

Original Research Paper

A survey on the status and constraints of Finger Millet (*Eleusine coracana* L.) production in Metekel Zone, North Western Ethiopia

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ABSTRACT

The study was carried out to examine the status and constraints of finger millet (*Eleusine coracana* L.) production in four districts of Metekel zone in Benishangul gumuz region, Ethiopia. Primary data were collected from 120 farmers using structured questionnaire. The analytical tool that was used included descriptive statistics. Results showed that farmers cultivated finger millet, sorghum, maize, pulse and oil crops in 95%, 59%, 69%, 23% and 47% proportions of their total cultivate lands respectively. The result indicated that majority of the population cultivates finger millet since it is the main staple food in the area. The study also showed that weeds were

the major constraints of finger millet production which was accounted for 55%, of the production loss. On the other hand insects (termite), diseases (e.g blast), and rat infestation had an impact on production lose with 23%, 16% and 16% respectively. The study identified no application or improper application of inputs (fertilizers and seed) and not exercising the recommended management practices were the major problems in finger millet production. Therefore, it is necessary to provide intensive training and adequate extension services to the farmers and development agents to promote better finger millet production in the above mentioned study areas of Ethiopia.

Key words: Finger millet, survey, Metekel, Ethiopia.

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INTRODUCTION

Finger millet (*Eleusine coracana*) is a small seeded cereal grown in low rain fall areas of the semi-arid tropics of the world under rain fed conditions. It is hardy crop capable of providing reasonable grain yield under circumstances where other crops give negligible yield. Finger millet is staple food crop in drought-prone areas of the world and often considered as component of food security strategies. Its annual world production was around 4.5 million T of which Africa produces more than 2 million T (National Research Council 1996). It was also found that finger millet was capable of being adapted to a wide range of environmental conditions.

In Africa finger millet is grown by small-scale farmers often as intercropping with cereals legumes or vegetables. It is also important for its nutritive and cultural value especially in traditional low-input cereal based farming systems (House *et al.* 1980). In eastern Africa it is produced in Ethiopia, Uganda, Kenya, Tanzania, Rwanda, Burundi, Democratic Republic of Congo, Sudan

and Somalia (Oduori, 2005).

In Ethiopia finger millet is grown usually as sole crop in rotation with other annual crop preferably legumes by subsistence the farmers and serves as a food security crop because of its high nutritional value and excellent storage qualities (Dida *et al.*, 2007). Despite its importance as a low input crop, its productivity in the region is limited to between 400 and 2,000 kg/ha (Dida *et al.*, 2007). It is produced in Tigray, Amhara, Oromiya, Benishangule Gumz Southern Nations and nationalities and peoples (SNNP), and Gambella Regional states. The general objective of the survey was to characterize finger millet production, input and output value chain systems as well as to identify broad systemic constraints and options for field testing. The specific objectives were:

- Characterize finger millet farming system
- Understand farmers' finger millet production constraints and opportunities, crop and livestock interactions, resource use, technology preferences and

(c) market access in the target areas.

(d) Analyze the determinants of technology adoption and the impact of the McKnight project on household welfare (particularly agricultural productivity, income poverty reduction and food security).

To achieve these objectives, primary data at household, plot level were collected using developed survey instruments.

Materials and Method

The experiment was conducted in four districts of Metekel zone i.e. Mandura, Dangur, Dibate and Bullen. Metekel is one of the three zones of Benishangul Gumuz Regional State. It is bordered on the South by Kamashi, on the South West by Asossa, on the West by Sudan, and on the North by Amhara Regional State occupying an estimated total area of 22,028 Km² (Wolde-Selase, 2002). The zone has seven woredas namely: Dangur, Guba, Wombera, Mandura, Dibate, Bullen and Pawe. Altitude of the study area ranges from 1185 to 1780 m.a.l. From these four districts a total of 120 respondents were taken as representative samples of the population in the study areas based on finger millet production coverage of the area. The data were collected with the help of structured questionnaire that included demographic information of the respondents. The collected data were analyzed using Statistical Package for Social Science software/SPSS www.winwrap.com/.

RESULTS AND DISCUSSION

Socio-economic characteristics of the respondents

The socio-economic characteristics of the respondents for various variables are presented in Table 1. More than half of the respondents' age (62%) was fallen between 18-40 years implying that they are in active productive age. It was observed that 62% of the total respondents were illiterate. However, of the educated respondents, 19% of the respondents had primary education, 12.5% of them could read and write and only 7% of the respondents had secondary education. Formal education was important, since the potential for making up some of the deficiencies in farmers and assists them to have more benefit from existing extension services. It was also reported that 72% of the respondents had more than five children which is actually above the average children per family in the region.

