Assessment of Challenges and Opportunities of Row Planting of Teff in Case of Chilla Kebeles of Dehana Woreda, Ethiopia

Moges Girmay, Mekelle University

Abstract

This study Analysed challenges and opportunities of row planting of Teff in case the of Chilla kebele of Dehana Woreda. In this study, multistage sampling techniques were used. In the first stage Dehana Woreda and Chilla Kebelle were selected purposively and in the second stage 45 sample respondents were selected randomly.

The finding of the study was: Firstly, the study was on assessment of the level or status of farmers in practicing row planting of Teff. They have been in a good understanding about benefits and the yield in row planting was greater than the yield in broadcasting methods of sowing. But, according to the result, the way of introducing the technology didn't consider the participation of all level of farmers. Due to this, small holder farmer had low participation in practicing row planting. Furthermore, the status of farmers was good in theoretical understanding but farmers who practice the technology were not using it continuously. Secondly, in practicing row planting farmers were exposed to different challenges like labor shortage, time shortage, no any field day and platform, problems from low performance of top level manager, the age of the household and other natural related problems hinder their level of practicing row planting of Teff. Thirdly, we had setting suitable arrangement of opportunities for filling the challenges of farmers to scale up their rate. These were: participatory based awareness creation, skilled professions, fair distribution of improved seed and fertilizer, increasing and diversify the roles of government for the achievement of practicing row planting of Teff. Furthermore, the status of farmers was more or less in good position but due to different challenges they were not used using the technology in a continuous manner. As a result, different opportunities were recorded from farmers based on their idea and our observation of the study area. We recommended the systems, different activities, and the concerned bodies that should be addressed for the success of practicing row planting of Teff.

1. Introduction

1.1 Background

Ethiopia's economy is mainly based on agriculture, which accounts for about 46% of the GDP of the nation and 90% of its export earnings and hold about 85% of the country's labor force (UNDP, 2002). Eragrostis Teff (Zucc.), is a small cereal grain indigenous to Ethiopia. It is the most preferred staple food by the majority of Ethiopian population. Teff grains are milled into flour and mixed with water in order to form slurry and fermented for two or three days and baked into a flat soft bread –just like pancake, which is locally known as "Injera" (Haftamu et al, 2009). Teff is most widely important cereal grain of Ethiopia, which is most probably adopted thousands of years ago before the birth of Christ (Seyfu, 1997). As a result of this it is a part of the society's culture, tradition and food security. It is a hugely important crop to Ethiopia, both in terms of production and consumption. In a country of over 80 million people, Teff accounts for about 15% of all calories consumed in Ethiopia. Furthermore, approximately 6 million households grow teff and it is the dominant cereal crop in over 30 of the 83 high-potential agricultural Woredas (MOA, 2011). In terms of production, Teff is the dominant cereal by area planted and second only to maize in production and consumption. However, yields are relatively low (around 1.2 tones/ha) and suffer from high loss rates (25-30% both before and after harvest). As a result of this, it reduces the quantity of grain available to consumers by up to 50%. Furthermore, while wholesale prices for Teff are relatively high, making the crop attractive to some producers as a cash crop, production costs are also high.(ATA Ethiopia 2009).

Teff, one of the staple food crops of Ethiopians, is believed to be originated, domesticated and diversified in the country. It is highly important crop to Ethiopia both in terms of production and conception. In country of over 80 million people Teff accounts about 15% of food conception (MoA, 2011).

Row planting technology is one of the new ways of increasing crop production level of Teff. It is recommended for increasing production to sustain their feeding requirement and other economic gain of the country.

1.2 Statement of the Problem

Teff is a highly valuable grain for Ethiopian people both in production amount and in consumption level, BUT in fact Teff production system used by the majority of farmers is very backward and traditional, most of the farmers in the country broadcast Teff seeds, i.e. scattering seed by hand, at high seed rates. This impedes Teff yields because of high amount and uneven distribution of the seeds makes weeding difficult and increased competition with weeds and other Teff plants lowers nutrient uptake by the individual Teff plant (Berhe et al. 2011; Fufa et al. 2011). This results in the reduction of Teff yield at the harvesting period. Especially in the study area Teff production and adoption of row planting were very low due to traditional planting method (broadcasting).

This study intended to assess and addressed the challenges that farmers faced with the application of row planting of Teff seed with reduced seed rate. Based on the results of this study, ways and directions have been provided to policy makers and concerned stockholders in order to improve farmers' adoption level of modern agricultural technologies and enhance Teff yield production.

