

International Journal of Agriculture Extension and Social Development

Volume 9; SP-Issue 6; June 2026; Page No. 83-87

Received: 03-03-2026
Accepted: 05-04-2026

Indexed Journal
Peer Reviewed Journal

Effect of cow urine on growth, yield attributes and yield in rice crop

¹Dibyendu Das, ²LK Srivastava, ²V Bhachkya, ²G Jatav and ¹Harendra Tonday

¹Department of Soil Science, College of Agriculture, Krishi Vigyan Kendra, Narayanpur, Chhattisgarh, India

²Department of Soil Science, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

DOI: <https://www.doi.org/10.33545/26180723.2026.v9.i6Sb.3710>

Corresponding Author: Dibyendu Das

Abstract

A field experiment was conducted in the Kharif season of 2022-23 and 2023-24 at Krishi Vigyan Kendra, Narayanpur to evaluate the effect of different doses of cow urine on growth, yield attributes and yield in rice crop. The experiment was conducted under the Randomize Block Design (RBD) with thirteen treatments and three replications. However, the response of fertility levels (100% RDF) was highest in yield, growth and yield attributes. It was reported that the grain yield and straw yield of rice varied significantly under various cow urine foliar sprays. Application of 50% RDF with 40 - 60% cow urine spray with 10 days interval recorded higher grain and straw yield over 50% RDF. Moreover, application of 60% cow urine spray with 50% RDF increased higher growth and yield attributes over only 50% RDF and control. Similar trend also found with nutrients uptake.

Keywords: Cow urine, Rice, Organic farming, kharif

1. Introduction

India is primarily agrarian, and this sector provides livelihood to a major part of the population. To feed the 1.3 billion population of the country, increasing tremendously approximately at 1.2% every year, the food grain production need to be increased correspondingly, towards attaining this goal, there is requirement of higher doses of fertilizers, which require non-renewable energy. In the same time, declining factor productivity owing to imbalanced and indiscriminate use of fertilizers in most productive zone of the country i.e. Indo Gangetic Plains, food grain production in India reached to the plateau. In recent days farmers facing many problems like -insufficient fertilizer for cost variation of petroleum products (Naphtha), insufficient level of good quality of seed in this fast growing agriculture many companies were produce many types of seed but quality of seed was questioned, insufficient labour, lack of technology and deficit equipment. The major crises of nitrogen fertilizers demanding and pay higher amount of money from farmer community fully. These fertilizers were produce soil infertility, salinity and agricultural plantation totally suffered. They were creating major crises affected to day to day life of farmer. Thus, the importance of organic sources of nutrients was recognized in current scenario in order to get higher yield without disturbing soil health (Arif *et al.*, 2012)^[1].

Cow is the backbone of Indian culture and rural economy, and sustains our life; represent cattle wealth and bio-diversity. Cow urine is a rich source of nutrients (especially nitrogen and potassium), but usually drains out a waste material. Being organic nature, it can be used in crops without any adverse effect on environment and human

health (Singh *et al.*, 2012)^[9]. Cattle urine is a good source of nitrogen, phosphate, potassium, calcium, magnesium, chlorite and sulphate. It contains 95% water, 2.5% urea, 2.5% enzymes and 24 types of mineral salts, hormones. It also contains several essential minerals like phosphorus, calcium, sulphur, iron and manganese, along with several other organic compounds like amino acids, carbonic acid, uric acid, cytokinin, lactose etc. (Bhadauria, 2002)^[2]. Research shows that only one fifth of nitrogenous materials consumed by cattle is absorbed in the body and remaining is excreted through urine and dung (Bhadauria, 2002)^[2]. Further organic nutrient spray (cow urine) can be sprayed at critical growth stage of crop to overcome the problem of the slow release nutrients of organic sources affecting crop growth. Cow urine might act as a stimulator for accumulation of nutrients in the plant biomass, proliferation of plant growth, promoting, phosphate solubilizing, a biotic stress tolerant and antagonism towards plant pathogenic fungi in the rhizosphere of plants, and enhance the total phenolic contents of the plants and controlling plant pathogenic fungi, and also it's effective in the enhancement of plant growth and soil health (Nautiyal *et al.* 2004)^[5]. Foliar application is credited with the advantage of quick and efficient utilization of nutrients, elimination of losses through leaching and fixation and regulating the uptake of nutrient by plants (Manonmani and Srimathi, 2009)^[4]. Narayanpur is tribal populated district where farmers are very poor and mostly house hold having on an average 3-4 desi cow but they don't apply cow urine to the crops. Cow urine is a rich source of nitrogen and potassium which usually drains out as waste material from farmer household. This nutrient source is available to farmers, free of cost in

