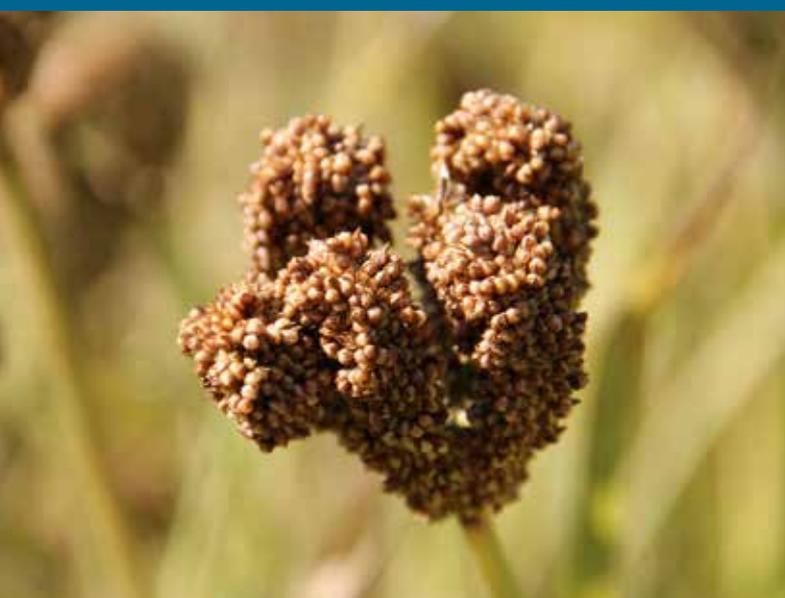


# Constraints and Opportunities for Promotion of Finger Millet in Nepal



Photos: Lise Bjerke/LI-BIRD Photo Bank

## Context

Finger millet (*Eleusine coracana*) is the fourth major cereal crop in Nepal, cultivated in 274,350 hectare with an annual production of 305,588 metric tons. The crop has a wide ecological and geographical adaptability and resilience to various agro-climatic adversities, hence it is highly suited to marginal and low external input agriculture. Finger millet grains are used to brew local alcoholic beverages, owing its significance in the local culture of some ethnic communities. It has the potential to improve food security, health, income, livestock production and overall development of smallholders living in marginal lands. Despite having multiple uses, challenges of cultivation and promotion of finger millet abound due to the constraints associated with labour intensive agronomic cultivation practices including post harvest handling and negative socio-cultural beliefs.

With due consideration of all these facts, IDRC and CIDA (currently DFATD) funded the *Revalorizing Small Millets in Rain-fed Regions of South Asia (RESMISA)* project, implemented in Kaski and Dhading districts of Nepal. The project made efforts to uplift the current status of the crop through various participatory on-farm research, innovative promotion, and inclusion of small millets in public food programmes. These efforts have shown that it is possible to improve the status of small millets,

but support from the public sector will be the key to further success of the project. It is anticipated that the outputs and lessons from the project will be integrated in the government programmes and plans for improved food and nutrition security and increased resilience to climate-induced problems in agriculture.

## Background

The major cereals rice, maize, wheat and finger millet share the largest contribution to the food and nutrition security of the Nepalese people. Among these four major cereals, finger millet is a crop with multiple values both for food and nutrition and for animal fodder and ecology. A majority of finger millet growers maintain local cultivars by continuously selecting seeds suitable to local culture and agroecosystem.

The challenges of growing and promoting finger millet are multiple despite its significance. The first challenge is that finger millet is a labour intensive crop compared to other major cereals, requiring high labour input mainly during transplanting, weeding, harvesting, threshing and grinding. This increases the workload of farmers, especially women, throughout the whole process of cultivation and preparation of finger millet food items. The crop is mostly grown in the sloped or

bench terraces in the hills, with limited possibility of mechanization to reduce the drudgery associated with production and post harvest operations. The second major challenge is that the crop is considered 'low status food' or 'food of marginalized communities', although it is consumed by the majority of households in the mid and high hill regions in varying quantity, irrespective of ethnicity. The third challenge is lack of awareness on the nutrient composition and value of finger millet on human health; consequently there is a low rate of consumption especially among the younger generation. Finally, the crop has remained neglected by research and development sectors of Nepal. It has received inadequate policy support for variety development, cultivation, value addition and promotion. Information on area and cultivation of small millets other than finger millet is scanty although they are grown and consumed by farmers in different parts of the country.

