

Original Research Article

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Effect of Nitrogen and Foliar Sprays of Cattle Urine on Growth, Yield and Nutrient Uptake by Maize (Fodder) Grown on Inceptisol

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ABSTRACT

A pot culture experiment was conducted to assess the effect of nitrogen and foliar sprays of cattle urine on growth, yield and nutrient uptake by maize (fodder) grown on Inceptisol at the Division of Soil Science and Agricultural Chemistry and Division of Animal Husbandry and Dairy Science, College of Agriculture, Pune, during *Kharif*-2018. The experiment consisted of 12 treatment combinations based on three levels of recommended dose of nitrogen (@ 0, 75 and 100 %) through urea and four levels of cattle urine foliar spray (@ 0, 5, 10 and 15 %) taken at 25, 45 and 65 DAS replicated thrice in Factorial Completely Randomized Design. The results revealed that application of 75% N through urea recorded significantly higher plant height, number of functional leaves and leaf area at 30, 50 and 70 DAS of fodder maize which was found to be at par with 100 % N through urea. While cattle urine foliar sprays @ 10 % taken at 25, 45 and 65 DAS was found superior for plant height, number of functional leaves and leaf area of fodder maize at 30, 50 and 70 DAS which was closely followed by 15 % cattle urine foliar spray. Interaction effect between N fertilizers and foliar sprays of cattle urine was found non-significant but combine application of 75% N through urea along with three foliar sprays of 10% cattle urine was recorded numerically higher plant height, number of functional leaves and leaf area of fodder maize. Statistically at par green fodder yield of maize was recorded with the application of either 75 % N (971.75 g pot⁻¹) or 100 % N (962.83 g pot⁻¹) through urea or foliar sprays of cattle urine either @ 10 % (889.11 g pot⁻¹) or 15 % (821.78 g pot⁻¹). Significantly higher N (3.54 g pot⁻¹), P (0.90 g pot⁻¹) and K (4.84 g pot⁻¹) uptake by fodder maize was reported with the application of 100 % N through urea which was followed by 75% N for N (2.85 g pot⁻¹), P (0.76 g pot⁻¹) and K (4.34 g pot⁻¹). However, application of cattle urine foliar sprays @ 15% recorded significantly higher N (3.15 g pot⁻¹) uptake by fodder maize which was closely followed by 10% (2.69 g pot⁻¹). Higher P uptake by fodder maize was observed with 10% cattle urine foliar spray (0.83 g pot⁻¹) which was followed by 15% (0.75 g pot⁻¹) however 10% cattle urine foliar sprays recorded significantly higher K (4.51g pot⁻¹) uptake by fodder maize than rest of treatment.

Keywords

Maize, cattle urine,
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Introduction

Maize is also known as corn and that was first grown by people of Central America. It is now the third most important cereal crop in the world and is called “Queen of cereals” because it has highest genetic potential among the cereals. Maize is one of the most versatile emerging crops having wider adaptability

under varied agro-climatic conditions. It is cultivated as nearly 150 m ha in about 160 countries having wider diversity of soil, climate, biodiversity and management practices that contributes 3.6 % in the global grain production. The United States of America (USA) is the largest producer of maize contributes nearly 35% of the total production in the world.

India produces about 2% the world maize produce. Maize production in Maharashtra was 3.8 million tones that accounts for 15.17% of India's production in 2017. About 71% of maize in India is produced in the *kharif* season. Karnataka is the leading producer of maize followed by Madhya Pradesh, Tamil Nadu, Telengana, Uttar Pradesh and Rajasthan. India's corn productivity is about half the world's average (NCML report, 2017). The reasons for lower productivity are imbalanced and indiscriminate use of chemical fertilizers and limited use of organic manures which leads to deterioration of soil health and fertility. So integrated nutrient management is the most is the most appropriate and adoptable practice in which organic, inorganic and biofertilizers are used for enhancing crop production and productivity.

The integrated use of inorganic fertilizers with the liquid organic manures (cattle urine) can help to maintain optimum crop yield by maintaining fertility status of the soil. Cattle urine contains 95% water, 2.5% urea and 2.5% minerals, salts, hormones and enzymes. It also contains essential nutrients like nitrogen, phosphorus, potassium, calcium, magnesium, sulphur, uric acid, amino acids, enzymes, cytokinins etc. (Bhadauria 2002). The use of cattle urine is known for long time in India. Cow urine has been described as a liquid with good nutrient value having capacity to supply essential nutrients to plants. It can act as bio-fertilizer, bio-pesticides and rich source of macro, micro nutrients and has capacity to improve soil fertility. Use of cattle urine alone or in combination with chemical fertilizers can increase the productivity of soil crop.

