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Short Communication

Evaluation of Common Bean (*Phaseolus Vulagris* L) Varieties in Eastern, Ethiopia

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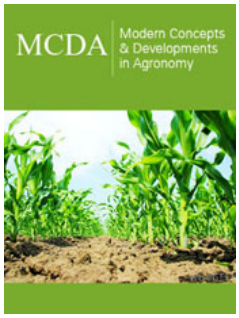
ISSN: 2637-7659



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Submission: August 19, 2022
Published: October 18, 2022

Volume 11 - Issue 5

How to cite this article: Motuma Delesa* and Habte Berhanu. Evaluation of Common Bean (Phaseolus Vulagris L) Varieties in Eastern, Ethiopia. Mod Concep Dev Agrono. 11(5). MCDA. 000771. 2022.
DOI: 10.31031/MCDA.2022.11.000771

Abstract

Common bean has very importance in country economy such as for home consumption, soil fertility improvement and its improvement are highly challenged by diseases, insect pests and prolonged drought in Ethiopia. Different classes of common bean are there like market types, food types, climbing types, bush types, red, white, canning types etc. The experiment was layout in Randomized Complete Block Design (RCBD) with three replications to identify the high yielding, biotic and abiotic resistance, or tolerance varieties. The trial was conducted at Dire Dawa and Harari Qile during the rainy season of 2018/9 and important data *via*: - plant height, pod per plants, seed per pod, number of branches per plants and yielded per plots were collected. Analysis of variance revealed the presence of significant ($P \leq 0.05$) difference in days to maturity, plant height, pods/plant, seed/pod, and seed yield. The maximum and minimum amount of pods/ plant of (17.03) and (10.06) were recorded for the varieties Awash-mitin and SER-125, respectively. The highest grain yield of 16.10qt/ha was recorded for the variety Awash-2 and the least grain yield of (13.92qt/ha) was noted for local variety. Generally, Awash-2 followed Awash-mitin, KAT-B9, and Awash-1 which gave high yield than the standard check interims of number of pods per plant and grain yield. Therefore, Awash-2, KATB1, SAB736 and Awash-1 were recommended for further production under the study areas and other similar agro-ecology.

Keyword: Common bean; Seed yield; Varieties

Introduction

Common bean (*Phaseolus vulagris* L) is a very important legume crop grown worldwide and it is one of the most important and widely cultivated in Ethiopia. It is grown predominantly under small holder producers as an important food crop and source of cash. It is one of the fast-expanding legume crops that provide an essential part of the daily diet and foreign export earnings for the country [1]. It is the Ethiopia's most important grain legume for direct human consumption of dry beans harvested in Ethiopia [2]. It is cultivated primarily for dry seeds, green pods (as snap beans) and green-shelled seed. In Ethiopia a wide ranges of common bean types are grown including mottled, red, white, and black varieties [3]. The most commercial varieties are pure red and pure white color beans, and these are becoming the most grown types with increasing market demand [4]. The white navy beans are grown for export canning industry and other types are mainly for households' food for national and regional markets. In addition, beans are important crop in farming systems. They are intercropped with sorghum, maize, enset, coffee and chat.

Even though more than 50 common bean varieties are released by the NARS, due to less cooperation between agricultural extension and development offices and NARS of the country, few varieties dominate the production system: in Ethiopia [5]. Similarly, FARC is trying to address the eastern parts of the country by adapting varieties released so far in similar agro-ecologies. FARC is targeted to make the farmers beneficial from the high yielding improved common bean varieties. Its production is highly challenged by diseases, insect pests, and prolonged drought in Ethiopia. Its adaptation is in the promising status in eastern parts of Ethiopia even though it need due attention through extension serves in the study areas. Therefore, the work was initiated to identify adaptable and high yielding, with desirable agronomic characters of Common bean Varieties.

Materials and Methods

Experimental site

The study was conducted at Harari Regional state, Sofi district, Kile kebele, and Dire dawa administrative city of Adada 2 rural area where these kebeles is known for its frequent low moisture stress. Kile kebele is situated at a distance of about 20km away from Harar city in the eastern direction and Adada 30km for diredawa administrative city. The experiment was conducted during the 2019 main cropping season.

