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Evaluation of Maize Variety for Northern Leaf Blight (*Trichometasphaeria turcica)* in South Omo zone

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Abstract Maize is a staple food crop which plays a role in food security in Ethiopia. It is affected by many diseases that reduces yield. The majour control methods are chemical and cultural. However , such options are unsustainable to the smallholder resource poor. An experiment conducted on station in Jinka Agricultural Research Center evaluated 12 improved maize varieties and one local check using Randomized Complete Block Design with three replications.The objective of the study was to select a maize variety or varieties resistant to northern leaf blight. The variety BH660 was highly resistant compare to the other tested varieties with the incidence of 13.7% and a grain yield of 3.7kg/plot. The variety BH543 was susceptible with the incidence of 52.3% and it gave grain yield of 3.4kg/plot.On the other hand BHQPY545 and local check were susceptible to northern leaf blight but their yields were 4.1kg/plot and 3.8kg/plot respectively. This indicates that the local check and BHQPY545 were able to tolerate high disease pressure. Therefore, the variety BHQPY545 is recommended for mid land maize production areas of South Omo zone.

Keywords: *resistance, northern leaf blight, disease incidence severity, yield*

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1. Introduction

Maize (*Zea mays* L.) is world's third most important cereal food crop next to wheat and rice. In sub-Saharan Africa it is considered as th major food and income provider crop for more than 300 million households (Tefera *et al*., 2011). The crop is affected by a number of diseases that reduce both the quality and quantity of production.

Northern leaf blight is a foliar disease of maize caused by *Exserhilum turcicum*, the residue- borne fungus. This disease occurs sporadically in most temperate humid areas where maize is grown (Lim *et al*., 1974). In Africa, the northern leaf blight is reported to be widespread and destructive disease that affect maize in warm and humid growing regions of Ethiopia, Uganda and Tanzania (Adiopla *et al*., 1993: Tilahun *et al*., 2001and Nkonya *et al*., 1988).

Maize is the major cereal crop for the people of Ethiopia it grows in diverse ecology in the country but it is faced with major challenges including diseases. Among diseases, as identified by diagnostic survey of farmers' fields, it is mainly affected by foliar diseases (Asfaw *et al*., 1992). The most common potential economic foliar disease on maize is the northern corn leaf blight (Assefa and Tewbech, 1992). According to Assefa *et al* (1996), the northern leaf blight caused the highest mean grain yield loss of 50% and 1000 kernel weight loss of 16.4% of susceptible cultivar of open pollinated variety, OPV POOL 32C19 under the artificial infestation condition.

Currently the recommended control measures of the northern leaf blight of maize are the use of relative resistant or tolerant cultivars, Tillage to bury infected residue may also be helpful where erosion is not a problem while, crop rotation is also helpful because the disease tends to increase in continuous cropping and the use of fungicides. But significant yield losses still occur when the environmental conditions are favorable for the disease.

The use of resistant varieties adds little or nothing to cost of production (Gareth and Cliffored, 1983). Efficient disease control is achieved through the use of fungicide spray including maneb, chlorothalonial and propconzale which offers the most consistent method of control northern leaf blight (Brunette and Whit, 1985). Though, fungicides can be used to control of northern leaf disease in corn, they are usually economical only in seed corn production, or sweet corn production.

In South Omo zone the predominant maize cultivation system is mono cropping system. Hence, the lack of appropriate farming system and the absence of crop rotation practice in the zone increase the potential of the disease incident for northern leaf blight. As a result it becomes a major yield limiting factor in the zone. Therefore, introducing available control measures to the farmers is vital to increase production and productivity of maize in the areas. Among the available control measures, the use of resistant and high yielding varieties has been

very cheap and effective method (Daniel *et al*,2008). This study was conducted to evaluate maize varieties against northern leaf blight.

2. Materials and Methods

The experiment was conducted at Jinka Agricultural Research center of South Agricultural Research Institute, Ethiopia.Jinka is located at 5°52'N, 36°38'E, and 1450 m above sea level with annual average rainfall and temperature of 900 mm and 22.3°C, respectively. The soil of the experimental field is sandy loam.

Twelve maize varieties and one local check were planted on march 2, 2013. A randomized complete block design with three replications was used. Each plot consisted of four rows, 3.6 m long and 3m width with spacing of 75 cm between rows and 30 cm between plants. All Plots were managed according to farmers' practices and the recommended management approaches for weed and insect problems. Disease assessments were conducted in the field after onset of the disease. Six randomly selected plants from the center row were tagged and used for successive disease assessments. Plants were rated at-2 weeks intervals for percent incidence, agronomic, yield and other disease related traits. Disease severity was rated using 1-9 scoring scale. The data were analyzed using GLM procedure of SAS software. The means were separated using LSD at 0.05 probability level.

3. Results

Table 1. Significance of mean square value for yield, incidence and severity of northern leaf blight for 12 improved maize varieties and 1 local check

Source of variation	Df	IN(%)	SV	GY(kg/plot)
Replication	2	148.2ns	1.3ns	0.45ns
Treatment	12	450.0*	1,2ns	0.53ns
Error	24	209.3	0.7	1.3
Cv(%)	36.7	25.1	32.3	

*,ns, Df, IN, SV, GY =significant at p<0.05, not significant , degree of freedom, Incidence , Severity and grain Yield .

Table 2. Mean values of grain yield, Incidence and severity of northern leaf blight for the tested varieties

Varieties	Grain Yield(Kg/plot)	Incidence(%)	Severity(1-9)
BH661	3.6	28.4	3.0
Melkassa7	2.6	52.2	4.3
BH543	3.4	52.3	3.7
Gibe1	3.7	42.2	3.0
Melkassa4	2.7	40.7	3.7
Melkassa1	3.5	31.9	4.3
Gibe2	3.4	32.9	3.0
BH540	3.8	25.0	2.3
BH660	3.7	13.7	2.3
BHQP542	3.6	47.1	3.7
BHQPY545	4.1	42.7	3.0
Mlkassa6	3.3	51.1	3.0
Local	3.8	52.3	3.0
LSD	1.9	24.4	1.4

LSD= least significance Difference at 0.05 probability level.

The analysis of variance showed that the tested maize varieties were significantly different (P<0.05) in incidence of northern leaf blight but they were not significantly different in their severity and grain yield (Table 1). Grain yield, incidence and severity ranged from 2.6 to 4.1, 25.0 to 52.3,2.3 to 4.3, respectively.

The most tolerant varieties to northern leaf blight were BH660, BH540, and BH661 with scores of 13.7% ,25.0% and 28.4% , respectively. The variety melkassa 7, Local, and melkassa 6 were most susceptible with the score of 52.2%, 52.3% and 51.1%, respectively. The variety Melkassa 1 and Gibe 2 had intermediate score (Table 2).

4. Discussion

The variety BHQPY545 and local check was highly susceptible to northern leaf blight, but high yielding. This indicates that the local check and BHQPY545 were able to tolerate high disease pressure. This result is inline with (Karavina1, Mandumbu1 and Mukaro, 2014). On the other hand the variety melkassa 7 was highly susceptible to northern leaf blight and gave lower yield, which showed that a dominant gene or particularly dominant genes that control grain yield could not express themselves due to susceptibility to northern leaf blight (Hooker, 1963, 1977; & 1981 and Ogliari *et al*., 2005).

5. Conclusion

The variety BHQPY545 was susceptible to northern leaf blight, and is a high yielder variety compared to the other varieties. Therefore, dissemination of this variety to the farmers in mid land areas of South Omo zone will be vital to increase production and productivity of the farmers utilize it as an alternative of the local cultivar.

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