Forage Res., **40** (4) : pp. 243-246 (2015) **http://forageresearch.in**

EFFECT OF NITROGEN LEVELS ON DIFFERENT VARIETIES OF FODDER TEOSINTE [*EUCHLAENA MAXICANA* (L.) SCHROD] IN NEW ALLUVIAL ZONE OF WEST BENGAL

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(Received : 27 September 2014; Accepted : 30 December 2014)

SUMMARY

The experiment was carried out during the **kharif** season of 2006-07 at Central Research Farm, Bidhan Chandra Krishi Viswavidyalaya, Gayeshpur, Nadia, West Bengal, India which is situated at 23^0N latitude and 89^0E longitude and at an elevation of 9.75 m above the mean sea level to study the effect of nitrogen levels on different varieties of teosinte [*Euchlaena maxicana* (L.) Schrod] in new alluvial zone of West Bengal. The soil of the experimental field was sandy loam alluvial soil. The soil was neutral in reaction pH 6.8, oxydizable organic carbon 0.43 per cent, total nitrogen 0.047 per cent, available phosphorus 46 kg/ha and available potassium 241 kg/ha. The experiment was laid out in factorial randomized block design with 12 treatments and three replications. The treatments were first factor teosinte variety with five levels viz., JHT-04-1, JHT-04-2, JHT-04-3, TL-1 and Improved Sirsa and second factor nitrogen with three levels viz., N_{30}, N_{60} and N_{90}. The significantly highest green fodder yield of 403.13, 447.92 and 473.07 q/ha was recorded with variety TL-1 treatment, N_{90} treatment and combined effect of TL-1 × N_{90} treatment, respectively. The increasing nitrogen levels increased plant height, plant population, dry matter yield and green fodder yield. The increasing trend of crude protein was observed with increasing nitrogen levels. Among the varieties, TL-1 and JHT-04-3 performed well in all aspects in new alluvial zone of West Bengal.

Key words : Teosinte variety, nitrogen, fodder yield, crude protein

The teosinte fodder crops are known as makchari. It is an excellent multicut fodder for **kharif** season, it produces tillers and has dark green narrow leaves than maize and remains green for a longer period and gives two cuttings. Teosinte is a wild relative of maize. Teosinte has special characters over fodder maize including multiple cutting, high nutritive value and ease of cultivation. Teosinte differs from corn by abundant tillering habit which results in tufted plants, and the ability to recover and produce new growth from the crown buds after cutting (Kellogy and Birchler, 1993; Rammah, 1995). The crop is valued for its productivity, ease of establishment and for its tolerance to flooding and excessive soil moisture stress. Normally it does not lodge. It is normally free from toxic constituents. In case of multicut management, it can give four cuttings and thus has higher nutrient requirement. Green fodder is an important component of livestock feed and nutrition. India accounts for 15 per cent of the world's livestock population and only 2 per cent of world's geographical area resulting in tremendous animal pressure on the limited land resources. On the other hand, less than 5 per cent of total cultivated land in India is under fodder production. Accordingly, the availability of green and dry fodder is in deficit on an average to the extent of 53 per cent (Hazra, 1998) which may further increase to the extent of 65 per cent in 2025. There are many ways to fulfil the deficit of fodder in India to supply green or hay to the animal. The cultivable land is occupied by major and minor cereal, oil, pulse and other crops but still vast land is uncultivated. There is huge scope to grow teosinte with minimum agronomic management. The nitrogen is very responsible for higher green fodder production and quality

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of fodder. The forage is utilized to feed domestic herbivores that provide milk and meat and their products play an important role in food production (Chatterjee and Das, 1989).

MATERIALS AND METHODS

The experiment was carried out during the **kharif** season of 2006-07 at Central Research Farm, Bidhan Chandra Krishi Viswavidyalaya, Gayeshpur, Nadia, West Bengal, India which is situated at 23^0N latitude and 89^0E longitude and at an elevation 9.75 m above the sea level to study the effect of nitrogen levels on different varieties of teosinte [*Euchlaena maxicana* (L.) Schrod] in new alluvial zone of West Bengal. The soil of the experimental field was sandy loam alluvial soil. The soil was neutral in reaction pH 6.8, oxydizable organic carbon 0.43 per cent, total nitrogen 0.047 per cent, available phosphorus 46 kg/ha and available potassium 241 kg/ha. The experiment was laid out in factorial randomized block design with 12 treatments and three replications. The treatments were first factor teosinte variety with five levels viz., JHT-04-1, JHT-04-2, JHT-04-3, TL-1 and Improved Sirsa and second factor nitrogen with three levels viz., N_{30}, N_{60} and N_{90}. The data were analysed statistically for comparing the treatment means.

