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Effect of neem coated urea (NCU) and ordinary urea on soil properties

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Abstract
The present study conducted entitled, "Effect of Neem Coated Urea (NCU) and Ordinary Urea on Soil Properties". Involved field experimentation conducted during Kharif season of year 2015 followed by laboratory analysis of the plant and soil samples in the department of agriculture chemistry and soil science, Udai Pratap Autonomous college, Varanasi (U. P). All grasses were removed from the experimental plots and soil samples have been taken from each replication plots at 30 DAT, 60 DAT and at harvesting. Significantly higher organic carbon content was recorded with 150% N of R.D by Neem coated urea (T6). On the basis of Nitrogen content of soil, different treatments could be arranged in order$T_6>T_4>T_5>T_3>T_2>T_1$. The available phosphorus content of rice plots under different treatments was found in the order $T_6>T_4>T_5,>T_3>T_2>T_1$, and values varied from 18.00 to 22.25, 16.50 to 20.65, 15.25 to 19.70, 14.00 to 18.51, 13.10 to 17.20 and 11.00 to 14.50 kg ha^{-1} under respective treatments. the available potassium content of soil varied from 201.30 to 247.00 kg ha^{-1} and significantly higher potassium content of soil (247.00 kg ha^{-1}) was recorded under T, and least (201.30 kg ha^{-1}) under control. The effect of various treatment on available K was found in the order $T_6>T_4>T_5>T_3>T_2>T_1$.

Keywords: Available phosphorous, neem coated urea, ordinary urea, soil sample and the experimental plots

Introduction
Nitrogen is the most important essential plant nutrient, makeup green and dark plant body. Nitrogen increase plant vegetative growth. To improve the production efficiency of rice, it is necessary to apply required dose of N, P, K and organic matter. Urea coated with different natural essential oils was significantly superior to uncoated urea at both the rates of fertilizer nitrogen treatments. Mint herb, essential oil yield and nitrogen uptake were significantly higher with the coated urea over the uncoated urea.
Nitrus Oxide, nitrate and ammonium were analyzed from three sites in the northwest coastal Salt marsh soils of Germany in order to find out the reason for irregular emission of nitrous oxide from the soils. Emission rates of N_2O within the consequent (1994-95) years were about 0.3 kg ha^{-1} yr^{-1} (mean of 110 samples over 2 year, SD = 39) for the haplic sulphaquent and about 1.0 Kg. ha^{-1} yr^{-1} for the typic salphaquent which reflected a low concentration of this gas throughout the soil profiles, Khan *et al,* (2002).
Due to rapid transformation of urea-N to $NH_{4\pm}$ and NO_3- forms, no urea-N is detected in the soil profile at 7 or during later samplings. More downward displacement of NH_4-N and NO_3-N was observed in the course than in fine textured soil. Studied were conducted in 100 cm long column (10cm ID) to study distribution and leaching of applied urea-N in a sandy loamy and clay loam soils under upland and wetland moisture regimes. At 2 days after application, movement of N coincided with wetting front in both the soil and under both the moisture regimes. Urea moved to deeper layer soil layer in the sandy loam soil as compared to in the clay loam soil, Singh and Singh (2006)

Materials and Methods
The present study entitled, "Effect of Neem Coated Urea (NCU) and Ordinary Urea on Soil Properties". Involved field experimentation conducted during Kharif season of year 2015 followed by laboratory analysis of the plant and soil samples in the department of agriculture chemistry and soil science, Udai Pratap Autonomous college, Varanasi (U. P).
All grasses were removed from the experimental plots and soil samples have been taken from each replication plots at 30 DAT, 60 DAT and at harvesting.

Khurpi and auger was used as sampling tools. Samples were collected in clean plastic bags. Soil samples were brought to the laboratory, air dried soil samples were crushed and passed through 2mm sieve. The representative samples about 500 gm were collected in polythene bags. Samples were analyzed for important physic0-chemical properties.

