



Onion (*Allium cepa*) Varieties Evaluation at Miyo District of Borana Lowland

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Abstract

Crops can be grown in different agro-ecology depending on their ability to adapt to their specific area. So, it is essential to conduct location specific adaptation trial to identify suitable variety/varieties. Accordingly, an adaptation trial of onion (*Allium cepa*) varieties was conducted in Miyo district to identify onion varieties that are better in adaptation, yield and other agronomic characteristics, as well aspects and disease tolerance. Four released varieties, viz., Adama red, Melkam, Bombay red and Nasic red were brought from a public research center, Worer Agricultural Research Center, Ethiopia. The four treatments (varieties) were laid out in RCBD with three replications in 2017/2018. The results indicated significant variations between the varieties for the bulb weight and unmarketable yield. However, there was no significant variation among the varieties for all the other parameters. Adama red variety surpassed the other varieties except Nasic red in average bulb weight. Therefore, Adama red can be recommended for the farmers in the area to improve their onion production and productivity.

Keywords: Adaptation; Evaluation; Onion; Variety

Introduction

Onion (*Allium cepa*) has the major economic and dietary importance in all parts of the world. It is used as spices and condiments for flavoring dishes. Ethiopia has great potential to produce onion [1]. It is comparatively easy to produce provided it is grown in the dry season when diseases are less prevalent using irrigation [2]. It grows between 500 and 2400 ma.s.l., preferring altitude between 700 and 1800 ma.s.l.; optimum temperatures from 18.3 to 23.9°C day and from 10 to 12°C night are ideal for bulb production. It requires sandy loam soil with PH ranging from 5.5 to 6.8 [3]. It doesn't tolerate badly drained soil and it is moderately sensitive to soil salinity [4]. Production system requires the production of health and vigorous seedling in the nursery. Sunken beds prepared for seedling rising at nursery to ensure adequate flooding while watering using watering cane because sunken beds were ability to conserve water in dry lands [5] such as Borana lowland. The frequency of seed bed watering should be every 3 - 4 days. The seedling reaches transplanting at about 45-55 days of sowing when the seedling has 3-4 leaves [7]. Good management on the site is very important to insure high production [8]. Harvesting must be when the pseudo stem soften just above the neck and about half of the plant have their tops down. After onion bulbs are harvested they should be cured for some time before storage or transportation to a long distance. For longer storage life temperature and humidity management in the store is necessary [9]. The market opportunity for onion in the study area is high as demand is high [10]. So onion production is one of the potential income sources for agro-pastoralists and people around the towns. However, successful production depends on the selection of varieties that are adapted to different conditions imposed by specific environment [3]. Hence, the

present experiment was conducted to study the response of some improved varieties of common onion using irrigation.

Specific objective

To identify onion varieties that is better in yield and other agronomic characteristics.

Materials and Methods

Description of the study area

The experiment was conducted in Miyo district of Borana zone and it is located south of Addis Ababa at about 732 km. It is characterized by short rainfall. The area is characterized by agro-pastoral production system.

Methodology

Prior to actual field work, field visits were conducted targeting exploratory study of resources, land use evaluation, production possibilities and identification of the farming system of the concerned zones. Seedlings of four varieties (Adama red, Bombay red, Melkam, Nasic red) were raised on Sunken beds of 1m x 5m that were prepared at nursery to ensure adequate flooding while watering using watering can. The frequency of seed bed watering was every 3 - 4 days. The seedling reached transplanting at about 45-55 days of sowing when the seedling had 3-4 leaves. The four varieties were transplanted to identify their production capacity and adaptability in the area. The results of the experiment were assessed from agronomic performance point of view. Then, superior ones identified and recommended to use in the respective new potential agro climatic regions.

Collected data and statistical analysis

The collected data were planting date, date to emergence of 50% date to flowering of 50%, harvesting date, harvestable fresh yield (kg/ha), bulb weight, Harvest index, stand count at 100%, plant height at physiological maturity, marketable and unmarketable yield and bulb diameter. Data were analyzed using SAS software and mean separation was done using LSD at 0.05 alpha levels.

Results and Discussion

The result of analysis of variance shows that there were no significant variations observed among most of the collected param-

eters among the varieties tried. Significant variation was observed among the varieties only in average bulb weight and unmarketable yield (Table 1). According to Aklilu [10] finding using the improved cultivars increases the productivity of onion bulbs beside to using recommended amount of fertilizer. Aklilu [10] reported that most of the growers have preferred the Adama variety due to its early maturing and in its anticipation of reduction of production cost than the rest of cultivars. The present finding is in line with the findings of Dinkecha, *et al.* [11] who reported Adama red gave the highest bulb weight and marketable yield than melkam nasic red and Bombay red varieties.

