Sarcouncil Journal of Multidisciplinary

ISSN(Online): 2945-3445

Volume- 02| Issue- 03| 2022

Research Article **Received:** 10-03-2022 | **Accepted:** 17-03-2022 | **Published:** 23-03-2022

On-farm Demonstration of Improved Field Pea Varieties in Selected Districts of Bale Highlands, Oromiya National Regional State, Ethiopia

Bayeta Gadissa, Amare Biftu and Ayalew Sida

Oromiya Agricultural Research Institute (OARI), Sinana Agricultural Research Center (SARC) P.O.Box-208, Bale-Robe, Ethiopia

Abstract: On-farm demonstration of improved field pea varieties was conducted in Goba, Sinana and Agarfa districts of Bale zone. The main objective of the study was to demonstrate and evaluate recently released (Hortu) variety along with standard check. The demonstration was under taken on single plot of 10mx10m area for each variety with row planting, recommended seed rate of 75kgha^{-1} and fertilizer rate of 100kgha^{-1} NPS. Mini-field day involving different stakeholders was organized at each respective site. Yield data per plot was recorded and analysed using descriptive statistics, while farmers' preference to the demonstrated varieties was identified using focused group discussion and summarized using pair wise ranking methods. The demonstration result revealed that Hortu variety performed better than the standard check (Harena variety) with an average yield of 36.3qtha^{-1} and 31.42qtha^{-1} respectively. Hortu variety had 15.53% yield advantage over the standard check. Furthermore, this variety was selected by farmers. Thus, Hortu variety was recommended for further scaling up.

Keywords: Demonstration, Farmers' preference, field pea, Hortu, Selection criteria.

INTRODUCTION

Field pea is the most important high land pulse which is mainly used for human consumption in Ethiopia. It is widely grown in the Highlands and performs well at an altitude of 1800 – 3000 meter above sea level. In addition, the crop also better adapted under low rainfall environments as compared to other pulses such as Faba bean, lentil, and chickpea. Field pea has moisture requirements similar to those of cereal grains. However, field peas have lower tolerance to saline and water-logged soil conditions than cereal grains (Mohammed. *et al*., 2016).Among the pulse crops produced in Bale zone, 9,562.24 hectare of land was covered by field pea with average productivity of 20.15 quintal per hectare (CSA, 2017).

It contains high levels of amino acids, lysine and tryptophan, which are relatively low in cereals. It also contains approximately 21-25 % protein and rich in carbohydrates. Moreover, it plays a significant role in soil fertility restoration as a suitable rotation crop that fixes atmospheric nitrogen. It is used as source of protein and income for the poor farmers (Telaye. *et al*., 1994). However, local varieties are becoming low yielding and less profitable to subsistence farmers. The reduction in yield is due to pests like pea weevil and pea aphid; diseases like Ascochyta blight and powdery mildew, poor management practices and climatic changes (Fikere, 2010). By considering this prevailing problem, researchers from Sinana Agricultural Research Center had made significant efforts by releasing high yielding and disease tolerant variety namely Hortu with yield potential of 42.04 quintal per hectare. The yield advantage of Hortu over Urji (standard check) and local check is 26.28% and 43.1%, respectively. However, this variety was not evaluated by target beneficiaries, since it was released.

Participatory technology evaluation under farmers management condition may have many advantages, such as increased and stable crop productivity, faster release and adoption of varieties, better understanding farmers' criteria for variety selection, enhanced biodiversity, increased cost effectiveness, facilitated farmers learning and empowerment (Sperling. *et al*., 2001).The two way feedback between farmers and researchers is indeed vital component of high yielder and disease and pest resistant varietal development process (Getachew. *et al*., 2008). Hence, participatory on farm demonstration of these varieties under farmers' condition and enhancing farmers to select variety/ies of their interest to their locality is a vital task.

OBJECTIVES

1. To evaluate the yield performance of field pea varieties under farmers' condition in Bale zone.
2. To create awareness on the importance of field pea varieties among farmers, DAs, SMSs and other participant stakeholders.
3. To collect farmers' feedbacks on field pea varieties for further development of field pea technologies.

