Exploring the Impact of Nitrogen Sources on Yield, Partitioning and Nitrogen use Efficiencies of Irrigated low land rice

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Introduction

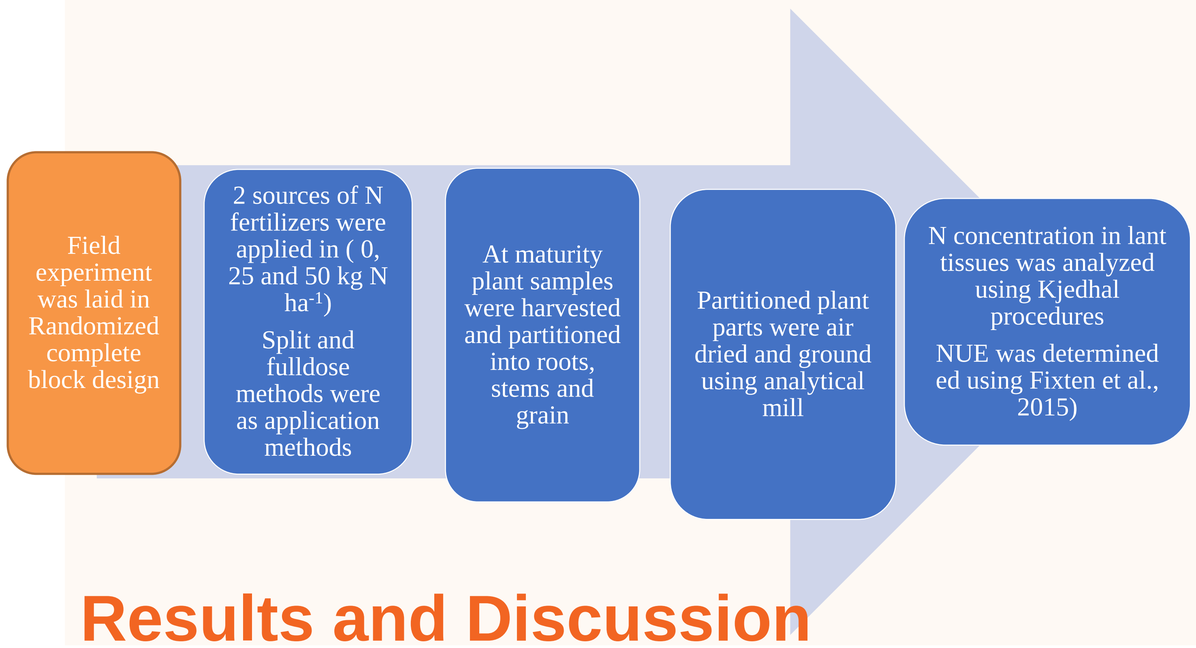
- Nitrogen (N) constitutes 90% of the applied mineral fertilizers to boost crop productivity.
- In sub-Saharan Africa (SSA) N inputs are as low as 10 kg N ha^{-1}.
- The low N inputs have led to depletion of soil fertility and large yield gaps in cropping systems
- The Nitrogen Use efficiency is very low due to insufficient application of the required N .
- Insufficient application of mineral N is associated with depletion of N resources in through soil mining.
- Availability of N has critical impact to both agriculture and environment
- As a yield- limiting nutrient, N management required improved strategies from current practices

Objectives

I. To asses the effects of two N sources $(NH_4)_2SO_4$) and urea ($CO(NH_2)_2$) in yield and partitioning in low land rice.

II. To determine Nitrogen Use Efficiencies of two N sources on low land rice .

Materials and methods



Results and Discussion

Table 1: Mean Nitrogen use efficiency (NUE) as affected by N sources and levels at vegetative, reproductive and harvesting stages

Method	NUE		
	VS	RS	HS
Full dose	18.20[a]	40.80[a]	159.00[a]
Split	12.80[a]	46.70[a]	182.00[a]
LSD	5.89	11.11	74.8
N rates kg ha^{-1}			
As25	22.15[a]	20.86[ab]	73.15[b]
AS50	20.03[a]	31.96[a]	120.60[a]
Ur25	27.48[a]	13.41[c]	54.24[bc]
Ur50	23.38[a]	30.95[a]	146.53[a]
LSD	13.01	11.17	39.44
M*NR	NS	NS	NS

Means followed by the same letter within the same column are not significantly different (P≤0.05).
VS- Vegetative stage, RS- Reproductive stage, HS-Harvesting stage .

