



Research Article

Demonstration of Improved Chickpea Varieties in L/Maichew, Central Zone of Tigray, Northern Ethiopia

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ABSTRACT

Limited access of improved chickpea varieties by the farmers is one of the bottle necks for the low productivity and production of chickpea. Therefore, on farm demonstration of Teketay variety and standard check (Dalota) were carried out in L/maichew (Hatsebo and Hadsh-Adi kebelles) in 2018/2019 in the main cropping season. The current study was aimed to increase chickpea production and productivity through the improved chickpea varieties under the farmers condition with the following specific objectives: i) to demonstrate high yielding chickpea varieties ii) to assess farmers perception towards the new chickpea variety (Teketay). A total of 30 participant farmers were selected from two chickpea growing potential Kebeles of Laelay maichew district to carry out the demonstration activity. One new chickpea variety (Teketay) was compared (demonstrated) with one standard check (Dalota) on plot area of 20m*20m (400 m²) in each farmer's field. Yield and perception of farmers data were collected and analyzed using SAS and SPSS soft wares in order to evaluate the performance of the varieties. Analysis of variance result showed there was no statistical significance between the two varieties. And farmers showed similar preferences for each varieties. Hence, Teketay could be scale up/out in L/maichew and similar agroecologies to have a basket choice of varieties for the end users/farmers.

Key words: Chickpea demonstration; Farmers preferences; Improved varieties; Production and productivity

INTRODUCTION

In Ethiopia pulses are among the various crops produced in all the regions of the country after cereals (CSA, 2018). In 2017/18 in Ethiopia, pulses were cultivated in about 1.6 x 10⁶ ha with annual estimated production of 2,978,588 tons (CSA, 2018). Among the pulse's crops, chickpea is an important annual crop. It is only cultivated species of genus *Cicer*. Chick pea is the world's third most important food legume next to haricot bean and soybean (Namvar and Sharifi, 2011). Globally it was cultivated on area of 13.65 million ha with production of 13.10 million tons (FAOSTAT, 2016). It is grown in 35 countries of the world. India, Turkey, Pakistan, Iran, Mexico, Myanmar, Ethiopia, Australia, Spain, Canada and USA are top ten chickpea producing countries. Ethiopia contributed around 3% of the global chickpea production. In Africa, Ethiopia is the leading chickpea producer and ranked third in its production next to faba bean and haricot bean (FAOSTAT, 2012).

Chickpea is a relatively cheap source of protein (20–23% in the grain), energy (carbohydrates, 40%), oil (3–6%) (Gil et al 1996) and minerals (Mg, K, P, Fe, Zn and Mn

(Ibrikci et al 2003) and β -carotene (Milan et al 2006) in the developing world. It contributes significantly to sustainability of cereal-legume cropping systems, increasing the yield of cereals through enhancing the soil nitrogen and breaking the disease cycles of important cereal pathogens (Pande et al., 2011).

In spite of the multi benefits of chickpea, its productivity is low (16.30 qt ha⁻¹) in Tigray compared to the national average (20.53 qt ha⁻¹) in Ethiopia (CSA, 2018) and very much below the potential of the crop (>60 qt ha⁻¹). Limited access to improved chickpea varieties, moisture stress, low crop management practices, diseases and insect pests are the major constraints and challenges contributing for low productivity of chickpea. Therefore, keeping this fact in view, for the last few years, improved varieties were evaluated under the farmers condition through participatory varieties selection (PVS) approach in L/maichew, Central zone of tigray. Variety Teketay was selected based on better performance and farmers preference. Hence the present study aimed at demonstrating of Teketay variety at L/maichew in a wide area of land and large number of farmers. The general objective of the study

was to demonstrate improved chickpea variety so as increase chickpea productivity and production with the following specific objectives: i) To demonstrate high yielding chickpea variety ii) To assess farmers perception towards the improved about the Teketay variety.

MATERIALS AND METHODS

Description of the study area

The study was conducted in L/maichew district at Hatsebo and Hadsh –Adi *kebelles*. Hatsebo is located 5 km East from Axum town of Tigray regional state, Northern Ethiopia at 14°6'46"N and 38°46'3" E and attitude of 2084 meter above sea level. It has a Vertisols dominated clay soil type. It is situated in the northern semi-arid tropical belt of Ethiopia where teff, chickpea, wheat and faba bean are commonly grown. Chickpea is an important crop in the area both economically and ecologically. The mean minimum and maximum annual temperature are 13.2°C and 26°C, respectively (AxARC, 2012). And Hadsh-Adi is located at an altitude of 2099 m.a.s.l and situated at 14°03'28"N and 038°49'2" E. The rainy season of the L/maichew is mono modal concentrated in one season from July to September and receives from 700 to 800 mm rainfall per annum.

Sampling technique and procedures

Site and farmers' selection

L/maiche district was selected for the implementation of the demonstration activity from its potentiality for chickpea production and the high demand for the crop. Accordingly, Hatsebo and Hadsh-Adi Kebeles were selected as demonstration sites of the varieties based on accessibility and potentiality for the crop in the areas. Selection of farmers was carried out in collaboration with DAs and experts, based on willingness to contribute the land and sufficient land to accommodate the demonstration activity (400m²).

Then after training was organized and Multidisciplinary team of researchers (Agronomist, Protection and socio-economic) from AxARC delivered training to a total of 37 participants: 30 farmers, 4 DAs, and 3 experts on the following topics: participatory agricultural research and promotion through FRGs/FREGs, suitable agro-ecologies and weather condition for chickpea production, chickpea production and management packages, agronomic practices, economic and nutritive importance of chickpea, post-harvest managements and storage of the crop.

