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Effect of Nitrogen Fertilization on Economics of Hybrid Maize Genotypes

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Abstract:
A field experiment was conducted during rabi 2008-09 with three hybrids viz., BH 40625, Super 900 M and BH 1576 as main treatments and four nitrogen levels (150,200,250 and 300 kg N ha^{-1}) as sub treatments. The results indicated that hybrids BH 40625, Super 900 M and BH 1576 performed almost alike regarding all the growth parameters, yield attributes and grain yield. All the growth parameters except number of green leaves plant^{-1}, yield attributes, grain yield and protein content in grain increased significantly with each higher level of nitrogen up to 200 kg N ha^{-1} Application of 300 kg N ha^{-1} did not prove to advantageous over 200 kg N ha^{-1}. The interaction between hybrids and nitrogen levels was found to be significant only in case of Leaf area index, protein content and nutrient uptake. Maximum grain yield of 7.0 t ha^{-1} was obtained with the application 300 kg ha^{-1} where as hybrid BH 40625 recorded 6.7 t ha^{-1} in comparison to Super 900 M (6.5 t ha^{-1}) and BH 1576 (6.4 t ha^{-1}).

Keywords: *Maize, nitrogen, growth, yield*

1. Introduction

The productivity of *rabi* maize is more compared to *kharif* maize crop and hence additional plant population with enhanced nitrogen fertilization is required for maximizing the yield potential of presently available genotypes. Maize is a heavy feeder of nutrients. Among the nutrients nitrogen is the primary one in the fertilizer management programme for maize as it is the key to realize the yield potential of maize crop. Nitrogen plays a major role both in structural and functional aspects of crop growth. It not only increases yield by increasing total dry matter production but also influences the availability of other essential elements. The uptake of nutrients by a maize crop producing 5 t ha^{-1} of grain yield was estimated around 105 kg N, 50 kg P_2O_5 and 75 kg K_2O kg ha^{-1}. Further, it is assumed that for every 100 kg of grain yield 1.8 kg N in the grain and 1.0 kg in the above ground parts of the plant are required and must be supplied by soil and/or fertilizer. At present the information about the response of present single cross hybrids to higher levels of fertilizers particularly nitrogen is meager therefore the present study is proposed to evaluate different maize genotypes in relation to nitrogen fertilization for maximizing grain yields during rabi season.

2. Material And Methods

A field experiment was conducted during *Rabi*, 2008-09 at Agricultural College Farm, Rajendranagar, Hyderabad. The soil was sandy loam, neutral in reaction (pH 7.0), with 0.49% of organic matter, 222.75 kg ha^{-1} available nitrogen, 22.60 kg ha^{-1} of available P and 260.70 kg ha^{-1} of available K. Four levels of applied nitrogen viz. - 150 kg N ha^{-1}, 200 kg N ha^{-1}, 250 kg N ha^{-1}and 300 kg N ha^{-1} were used. Three genotypes BH-1576, Super 900M and BH 40625 were tested. Entire quantity of P_2O_5 and K_2O (60:60 kg,P_2O_5:K_2O ha$^{-1)}$ was applied as a basal dose. Nitrogen was applied as per the sub plot treatments in three splits i.e. one third as basal, one third at knee high stage and the remaining one third at tusselling stage. The sources of N, P and K are urea, single super phosphate and muriate of potash respectively. The fertilizers were applied by placement along the lines 5 cm away and 5 cm below the seed rows. Atrazine @ 1.0 kg a.i. ha^{-1} was applied as pre-emergence spray after sowing and irrigation. One interculture and hand weeding were taken at 30 DAE. All the plots were uniformly irrigated as and when required based on soil moisture content and phenological stages of the crop growth. Total 15 irrigations were given to crop. Harvesting was done, when the sheath of the cob dried completely.

3. Results AND Discussion

3.1. Economics

3.1.1. Gross Returns

Higher gross returns (Rs.59680 ha^{-1}) were realized by BH 40625 which was comparable with Super 900 M (Rs.58414 ha^{-1}) and BH 1576 (Rs.57414 ha^{-1}).

Gross returns showed noticeable variation due to the nitrogen levels tried and significantly highest gross return (Rs.62329/-) were obtained with 300 kg ha^{-1} recommended dose of nitrogen, which was superior to rest of the levels. This was followed by 250 kg ha^{-1} level of nitrogen, with Rs.60342/- and the lowest gross return (Rs.53172/-) were obtained under 150 kg ha^{-1} nitrogen level.

3.1.2. Net Returns

Higher net returns (Rs.41714 ha^{-1}) were obtained by BH 40625 which was comparable with Super 900 M (Rs.40448 ha^{-1}) and BH 1576 (Rs.39448 ha^{-1}).

Net returns showed considerable variation due to the nitrogen levels indicating that significantly high net returns (Rs.43571/-) were obtained by 300 kg ha^{-1} level of nitrogen, followed by 250 kg ha^{-1} with Rs.42127/- and the lowest net returns (Rs.39953/-) were obtained with 150 kg ha^{-1} nitrogen level.

3.1.3. Benefit Cost Ratio (B: C ratio)

With regard to varieties, BH 40625 recorded the highest B:C ratio (2.32) which was on par with BH 1576 (2.25) and Super 900 M (2.19).

In case of nitrogen levels, benefit – cost ratio was on par with 150, 200,250 and 300 Kg ha^{-1} of N (Appendix -11).

Higher gross returns, net returns and B:C ratio were realized with BH 40625 compared to other cultivars, because of higher grain yield and stover yield obtained with BH 40625.Sreedhar *et al.* (1993) have also reported this type of disparity among maize cultivars

Higher gross returns, net returns and B:C ratio were observed with 250, 300 kg N ha^{-1} compared to other treaments, because of higher grain yield (Appendix -11). However the treatments were on par with each other. Similar results of economics with increased nitrogen levels were also reported by Thakur and Vinod Sharma (1999).

Treatment	**Cost of cultivation (Rs ha^{-1})**	**Gross returns (Rs ha^{-1})**	**Net returns (Rs ha^{-1})**	**Benefit: Cost ratio**
Hybrids				
BH 1576	17966	57414	39448	2.19:1
Super 900 m	17966	58414	40448	2.25:1
BH 40625	17966	59680	41714	2.32:1
Nitrogen levels (Kg ha^{-1})				
150	17219	53172	39953	2.32:1
200	17672	58253	40851	2.31:1
250	18215	60342	42127	2.31:1
300	18758	62329	43571	2.32:1

Appendix 11: Economics of maize as influenced by hybrids and nitrogen levels

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