

PRODUCTION, VALUE ADDITION AND ENTREPRENEURSHIP DEVELOPMENT OF WHITE GRAINED VARIETY FINGER MILLET KMR 340

Abstract:

Finger millet is one of the important millets grown extensively in various parts of India and Africa. It is nutritious and even superior to rice and wheat, in respect of crude fiber and minerals like calcium and phosphorus. It is a major source of dietary carbohydrates for a large section of society and forms at least one meal per day for the families residing in production catchments. Unfortunately, it is termed as poor men's food and due to lack of awareness of its importance and properties its utilization is restricted in the regions where it is grown. To throw a light on it the white Finger millet variety KMR 340, especially for confectionary purpose, resistant to blast and blight diseases, tolerant to stem borer and aphids has been introduced. Unavailability of processed products of finger millet is the major reason for its localized utilization. Efforts have been made to convert the millet grains into convenient forms such as Multi-grain Flour and Ragi Malt and deliver the products to the consumers through the establishment of enterprises on finger millet with the help of Self-Help Groups in rural areas. Establishment of rural enterprises on finger millet has been found to be a successful profit-making avenue for the farm women and SHGs. This has not only created additional employment and enhanced income of the group members but also playing significant role in increasing the demand of finger millet which is resistant to blast and blight diseases, tolerant to stem borer and aphids. This is directly related to the increased consumption of nutritious food thereby marching towards a better health of the society.

Keywords: Finger millet, blast and blight resistant, white finger millet variety, value addition and entrepreneurship development

Introduction:

Agriculture and food security are likely to face serious threats from socioeconomic factors such as climate change, water scarcity, population growth, rising food prices, and other factors. In order to combat hunger and poverty, researchers and nutritionists must carefully

consider the options to produce, prepare and use alternative potential food sources, such as little millets. Small millets are a significant source of nutrients in this situation and are more tolerant to climate change. Small millets are grass family plants with small seeds, and there are six of them: Japanese barnyard millet (*Echinochloa frumentacea*), Kodo millet (*Paspalum scrobiculatum*), Proso millet (*Panicum miliaceum*), Finger millet (*Eleusine coracana*), and little millet (*Panicum sumatrense*) Chetan and Malleshi (2007) significantly higher than those of rice (0.2% fibre, 0.6% minerals), wheat (1.2% fibre, 1.5% minerals), and other grains. Among all cereals, it contains the most calcium (344 mg/100 g). However, phytates (0.48%), polyphenols, tannins (0.61%), trypsin inhibitory substances, and dietary fibre are also present in millet. (Gopalan *et al.*, 2004)

The antioxidant activity of millet meals can be boosted by phytates, polyphenols, and tannins, which is a crucial component in maintaining good health and preventing disorders linked to ageing and metabolism (Hadimani and Malleshi, 1993). It benefits in many ways due to its higher fibre content, which also helps to avoid intestinal cancer, high cholesterol, and constipation. One of the minor cereals, finger millet, also known as ragi and mandua in India, is a native of Ethiopia and is widely grown throughout India and Africa. It is a staple food in these nations that provides a significant amount of calories and protein to large portions of the population, especially those in lower socioeconomic groups. Karnataka is the largest producer of finger millet in India, accounting for 58% of the country's total production, although few Indians are aware of its nutritional worth and health advantages. Finger millet is the sixth most widely produced crop in India, behind wheat, rice, maize, sorghum, and bajra. (O'Kennedy *et al.*, 2006)

Karnataka is the largest producer of finger millet in India, accounting for 58% of the country's total production, although few Indians are aware of its nutritional worth and health advantages. After wheat, rice, maize, sorghum, and bajra, finger millet is the sixth most important crop produced in India. After sorghum, pearl millet, and foxtail millet, finger millet is the fourth most important millet in the world. (Sharathbabu *et al.*, 2008)

Therefore, it is recommended that diabetics consume finger millet and other small millets rather than rice (Upadhyaya *et al.*, 2007). As a result of finger millet's health advantages, demand has skyrocketed. It is traditionally eaten in a variety of ways, including as fermented porridge, thin or thick porridge, mudde, unleavened bread (roti), and brewing. However, the main barrier

to grains being accepted by kids has been their dark coloration. An idea for white finger millet has emerged in this preview. White grain types are favoured over both brown and white grain types due to their superior acceptance among consumers, higher protein, lower fibre, and lower tannin content (Yenagi *et al.*, 2010). Thus, the baking sector and metropolitan regions have seen an increase in demand for white grained finger millet. In light of this, efforts were made to create a white-grained finger millet variety for value addition, particularly for the baking industry.