Therefore, use of cow urine in agriculture is an effective way to address multi-nutrient deficiencies in the soils of India and Maharashtra. The beneficial effect of cattle urine application has been reported on several

crops such as Maize (Devakumar *et al.*, 2014), Sweet corn (Pande *et al.*, 2015), Mustard (Pradhan *et al.*, 2016). In view of this, the present study entitled "effect of nitrogen and foliar sprays of cattle urine on growth, yield and nutrient uptake by maize (fodder) grown on Inceptisol".

Materials and Methods

Pot culture experiment was conducted to study the effect of nitrogen and foliar sprays of cattle urine on growth, yield and nutrient uptake by maize (fodder) grown on Inceptisol at the Division of Soil Science and Agricultural Chemistry and Animal Husbandry and Dairy Science, College of Agriculture, Pune, during *Kharif*-2018. There were 12 treatments consisting of three levels of nitrogen (@ 0, 75 and 100 kg ha⁻¹) and four levels of cattle urine foliar sprays (@ 0, 5, 10, and 15 %) imposed to maize (fodder). The foliar sprays were taken at 25, 45 and 65th days after sowing. There were total 36 plastic pots of diameter 41 cm and height 38 cm were used to conduct the experiment. The pots were washed with water and then filled each with gravel at the bottom and 2 mm 30 kg sieved soil.

The experimental soil was characterized by black colour dominated by montmorillonite clay comes under the Typic Haplustept and well drained. The soil was moderately calcareous (free CaCO₃: 5.25%) in nature with alkaline pH: 8.34, EC: 0.13 d Sm⁻¹ and organic carbon: 0.66%. The alkaline KMnO₄-N, Olsen's P and NH₄OAC-K in the experimental soil was 200.70, 18 and 571.20 kg ha⁻¹ respectively. The soil KMnO₄-N, Olsen's-P and N N NH₄OA-K was analyzed by methods given by Subbia and Asijia, 1956, Olsen *et al.*, 1954 and Knudsen *et al.*, 1982 respectively. The soil CaCO₃ content was assessed by rapid titration method prescribed by Jackson, 1973.

Further treatment wise required quantity of N, P₂O₅ and K₂O through urea, single super phosphate and muriate of potash were mixed thoroughly with soil. The nitrogen @ 50 % N + 100 % P₂O₅ + 100 % K₂O were mixed at the time of sowing as basal dose and remaining 50 % N was applied at 30 DAS of maize.

On the basis of recommended dose of nitrogen for maize (fodder) @ 100 kg ha⁻¹ three levels of nitrogen were formulated as 0 %, 75 % and 100 %. In order under take foliar spray of cattle urine at 25, 45 and 65 DAS fresh urine was collected at each time in early morning. Water sprays at respective days were undertaken for 0 % as control. The required volume of cattle urine for 5, 10 and 15 % concentration and sprayed at respective growth stage by using 2 lit capacity hand pump.(Table 1) Cattle urine was analyzed for nutrient composition before every spray by following standard method (Table 2). During foliar spray due care was taken by considering foliage of maize at respective growth stage. The truthful maize seed of variety African tall was procured from Division of Animal Husbandry and Dairy Science, College of Agriculture Pune. There were total six seed seeds sown equidistantly and four plants were maintained throughout experiment.

The maize plant height at respective growth stage was measured for four plants by using measuring scale. The height of the plant was measured from the base to the top. The number of fully opened functional leaves of four plants from each pot were counted and recorded. The length of fully opened functional leaf was measured from the base of leaf to the tip and width at middle portion for four plants. The leaf area (cm²) was calculated by multiplying length of leaf (cm) and width (cm) x 0.75 correction factor as given by Tanko and Hassan (2016). The four plants from each pot was harvested and

immediately weighed in gram pot⁻¹. The four maize plants from each pot were cut down at harvest and weighed fresh. The composite samples from each pot were air dried, oven dried and accordingly % dry matter was calculated. Nitrogen, phosphorous and potassium were analyzed from composite sample of fodder maize. The nutrient concentration was analyzed by digesting composite fodder maize sample. The nutrient uptake was calculated by using dry matter and nutrient concentration and expressed in g pot⁻¹ for N, P and K.

