

SYNCHRONIZATION OF NITROGEN APPLICATION WITH GROWTH STAGES OF MAIZEM. R. A. MOLLAH¹, M. ASADUZZAMAN², M. A. AKTHER¹ AND K. M. KHALEQUZZAMAN³¹Agricultural Research Station, Bangladesh Agricultural Research Institute (BARI), Seujgari, Bogra-5800, ²Agricultural Research Station, BARI, Shibpur, Narsingdi, ³Regional Agricultural Research Station, BARI, Ishurdi, Pabna, Bangladesh.

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ABSTRACTSMollah, M.R.A., Asaduzzaman, M., Akther, M.A. and Khalequzzaman, K.M. 2007. *Synchronization of Nitrogen Application with Growth Stages of Maize*. *Int. J. Sustain. Crop Prod.* 2(3): 53-55

The experiment was conducted to verify the effect of nitrogen (N) application at different growth stages of maize at Multilocation Testing (MLT) site sherpur under On Farm Research Division, BARI, Bogra during 2005-06. Three urea application treatments were T₁ (1/3 as basal + 1/3 at 8 leaves stage + 1/3 at tasseling stage), T₂ (30 % as basal + 70% at 8 leaves stage) and T₃ (50% as basal and 50% at 8 leaves stage). Plant height, no of filled grains/cob, 100 seed weight, grain yield and straw yield were highest in T₂ compared to others. On the other hand, the highest no of cob was found in T₁ and unfilled grain/cob in T₃. There was no significant difference for grain yield among the treatments: But the comparatively higher grain yield (8.27 t/ha) was obtained from treatment T₂. The present results clearly indicate that in hybrid maize urea should be applied either 30% or 50% as basal and rest 70% or 50% at 8 leaves stage instead of 1/3 as basal +1/3 at 8 leaves stage + 1/3 at tasseling stage.

Key words: Yield, synchronization of N application, growth stage

INTRODUCTION

A growing interest has been found to cultivate maize as it is multipurpose cereal crops in nature. Due to the establishment of poultry industry its demand is increasing day by day. The poultry farm owners fortified the food with costly artificial lysine and triptophene. But the recently developed quality protein maize (QPM) is rich in protein, especially it contains higher amount of lysine and treptophene. In the present recommendation urea is applied as top-dress at 8 leaves stage and tasseling stage. However, at tasseling stage it is difficult to enter maize field and most of the maize farmers do not apply urea because injury of farmers' skin and eye is occurred. N use efficiency was higher from mineral fertilizer + poultry manure than from mineral fertilizer alone. Both dry matter yield and grain yield were highest when N was applied in before sowing and split application at the 4-8 leaf stage (Borin and sartori 1989). Average of two years results indicated that the single time of N fertilizer application as top dress at 8 leaf stage of maize is costly effective and helps to avoid health hazard (Anonymous, 2005). Therefore, the recommendation needs verification to find out alternative package of urea application at different growth stages of maize.

MATERIALS AND METHODS

The experiment was conducted at farmers' field under MLT site sherpur, Bogra during 2005-06. Two new nitrogen fertilizer application methods were tested against the present recommendation. T₁ was the present recommendation of N fertilizer application method where N was applied as basal and two top-dress at 8 leaves stage and at tasseling stage. T₂ was the new one where N was applied 30% as basal and 70% as top-dress at 8 leaves stage. T₃ was another new one where N was applied 50% as basal and 50% as top dress at 8 leaves stages. The experiment was designed in RCB with 4 dispersed replications. Seeds of maize were sown at 6-7 December, 2005 maintaining the spacing 75 cm X 25 cm. Fertilizers nutrients were used @ 253-51-110-46-5.4-1.25 kg N-P-K-S-Zn-B and 6 ton cowdung per hectare. (Anonymous, 2004). Entire amount of P, K, S, Zn, B and cow dung were applied as basal during final land preparation. N was applied as treatment concerned. Two irrigations were applied at January 9 and February 26, 2006. Other intercultural operation was done as and when necessary. The hybrid maize variety was pacific-II and the crop was harvested at 24-26 April, 2006. Data on different parameters were collected and analyzed statistically following Duncan's New Multiple Range Test (DMRT).

RESULTS AND DISCUSSION

The performance of different treatment is presented in Table 1. Yield and yield contributing characters were not statistically significant except unfilled grain per cob. The number of plants per meter square was equal in all the treatments. The number of cob per meter square, plant height and the number of filled grain per cob were also found not significant in all the treatments. The highest number of unfilled grain from T₃ (9.10) which was statistically difference with T₂ (6.43) and T₁ (7.33). The hundred seed weight was found identical in all the treatments. Finally the grain and straw yield were statistically similar in all the treatments. Palled and shenoy, (2000) reported that the N was applied as a single dose at sowing (T₁), in 2 splits (50% at sowing + 50% at 30 days after sowing, T₂) and in 3 splits (50% at sowing + 25% at 30 DAS + 25% at tasseling; T₃) resulted in 2 and 3 splits (T₂ and T₃ respectively) significantly increased crop yield over single dose (T₁) but the identical yield were found from T₂ and T₃.