their own house which may be proved as boon for them. It is organic in nature, ecofriendly if used in crops without any adverse effect on ecosystem and human health. Livestock excreta has two portions, that is solid dung and urine; the compounds in urine - urea, uric acid, soluble phosphates, and potassium salts - are ready for nutrition of plants and require slight changes, whereas, solid dung needs to be decomposed before availability of nutrients to the plant. Further organic nutrient spray (cow urine) can be sprayed at critical growth stage of crop to overcome the problem of the slow release nutrients of organic sources affecting crop growth. Therefore, to utilize the natural source of available nutrients as cow urine needs to be studied under existing condition. Therefore, the objective has been taken to study the effect of different doses of cow urine on growth, yield attributes and yield in rice crop.

Material and Methods

The experiment with rice crop was laid out in a Randomized Block Design (RBD) with three replications. The treatment involved three RDN (0, 50% and 100%) + full dose of phosphorus and potash + three cow urine (600 lha⁻¹) foliar spray i.e. (20%, 40% and 60%) at 10, 15 and 20 day interval. There were total thirteen different treatment combinations such as T₁ - Absolute control (no fertilizers, no cow urine), T₂ - 0% RDN (only water spray) + Phosphorus + Potash, T₃ - 50% Recommended Dose of Nitrogen (RDN) + Phosphorus + Potash, T₄ - 100% RDN + Phosphorus + Potash (Full recommended NPK), T₅ - 50% RDN+20% cow urine foliar spray at 10-day intervals +Phosphorus+ Potash, T₆ - 50% RDN+40% cow urine foliar spray at 10-day intervals +Phosphorus+ Potash, T₇ - 50% RDN+60% cow urine foliar spray at 10-day intervals +Phosphorus+ Potash, T₈ - 50% RDN+20% cow urine foliar spray at 15-day intervals +Phosphorus+ Potash, T₉ - 50% RDN+40% cow urine foliar spray at 15-day intervals +Phosphorus+ Potash, T₁₀ - 50% RDN+60% cow urine foliar spray at 15-day intervals +Phosphorus+ Potash, T₁₁ - 50% RDN+20% cow urine foliar spray at 20-day intervals +Phosphorus+ Potash, T₁₂ - 50% RDN+40% cow urine foliar spray at 20-day intervals +Phosphorus+ Potash and T₁₃ - 50% RDN+60% cow urine foliar spray at 20-day intervals +Phosphorus+ Potash. To counteract the effects of heterogeneity, three replicates of the treatments were executed. According to protocol, the treatments were allocated at random among the plots in each replication. Therefore, there were 39 plots in the experiment as a whole. Urea, di-ammonium phosphate and muriate of potash were used to apply nitrogen, phosphorus and potassium. Fresh cow urine was obtained from the Dairy unit of the KVK Farm of the Krishi Vigyan Kendra, Narayanpur.

Different quantitative and qualitative expressions were used to test the response to cow urine levels applied as a foliar spray. Plant height (cm), dry matter accumulation, number of grain panicle⁻¹, number of effective tiller hill⁻¹, panicle length (cm), test weight (g), grain and straw yield (q ha⁻¹) for rice were observed as growth, yield attributes and yield

parameters. The amounts of nitrogen, phosphorus and potassium in grain and straw were determined as well, along with the total nitrogen, phosphorus and potassium uptake.

