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Study on effects of ordinary urea and neem coated urea on nutrients uptake by rice crop

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Abstract

The field experiment was conducted during Kharif season of 2015 on research plot of Udai Pratap Autonomous College, Varanasi (U.P) adjoining the Department of Agriculture chemistry and soil science. The present study conducted on, "Study on Effects of Ordinary Urea and Neem Coated Urea on Nutrients Uptake by Rice Crop". Treatment of this investigation were consisted of neem (*Azadirachta indica*) coated urea vis-a vis ordinary urea applied to rice variety Kashturi on the basis of soil test., its involved treatment T₁ =Control, T₂ =Farmer practice, T₃=Farmer practice up to 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 and T₆ = 150% N of R.D by N.C.U Neem coated. The experiment was laid out in a randomized block design (RBD) with three replications. It revealed from results that among various treatments the nutrients (N, P, K and S) uptake by rice plant were recorded highest on 150 N of R.D by Neem coated urea (T₆) treated plots and lower under control (T₁).

Keywords: Ordinary urea, neem coated urea, uptake, treatment, replication and RBD

Introduction

Rice (*Oryza sativa* L.) is the staple food of more than 65% of the world population. It is the grain with the second highest wide production after maize, producing more than one fifth of the calories consumed by the human species of the world. Among the rice growing countries, India has largest farm area (44.00 million hectare) followed by china (FAO 2015). India is the largest producer and consumer of rice in the world. The productivity of rice has increased from 1984 kg ha⁻¹ in 2004-05 to 3075 Kg ha⁻¹ in 2015-16. The India's rice production reached to a record high of 106.19 million tons in 2015-16 crop year (Ministry of Agriculture, Government of India). The UN's Food and Agricultural Organization (FAO) has estimated India's 2015, aggregate paddy rice production (including the ongoing 2015 main and the 2015-16 secondary season) at around 157.5 million tons.

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. Present study conducted entitled " Study on Effects of Ordinary Urea and Neem Coated Urea on Nutrients Uptake by Rice Crop" on during Kharif season of 2015 on research plot of Udai Pratap Autonomous College, Varanasi (U.P).

Materials and Methods

The field experiment was conducted during Kharif season of 2015 on research plot of Udai Pratap Autonomous College, Varanasi (U.P) adjoining the Department of Agriculture chemistry and soil science. The present study conducted on, "Study on Effects of Ordinary Urea and Neem Coated Urea on Nutrients Uptake by Rice Crop". Treatment of this investigation were consisted of neem (*Azadirachta indica*) coated urea vis-a vis ordinary urea applied to rice variety Kashturi on the basis of soil test., its involved treatment T₁ =Control, T₂ =Farmer practice, T₃ =Farmer practice up to 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 and T₆ = 150% N of R.D by N.C.U Neem coated. The experiment was laid out in a randomized block design (RBD) with three replications. Field was prepared by ploughing, three cross harrowing followed by planking at the onset of monsoon.

Thereafter, puddling was done by harrowing followed by planking, 21 days old rice seedling of cultivar Kasturi transplanted at spacing of 20x 15 cm. Recommended dose of P & K were applied in all plots through SSP & MOP respectively. Nitrogen was applied through urea (ordinary) and neem coated urea (N.C.U) as per treatment. Half dozen of nitrogen and full doze of P and K applied as basal dressing and rest half dose of N was applied in the two equal split one at 45 days and second 60 after transplanting.

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 500gm were collected in polythene bags. Samples were analyzed for important physico-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°C for 12 hours for make free form moisture.

After sampling of plant, samples were ground into grinder. After mixing well, the ground samples were kept in labeled samples bags for analysis. Primarily 0.5 gram ground plant sample was digested in Sulphuric acid and perchloric acid with the ratio of 9:1 and digested Sample were used to determine the nitrogen, phosphorus, potassium and Sulphur content in plant. N, P, K and S uptake were calculated by multiplying grain yield per hectare and nutrient content. The height of 5 marked plants in all the plots were recorded at different growth stages (30 DAT, 60 DAT and at maturity) from the base of the plant to the tip of the upper most fully matured and starched leaf before emergence of ear and after it emergence. The average of all observations in each plot worked out and designed as mean plants height. Number of tillers per meter in row length per plot at different growth stage (30 DAT, 60 DAT and at maturity) were recorded.

The data collected from field and laboratory were analyzed Statistically using standard procedure of randomized block design (RBD) (Cochran and Cox, 1959) Critical difference (C.D.) and standard error of mean (S.E.M.) were calculated to determine the significance among treatments mean.

Result and Discussion

The present investigation was carried out on "Study on Effects of Ordinary Urea and Neem Coated Urea on Nutrients Uptake by Rice Crop" during Kharif season of 2015 on research plot of Udai Pratap Autonomous College, Varanasi (U.P).

Table – 1 revealed that nutrients uptake by rice under different treatments over neem coated urea and ordinary urea through which total nutrient uptake. Application of N, With Neem coated urea or ordinary urea recorded significantly higher total (grain + straw) uptake of N, P, K and S over that of control. Application of 150% N of R.D by Neem coated urea recorded significantly higher NPKS (93.16, 20.20,

138.60 & 17.00 kg ha respectively) uptake in comparison to NPK alone use of NCU and ordinary urea significantly enhanced the total uptake of NPK and S over that of chemical fertilizers alone at all level of NPK. The extra amount of nutrient supplied by NCU (Neem coated urea) & ordinary urea providing conducive physical environment facilitating better root growth and adsorption of nutrients from the native as well as applied source. The effect of various treatments On NPK and S uptake could be arranged in order of $T_6 > T_5 > T_4 > T_3 > T_2 > T_1$ and among the treatments the uptake on N varied from 54.10 to 95.10 Kg ha P from 9.22 to 20.20 kg ha⁻¹ K from 105.60 to 138.60 kg ha and from 8.40 to 13.25 kg ha⁻¹. The substantial improvement in nutrient uptake indicates the requirement of integration of nutrient supply sources for rice crop and also for overall improvement in soils physico-chemical properties and biological environment.

Table 1: Effect of Neem coated urea and ordinary urea on total NPK and S uptake by rice crop

Treatment	Day after transplanting (DAT)			
	N	P	K	S
T ₁	54.10	9.22	105.60	8.40
T ₂	78.17	12.00	126.00	11.00
T ₃	82.21	13.22	129.50	12.65
T ₄	88.14	17.23	135.00	14.50
T ₅	85.00	15.00	131.00	13.00
T ₆	93.16	20.20	138.60	17.00
S.Em±	0.25	0.25	0.33	0.45
CD (0.05%)	0.78	0.79	1.04	1.41

Therefore it observed that among various treatments the nutrients (N, P, K and S) uptake by rice plant were recorded highest on 150 N of R.D by Neem coated urea (T₆) treated plots and lower under control (T₁).

Summary and conclusion

A field study was conducted with Rice crop on sandy loam soil during *kharif* season (2015) entitled "Study on Effects of Ordinary Urea and Neem Coated Urea on Nutrients Uptake by Rice Crop". 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). The rice crop experiment was laid out in randomized block design (R.B.D) with three replications. Uptake of nutrients was also measured under these treatments.

It concluded from results that among various treatments the nutrients (N, P, K and S) uptake by rice plant were recorded highest on 150 N of R.D by Neem coated urea (T₆) treated plots and lower under control (T₁).

It is observed that application of 150% N of R.D by Neem coated urea not only produced higher yield of rice, but also enhance soil fertility as compared uncoated urea. Higher nutrient availability was recorded in case of neem coated urea over uncoated urea.

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