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Research Article

Effect of seed rate and nitrogen on growth and yield of summer fodder sorghum [*Sorghum bicolor* (L.) Moench]

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ABSTRACT : A field experiment was conducted to ascertain the effect nitrogen and seed rate on growth and yield of summer fodder sorghum. Application of 80 kg N ha^{-1}significantly increased plant height , stem diameter , dry matter production and number of functional leaves $plant^{-1}$ etc. at different crop growth periods. Stem diameter showed significant and consistent increase, where as leaf stem ratio recorded significant and consistent decrease with increase nitrogen application. Green and dry fodder yield recorded marked increase with increase in nitrogen levels from 40 to 100 kg ha^{-1}. Seed rate of 40 and 45 kg ha^{-1} being at par, significantly increased plant height and dry matter accumulation of summer fodder sorghum at different crop growth periods where as number of functional leaves $plant^{-1}$ remained unaffected by different seed rate. Increasing seed rate significantly decreased the stem diameter, whereas leaf stem ratio decreased significant up to 45 kg ha^{-1}. Green and dry fodder yield increased significantly with increase in seed rate 40 to 45 kg ha^{-1}compare to 30 and 35 kg ha^{-1}.The results revealed that application of 80 kg N $ha^{-1}$and seed rate of 40 kg ha^{-1} may be used for realizing palatable and higher yield of summer fodder sorghum.

KEY WORDS : Summer fodder sorghum, Nitrogen, Seed rate, Growth, Yield

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INTRODUCTION

Among the various fodder crops, sorghum [*Sorghum bicolor* (L.) Moench] is one of the most important dual crops widely grown in summer and *Kharif* season for grain as well as for fodder in India. The crop has significant over other cultivated fodder crops due to its high production potential, wider adaptability, quick growing nature, succulence, palatability, excellent fodder quality and free from toxicant and it can safely fed to animals at flowering stage. Fertilizer application is one of the principle factors that markedly increase the fodder yield. An adequate supply of nutrients at each growth stage is essential for optimum growth and development of fodder sorghum. Nutrients nitrogen is an important from essential nutrient physiological, growth and yield point of view (Alloway, 2008) but at the same time establishment of an optimum plant stand is equally important to get maximum yield as (Reddy and Reddy, 2010).Therefore, there is a need to evaluate the effect of seed rate and nitrogen on the growth and yield of summer fodder sorghum.

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EXPERIMENTAL METHODS

The field experiment was conducted during summer season of 2011 at Instructional farm of Rajasthan College of Agriculture, Udaipur. The experiment was laid out in factorial randomized block design using fodder sorghum variety SU-1080 as a test crop. The experiment consisted of 16 treatment combinations which consisted of 4 nitrogen levels (40,60,80

and 100 kg N ha^{-1}) and 4 seed rates (30,35,40 and 45 kg ha^{-1}) with 3 replications. Half dose of nitrogen in the form of urea and full dose of 40 kg ha^{-1} phosphorus in the form of DAP were applied as basal and remaining half dose of nitrogen as per treatment was top dressed 40 DAS. The soil of the experimental site was clay loam in having pH 7.9 and organic carbon 0.60. Crop was sown with single row hand drill on a well prepared seed bed at 30 cm apart. All other agronomic practices were kept uniform for all the treatments. Plant height, stem diameter, number of functional leaves plant^{-1}, dry matter accumulation and fodder yield were recorded by adopting the standard procedures.

EXPERIMENTAL RESULTS AND ANALYSIS

The results obtained from the present study have been discussed in detail under following heads :

Effect of seed rate:

Plant population plays a key role in determining the yield per unit area as it depends on both number of plants per unit area and yield plant^{-1}. Data (Table 1) inferred that seed rate of 45 kg ha^{-1}and 40 kg ha^{-1} being at par, recorded significantly taller plants than 30 and 35 kg ha^{-1} during the study. Increase in plant height with increasing seed rates may be due to competition for light. Further, auxins have besipetal movement and spelling effect because the auxins to move from illuminated side to shade side and thus, the imbalance of auxins cause more elongation of plants in shade with curvature compared to being in light. Since auxin is sensitive to light, shading prevents its destruction and thus, higher accumulation of auxin in shady plants triggers its growth to height. Earlier Mahdi *et al.* (2011) agreed the same results.

Dry matter production recorded with 45 kg ha^{-1} and 40 kg ha^{-1} seed rate being at par, was significantly higher than 35 and 30 kg ha^{-1} (Table 1). Increased dry matter yield with increased seed rate was mainly due to plant height, more leaf area and functional leaves per unit area. Further, dry matter production related to the amount of solar radiation intercepted by the canopy. As plant density increases, the canopy expands more rapidly, more radiation is intercepted and more dry matter produced. Increased in dry matter yield with increased seed rate has also been reported by Mahdi *et al.* (2011). Significant decrease in stem diameter (Table 1) was noticed with increased in seed rate, which may be attributed to severe competition to sorghum plants for nutrients, sun light and moisture. Mahdi *et al.* (2011) corroborates the same findings. It was also found that leaf stem ratio decreased with increased in seed rate (Table 1), however, differences were not significant , which could be attributed to increased height of the plants at higher plant density . Regarding the green and dry fodder yield, the data (Table 1) revealed a significant and consistent increase in green fodder yield with increase in seed rate. Increase in green fodder yield at higher seed rate may be due to more number of plants per unit area. Seed rate of 40 kg ha^{-1}, at par with 45 kg ha^{-1} increased dry fodder yield by 12.78 and 21.30 per cent over 35 and 30 kg ha^{-1}. Osman *et al.* (2010) also reported significant improvement in the green and dry fodder yield at higher seed rates.