Source of variation	DF	TBM	YLD (t/1.6m ²)	BULB WT	UNMY (%)	MY (t/ha)	HI	B Diameter
Varieties	4	2.3866 ^{ns}	2.380 ^{ns}	0.00093*	1.2730*	1.7331 ^{ns}	0.00084 ^{ns}	11.3326 ^{ns}
Replication	3	14.1918*	12.7633*	0.00059 ^{ns}	0.5656 ^{ns}	7.9896*	0.001184 ^{ns}	9.780 ^{ns}
Error	6	2.0867	1.7369	0.000261	0.31028	1.0926	0.00134	10.738

Table 1: Mean square of total biomass, yield, bulb weight, harvest index, unmarketable yield, marketable yield, and bulb diameter affected by variety and replication.

DF: Degree of Freedom; TBM: Total Biomass; YLD: Total Bulb Yield; UNMY: Unmarketable Yield, MY: Marketable Yield, BLB WT: Bulb Weight, HI: Harvest index, B Diameter: Bulb Diameter.

There is significant difference among varieties for total biomass, total yield, marketable yield, and harvest index and bulb diameter (Table 2). Bombay red has got significantly higher unmarketable yield than other varieties except Adama red. Adama red has got significantly higher average bulb weight than other varieties except Nasic red (Table 2). This study is in line with other report [12], in which the Adama red variety was the most widely grown variety under irrigation in the country due to its higher bulb yield than Bombay red.

The highest bulb yield (8.43) found in Adama red while lowest (4.91.9) in Melkam. The highest bulb weight (0.1192) found in Adama red while lowest (0.0804) in melkam, the highest marketable yield (7.535) found in Nasic red while lowest (5.901) in Bombay red. As compared to Melkam and Bombay red varieties in highest bulb yield, weight and lower unmarketable yield Adama red variety was significantly higher as observed on the table 2.

Varieties	TBM	YLD (t/1.6m ²)	BULB WT	UNMY (%)	MY (t/ha)	HI	B Diameter
Adama red	9.294	8.434	0.1192 ^a	0.898 ^{ab}	7.535	0.908	57.05
Bombay red	8.429	7.766	0.0833 ^b	1.864 ^a	5.901	0.918	54.68
Melkam	4.912	7.012	0.0804 ^b	0.528 ^b	6.48	0.881	55.87
Nasic red	7.173	6.386	0.0927 ^{ab}	0.441 ^b	5.944	0.891	52.49
LSD 5%	NS	NS	0.0323	1.112	NS	NS	NS

Table 2: Mean values of total biomass, yield, and bulb weight, unmarketable weight, marketable yield, harvest index, bulb diameter affected by varieties.

TBM: Total Biomass; YLD: Total Yield; UNMY: Unmarketable Yield; MY: Marketable Yield; BLB WT: Bulb Weight; HI: Harvest Index; B Diameter: Bulb Diameter

Generally maximum bulb yield and bulb quality (bulb weight, marketable yield and bulb yield) were obtained from Adama reds compared to the rest three varieties, and this variety was not affected by major onion diseases. But, on the rest varieties slightly some onion diseases were seen even though didn't have significant effect on the yield or they are not susceptible to disease. Therefore, it is recommended that Adama red variety is suitable for using in Miyo district. This variety was also selected by pastoral research group (PRG) and field day participant in terms of both yield and no sign of disease observation on this variety [13].

Conclusion and Recommendation

Onion is one of the popular crops used for commercial and household consumption in the area. Since there are no improved technologies used by the farmers in the area, the finding of our study can contribute to better utilization of the crop. As such the income generated by producing the crop would improve the livelihood of the agro pastoral community. So it is important to introduce new and improved varieties that can adapt to the area to improve the productivity of the farmers or agro-pastoral communities.

Adama red was found to be significantly greater than other varieties except Nasic red in average bulb weight. It also has the highest yield (kg/ha) than other varieties tried even though the difference is not significant. Therefore, Adama red can be recommended for the farmers/agro-pastoral communities in the area to improve their onion production and productivity, which has a positive implication on the improvement of their livelihood.

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