The farmland size of 10.6% of the respondents was only two and below two ha of land, and only 75% had above 2ha. This has to play the role in using agricultural inputs. Previous studies (Habtemariam, 1996; Ngatwa, 2006; Ogunlela and Mukhtar, 2009) indicated that the male are dominated in benefiting from trainings and

extension services provided by supporting organizations. This may be related to the illiteracy and less educational level of most of the women respondents which often unable them to attend or continue formal training courses, in addition to social and economic services that were provided by supporting organizations (Aazami *et al*, 2011).

Farmers' involvement in different farming activities and cultivation of crops

The data presented in Table 2 revealed that 93%, 75%, 70%, 62%, 42% and 41% of the respondents participated and engaged in pesticide application, sowing, thrashing, harvesting, land preparation and fertilizer application respectively were males. Females were highly involved in marketing of the product i.e. 52% while 79% participated in weeding. The result showed the presence of significant participation by rural women in most of the finger millet farming activities. On the other hand, fertilizer application and land preparation activities were carried out by male and female of the respondents, 59% and 58% respectively. These farming activities by their nature are tedious and were considered by the community as works to be carried out by men. Lemlem *et al*. (2010) reported that men are equally responsible for the heavier manual tasks such as land preparation and tillage with oxen. More or less similar results were also presented by Nazar (2004) and Luqman *et al*. (2007).

Almost all rural women were found to participated in weeding activities indicating their contribution for better and vigor growth and development of the crop at early growth stage. Traditionally in most areas of Ethiopia, weeding is considered as women's task (Bishop-Sambrook, 2004; Lemlem *et al*, 2010). Rural women play key roles in most of the seed production activities which were usually carried out by men (Amri and Kimaro, 2010). Almaz (2000) reported that up to 60% of farming activities in Ethiopia are done by rural women, especially in food production and processing. Rural women in Ethiopia are increasingly managing and operating farms on a regular and full-time basis, as men leave farms in search of paid employment in urban areas (Edu, 2006).

The present study also supported the former observations. Based on the data presented in Table 3 showed that 88% of the respondents used the local variety of finger millet and only 8% of them have grown the improved variety. Thus, there should be an intervention to increase the adoption of new technologies throughout farmers using high yielding seed. This may be possible using intensive training and demonstration of improved finger millet technologies on land demonstration plots.. The two released varieties of finger millet e.g *Baruda* and *Dibatse* having an yield potential around 40 q/h should be adopted by our farmers. Similarly the (Figure 1) presented below also showed

Table 1. Socio-economic characteristics of the respondents

Variables	Frequency	Percentage
Age of respondent		
18-40	74	62
41-50	18	15
Above 50	28	23
Sex of respondent		
Male	99	82.5
Female	21	17.5
Educational level		
Illiterate	74	62
Write and read	15	12.5
Primary	23	19
Secondary	8	7
Marital status		
Married	98	82
Single	4	3
Widowed	10	8
Divorced	5	4
Separated	3	2.5
Number of household members		
2 to 4	34	28
5 to 7	54	45
8 to 10	25	21
Above 10	7	6
Total farm land size(ha)		
0.5-1	5	4
1-2	8	6.6
2-4	39	32.5
Above 4	51	42.5

Source: field survey, 2012

Table 2. Distribution of the respondents according to their participation in various farming Activities

Activities	Male	%	Female	%	Both	%
Land preparation	50	42			70	58
Sowing	90	75	2	2	28	23
Fertilizer application	49	41			71	59
Pesticide application	112	93			8	7
Weeding	16	13	9	8	95	79
Harvesting	74	62	1	1	45	37
Trashing	84	70	3	3	33	27
Marketing	7	6	63	52	50	42

Source: field survey, 2012

Table 3. Cultivation of different finger millet varieties in 2010.

Variables	Frequency	Percentage
Type of finger millet variety used		
Local variety	106	88
Improved variety	8	7