The food applications of millets, notably finger millet, have, despite their recognition as healthy foods, been restricted to traditional consumers; they are also only available in certain regions where they are grown and are currently underutilized. The primary causes are customers' ignorance of its health benefits and, secondly, a lack of availability in a convenient form. The variety of food uses for finger millet would be increased by processing it in both traditional and modern ways to create products with enhanced value and convenience. Utilizing them to create items that are already cooked or ready to use might encourage non-millet eaters to consume more finger millet. Increased consumption of finger millet will not only provide opportunities for job creation and increased income for the stakeholders in addition to nutritional security of the society. The establishment of finger millet processing enterprises was initiated in the year 2010-2011 following the cluster approach through Self Help Groups (SHGs). It is worth mentioning here that economic and social empowerment of socially disadvantaged groups and marginalized sections of society is necessary for achieving faster and more inclusive development.

The present paper describes the efforts made to establish village level enterprise on processing and value addition of finger millet with the objectives of additional employment and income generation for the farm women.

Materials and Methods

Location: Krishi Vigyan Kendra, Chikkaballapura district undertaken a Front-Line Demonstration (FLD) on Entrepreneurship development through branding and market linkage for value added finger millet products during the year 2020-22. The FLD was approved by an Action Pan Committee of ICAR. The FLD was undertaken in Anooru village, Chintamani taluk, Chikkaballapura district. It is one of the cluster village selected for implementation of activities

of Krishi Vigyan Kendra, Chikkaballapura for the year 2020-2022. The supported activities conducted in the village are described below.

Seed treatment and Production: The seed treatment for the finger millet using azatobacter and jaggery was done before one day of sawing and stage wise observation for growth and yield of the crop was noted.

Quality parameters: Quality parameters of the KMR 340 finger millet variety was measured by considering plant height (cm), number of tillers per plant, number of ear heads per fingers, finger length (cm), yield (q/ha), % increase over check, gross cost (Rs. /ha), gross Returns (Rs. /ha), net returns (Rs. /ha) and B:C ratio (Rs.) and compared with check crop MLR.

Socio demographic profile: The on general information such age categorized into three groups: 21-25, 26-35 and 36-40 years, education status as illiterates, primary, secondary, high school, occupation classified as house wife and labour, family type as nuclear or joint and number of children as one, two or three and above were noted. (Thimmayamma, 1987)

Trainings and Demonstrations: The trainings were concentrated on seed treatment during production, processing and value addition to finger millet. In total, 20 farm women were selected for detailed skill development training in processing and value addition. Secondly, intensive value-added product trials were done by conducting on campus and off campus trainings and selected the suitable products having commercial potential for income generation and to facilitate enterprise building by the farm women. Further training was also imparted to these farm women on Nutrition education, importance of value addition in food products, handling of processing and value addition unit, maintaining hygienic practices while handling food products, labeling, packing, licensing and financial management. Besides, these women were also sensitized for the linkage development and marketing skills.

Processing and value addition: The aim of processing and value addition of finger millet was to convert the grains into convenient food and to make the product nutritionally superior, to market easily and having a shelf life of minimum 3 months. Accordingly, four products namely finger millet malt, mixture, laddu and kurkure were selected for preparation and marketing.

Establishment of processing unit: To bring systemization and regular production there was a need for establishment of their own processing unit for preparation of exclusively finger millet-

based products. Hence a plan was developed for establishment of processing unit with minimum necessary machineries.

Packaging and labeling: Packaging serves as a silent sales man. To promote the products and to get better market opportunity, farm women were supported for development of attractive and suitable packaging with nutrition label.

Statistical analysis: Statistical analysis was conducted using suitable statistical tools

Results and Discussion

General information on the origin of KMR 340 (White finger millet variety: Table 1 denotes that the crop White finger millet variety KMR 340 was introduced in the year 2016 by VC Farm, Mandya, UAS, GKVK, Bengaluru. Which has the pure breed OUAT-2 x WRT-4, prime life of 90-95 days and an average yield (Q/ha) being 35-40 and its area of adoption is Karnataka. The special features of the variety is that it is especially for confectionary purpose, resistant to blast and blight diseases, tolerant to stem borer and aphids.