1.3 Objectives of the Study

1.3.1 General Objective

- To assess the challenges and opportunities of row planting of Teff in the study area.

1.3.2 Specific Objective

- Assess the status of row planting of Teff in Chilla Kebelle
- To identify the challenges of row planting of Teff in Chilla Kebelle
- To identify the opportunities of row planting of Teff in Chilla Kebelle

1.4 Research Question

1. What are the challenges of row planting of Teff in Chilla Kebelle?
2. What are the opportunities of row planting of Teff in Chilla Kebelle?

1.5 Significance of the Study

The rationale behind conducting the study was to provide an input for policy makers to have information's about row planting of Teff. To provide

information about the factors that hinder adoption of row planting of Teff. This research result create the need to improve living standards of farmer by increasing their production capacity. The study provides information for those who wants to conduct further study on the issue. The study also helps farmers to learn from their problems. This means the challenges are identified and appropriate solutions are also given to farmers to increase their knowledge level about line sowing of Teff. This study also can change farmers' existing knowledge of sowing Teff in traditional way to the modern and recommended technology of line sowing of Teff.

1.6 Scope of the Study and Limitation of the Study

Since it was not possible to cover all areas of the Woreda due to low available time and resource, the research was conducted in chilla Kebelle, Dehana Woreda, Amhara region to assess challenges and opportunities of Teff row planting.

The challenges to conduct the study were:

- Less infrastructural faculty and most of the population were illiterate who may not able to remember all things in the past.
- Unwillingness to get interviewed – many of the respondents was unwilling to spend their time being interviewed as they were told there was no money after the interview.
- Accessibility.-Some areas were not easily accessible due to geographical location.
- Wrong Perception: - Some respondents were not open to answer questions particularly those questions referring to their income or salary..

2. Research Methodology

2.1 Research Design

The research design employed for this study was cross sectional survey type of research involving both qualitative and quantitative approaches. Qualitative data were collected from farmers understanding on line sowing technology through key informant survey, observation and other methods. Quantitative data were gathered from sample farmers by using statistical methods and tools. Cross sectional research design was used because the purpose of the study was descriptive not experimental, often in the form of survey. The fact

that they were carried out at one point of time was that they didn't give indication of the sequence of events whether it occurred after the year or not.

2.2 Types and Sources of Data

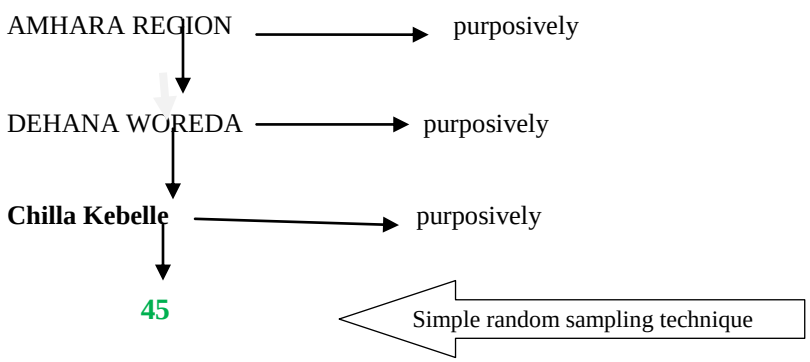
Data for this study were captured from primary and secondary data. The majority of primary data were collected from selected farmers through focused group discussion (FGD), structured interviews and field observation. Other informants: zonal and district agricultural experts, kebele administrators and development agents (DAs) were also source of primary data. In addition various documents such as , annual grain production and input application reports from Dehana Woreda; population census reports from CSA; and research reports on Teff from Ethiopian Agricultural Transformation Agency (ATA) were also used as sources of secondary data.

2.3 Sample Size and Sampling Technique

In this study, the appropriate sample size was 45 respondents by considering different factors like time aspect, financial aspect, and human resources. For the purpose of this study, multi stage sampling technique was employed to select sample farmers from probability sampling method.

In the first stage, Dehana Woreda and Chilla Kebelle were selected purposively due to very low adaptation of Teff row planting. The other justifications for the use of purposive sampling technique were proximity, time, availability of data and finance. The second stage, 45 sample respondents were select by using simple random sampling technique without any criteria to select sample respondents. With the support of DAs and Kebeles administrators.

Figure 1 Sampling Procedure



2.4 Data Collection

The following data collection tools were employed to gather relevant data for further analysis.

