



## THE EXTENT OF FINGER MILLET PRODUCTION IN SOUTH OMO ZONE IN THE CASE OF SOUTH ARI WOREDA

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### ABSTRACT

*In Ethiopia finger millet occupies 4% of the total area allocated to cereals (nearly half a million hectares) each year and also contributes about 4% to the total annual cereal grain production in the country. The production area increased from 342,120 ha to 368,999 ha with an increase of 7.3%, and the productivity increased from 3,769,290 to 5,241,911 quintals with a proportion of 28%. Six varieties (Tadesse, Padet, Wama, Baruda, Degu and Boneya) have been identified for cultivation to date. Though the varieties were initially released for cultivation in the sub-humid and mid altitude areas, their inadvertent introduction in to low rainfall areas found new adaptation zones. The production of these varieties has expanded to dry low altitude areas including regions where the crop was previously unknown. As a result of frequent drought, farmers in the dry rift valley region of Ethiopia widely adopted the variety that it is currently grown as one of the most important crops in this region. Therefore this study was initiated to discuss the production of finger millet in South Omo Zone, Ari woreda and generates information on the extent of finger millet production which is useful in designing suitable approaches for identifying gaps and intervening production constrains in the target area. The study areas comprised major finger millet producing kebeles of Ari woreda. Ten kebeles were selected systematically. Six year data on finger millet production and productivity was taken from woreda and each kebele. Data were collected through key informant interviews, focus group discussions, and questionnaires during a three-month period. Research in south omo zone, southern research institute and several national programs have resulted in considerable progress and identification of some improved finger millet varieties. The production of the crop in the study area is increasing.*

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## 1. INTRODUCTION

Finger millet (*Eleusine coracana* (L.) Gaertn.), is one of the most important food cereals in the sub-Saharan Africa and south Asia. The cultivation of this crop is relatively easy and it has been found to be reliable under circumstances where other cereal crops would have failed due to drought or would have given negligible yield. In Ethiopia, the crop is mainly grown in the northern, north western and western parts of the country, especially during the main rainy season. The nutritional value of the grain is high and it is used as important staple food and generally consumed as porridge. It is often valued as nutritious cereal by local people. This observation has scientific merit in that finger millet contains relatively higher concentration of calcium and dietary fiber than other cereals [1]. The major attributes of finger millet are therefore, its adaptability to adverse agro-ecological conditions with minimal inputs, tolerant to moisture stress, produced on marginal land where other crops cannot perform and tolerant to acidic soil and termite. Also it has high nutritional value and excellent storage qualities. Therefore, finger millets represent one of the critical plant genetic resources for the agriculture and food security of poor farmers that inhabit arid, infertile and marginal lands.

In Ethiopia, the grain is used for making native bread, injera, porridge, cake, soup, traditional breakfast called “Chachabsa” malt, local beer, and distilled spirit (Areki) alone or in mixture with teff, maize and barley. The great merit of finger millet is that it can be stored for period up to ten years or more without deterioration and weevil damage. Consequently, it has period played an important role as reserve crop. Nevertheless, its productivity is very low mainly due to lack of improved varieties, management technologies and other biotic and a biotic factor [2].

Finger millet occupies 4% of the total area allocated to cereals (nearly half a million hectares) each year and also contributes about 4% to the total annual cereal grain production in the country. Similar to teff, finger millet grain can be stored for several years under local storage conditions without sustaining significant damage by storage pests. This property together with its adaptation to low input conditions and relatively better nutritional value makes it one of the salient crops among resource poor communities living in food insecure areas. It often grown in poor soils without fertilizer. Only six varieties (Tadesse, Padet, Wama, Baruda, Degu and Boneya) have been identified for cultivation to date but appropriate management practices are still lacking. Though the varieties were initially released for cultivation in the sub-humid and mid altitude areas especially Tadesse and Padet, their inadvertent introduction in to low rainfall areas found new adaptation zones. At present the production of these varieties has expanded to dry low altitude areas including regions where the crop was previously unknown. Frustrated by repeated failure of the maize crop as a result of frequent drought, farmers in the dry rift valley region of Ethiopia widely adopted the variety that it is currently grown as one of the most important crops in this region [3].

