were highly accepted, increased the consumption frequency and increased the income of farm women.

Keywords: Millets; value added products; enterprise; phytochemicals and micronutrients.

1. INTRODUCTION

Millets are known as one of the most important cereal grains as it is good source of phytochemicals and micronutrients. Millets are consumed by more than 1/3rd of the world’s population. It is the 6th cereal crop in terms of world’s agricultural production. There are Millets like Jowar (Sorghum), Sama (Little millet), Ragi (Finger millet), Korra (Foxtail millet) and Variga (Proso millet). Bajra and Sama are high in fat while Ragi has the lowest fat. Millets are used as food and are widely used in rural areas. They have been cultivated for a thousand years and are used throughout the world. Millets help in prevention of Type II Diabetes due to their significant levels of magnesium. Magnesium is an important mineral which helps in increasing the efficiency of Insulin and glucose receptors by producing many carbohydrate digesting enzymes, which manages insulin action [1]. Its high fiber content also helps to prevent constipation and the risk of developing bowel disorders. Millets are the staple food for millions of rural people in Asia & Africa when Compare to other cereals, millets have high carbohydrate energy content and nutritious combination of millets with other source of protein would compensate the deficiency of certain amino acids [2]. It’s very nutritious and healthy as it has anti-diabetic, anti-tumorogenic, atherosclero-genic effects [3].

According to the research study by Chandrasekara A, et al. [4], Millets are rich in Phytochemicals like phenolics, sterols, lignans, inulin, resistant starch, β-glucan, phytates, tocopherol, dietary fiber and carotenoids are present in millets. The polyphenols are the phenolic acids and tannins, flavonoids are present in small quantities; which act as antioxidant and play a role in the body immune system.

Finger millet helps in losing weight, as it contain an amino acid called Tryptophan which helps in lowering of appetite and helps in weight control. Finger millet is digested at a slower rate. Hence helps in keeping away the intake of excessive calories where as fiber of finger millet gives feeling of fullness thus controlling the excessive food consumption [7].

According to the research study by O.S.K. Reddy [1], Finger millet helps to increase the hemoglobin level and helps to fight malnutrition and degenerative diseases.
According to the research study by O.S.K. Reddy [1], Foxtail millet helps in steady release of glucose without affecting the metabolism of the body. When consumed the prevalence of diabetes is reduced and it is also known as healthy heart food due to its good source of magnesium. Little millet is highly nutritional content as it is good source of B vitamin, minerals like calcium, iron, zinc, potassium compare to other millets. It is rich in fiber content and essential fatty acids required by the body which in turns helps in weight loss [1].

The cultivation of millets is decreasing with decrease production and consumptions over the last five decades. Despite their superior nutritional qualities and climate resilience cultivation of small millets in India declined from 7.22 million hectares to 2.29 million hectares from 1961 – 2009.

The investigation of Michaelraj and Shanmugam [5], has shown that the harvested area and the consumption of millets in India gradually decreased in an alternative years of 2005-2008 & 2009 onwards it was increased but in the year of 2012 onwards it came to falling. The reasons reported were Low productivity, high labour intensity, drudgery of agricultural operations and lack of alternative farm gate prices, easy availability of rice and wheat through public distribution system, inadequate investment in product development and commercialization, inadequate availability of small millets in local markets and high prices, inadequate policy support for small millets when compared to crops like rice and wheat, were the reason for decline of millets.

Another study by Gruere et al. [8], has analyzed the role of collective action in the marketing of underutilized plant species like minor millet. Due to low market demand and trading, cooking knowledge, the establishment of long run market for minor millets will require sustained efforts and will likely need to target a specific, stable segment of consumers and consumer subsidies that would enhance their appeal and increase their consumer base.

According to the study by Michaelraj and Shanmugam [5], the consumption and harvesting of millets are falling from 2012 onwards. To overcome this their research suggested that developmental effort should be made through minikit demonstration, state level training programs, providing improved seeds, non-monetary inputs and research, start a massive education and promotional programs on millets and government must use its media campaign funds to take up millet promotion.

