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

**Abstract:**

One of the significant millets that is widely grown in diverse regions of India and Africa is finger millet. In terms of raw fibre and minerals like calcium and phosphorus, it is more nutrient-dense and even superior to wheat and rice. For a considerable portion of the population and at least one meal a day for families living in producing catchments, it provides a significant source of dietary carbs. Unfortunately, it is referred to as "poor men's food," and because people are unaware of its benefits and limitations, its use is restricted in the areas where it is grown. The white Finger millet cultivar KMR 340, specifically developed for confectionery use, is resistant to blast and blight diseases and is tolerable to stem borer and aphids. The main cause of finger millet's limited use is the lack of processed millet products. By setting up businesses on finger millet with the aid of Self-Help Groups in rural regions, efforts have been made to transform the millet grains into practical forms like Multi-grain Flour and Ragi Malt and provide the products to the consumers. For farm women and SHGs, starting rural businesses using finger millet has proven to be a profitable venture. This has increased demand for finger millet, which is resistant to blast and blight diseases and tolerant of stem borer and aphids, as well as increased employment opportunities and revenue for the group members. This is closely connected to the rise in nutrient-dense food consumption, which is moving society closer to greater health.

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



## Introduction:

Socioeconomic variables like population increase, rising food prices, water shortages, climate change, and others are anticipated to pose severe concerns to agriculture and food security. Researchers and nutritionists must carefully study the choices to grow, prepare, and use different possible food sources, such as little millets, in order to battle hunger and poverty. In this context, little millets provide a substantial source of nutrients and are more resilient to climate

change. There are six types of small millets, which are plants from the grass family that have tiny seeds: Japanese millet species include finger millet (*Eleusine coracana*), small millet (*Panicum sumatrense*), Kodo millet (*Paspalum scrobiculatum*), Japanese barnyard millet (*Echinochloa frumentacea*), and proso millet (*Panicum miliaceum*). much higher than those of other grains including wheat (1.2% fibre, 1.5% minerals), rice (0.2% fibre, 0.6% minerals), and oats. It has the highest calcium content of any grain (344 mg/100 g). However, millet also contains trypsin inhibitory compounds, dietary fibre, polyphenols, tannins (0.61%), and phytates (0.48%). Gopalan and others (2004).

Phytates, polyphenols, and tannins can increase the antioxidant activity of millet meals, which is essential for preserving health and preventing diseases associated with ageing and metabolism (Hadimani and Malleshi, 1993). Due to its greater fibre content, which also aids in preventing constipation, excessive cholesterol, and intestinal cancer, it has numerous advantages. Finger millet is a small crop that is produced extensively in India and Africa. It is a native of Ethiopia and is also known as ragi and mandua in India. It is a common cuisine in these countries and gives a lot of people, particularly those in lower socioeconomic classes, a lot of calories and protein. With 58% of the nation's production, Karnataka is the state that produces the most finger millet, although few Indians are aware of its nutritional value or health benefits. In India, finger millet ranks behind wheat, rice, maize, sorghum, and bajra as the sixth most popular crop. O'Kennedy and others (2006)

With 58% of the nation's production, Karnataka is the state that produces the most finger millet, although few Indians are aware of its nutritional value or health benefits. The sixth-largest crop grown in India is finger millet, which is followed by wheat, rice, maize, sorghum, and bajra. Finger millet is the fourth most significant millet in the world, behind sorghum, pearl millet, and foxtail millet. Sharathbabu *et al.* (2008)

As a result, finger millet and other tiny millets are advised as an alternative to rice for diabetics (Upadhyaya *et al.*, 2007). The benefits of finger millet for health have caused demand to soar. It is typically consumed in a number of forms, including mudde, thick or thin porridge, fermented porridge, unleavened bread (roti), and brewing. The biggest obstacle to grains being accepted by children, meanwhile, has been their dark colouring. In this preview, a concept for white finger millet has arisen. Due to their improved consumer acceptance, more protein, lower

fibre, and lower tannin content, white grain types are preferred over both brown and white grain types (Yenagi *et al.*, 2010). As a result, there has been an upsurge in demand for white grained finger millet in metropolitan areas and the baking industry. To add value, especially for the baking industry, an effort was made to develop a white-grained finger millet type.

