

## Effect of Seed Rates and Nitrogen Levels on Green Fodder Yield and Quality of Teosinte (*Euchlaena Mexicana* Schrad)

Mahendra Singh Pal\*, Avadesh Kumar\*\*, Y.P. Joshi\*\*\*

**Author's Affiliation:** \*Professor of Agronomy and Program Coordinator of Forage Crops of the University, \*\*M.Sc. Student, Department of Agronomy, \*\*\*Ex. Professor of Agronomy, Department of Agronomy, GB Pant University of Agriculture & Technology, Pantnagar, Uttarakhand 263145, India

### Abstract

The field experiment was conducted during Kharif season of 2010-11 at Instructional Dairy farm, G B pant University of Agriculture & Technology, Pantnagar to study the effect of seed rates and nitrogen levels on green fodder yield and quality of teosinte (*Euchlaena mexicana* Schrad) yield of teosinte. The growth and yield attributes, green and dry fodder yield, digestible dry matter, crude protein and nitrogen uptake increased with both seed rates and N levels. The green fodder yield was found significantly higher at 50kg seed rate/ha that 16.8% higher yield than 40kg seed rates/ha. The same trend was also found in dry matter with highest value at 50kg seed rate with 14.5% more dry matter yield than 40kg seed rate/ha. Similarly, the green and dry fodder yield were recorded significantly highest at 150kg N/ha which gave 14.5 and 18.6% higher green and dry fodder yield, respectively than 100kg N/ha. The crude protein and nitrogen uptake were also found higher at 50 kg seed rate and 150 kg N/ha. It is therefore concluded that 50 kg seed rate with 150 kg N/ha is required for production of high quality green and dry fodder yield of teosinte in *Tarai* region of India.

### Keywords

Crude Protein; Digestibility; Nitrogen Uptake; Teosinte; Seed Rate.

### Introduction

Teosinte (*Euchlaena mexicana* Schrad) is a native to Mexico, Guatemala, Honduras, and Nicaragua. Domesticated corn, or maize (*Zea mays*) is derived from the Balsas teosinte (*Z. mays parviglumis*) of southern Mexico in pre-Columbian times more than 6,000 years ago. Teosintes are solitary (single-stalked) annuals or spreading perennials. Annual species

strongly resemble domesticated corn in their large terminal plume like male inflorescences (the tassels). However, they differ in their small 5–12-seeded female ears, which are hidden in clusters in the leaf axils. It has a higher resistance to both viral and fungal diseases of corn as well as corn insect pests. Teosinte performs better in water lodged areas than maize. Teosinte is a perennial green fodder and locally known as a 'chari' or 'makchari'. Normally it is grown as an annual fodder crop in Northern sub tropical India. It is harder than maize crop as it can tolerate both water logging and water stress more than maize crop. Besides, it grows better under low fertility conditions than maize. Its fodder contains 27-28% dry matter, 8-9% crude protein, 19.6% crude fibre, 0.65% Ca, 0.28% P and 50-55% dry matter digestibility. It is C<sub>4</sub> plant and requires tropical climate for its growth and development. It can provide green fodder throughout the year, therefore the it requires smart agronomy for its higher productivity. Therefore the present investigation was carried out on seed rates and nitrogen levels and its effect on foliage production and its quality.

### Materials and Methods

The field experiment was conducted during Kharif season of 2010-11 at Instructional Dairy farm, G.B. Pant University of Agriculture & Technology, Pantnagar to study the effect of seed rates and nitrogen levels on green fodder yield and quality of teosinte (*Euchlaena mexicana* Schrad.). The experimental site was silty loam in texture with 0.84%

Corresponding Author: Mahendra Singh Pal,  
Professor, Dept. of Agronomy,  
GB Pant University of Agriculture & Technology,  
Pantnagar, Uttarakhand 263145, India.  
E-mail: [drmspal1@gmail.com](mailto:drmspal1@gmail.com)

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organic carbon and neutral in soil reaction (soil pH 7.1). The available N, P and K (0-15 cm soil depth) was 282, 26.5, 245 kg/ha, respectively. The experiment consisted of 03 seed rates i.e. 30, 40 and 50 kg/ha and 4 N levels i.e. 0, 50, 100, 150 kg/ha, was laid out in factorial RBD with three replications. The half nitrogen and full P and K were applied as basal and remaining nitrogen was top dressed in two equal doses at 25 days of sowing (DAS) and 1<sup>st</sup> cut at 50 DAS. The crop was harvested twice 1<sup>st</sup> at 50 DAS and 2<sup>nd</sup> at 90 DAS. The growth and yield parameters were observed at both cutting and data were averaged and presented in Table 1. The leaf area index was calculated by dividing the total leaf area per unit area (Watson, 1947). The total land area was taken 1500 cm<sup>2</sup> (50cm x 30cm). The digestibility was determined by nylon bag digestibility method (Mehrez and Orskov, 1977).