Results and Discussion

Plant height, number of functional leaves and leaf area

Effect of N levels and foliar sprays of cattle urine taken at 25, 45 and 65 DAS were significantly influenced plant height, number of functional leaves and leaf area of maize (fodder) grown on Inceptisol (Table 3a, 3b and 3c). Application of 75% RDN recorded significantly higher plant height, number of functional leaves and leaf area measured at 30, 50 and 70 DAS. Significantly higher plant height at 30 DAS (83.06 cm), 50 DAS (133.50 cm) and 70 DAS (170.92 cm) reported with the application of 75% RDN which was found statistically at par with 100% RDN. Foliar application of cattle urine @ 10% reported significantly higher plant height of maize at 30 DAS (80.06 cm), 50 DAS (130.56 cm) and 70 DAS (164.78 cm) which was found on par with 15 % foliar spray of cattle urine. While combine application of N fertilizers and foliar sprays of cattle urine reported non-significant results for plant height.

In case of number of functional leaves of maize, application of 75% N reported higher plant height at 30 (5.42), 50 (5.75) and 70 DAS (7.56) which was also found statistically

on par with 100% RDN. Foliar spray of cattle urine @ 10% reported significantly higher number of functional leaves at 30 (5.47), 50 (5.86) and 70 DAS (7.42) however this treatment was found on par with foliar spray @ 15% application. But combine application of N fertilizers and cattle urine foliar sprays reported non-significant results for functional leaves.

Maize (fodder) leaf area was significantly higher with application of 75% N at 30 (204.59 cm²), 50 (358.26 cm²) and 70 (482.73 cm²) DAS which was found at par with 100% N (203.14, 314.06 and 476.93 cm²) respectively. Application of cattle urine foliar spray @ 10% reported non-significant effect on leaf area at 30 DAS but it was significant at 50 (365.89 cm²) and 70 (473.51 cm²) DAS. Non-significant effect on maize leaf area was recorded with combine application of N fertilizers and foliar sprays of cattle urine.

It could be observed from the data that three foliar sprays of cattle urine @ 10 % taken at 25, 45 and 65 DAS was reported more or less equal effects as that of 75% N application on plant height, number of leaves and leaf area. Enhanced height of plant due to sprays of cattle urine might be due to nitrogen, phosphorous and potassium content with some growth stimulant hormones content in cattle urine (Choudhary *et al.*, 2017). Application of cow urine on chickpea at the rate of 10% at flowering initiation and 15 days after flowering recorded higher plant height (35.78 cm), as compare to control. (Patil *et al.*, 2012). Similarly Singh, *et al.*, (2014) reported that the application of nitrogen @ 90 kg ha⁻¹ with 60 kg ha⁻¹ potassium and phosphorus + cow urine was found to be the best treatment regarding growth of paddy.

These results are in conformity with the findings of Masti *et al.*, 2003 where liquid

cattle manure applied to soil did not affect the seed germination but resulted in a significant increase in plant height, number of green leaves and dry biomass of maize relative to control and was at par with that fertilizer treatment. Ravi kumar *et al.*, (2012) also reported that plant height significantly higher with application of FYM (7.5 t/ha) + *Rhizobium* + PSB + Panchagavya spray (3% at 30, 60 and 75 DAS) as compared to other treatments except application of FYM (7.5 t/ha) + *Rhizobium* + PSB + Jeevamruta (equivalent to 25 kg N/ha) which were at par with each other.

Green fodder yield

The green fodder yield of maize was significantly influenced the application of N fertilizers and three foliar sprays of cattle urine taken at 25, 45 and 65 DAS. (Table 5)

Application of 75 % N through urea recorded significantly higher green fodder yield of maize (971.75 g pot⁻¹) which was closely followed and statistically at par with 100 % N (962.83 g pot⁻¹). Significantly higher green fodder yield of maize (889.11 g pot⁻¹) was recorded with 10 % cattle urine three sprays which were followed and statistically on par with 15 % cattle urine spray (821.78 g pot⁻¹). Application of water spray and 5 % recorded lower green fodder yield of maize as (745.56 g pot⁻¹) and (805.67 g pot⁻¹) respectively.

The interaction effect between nitrogen levels and foliar sprays of cattle urine on maize green fodder yield was found non-significant. But numerically higher green fodder yield was recorded with combine application of 75 % N through urea along with three cattle urine sprays @ 10 % (1061.33 g pot⁻¹). Higher green fodder yield with foliar sprays of cattle urine might be due to timely nutrient absorption from cattle urine sprays taken at different growth stages maize (fodder).