Ethiopian national sorghum research program increased its effort to identify additional high yielding varieties that can fit in a wide range of environments. This effort drew an important lesson from past activities where extensive evaluation of hundreds of entries involving exotic sources acquired through the Eastern African Regional Sorghum and Millet (EARSAM) research network produced only limited progress. Superior genotypes selected from different stages of screening were pulled together and evaluated at multiple locations representing different agro-ecologies [1].

Therefore, this paper discusses the production of finger millet in South Omo, South Ari woreda and generates information on the extent of finger millet production which is useful in designing suitable approaches for identifying gaps and intervening production constraints in the target area.

## 2. METHODOLOGY

### 2.1. Site Description

The study was conducted during years from 2008 to 2013 based on ten potential finger millet producing Kebele's in Ari woreda. Ari woreda is located in the intensively cultivated middle altitudes, and could be said to mark the south-western limits of the traditional Ethiopian highland ox-plough agriculture. It is one of the woreda in south omo zone, Southern Ethiopia. It is bordered on the south by Bena Tsemay, on the west by the Mago River which separates it from Selamago, on the north by the Basketo special woreda and Semen Ari, on the northeast by the Gamo Gofa Zone, and on the east by Male woreda.

### 2.2. Crop Production in South Ari woreda

Ari woreda belongs to the agro-ecological classification of hot to warm sub-moist lowlands. The woreda is divided into forty eight kebeles, it has an average altitude of 1600 m.a.s.l. The rainfall pattern of the woreda is bimodal. It has average rain fall of 900mm and annually it ranges between 1400-3200mm and the mean annual temperature is 20<sup>o</sup>c. About 37% of the is 'dega' and 60% 'woina dega', while 3 % is considered as 'Wirch'. The major crops produced in the area are maize, sorghum, barley, wheat, teff, finger millet from cereals, haricot bean, faba bean, field pea, ground nut from pulses and cash crops such as coffee, kororima and chat. The farming calendar for these major crops varied depending on the season. In the main season 'Belg' which has long rain fall start from February and March the land preparation starts from December. The second season 'Mihere' receive rain fall from August and last 2<sup>nd</sup> weeks of December [4]. Major crops produced during this season are maize, barely, wheat and finer millet in large. The predominant form of crop production in the study area is rain-fed. The productivity of farmland is influenced availability of improved technologies and other production factors. As reported that the average productivity of major crops was 20-25, 10-20, and 9-12 quintals per hectare for maize, sorghum and haricot beans in general [5]. The study areas comprised major finger millet producing kebeles of south ari woreda. Ten kebeles were selected systematically. Six year data on finger millet production and productivity was taken from woreda and each kebele.

The study population comprised of three extension personnel in three extension offices and bureaus of agriculture and rural development, and the client system, i.e. finger millet growers (the end users of technology). Ten of the forty eight kebeles of Ari districts were selected randomly. Ten farmers and two key informants were randomly selected per kebeles respectively. Total of hundred farmers were selected.

Extension agents that were found in each Kebele were included in the study. Meanwhile, due to their limited number all or fifteen extension staff whose work mandate covers finger millet technology transfer are targeted, and further, Ten key extension agents/supervisors/ who involved in research-extension-farmers linkage activities and act as managers or department heads in the unit

of analysis were selected purposefully. Jinka Agricultural Research Center was selected sample because it have been engaged on linkage activities with extension and farmers for a long time and also known for the lion share of generated finger millet technologies in the study woreda.

Meanwhile, due to their limited number all or three researchers whose work mandate covers finger millet technology generation, adaptation, and transfer are included, and further, five experienced researchers who involved in linkage activities and act as managers, coordinators or department heads in the unit of analysis are selected purposefully. All in all, eight researchers were included. In sum, eight researchers, twenty-three extension staffs, and hundred finger millet growing farmers were targeted.