RESULTS AND DISCUSSION

Growth Characters

Effect of nitrogen levels of fodder teosinte varieties on plant height, plant population, leaf : stem ratio and crude protein percentage : The effect of nitrogen levels of fodder teosinte varieties is shown in Tables 1 and 2. The significantly maximum plant height (189.79 cm) was recorded with variety JHT-04-1 and the highest (192.54 cm) plant height was observed with N_{90} dose of nitrogen and the minimum plant height (162.70 cm) was recorded in Tl-1 treatment. The combined effect of nitrogen on plant height was also recorded maximum (201.23 cm) with JHT-04-1 × N_{90} treatment and minimum plant height (147.47 cm) was recorded with TL-1 × N_{30} treatment. The significantly higher plant population (22.41and 21.73 numbers) was recorded with Improved Sirsa and JHT-04-3 treatment, respectively. The significantly higher plant population (22.86 and 21.44 numbers) was recorded with Improved Sirsa and JHT-04-3 treatment, respectively. The combined effect of nitrogen was also recorded maximum (24.40 and 23.63 numbers) with Improved Sirsa × N_{90} and TL-1 × N_{90} treatment, respectively. The maximum (1.72) leaf : steam ratio was recorded in JHT-04-1 × N_{90} treatment and lowest (0.88) in JHT-04-3 × N_{30} treatment (Table 2). The maximum (12.6) crude protein percentage was recorded in JHT-04-3 × N_{60} treatment and lowest (5.25) in JHT-04-2 × N_{30} treatment (Table 2). The almost similar plant height was obtained with nitrogen level by Singh *et al*. (2014 a, b) and up to 90 kg N/ha by Verma and Joshi (1998).

Yield Attributes

Effect of nitrogen levels of fodder teosinte varieties on green and dry fodder yield : The green fodder yield of different teosinte varieties varied with

TABLE 1
Effect of nitrogen levels of fodder teosinte varieties on growth parameters and yield attributes

Treatment	Plant height (cm)	Plant population/ row metre	Green fodder yield (q/ha)	Dry matter yield (q/ha)	Crude protein yield (q/ha)
Varieties					
JHT-04-1	189.79	20.11	355.43	58.87	5.22
JHT-04-2	171.47	20.45	383.92	47.59	3.22
JHT-04-3	189.13	21.73	383.22	58.84	6.15
TL-1	162.70	21.42	403.13	59.85	5.35
Improved Sirsa	181.79	22.41	369.79	59.56	4.88
S. Em±	3.93	0.80	16.76	1.85	0.17
C. D. (P=0.05)	9.46	1.92	40.31	4.44	0.42
Doses of nitrogen					
N_{30}	163.75	19.38	315.93	46.58	3.06
N_{60}	180.64	21.44	373.45	57.97	6.16
N_{90}	192.54	22.86	447.92	66.27	5.68
S. Em±	3.05	0.62	12.98	1.43	0.13
C. D. (P=0.05)	7.33	1.49	31.23	3.44	0.33

TABLE 2
Effect of nitrogen levels of fodder teosinte varieties on growth parameters and yield attributes

