Current Research in Agricultural Sciences
2018 Vol. 5, No. 1, pp. 1-5
ISSN(e): 2312-6418
ISSN(p): 2313-3716
DOI: 10.18488/journal.68.2018.51.1.5
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PERFORMANCE EVALUATION OF ONION (*Allium Cepa L.*) VARIETIES AT BENATSEMAY WOREDA OF SOUTH OMO ZONE, ETHIOPIA

Misgana Mitiku[1+]
Awoke Tadesse[2]

[1]*Department of plant pathology, Southern Agricultural Research Institute, Jinka Agricultural Research Center, Jinka, Ethiopia*
E-mail: misganamitiku441@gmail.com
[2]*Department of Agronomy, Southern Agricultural Research Institute, Jinka Agricultural Research Center, Jinka, Ethiopia*
E-mail: awoketadese9@gmail.com

(+ Corresponding author)

Article History
Received: 15 August 2017
Revised: 16 November 2017
Accepted: 30 November 2017
Published: 13 December 2017

Keywords
Onion
Onion productivity
Onion varieties
Research field evaluation
Adaptation
Yield performance
Benatsemay woreda.

ABSTRACT

Onion varieties were evaluated for adaptability to the climatic conditions in Benatsemay woreda. Three varieties of onion were planted under a complete randomized block design experiment with three replications at farmer's field at Benatsemay woreda. Yield and yield component data like; plant height, number of leaves, bulb size and bulb yield of each varieties were collected. Bulb of all onion varieties were harvested at their maturity stage (90% tops down) and then weighted. SAS were used for data analysis. The result indicated that, the three varieties namely; Adama red, Nasick red and local contribute similarly to total yield, plant height, number of leaves and bulb size. The variety local was the best variety as it produced the highest bulb yield of 7.0033kg/plot numerically. Based on the result, we advise farmers to use local variety followed by Nasick red and Adama red therefore, government should promote these onion varieties for cultivation in Benatsemay woreda especially for Beneta kebele and its vicinity. Concerning body has to work together to ensure the availability of the seed of Local and Nasick red varieties. So that, onion producer can be interested for accepting these varieties for large scale production. The effects of different agricultural practices on yield of onion have to be considered for future investigation.

Contribution/Originality: This study is one of very few studies which have investigated the potential of different onion varieties to increase the productivity and income of onion producer in the studied area and its vicinity.

1. INTRODUCTION

Onion *(Allium cepa L.)* is an important crop worldwide [1]. It is one of the oldest bulb vegetables in continuous cultivation dating back to at least 4000 BC [2, 3]. It is native of South Asia or Mediterranean region. It is important in the daily Ethiopian diet [4]. All parts are edible, but the bulbs and the lower stems sections are the most popular as vegetables in stews. It is recently introduced crop and rapidly becoming popular among producers and consumers. It is widely produced by small farmers and commercial growers throughout the year for local use and export market [5].

Onion is appreciated for its distinct pungency and flavoring varieties of dishes, sauces, soup, sandwiches, snacks as onion rings etc. It contain 2.0 g protein, 70 mg calcium and 53 mg phosphorus as nutritional composition [6]. It also contains the vitamins thiamine, riboflavin and niacin and is used for its medicinal value. [7]. It also contain a phytochemical called quercetin, which is effective in reducing the risk of cardiovascular disease, an anticancer, and

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has promise to be an antioxidant [8]. It is common over the local shallot because of its high yield potential per unit area, availability of desirable cultivars for various uses, ease of propagation by seed, high domestic(bulb and seed) and export(bulb, cut flowers) markets in fresh and processed forms [9].

Onion pays too considerably to the national economy, apart from overcoming local demands. Products like bulbs and cut flowers are exported to different countries of the world. With the increasing irrigated agriculture in the country, there is a unlimited potential for extensive onion seed and dry bulb production in the different production belts of the country [4]. It needs well-drained sandy loam with a high content of organic matter. The optimum altitude range for onion production is between 700 and 2200 m.a.s.l and the optimum growing temperature is between 15 and 23 ºC [10]. The total area under production during 2012/13 cropping season, reaches over 21,865.37 hectares and the production is estimated to be over 2,191,886.02 quintals [11].

Though, the zone is endowed with stated agro-ecologies and has valuable resource for onion production, there are large number of production obstacles which limits the large production by farmers. From those production barriers low yields because of non-optimal agronomic practices, unavailability and high cost of seed, diseases and insect pests, lack of awareness about improved varieties and improved production technologies. So, the objective of the experiment was to evaluate the performance of improved onion varieties and to select the high yielding variety/ies from the tested varieties.

2. MATERIAL AND METHOD

2.1. Description of the Study Area

The experiment was conducted at Benatsemay woreda Beneta kebele of South Omo zone SNNPR Ethiopia. It is located at 508 km and 42km away from the administrative town of Southern Nation Nationalities and People Regional State and the administrative town of the zone respectively. The trial field is situated at 5°15'N latitude, 36°38E longitude and 1400m above sea level with annual average rain fall and temperature of 1050 mm and 21.8°c respectively.