### 2.3. Data Collection Instruments

Qualitative and quantitative primary data were collected through focus group discussions and questionnaires. In depth interviews were conducted with three experienced researchers and eleven extension workers holding no managerial roles and which are not targeted as a sample. Moreover, twenty key informant farmers from each kebeles comprised of leaders, women's, and progressive farmers had participated in the key informant interviews.

### 2.4. Data Analysis

Descriptive statistics was used to analyze the research-extension-farmers linkage in finger millet technology development, deliver, production and utilization. The qualitative data generated using farmer group discussions (FGDs) and key informant interviews (KIIs) are analyzed thematically.

## 3. RESULTS AND DISCUSSION

**House Hold Characterization** of the 100 household heads interviewed, only 12% were females, indicating that most of the households were headed by men. The farmers had an average of twenty years of farming experience. Only nineteen percent of the farmers had formal education. All the researchers surveyed were males, suggesting probably the presence of high gender disparity in the research organizations in one reason or could be the presence of few and young women researchers in the organizations. On average, the researchers had six years of working experience.

### 3.1. Improved Finger Millet Varieties

Forty three percent (43%) of the farmers claimed to be aware of improved finger millet varieties. However, only 15% of them had been cultivating at least one improved varieties of finger millet, namely 'Degu' (13%), 'Tadesse' (2%), and 'Padet' (0%) in their farming experience. When asked whether they had been cultivating at least one of the improved finger millet varieties in 2008 and 2009 cropping season, only 7% and 6% of farmers claimed the cultivation of only 'Degu' variety in the respective years. On the contrary, majorities (57%) of the households had no awareness or understanding information that new finger millet varieties were exist in the technology system of the study area. Thus, it depicted the existing gap between researchers, extension agents, and farmers in developing and delivering sound finger millet varieties and

practices. The group discussion and key informant interviews held with the farmers, researchers, and extension agents revealed that the improved varieties that were developed, demonstrated and transferred to the study district in the last ten years were, 1) Degu variety in 2005, 2) Padet variety in 2002, and 3) Tadesse variety in 2003 cropping seasons. However, the farmers claimed the rejection of two of the improved finger millet varieties (Padet and Tadesse) by indicating that their local finger millet varieties, especially the best-preferred variety (Deqe) were superior to the improved varieties almost in all traits, with respect to grain yield, straw quality, grain color, early maturity, quality for local consumptions, weed tolerance, easy of threshing, and preference in market. It implied that research output for finger millet variety were minimal and lagged behind the farmers need for the staple crop.

### **3.2. Researchers Awareness of Farmers Best Local Finger Millet Varieties**

To determine whether researchers were really knowledgeable about farmers' local finger millet varieties and practices, they were asked to respond to questions related to farmers' practices or varieties that were perceived to be interesting and better than some of the recommendations from the research organizations, and to cite the best local finger millet varieties that were rated highly by farmers.

Only six or about 33% of the researchers claimed to be aware of local finger millet varieties that were superior to some of the practices recommended by their research organization. When asked to name at least one local finger millet varieties that farmers rated highly, five out of the six (83.3%) of the researchers correctly mentioned any such varieties (Deqe (two of them), Tiukur dagusa (2), Necho (1 of them)). On the contrary, twelve (about 67%) of the researchers claimed that they were not aware of best local finger millet varieties or practices that outstands the improved finger millet practices. Generally, focus group discussion held with farmers and extensionists revealed that four local finger millet varieties of names, Deqe, Necho, Angedie, and Tikur dagusa, respectively are grown in the study district.

### **3.3. Extension Agents Awareness of Farmers Best Local Finger Millet Varieties**

As with researchers, extension agents were also asked about their awareness of best local finger millet varieties. Eighteen or the majority of the extension agents (69.2%) claimed that they were aware of local finger millet varieties that were better than the recommendations from the research organizations. Moreover, fourteen out of the eighteen (77.8%) of the agents correctly mentioned any such varieties (Zeymi barge, eight of them), Tiukur dagusa (four), Tsame barge (two). About 30.8% of the extension agents were not aware of best local finger millet varieties that were superior to improved finger millet varieties or practices.