2.4.1 Key Informant Interview

Purposively, the researcher selected 20 respondents who were be able to provide detail information on the application of row planting technology of Teff grain production and the consequent Teff yield and yield component improvement achieved from this technology in the study area. These included eight development agents from the sample Kebelle, three officers from the district agriculture and rural development bureau and five village leaders.

2. .4.2 Structured Interviews

The major instrument used for data collection was structured interview with questions which were carefully constructed.

2.4.3 Field Observation

Field observation was conducted from the time of proposal preparation and continued through the whole processes of data gathering in order to assure the validity of acquired data. It was conducted by the researcher aiming to understand the local communities farming practice, adoption level of new agricultural technologies, and to evaluate the access to package provision for Teff grain production. On his way, the researcher took notes on soil color, topography of the land, land use and type of farm support provided by DAs.

2.5 Data Analysis

The data was analyzed after gathering primary and secondary data. The quantitative data had been organized and analyzed by using descriptive statistics like frequency, percentage, range, and minimum and maximum value to express the findings. The analysis tools like tables were used to display the key findings of the study by arranging frequencies and percentages. The qualitative data was collected through FGD_S and observation. As a result, these data were analysed qualitatively.

3. Result and Discussion

3.1 Demographic Characteristics of the Household

3.1.1 Age of Household

According to the collected data, the age of the household was between 21 and 80.The minimum age was 21, and the maximum age of the household was 80 and the range between the two was 59. The age of respondents were arranged by intervals by preparing their frequencies and related percentages. As shown in the Table 1 below, the age range of the of households were between: 21-30,, 31-40, 41-50,, 51-60 ,61-70, 71-80, and their percentile ranges were 17.77%, 20%, 24.44%, 22.22%,11.11%,4.44% respectively.

Table 1: Age Percentage of Household

No	Age	Frequency	Percentage (%)
1	21-30	8	17.77%
2	31-40	9	20%
3	41-50	11	24.44%
4	51-60	10	22.22%
5	61-70	5	11.11%
6	71-80	2	4.44%
7	Total	45	100%

Source: from own survey, 2016G.C

3.1.2 Sex of Household

From the total respondents 41 were males and the rest 4 were females. As shown in the Table 2 below. 91.11% were males and 8.88 % were females. As a result, more males were engaged in agricultural activities than females. Due to this, the experts mainly focused on males to introduce the technology of row planting without considering the participation of females. So, there was no female participation in practicing row planting of Teff.

Table 2: Sex of Households

No	Sex of house hold	Frequency	Percentage
1	Male	41	91.11%
2	Female	4	8.88%
3	Total	45	100%

Source: from own survey, 2016G.C

3.1.3 Martial Status of the Household

As Table 3 shows, out of 45 respondents 39 or (86.66%) were married and 6 or (2.7%) were windowed.

Table 3: Marital Status of Households

No	Marital status	Frequency	Percentage
1	Married	39	86.66%
2	Windowed	6	13.33%
3	divorced	0	0%
4	single	0	0%
5	Total	45	100%

Source: from own survey, 2016G.C

3.1.4 The Household's Family Size

As the data shows in Table 3 below, the largest family size was 8 and the smallest family size was 2.. In addition to this, the largest households had 4 (22.22%) and 5 (28.89%) family members respectively.

Table 4: Family Size of Households

No	Family size	Frequency	Percentage
1	2	3	6.66%
2	3	6	13.33%
3	4	10	22.22%
4	5	13	28.89%
5	6	7	15.56%
6	7	4	8.89%
7	8	2	4.44%
8	Total	45	100%

Source: from own survey, 2016G.C

3.1.6 Educational Status of Respondents

According to the data collected, the respondents were categorized under different level of educational status. As shown in Table -4 below, most of respondents (57.77%) were illiterate and 26.66% of the total sample size were able to read and write and out of these 13.33 % of the respondents completed grade 6 whereas 2.22% of them completed grade 8.

Table 6: Educational Status of Respondents

No	Educational status	Frequency	Percentage
1	Illiterate	26	57.77%
2	Able to read and write	12	26.66%
3	completing 1-6	6	13.33%
4	Completing 1-8	1	2.22%
5	Total	45	100%

Source: from own survey, 2016G.C

3.2 Socio Economic Information of Respondents

3.2.1 Occupation of Household

The occupation of respondents was shown below in the Table 5. As the data in Table indicates, some of the respondents (84.44%) were farmers who owned their own plots of farming land. The rest (4.44%) were day laborers who worked for other farmers and still others (11.11%) were both farmeres and day laborers.