## Initiatives for finger millet promotion

Farmers are cultivating finger millet with minimum external inputs. A survey conducted in Dhading and Kaski district showed that no farmers applied manure and fertilizers to finger millet separately when they applied for maize. More than 80 percent of the farmers indicated a loss in yield of finger millet in the recent years. Less availability of farm yard manure, scarcity of labour and low quality seeds are the major constraints contributing to reduction in crop yield as indicated by the farmers of both the project sites. The survey showed that out of the total reduction in yield, more than 50 percent is due to weeds and about 10 percent is due to diseases.

Involvement of women is more than double compared to involvement of men in operations like harvesting, threshing, cleaning, drying etc. Women farmers complained about various health related problems like back ache, hand injury and respiratory problems,

associated with traditional methods of harvest and post harvest handling of finger millet. Finger millet lacks mechanization for any of the cultivation practices and post harvest handling including food processing. Studies have shown that drudgery faced by the farmers and the returns on investment are among the major constraints for declined interest towards finger millet farming.

## Key Facts

- National average productivity of finger millet is only 1113 kg per hectare which is very low compared to the potential yield of the crop.
- The area, production, and productivity of finger millet was almost stagnant the last decade.
- Only three finger millet varieties namely Dalle 1, Okhle 1 and Kabre Kodo 1 have been released for commercial cultivation. The last variety released was in 1990; almost 24 years ago.
- Different publications from Nepal Agricultural Research Council (NARC), viz. proceedings, annual reports and journals, were scanned to assess the number of publications on rice, wheat, maize and small millets. Among these publications only 6% were on small millets; the majority on finger millet.
- Out of the 154 theses published from Institute of Agriculture and Animal Science (IAAS) Rampur, only four of them were on finger millet and of these none were on plant breeding, agronomy, pathology or entomology.
- Finger millet is grown as mono-crops in the lower hills while grown as a relay crop to maize in the high hills and mountain districts in Nepal.
- The National Seed Vision 2013-2025 of Nepal targets to release/register 12 more varieties of finger millet by 2025, and the requirement of total seed crop area is estimated to be 26,801 ha in 2025 which is ambitious considering the current pace of research and development on finger millet.
- More than 17,700 tons of finger millet was imported from India in 2012-13 alone.

## Comparison of nutritional values of finger millet and major cereals

Crop	Amount of nutrients per 100 gram raw grain						
	Protein (g)	Fat (g)	Carbohydrate (g)	Fibre (g)	Ca (mg)	P (mg)	Fe (mg)
Finger Millet	7.3	1.3	72	3.6	344	283	3.9
Rice	6.8	0.5	78.2	1.0	33	160	1.8
Wheat	11.8	1.5	71.2	2.0	30	306	3.5
DRVs*	50	65	300	25	1000	1000	18

Sources: <http://earth360.in/web/Millets.html>, US Food and Drug Administration

\* DRVs based on a caloric intake of 2000 calories.

## Providing varietal options through participatory variety selection

As a part of the RESMISA project, more than 30 local accessions of finger millet were tested in diversity a block, which was followed by participatory on-farm trials using participatory variety selection (PVS) method. The project also tested a number of advanced finger millet lines in the PVS trials. Within the two seasons we were able to identify potential local varieties like *Seto Jhyape* and advanced lines like GE 5001 and GE 5016 from Hill Crop Research Program (HCRP). The farmers were fully involved in the process, where they used multiple criteria to select varieties among a pool of numerous varieties.

## Interventions to reduce labour requirement

The project tested different agronomic interventions for finger millet with an aim to reduce the labour requirement and drudgery faced by the farmers. On-farm experiments were conducted on direct seeding (broadcasting), direct seeding in line, and line transplanting of finger millet. Broadcasting and direct seeding in line showed promising results in mono-culture conditions while in the finger millet relayed into maize, line transplanting shows a potential for scaling up. However, strategic promotion of line transplanting of both maize and finger millet could go a long way in reducing drudgery and increasing production of both crops. Farmers in the project sites are interested in adopting auto-seeders for sowing maize in lines, which was also tested in the project sites. We also designed some weeding tools locally for weeding finger millet sown/transplanted in line. The efficiency of the weeding tools was not as expected, because farmers preferred the tools for multiple uses apart from weeding, but many women farmers still liked these small hand tools.

