

Value Chain Analysis of Finger Millet (Eleusine Coracana) for Improving Economic Status of Hill Farmers in Uttarakhand, India

Nirmal Chandra

ICAR-Vivekananda Parvatiya Krishi Anusandhan Sansthan, Almora- Uttarakhand, India
E-mail: ncdiwan@yahoo.com

Abstract—In Uttarakhand hills farmers cultivate Finger Millet in a large area in rainfed condition but do not get proper dividend for this. This food-grain is rich in minerals and contains slow digesting protein, thus has a strong potential for making healthy foods. Other than the local traditional preparations various other value added products viz. biscuits, namkeen, idli, dosa, cake etc. can also be made from this. In the present study Porter's Value Chain Model (1985) was used for analysis. Focus group discussions with farmers in Raun-Dal, Bimoula, Latwal Gaon, and Naugaon villages were done. Personal interviews were also conducted with 30 respondents who were representatives of various NGOs from different parts of Uttarakhand State. To improve the primary activities in the value chain, improvements suggested for Inbound Logistics were a) procurement of Finger Millet through government agency at MSP (80%); b) government support to farmers and entrepreneurs to crate storage facilities (66%); c) training of entrepreneurs, SHGs and traders on improved crop production practices, processing and storage (56%). Improvement suggested for Operations Activities were a) ensuring supply of quality seeds and other inputs. (53%); b) providing ragi threshers to farmers (46%) and c) imparting training on value addition to entrepreneurs engaged in ragi processing. (33%).

Keywords: Finger millet, value chain analysis, hill farmers, Uttarakhand.

1. INTRODUCTION

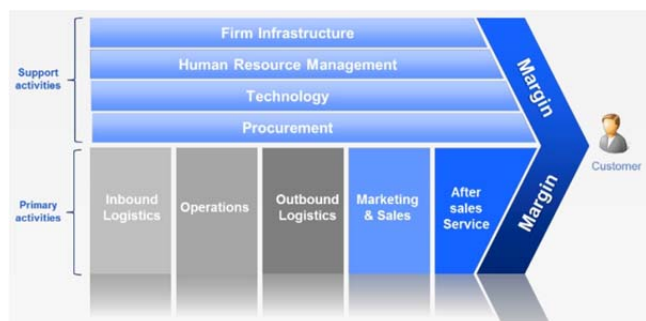
Millet can survive in areas with as little as 300 mm or less of seasonal rainfall. The minimum water requirement is 400 mm for sorghum and 500-600 mm for maize. They can also tolerate higher temperatures. Millets are better adapted than most other crops to dry, infertile soils, high temperatures, low and erratic precipitation, short growing seasons and acidic soils with poor water-holding capacity (Leder (2004)., FAO (2015). One of the most important millets worldwide is finger millet (Eleusine coracana) a product well suited for Uttarakhand hill climate. Finger millet is an important crop grown in low input farming systems by resource poor farmers in Uttarakhand hills and plays a critical role in agriculture and food security of poor farmers that infertile, and marginal lands. At the same time finger millet grains can be stored for over 10 years without significant deterioration (FAO (2015).

Beyond being well suited for Uttarakhand hill agro-ecological conditions, it is a very nutritious crop. It has more fiber, essential amino acids and minerals when compared to most other cereal grains (National Research Council, 1996). The main protein fraction (Eleusinin) has high biological value, with good amounts of tryptophan, cystine, methionine, and total aromatic amino acids, which are all crucial to human health and growth and are deficient in most cereals. For this reason alone, eating finger millet is an important preventive measure against malnutrition (National Research Council, 1996). Because of its nutritive properties, the crop has medicinal value and it is used in management of anaemia, and diabetes. Despite its potential, finger millet has faced declining use in the world over the last 50 years due to changing farming systems and low productivity (FAO (2015).

Major constraints that have hampered production and utilization of millets include limited improved varieties, poor crop management practices, pests and diseases, poor soil fertility, limited commercial utilization and lack of an organized marketing system for Finger Millet (FM) and its products⁴. Mitigation of these challenges has the potential to increase productivity, food and nutritional security among malnourished poor communities, and ultimately alleviate poverty through marketing of millet.