Table 7: Occupation of Respondents

No	Occupation	Frequency	Percentage
1	Farming own land	38	84.44%
2	Labor for others(laborer)	2	4.44%
3	Both	5	11.11%
4	Total	45	100%

Source: from own survey, 2016 G.C

3.2.2. Income Source of Respondents

The income source of respondents shows that the source of their earnings for their life sustenance was based on farming, farming and livestock, off farm and nonfarm activities of livelihood. As the findings show, among the 45 sample size of respondents the majority of the respondents (17) lived on farming and (23) on farming and livestock and 3 respondents lived on other income activities such as trade. The rest 2 live on off farm activities.

Table 8: Income Sources of Respondents

No	Income source	Frequency	Percentage
1	Farming	17	37.77%
2	Farming and livestock	23	51.11%
3	Non-farm	3	6.67%
4	Off-farm	2	4.44%
5	Total	45	100%

Sources, Own survey, 2016G.C

3.2.3 Land Ownership of Respondents

The sample respondents possessed plots of land for various activities. Some of them used the land for cultivation, others used it for grazing, and some others used the land for growing vegetables. The rest rented the land to other farmers. Out of these types of land the largest possession of the land was used for cultivation.

Table 9: Land Showing of Respondents

Cultivated land	Frequency	Percentage	Grazing land	Frequency	Percentage	Vegetative land	Frequency	Percentage	Rented land	Frequency	Percentage
0.5	6	13.33 %	0.125	14	31.11%	0.125	24	53.33%	0.25	7	15.56%
1	14	31.11 %	0.25	18	40%	0.25	21	46.67%	0.375	11	24.44%
2	22	48.89 %	0.375	8	17.78%				0.5	19	42.44%
3	3	6.67%	0.5	5	11.11%				0.75	8	17.78%

Source: from own survey, 2016G.C

3.2.4 Livestock Ownership of Households

Most of the respondents were livestock farmers and they mainly reared oxen, cows, sheep etc. These cattle were very common source of income. They used the income for buying farm input and for their family consumption.

Table 10 Livestock Ownership of Respondents

Cow	Frequency	Percentage	Oxen	Frequency	Percentage	sheep	Frequency	Percentage
None	7	15.56%	None	3	6.67%	None	5	11.11%
1	12	26.67%	1	12	26.67%	1-3	7	15.55%
2	15	33.33%	2	25	55.55%	4-6	18	40
3	6	13.33%	3	5	11.11	7-8	9	20
4	3	6.67%	4	0	-	9-10	6	13.33
5	2	4.44%	5	0	-	11	0	-

Source: from own survey, 2016G.C

3.3 Status of Adoption on Row Planting of Teff

In Chilla Kebele, Teff was the most common type of crop and it was staple crop in the area that was grown by farmers. It was used as a source of food, source income. Consequently, almost all of the farmers grew it. However, Teff was produced in different amount.

Moreover, farmers used different types of methods of growing Teff. The most common type of sowing was broadcasting, and row planting. Row planting method was started in the Kebelle around 2003E.

Extension experts, plant experts, other agriculture sector workers had contributed a lot to introduce this methods to the local farmers throughout the Kebelle.

The survey result indicated that the types of sowing used by farmer were row planting and broadcasting. Farmers practiced row planting in a small area of plots and used broadcasting method for cultivating in a large area. But there were few farmers who used row planting alone without using broadcasting method. As shown in the table below, 77.8% of farmers used broadcasting, and only 22.2% of the total sample used row planting technology. So, the data show that farmers were using the technology in their production system.

Table -11 Status of Farmers in Row Planting and Broadcasting

No	Type of sowing	Frequency	percentage
1	Row planting	10	22.2%
2	Broad casting	35	77.8%
4	Total	45	100%

Source; from Own survey, 2016G.C

In introducing these agricultural methods, agricultural professionals had played significant and most of the respondents were happy and had adopted the new technology. However, some farmers were reluctant to implement the new technology because they thought that the new input was not useful.
The participation of the respondents in the new technology was increasing from year to year due to the professional support. Professionals raised the respondents' awareness by showing the farm result from the new technology, by explaining the benefits of fertilizers and seed,

When the new technology was introduced in 2003, the adoption rate was low. Only 2 or (4.44%) respondents started using the new technology. In the

subsequent years farmers adopted the technology and more farmers involved in the technology. In 2006, 10 or (22.22%) farmers accepted and implemented the technology but the application of row planting of Teff didn't continue. Still, there were some farmers who do not implement row planting of Teff. In 2008, the potential of practicing row planting had decreased, when compared with the previous years.