## Results and Discussion

### Effect of Seed Rates

The growth, green and dry fodder yield and quality parameters like digestible dry matter crude protein and also nitrogen uptake differed greatly by seed rates. It is clear from the results that most of the parameters had significantly equal values at both 30 and 40 kg seed rates but 50 kg seed rate gave significantly higher values than 30 kg seed rate but remained non significant with 50 kg seed rate (Table 1).

The plant height of teosinte was affected significantly by both seed rates and the tallest plants were observed at 50 kg/ha seed rate that was

statistically at par with 40 kg seed rate. The leaf area index was also had significant effect of seed rate and highest value was observed at 40 kg seed/ha that was significantly equal to 50 kg seed/ha. The L:S ratio did not differ with seed rate however the highest value was estimated at 50 kg seed rate/ha.

The green fodder yield was found significantly higher at 50 kg seed rate/ha that was significantly equal to 40 kg seed rate/ha with 16.8% higher yield. The same trend was also found in dry matter with highest value at 50 kg seed rate with 14.5% more dry matter yield than 40 kg seed rate/ha. The higher green and dry fodder yield was attributed to more plant height and leaf area index. Verma and Joshi (1998) reported higher green and dry fodder yield at 50 kg than 30 kg seed rate/ha. Seheb *et al.* (1997) also observed higher dry matter production with increasing plant height, LAIL:S ratio and fresh weight. The lowest values were recorded at 30 kg seed rate/ha.

The digestible dry matter was recorded 23.5% higher at 50 kg than 40 kg seed rate/ha, however both were non significant to each other. The crude protein production was not affected significantly by seed rates but the highest value was recorded at 50 kg seed rate/ha mainly because of better L:S ratio. Ogunlela and Ochoa (2005) reported positive correlation between crude protein, digestible dry matter and seed rates. The highest total N uptake was measured at 50 kg seed rate/ha that remained non significant with 40 kg seed rate/ha. The higher N uptake was the result of greater dry matter production. Garg (1988) reported increase in nitrogen content with increase in seed rate from 30 to 60 kg/ha in forage maize.

**Table 1:** Effect of seed rates and nitrogen levels on green fodder yield and quality of teosinte (*Euchlaena mexicana* Schrad) in Tarai region of India

Treatment	Pl ht (cm)	Leaf area index	L:S ratio	Green forage yield (q/ha)	Dry matter yield (q/ha)	Digestible dry matter yield (q/ha)	Crude protein yield (q/ha)	Total N uptake (kg/ha)
<b>Seed rates (kg/ha)</b>								
30	115	2.6	2.01	822	115.9	68.0	12.9	208
40	124	3.0	2.04	880	126.6	74.4	13.8	221
50	126	2.9	2.10	1028	145.0	91.9	16.2	259
SEm ±	2.1	0.1	0.20	46	7.4	5.5	1.0	16.8
C D (0.05)	07	0.3	ns	131	22.0	15.0	ns	49
<b>N Levels (kg/ha)</b>								
0	113	2.2	1.98	685	88.4	49.2	9.1	146
50	118	2.6	2.13	886	123.3	70.0	13.5	216
100	126	2.9	2.13	964	140.5	84.3	15.3	245
150	130	3.6	2.06	1104	166.7	109.4	19.4	310
SEm ±	2.5	0.1	0.08	52	8.1	6.3	1.2	19.4
C D (0.05)	07	0.4	ns	152	23.4	18.2	3.5	56

*Effect of Nitrogen Levels*

The plant height, leaf area index, L:S ratio, green and dry fodder yield, digestible dry matter, crude protein and nitrogen uptake were affected significantly by nitrogen levels. All the values increased significantly from 0 to 50 kg N/ha but the increase from 50 to 100 and 100 to 150 N/ha remained non significant, however the increase from 50 to 150 was significant for all the observed attributes (Table 1).

The plant height increased with increasing rates of nitrogen and the highest plant height was recorded at 150 kg N levels that was significantly at par with 100 kg N. Similarly the leaf area index increased from zero to 150 kg N and significantly highest value was found at 150 kg N/ha. The green and dry fodder yield were recorded significantly highest at 150 kg N/ha which gave 14.5 and 18.6% higher green and dry fodder yield, respectively than 100 kg N/ha. The higher values were attributed to greater plant height and leaf area index.

The digestible dry matter was also recorded highest at 150 kg N/ha followed by 100 kg N/ha. The crude protein production was also increased up to 150 kg N/ha with significantly highest values. The nitrogen uptake had similar trend with highest value at 150 kg N/ha. The higher crude protein and nitrogen uptake is the result of higher dry matter production and N content in plant organs. Patel *et al.* (1976) in teosinte as well as Singh *et al.* (2005) and Chandra and Joshi (2006) in forage sorghum found higher plant height, leaf area index, green and dry fodder yield, crude protein and nitrogen uptake at higher levels of nitrogen application.

### Conclusion

The experimental results revealed that teosinte may be planted at 30 kg seed rate/ha with application

of 150 kg N/ha for higher green and dry fodder yield as well as high quality of, digestible dry matter and crude protein production in Tarai region of India.

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