2.2. Design and Procedures

The experiment was conducting using two improved onion varieties and one local check (Ferensay). These varieties were planted at recommended seed rate of 4kg/ha on March, 2014. A randomized complete block design (RCBD) with three replications was used. Seeds of three onion varieties namely: Adama red, Nasick red and local (Ferensay) were sown on seed bed. At four leaves stage or pencil thickness, seedlings were transplanted on plot of 3.2 m x3.2 m. Each plot consists of eight rows with 3.2 meter long. Row to row and plant to plant spacing was 40cm and 20cm respectively. Before transplanting, full dose of DAP and half of Urea which is 75kg/ha were applied before planting and the remaining half of urea (75kg/ha) was applied 45 days after transplanting. Recommended management was applied during growing period. But, no farm chemical was applied as all the varieties were growing healthy and no pest and diseases problem was observed. All varieties were harvested at their maturity stage (90% tops down). The harvested bulb were left to dry under shade for four days then the leaves were removed to get the dry bulb of onion.

The yield and yield component data were analyzed using analysis of variance; SAS program version 9.1.Treatment means were separated using Duncan Least Significant Difference (LSD).

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Fig-1. Field preparation, transplanting of onion seedlings and harvested onion bulb (Taken from the field trial)

3. RESULT AND DISCUSSION

Statistical analysis was conducted to see the treatments were significantly differ or not for their yield and yield component. The results of their total bulb yield, plant height, number of leaves and bulb size were showed in Table 1 and Table 2 respectively. Table 1 and table 2 reveals that total bulb yield, plant height, number of leaves and bulb size of three onion varieties are not significantly differ ($p < .05$).Therefore, from the result we can concluded that the three varieties, namely; Adama red, Nasick red and Local contribute similarly to yield and yield component data. Also the total bulb yield, plant height, number of leaves and bulb size does not seem to be impacted by the layout of experiment in the field and its condition. It implies that onion varieties do not responded to the climatic conditions of Benatsemay woreda and reflected none significant to their productivity performance. These results are not in line with the findings of [12, 13].

The person correlation coefficient analysis revealed that, number of leaves has positive and significant correlation with plant height but, it didn't correlate with bulb size and total bulb yield as indicated in (table3).But bulb size has positive and non-significant correlation with plant height and number of leaves but, it doesn't have correlation with total bulb yield (Table3).While bulb yield has positive non-significant correlation with plant height, number of leaves and bulb size.

Table-1. Significances of mean square values for 4 agronomic traits for 2 improved onion varieties and one local check.

Source of variation	DF	PH.(cm)	NL	BS	BY
Replication	2	14.1122ns	1.44284ns	0.06574ns	0.64858ns
Treatment	2	28.9985ns	1.33618ns	0.11001ns	0.30528ns
Error	4	24.5780	1.72711	2.45269	3.92216
Cv		7.79	14.03	13.56	29.37

Note: PH=plant height in cm, NL=number of leaves, BS=bulb size in cm, BY=bulb yield and ns=no significant difference

Table-2. Mean values of Plant height, Number of leaves, Bulb size and bulb yield for the tested varieties.

Treatments	PH(cm)	NL	BS (cm)	BY(kg/plot)
Local	62.330A	8.720A	11.660A	7.0033A
Adama red	61.443A	9.333A	11.330A	6.3867A
Nasick red	67.217A	10.053A	11.663A	6.8367A
Critical Value for Comparison	11.239	2.9792	3.5503	4.4896

Note: There are no significant pairwise differences among the means. Means with the same letter are not significantly different

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Table-3. Pearson Correlations Analysis

Character	PH	NL	BS	BY
PH	1.0000			
NL	0.0532	1.0000		
BS	0.3621	0.5128	1.0000	
BY	0.4780	0.4268	0.9295	1.0000

Note: PH=plant height, NL=number of leaves, BS=bulb size and BY=bulb yield

4. CONCLUSION AND RECOMMENDATION

The results showed that, all treatments were not significantly different from each other for their bulb yield but, the variety local was the best variety as it produce highest bulb yield of 7.00kg/plot or 9.11 tons/ha numerically. Based on the result, we advise farmers to use local variety followed by Nasick red and Adama red. Observing the numerical value of the yield, it can be concluded that Local is be the best onion variety followed by Nasick red which can improve onion production in Benatsemay woreda (Beneta kebele) and its vicinity; therefore should be promoted for cultivation in Benatsemay woreda (Beneta kebele) and its vicinity of South Omo zone of Southern Nations Nationality and People Regional state of Ethiopia. Concerning bodies has to work together to create effective platform for development and evaluation of new onion production technologies. Agronomic practices like planting date can be a limiting factor in production and productivity of onion varieties. So, effects of different agronomic practices on yield of onion in the target have to be considered for future investigation.

Funding: The authors would like to thank SARI (Southern Agricultural Research Institute) for financial support.
Competing Interests: The authors declare that they have no competing interests.
Contributors/Acknowledgement: Both authors would like to thank SARI and JARC for their contribution for the success of this work.

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