Further this might be the cumulative effect of hormones, essential nutrients and enzymes present in cattle urine which increased growth rate and accumulation of photosynthesites. The increased growth and dry matter production of maize might be due to efficient absorption of N through cattle urine which ultimately resulted in higher yield. Further higher green fodder yield with foliar sprays of cattle urine might have beneficial effect on cell elongation, cell division, formation of nucleotide and co-enzymes in meristematic activity and also increased photosynthetic area which ultimately enhanced the green matter (Verma 1989). Higher plant height, number of functional leaves and leaf area leading to more photosynthetic area there by resulting in higher maize green biomass yield. These results are in conformity with the finding of Sathyamoorthi K.(1997) where higher leaf area and nutrient uptake might have contributed for higher green fodder yield by the application of liquid panchagavya and cattle urine spray.

Nutrient content in cattle urine like N, P, K, Ca, Mg, SO₄ and Fe along with animal hormones and enzymes might have played cumulative effect to enhance the photosynthesis rate there by increased green fodder yield of maize. Similar results were also reported by Rahman *et al.*, (2008) for

fodder maize. They concluded that application of 12 kg cattle slurry 10 m² plot reported higher maize biomass yield (45 t ha⁻¹). These results are in corroboration with the findings of Meena and Bheemavat (2009) that cow urine combined with application of green manures and foliar application of panchagavya twice on the standing crop resulted in better growth and development of plants for increase green fodder yield of maize. Sandhukhan *et al.*, (2018) concluded that application of 50 %, 25 % and 100 % cow urine spray recorded 2.69 % , 18.01 % and 27.21 % respectively higher grain yield of wheat. Sharma *et al.*, (2016) also concluded that application of N @ 150 kg ha⁻¹ through urine recorded higher biological yield and curd yield of broccoli which was followed by application of N @ 50 kg ha⁻¹. Similar results were also quoted by Nelson *et al.*, (2009), Singh, *et al.*, (2014), Iqbal, *et al.*, (2014).

Nutrient uptake

The data presented in tables (Table 5) indicated that nitrogen, phosphorous and potassium uptake by maize fodder grown in Inceptisol was significantly influenced by graded levels of N fertilizers and three cattle urine foliar sprays applied at 25, 45 and 65 DAS with four concentrations (0,5,10 and 15%).

Table.1 Quantity of cattle urine used for spraying

Cattle urine %	First Spray (25 th DAS)		Total volume of spray (ml)	Second Spray (45 th DAS)		Total volume of spray (ml)	Third Spray (65 th DAS)		Total volume of spray (ml)
	Quantity of cattle urine (ml)	Quantity of water (ml)		Quantity of cattle urine (ml)	Quantity of water (ml)		Quantity of cattle urine (ml)	Quantity of water (ml)	
0	0	1500	1500	0	2250	2250	0	3000	3000
5	75	1425	1500	112.5	2137.5	2250	150	2850	3000
10	150	1350	1500	225	2025	2250	300	2700	3000
15	225	1275	1500	337.5	1912.5	2250	450	2550	3000

Table.2 Cattle urine analysis

Sr. No	Parameter	Before 1 st spray	Before 2 nd spray	Before 3 rd spray	Average
1	pH	7.09	8.05	7.30	7.63
2	EC dSm ⁻¹	16.71	18.65	20	18.45
3	OC %	1.67	1.56	2.19	1.81
4	N %	0.75	0.83	0.55	0.71
5	P %	0.052	0.08	0.084	0.048
6	K %	0.84	0.64	1.09	0.86
7	Ca %	0.02	0.010	0.012	0.014
8	Mg %	0.042	0.054	0.037	0.044
9	SO ₄ %	0.035	0.052	0.033	0.040

Table.3 Effect of N fertilizers and foliar sprays of cattle urine on growth of maize (fodder) grown on Inceptisol

a) Plant height At 30th DAS

CUS	Plant height (cm)				Mean
RDN	0 %	5 %	10 %	15 %	
0 %	68.33	69.67	71.50	70.50	70.00
75 %	80.33	82.73	85.50	83.67	83.06
100 %	82.00	82.33	83.17	82.83	82.58
Mean	76.89	78.24	80.06	79.00	