Source: field survey, 2012

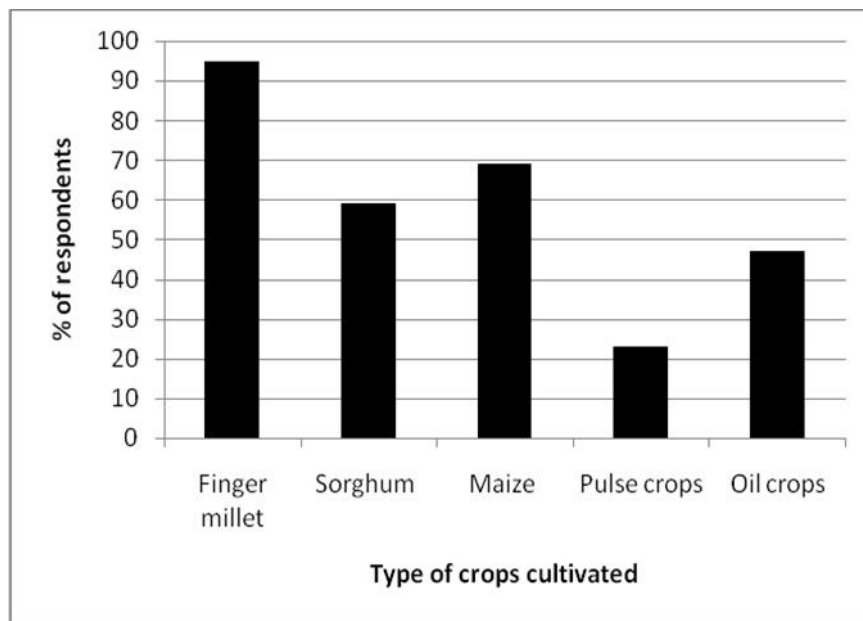


Figure 1. Cultivation trend of various crops in 2010.

that farmers cultivated finger millet, sorghum, maize, pulse and oil crops in 95%, 59%, 69%, 23% and 47% proportions respectively. Therefore, it is clear that the majority of the farmers grew finger millet since it is the main staple food in the area.

Utilization, livestock interaction and market access of finger millet

Finger millet is indeed a versatile crop for the people of Metekel zone of Ethiopia. Present study has shown that they used finger millet for making *Injera*, *Genfo*, *Kita* and cultural drinks such as *Areqi*, *Borde* and *Tella*. Of the total respondents 87% of them have used the crop for the preparation of the above mentioned food items. On the other hand only 4.2% made *Injera*. The Gumuz who are regarded as the indigenous people of the area consistently used the crop for *Borde* and *Porridge* than the corresponding settlers' and they prefer red finger millet for this purpose. However, black finger millets are preferred by others when they make *Injera*. Apart from the above, the present study has revealed that (Table 4), finger millet has also played a significant role in the feeding system of livestock. Most farmers used finger millet residue (straw) for animal feed which accounts 69% as indicated below which is regarded benefits for farmers without expenses for their cattle. Although 17% of the respondents used to leave the finger millet straw in the field and burnt before planting and the remaining 12% were used to build houses. Marketing has an influential impact on the production of finger millet. Therefore a strong market linkage/access should be made available

to suggest farmers and to increase productivity.

Major constraints of finger millet production and its viable solutions

Although, Metekel Zone, North Western Ethiopia has the potential to grow finger millet and other crops there are a number of constraints that reduce crop production. Among those factors that hinder finger millet production in Metekel zone some are presented in Table 4. The result showed that weeds are the major and significant constraints of finger millet production which is accounted for 55% of the total constraints, where as insects (termite), disease (blast), and rat damage have also an impact on production loss with 23%, 16% and 16% respectively.

To overcome these problems the respondents those were interviewed suggested different possible solutions and they were presented in (Tables 5 a and b). It was recorded that 30-70% of grain losses occurred because of poor weeding (Croon et al. 1984). Weeding by hand requires manual labor and if it is not done properly and on time, that may result in an increase in loss of crop yield.

Most of the farmers were used local finger millet varieties 51% of the respondents were suggested that the main achievable solution to increase finger millet production is using improved finger millet variety like *Baruda* that resists weeds such as *Striga*. The remaining 17.5%, 16% and 11% of the respondents suggested awareness creation training, decrease fertilizer price and weeding on time as a solution.

Table 4. Utilization, livestock interaction and marketing of finger millet.

Variables	Frequency	Percentage
For what purpose you used with the finger millet product		
Injera	5	4.2
All	105	87.5
What do you do with the finger millet crop residues		
To feed animals (straw)	83	69.2
Organic matter of soil	1	0.8
Leave in the field and burnt before planting	20	16.7
Used to building house	14	11.7
Not used	1	0.8
Do you have reliable market for finger millet		
Yes	57	47.5
No	61	50.8

Table 5a. List of Factors affecting finger millet production.

Factors	Frequency	Percentage
Weeds	66	55
Insect e.g. termite	23	19
Disease e.g. blast	16	13
Rat damage	16	13
Shortage of rainfall	9	7.5
Land degradation	6	5
Worm attack	5	4
Price of fertilizer	4	3

Source: field survey, 2012.

Table 5b. List of comments given by respondents to increase finger millet production.

Comments	Frequency	Percentage
Using improved variety	61	51
Awareness creation Training	21	17.5
Decrease fertilizer price	19	16
Weeding on time	13	11
Sowing on time	8	7

Source: field survey, 2012.