S. No.	Treatment	Plant height (cm)	Plant population/ row metre	Green fodder yield (q/ha)	Dry matter yield (q/ha)	Crude protein yield (q/ha)	Leaf : stem	Crude protein (%)
1.	JHT-04-1 × N_{30}	178.67	19.20	342.47	51.74	3.52	1.37	6.81
2.	JHT-04-1 × N_{60}	189.47	20.30	345.25	60.16	6.38	1.57	10.62
3.	JHT-04-1 × N_{90}	201.23	20.80	378.59	64.70	5.74	1.72	8.87
4.	JHT-04-2 × N_{30}	156.23	18.53	269.53	33.57	1.76	1.39	5.25
5.	JHT-04-2 × N_{60}	169.07	20.87	375.12	47.49	4.03	1.59	8.50
6.	JHT-04-2 × N_{90}	189.10	21.97	507.17	61.74	3.86	1.66	6.25
7.	JHT-04-3 × N_{30}	178.77	20.00	343.16	52.72	3.95	0.88	7.50
8.	JHT-04-3 × N_{60}	192.43	21.77	384.15	61.33	7.39	0.96	12.06
9.	JHT-04-3 × N_{90}	196.20	23.43	422.35	62.48	7.10	1.13	11.37
10.	TL-1 × N_{30}	147.47	18.97	322.33	47.09	3.15	1.07	6.69
11.	TL-1 × N_{60}	165.03	21.63	414.02	63.07	6.94	1.30	11.00
12.	TL-1 × N_{90}	175.60	23.67	473.07	69.38	5.98	1.61	8.62
13.	Improved Sirsa × N_{30}	157.60	20.20	302.18	47.80	2.89	1.06	6.06
14.	Improved Sirsa × N_{60}	187.20	22.63	348.72	57.83	6.04	1.20	10.44
15.	Improved Sirsa × N_{90}	200.57	24.40	458.48	73.05	5.71	1.62	7.81
	C. V. (%)	6.60	11.28	13.26	9.73	10.57	-	-
	S. Em±	6.81	1.38	29.03	3.20	0.30	-	-
	C. D. (P=0.05)	16.40	3.32	69.83	7.69	0.73	-	-

varying doses of nitrogen. The significantly maximum green fodder yield (403.13 q/ha) was recorded with variety TL-1 treatment and the lowest (355.43 q/ha) green fodder yield was recorded in JHT-04-1 treatment (Fig. 1). The maximum (447.92 q/ha) green fodder yield was observed with N_{90} dose of nitrogen and the minimum green fodder yield (315.93 q/ha) was recorded in N_{30} treatment (Fig. 2). The combined effect of nitrogen on green fodder yield was also recorded maximum (507.17 q/ha) with JHT-04-2 × N_{90} treatment and minimum green fodder yield (269.53 q/ha) was recorded with JHT-04-2 × N_{30} treatment. Singh *et al.* (1988) also expressed similar views. The significantly maximum dry matter yield (59.85 q/ha) was recorded with variety TL-1 treatment and the lowest (47.59 q/ha) dry matter yield was recorded in JHT-04-2 treatment. The maximum (66.27 q/ha) dry matter yield was observed with N_{90} dose of nitrogen and the minimum dry matter yield (46.58 q/ha) was recorded in N_{30} treatment. The combined effect of nitrogen on dry matter yield was also recorded maximum (73.05 q/ha) with Improved Sirsa × N_{90} treatment and minimum dry matter yield (33.57 q/ha) was recorded with JHT-04-2 × N_{30} treatment (Tables 1 and 2). Choubey *et al.* (1997) reported similar results, whereas Singh *et al.* (2014 a, b) also reported similar trend of pearl millets and teosinte.

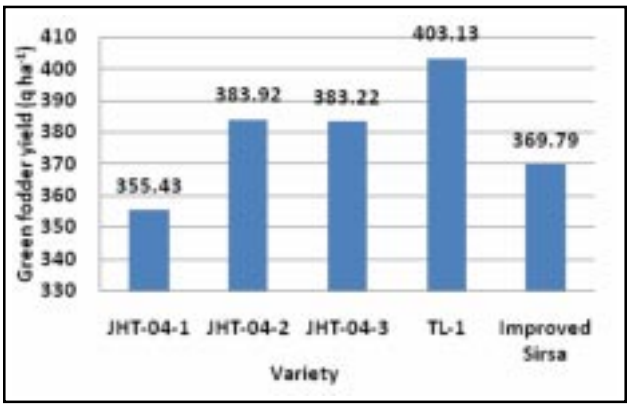

Fig. 1. Effect of varieties on green fodder yield (q/ha).