Quality parameters: Quality parameters of the KMR 340 finger millet variety was measured by considering plant height (cm) compared to check was 111cm followed by number of tillers per plant was 7.1 where check was 6.0, number of ear heads per fingers was 5.2 when compared to check as 4.4, finger length (cm) was high in demo i.e., 9.0cm than in check was 7.0cm, yield (q/ha) was much higher in demo 35.42 (q/ha), % increase over check was 11.8 per cent and the cost benefit ratio was 2.41 compared to check 2.31. The table 2 revealed that the demo KMR 340 was better over check crop MLR

Socio-demographic profile: The socio-demographic profile of the farm women engaged in processing and value addition of finger millet is presented in Table 3. The age profile indicated that majority of farm women belonged to the age group of 26-35 years (55%) followed by 21-25 years (30%). With respect to literacy, 50 per cent of women were educated up to high school level followed by primary education level (25 %) and only 10 per cent were illiterates. The occupation pattern indicated that majority (80 %) of them were farm labours followed by housewives (20%). Majority of these women were having two children (55%). The results also showed that 65 per cent of families were nuclear.

Establishment of processing and value addition unit: After acquainting with processing, preparation of value added products and packing, 20 farm women of Anooru village, with the leadership of Mrs. Jyothi came forward to take up processing and value addition to finger millet as an entrepreneur activity is depicted in the table 4. Under technical guidance of Krishi Vigyan Kendra through Front Line Demonstration on “Entrepreneurship development through value addition finger millet KMR -340” with the brand name “Sri Seetha Byraveshwara Swami Sanga” they established a small-scale processing and value addition unit. For establishment of the unit first they procured a building having a unit area of 2000 square feet and then they purchased and installed the necessary equipment’s viz., Destoner, Pulveriser, Roaster, Weighing scale and Sealing machine. With the assistance of Krishi Vigyan Kendra, they registered value added finger millet products under Food Safety and Standards Authority of India 2006 (FSSAI Reg. No. 21220048000019).

Nutrient composition of value-added products: The nutrient composition of finger millet value added products namely malt, mixture, laddu and kurkure was calculated and given in table 5. The nutrient content of the products which were promoted through these interventions ranged from 353- 446 kilo calorie of energy, 4.47-12.31g of protein, 1.3-13.13g of fat, 194-256 mg calcium and 1.63-6.20 mg iron.

Marketing of the value-added products: The value-added products were first commercialized by marketing through Krishi Vigyan Kendra market outlet introduced to some provision stores in Chintamani. Later they were made to participate in various exhibitions organized by Agricultural Universities, State departments and NGOs. To expand their market network. Presently, they are involved in preparation and marketing of finger millet malt, laddu, mixture and kurkure under the registered brand name of “Sri Seetha Byraveshwara Swami Sanga” food products and selling them through their own provision store, Krishi Vigyan Kendra outlet, Bakery, Sweet marts, Provision stores and Medical Shops in Chintamani, Chikkaballapura, Bangalore and Mobile sales van arranged by the Department of Women and Child Welfare, Chikkaballapura. The monthly production of the products is around 500 kgs with a net profit of Rs. 1,00,000/-. The similar study was conducted by Savitha *et al.*, 2010 showed the similar results.

Economics of value addition to finger millet: On the basis of two years data, the average results of the present activity are presented in the table 6 and 7. Table 6 gives the economic

analysis of the four products viz., finger millet malt, laddu, mixture and kurkure. It is depicted from the table that the monthly sales are around 323kg malt, 150kg laddu, 225kg mixture and 122kg kurkure with the monthly net profit of Rs. 12920 from malt, Rs. 5250 from laddu Rs. 9000 from mixture and Rs. 4880 from kurkure whereas unprocessed finger millet cost Rs. 30 per kg. The results are in conformity with the studies of Patel *et al.* (2014) who analyzed the economics of ragi malt and multi grain flour prepared and sold by SHGs of Jagadpur District of Chattisgarh, India, where the groups made a profit of Rs.1205.00 and Rs.895.00 per 100 kg of the product sold from ragi malt and multi grain flour respectively.

In a short span of time farm women were able to establish successful livelihood source by converting farm produce into products and earning a net annual income of around Rs.3.0 lakhs. University of Agricultural Sciences identified the passion of Mrs. Jyothi towards farming and entrepreneurial sector and awarded “Best Farm Women at Taluk level” in the year 2021. Looking into the success of these members many farmers and farm women approached KVK to take up similar kind of enterprise.