The whole rate of adoption of the technology by farmers and their status was presented in Table 12 below.

Table 12: Households who used Row Planting

No	Year of adoption	frequency	percentage
1	2003	2	4.44%
2	2004	5	11.11%
3	2005	7	15.55%
4	2006	10	22.22%
5	2007	4	8.89%
6	2008	3	6.67%
Total		31	68.88%

Source: from own survey, 2016 G.C

When assessed and compared the yield of Teff product, there was difference between row planting and broadcasting. Most of farmers agreed that row planting was effective method of sowing as compared to broadcasting. Moreover, the yield was greater in row planting as compared to the traditional method of sowing. The sowing method, yield of product, and the number of respondents involved in each type of production level were shown in the table below:

13: The Yield Difference between Row Planting and Broadcasting

No	Type of Sowing	Hectare	Yield (Qt)	Frequency	Percentage
1	Row planting	0.25 hectare	1qt	4	8.89%
			1.2qt	8	20%
			1.5qt	9	17.77%
		0.375 hectare	2.1qt	3	6.67%
			2.4qt	5	11.11%
			2.7qt	2	4.44%
	Sub total			31	68.88%
	Broadcasting	0.25 hectare	1qt	3	6.67%
			1.2qt	5	11.11%
			1.5qt	2	4.44%
		0.375hectare	2.1qt	9	20%
			2.4qt	8	17.78%
			2.7qt	4	8.89%
		0.5 hectare	3qt	7	15.56%
			3.3qt	3	6.67%
			3.6qt	1	2.22%
	Sub total			42	93.33%

Sources: From own survey, 2016G.C

The above table clarifies that 31 farmers adopted row planting. They owned different size of plot of land. The maximum size was 0.25 and the minimum was 0.375 hectare. According to their farm size farmers got different yields from 0.25 hectares of land. The maximum yield was 1.5 quintal and minimum yield was 1 quintal of Teff. For row planting, most of the farmers invested on 0.25 hectare of farm land. But ten respondents practiced row planting on 0.375 hectare of land.

Out of 45 respondents 42 respondents practiced broadcasting farm.. And in this method, the minimum farm size was 0.25 hectare and the maximum farm size was about 0.5 hectare. The status showed that farmers had great understanding on the technology but they were not able to use it due to different problems. As we had asked and understand them, respondents had interest to increase the farm size for row planting by making linkage with experts and by sharing experience from model farmers. So, this implied that the respondents' product would increase if other precondition were fulfilled by the responsible body. But at the moment, farmers used more land size for broadcasting than row planting.

3.4 Challenges in Row Planting of Teff

In Chilla Kebelle farmers faced different challenges regarding the practices of row planting of Teff. Moreover, in the survey almost all of samples (95) were exposed to different constraint to practice row planting of Teff. Based on the survey, the challenges respondents faced for practicing row planting of were discussed thus:

3.4.1 Economic Problem of Households

For practicing row planting different precondition should be fulfilled. But it was not possible to incorporate all them here because of economic problems. The main ones were listed below:

- Row planting required more labor. In dealing with row planting, several activities and man power were needed. Different activities required different manpower to apply fertilizer, to sow seeds, to measure the distance between rows and between plants. As a result, farmers in the study area were challenged by shortage of labor power. Most of the farmers had small family even they had large family, their children went to primary and secondary schools. In addition to this, there was no labor power in the vicinity in the Kebelle. Furthermore, the low level of economy limited the farmers to buy day laborers from other places.
- Row planting also required more time. It was very difficult to cover a large area of farm land within a short period of time. Due to these and other factors farmers were not able to practice row planting of Teff.
- Income level was bottleneck to farmers to recover all necessary inputs to apply row planting of Teff. Row plating methods required skills of putting seeds and fertilizer in line. Because of these farmers were challenged economically to purchase improved seed and, purchasing fertilizer in cash,
- Land size was another problem for farmers, regarding land size as we had discussed above, there was shortage of land size to practice row planting of Teff. Due to economic problem farmers were not able to purchase or rent land from other farmers. As a result, they preferred to apply the traditional method of sowing. They gave much attention to their traditional method of sowing because they were sure to get Teff product by considering their past experience than applying row planting of Teff.