CONCLUSION AND RECOMMENDATION

Finger millet is the main staple food in the zone Metekel Zone, North Western Ethiopia but its productivity is not promising as compared to those of production potential of the area. It was indicated that the major factors raised by farmers as the cause of reduction of finger millet production in Metekel zone are weeds which can easily be controlled by hand weeding. However, farmers did not accept it rather they need to externalize their problems to find out solutions by external bodies instead of giving attention for to it. Although, inaccessibility to improved finger millet variety may be more important. Using

improved finger millet variety by itself without good agricultural practice like proper control of weeding does not meet the required objectives i.e. maximization of finger millet production in the zone. Therefore, intensive trainings should be arranged and given to farmers and development agents in each district to scale out the technologies with full packages phase by phase could be one of the possible solution. On the other hand the breeding program of finger millet should be continued either by crossing or collection of landraces and evaluate them to find out a variety that resist weeds and other biotic and abiotic stresses. The above two recommendations are actually taking place by McKnight

project but it needs to be strengthened and continued

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REFERENCES

- Aazami M, Sorushmehr H, Mahdei KN (2011). Socio-economic factors affecting rural women participation in productive cooperatives: case study of Paveh ball-making cooperative. *Afr. J. Agric. Res.* 6(14): 3369-3381.
- Almaz E (2000). Why is gender a development issue? In: The Proceedings of National workshop on institutionalizing gender planning in agricultural technology generation and transfer process. EARO. Pp 37-45. Addis Ababa Ethiopia.
- Amri E, Kimaro C (2010). The role of gender in management and conservation of seed diversity of crops and varieties: a case study in Bariadi, Tanzania. *Am-Euras. J. Agric. and Environ. Sci.* 8(4): 365-369.
- Benishangul Gumuz Bureau of Culture Tourism and Social Affairs (BoCTSA). 2007. Facts about Benishangul Gumuz region. Annual magazine year-4: Number-3.
- Bishop-Sambrook C (2004). "Gender Analysis: An Overview of Gender Issues in the Agricultural Sector of Ethiopia". IPMS (Improving Productivity and Market Success) Gender analysis and strategy paper, Addis Ababa, Ethiopia.
- Dida, MM, Srinivasachary, Ramakrishnan S, Bennetzen JL, Gale MD, Devos KM (2007). The genetic map of finger millet, *Eleusine coracana*. *Theor Appl Genet.* 114:321-332.
- Edlu B (2006). Extension Program Coverage and Utilization by different Categories of Farmers in Enemore and Ener Woreda, Gurage Zone. M.Sc. Thesis, Haramaya University. pp. 23-28
- Habtemariam K (1996). Agricultural Education, Research and Extension in Ethiopia: Problems and Linkages. In: Mulat, D., Aregay W., Tesfaye Z, Solomon B., Sustainable Intensification of Agriculture in Ethiopia. Proceedings of the Second Conference of the Agricultural Economics Society of Ethiopia, held in Addis Ababa. Agricultural Economics Society of Ethiopia, Addis Ababa, pp 229-236.
- Lemlem A, Bishop-Sambrook C, Puskur R, Ephrem T (2010). Opportunities for promoting gender equality in rural Ethiopia through the commercialization of agriculture. IPMS (Improving Productivity and Market Success) of Ethiopian Farmers Project Working Paper 18. ILRI (International Livestock Research Institute), Nairobi, Kenya. pp.84.
- Luqman M, Malik NH, Khan AS (2007). Extent of rural women's participation in agriculture and household activities. *J. Agri. Soc. Sci.* 2(1): 5-9.
- National Research Council (1996) Lost crops of Africa; Volume I Grains. National Academy Press, 30 Washington, DC.
- Nazar F (2004). A sociological study of participation of rural women in agricultural activities in district Khanewal. MSc Thesis. Rural Sociology University of Agriculture, Faisalabad.
- Negatwa A (2006). Agriculture in Ethiopia-Gender in Agriculture. Paper presented on the workshop for guideline formulation on gender mainstreaming in agricultural sector, April 2006, Debre Zeit. pp.9-12
- Oduori COA (2005). The importance of research status of finger millet in Africa. Workshop on Tef and Finger Millet: Comparative Genomics of the Chloridiod Cereals at the Biosciences for East and Central Africa (BECA) ILRI, Nairobi, Kenya, 28-30 June 2005
- Ogunlela YI, Mukhtar AA (2009). Gender Issues in Agriculture and Rural Development in Nigeria: The Role of Women. *Humanity and Social Sci.J.* 4(1): 19-30.
- Wolde-Selase Abbute (2002). Gumuz and Highland Resettlers: Differing Strategies of Livelihood and Ethnic Relations in Metekel, Northwestern Ethiopia. *PhD. Dissertation*, University of Gottingen, German.