2. METHODOLOGY

This study was conducted in hills of Uttarakhand. Focus group discussions with farmers in Raun-Dal, Bimoula, Latwal Gaon, and Naugaon villages of Almora district were conducted. Personal interviews were also conducted with 30 respondents who were representatives of various NGOs from different parts of Uttarakhand State through pre-structured interview schedule. In the present study Porter's Value Chain Model (1985) was used for analysis.



3. RESULTS AND DISCUSSION

Economic efficiency in finger millet cultivation in hill of Uttarakhand:

From (Table 1) it is evident that there was no use of fertilizers in finger millet crop in hills. The maximum input cost in its cultivation was incurred in human labour (Rs. 8241/-) followed by farm yard manure (Rs. 5129/-), bullock labour (Rs. 1068/-) and minimum cost was involved in seeds input (Rs. 356/-).

Table 1: Cost and return (Rs./ ha/year) as input and output used for finger miller production in hills of Uttarakhand.

	Quantity		Cost/ Income (Rs./ ha/ year)	
Input	Human labour	54.76 (days)	Cost of Human labour	8214
	Bullock labour	10.68 (days)	Cost of Bullock labour	1068
	Seed	23.74 (Kg)	Cost of Seed	356.1
	FYM	10.258 (Ton)	Cost of FYM	5129
	Fertilizer		Cost of Fertilizer	-
	Urea	0		
	DAP	0		
	K2O	0		
	Plant protection chemicals	-	Cost of Plant protection chemicals	-
			Total Cost of cultivation	14767.1
Output	Yield of Main product	13.4 q	Income from Main product	16080
	Yield of By-product	26.8 q	Income from By-product	8040
			Gross Income	24120
			Net Income Gain	9352.9
Cost of finger millet Rs./Kg				5.80

Economic efficiency of Millet based cropping sequences followed in hill of Uttarakhand:

It was revealed that the input cost was minimum in case of finger Millet-Fallow crop rotation being Rs. 14767 per ha and in case of Finger Millet – Fallow – Barnyard millet – Wheat (Rs. 25604 per ha). Input-output budget shows that lowest

returns were received from crop rotations viz., Finger Millet – Fallow being (Rs. 9353 per ha) and Finger Millet – Fallow – Barnyard millet – Wheat (Two year rotation) (Rs. 14680 per ha). These crop rotations gave remarkable loss to the farmers with B:C ratios of 0.63 and 0.57 respectively.

Table: Millet based cropping sequences followed in hill of Uttarakhand.

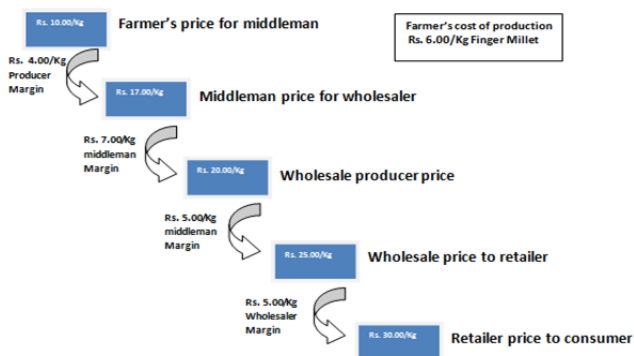
Crop rotations	Cost of cultivation per year	Net Returns (Rs) Per year	B:C Ratio
Barnyard millet-wheat	27837	20008	0.72
Finger Millet – Fallow – Barnyard millet – Wheat (Two year rotation)	25604	14680	0.57
Finger Millet - Fallow	14767	9353	0.63

The finger millet value chain is highly underdeveloped. At the production level, farmers grow finger millet and other crops in cropping sequence. Finger millet is grown both as food crop and also for fodder. Farmers sell millet mostly at the local markets to other traders and also to consumers. This is sold as grain. Traders buy finger millet to sell mainly to other traders and directly to consumers and, to a small extent, processors. Traders process a significant part of their finger millet to flour using service millers. In essence traders sell both grains and flour. Some traders also package millet flour to add value. Consumers who buy grains also make use of service millers to process the grain into flour. Flour is the main form in which millet is consumed and is used mainly to prepare chapati. Millet processors obtain grain and process and package millet flour for sale to retailers, wholesalers and to consumers. Processors tend to acquire grains from brokers and other appointed agents rather than deal with farmers directly. Like traders, they mostly sell directly to consumers. Processors also mill and pack millet products. Products are mostly straight flours and composite flour though a few are making more sophisticated products like biscuits, namkeens (Ready-To-Eat) products.