Despite being recognised as healthful foods, millets, particularly finger millet, have only recently begun to be used in food applications. They are currently underutilised and only available to traditional consumers in limited growing regions. Customers' ignorance of its health advantages and, secondly, a lack of availability in a convenient form, are the main contributing factors. Processing finger millet in both conventional and contemporary ways would increase the diversity of food uses for it and provide goods with higher value and more convenience. Making use of them to produce foods that are already prepared or cooked could persuade those who don't often eat finger millet to do so. In addition to improving the nutritional security of the community, higher consumption of finger millet will open up chances for stakeholders to enhance their income and create jobs. Through Self Help Groups (SHGs), the establishment of finger millet processing businesses was started in the years 2010–2011 using the cluster concept. It is important to note that achieving faster and more inclusive development requires the economic and social empowerment of socially disadvantaged groups and marginalised areas of society.

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:** During the years 2020–2022, Krishi Vigyan Kendra in the Chikkaballapura district will conduct a Front-Line Demonstration (FLD) on the growth of entrepreneurship through branding and market linkage for value-added finger millet goods. An ICAR Action Pan Committee endorsed the FLD. The FLD was conducted in the Chintamani taluk, Chikkaballapura district's Anooru hamlet. It is one of the cluster villages that Krishi Vigyan

Kendra, Chikkaballapura, has chosen to implement activities in for the 2020–2022 academic year. The following is a description of the village's supported activities.

**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:** Finger millet value addition, processing, and seed treatment during production were the main topics of the trainings. Twenty farm women in total were chosen to get thorough instruction in processing and value addition. Second, extensive value-added product testing were carried out through on- and off-campus trainings, and acceptable goods with commercial potential for generating money as well as supporting farm women's business development were chosen. These farm women also received additional training in nutrition education, the value addition of food items, managing processing and value-added units, maintaining hygienic handling procedures for food goods, labelling, packing, obtaining licenses, and financial management. Additionally, these women received sensitization training in linkage creation and marketing techniques.

**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:** The creation of their own processing facility was required in order to prepare items that were only made from finger millet in order to bring systemization and

regular manufacturing. Consequently, a strategy for the development of a processing unit with the absolute lowest amount of machinery was created.

**Packaging and labeling:** Packaging acts as a sneaky salesperson. Farm women were given guidance to create appealing and functional packaging with nutrition labels in order to market their products and increase their market opportunities.

**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:** Table 3 lists the sociodemographic characteristics of the farm women who process and add value to finger millet. According to the age distribution, the majority of farm women were between the ages of 26 and 35 (55%) and 21 to 25 (30%), respectively. In terms of literacy, 50% of women had completed high school, followed by 25% who had only completed primary school, and 10% were illiterate. The majority of them (80%) were farm labourers, followed by housewives (20%), according to the occupation distribution. The majority of these women (55%) were already parents of two. The findings also revealed that nuclear families made up 65% of all families.

**Establishment of processing and value addition unit:** Twenty farm women from Anooru village stepped forward to start processing and adding value to finger millet as an entrepreneurial activity after learning about processing, creating value-added goods, and packing. This is shown in table 4 after they were led by Mrs. Jyothi. They created a small-scale processing and value addition unit under the technical direction of Krishi Vigyan Kendra through a Front Line Demonstration on "Entrepreneurship development through value addition finger millet KMR-340" under the brand name "Sri Seetha Byraveshwara Swami Sanga". They first acquired a facility with a 2000 square foot unit area for the unit's construction, after which they bought and set up the essential machinery, including a destoner, a pulverizer, a roaster, a weighing scale, and a sealing machine. They registered value-added finger millet products with the Food Safety and Standards Authority of India in 2006 (FSSAI Reg. No. 21220048000019) with the help of Krishi Vigyan Kendra.

**Nutrient composition of value-added products:** The nutritional makeup of the value-added finger millet products malt, mixture, laddu, and kurkure was calculated and is shown in table 5. The goods that were promoted through these interventions had nutrient contents that ranged from 353 to 446 kilocalories of energy, 4.47 to 12.31g of protein, 1.3 to 13.13g of fat, 194 to 256 mg of calcium, and 1.6 to 3.20 mg of iron.