	RDN	CUS	RDN × CUS
S.E. ±	0.570	0.659	1.141
CD at 5%	1.675	1.934	NS

At 50th DAS

CUS	Plant height (cm)				Mean
RDN	0 %	5 %	10 %	15 %	
0 %	97	102.44	113.33	110.50	105.82
75 %	119.83	135.33	142.00	136.83	133.50
100 %	120.83	132.00	136.33	136.50	131.42
Mean	112.55	123.26	130.56	127.94	
	RDN	CUS	RDN × CUS		
S.E. ±	0.912	1.053	1.824		
CD at 5%	2.678	3.092	NS		

At 70th DAS

CUS	Plant height (cm)				Mean
	RDN	0 %	5 %	10 %	
0 %	127.17	133.00	136.17	134.33	132.67
75 %	153.67	165.83	184.83	179.33	170.92
100 %	155.83	172.17	173.33	174.33	168.92
Mean	145.56	157.00	164.78	162.67	
	RDN		CUS		RDN × CUS
S.E. ±	1.826		2.108		3.651
CD at 5%	5.360		6.189		NS

b) Number of functional leaves at 30 DAS

CUS	Number of functional leaves				Mean
	RDN	0 %	5 %	10 %	
0 %	4.45	4.50	5.42	5.17	4.88
75 %	4.83	5.42	5.75	5.67	5.42
100 %	4.92	5.17	5.25	5.33	5.17
Mean	4.73	5.03	5.47	5.39	
	RDN		CUS		RDN × CUS
S.E. ±	0.121		0.140		0.242
CD at 5%	0.356		0.411		NS

At 50 DAS

CUS	Number of functional leaves				Mean
	RDN	0 %	5 %	10 %	
0 %	4.75	5.08	5.50	5.25	5.15
75 %	5.25	5.68	6.17	5.92	5.75
100 %	5.17	5.75	5.92	5.92	5.69
Mean	5.06	5.51	5.86	5.69	
	RDN		CUS		RDN × CUS
S.E. ±	0.125		0.145		0.251
CD at 5%	0.368		0.425		NS

At 70 DAS

RDN	0 %	5 %	10 %	15 %	
0 %	6.25	6.42	6.67	6.58	6.48
75 %	6.92	7.67	7.92	7.75	7.56
100 %	7.08	7.50	7.67	7.50	7.44
Mean	6.75	7.19	7.42	7.28	
	RDN		CUS		RDN × CUS
S.E. ±	0.101		0.117		0.203
CD at 5%	0.298		0.344		NS

c) Leaf area at 30 DAS

CUS	Leaf area (cm ²)				Mean
RDN	0 %	5 %	10 %	15 %	
0 %	166.50	168.96	175.75	172.51	170.93
75 %	176.80	207.11	226.32	208.15	204.59
100 %	177.65	207.40	218.63	208.88	203.14
Mean	173.65	194.49	206.90	196.51	

	RDN		CUS		RDN × CUS
S.E. ±	8.361		9.654		16.721
CD at 5%	2.549		NS		NS
At 50 DAS					
CUS	Leaf area (cm ²)				Mean
RDN	0 %	5 %	10 %	15 %	
0 %	259.95	283.19	312.84	344.79	300.19
75 %	267.87	324.95	446.59	393.62	358.26
100 %	273.37	316.49	338.23	328.14	314.06
Mean	267.06	308.21	365.89	355.52	
	RDN		CUS		RDN × CUS
S.E. ±	12.323		14.229		24.646
CD at 5%	36.182		41.779		NS
At 70 DAS					
CUS	Leaf area (cm ²)				Mean
RDN	0 %	5 %	10 %	15 %	
0 %	272.71	295.17	339.66	384.31	322.96
75 %	389.42	469.79	556.11	515.59	482.73
100 %	437.94	437.29	524.75	507.73	476.93
Mean	366.69	400.75	473.51	469.21	
	RDN		CUS		RDN × CUS
S.E. ±	12.819		14.802		25.638
CD at 5%	37.638		43.461		NS

Table.4 Effect of N fertilizers and foliar sprays of cattle urine on green fodder yield of maize (fodder) grown on inceptisol

CUS RDN	Green fodder yield (g pot ⁻¹)				Mean
	0 %	5 %	10 %	15 %	
0 %	432.67	514.00	576.00	525.33	512.00
75 %	889.33	959.00	1061.33	977.33	971.75
100 %	914.67	944.00	1030.00	962.67	962.83
Mean	745.56	805.67	889.11	821.78	
	RDN		CUS		RDN × CUS
S.E. ±	18.310		21.142		36.620
CD at 5%	53.761		62.078		NS

