Advances in Crop Science and Technology

Research Article Open Access

Evaluating Blended Fertilizers Response of Malt Barley Grown In the Vertisols Areas of South Tigray, Ethiopia

Assefa Workineh*

Tigray Agricultural Research Institute, Alamata Agricultural Research Center, Ethiopia

Abstract

Study on the e ect of di erent bended fertilizers level on malt barley was conducted in 2018 and 2019 cropping season on vertisols of Oþa, Enda-Mehoni and Emba-Alaje districts of Tigray, Ethiopia with the objective of determining the optimum blended fertilization for malt barley production. The experiment contained randomized complete block design with seven level of blended fertilizer (0, 50, 100, 150, 200, 250 and 300 kg NPSZnB ha-1) and replicated three times. The analysis of variance for grain yield indicate that e ects of NPSZnB blended fertilizer were signiýcance (P<0.05) for grain yield. Signiýcantly more grain yields (3.67 and 4.17 t ha-1) with higher economic return were obtained from application of 150 kg NPSZnB ha-1 in Adigolo and Mekan areas respectively. More over higher grain yield of 3.51 t ha-1 with economic return was obtained at Atsela districts from the application of 100 kg of NPSZnB ha-1 blended fertilizer. Hence application of 150 kg NPSZnBha-1 blended fertilizer are agronomical and economical optimum level for Adigolo and Mekan districts and 100 kg NPSZnBha-1 of blended fertilizer for Atsela and other similar agro ecologies. Even if there is signiýcance e ect of blended fertilizer on grain yield of malt barley, the maximum grain yield obtained is not the potential of the variety, hence integration of blended and nitrogen fertilizer is further research directions to boost the grain yield with brewing quality attributes in malt barley.

Ke ´ d : Malt barley; Blended fertilizer; Grain yield

I ´d c ´

Barley (Hordeum vulgare L.) is an important cereal crop grown worldwide for not only food and feed but it is also used as a raw material for the malting process to produce beer or other alcoholic beverages (Henry, 1989; Celus et al., 2006). It is a cool-season crop with a wide range of adaptation grow but well at an altitude of about 3,000 m above sea level or above. It provides food, homemade drinks, animal feed, cash and other necessities to many millions of people (Berhanu et al., 2005; Mulatu and Lakew, 2011). In Ethiopia, there is signi cant opportunity for the production of malting barley and can be one of the major sources of income for smallholder farmers due to the booming demand for malt following the expansion of breweries (Mohammed and Legesse, 2003) [1].

e pro tability of malting barley is in uenced largely by the grain yield, which in turn depends on a number of factors including di erences in cultivar, farming conditions, soil and climate (Fathiet et al., 1997). ough, grain yield of malt barley are increasing, during the past decades, barley yields in Ethiopia have averaged 2.5 t ha^{-1}(CSA, 2020), which is quite low compared to the world average (2.95 t ha^{-1}, which is still less than half of barley yields in the two best performing African countries of Kenya (3.26 t ha^{-1}) and South Africa (2.93 t ha^{-1}), and well below yields in the highest-performing countries, such as France, Germany and the Netherlands, with average barley yields over 6.0 t ha-1 (FAOSTAT, 2018).

Agriculture in Ethiopia is characterized by low productivity, mainly caused by low soil fertility and absence of e cient, sustainable and site speci c soil fertility management practices (Abushet al., 2011). Fertilizer use on food and malting barley is the lowest than among all cereal crops, which is only 48.3% of the total area of land covered by barley compared to Te , Wheat, and Maize receiving fertilizer on 59.7%, 69.1%, and 56.3% of their total land area, respectively (CSA 2010). In addition in the past decades, Ethiopian agriculture depended solely on imported fertilizer products namely urea and di-ammonium phosphate which are source of N and P although most Ethiopian soils lack other macro- and micro-nutrients (EthioSIS, 2014) [2]. is may lead to low nutrient uptake e ciency of crops due to low availability or lack of synchrony of maximum growth of crops with adequate availability of the nutrients in the soil. Based on the national soil data base, in addition to the macronutrients, due to long year cultivation, some of the micronutrients like zinc, boron, and copper are depleted from the soil in the major crop producing area of the country (EthioSIS, 2014).

