

## **Nitrogen sources with and without residue management influences crop yields, water-use and economics in maize systems under conservation agriculture**

**Shankar Lal Jat**<sup>\*1</sup>, C.M. Parihar<sup>2</sup> and A.K. Singh<sup>3</sup>

<sup>1</sup>ICAR-Indian Institute of Maize Research, Delhi Unit, New Delhi; <sup>2</sup>ICAR-Indian Agricultural Research Institute, New Delhi 110012, India.; <sup>3</sup>ICAR-Indian Institute of Maize Research, Ludhiana 141004, India

\*Presenter e-mail: sliari@gmail.com

### **Abstract**

Sustainability of crop production is under threat in the present scenario of climate-change coupled with resource degradation, water shortage, energy and labour, growing production cost. Full conservation agriculture based crop production technologies may furnish more yield, reduce the water need and enhance profit margin from farming, without hampering the sustainability of natural resources. Maize being predominantly a rainfed crop has multiple challenges for sustaining its yields in limited moisture conditions. From an on-going long term study established since 2012, we assessed the medium term-impact of four different nitrogen management practices [Unfertilized, N through Prilled urea (PU), N through Sulphur coated urea (SCU) and N through Neem coated urea (NCU)] for maize systems in residue retained permanent bed (PB+R) vs. residue removed permanent bed (PB-R). Results showed that, the maize yields under full CA based PB+R were statistically similar in first, years of study, whereas during subsequent years, yields were significantly ( $P < 0.05$ ) higher by 10.1-16.7% under full CA-based PB+R than in partial CA-based PB-R system. Full CA-based PB+R practices reduced the total water requirement of maize with improved water productivity by 9.4-27.6% compared to partial CA (PB-R) plots. Economic profit for maize (from 2nd year onward) were significantly ( $P < 0.05$ ) higher in PB+R than in PB-R system. The radiation conversion efficiency (RCE) of maize and mungbean was comparable in PB+R and PB-R systems in almost all the years (except in fourth year). Among N management practices, neem coated urea (NCU) and sulphur coated urea (SCU) significantly improved the crops yield, water productivity and system profitability in all the residue applied plots compared to un-fertilized plots. Thus, the study supports and recommends that the full CA-based maize system with efficient N management through slow release coated fertilizers (NCU/SCU) is one of the pathways for enhancing productivity, resource-use efficiency, farm profitability and food security.

**Keywords:** nitrogen management, maize, residue, water productivity