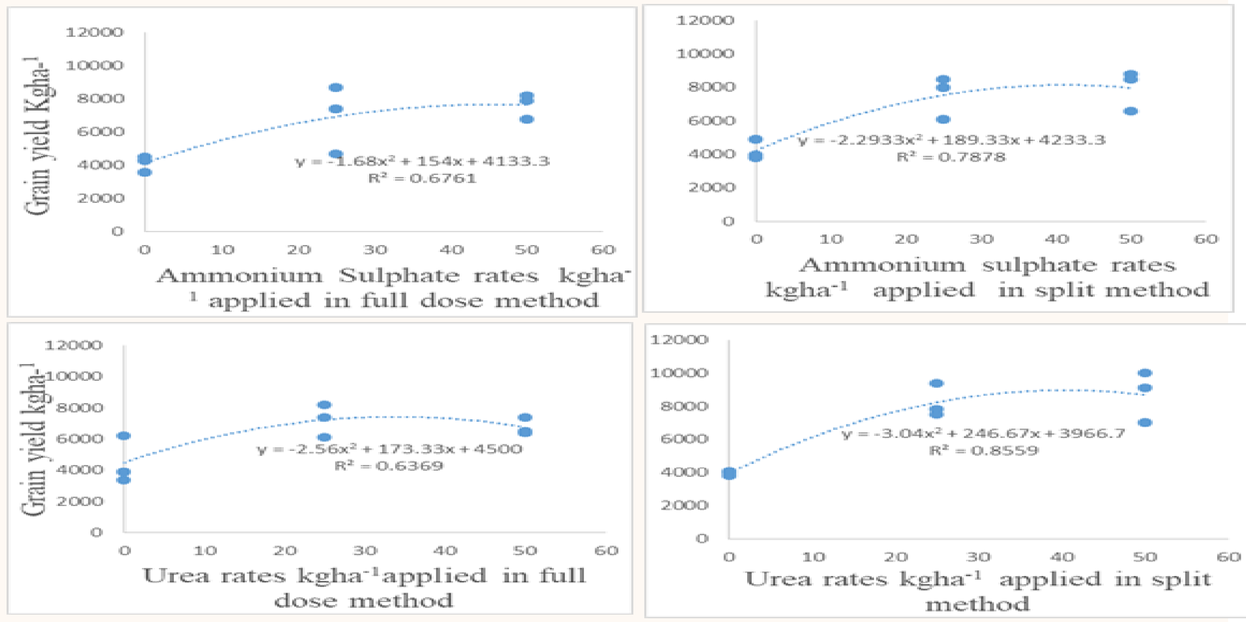


Figure 1: Grain yield as a polynomial function of nitrogen sources, rates and methods for rice in Mwea study site

- Both N sources influenced an increase of rice grain yield with the split method of application resulting in higher R^2 values (0.79 and 0.86) than full dose) for $(NH_4)_2SO_4$ and $CO(NH_2)_2$, respectively.
- The positive response of high yield on the addition of more N implies that the rate applied was inadequate since an incremental N elicited more grain yield.

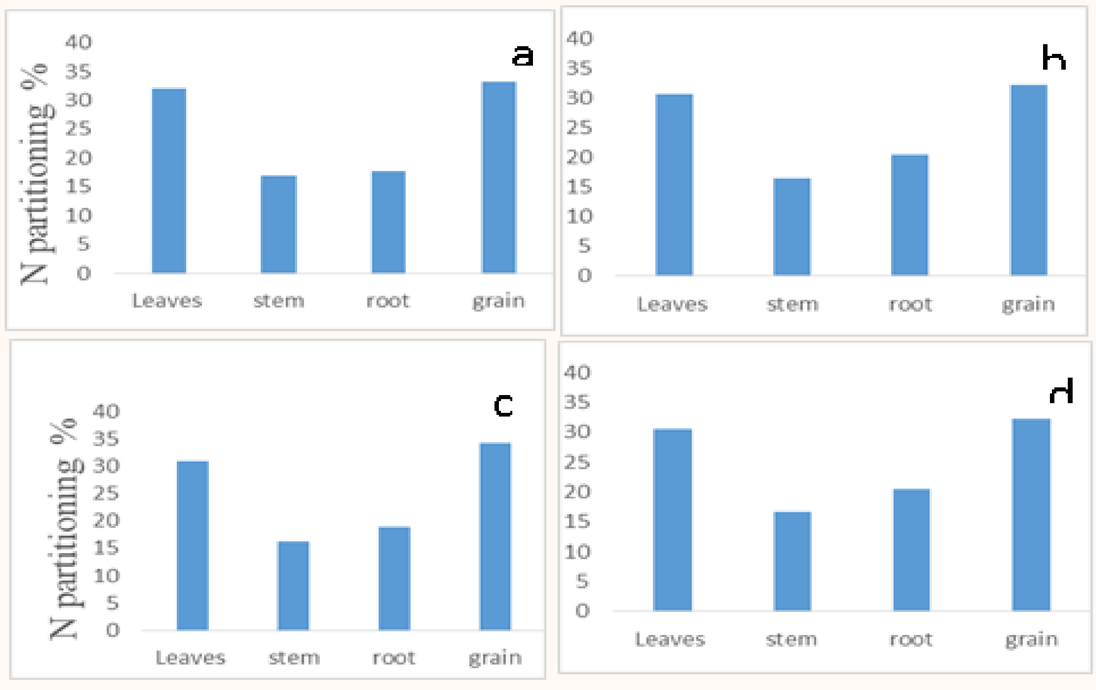


Figure 2: Mean nitrogen partitioning percentage in Ahero study site at harvesting stage (120 DAT) a- AS25kg ha^{-1} , b-AS 50kg ha^{-1} , c-urea 25kg ha^{-1} , d-urea 50kg ha^{-1}

Conclusion and Recommendations

- The findings confirmed that the amount of N applied in farms is too low to obtain optimum yields, while the extent of losses through leaching and emissions could be fairly high.
- There is a need to revisit the N fertilizer recommendations in lowland irrigated rice, including the splitting schedule and the form of fertilizers, to address the current low N use efficiency in the cropping system.

Reference

- Fixen, P., Brentrup, F., Bruulsema, T., Garcia, F., Norton, R., & Zingore, S. (2015). Nutrient/fertilizer use efficiency: measurement, current situation, and trends. *Managing water and fertilizer for sustainable agricultural intensification*, *270*.