One major impediment to increase fertilizer use e ciency in the country has been lack of information about the fertility status of the agricultural land. Currently, the government and a national land resource have recognized the problem and soil fertility mapping work is undertaken by the EthioSIS project of the Agricultural Transformation Agency (ATA). is initiative has been conducted throughout the country to assess the soil fertility status so that fertilizer recommendations can be based on soil test results [3].

Many research ndings have indicated that nutrients like N, P, K, S and Zn levels as well as B and Cu are becoming depleted and de ciency symptoms are being observed on major crops in di erent areas of the country (ATA, 2013). Most Ethiopian soils are de cit in macronutrients (N, P, K and S) and micronutrients (Cu, B, and Zn) (EthioSIS, 2014). Macronutrients as well as micronutrients are of primary importance in our agriculture system but due to unawareness of the farmers about importance of applying micronutrients and unavailability, the soils are becoming de cient in micronutrients.

*Corresponding author: Assefa Workineh, Tigray Agricultural Research Institute, Alamata Agricultural Research Center, Ethiopia, E-mail: assefaw.02@gmail.com

Received: 01-Sep-2024, Manuscript No: acst-24-147163, Editor Assigned: 04-Sep-2024, pre QC No: acst-24-147163 (PQ), Reviewed: 18-Sep-2024, QC No: acst-24-147163, Revised: 22-Sep-2024, Manuscript No: acst-24-147163 (R), Published: 29-Sep-2024, DOI: 10.4172/2329-8863.1000738

Citation: Workineh A (2024) Evaluating Blended Fertilizers Response of Malt Barley Grown In the Vertisols Areas of South Tigray, Ethiopia. Adv Crop Sci Tech 12: 738.

the aboveground straw biomass and grain yield were adjusted to 90% of the actual yield obtained from the experimental plots to represent a more realistic yield in farmers' elds (CIMMYT, 1988). e gross and net bene ts were calculated as;

Gross bene t (GB) =yield×Price

Net bene t (NB) =Gross bene t (GB)-total varying cost (VC)

e marginal rate of return (MRR) was calculated by dividing the change in net bene t by the change in variable cost, which is the increase in return by increasing the input. e marginal rate of return was calculated a er conducting a simpli ed dominance analysis (CIMMYT, 1988) to select the treatments that are relevant to farmers in terms of return. A treatment is said to be dominated when increase in costs does not lead to an increase in net bene ts. It is dominated because there is at least one other treatment of less or equal cost that gave greater bene ts. To perform the economic analysis, the treatments were arranged according to an increasing order of variable costs (VC) and compared with respect to whether increasing costs are followed by a larger increase in net bene ts (NB). Blended rertilizer and labor costs were determined based on the current rates of fertilizer in the speci c locations.

e cost for the NPSZnB blended and urea fertilizer was 15.81 and 16.5Birr kg^{-1}. e grain and straw yields harvested from the plot were converted to a hectare basis, and the market values of both components were computed based on the 2019 cropping season market prices, with prices of 30 and 1.5 Birr kg^{-1} for grain and straw of barley, respectively.

Re a d D c ´

S´ h c che ca ´ e e ´f he d d c

e mean pH values of the composite surface soil samples of the experimental sites were falls under the slightly neutral soil reaction

investment of blended fertilizer from the lower selected treatments to higher resulted to more than 100% return..

e partial budget analysis showed the highest net bene ts (72,384.61, 69811.66 and 85975.31 birr ha^{-1} from Atsela, Adigolo and Mekan areas respectively) were obtained from the application of 150,150 and 200 kg NPSZnB ha^{-1} blended fertilizer levels. Next to the control, the application of 50 kg NPSZnB ha

C´ c ´ a d Rec´ e da ´

Many factors limiting crop yields have been reported by many researchers and the current study showed that application of di erent NPSZnB blended fertilizer levels were signi cantly ($P \leq 0.05$) in uenced grain yield of malt Barley at Adigolo, Atsela and Mekan districts of O a, Enda-Mehoni, and Emba-Alaje Woredas Tigray region respectively.

Application of 150 kg NPSZnB ha^{-1} have sound and promising impact yield of malt barley production and the determined blended fertilizer level reaches argonomically and economically optimum for malt barley production in the at Adigolo and Mekan districts respectively and 100 kg NPSZnB ha^{-1} at Atsela disricts. Even if there is signi cance e ect of blended fertilizer on grain yield of malt barley, the maximum grain yield obtained is not the potential of the variety, hence integration of blended and nitrogen fertilizer is further research