Organic carbon was determined by the modified Walkley and Black method (1934) as described by Jackson (1967). The available soil nitrogen was determined by the alkaline permanganate method (Subbiah and Asija, 1956). The available phosphorus in soil was determined by the Olsen's method (Olsen' *et al.*, 1954). The available potassium was determined by ammonium acetate method (Honway and Heidel, 1952). Plant samples drawn after harvesting of crop were dried in shade and chapped into pieces and then kept in oven at 70^0C for 12 hours for make free form moisture.

Results and Discussion

Table-1 indicated that relative performance of neem (*Azadirachta indica*) coated urea Vis-a-vis ordinary urea applied to rice on the basis of soil test on organic carbon content of soil under rice crop measured at 30, 60 and 90 DAT.

Table -1 revealed that effect of chemical fertilizer such as Neem coated urea (NCU) as applied in T_4 and T_6, treatments. The increased in organic carbon content in T_4 and T_6. It may be due to addition of organic form through better root and treatment respectively had significant positive impact on organic carbon over other plant growth. It also revealed that the effect of different treatment of NCU (Neem coated urea) and ordinary urea could be arranged in the order T6>T4>T3>T>T2> T1 and values varied from 0.30 to 0.01, 0.55 to 0.59, 0.52 to 0.57, 0.50 to 0.56, 0.49 to 0.54 and 0.47 to 0.51% under respective treatments.

Table 1: Effect of NCU vis-a-vis ordinary urea on soil organic carbon (%) under rice crop

Treatment	Day after transplanting (DAT)		
	30	60	90
T_1	0.51	0.49	0.47
T_2	0.54	0.51	0.49
T_3	0.56	0.53	0.50
T_4	0.59	0.56	0.55
T_5	0.56	0.54	0.52
T_6	0.61	0.58	0.56
CD(0.05%)	0.02	0.01	0.01

Table-2 revealed that the data related to available nitrogen content under rice crop as influenced by addition of ordinary urea as well as neem coated.

It revealed from table-2 that available nitrogen content of soil continuously decreased with advancement in crop growth stage under all treatments. The effect of different treatments on available nitrogen content of soil was found in order $T_6>T_5>T_4>T_3>T_2>T_1$ and values of available nitrogen content of soil varied from 229.35 to 249.00, 220.40 to 240.60, 213.73 to 238.00, 209.62 to 232.38, 204.70 to 228.67 and 196.60 to 221.20 kg ha^{-1} under respective treatment. The available nitrogen content differed significantly due to addition of various levels of urea. The increase in available N at higher dose of nitrogen might be attributed to the enhanced multiplication of microbes by the incorporation of crop residues for the conversion of organically bound N to inorganic form. Application of neem coated urea (NCU) significantly increased the available N content of soil over uncoated urea at all level of nitrogen.

Table 2: Available nitrogen (kg ha^{-1}) content of rice plot as influenced by application of neem coated urea and ordinary urea.

Treatment	Day after transplanting (DAT)		
	30	60	90
T_1	221.20	209.70	196.60
T_2	228.67	215.60	204.70
T_3	232.38	218.75	209.62
T_4	240.6.	228.60	220.40
T_5	238.00	222.60	213.73
T_6	249.00	237.50	229.35
S.Em±	0.80	0.69	0.44
CD(0.05%)	2.53	2.16	1.40

Table-3 indicated that effect of neem coated urea (NCU) vis-à-vis ordinary urea on available phosphorus content of soil measured at 30, 60, and 90 DAT.

It revealed from table-3 that available phosphorus content of rice plots decreased continuously with age of crop under all treatment. The content of available P in soil showed significant increase under all treatments combination throughout the crops as compared to control. Significantly higher available phosphorus was recorded under neem coated urea over ordinary urea at all levels of nitrogen. Higher P content in case of coated urea might be attributed to higher organic matter content. The values of available phosphorus content of rice plots at harvesting were 18.00, 16.50, 15.25, 14.00, 13.10, 11.00 kg ha^{-1} under T_6, T_5, T_4, T_3, T_2, and T_1.Effect of treatments respectively. Effect of various treatments on available P content of soil could be arranged in the order of $T_6>T_5>T_4>T_3>T_2>T_1$.