Experimental materials

The experimental materials were comprised of seven released Common bean varieties and one local check. The planting materials are collected from Melkasa Agricultural Research Center (Table 1).

Table 1: List of Common bean varieties used as planting materials during experimentation.

No	V. Name	Year of Release
1	Awash-1	1990
2	SER-119	2014
3	KAT-B1	2013
4	Awash-mitin	2017
5	Nasir	2003
6	SER-125	2014
7	Awash-2	2013
8	Local	

Experimental design

The trial was laid out in Randomized Complete Block Design (RCBD) in three replications. Each Variety was planted in 6 rows of 40cm spacing between rows and 10cm between plants with row length of 3m.

Data analysis

Analysis of Variance (ANOVA): To estimate the variation among varieties the data recorded was analyzed using ANOVA (Steel et al., 1997). Duncan Multiple Range Test (DMRT) was used to compare the means of different treatments. Analysis of Variance (ANOVA) was conducted using the Statistical Analysis System (SAS) computer software program

Results and Discussions

Analysis of variance showed that significant variations were obtained among the varieties for days to maturity, plant height, pods/plant, seed/pod, and Seed yield. Similarly, Sixbert et al. [6] reported significant ($P \leq 0.05$) variability among genotypes with respect to number of pods/plants, seeds/pod, grain yields and 100-seed weights and number of days to maturity, pods/plant and seeds/pod was not significantly affected due to varieties [7] (Table 2).

Table 2: Mean of Seed yield and yield related traits of 2019.

Varieties	Days to Maturity	Plant Height	Pod/Plant	Seed/Pod	Seed Yield
Awash-1	67.00ab	38.25ab	12.81abc	6.82ab	15.03ab
SER-119	62.33c	37.58ab	11.28bc	5.72b	14.65ab
KAT-B9	70.00a	34.64ab	11.11bc	6.28b	15.07ab
Awash-mitin	65.83bc	28.00b	17.03a	8.17ab	15.73ab
Nasir	65.83bc	48.69a	11.03bc	5.89b	14.74ab
SER-125	63.50bc	38.61ab	10.06c	6.00b	14.19ab
Awash-2	67.33ab	48.86a	15.64ab	9.44a	16.10a
Local	66.00bc	39.61ab	15.53ab	5.45b	13.92b
CV	15.1	22.4	20.6	15.8	11.3
LSD	5.59	21.25	6.66	3.84	2.82

Maximum number of pods/plants was counted from Awash-mitin Variety followed by Awash-2 and the Local varieties. Awash-2 measures the longest in terms of plant height and counts maximum numbers of pods per plant, number of seeds per pod and seed yield. Similarly, Awash-mitin and Awash-1were recorded maximum number of pods per plant, number of seeds per pod and Seed yield. While minimum number of pods per plant (10.06) was counted by SER-125. Combined mean of seed yield Shows maximum number of seed yield was obtained from Awash-2 followed Awash-mitin, KAT-B9, and Awash-1. The highest Seed yield of 16.1qt/ha was recorded for the variety Awash-2 and the least seed yield of (13.92qt/ha) was noted for local variety. Awash-2 followed Awash-mitin, KAT-B9, and Awash-1 which gave high yield than the standard check interims of number of pods per plant and grain yield.

Summary

Common bean adaptation is in the promising status in eastern parts of Ethiopia even though it need due attention through extension serves in the study areas. The crop probably preference due to multiple uses nutritive value, soil fertility increment and use for export to earn foreign currency. Analysis of variance stated that significant variation was observed among the varieties for different characters. The highest grain yield of 1.61t/ha was harvested for the variety Awash-2 followed by Awash-mitin (1.57t/ha), KAT-B1 (1.51t/ha) and Awash-1(1.5t/ha). Therefore, Awash-2 and Awash-mitin was recommended for further production under the study areas and other similar agro-ecology.

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