- Off farm activity: In our study most of respondents were not in off farm activity from 45 households 43 were not in off farm activity. Oonly 2 households have off farm livelihood activities. As a result, they lacked income source for the practicing row planting of Teff. As a result, they were exposed to poverty.
- Livestock owner ship: In Chilla kebele there was low units of livestock. They were reared by households with poor quality and they degraded the market advantage of earning incomes for their requirement. Livestock were limited in number, for example, cows were only used for home consumption. The earnings from sellling butter and milk were not achieved by households (source : from our survey result)

In relation to land, the distance from farm also affected the farmers in getting support from professionals to practice the new technology. When the farm was far from the Kebelle, the experts didn't go to the village to help and encourage farmers to adopt the technology due to lack of car service for experts. The challenges due to economic problem of households were shown in the table below.

Table 14: Economic Problem of the Household

No	Economic problem	Frequency	Percentage
1	Labor shortage	6	13.33%
2	Time shortage	4	8.89%
3	Financial problem	10	22.22%
4	Land problem	9	20%
5	Input problem	16	35.56%
	Total	45	100%

Source: from own survey result 2016

According to the above table, lack of farm input was the significant challenge to adopt row planting (35.56%) and other main challenge was financial problem to purchase farm input. Land problem, labor shortage of labor power, and shortage time 22.22%, 20%, 13% and 8.89% respectively were the other major problem in practicing row planting.

3.4.2 Institutional Problems

Institutional problems were the other source of problems in applying row farming. These institutional problems were discussed below:

3.4.2.1 Cooperatives

It was one of the institutional concerns to access the kebele through cooperative associations. But there was a challenge of repaying system. The cooperatives gave fertilizers to farmers in reimburse system not in transaction system. When the system was in cash, poor farmers were not considered. Only rich farmers were subjected for the cash system. Cooperatives did not get the seed and fertilizer on time. They stocked them in store without using it for the right purpose on the right time. And the quality of storage house was poor. Due to this, fertilizer and seeds were not given with the exact content according to the written prescription on label of the container. 86.67% households were member of cooperatives but they were not benefited by the service given by the cooperative, and the workers were discriminated at different level of farmers. As the above table showed, the majority of the respondents (70%) were not member of cooperative. So, they had not access to input easily to adapt modern Teff row planting method.

3.4.2.2 Problem of Extension Service

The extension service had some drawbacks for farmers to practice row planting of teff. As the respondents spoke to experts that were assigned in the kebele were not performing their duties. .They focused only on model farmers by ignoring other fellow farmers. The extensions workers were not voluntary to address all farmers that were located in remote area, but they only focused on the farms around main roads and did not give any means of achieving the technology for those farmers who live at distant places.

Extension workers have problem of working with and treating farmers properly. They lacked close contact to the household. In some ways, their level and skill of profession was a source of problem to the achievement of the required result of technology of row planting. The experts also didn't have preparation and the skills to approach farmers about row planting of Teff. The farmers also did not involve in innovative platform around the merits and demerits of row planting of Teff. They simply made farmers aware that the use of new technology was mandatory. But they did not update/appreciate their indigenous or existing knowledge in order to reduce the challenge and made the package of row planting productive and effective. (Source from survey result).

Table 15: Challenges due to Problems of Extension Service

No	Problems of extension	Frequency	Percentage
1	Lack of close contact	9	20%
2	No field day	3	6.67%
3	No innovative platform	6	13.33%
4	Lack of skilled professionals	8	17.78%
5	lack of training	19	42.22%
6	Total	45	100%

Source: from own survey result 2016

As the above table shoed lack of training was the main challenge to adopt Teff row planting than the other. (42.22%) lack of close contact with extension agents (20%), lack of skilled professionals (17.78%), and no innovative plat form (13.33%) no field day to observe ground reality (6.6%) were the other main challenge for the adaptation of Teff row planting.

3.4.2.3 Problem on Credit access

Credit access was also another problem related to institutions. In the study area, most farmers were not users of credit card. The reason was that they had fear of failure and they thought paying debt with the required interest rate may reduce their production and productivity. On the other hand, some farmers used the credit card for their requirement like for purchasing improved seed and fertilizer, for renting lands and for buying labor force. The users concluded that credit was an option because they used it in place of when they were in short of money but if they got any other means, credit was not required for agricultural production (Source: from survey result).

