

# Participatory Evaluation of Improved Onion Varieties for Management of Onion Maggot (*Delia antiqua*) at Chirr Keble Delomenna District South Eastern Ethiopia

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## Abstract

Ethiopia is one of the onion producing countries of the world and Bale Zone is one of the most productive areas of onion crop within a country. Pastoralists and agro pastoralists living from low land to highland areas of this zone are involved in onion production and the area is known by its huge potential. Even if the extensive onion production techniques used by smallholder farming generate very high income, these practices are threatening the sustainability of such farming because of many pests. The most prominent and devastating insect pests in study area is onion maggot. Therefore the study intended to do the research on Participatory Evaluation of Improved Onion Varieties for Management of Onion maggot. It was conducted on Bale zone Delomenna woreda chirri kebel. The treatments consisted of three varieties namely: Melkam, Bombay and Nafis. The experiment was conducted using a randomized complete block design with three replication. The results of this study revealed that variety Bombay red and melkam are showed the symptom of onion maggot starting from seedling up to vegetative stage however variety Nafis is not totally show the symptom. Variety Bombay and melkam are showed the symptom at seedling stage maggot pupa on the base of the crop and yellowing of leaf at the vegetative stage. However, there are no significant yield losses at harvesting time. On the other hand the use of different varieties significantly affect plant height, number of leaf, pseudo stem length, bulb weight, bulb length and yield /ha. The highest plant height (69.07 cm) are found in Nafis while the lowest (53.03 cm) in melkam. The highest number of leaf (7.33) found in melkam while lowest (5) in Bombay red. The highest pseudo stem length (15.2) found in Bombay red while lowest (12.9) in Nafis. The highest bulb weight (110.10) found in Nafis red while lowest (80.17) in melkam. The highest bulb length (14.68) found in Nafis red while lowest (10.17) in Bombay red. The highest yield/ha (305.97) found in Nafis red while lowest (246.90) in Bombay red. Generally maximum bulb yield and bulb quality were obtained from Nafis variety and this variety was not affected by onion maggot. In addition to the finding the variety also selected by pastoral research group (PRG) in terms of both yield and resistant to onion maggot. Therefore, it is suggested that using Nafis variety in Delomenna chirr Keble is effective for producing high yield and maggot resistant onion.

**Keywords:** Onion; Maggot onion maggot; Varieties

## Introduction

Onion (*Allium cepa* L.) belongs to the family Alliaceae. It is one of the most important commercial vegetable crops and is widely grown in almost all the countries of the world [1]. Ethiopia is one of onion producing countries of the world with an estimated total area of about 13,000 hectares from which 163,800 tones were produced in 2012 with average yield of about 12.9 t ha<sup>-1</sup> [2]. According to Lemma and Shimeles, 2003, onion is produced in many parts of the country by small farmers, private growers, state enterprise mainly in Awash valley and Lake Region, where the bulk of dry bulbs and seed are produced [3-5]. In the past decades its area coverage increased dramatically due to its ease of production, increases in small scale irrigation channels and due to its capacity of high production from small area [6].

Bale Zone is one of the most productive areas of onion crop within a country. Pastoralists and agro pastoralists living from low land to highland areas of this zone are involved in onion production and the area is known by its huge potential. However, the farmers were paying huge amount of money for onion which is transported from Zeway and other onion producing areas due to their lack of knowledge on how and what type of onion could be suitable for that area except their little knowledge about shallot and garlic production. But on these decades due to extensive work by research centers and development agents the farmers are turning their face on onion production and they started extensive onion production thereby they are fetching good income [7]. Even if the extensive onion production techniques used by smallholder farming generate very high income, these practices are threatening

the sustainability of such farming because of many pests in such environments. This problem has arisen in onion producing regions of Bale Zone like Delomenna where there is a high infestation of pest. This may be due to cropping practice (like mono-cropping), lack of awareness about the pest control methods, difficulty in identifying the type of pest and lack of well-established knowledge of other agronomic practices [7]. They affect both the quality and quantity of produce. Bale zone is one of the most vulnerable areas to most of destructive pests. However the most devastating one around Delomenna is onion maggot (*Delia antiqua*) which is a serious pest of onion and related crops (i.e., garlic and leek) in northern temperate regions throughout the world [8,9]. This insect pest cause loss of greater than 80% of their production and the farmers doesn't know strict measures which should be taken to control it. In view of the existing problem, this study was proposed with

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the objective of reduce the impact of pests by selecting best variety that resists the insect pest in the research areas.

## Material and Methods

### Description of the study area

The study was conducted in bale zone Delomenna distinct Chirra Keble. The study area is 555 km far from Addis Ababa. The altitude of the area is range from 800-3500 m above sea level with average annual rainfall range from 700 mm. The average monthly maximum and minimum temperatures are 38°C and 21°C, respectively [9].

### Treatment and experiential procedure

The experimental unit consisted of three Variety (Nafis, Bombay Red and 'Melkam') arranged in randomized complete block design (RCBD) with three replicate. The experimental plots were thoroughly pulverized, leveled and ridges of about 20 cm high will be prepared. The seed was planted on the ridge of smoothed soil at the spacing of 20 cm between rows and 10 cm between plants on plot size of (1 m x 1.5 m). A distance of 0.5 m and 1 m was maintained between the blocks and plots respectively.

### Data collected and analysis

The following data was collected analyzed through standard procedures [10]. Total Bulb Yield, Average Bulb Weight, Bulb Length, Bulb Diameter, Plant height, Length of pseudo steam, Leaf number, and Leaf length was measured and the mean values subjected to the Analysis of Variance (ANOVA) using SAS version 9.2 Computer software. All significant pairs of treatment means was compared using Least Significant Difference (LSD) test at 5 % probability level.