**Marketing of the value-added products:** The first step in the commercialization of the value-added goods was marketing through the Krishi Vigyan Kendra market outlet, which was then introduced to some supply stores in Chintamani. Later, they were forced to take part in a variety of shows held by agricultural universities, government agencies, and NGOs. to widen their network of markets. 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:** The average outcomes of the current activity are shown in tables 6 and 7 based on data collected over the previous two years. The economic analysis of the four products—finger millet malt, laddus, mixture, and kurkure—is provided in Table 6. The table shows that the monthly sales are around 323 kg of malt, 150 kg of laddu, 225 kg of mixture, and 122 kg of kurkure, with monthly net profits from malt, laddu, mixture, and kurkure totaling Rs. 12920, Rs. 5250, Rs. 9000, and Rs. 4880, respectively. Meanwhile, the price of unprocessed finger millet is Rs. 30 per kg. The findings are consistent with those of Patel et al.'s (2014) studies, which examined the economics of ragi malt and multigrain flour produced and sold by SHGs in the Jagadpur District of Chhattisgarh, India. The groups generated profits of Rs. 1205.00 and Rs. 895.00 per 100 kg of the product sold from ragi malt and multigrain flour, respectively.

Agricultural women quickly established a lucrative source of income by turning agricultural produce into products, bringing in a net income of about Rs. 3.0 lakhs per year. The University of Agricultural Sciences recognized Mrs. Jyothi's enthusiasm for farming and the entrepreneurial world and named her the "Best Farm Women at Taluk level" in 2021. Many farmers and farm women approached KVK to start similar businesses after seeing the success of these members.

**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** | Home maker | 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 × 2400 = Rs. 240,000<br>Net income = Gross income – total expenditure = Rs. 240,000 – 135,000 =100,000 | |
| B/C ratio (benefit/cost) = 240,000/135,000 =**1.7** (benefit of one rupee 70 paisa 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

Krishi Vigyan Kendra's guidance, helped farm women to feel more secure to begin small-scale food processing and value-added companies in their communities and sell their goods in urban areas. The organised introduction of farm women to the preparation and processing of value addition to finger millet is an innovative strategy for cultivating self-reliance. In addition to raising household income and creating new jobs, the millet-focused entrepreneurial activity has also spared farm families the bother of hunting for work to support their families. When finger millet is more widely available, consumption rises, which encourages people to eat a wider variety of nutrient-dense foods.

| | |
|---|---|
|  |  |
| **Pic 1. Seed Treatment** | **Pic 2. Sawing** |
|  |  |
| **Pic 3. Field visits** | **Pic 4. Field Day** |

**Pic 5. Demonstration on value addition**


**Pic 6. Labelling with FSSAI no.**


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**Pic 7. Newspaper article**



## COMPETING INTERESTS

Authors have declared that they have no known competing financial interests OR non-financial interests OR personal relationships that could have appeared to influence the work reported in this paper.

**References:**

- Chetan, S. and Malleshi, N. G. Finger millet polyphenols: optimization of extraction and effect of pH on their stability. Food Chemistry. 2007; (105):762-870
- Gopalan, C., Ramashastri, B. V. and Balasubramanian S. C. Nutritive value of Indian Foods. NIN. Hyderabad. 2004; 47-91
- Hadimani, N. A. and Malleshi, N.G. Studies on milling, physicochemical properties, nutrient composition and dietary fiber content of millets. Journal of Food Science and Technology.1993; 30:17-20.
- O'Kennedy, M., Grootboom, A. and Shewry, P. Harnessing sorghum and millet biotechnology for food and health. Journal of Cereal science. 2006;44(3):224-235.
- Patel, S., Naik, R.K., Sahu, R. and Nag, S.K. Entrepreneurship development through finger millet processing for better livelihood in production catchment. American International Journal of Research in Humanities, Arts and Social Sciences. 2014; 8(2):223-227.
- Savitha, C. M, Siddaramaiah, B. S. and Nataraju, M.S. Development of a scale to measure the entrepreneurial behaviour of rural and urban women entrepreneurs. Mys. J Agric. Sci. 2009;43(1):1190-121
- Sharathbabu, Sonnad S.K., Santhakumar G. and Salimath P.M. Karnataka Journal of Agriclutural Sciences. 2008; 21(2): 190-193.
- Thimmayamma, B.V.S. A hand book of Schedules and guidelines in socio economic and diet surveys. 1987;40-42.
- Upadhyaya. H., Gowda, C. and Reddy, V. Morphological diversity in finger millet germplasm introduced from Southern and Eastern Africa. Journal of Agricultural Research. 2007;3(1):1-3
- Yenagi, N. B., Handigol, J. A., Bala Ravi, S., Bhag Mal and Padulosi. Nutritional and technological advancements in the promotion of ethnic and novel foods using the genetic diversity of minor millets in India. Indian Journal of Plant Genetics Resources. 2010; 23(1):82-86.