2. METHODOLOGY

2.1 Objectives

Value addition to millet products will lead to food security, nutritional security and also help farm women for generating income to improve their livelihoods.

2.2 Statement of the Problem

Lack of awareness on value addition to millets causing food wastage and nutritional insecurity. Farm women are producing millets and the net profits are low due to unawareness about value addition of millets and its nutritional benefits and market demands.

2.3 Study Area

The study was conducted in Nagarkurnool district of southern Telangana zone.

2.4 Study Subject

The sample size studied in the present study is 30 (n=30).

2.5 Sample Size and Sampling Technique

Present study included 30 millet growing farm women were purposively selected from Nagarkurnool districts of southern Telangana state.

2.6 Data Collection

The basic family and economic data is collected through questionnaire method. The data of cost benefit ratio, gross income and net income profits were collected through questionnaires every week.

2.7 Intervention

Nutrition intervention includes three components a. Nutritional education programs, b. Method demonstrations and c. Training on marketing skills and entrepreneurship development.
a. **Nutritional education programs:** Under nutritional awareness programs Dr. Afifa Jahan scientist, KVK-Palem has conducted awareness camps, group meetings and diagnostic field visits to sensitize farm women about importance of millets and increase the area of millet cultivation as the millet production was decreasing in the district.

b. **Method demonstrations:** Under method demonstrations the resources persons were invited to give farm women firsthand experience in making nutritious recipes with locally available resources. Dr. R. Arunjyothi, Scientist, Home Science K.V.K PVNRTVU, Mamnoor, Warangal district has been part of these demonstrations since the study started.

c. **Training on marketing skills and entrepreneurship development:** Farm women were encouraged to start the value addition of millets instead of selling the raw for this Dr.Affia Jahan scientist, KVK-Palem has distributed free millets to selected sample group for learning products development from millets. Farm women were every week given a class on entrepreneurship development in value added millet based products including market mix, branding, labeling etc.

### 2.8 Data Analysis

The SPSS software was used for the analysis of the data. The cost benefit ratio was calculated using formula of gross income divided by cost of cultivation by Perin et al. [9].

### 3. RESULTS AND DISCUSSION

The thirty economically backward millet growing farm women were selected purposively for this study. There family background and economic status were collected through questionnaire. There nutritional status and consumption of millets in their diets was documented through 24 hour diet recall method. The results shown that 66% of sample consumes millet in from of roties (Sorghum roties as breakfast) every day and 24% of sample consumes once in a week and 10% consumes once in a month as shown in Image 1. 100% of the studied samples were not aware about millet value addition. They sold the produces as raw crop and stores few produce for their family consumption basically traditional recipes only.

![Image 1. Training program, method demonstration and awareness camps conducted for three years in Nagarkurnool district](image1)

![Image 2. Consumption of millet based products frequency before value addition](image2)
The selected farm women were motivated for increasing the production of millets and formed a whatsapp group and daily messages on crop cultivation problems of crops pests and disease protection, spraying of fertilizers etc kind of messages were given. Group meetings were conducted and brainstorming sessions were conducted. The farm women were given method demonstration of the millet based value added products were given. They were skilled to make value added products and knowledge materials of low cost nutritious recipes along with millets were provided from Krishi Vigyan Kendra Palem. Training program on marketing and entrepreneurship development were given. Farm women were asked to select a product for marketing. They selected sorghum laddoo as product for they enterprise. The product was made with sorghum flour and Jaggery including Indian butter (Ghee) which is a nutritious snack item suitable for all age groups.

The raw produce were sold to dealers for Rupees 40/- per KG (Kilo Gram) of sorghum later in the year 2018 the produced was processed into sorghum laddos and sold for a price of Rs 190/- per kg of laddoo which was including Rs 130 processing cost and Rs 60 profit per kilogram. The cost benefit ratio for the year 2018 was 1:1.46 as shown in Table 1.