Results and Discussion

Effect of Cow Urine on Yield of Rice

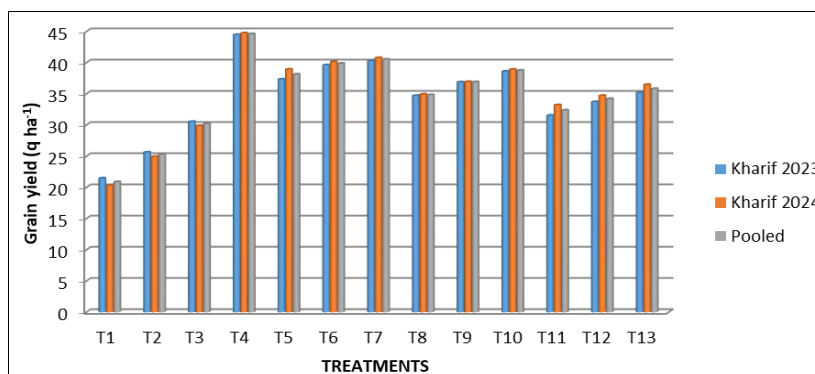
The effect of different nutrient management practices on the grain and straw yield of rice during kharif 2023, kharif 2024, and the pooled mean is presented in Table 1. The results clearly indicate that the application of 100% RDN with phosphorus and potash provides the maximum grain and straw yield. However, supplementing 50% RDN with foliar applications of cow urine (especially at 40-60% concentration at 10-day intervals) also produced high yields, suggesting potential for nutrient substitution without significant yield loss. The highest grain yield was recorded with T₄ (100% RDN + Phosphorus + Potash) which was statistically superior to all other treatments. This was followed by T₇ and T₆ both of which involved 50% RDN supplemented with 10- day interval foliar spraying of cow urine (60% and 40% concentration, respectively). The lowest yield was recorded under absolute control (Fig.1). With an increase in cow urine content from control to 60% spray with 10 days interval, yield output improved. Grain yield is highly connected with the number of effective tillers, the number of grain panicles⁻¹ and the test weight of 1000 grains. Similar result was reported by Singh *et al.* (2014) [10], Krishnapriya and Padmadevi (2011) [3] and Sadhukhan *et al.*, (2019) [8].

When the data were pooled across both years, T₄ produced the maximum straw yield (55.56 q ha⁻¹), followed closely by T₇ (51.82 q ha⁻¹), T₆ (51.15 q ha⁻¹), and T₁₀ (51.29 q ha⁻¹), all of which were statistically at par but significantly higher than the rest of the treatments. The minimum pooled straw yield was recorded in T₁ (29.02 q ha⁻¹). These results indicate that 100% RDN with phosphorus and potash ensures the highest straw biomass production. However, treatments involving 50% RDN with 10-15 day interval foliar spraying of cow urine (especially at 40-60% concentration) also maintained high straw yields, suggesting their potential in integrated nutrient management to partially replace chemical nitrogen without substantial yield reduction. With an increase in cow urine concentration from control to 60%, straw production significantly increased. A crop's straw yield is highly correlated with its vegetative growth, including plant height, tillers hill⁻¹ and dry matter production. The enhanced production of straw at greater cow urine concentrations is supported by the higher values of these parameters. Similar result was reported by Singh *et al.*, (2014) [10].

The increased grain yield at higher fertility level growth and better availability of nutrients during growth period, more synthesis of carbohydrates and their translocation (Sadhukhan *et al.*, 2018) [7]. Consequently, the highest values were recorded with 60% foliar spray with 10 days interval of cow urine.

Table 1: Effect of Cow Urine on Yield of Rice

Treatments	Grain yield (q ha ⁻¹)			Straw yield (q ha ⁻¹)		
	Kharif 2023	Kharif 2024	Pooled	Kharif 2023	Kharif 2024	Pooled
T ₁	21.47	20.27	20.87	29.56	28.49	29.02
T ₂	25.63	24.93	25.28	34.98	32.63	33.80
T ₃	30.53	29.87	30.20	40.72	39.06	39.89
T ₄	44.47	44.73	44.60	53.31	57.80	55.56
T ₅	37.33	38.93	38.13	48.66	51.22	49.94
T ₆	39.60	40.13	39.87	49.87	52.43	51.15
T ₇	40.27	40.77	40.52	50.64	53.00	51.82
T ₈	34.70	34.93	34.82	47.28	49.63	48.46
T ₉	36.87	36.93	36.90	49.41	52.22	50.81
T ₁₀	38.60	38.90	38.75	49.72	52.86	51.29
T ₁₁	31.53	33.20	32.37	41.42	42.63	42.02
T ₁₂	33.70	34.70	34.20	44.01	45.05	44.53
T ₁₃	35.17	36.47	35.82	45.38	46.53	45.95
SEm±	2.04	2.03	0.98	1.44	1.42	0.91
CD (5%)	5.97	9.28	2.86	4.21	4.17	2.68