Table 3: Effect of neem coated urea and ordinary urea on available Phosphorus content (kg ha^{-1}) of rice plots.

Treatment	Day after transplanting (DAT)		
	30	60	90
T_1	14.50	12.40	11.00
T_2	17.20	15.30	13.10
T_3	18.51	16.63	14.00
T_4	20.65	19.33	16.50
T_5	19.70	18.34	15.25
T_6	22.25	20.67	18.00
S.Em±	0.39	0.63	0.29
CD(0.05%)	1.22	1.97	0.91

Table -4 indicated that the effect of N C U (neem coated urea) vis-à-vis ordinary urea on available potassium content of rice plots under different treatment measured at 30, 60 & 90 DAT Result revealed that available potassium content of soil of rice plots decreased continuously with advancement in growth stages up to harvest under all treatments. Effect of various treatments on potassium contents of soil could be arranged in the order of $T6>T_5>T_4>T_3>T_2>T_1$, the values varied from 222.50 to 247.00, 217.85 to 242.00, 219.00 to 241.93, 214.00 to 238.83, 210.63 to 234.70 and 201.30 to 228.00 under the respective treatments. The content of available K in soil increased significantly due to addition of nitrogen during the growth period of rice as compared to control. Increasing levels of nitrogen significantly increased the available potassium.

Table 4: Effect of nitrogen level and sources on available potassium content (Kg ha^{-1}) under rice crop.

Treatment	Day after transplanting (DAT)		
	30	60	90
T_1	228.00	222.00	201.30
T_2	234.70	225.50	210.60
T_3	238.83	227.10	214.00
T_4	242.00	232.46	217.85
T_5	241.93	230.30	219.00
T_6	247.00	238.52	222.50
S.Em±	0.25	0.50	0.54
CD(0.05%)	0.80	1.58	1.69

Summary and conclusion

A field study was the treatments were T1 (control), T2 (farmer practice), T3 (Farmer practice up to recommended dose (R.D) of N by ordinary urea), T4 (farmer practice up to R.D of N by Neem coated urea), T5 (150%% N of R.D by ordinary urea), T6 (150% N of R.D by Neem coated urea). Soil properties such as organic carbon, available nitrogen, available phosphorus, available potassium, and available sulphur, were made at different time intervals (30, 60, and 90 DAT)

Significantly higher organic carbon content was recorded with 150% N of R.D by Neem coated urea (T6). On the basis of Nitrogen content of soil, different treatments could be arranged in order$T_6>T_4>T_5>T_3>T_2>T_1$. Accordingly recorded values of available nitrogen contents were varied from 229.35 to 249.00, 220.40 196.60 to 221.20 kg ha^{-1}. The available phosphorus content of soil of rice plots under different o 240.6 213.73 to 238.00 209.62 to 232.38, 204.70 to 228.67 and treatment was significantly higher under 150% N of R.D by Neem coated urea (T6) treated plots and lowest under control at all growth stages. The available phosphorus content of rice plots under different treatments was found in the order $T_6>T_4>T_5,>T_3>T_2>T_1$, and values varied from 18.00 to 22.25, 16.50 to 20.65, 15.25 to 19.70, 14.00 to 18.51, 13.10 to 17.20 and 11.00 to 14.50 kg ha^{-1} under respective treatments. Under various treatments, the available potassium content of soil varied from 201.30 to 247.00 kg ha^{-1} and significantly higher potassium content of soil (247.00 kg ha^{-1}) was recorded under T, and least (201.30 kg ha^{-1}) under control. The effect of various treatment on available K was found in the order $T_6>T_4>T_5>T_3>T_2>T_1$.

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