



**INSTITUTION OF AGRICULTURAL TECHNOLOGISTS,
BENGALURU**



**EVALUATION OF RKVY PROJECTS
OF
UNIVERSITY OF AGRICULTURAL SCIENCES,
RAICHUR**

**“PROCESSING AND VALUE ADDITION TECHNOLOGY OF
MILLETS FOR NUTRITIONAL SECURITY
IN
HYDERABAD KARNATAKA REGION”**

**INSTITUTION OF AGRICULTURAL TECHNOLOGISTS,
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PROCESSING AND VALUE ADDITION TECHNOLOGY OF MILLETS FOR NUTRITIONAL SECURITY IN HYDERABAD KARNATAKA REGION

EXECUTIVE SUMMARY

Global food security has been increasingly narrowing down to a handful of crops. Over 50% of the global requirement for proteins and calories are met by just three grains, maize, wheat and rice. Only 150 crops are commercialized on a significant global scale, while humankind over time, had used more than 7,000 edible species. The narrowing base of global food security is limiting livelihood options for the rural poor, particularly in marginal areas. Addressing their needs requires that we broaden the focus of research and development to include a much wider range of crop species, as one of the options.

Minor millets, a group of small-grained grass cereals, are of importance as food and fodder in the semi-arid regions of the world. Millets are the most viable option in the dryland conditions as they require minimum water and can withstand in adverse weather conditions. These crops were cultivated in wide ranges of climatic conditions and marginal conditions of soil and moisture. In India, minor millets have traditionally been cultivated in the drylands from ancient times, predominantly by poor and marginal farmers and in many cases by tribal communities.

There is a growing interest in reviving millets in the country owing to their ability to survive in changing climatic conditions while providing high nutrition and better health. Millets provide nutritious food as compared to others cereals with high fibre content, minerals and slow digestibility. The millets can constantly help to meet out the needs of our animal feed and fodder and will continue to be grown by dryland and resource poor farmers in the foreseeable future. The millets are one of the cheapest sources of energy, high content of digestive fibre, protein, vitamins and minerals.

Difficulty in processing is the key challenge that hinders consumer demand and upscaling potential for minor millets. Several interventions can be made to facilitate access by value chain actors to processing plants on the one end and by consumers to processed millet products on the other. The lack of suitable processing units close to millet fields forces local producers to take their produce to distant places (Panwar Hema Yogendra Singh, 2015).

More specifically, there is a critical need to optimise technology for de-hulling of different small millet species, which have different seed sizes. More research is needed for improving the separation mechanism in hullers to reduce removal of grits and other usable

materials along with the husk. Improving the sieving efficiency of graders is also needed. Large-scale equipment is available for this operation but equipment tailored for the community level and the small and medium enterprise level is needed and would be most relevant for supporting development of farmer enterprises.

Keeping the above in view, “**PROCESSING AND VALUE ADDITION TECHNOLOGY OF MILLETS FOR NUTRITIONAL SECURITY IN HYDERABAD KARNATAKA REGION**” was taken up by University of Agricultural Sciences, Raichur with Rashtriya Krishi Vikas Yojana funding. The project was implemented from 2013-14 to 2016-17. The details of the project are as under:

1.	Title of Project	:	PROCESSING AND VALUE ADDITION TECHNOLOGY OF MILLETS FOR NUTRITIONAL SECURITY IN HYDERABAD-KARNATAKA REGION
2.	Nodal officer and Principal Investigator	:	Dr. Udaykumar Nidoni, Head, Dept. of Processing and Food Engineering, College of Agricultural Engineering, University of Agricultural Sciences, Raichur.
3.	Implementing Institution (S) and other collaborating Institution (s)	:	Departments of Processing and Food Engineering, College of Agricultural Engineering, Raichur
4.	Date of commencement of Project	:	2013-14
5.	Approved date of completion	:	2016-17
6.	Actual date of completion	:	2016-17
7.	Project cost	:	Rs. 175 lakhs

The objectives of the project are as follows:

1. Development of selected primary millet processing equipment for establishment of state-of-art millet processing complex at UAS Raichur.
2. Standardization of process technology for preparation of millet-based value-added products.
3. Adoption of developed processing and value addition technologies in the millets production catchments.
4. Imparting technical know-how on processing and value addition technologies among different stake holders.

The focus of Evaluation is:

- i. To evaluate the primary millet processing equipment developed by the University.
- ii. To examine the standardization of process technology for preparation of millet-based value-added products finalized by the University and its utility.
- iii. To evaluate the effectiveness of developed processing and value addition technologies in the millets production catchments
- iv. To evaluate the efforts made at imparting technical know-how on processing and value addition technologies among different stake holders.

Development of selected primary millet processing equipment for establishment of state-of-art millet processing complex at UAS Raichur.

Development of dehusker for foxtail millet

Millet is neither ready to eat nor ready to cook grains and need some kind of processing invariably for human consumption. Difficulty in processing is the key challenge that hinders consumer demand and upscaling potential for minor millets. Several interventions can be made to facilitate access by value chain actors to processing plants on the one end and by consumers to processed millet products on the other. The lack of suitable processing units close to millet fields forces local producers to take their produce to distant places. More specifically, there is a critical need to optimise technology for dehulling of different small millet species, which have different seed sizes. More research is needed for improving the separation mechanism in hullers to reduce removal of grits and other usable materials along with the husk. Improving the sieving efficiency of graders is also needed.