Implementation of the demonstration activity

Two chickpea varieties one standard check (Dalota) and a new variety (Teketay) were used for the demonstration activity. And 15 each farmer's at each kebele (Hatsebo and hadsh-Adi), planted with simple plot design (20 m * 20 m) in 2018/19 in the rain fed condition.

Row planting method was applied and spacing of 30 cm between rows and 10 cm between plants was employed. The recommended seed rate of 120 kg/ha was used by drilling in the prepared rows was used in the presence of sufficient soil moisture at planting time. The recommended rates of 121 kg/ha NPSB (Blended fertilizer) was applied to conduct the demonstration activity. All the recommended

Blended fertilizers rates was applied at planting. At planting farm operations (land preparation- planting 3 to 4 times using oxen plough) and the management activities to threshing were carried out by hosting farmers. Data on grain yield were weighed and recorded by Axum Agricultural research center researchers.

Field day, Farmers' preferences and selection criteria

Field visit was arranged to create awareness and farmers shared experience and knowledge.

The varieties were demonstrated, evaluated at crop maturity stage by farmers, agricultural experts, development agents, researchers and other stakeholders.

Farmers were interviewed for their preference of the varieties viz., branching ability, disease tolerance, plant height, seed size, early maturing, adaptability to their locality, uniformity, and crop stand, overall yield marketable, cooking quality and taste. Each selection and evaluation criteria were rated using the following rating scale; 1=strongly disagree, 2=disagree, 3=no change, 4=agree 5= strongly agree.

Data Collection methods

Both qualitative and quantitative data were collected using appropriate data collection methods from 11 sampled farmers. grain was harvested, threshed and yield per plot recorded. Feedback assessment on farmers' preference to the demonstrated varieties (likes and dislikes, which is the base for plant breeding process) and farmers' perception towards the performance of the technologies were also identified using semi-structured questionnaire.

Data collected

Perception/qualitative data: branching ability, resistance to disease, drought tolerance, earliness, yield performance, adaptability, seed size and uniformity and marketability, cooking quality and taste Quantitative: yield data per plot were recorded from the 11 sample farmers.

Data analysis

Data collected were analyzed using the SAS computer program, version 9.1 (SAS 2002) and SPSS and descriptive statistics such as mean, frequencies distribution and percentages. Besides, pair wise ranking matrix was used to evaluate and select best performing varieties and rank the varieties in order of their importance.

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RESULTS AND DISCUSSION

Grain yield

Demonstration of improved of Teketay demonstrated in Laelaymaichew district (Hatsebo and Hadush-Adi) in 2018/19 sown early September. The variety has demonstrated expected to give high yield compared to the standard check. However, Teketay gave an average yield of 2161.30kg/ha while from the standard check (Dalota) obtained 2309.40 kg/ha. As the inferential statistics shows that there is no significance difference between the two varieties. Both the varieties have similar characteristics in maturity but might not be the same in terms of disease and vegetative ability. From the numerical difference/not statistical, Dalota variety showed a yield advantage of the expected result is not secured against to the proposed action.

Farmers' perception towards Teketay variety

The response of respondents shows that there was no difference in most of the pre and post-harvest characteristics of both varieties. The respondents said that no change in terms of early maturity, yield quality, color preference, market demand, cooking quality and food taste (green pod, "nifro and wot"). Generally, most of the respondents evaluated the new variety is no change in any of criteria compared to the existing standard check (Dalota).

Conclusion and Recommendation

Improved chickpea variety (Teketay) was demonstrated along with the standard check (Dalota) in Laelay maichew district in Hatsebo and Hadush-adi kebelles at 30 participant farmers in 2018/19 under the rain fed condition. Training was delivered to farmers, to implement the demonstration activity. In the intervention area the improved chickpea variety (Teketay) did not show significance difference for its grain yield. A grain yield of 2161.3 kg/ha was obtained from Teketay variety whereas,

Table 1: Grain yield (kg/ha) of chickpea varieties (Teketay and Dalota)

Varieties	N	Min	Max	Mean	SD	t-value	P-value
standard check (Dalota)	11	1250	3200	2309	663.6	0.52	0.61
New variety (Teketay)	11	1200	3160	2161	607.6		

Table 2: Farmers' perception towards the improved chickpea variety (Teketay vs Dalota)

Variety attributes/criterias	N	Perception /Agreement level (n= 11)				
		St. agree (5) %	Agree (4)%	No change (3)%	Dis-agree (2) %	St. dis-agree (1) %
It has good branching ability	11	9.1	18.2	45.45	27.27	0
The variety is good resistance to disease	11	0	27.27	45.45	27.27	0
Drought resistant	11	0	27.3	27.27	45.45	0
Early maturity	11	0	18.2	54.54	27.27	0
High yielding ability	11	0	45.5	36.36	18.18	0
Good yield quality	11	0	18.2	63.6	18.2	0
The variety has good seed size and uniformity	11	0	27.27	45.45	27.27	0
It has good market demand	11	0	0	100	0	0
It has good cooking quality	11	0	0	81.8	18.2	0
It is good in food taste	11	0	27.2	81.8	0	0
The variety is attractive in color	11	0	0	100	0	0

the highest yield (2309.40 kg/ha) was gained from Dalota. Dalota showed a yield advantage of 6.41% over Teketay, although no significance difference was observed between the two varieties.

Recommendation

Chickpea variety (Dalota) which has been under production in the intervention area needs to be continued farmers at large scale since there is no difference with new variety. As an option Teketay variety should be popularized to increase farmer's choice of technologies (varieties) thenew variety (Teketay) and could be scale up/out in the L/maichew district and other similar agroecologies at large scale in the similar agro-ecologies.

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