Effect of nitrogen:

Plant height, dry matter accumulation, number of functional leaves and stem diameter were recorded significant with enhancement in nitrogen rate up to 80 kg ha^{-1} (Table 1).

Table 1: Effect of seed rate and nitrogen level on growth parameters and yield of summer fodder sorghum at harvest

Treatments	Plant height (cm)	Stem diameter (cm)	functional leaves plant^{-1}	Dry matter accumulation (g plant^{-1})	Green fodder yield (q ha^{-1})	Dry fodder yield (q ha^{-1})
Seed rate (kg ha^{-1})						
30	178.80	1.15	10.39	120.84	367.79	134.56
35	195.93	1.13	11.03	113.26	403.35	144.73
40	206.83	1.04	11.30	111.52	466.45	163.23
45	209.96	1.04	11.38	109.50	476.07	173.45
S.E. ±	3.98	0.03	0.27	2.36	12.45	3.53
C.D. (P = 0.05)	11.50	0.09	NS	6.83	35.98	10.21
Nitrogen levels (kg ha^{-1})						
40	186.50	0.98	10.00	99.46	357.89	133.23
60	195.10	1.11	10.83	109.19	398.66	144.78
80	200.33	1.12	11.38	120.03	462.00	164.14
100	209.59	1.15	11.88	126.44	495.11	173.81
S.E. ±	3.98	0.03	0.27	2.36	12.45	3.53
C.D. (P = 0.05)	11.50	0.09	0.78	6.83	35.98	10.21

This may be attributed to the fact that nitrogen cause cell elongation , act as principle constituent of proteins, enzymes, hormones, vitamins, chlorophyll and accelerate the meristematic activity of plant that led to progressive increase in internodes length, protein synthesis and photosynthetic area thereby resulted in increased plant height, dry matter accumulation, number of functional leaves plant^{-1} and stem diameter . These results corroborate the findings of Ayub *et al.* (2007).

Data (Table1) also indicated that green and dry fodder yield of sorghum recorded significant and consistent increase with increase in nitrogen rates from 40 to 100 kg ha^{-1}. Nitrogen level of 80 kg ha^{-1} increased dry fodder yield by 13.37 and 23.20 per cent over 60 and 40 kg N ha^{-1}, respectively but it was found statistically at par with 100 kg ha^{-1}. Since nitrogen is an essential constituent of plant tissue and involved in cell division and cell elongation, its beneficial effect on the growth characters *viz.*, plant height and stem diameter might have contributed to higher yield. These findings confirm the results of Trivedi (2011).

Conclusion:

Seed rate of 40 kg ha^{-1}and application of 80 kg N ha^{-1} may be recommended for maximization of summer fodder sorghum yield in clay loam soil.

REFERENCES

Alloway, B.J. (2008). *Zinc in soils and crop nutrition.* 2nd Ed. published by International Zinc Association and International Fertilizer Association, Brussels, Belgium and Paris, Frances.

Ayub, M., Tanveer, A., Nadeem, M.A. Tahir, M. and Khan R.M.A. (2007). Interactive effect of different levels of nitrogen and seedling rates on fodder yield and quality of pearl millet. *Pakistan J. Agric. Sci.*, **44**: 592-597.

Mahdi, S.S. Hasan, B., Bhat, R.A. Aziz, M.A. Singh, L., Rasool, F., Ablum, I. and Bashir, S. (2011). Effect of nitrogen, zinc and seed rate on growth dynamic and yield of fodder maize (*Zea mays* L.) under temperate condition. *Plant Archives*, **11**: 165-171.

Osman, S., Abdelsalam, Y., Abdelsalam, K. (2010). Effect of nitrogen and seed rate on growth and yield of forage sorghum [*Sorghum bicolor* (L.) Moench]. *Suddan J. Sci. Technol.*, **11**: 123-135.

Reddy, T.Y. and Reddi, G.H. (2010). *Principle of agronomy*, 4th Ed. Kalyani Publishers, Ludhiana (PUNJAB) INDIA.

Trivedi, J. (2011).Response of fodder sorghum genotypes to nitrogen fertilization in southern Rajasthan. M.Sc. Thesis, Department of Agronomy, Rajasthan College of Agriculture, Maharana Pratap University of Agriculture and Technology, Udaipur, RAJASTHAN (INDIA).

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