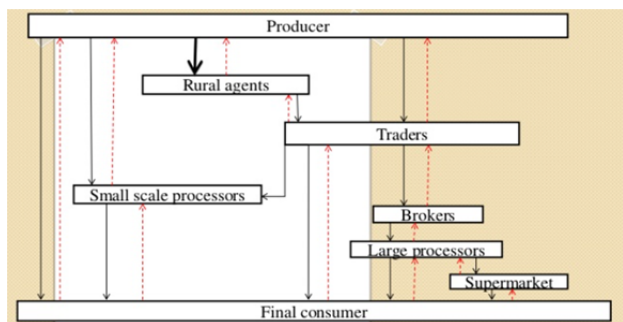
Key stakeholders in marketing of Finger Millet in Uttarakhand

Stakeholders	Role/ Responsibility
Input suppliers	Research institutes, fellow farmers, NGOs, State Department of Agriculture
Producers	Millet growing farmers
Middlemen	Rural agents, traders, small scale processors, brokers
Wholesalers	Bulk buyers from middlemen
Retailers	Mostly domestic customers

High input cost – Low margin operating environment for producers



Mapping of the Finger miller value chain and marketing channels



Channel 1 – Producer – Rural agent – Traders – Small processors – Consumers

Channel 2 - Producer –Traders – Brokers – Large processors – Final Consumers

Channel 3 – Prod. – Rural agents - Traders – Brokers – Large processors – Final Consumers

Channel 4 – Prod. – Rural agents - Traders – Final Consumers

Channel 5 – Producer – Final consumer

4. IMPROVING VALUE CHAIN:

Following table presents the suggestions documented from various stakeholders to improve the various stages of value chain.

Primary Activities	Adding value	Response (N=30)	%
Inbound Logistics (Receiving, storing and distributing inputs)	1. Procurement of ragi through government agency at MSP	24	80.0
	2. Govt. support to farmers and entrepreneurs to crate storage facilities	20	66.7

	3. Training of entrepreneurs, SHGs and traders on improved crop production practices, processing and storage.	17	56.7
Operations (Activities that change inputs to outputs)	1. Ensuring supply of quality seeds and other inputs.	16	53.3
	2. Providing ragi threshers to farmers	14	46.7
	3. Imparting training on value addition to entrepreneurs engaged in ragi processing.	10	33.3
Outbound logistics (Activities that deliver product to customers)	1. Improving market information system	17	56.7
	2. Improved transport facilities	14	46.7
	3. Opening of outlets for processed food.	09	30.0
Marketing & sales	1. Development of products as per the requirement of the customers	15	50.0
	2. Highlighting the nutritional and medicinal properties of ragi	11	36.7
	3. Good quality packaging for better presentation.	7	23.3

Support Activities	Adding value	Response (N=30)	
Procurement and purchasing	1. More number of processing and value addition units.	25	83.3
	2. Government procurement on MSP.	18	60.0
	3. “Indira Amma Restaurant” like outlets in every town	15	50.0
Human Resource Management	1. Connecting local cooks for people who want home cooked food	17	56.7
	2. Hotel Management Institute of the state to train the entrepreneurs to make high value products from ragi	12	40.0

	3. Training of farmers in handling improved implements	8	26.7
Technological Development	1. New farm machinery should be introduced to reduce drudgery.	13	43.3
	2. Regular skill development programs for farmers	10	33.3
	3. The innovations available with R&D institutes should be shared with farmers and entrepreneurs.	10	33.3
Infrastructure	1. Development of warehouses	16	53.3
	2. Creating new markets through easy transport through legal reforms.	12	40.0
	3. Responsible role of Dept. of Agri. In providing support	6	20.0

5. CONCLUSION

Conclusion Millet provides an important opportunity to improve food security and nutrition and at the same time opportunities for product development. However for opportunities to be captured, more attention is needed to improve millet productivity but more importantly improve the perception about millet from the cereal of the poor to a healthy cereal for modern health conscious consumers.

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