**Fig 1:** Effect of cow urine on grain yield of rice

Effect of Cow Urine on growth attributes of Rice

Growth parameters like plant height, number of tillers per hill and dry matter per hill was significantly influenced by different nutrient management practices in both kharif seasons mentioned in pooled analysis data (Table 2 and Fig. 2). These results indicate that 100% RDN with phosphorus and potash consistently produces the tallest rice plants, while 50% RDN combined with frequent foliar spraying of cow urine (especially at 40-60% concentration at 10-day intervals) also promotes substantial vegetative growth, approaching the performance of full recommended nitrogen application. 100% RDN and 50% RDN + 60% cow urine foliar spray at 10 days interval has a significant impact on

plant growth parameters including plant height (cm), number of tillers hill⁻¹, dry matter accumulation, number of effective tillers hill⁻¹ for rice were observed as growth parameters. The application of 50%RDN + 60% and 40% Cow urine foliar spray at 10 days interval recorded the considerably higher growth parameters compared to control and only 50% RDN.

The growth attributing characters progressed presumably because of better supply of nitrogen and other major, secondary and micro-nutrient at higher rate of urine application. The different enzymes and hormones present in cow urine are also lead to better growth of plant (Vahanka *et al.*, 2010)^[12].

Table 2: Effect of cow urine on growth and yield attributing of rice

Treatments	Growth attributes				Yield attributes			
	plant height (cm)	number of tillers per hill	panicles per m ²	Dry Matter per Hill (g)	panicle length (cm)	test weight (g)	percent of chaffy grain	harvest index (%)
T ₁	88.17	6.00	141.17	15.25	15.67	18.49	33.50	32.98
T ₂	89.33	6.50	157.83	17.90	16.00	19.89	28.83	33.95
T ₃	103.17	9.83	189.33	25.31	17.00	22.71	24.67	34.22
T ₄	123.83	15.83	301.83	52.81	21.17	28.40		39.10
T ₅	113.33	13.17	268.00	38.78	18.83	24.71	18.50	37.55
T ₆	115.00	14.50	292.83	45.24	19.67	26.09	15.50	38.07
T ₇	117.17	15.50	300.83	48.76	21.00	27.57	13.50	38.14
T ₈	106.50	11.83	239.00	32.84	17.50	24.85	19.17	36.16
T ₉	111.83	13.17	258.67	37.77	18.50	25.30	16.83	36.35
T ₁₀	113.17	13.83	265.00	43.09	20.17	25.98	14.50	37.33
T ₁₁	107.50	10.67	239.67	30.32	16.00	24.26	21.00	35.19
T ₁₂	109.17	12.17	244.67	33.81	16.83	24.55	17.50	35.13
T ₁₃	112.17	13.50	246.67	36.26	18.50	25.35	15.50	35.48
SEm±	1.14	0.47	6.27	1.26	0.86	1.89	0.99	0.71
CD (5%)	3.34	1.39	18.39	3.70	2.53	NS	2.90	2.09