For the year 2019 the raw produce were sold to dealers for Rupees 40/- per KG (Kilo Gram) of sorghum but the processed sorghum laddoo were sold for a price of Rs 250/- per kg of laddoo which was including Rs 130 processing cost and Rs 80 profit per kilogram. The cost benefit ratio for the year 2019 was 1:1.92 as shown in Table 2. The reason for increasing the price was market demands and confidence in farm women. They started selling products near schools, government offices etc. the taste was appreciated and the mouth by mouth advertising of local people helped them to increase sale.

For the year 2020 the raw produce were sold to dealers for Rupees 50/- per KG (Kilo Gram) of sorghum but the processed sorghum laddos were sold for a price of Rs 250/- per kg of laddoo which was including Rs 100 processing cost and Rs 100 profit per kilogram. The cost benefit ratio for the year 2020 was 1:2.5 as shown in Table 2.

The reason for decrease in processing price was development of relationships and contracts with local dealer for providing same quality raw material for low rates than market price. Market demands and confidence in farm women has increase compared to last years.

### Table 1. For the year 2018

| Treatment 1 (T₁) | Treatment 2 (T₂) | Cost of processing | Increase in income/KG | Cost benefit ratio |
|------------------|------------------|--------------------|-----------------------|-------------------|
| Rs/KG            | Rs/KG            | Rs/KG              | Rs/KG                |                   |
| 40               | 190              | 130                | 60                   | 1:1.46            |

### Table 2. For the year 2019

| Treatment 1 (T₁) | Treatment 2 (T₂) | Cost of processing | Increase in income/KG | Cost benefit ratio |
|------------------|------------------|--------------------|-----------------------|-------------------|
| Rs/Kg            | Rs/Kg            | Rs/Kg              | Rs/Kg                |                   |
| 40               | 250              | 130                | 80                   | 1:1.92            |

### Table 3. For the year 2020

| Treatment 1 (T₁) | Treatment 2 (T₂) | Cost of processing | Increase in income/KG | Cost benefit ratio |
|------------------|------------------|--------------------|-----------------------|-------------------|
| Rs/Kg            | Rs/Kg            | Rs/Kg              | Rs/Kg                |                   |
| 50               | 250              | 100                | 100                  | 1:2.5             |
The post evaluation after the study was done it is shown that the financial conditions of the farm women has improved and their won nutritional status has improved. The results of post evaluation of 24 hour diet recall has shown that that 92% of sample consumes millet in from of millet based value added products like every day and 6% of sample consumes once in a week and 2% consumes once in a month as shown in Image 2.

4. CONCLUSION

Millet value based products has enhanced the enterprise opportunities as the increase in health consciousness of the people. In the present study the cost benefit ratio has increase gradually with the each year 1:1.46 in the year 2018, 1:1.92 in the year 2019 and 1:2.5 in the year 2020. The consumption frequency of millet based value added products has also increased from 66% of sample daily consumption to 92% of daily consumption. As traditional roties were not accepted by young age and unable to chew and swallow by old age. Millet based value added products were highly accepted increased the consumption frequency also increased the income of farm women.

5. RECOMMENDATIONS

1. There is a need to create awareness among farm women about the market demand of millets and nutritional importance of millets.
2. Farmers and farm women needs to be motivated to cultivate more area under millets by extension scientist.
3. The farm women should be educated on value addition, primary processing and secondary processing of millets apart from skill development trainings like method demonstrations.
4. There is an urgent need of developing small scale enterprise for improving the GDP of country. Hence entrepreneurship development among women farmers must be aim of government programs.
5. The women farmers must be encouraged to form self help groups (SHG) and link them to Farmer Producer Organizations (FPO) for better net returns.
6. Government should fund the SHG for starting enterprises and motivate farm women.

CONSENT

As per international standard or university standard, Participants’ written consent has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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