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Abstract: A field experiment was conducted at the research farm of soil science department of Ranchi Agriculture College, B.A.U. during the year 2015-16 to study the effect of rate and time of nitrogen application on nitrogen use-efficiency, economics, soil properties and GHGs emission under maize-wheat cropping system in an acid soil. The experiment was carried out on a sandy loam soil having initial soil pH 5.4, organic carbon 4.3 g kg-1, available nitrogen 251.0 kg ha-1(medium in range), available phosphorous 45.69 kg ha-1(high in range), and available potassium 133.28 kg ha-1 (medium in range) comprising 12 treatments and 3 replications in a Randomized Block design. Nitrogen rates were arranged with four levels including (N1:0, N2 : 80 N3 : 160 and N4 : 240 kg N ha-1) which was applied at different time (S1 : 1/3 after germination+ 1/3 at V4 stage + 1/3 V10 stage), (S2 : 1/3 after germination + 1/3 in V4 stage + 1/3 V10 stage may it be varied on leaf colour chart (LCC)), (S3: ½ after germination + ½ in V10 stage) in case of maize. However in case of wheat N rates was (N1 : 0, N2 : 50, N3 : 100 & N4 : 150 kg N ha-1) consisting different time schedule (S1: 1/3 after germination + 1/3 in crown root initiation stage (CRI) + 1/3 in PI), (S2 : 1/3 after germination+ 1/3 in CRI + 1/3 in PI as per LCC), (S3 : ½ after germination + ½ in CRI stage). It was observed that maize grain yield, straw yield and other character (nutrient content, uptake and B:C ratio) where significantly affected by different rates of N. While phosphorous uptake was significantly affected by nitrogen rate x timing but potassium uptake significantly affected by nitrogen timing only. Statistically application of N @ 160 kg ha-1in three split on the basis of LCC and N @ 240 kg ha-1 in three split which attributed 71.75 & 76.11 q ha-1 grain yield, respectively, which was at par. Reduction in system yield was highest in N omission plots (87%) and the lowest with application of 160 kg N ha-1. GHGs were estimated by using Cool Farm Tool (CFT), an empirical model, and the result showed that the application of higher dose of N application emitted more total GHGs (11163 kg CO2 eq ha-1 in maize & 7108 kg CO2 eq ha-1 in wheat respectively. Similar trend followed by emission of N2O and CO2. There was no emission of methane gas. However, total emission per tonne of produce (grain yield) was the highest in nitrogen omitted plot could be attributed towards low yield. A breakdown of various emission sources shows that the major emission sources at farm level is the production and use of synthetic fertilizer. The nutrient uptake & NUE were positively and significantly affected by rates rather than time. Maximum nitrogen use - efficiency of maize, wheat and MEY was obtained with lower dose of N application i.e. 68, 69 and 68 kg kg-1 respectively and minimum was obtained at higher dose 51, 50 & 50 kg kg-1 respectively. The highest grain yield (45.92 q ha-1) of wheat was found in 150 kg N ha-1(N4) and Concentration of N in wheat grain and straw was affected significantly by different rates but not significantly affected by nitrogen timing and as per interaction of N rate and timing. Total nitrogen uptake was maximum under N rate 150 kg ha-1. Correlation studied among different parameters in maize and wheat found that yield was highly significantly and positively correlated with GHGs emission (0.843**and 0.897**, respectively) while it is highly negatively correlated with Available P (-0.780** to maize and -0.740** to wheat) and Available K (-0.939** to maize and -0.651** to wheat) at $p \leq 0.05$. B:C ratio was calculated and it significantly varied among N rates and timing of application. 150 kg N ha-1(N4) recorded higher B:C ratio 1.44 which was statistically at par with 100 kg N ha-1 (N3) 1.28 in case of wheat while B:C ratio of maize was 1.96 in both cases i.e. N4 and N3. It may be concluded that the application of 160 kg and 100kg N ha-1 in three splits for maize and wheat crop is optimum considering the yield, B:C ratio, GHGs and post-harvest nutrient status of soil.

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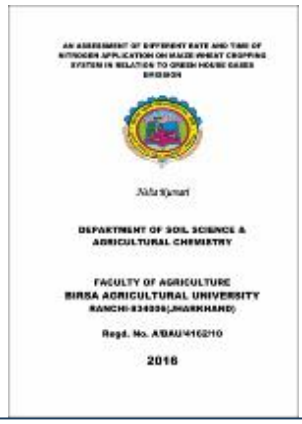
1608 Neha Kumari.pdf		3.43 MB	Adobe PDF	

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