Table 1: Development of white grained Finger millet variety KMR 340

Particulars	
Name of the variety	KMR 340
Purebred	OUAT-2 x WRT-4
Developed Institute	VC Farm, Mandya, UAS, Bengaluru
Year of release	2016
Prime of life (Days)	90-95
Average yield Q/ha	35-40
Area of Adaption	Karnataka
Special features	White ragi variety, especially for confectionary purpose, resistant to blast and blight diseases, tolerant to stem borer and aphids

Table 2: Quality parameters and production cost economics

Parameters	Demo	Check
Plant height (cm)	111	107.1
No. of tillers/pl.	7.1	6.0
No. of ear heads/fingers	5.2	4.4
Finger length (cm)	9.0	7.0
Yield (q/ha)	31.42	28.02
% increase over check	11.8	
Gross cost (Rs./ha)	38500	32400
Gross Returns (Rs./ha)	63150	52950
Net Returns (Rs./ha)	24650	20550
B:C Ratio (Rs.)	2.41	2.30

Table 3: Socio demographic profile of the farm women in self-help group

Variables	Category	n=20	
		Number	Percentage
Age	21-25Years	06	30
	26-35 Years	11	55
	36-40 Years	03	15
Education	Illiterates	02	10
	Primary	05	25
	Secondary	03	15
	High School	10	50
Occupation	Housewife	04	20
	Labourer	16	80
Type of family	Nuclear	13	65
	Joint	07	35

Family size	2-4 members	13	65
	5-7 members	07	35
Number of children	One	02	10
	Two	11	55
	Three and above	07	35

Table 4: General information of the developed enterprise

Particulars	
No. of farm women	20 members
Training cum method demonstration	Entrepreneurship development through value addition finger millet KMR - 340
Brand name	Sri Seetha Byraveshwara Swami Sanga
Marketing	Ragi products are being sold in local provisional stores and in exhibition
License no.	21220048000019
Place	Anooru Chintamani taluk, Chikkaballapura, Karnataka

Table 5: Nutritional composition of the ragi value added products

Products	Protein (g)	Energy (kcal)	Fat (g)	Calcium (mg)	Iron (mg)
Ragi malt	09.00	360	01.50	193	5.20
Ragi mixture	03.47	436	14.90	164	1.85
Ragi laddu	10.31	407	14.13	242	4.10
Ragi kurkure	06.60	343	01.68	181	5.65

Table 6. Cost economics of ragi malt production

Particulars	Amount (Rs.)
Variable cost (raw materials+ fuel+ labour +10% interest)	127,000
Fixed cost (depreciation of equipment + interest)	1,746
Space rental (500/month)	6,000
Total cost of production 2000 kg/annum	134,846
	≈135,000
Gross income = $100 \times 2400 = \text{Rs. } 240,000$	
Net income = Gross income – total expenditure = $\text{Rs. } 240,000 - 135,000 = 100,000$	
B/C ratio (benefit/cost) = $240,000/135,000 = 1.7$ (benefit of one rupee 70 paise for every rupee spent)	

Table 7: Income generation from production and marketing of ragi value added products

Ragi products	Production cost (Rs. /Kg)	Selling price (Rs. /Kg)	Net profit (Rs. /Kg)	Sales/Month (No.)	Profit/Month (Rs.)	B:C ratio
Ragi laddu	290	325	35	150	5250	1.60
Ragi mixture	270	310	40	225	9000	1.52
Ragi malt	150	110	40	323	12920	1.70
Ragi kurkure	290	330	40	122	4880	1.65
Total earnings / month (Rs.)					32050	1.62

Conclusion

Farm women now feel more confident in starting small-scale food processing and value-added businesses in their villages and selling their products in metropolitan areas thanks to Krishi Vigyan Kendra's assistance. A novel method of practicing self-reliance is the organized introduction of farm women to the preparation and processing of value addition to finger millet. The millet-focused entrepreneurial activity has not only increased family income and added new jobs, but it has also spared farm families the hassle of looking for work to support their families. The consumption of finger millet is increased when it is more readily available, which also helps consumers consume more nutritious foods.



Pic 1. Seed Treatment



Pic 2. Sowing



Pic 3. Field visits



Pic 4. Field Day

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