Table.5 Effect N fertilizers and foliar sprays of cattle urine on nitrogen, phosphorus and potassium uptake by maize (fodder) in Inceptisol

CUS RDN	Nitrogen uptake N (g pot ⁻¹)				Mean
	0 %	5 %	10 %	15 %	
0 %	1.15	1.15	1.30	1.47	1.27
75 %	2.33	2.86	3.08	3.14	2.85
100 %	2.67	2.93	3.70	4.80	3.54
Mean	2.05	2.31	2.69	3.15	
	RDN		CUS		RDN × CUS
S.E. ±	1.155		0.179		0.310
CD at 5%	0.455		0.526		NS

CUS RDN	Phosphorus uptake P (g pot ⁻¹)				Mean
	0 %	5 %	10 %	15 %	
0 %	0.35	0.40	0.57	0.49	0.45
75 %	0.74	0.68	0.84	0.80	0.76
100 %	0.72	0.84	1.07	0.97	0.90
Mean	0.60	0.64	0.83	0.75	
	RDN		CUS		RDN × CUS
S.E. ±	0.022		0.025		0.043
CD at 5%	0.064		0.074		NS

CUS	Potassium uptake K (g pot ⁻¹)				Mean
	0 %	5 %	10 %	15 %	
0 %	2.09	2.43	3.18	2.55	2.56
75 %	3.72	4.33	4.97	4.33	4.34
100 %	4.63	4.75	5.38	4.61	4.84
Mean	3.48	3.84	4.51	3.83	
	RDN		CUS		RDN × CUS
S.E. ±	0.096		0.110		0.191
CD at 5%	0.281		0.324		NS

Application of 100 % N through fertilizers recorded significantly higher N (3.54 g pot⁻¹), P (0.90 g pot⁻¹) and K (4.84 g pot⁻¹) uptake by fodder maize this was followed by 75% N through fertilizers for N (2.85 g pot⁻¹), P (0.76 g pot⁻¹) and K (4.34 g pot⁻¹) uptake.

Foliar sprays of 15% CUS recorded significantly higher N (3.15 g pot⁻¹) uptake by fodder maize which was closely followed by 10% CUS (2.69 g pot⁻¹). Higher P uptake by fodder maize was observed with 10% CUS (0.83 g pot⁻¹) which was followed by 15% CUS (0.75 g pot⁻¹) however 10% cattle urine foliar sprays recorded significantly higher K (4.51 g pot⁻¹) uptake by fodder maize than rest of treatment.

Combine application of N fertilizers along with cattle urine foliar sprays recorded non-significant results for N, P and K uptake. However numerically higher N uptake (4.80 g pot⁻¹) and P (1.07 g pot⁻¹) was recorded with 100% N + 10 % CUS but 100% N through fertilizers along with 10% CUS recorded higher K uptake by fodder maize (5.38 g pot⁻¹). Chute *et al.*, (2017) reported similar effect of cow urine @ 4 % and NAA @ 50 ppm reported higher chlorophyll, N, P, and K content in leaf of linseed, further Ledgard *et al.*, (1982) reported that urine increased the N concentration of grass and increased the

potassium concentration of grass and clover. Highest value of N, P and K uptake and its content in mustard recorded with combine application of 100% recommended dose of fertilizer with 1200 l ha⁻¹ cow urine as basal and foliar spray of 50% urine. (Swayamprabha, *et al.*, 2018). Singh, *et al.*, (2014) also concluded that application of nitrogen @ 90 kg ha⁻¹ with 60 kg ha⁻¹ potassium and phosphorus + cow urine (T4) was found to be the best treatment regarding growth, yield and nitrogen content of paddy. These results are in close conformity Rahman, *et al.*, (2008) similarly studied that application of cattle slurry @ 12 kg 10m² plot recorded significantly higher maize nutrient uptake Further they concluded that application of cattle slurry @ 10 kg 10 m² plot⁻¹ (45 MT ha⁻¹) or 12 kg 10 m² plot⁻¹ (44 MT ha⁻¹) recorded statistically on par results for biomass yield of maize fodder. Nwite, J. N. (2015) results concluded that higher total nitrogen was obtained under human and cattle urine treatments relative to goat urine treated pots.

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