Anonymous, (2006) also reported that there was no significant difference for grain yield among the treatments of different location such as Pabna, Kishoregonj, Jessore, Comilla and Rangpur. But numerically in most of the locations either application of urea 30% as basal + 70% at 8 leaves stage or 50% as basal + 50% at 8 leaves stage gave higher yield in comparison to present recommendation for urea application. Zhou *et al.*, (1988) reported that the hydroquinone and urea applied before sowing and without urea top dressing increased maize yield and no hydroquinone accumulation was found in soil, plant stems or grains. Coutinho *et al.*, (1987) expressed from their research findings that the effects of 0, 50 and 100 kg N/ha as urea applied either to the surface or incorporated at 40 days or split 50% at 30 days and 50% at 50 days after sowing on maize yield and leaf nitrogen content were studied at Jaboticabal, Brazil in 1983-84. N application increased yield and leaf nitrogen content and there were no difference in yield or nitrogen content between application methods or dates. Suwanarit *et al.*, (1986) reported that there were no effects of placement or timing of urea applications on yield. It was also expressed there were no significant difference in grain yield of maize between split applications of urea and a single banded application at sowing. Yusuf *et al.*, (2003) reported that the timing of application did not influence N fertilizer movement and N recovery. Banjoko and adediran, (2003) also reported that the methods of fertilizer application did not significantly vary. However, the rates of N fertilizer applied resulted in significant differences in maize yield. Nazakat *et al.*, (2004) reported that the N as urea was applied during sowing (50%), together with p as triple super phosphate (100%) and before the tasseling stage (50%) resulted the highest plant height and cob length, higher number of grains per cob and the highest grain yield.

Table 1. Effect of different methods of N application on maize at Sherpur, Bogra during 2005-06

Treats	No. of plants/m ²	Plant height (cm)	No. of Cob/ m ²	No. of filled grain/cob	Unfilled grain/cob	100 seed weight (g)	Grain yield (t/ha)	Straw yield (t/ha)
T ₁	6	239.10	6.25	508.0	7.33 a b	39.75	8.16	7.99
T ₂	6	246.88	5.75	550.0	6.43 b	40.25	8.27	8.12
T ₃	6	237.23	5.83	485.0	9.10 a	39.50	8.00	7.88
F-test	NS	NS	NS	NS	*	NS	NS	NS
CV %	3.57	5.30	8.82	8.28	15.25	-	2.55	2.72

In a column, similar letter do not differ significantly at 5% (*) level of significance

NS = Not significant

CONCLUSION

From the above discussion, the present results clearly indicated that in hybrid maize urea should be applied either 30% or 50% as basal and 70% or 50% at 8 leaves stage instead of 1/3 as basal + 1/3 at 8 leaves stage + 1/3 at tasseling stage. Apparently the present findings could save labour cost and particularly it also relieves the farmers from health hazard of applying urea at tasseling stage.

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REFERENCES

- Anonymous. 2004. Krishi Projukti Hatboi, 3rd Edition, BARI, Gazipur-1701. Vol. 1 P. 46
- Anonymous. 2005. BARI Annual Report. 2005. Gazipur-1701, Bangladesh. p.347
- Anonymous. 2006. Annual Research Report. 2005-06. On Farm Research Division, BARI, Gazipur-1701, Bangladesh. p.298
- Banjoko, V. A. and I. A. Adediran, 2003. Effect of source, rate and methods of nitrogen fertilizer application on maize yield in the savanna zone at South Western Nigeria. Moor J. agril. Res., 4 (1): 19-25.
- Borin, M. and G. sartori. 1989. Nitrogen fertilizer trials on maize (*Zea mays*), the effects of fertilizer rate, source and application date. Rivista-de-Agronomia. 23 (3): 263-269.
- Coutinho, E. L. M., A. J. Formigoni., E. C. A. D. Souza and P. E. Carnier. 1987. Effect of rate, application methods and splitting of urea on maize. Rivista-de-Agriculture, piracicaba, Brazil. 62 (3): 239-246.

- Nazakat, N., G. Sarwar, T. Naseeb and M. Yousaf. 2004. The effect of the combined application of N and P on growth and yield of maize. *Sarhad J. Agril.* 20(2): 251-253.
- Palled, Y. B. and H. Shenoy. 2000. Effect of Nitrification inhibitors and time of nitrogen application on hybrid maize. *Current research. University of Agricultural Science, Bangalore.* 29 (1-2): 19-20.
- Suwanarit, A., C. Suwannarat and S. chotchungmaneerat. 1986. Effect of land preparation and maize cultivar on efficiency of N- fertilizer applied at different times and by different methods in maize mungbean association using 15 N. *Plant and soil.* 94 (2): 179-190.
- Yusuf, A. A., V. O. chude and B. H. Janssen. 2003. Substitution rates of N,P and K in farm yard manure and Alfisol in Nothern Guinea savanna at Nigeria. *J. Agril and environ. for Int. Develop.* 97 (1/2): 93-106.
- Zhou, L. K., G. Y. Wu., Z. M. Zhang, C. M. Cao and Y. H. Li. 1988. Effect of the urease inhibitor hydroquinone on the efficiency of urea fertilizer. *Acta-pedologica sinica.* 25 (2): 191-198.