## Result and Discussion

The results of this study revealed that variety Bombay red and melkam are show symptom affecting by onion maggot starting from seedling up to vegetative stage however variety Nafis is not totally show the symptom. Variety Bombay red and melkam are producing the symptom at seedling stage maggot pupa on the base of the crop and yellowing of leaf at the vegetative stage. There is no significant yield loss at harvesting time. In addition to this the result obtain from vegetative growth and yield show that the use of different varieties significantly ( $P < 0.05$ ) affect plant height, number of leaf, pseudo steam length, bulb weight, bulb length and yield /ha.

The highest plant heights (69.07 cm) are found in Nafis. while the lowest (53.03 cm) in melkam, The highest number of leaf (7.33) found in melkam while lowest (5) in Bombay red, The present finding is in line with the findings [11] who reported Nasif gave the highest plant height length than melkam and Bombay red varieties. The highest pseudo steam length (15.2) found in Bombay red while lowest (12.9) in Nafis, The highest bulb weight (110.10) found in Nafis while lowest (80.17) in melkam, the highest bulb length (14.68) found in Nafis red while lowest (10.17) in Bombay red, the highest yield /ha (305.97) found in Nafis red while lowest (246.90) in Bombay red. The result found here was in line with the work of [11] and [5] Nafis and melkam gave highest yield than the Bombay Red Varieties. Generally maximum bulb yield and bulb quality (bulb length and bulb weight) where obtained from Nafis variety and this variety was not affected by onion maggot. Therefore, it is suggested that using Nafis variety in Delomenna Chirra Keble. This variety also selected by pastoral research group (PRG) and field day participant in terms of both yield and resistant to onion maggot [12].

Variety	Plant Height	Leaf Length	No Leaf	Pseudo Stem
Melkam	53.03 <sup>B</sup>	47.63 <sup>A</sup>	7.33 <sup>A</sup>	14.7 <sup>AB</sup>
Bombay red	59.33 <sup>AB</sup>	52.16 <sup>A</sup>	5.00 <sup>B</sup>	15.2 <sup>A</sup>
Nafis	69.07 <sup>A</sup>	60.90 <sup>A</sup>	6.00 <sup>AB</sup>	12.9 <sup>B</sup>
LSD	11.42	-	1.9	2.18
CV	8.33	11.31	14.43	6.77

Table 1: Effects of Variety on vegetative growth of onion.

Variety	Bulb length	Bulb diameter	Bulb weight	Yield kg/ha
Melkam	11.40 <sup>B</sup>	7.390 <sup>A</sup>	80.17 <sup>B</sup>	281.53 <sup>A</sup>
Bombay red	10.17 <sup>B</sup>	6.810 <sup>A</sup>	91.33 <sup>B</sup>	246.90 <sup>B</sup>
Nafis	14.68 <sup>A</sup>	8.90 <sup>A</sup>	110.10 <sup>A</sup>	305.97 <sup>A</sup>
LSD	2.18	-	12.682	30.54
CV	7.96	16.17	5.96	4.84

Table 2: Effects of Varieties on yield of onion.

## Conclusion

As showed in Tables 1 and 2 the maximum bulb yield and bulb quality where obtained from Nafis variety and this variety was not affected by onion maggot. In addition to Research Finding the PRG Group and Invited Guest Select Nafis variety in terms of both yield and resistant to onion maggot. Therefore, it is suggested that using Nafis variety in Delomenna Chirra Keble effective for increasing yield and quality maggot resistant onion.

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### References

- Baloch AF (1994) Vegetable crops. Horticulture. National Book Foundation Islamabad 48: 537.
- Central Statistical Authority (2012) Report on Area and Production of Private Peasan Holdings. Statistical Bulletin, Addis Ababa, Ethiopia.
- Central Statistical Authority (2008) Area and Production of Major Crops. Agricultural Sample Enumeration Survey. Addis Ababa, Ethiopia.
- Ethiopian Agricultural Research Organization, Directory of Released Crop Varieties (2004) Addis Ababa Ethiopian.
- Ethiopian Institute of Agricultural Research (2007) Crop technologies guidelines. Amharic version. Addis Ababa.
- Food and Agriculture Organization (2012) Production year book. Food and Agriculture Organization of the United Nation, Rome.
- Socio-Economic Profile of Bale Zone (2000) Bale Zone Finance and Economic Development. Department of planning and Budget.
- Nault BA, Straub RW, Taylor AG (2006) Performance of novel insecticide seed treatments for managing onion maggot (Diptera: Anthomyiidae) in onion fields. Crop Protection 25: 58-65.
- Nault BA, Werling BP, Straub RW, Nyrop JP (2011) Delaying onion planting to control onion maggot (Diptera: Anthomyiidae): Efficacy and underlying mechanisms. J Econ Entomol 104: 1622-1632.
- International Plant Genetic Resources Institution (IPGRI) (2001) Descriptors for Allium (Allium spp) International Plant Genetic Resources.
- Dinkecha K, Geleto J, Minuye M (2017) Determination of Nutritional Profile and Physicochemical Properties of Improved Onion (*Allium cepa* L.) Varieties in Ethiopia. Science Publishing Group.
- Dessalegne L, Aklilu S (2003) Research Experiences in Onion production. Research Report No. 55. Ethiopia Agricultural Research Organization, Addis Ababa, Ethiopia.