Table 15.1: Credit Access

No	Use of Credit	Frequency	Percentage
1	Yes	7	15.56%
2	No	38	84.44%
3	Total	45	100%

Source: from own survey result 2016

3.4.3 Challenge of Natural Problem

Natural variability was one of the challenges in practicing row planting of Teff .Weather and climate condition of the environment varied from time to time. As the natural conditions varied there was impact on production and productivity of Teff. There were several natural problems. These include: lack of effective rain fall, drought, creation of pest, lack of irrigation. When there

was no enough rain fall, it affected the time of sowing of Teff and disturbed the harvesting period of Teff. As a result, farmers felt negative attitude towards row planting of Teff. When the rain fall distribution was dynamic, it reduced the quality of production and productivity.

Drought was another challenge for farmers for the applying effective row planting. When drought occurred household lacked finance to fulfill the inputs that they needed for improving production of Teff.. In the data recorded it was showed that most farmers were affected by creation of pests. As, the natural conditions varied, there was probability of creation of pests and this affected Teff in growing level and the final stage of producing fruits. Moreover, farmers do not get access to antibiotics to eliminate the pests and to raise the production of Teff.. In addition to this, due to the natural condition of the kebele, there was no irrigation for producing cash crop. (Source from survey results) Finally, the most common natural problem that challenged farmers in practicing row planting was listed in the following table below.

Table 16: Farmers Response on Challenge of Natural Problem

No	Natural problem	Frequency	Percentage
1	Lack of rain fall	2	4.44.%
2	Drought	4	8.89%
3	Creation of pest	10	22.22%
4	Lack of irrigation	5	11.11%
5	Climate change	24	53.33%
6	Total	45	100%

Source: own survey result 2016

3.5 Opportunities for Practicing Row Planting of Teff

Opportunity means revealing somebody to various advantageous chances. Similarly, respondents must have favorable condition to achieve the objectives of row planting of Teff. As a result, farmers should get different feedback for increasing the rate of adoption as well as production capacity of the technology.

3.5.1 Stepwise the activities of practicing row planting of Teff are:

- The first step is creating awareness. The first thing what experts should do is changing the attitude of farmers from their traditional or existing experience to scientific knowledge and practice.

- The government should assign well equipped or trained professionals who have sufficient knowledge about row planting of Teff. Most of the time problems arise due to lack of confidence and trust on the knowledge and experience of the farmers. Usually experts do not give much attention to what farmers said.
- Farmers should be given all the necessary input like improved seed, fertilizer and other materials. In the kebele, the major problem was lack of fair distribution of inputs to all farmers. The experts discriminated the farmers from model farmers. The achievement of the package was necessary to all farmers. As a result, there must be fair distribution. The extension system needs improvement because the experts are dealing the activities only with selected farmers for a given input, advices by different parameters.

Table 19: Activities Done on Row Planting from the Responsible Body

No	Activities	Frequency	Percentage
1	Create awareness	8	17.78%
2	Allocated skilled professions	6	13.33%
3	Provide seed and fertilizer on time	14	31.11%
4	Provide training	17	37.78%
5	Total	45	100%

Source: from experts and survey result

According to the above table creating awareness, allocating skilled professions, providing input (seed and fertilizer) on time 17.78%, 13.33%, 31.11% and 37% respectively are very important opportunities to adopt row planting of Teff in the area.

3.5.2 Increase Role of Government Organization.

Government should have a great contribution for the success of practicing row planting of Teff. The government has to set different alternatives that are required by farmers to increase participation.

- Improve output market- the market opportunity should be given to farmers to sell their products in fair and relative market advantage. Most farmers affected by fluctuation of the market price and the government must design to stable appropriate price for farmers . When the designed market system is stabilized for farmers, they are able to adopt and sale their product according to the quality.

- Introduce mechanized planter – the government should help the farmers by offering mechanized planter. It is part of a solution to solve the farmer challenge and problems in order to increase farmers' rate of practicing row planting.
  The mechanized planter should be:
- Time serving
- Robust
- Cost effective
- save animal and human labor
- Lightweight
- Adoptable by farmers
- Able to survive shipping and distribution to region :
  (Source, Ayele, S.2013)

3.5.3 Improve Institutional Development

- The government should also increase the capacity of institutional mandates, like management ability, supervision, credit and other responsibilities requiring the institutional power of the government. When the infrastructures are addressed farmers can easily adopt and practice row planting.