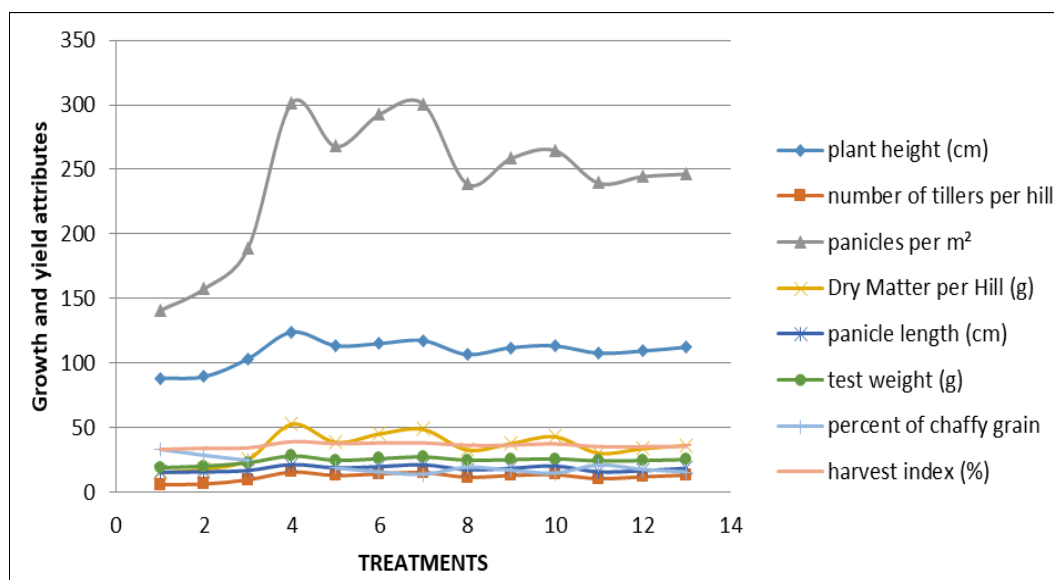


Fig 2: Effect of cow urine on growth and yield attributes of rice

Effect of Cow Urine on yield attributes of Rice

Yield attributes parameters like panicle length, panicles per m², test weight, percent of chaffy grain and harvest index was significantly influenced by different nutrient management practices in both kharif seasons which mentioned in Table no.2 and fig.2 as pooled analysis data. These results indicate that 100% RDN with phosphorus and potash consistently produces remarkably, while 50% RDN combined with frequent foliar spraying of cow urine (especially at 40-60% concentration at 10-day intervals) also promotes substantial vegetative growth, approaching the performance of full recommended nitrogen application. 100% RDN and 50% RDN + 60% cow urine foliar spray at 10 days interval has a significant impact on yield attributing parameters including number of panicle length (cm), panicles per m², test weight and harvest index were observed as yield attributes parameters. The application of 50% RDN + 60% and 40% Cow urine foliar spray at 10 days interval recorded the considerably higher growth parameters compared to control and only 50% RDN.

In harvest index, T₄ consistently recorded the highest HI (39.10%), which was statistically superior to all other treatments, followed by T₆ (38.07%) and T₇ (38.14%). The lowest pooled HI was observed in the absolute control (32.98%). The superiority of T₄ can be attributed to the balanced and adequate supply of nitrogen, phosphorus, and potash, which likely improved biomass partitioning towards grain production. Foliar application of cow urine, particularly at 10-day intervals with 40-60% concentration (T₆ and T₇), also resulted in higher HI values than most other treatments, indicating its role in supplementing nitrogen during critical growth stages.

Effect of Cow Urine on Major Nutrients Uptake by Rice

Major nutrients like nitrogen, phosphorus and potash uptake by rice are presented in Table no. 3. The results clearly

indicate that total nitrogen uptake by the rice crop was significantly affected by the treatments. The highest nitrogen uptake was recorded under T₄ (100% RDN + P + K), with 80.89 kg ha⁻¹. This confirms that full recommended nitrogen promotes both grain and straw nitrogen accumulation. Among the cow urine-based treatments, foliar application of CU in combination with 50% RDN significantly improved nitrogen uptake over 50% RDN alone (T₃). Notably, T₇ (50% RDN + 60% CU-FS at 10 DI) recorded the highest nitrogen uptake among CU treatments (70.95 kg ha⁻¹), closely followed by T₆ (50% RDN + 40% CU-FS at 10 DI, 70.32 kg ha⁻¹) and T₁₀ (50% RDN + 60% CU-FS at 15 DI, 70.12 kg ha⁻¹). This indicates that earlier foliar application (10 DI) at higher CU concentrations is more effective in enhancing nitrogen uptake.

The absolute control (T₁) recorded the lowest total nitrogen uptake (44.31 kg ha⁻¹, followed by T₂ (0% RDN + only water FS + P + K, 54.52 kg ha⁻¹ pooled), highlighting the importance of nitrogen supplementation for overall crop nitrogen nutrition. The improvement in nitrogen uptake with cow urine foliar spray may be attributed to its rich content of nitrogenous compounds, amino acids, enzymes, and growth-promoting substances that enhance nitrogen assimilation, remobilization, and utilization efficiency. These findings are consistent with previous reports, such as Sreenivasa *et al.* (2017)^[11] and Patil *et al.* (2020)^[6], who demonstrated enhanced nitrogen uptake and crop productivity in cereals with foliar-applied cow urine.

Similarly, the higher concentration of cow urine increases upto 60%, the uptake of P and K by grain and straw also increased from control. However, grain and straw both absorbed considerably more P and K under 60% CU than under control. The application of 50%RDN + 60% and 40% Cow urine foliar spray at 10 days interval recorded the maximum P and K content in grain and straw was found to be significantly superior to control and only 50% RDN.

