

Soil and plant based precision N management in rabi maize (Zea Mays L.) in north-Indian alluvial plains

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ABSTRACT

A 2-year field experiment was conducted during 2010-11 and 2011-12 to determine the effect of soil and plant based precision nitrogen (N) application on growth, productivity, profitability and nitrogen-use efficiency of maize (var. HQPM 5). The treatments of the experiment included, control (no-N), 60, 120 and 180 kg N ha⁻¹, soil based N (SBN), and plant based N (PBN) application, set in a three times replicated randomized complete block design (RCBD). N was applied in three splits, except in PBN supply where only 15 kg N ha⁻¹ was applied as basal and topdressing of 25-30 kg N ha⁻¹ was done each time the SPAD values dropped to ≤ 37 till silking. The quantity of N for SBN was decided using soil test crop response (STCR) model. On an average, PBN application resulted in a grain yield of 6.88 t ha⁻¹ that was almost equal to the yields obtained under 180 kg N ha⁻¹ and SBN application with additional advantage of saving of 30 and 55 kg N ha⁻¹, respectively. These three treatments recorded significantly higher yields compared to lower rates of N application. Partial factor productivity, net returns and B: C ratio were also highest under PBN application. The agronomic efficiency was highest with 60 kg N ha⁻¹ (24.8 kg grain per kg N) closely followed by PBN supply (24.2 kg grain per kg N), and lowest with SBN application (17 kg grain per kg N). Hence, it is concluded that plant based (SPAD value ≤ 37) scheduling of N has merit over the other approaches and N rates, and may be adopted in maize.

Key words: Agronomic efficiency, factor productivity, precision nitrogen, maize, chlorophyll meter