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Effect of nitrogen and phosphorus application on productivity, nutrient uptake and quality of teosinte (*Zea mexicana* L.) fodder

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Introduction

Teosinte (*Zea mexicana* L.) is popularly known as *Makchhari* being a close relative of maize. It provides succulent, palatable and nutritive fodder during *Kharif* season for feeding the animals as green fodder or conserved fodder in the form of silage. Teosinte is an excellent multicut fodder which gives high yield of nutritious green lush fodder in 65-70 days with less inputs as compared to maize. Nitrogen is an essential component of proteins, nucleic acid, enzymes, co-enzymes, chlorophyll and cell wall. Phosphorus plays a vital role in crop production as it is involved in CO₂ fixation, sugar metabolism, energy storage and transfer. Nutrient deficiency along with imbalanced and non-judicious fertilizers use of the important limiting factor that may affect the yield and quality of teosinte forage. In India about 62% and 49% soils are deficient in nitrogen and phosphorus (Gibson, 2006). The application of nitrogen and phosphorus is considered to be the most important which improves the yield and quality of fodder. The present investigation was under taken to assess the effect of N and P application on productivity, nutrient uptake and quality of teosinte fodder

Materials and Methods

The experiment was carried out during *kharif* season 2012 and 2013 at Forage Research and Management Centre, NDRI, Karnal. The farm is situated at 27°43'N latitude and 76°58'E longitude and at an altitude of 245m above mean sea level (msl). The soil of experimental field was clay loam in texture, low in available nitrogen (191 kg/ha), medium in available phosphorus (19.4 kg/ha) and high in available potassium (271 kg/ha) and neutral in reaction (pH 7.2), organic carbon (0.50%), bulk density (1.5Mg/m³). Fifteen treatments combinations of 5 levels of nitrogen (0,40,80,120 and 160 kg/ha) in main plots and 3 levels of phosphorus (0, 30 and 60 kg/ha) in sub plots with four replications were laid out in split plot design. Half dose of nitrogen and full dose of phosphorus was applied as basal dose through urea and single super phosphate respectively. The remaining half dose of nitrogen was applied through urea as top dressing after first irrigation. The teosinte cultivar 'Bihar local' was sown at planting distance of 30cmx20cm by *Kera* method. Thinning was done at early stage (25 DAS) of crop. Pre-emergence application of atrazine @ 1.5 kg a.i./ha was applied at 2 DAS for controlling of weeds. Harvesting of green forage was taken as only single cut at 78 DAS. Randomly selected plants were tagged for biometric observation *viz.*, plant height, stem girth, leaf: stem ratio were measured at harvest. The proximate analysis was done on dry weight basis by following the various standard procedures for different quality attributes of fodder. The N&P uptake was calculated by multiplying of N&P content (%) with dry matter yield. The statistical analysis of two years data (pooled) were done by using standard procedures of variance analysis with the help of statistical software IRRISTAT 4.0 (IRRI, 1999).

Results and Discussion

For fodder growing, the results revealed that plant height, plant girth, leaf stem ratio, green fodder yield and dry matter yield were significantly influenced by N and P application. Plant height, plant girth, leaf stem ration, green fodder yield and dry matter yield were increased with successive dose of nitrogen and phosphorus. Ayub *et al.*, (2002) reported that dry matter yield increased with increased N levels and Bhagawan *et al.*, (1997) reported that dry matter yield increased with P application. Growth and yield of teosinte differed significantly due to different levels of phosphorus. The green fodder and dry matter yield increased with increasing levels of N&P upto 160 kg/ha and 60 kg/ha respectively. Highest green fodder yield (473.13 q/ha) was obtained with the application of N₁₆₀P₆₀ kg/ha followed by N₁₂₀P₃₀ kg/ha. Increase the level of nitrogen from 0 to 160 kg/ha significantly increased the N uptake with each successive dose of N. Similar results reported by Singh *et al.*, (2010) and Ali *et al.*, (2002). N & P uptake by crop were significantly affected at varying levels of nitrogen and phosphorus. The results are in agreements with the findings of Patel *et al.* (1994). The highest uptake 137 kg/ha was estimated with the application of 160 kg N/ha. The uptake was 66% and 19.4% higher over to control with the application of N & P respectively. The highest uptake 22.39 kg/ha was noticed with application of 60 kg

P/ha. Increase in the levels of N&P significantly increased the DM, CP, total ash and EE. However CF and NFE decreased with increasing level of nitrogen and phosphorus. Results are conformity with the findings of Ayub *et al.* (2000). Nitrogen being the component of amino acid which increased the CP with application upto 160 kg N/ha. DM content increased accompanied by cell enlargement is mainly associated with the increase in cell content *i.e.*, soluble carbohydrate, soluble protein and ether extract which improves the nutritive value of fodder.

Conclusion

Increased dose of N&P influenced the growth, green fodder yield, dry matter yield and uptake of teosinte crop. The feasible combination of N₁₆₀P₆₀ was found for enhancement of yield, uptake, nutritive value and tonnage of teosinte fodder.

References

- Ali, J., J. Bakht, M. Shafi, S. Khan and W.A. Shah. 2002. Uptake of nitrogen as affected by various combinations of nitrogen and phosphorus. *Asian Journal of Plant Sciences* 1(4):367-369.
- Ayub, M., M. A. Nadeem, M. S. Sharar and N. Mahmood. 2002. Response of maize (*Zea mays* L.) fodder to different levels of nitrogen and phosphorus. *Asian Journal of Plant Sciences* 1:352-354.
- Bhagwan , D., R.S. Sheoran and B. Das. 1997. Effect of phosphorus fertilization on quality and yield of cowpea. *Annals of Biology Ludhiana*, 13(1): 195-196.
- Gibson, R. S. 2006. Zinc: The missing link in combating micronutrient malnutrition in developing countries. In: *Proceedings of the Nutrition Society* 65:51-60.
- IRRI, 1999. *IRRISTAT* for windows version 4.0 biometrics Unit, Irri, Los Banos, Philippines.
- Patel, G. N., P. G. Patel and J. C. Patel. 1994. Effect of nitrogen and phosphorus on yield and quality of forage sorghum (*Sorghum bicolor*). *Indian Journal of Agronomy* 39 (1): 123-25.

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