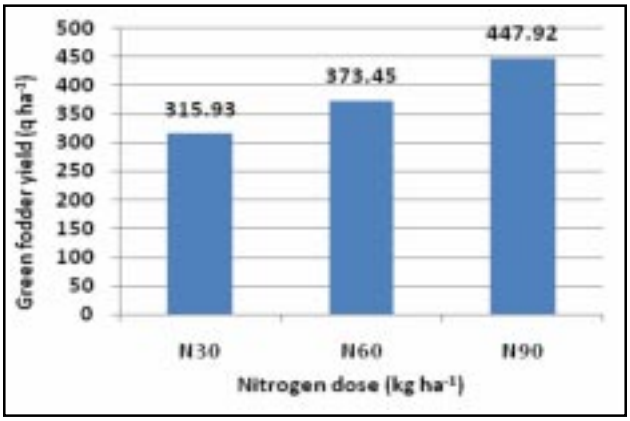

Fig. 2. Effect of nitrogen dose on green fodder yield (q/ha).

Effect of nitrogen levels of fodder teosinte varieties on crude protein yield : The crude protein yield of teosinte was significant trend found with increasing dose of nitrogen. The significantly maximum crude protein yield (6.15 q/ha) was recorded with variety JHT-04-3 treatment and the lowest (3.22 q/ha) crude protein yield was recorded in JHT-04-2 treatment (Fig. 3). The maximum (6.16 q/ha) crude protein yield was observed with N_{60} dose of nitrogen and the minimum crude protein yield (3.06 q/ha) was recorded in N_{30} treatment (Fig. 4). The combined effect of nitrogen on crude protein yield was also recorded maximum (12.06 q/ha) with JHT-04-3 × N_{60} treatment and minimum crude protein yield (1.76 q/ha) was recorded with JHT-04-2 × N_{30} treatment (Tables 1 and 2). The application of higher doses of nitrogen dose (kg/ha) on pearl millet genotypes produced significantly higher crude protein yield (Kumar *et al*., 2012; Damame *et al*., 2013). Singh *et al.* (2014) also observed increase in protein in teosinte with higher doses of nitrogen.

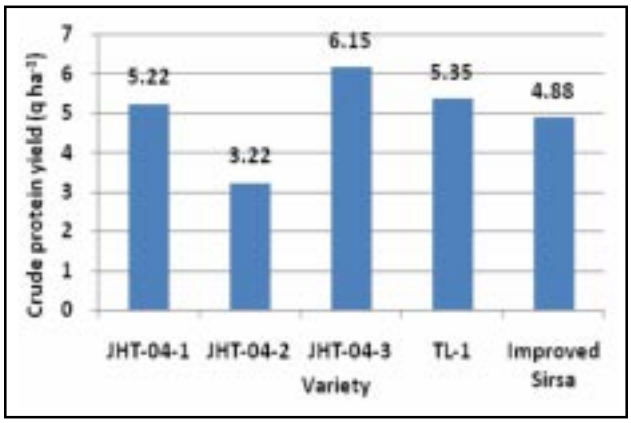

Fig. 3. Effect of varieties on crude protein yield (q/ha).

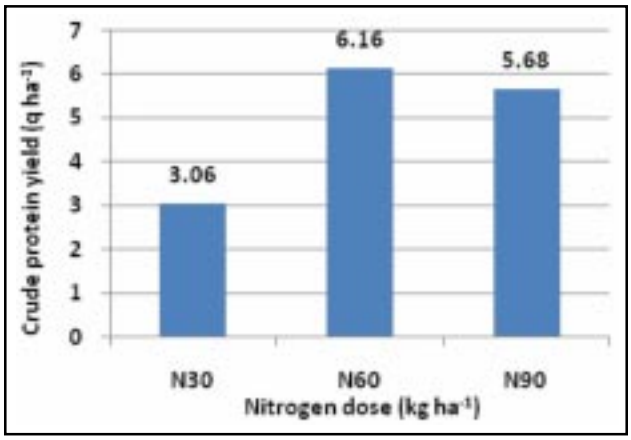

Fig. 4. Effect of nitrogen dose on crude protein yield (q/ha).

CONCLUSION

It was concluded that increasing nitrogen levels increased plant height, plant population, dry matter yield and green fodder yield. The increasing trend of crude protein was also observed with increasing nitrogen levels. Among the varieties, TL-1 and JHT-04-3 performed well in all aspects in new alluvial zone of West Bengal.

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