***Corresponding Author:** Bayeta Gadissa

METHODOLOGY

Description of the Study Area

The activity was conducted in Goba, Sinana and Agarfa districts of Bale zone, Oromiya National Regional State (ONRS), Ethiopia. Bale zone is among the 20 Administrative zones located in south eastern parts of Oromiya, Ethiopia.

Site and Farmers Selection

Purposive sampling methods were employed to select the districts based on the potential of the crop. Two PAs from Goba and Agarfa and three PAs from Sinana were selected based on accessibility or vicinity to the road. Similarly, one trial farmer from each PA was used to carry out the demonstration process considering each farmer's field as replication of the trial.

MATERIALS USED AND FIELD DESIGN

Improved field pea variety (Hortu) was demonstrated and compared with standard check Harena. The demonstration was under taken on simple plot design of 10mx10m area for each variety with full recommendation packages. In addition, twice hand weeding was done on time. SARC was the source of all agricultural inputs. Hosting farmers provided their land. Land preparations were carried out by trial/hosting farmers, whereas land leveling, planting, first and second weeding, follow up and visit, harvesting, threshing were handled and managed by SARC.

Data Collection

Data were collected using direct field observation/measurements, key informant interview and focused group discussion (FGD). Yield data per plot in all locations were recorded. Farmers' preference to the demonstrated varieties was identified.

Data Analysis

Descriptive statistics was used to analyze the yield data. Pair wise ranking was used to compare traits of demonstrated varieties.

RESULT AND DISCUSSION

Training

Training was given to farmers, DAs, and agricultural experts on field pea crop production techniques and management packages, agro-chemical applications and safety precautions. Stakeholders such as zone and district level agriculture development office, Zone and district level cooperative promotion offices, zone and district level agricultural inputs regulations and quarantine experts were invited and participated during consultation meeting and training.

Yield Performance of Demonstrated Varieties

The mean yield of demonstrated varieties of field pea collected from all sites were summarized in the following chart.

Table 1: Yield performance of the demonstrated varieties

No	Variety	Yield obtained (Qt/ha)				Yield advantage over standard check
		Goba	Sinana	Agarfa	Mean	
1	Hortu	30.98	40.53	37.4	36.3	15.53%
2	Harena	24.82	33.9	35.5	31.42	-

The demonstration result revealed that, the new variety (Hortu) performed better than the standard check (Harena variety) all over the demonstration sites. It gave higher yield at all locations. The mean yield of Hortu variety was 30.98qt/ha, 40.53qt/ha, and 37qt/ha at Goba, Sinana and Agarfa respectively with all over mean yield of 36.3qt/ha. Similarly, the mean yield of Harena variety was 24.82qt/ha, 33.9qt/ha and 35.5qt/ha Goba, Sinana and Agarfa respectively with all over mean yield of 31.42qt/ha (chart 1). The yield advantage of Hortu over Harena is 15.53%. The cost benefit ratio analysis also showed that (table 2), Hortu variety (2.01) had higher cost benefit ratio (1.64). This means, Hortu variety is more profitable than Harena variety.

Table 2: Cost-Benefit Analysis of the Demonstrated varieties

No	Variables	Varieties	
		Hortu	Harena
	Yield obtained ($qtha^{-1}$)	36.3	31.42
	Sale price (ETB/qt)	1600	1600
	Gross Returns (Price X Qt) TR	58080	50272
	Total Variable Costs TVC (ETB/ha)	11290	11030
	Fixed cost (FC)	8000	8000
	Total cost (TC)	19290	19030
	Net Return (GR-TC)	38790	31242

Publisher: SARC Publisher

	Benefit cost ratio (NR/TVC)	2.01	1.64

Table 3: Result of Independent sample t test

	Test for Equality of Variances		t-test for Equality of Means				
	F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Equal variances assumed	.235	.653	-1.125	4	.324	-4.9	4.35

The independent sample t test revealed that, there was no statistically significant difference between the mean yield of Hortu and Harena varieties. But there was a mean difference of 4.9qtha^{-1} between both varieties (table 3).

Farmers' Preference to Demonstrated Varieties

The farmers' preferences toward the demonstrated varieties were assessed by enhancing them to reflect their preference to varietal attributes by setting their own varietal selection criteria.