Increase linkage between farmers and extension experts. Their relation on the concept of row planting up to practical application is necessary. Farmers should be given access to the right experts of the kebele. When there is linkage between them, farmers gain a lot of understanding from experts. The importance and the difficulties of row planting of Teff can be differentiated by farmers based on the awareness created by high experts. The experts also get some knowledge from farmer's indigenous experience. When they are linked together they fill the gaps. The transport service also should be given to experts to reach all areas of the kebele.

Table 20: Respondents Feedback on Role of Government Organization

No	Role of government	Frequency	Percentage
1	Improved output market	7	15.56%
2	Introduce mechanized planter	11	24.44%
3	Institution development	5	11.11%
4	Increase linkage between farmer and extension	9	20%
5	All	13	28.89%
6	Total	45	100%

Source; from survey result

- Build farmer training center near the Kebelle: As the findings show, there is no available and interesting FTC in the kebele. They get special training in Dehana Woreda. As a result, to solve this problem FTC should be built near the village in order to increase their understanding and level of practicing row planting Teff .
- Improve the credit system: in the kebele the paying and credit system is cash system and farmers are challenged by repaying of the debt. To diversify the technology of row planting government should design other repayment mechanism based on the interest of farmers.

4. Conclusion and Recommendation

4.1 Conclusion

Teff is among the most widely grown cereals in Ethiopia. .It is a staple diet of the majority of the population and the most widely planted cereal by farmers. While production and productivities of the crop has been increasing through time, demand has risen faster and so the price of Teff has gone up to present years. In general the status, challenges and opportunities of row planting of Teff are summarized below::

In the Kebele, farmers used different types of sowing mechanism in the production of Teff. The most common type of sowing was broadcasting and row planting which was the new technology and the focus of the current issue of the country. The farmer practiced row planting in small plot of land and broadcasting method in large area of land. But there were few farmers who still used row planting alone. The status of farmer increased from year to year due to the professional support. It included awareness creation by showing research result, by showing mechanisms, and by creating awareness about

fertilizer and seed application. In the kebele, the farmers were more involved in the technology but there was no continuity of the application of row planting.

As a result, farmers in the study area were challenged by shortage of labor power. The reason was that most of them have small family size and their children go to elementary and secondary schools.. In the study area, farmers were also challenged economically to purchase improved seed, fertilizer, labor power, etc. In our study, most of the respondents were not in off farm activity. As a result, they had no alternative way of getting income.

The cooperatives gave fertilizers to farmers in repaying system rather than transaction system. When the system was in cash, poor farmers couldn't afford it only rich farmers were subjected to the cash system. Extension workers had problems in treating all farmers properly. They didn't have close contact with the households.

In the study area, most farmers were not users of credit. The reason was that they feared failure and they thought paying debt with related interest rate may reduce their production and productivity. Many natural problems including lack of effective rain fall, drought creation of pest, and lack of irrigation negatively affected the practice of row planting. Managerial problems including lack of supervision, lack of assessment of the program, and lack of direct involvement in practicing row planting, age of the household. Some farmers were too old to adopt the new technology whereas young framers easily adopted the new technology. The people who were older were difficult to adopt than the young in the generation.

Some of the opportunities that could help to the achievement of the new technology of row planting are:

- Arranging the activities of practicing row planting of teff stepwise
- Increasing the role participation of government organization,
- Improving institutional development
- Building farmer training center nearer to the village ,
- Improving the credit system
- Increasing linkage between farmers and extension experts

4.2. Recommendations

To increase the skills and knowledge of the farmers in practicing row planting of Teff, different studies suggest different ways. Regarding this study, the following points have been recommended. Farmers have low access to credit for purchasing modern farm input; therefore, regional government should provide finance to rural farmers so that they obtain more money to adopt the modern technology.

Farmers should be treated equally in participatory ways during awareness raising activities. Farmers should be trained in a flexible way. Training and education should be given to farmers in demonstration manner. Therefore, it is better to include graphical animations on how fertilizer and seed are applied.
The experts in the kebele enforce farmers without their interest. So disseminating the technology should be based on the interest of farmers. The linkage between farmers and extension workers and top level managers should be based on team work for applying agricultural knowledge and information system

Most of the time, the sowing mechanism is guided by the students' voluntary service, but their awareness about the technology is low. As a result, they affect the application of seed and fertilizer. So these types of gaps should be solved and activities are based on qualified personals.

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