Table 3: Effect of Cow Urine on Nutrients Uptake by Rice

Treatments	Nitrogen uptake (kg ha ⁻¹)			Phosphorus uptake (kg ha ⁻¹)			Potash uptake (kg ha ⁻¹)		
	By grain	By Straw	Total	By grain	By Straw	Total	By grain	By Straw	Total
T ₁	25.76	18.55	44.31	1.76	1.84	3.60	7.98	42.17	50.15
T ₂	31.22	23.31	54.52	2.68	1.80	4.48	9.53	50.27	59.80
T ₃	35.35	26.89	62.24	3.63	1.66	5.30	10.45	51.33	61.78
T ₄	49.51	31.38	80.89	6.30	2.51	8.81	12.66	68.44	81.10
T ₅	44.57	23.66	68.23	5.15	2.17	7.32	11.48	63.55	75.02
T ₆	48.26	22.06	70.32	5.73	2.06	7.78	12.02	65.87	77.88
T ₇	46.72	24.23	70.95	6.51	2.47	8.98	12.57	68.97	81.53
T ₈	40.47	25.77	66.24	3.89	1.70	5.59	11.66	62.10	73.76
T ₉	42.85	26.02	68.87	4.43	1.69	6.12	12.66	64.23	76.89
T ₁₀	44.08	26.04	70.12	5.37	1.54	6.91	12.82	64.14	76.97
T ₁₁	39.57	25.51	65.07	3.72	1.68	5.40	9.97	54.63	64.60
T ₁₂	39.78	26.99	66.76	4.01	1.93	5.94	10.90	56.11	67.01
T ₁₃	41.36	28.82	70.18	4.75	1.38	6.13	11.35	56.41	67.75
SEm±	1.21	0.84	1.54	0.33	0.15	0.39	0.57	1.48	1.67
CD (5%)	3.53	2.46	4.51	0.97	0.46	1.13	1.67	4.32	4.88

Conclusion

Recommended dose of nitrogen must be applied to rice (100 kg ha⁻¹) at 100% and cannot be reduced. Foliar applications of 60% or 40% cow urine at 10 days interval with 50% RDN improved growth, yield and quality of rice. The application of 50% RDN+ 60% or 40% cow urine at 10 days interval improved uptake of rice.

Reference

- Arif M, Ali A, Umair M, Munsif M, Ali K, Inamullah M, Saleem M, Ayub G. Effect of biochar, FYM and mineral nitrogen alone and in combination on yield and yield components of maize. *Sarhad J Agric.* 2012;28(2):191-195.
- Bhadauria H. Cow urine - a magical therapy. *Int J Cow Sci.* 2002;1(1):32-36.
- Krishnapriya K, Padmadevi SN. Effect of panchagavya on the growth and biochemical contents of *Oryza sativa* var. Ponni. *Asian J Biol Sci.* 2011;6(2):258-259.
- Manonmani V, Srimathi P. Influence of mother crop nutrition on seed and quality of black gram. *Madras Agric J.* 2009;96(1-6):125-128.
- Nautiyal CS, Mehta S, Singh HB, Mansinghka SB, Dawle HS, Rajhans NE, Pushpangadhan P. A synergistic fermented plant growth promoting biocontrol composition. *Natl Bot Res Inst, Rana Pratap Marg, Lucknow.* 2004.
- Patil SB, Biradar DP, Alagawadi AR. Influence of cow urine foliar spray on nutrient uptake and yield of maize. *Indian J Agron.* 2020;65(3):312-317.
- Sadhukhan R, Bohra JS, Choudhury S. Effect of fertility levels and cow urine foliar spray on growth and yield of wheat. *Int J Curr Microbiol Appl Sci.* 2018;7(3):907-912.
<https://doi.org/10.20546/ijcmas.2018.703.106>
- Sadhukhan R, Bohra JS, Sen S. Growth and yield response of rice (*Oryza sativa* L.) to graded doses of nutrients and foliar spray of cow urine. *Indian J Agron.* 2019;64(1):58-61.
- Singh L, Singh P, Kotru R, Hasan B, Chand L, Lone A. Cow urine spray and integrated nutrient management of rice on productivity and energy-use under temperate valley conditions. *Indian J Agric Sci.* 2012;82(7):583-588.
- Singh MK, Singh RP, Rai S. Effect of nitrogen levels and cow urine on soil status, growth and yield of paddy (*Oryza sativa* L.). *Environ Ecol.* 2014;32(4):1277-1281.
- Sreenivasa MN, Gore NS, Nagaraj B. Liquid organic manures and their influence on nutrient uptake and yield of maize. *J Org Agric.* 2017;7(1):23-29.
- Vahanka PM, Chawada CB, Dubey R. Cow urine as biofertilizers: Case studies. *BAIF-GRISERV Office, Vadodara;* 2010.