Pair wise ranking was used to identify farmers' preference of variety traits. Accordingly, yield, disease tolerance, number of branches/plant, pod/plant and early maturity were the top five priority concern given by farmers (table 4).

Table 4: Pair wise ranking result to rank variety traits in order of importance

No	variety traits	A	B	C	D	E	F	G	H	I	J	Frequency	Rank
1	A											7	2nd
2	B	B										7	2nd
3	C	A	B									4	6th
4	D	A	B	D								6	4th
5	E	A	E	E	D							6	4th
6	F	A	B	C	D	E						3	7th
7	G	A	B	C	D	E	F					0	10th
8	H	A	B	C	D	E	F	H				1	9th
9	I	A	B	C	D	E	F	I	I			2	8th
10	J	J	J	J	J	J	J	J	J	J		9	1st

A= Disease tolerance**, B=** Number of branches, C= Seed/pod, D= Pod/plant, E= Early maturity, F= Uniformity of maturity, G= Stem strength, H= Seed color, I=Plumpness, J= Yield.

Varieties were ranked based on the farmers' preference criteria. Their preference criteria were almost similar in all locations.

Table 5: Rank of the varieties based on farmers' selection criteria

No	Varieties	Rank	Reasons
1	Harena	2nd	Low yielder, lower number of branches, seed/pod (4-8), pod/plant(28), late mature, non-uniformity of maturity, less tolerant to disease,
2	Hortu	1st	High yielder, higher number of branches(7), early mature, tolerant to disease, good seed color , number of pod/plant (56), seed/pod(4-8), uniformity of maturity, resistant to water lodging,

CONCLUSIONS AND RECOMMENDATIONS

On-farm demonstration and evaluation of field pea varieties was carried out on seven (7) representative trial farmers' fields. Improved variety viz. *Hortu* was demonstrated along with Harena variety which is the standard check. Accordingly, Hortu gave higher yield than Harena variety.

Moreover, Hortu was selected by participant farmers in all districts due to it is high yielder, higher number of branches (7), early mature, tolerant to disease, good seed color , number of pod/plant (56), seed/pod (4-8), uniformity of maturity, resistant to water lodging. Based on these facts, Hortu variety was recommended for further scaling up.

REFERENCES

1. Central Statistical Agency (CSA). "The Federal Democratic Republic of Ethiopia. Central Statistical Agency Agricultural Sample

Publisher: SARC Publisher

Survey 2015/2016 (2008 E.C.): Report on Area and Production of Major Crops (Private Peasant Holdings, Meher Season).” Volume I. *Addis Ababa*, Ethiopia (2017).

2. Fikere, M., Tadesse, T., Gebeyehu, S. and Hundie, B. "Agronomic performances, disease reaction and yield stability of field pea (Pisum sativum L.) genotypes in Bale Highlands, Ethiopia." *Australian Journal of Crop Science* 4.4 (2010): 238-246.
3. Belay, G., Tefera, H., Getachew, A., Assefa, K. and Metaferia, G. "Highly client-oriented breeding with farmer participation in the Ethiopian cereal tef [Eragrostis tef (Zucc.) Trotter]." *African Journal of Agricultural Research* 3.1 (2008): 022-028.
4. Mohammed, A., Asefie, S., Dagnachew, W. and Seyum, N. "Participatory evaluations of field pea (Pisum sativum L.) varieties in Wollo, Ethiopia." *Excellent Word Journal of Agricultural Science* 1.2 (2016): 1-6.
5. Sperling, L., Ashby, J.A., Smith, M.E., Weltzien, E. and McGuire, S. ‘Participatory plant breeding approaches and results.” *Euphytica* 122(2001): 439-450.
6. Tilaye, A., Demisu, B. and Getachew, T. “Genetics and breeding of field pea.” *Proceedings of the 1st National Cool-Season Food Legumes Review Conference, Addis Ababa, Ethiopia* (1993): 285-214.

Source of support: Nil; **Conflict of interest:** Nil.

Cite this article as:

Gadissa, B., Biftu, A. and Sida, A. "On-farm Demonstration of Improved Field Pea Varieties in Selected Districts of Bale Highlands, Oromiya National Regional State, Ethiopia." *Sarcouncil Journal of Multidisciplinary 2.3* (2022): pp 8-11

Publisher: SARC Publisher