## Small machineries narrowing down the gender gap in finger millet production

Usually, men and women have different experiences of drudgery and constraints. Various studies show that women rank harvesting, weeding, and threshing jobs as drudgery. Threshing and dehulling finger millets is a tedious and time-consuming job, as reported by 90 percent of women from our working sites of Nepal. Considering the drudgery faced by women in threshing and dehulling, we tested pedal thresher developed by Agri-Engineering Division of Nepal Agriculture Research Council (NARC). The results showed that use of pedal thresher saved 30 percent of farmers' time in threshing finger millet. A total of 83 percent respondents (94.7 percent women) found pedal threshers to be an important alternative for manual threshing. They found pedal thresher good for easy grain separation, grain cleaning, and husk removal, when the grain is free of dust and other inert materials. Despite the ease and less time required for threshing, a few farmers complained about leg pain while pressing the pedal of the thresher. The result showed that the thresher also helped increase the participation of male members in threshing by 17 percent.

## Value addition and awareness raising

More than 60 individuals, including cooks from different schools, local entrepreneurs, farmers and development workers, were trained in value addition of finger millet through recipe diversification. We also assessed the knowledge of school children on finger millet. The comparison of the knowledge between children of three schools in the project villages and five schools in the Pokhara valley clearly stated that the knowledge erosion is very high among the children in the urban areas. Thus, the RESMISA project supported 15 schools in the Pokhara valley and 9 schools in the project villages on finger millet education through school lectures, video shows, school competitions and information sheets. Out of these schools seven of them have introduced finger millet recipes in the school mid-day meals, ranging from one to four times in a month.



Photo: Lise Bjerke/LI-BIRD Photo Bank

## What are the policy options?

Finger millet cultivation, production and consumption are limited by a number of constraints, thus a comprehensive and integrated research and development strategy is required. The experiences from the RESMISA project shows that the following areas should be emphasized in the coming years to uplift the status of the crop:

**Employ participatory crop improvement to supply farmer preferred finger millet varieties:** There has been more than 20 years gap in release and registration of new finger millet varieties. The Seed Sector Development Strategy (Seed Vision 2013-2025) of Nepal has given a due emphasis on finger millet along with the major cereals rice, maize and wheat. It has prioritized variety development of finger millet, with an ambitious goal of releasing 15 varieties of finger millet by 2025. This can be achieved if participatory approaches of variety improvement are considered. Participatory varietal selection method has the potential to help in identification, testing and promotion of promising varieties from the existing or introduced pool of varieties, thus having high likelihood of tailoring to the local needs.

**Take a cropping system approach in promoting agronomic package of practices for finger millet:** Improvement of agronomic practices in finger millet is a must for encouraging farmers for continued cultivation. The new cultivation practices should address the issues related to labour requirement and the drudgery faced by the farmers, especially women farmers. Experiences from the RESMISA project show that improvement in finger millet agronomy is possible with the improvement of the agronomy of other associated crops. Therefore, researchers need to look at the cropping system approach rather than on one single crop. Mechanization in the hills is extremely challenging, yet development, testing and promotion of small tools and machineries suitable to hill farming can be done to raise the interest

of the farmers in the cultivation of neglected crops like finger millet.

**Create market incentives to increase domestic production of finger millet:** A significant amount of finger millet is imported from India every year, which clearly indicates that the market demand exists. However, development of proper value chains, regulated markets, establishment of production cooperatives, and various value addition initiatives should receive support so that demand can drive the cultivation. Value addition through product diversification is another option to increase demand.

**Promote integration of local and nutritious crops such as finger millet in public schools:** The new generation is missing the opportunity to learn about the values of finger millet. The socio-cultural environment and education system does not provide any conducive platform. Thus, it is imperative that parents and school teachers are aware, and that the courses in schools and universities include lectures on crops like finger millet.

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