In this direction, a prototype of the millet dehusker has been developed under the project. The prototype has been tested for efficiency and it has been observed that the dehusking efficiency of dehusker for foxtail millet was found to be 81%. that the dehusking efficiency of dehusker for foxtail millet was found to be 81%. The head yield of dehusked grains was 97.33%. The cleaning efficiency of the grader/separator was found to be 81.66%. The broken yield of dehusked grains was 2.66%. Malathi Durairaj et al., 2018 reported dehulling efficiency of 95-96% and broken yield of dehusked grains of 4-5% with the double chamber centrifugal dehuller developed at Department of Post-Harvest Technology Centre, Tamil Nadu Agricultural University, Coimbatore, India.

The dehusker and polisher developed by Department of Processing and Food Engineering, College of Agricultural Engineering, University of Agricultural Sciences, Raichur has been installed at Agricultural Research Stations, Bidar, Hagari, Lingsugur, Gangavathi and Raichur.

Standardization of process technology for preparation of millet-based value added products has been taken up under the project and preparation flow charts have been prepared for various millet-based bakery products. Indian Institute of Millets Research, Hyderabad has already brought out Technologies of Millet Value added products detailing the methods of preparation of various products from millets. Similar efforts have been done by Central Food Technology Research Institute, Mysuru and Tamilnadu Agricultural University, Coimbatore also. There is need to bring out the literature in local language.

The bakery established in the University campus is being used for commercial production of millet-based bakery products and sale in the University Sales counter. This is a good move and helps in popularizing the millet products.

Memorandum of Understanding has been signed with two private entrepreneurs, viz., Mr. Millet and M/s. Farm Bandi for commercial production of millet-based bakery products and units have been started to manufacture millet bakery products of 500 kg/hour. These are being marketed in Ballari, Davanagere and Raichur.

Training programmes have been conducted for training entrepreneurs in making various millet-based bakery products. Totally 390 entrepreneurs during 2012-14, 212 beneficiaries during 2015-16 and 376 beneficiaries during 2016-18 have been trained at in Raichur. Similar programmes were held in Hagari, Lingsugur and Huvina Hadagali where 289, 38 and 71 beneficiaries were trained. There is need to evaluate the impact of these training programmes.

REFLECTIONS AND CONCLUSIONS

1. Efforts made in design and development of millets dehusker are praiseworthy. The University should obtain patent for the machinery developed and also take up commercial production of the machinery under PPP mode by tying up with a commercial agricultural machinery manufacturer.
2. Standardization of process technology for preparation of millet-based value added products has been taken up under the project and preparation flow charts have been prepared for various millet-based bakery products. There is need to bring out the literature in local language.
3. The bakery established in the University campus is being used for commercial production of millet-based bakery products and sale in the University Sales counter. This is a good move and helps in popularizing the millet products.
4. Training programmes have been conducted for training entrepreneurs in making various millet-based bakery products. There is need to evaluate the impact of these training programmes.

ACTION POINTS

1. The outcome of the projects is very good. However, there is a need of working model with support of private participation or as per Farmer Producer Organization principles/ model.
2. Nutritional status of millet products and their digestibility need to be worked out in collaboration with food scientists and medical practitioners.
3. Keeping quality of millet products, i.e., shelf life of products and their economics need to be worked out in detail.
4. Comparative keeping quality of dehusked and nondehusked products may be tested with economics.
5. Economics of by-products and products may be worked out in addition to value addition and nutrition quality.
6. Efforts made in design and development of millets dehusker are praiseworthy. The University should obtain patent for the machinery developed and also take up commercial production of the machinery under PPP mode by tying up with a commercial agricultural machinery manufacturer. Effort may be made include this machine under mechanization subsidy scheme.
7. Efforts made in development of the millet de-husker increases the quality input of the processed product of millets, enables the farmers to fetch more price in the market (Approximately 1000 farmers benefitted using this unit).
8. Standardization of process technology for preparation of millet-based value added products has been taken up under the project and preparation flow charts have been prepared for various millet-based bakery products. There is need to bring out the literature in local language.
9. The bakery established for commercial production of millet-based bakery products and a sale counter at UAS RAICHUR under this project enables the farmers of this Hyderabad Karnataka region as a market facility to sell their value-added product to get notable price for enhancing economic conditions of the farmers
10. Training programmes have been conducted for training entrepreneurs in making various millet-based bakery products. There is need to evaluate the impact of these training programmes.
11. Already Two Enterprises Mr. Millet and M/s. Farm Bandi (Memorandum of Understanding with UAS Raichur) has started bakery more private Enterprises are to be attracted to popularize this technology and extend the benefits to the farmers.
12. A core team of experts at the Institution level may be identified to identify suitable equipment/ technology developed to recommend and initiate for patent registration and policy formation at university level/ transfer of this technology to

other Agricultural Universities in the state for adopting / popularization among farmers through frontline demonstration and series of training programmes involving farmers, manufacturers etc.

RESEARCHABLE ISSUES

1. Rice husk is abundantly available. Hence, there is need for research on value addition to rice husk and straw (ethanol production) and their by products in PPP mode.
2. Integrated and multi-disciplinary approach for integration of indigenous technology knowledges (ITKs) in agro climatic zones and patenting.
3. Establishment of millet quality testing techniques.
4. Need for research on product development/ technology for millets keeping in view their nutritional and antinutritional status.
5. Initiate farmers use of incubation facilities on campus to enhance use of millets.