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Participatory Promotion of Hybrid Onion (*Allium cepa* L.) Varieties at Larena in Humbo Woreda, Wolaita Zone Southern Ethiopia

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Abstract

Onion (*Allium cepa* L) is an important crop as a condiment as well as a source of income for smallholder farmers in Ethiopia. However, yield of the crop is constrained mainly by soil nutrient depletion and poor fertilizer management practices. Considering improved varieties limitation the center received hybrid onion varieties (Neptune and Russel) from a private company to test their performances at Wolaita Sodo University – Research Site in 2022. The result revealed that these varieties are found promising. Therefore, a promotion work was done in onion producing areas at Larena in Humbo Woreda. Neptune, Russel, Bombey red and Adama red gave 57.00, 40.20, 33.60 and 31.50 t/ha bulb yields respectively. Therefore, based on partial budget analysis yield, bulb color, storability and general performance, Neptune is recommended for resource full farmers and private investors as alternative and/or additional variety with the existing varieties.

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Food self-sufficiency, cereal production, food grains, horticultural crops and livestock.

Introduction

Many researchers over the world in general and in Ethiopia in particular, advocate food self-sufficiency with respect to only cereal production. It may be significant to note that food self-sufficiency in real sense must consider nutritional as well as economic security and could be achieved only through balanced production of food grains, horticultural crops and livestock with minimum impact on the ecology (Girma, 2001).

Onion is a popular vegetable everywhere and its bulb is used as raw, sliced for seasoning salads, and cooked with other vegetables and meat. The onion bulbs are essential ingredients in many African sauces and relishes. If consumed in small amounts for their pungency, they can be considered as condiments (Schwimmer and Weston, 1961). In some parts of West Africa, leaves still green at

bulb harvest are propounded, and then used to make sun-dried and fermented balls, which are used later for seasoning dishes (Grubben and Denton, 2004).

The extracted distillate from onion also extensively used in the food industry as seasoning and flavouring agent for savory products (Resemann and Carle, 2003). Onion is considerably important in the daily Ethiopian diet. All the plant parts are edible, the bulbs and the lower section of stem are the most popular as a seasoning or a vegetable in stews (MoARD, 2005). The crop is produced as a cash crop by small farmers and commercial growers especially under irrigation conditions compared to other traditional bulb crops, shallot and garlic, which are rain fed. Onion production was nationally become an important component since the release of Adam red cultivar. Today this crop is produced in different administrative regions in small and

large scale farmers. With the realization and advance in expansion of irrigation projects in the region it is becoming an important cash crop even in areas where bulb crop production was not commonly practiced. There is a shortage of advanced varieties to different agro ecological zones, disease and insect pest resistant and/or tolerant, good shelf life (Lemma and Shimeles, 2003).

Considering these limitations the center received hybrid varieties from a private company to test their performance in terms of yield, disease and pest reactions and shelf life. The result revealed that these varieties are found promising. Therefore, as additional and/or alternative with the existing open pollinated varieties a promotion work was done in onion producing areas at Larena in Humbo Woreda. Therefore, the study main objective to investigate the and evaluation of different hybrid onion varieties at study area

Materials and Methods

Two hybrid onion varieties (Nepune and Russle) along with Adama red and Bombay red were planted on a single plot base (25m²) for each. The spacing was maintained 60x20x10 cm between ridges, rows on the ridge and plants respectively. 92kgP₂O₅ ha⁻¹ base was applied at planting. Whereas 151kg N ha⁻¹ base was applied in 4 splits: 36, 50, 50 and 15kg N at transplanting, 25th, 40th and 55th days after transplanting. Other agronomic practices and pest managements were applied as recommendations. Field day was organized to assess farmers' reaction at field condition.

Results and Discussion

Nepune, Russel, Bombay red and Adama red gave 57.00, 40.20, 33.60 and 31.50 tone ha⁻¹ bulb yields respectively (Table1). It indicates that the area is ideal for hybrid onion bulb production. Based on partial budget analysis, with 10% increase in input price and 10% decrease in output price the highest net benefit was obtained on Neptune 114929.00 birr with a marginal rate of return (MMR) of 522.59 % (table 2).

Farmers' suggestions

- They have vigorous vegetative growth.

- They totally beat the varieties already under production.
- These two hybrid varieties have purple skin and flesh color which is a good merit for market
- They are too early.
- In addition to yield these hybrids have excellent quality characters in terms of bulb weight, size, color and prolonged shelf life
- Seeds should be available in near market.

Partial Budget Analysis

Average bulb yield of the treatments were used in the partial budget analysis to recommend rate of N and P fertilizers (CIMMYT, 1988). The field price of 1kg of onion bulb that farmers receive for sale of the crop was taken as 12.0 ETB based on the market price of onion bulb at Humbo town. The transportation cost to the market taken as 10 ETB per quintal. The cost of load and unload was 10.ETB Qt⁻¹ and the cost of sack as taken the amount of adjusted yield per hectare P and the cost was 5.0 ETB. Nitrogen was applied as urea and its price was 12.0 ETB kg⁻¹. Phosphorus (TSP) was applied as DAP and its price was 16.758 ETB kg⁻¹. The average labour cost incurred for land preparation (nursery and main field), transplanting, fertilizer application, watering, weeding, chemical application and harvesting was 2950.0 ETB and seed cost 500.0 ETBkg⁻¹ taken as fixed costs. The gross benefit was calculated as average adjusted bulb yield (kg ha⁻¹) x current market price that farmers receive for the sale of the crop (12.0 ETB kg⁻¹).

The economic analysis showed that the highest net revenue was found from application of 69 kg N per ha along with 45 kg P ha⁻¹ followed by application of 46 kg N ha⁻¹ along with 45 kg P ha⁻¹. The highest marginal rate of return was recorded at the N level of 46 kg N ha⁻¹ with P level of 15

During the experimentation period field price of onion produce, seed cost of hybrid onion and OPV was 3.00 birr/kg, 2257.00 birr/kg and 500.00 birr/kg respectively. Due to Bombay red is dominant in the areas and gave more net benefit than Adama Red; MRR is calculated by comparing each hybrid onion varieties with the standard check Bombay Red*.

Table.1 Mean Bulb Yield of Hybrid Onion Varieties at Humbo Larena

Variety	Bulb yield per plot(kg)	Bulb yield (tone ha ⁻¹)
Adama Red (OPV)	78.75	31.50
Russell (hybrid)	100.50	40.20
Neptune (hybrid)	142.50	57.00
Bombey Red (OPV)	84.00	33.60

Table.2 Partial budget and MRR analysis of hybrid onion varieties with 10% increase in input price and 10% decrease in output price

Treatment	Marketable Yield(Q/ha)	Gross Benefit	Total variable cost	Net benefit	MRR%
Adama Red	315	85050.00	28490.00	56560.00	-
BombeyRed*	336	90720.00	28050.00	62670.00	-
Russel	402	108540.00	38971.00	69569.00	68.99
Neptune	570	153900.00	38971.00	114929.00	522.59

Fig.1



Fig.2



Recommendation

The performance of hybrid varieties was excellent. Therefore, based on partial budget analysis, yield, bulb color, storability and general performance, Neptune is recommended for resource full farmers and private investors as alternative and/or additional variety with the existing varieties. However, the cost of the seed is relatively high but can be justified by high yield and particularly by their market value.

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