### **3.4. Researchers, Extension Agents and Farmers Participation in Joint Demonstration Trials**

Joint demonstration trials were also one of the prominent linkage activities where by researchers, extension workers and farmers were participated collaboratively regarding finger millet technologies. About half of the researchers had attended joint demonstration trials with farmers and extension workers at least once in 2008 and 2009 cropping seasons, about 26.9 percent

and 36 percent of extension agents and farmers respectively indicated that they had also attended such activities.

### 3.5. Extent of Finger Millet Production

The production of the crop in the woreda is increasing from year to year as shown in table-1 below. Due to fluctuation of rain fall precipitation, farmers demand to grow finger millet has been increasing. Basemal and Keyessa kebele share large finger millet production potential in the woreda (Table 1).

**Table-1.** Area covered and production of finger millet in south Ari woreda

N o.	Name of kebele	Years											
		2008		2009		2010		2011		2012		2013	
		Area covered (ha)	Production (qt/ha)										
1	Basemal	8	32	10	60	14	112	18	153	24	216	28	280
2	Kayessa	6	24	7	42	8	64	16	136	20	180	26	260
3	Arekisha	6	24	6.5	39	7	56	12	102	16	144	24	240
4	Kure	5	20	6	36	7	56	10	85	14	196	22	220
5	Tenbele	5	20	5.5	33	6.5	52	8	68	12	108	18	180
6	Aliga	4	16	5	30	6	48	8	68	10	90	16	160
7	Bathet	4	16	5	30	6	48	7.5	63.75	10	90	14	140
8	Geza	4	16	4.5	27	5	40	6	51	8	72	12	120
9	Senmamere	3	12	4	24	5	40	5.5	46.75	7.5	67.5	10	100

### 3.6. Achievements on Finger Millet Technology

In the past decade, 2001-2010, finger millet production area in Ethiopia increased from 342,120 ha to 368,999 ha with an increase of 7.3%, and the productivity increased from 3,769,290 to 5,241,911 quintals with a proportion of 28%. This was partly due to the adoption of improved varieties and production practices as well as the ability of the crop to adapt marginal lands. Thus, a continuous supply of high yielding varieties that have stable performance in a wide range of environments is needed for sustainable production [1].

Southern research institute, jinka agricultural research center and other national programs have resulted in considerable progress and identification of some improved finger millet varieties. As result variety Tadesse was demonstrated to growing agro-pastoral during 2007. Tadesse reach almost major finger millet producing areas of south omo zone especially, south ari woreda through pre-scale up program. As result the area coverage and production of the crop increased from year 2008 to 2013 almost in triple as shown in table-1 above.

Also 25 new lines were tested for preliminary yield trial at Jinka research center on-station from 2006-2009 and out of these only six lines were selected for regional variety trial. During 2011 and 2012 cropping season six new lines namely, LR001, LR002, LR003, LR004, LR005, LR006 and with standard check (Tadesse ) were tasted at Jinka , Kako, Halaba and Konso. Data from each location is now organized and submitted for national plant health and quality control for variety evaluation and release [6]. This will have significant contribution on the production and productivity of finger millet in south omo especially south ari worda.

### 3.7. Major Gaps and Limitations in the Production and Use of Finger Millet

Major limitations for sustainable finger millet technology use have also been identified by many national programmes such as low priority on finger millet, declining funding for its

conservation, lack of trained and experienced staff, lack of facilities for multiplication and regeneration.

Farmers' awareness of improved finger millet technologies and researchers' awareness of best farmers' finger millet varieties are low. Thus, further work is required to create awareness and improve their perceptions through joint participation in linkage activities for sound generation, transfer, and adoptions of new finger millet technologies.

#### 4. CONCLUSION

As potential area for finger millet production, area coverage and productivity is being increased. Farmers demand to grown finger millet has been increasing. This may due to fluctuation of rain fall precipitation in the study area. Also improved variety avail is not negligible as the area is remote part of the country.

Accordingly, the extent of finger millet of production is increasing in the study area. Research study on variety development is also on progress. Finger millet can be a potential cereal for food security under the rapidly changing climate, alleviating its constraints will remain a challenging task for the researchers and office of agriculture.

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