

ABSTRACT

Sustainable crop production of tropical and sub-tropical countries is severely affected due to improper management of chemical fertilizer. An investigation was carried out to study the effect of SPAD based N management on growth, yield, N use efficiency, and economics of rice-wheat cropping system in lateritic soil of eastern India. Field experiments were conducted in a randomized complete block design with nine treatment combinations of three SPAD values (34, 36 and 38 in rice and 38, 40 and 42 in wheat) and three N levels (15, 25 and 35 kg N ha⁻¹) in each top dressing as real time N management (RTNM), one fixed time N management (FTNM), one farmers' fertilizer practice (FFP) and control (no application of N) in three replications in wet (July–October) and dry season (November–March) with rice and wheat crop, respectively during the years 2010 to 2012 at Kharagpur, India. The RTNM treatment as maintenance of minimum SPAD level '36' in rice leaf and '40' in wheat leaf through N application at 25 kg ha⁻¹ in each top dressing increased soil N availability, leaf N content, above ground biomass, and yield attributes of rice and wheat and produced high grain yield (5215 kg ha⁻¹ in rice and 4483 kg ha⁻¹ in wheat), which was comparable to those with higher rate of N top dressing at same and higher SPAD and FTNM; but significantly greater than those with lower rate of N top dressing at lower SPAD, FFP and control treatments. This RTNM recorded 58% increase in agronomic N use efficiency with 26% less use of chemical fertilizer N, thus increased the annual net return by 8020 Rs. ha⁻¹ as compared to the conventional FTNM treatment in the rice-wheat cropping system. Further, the SPAD based RTNM treatments could maintain similar soil physical and chemical properties as in the FTNM. The SPAD value of ≥ 36 in rice leaf and ≥ 40 in wheat leaf should be maintained up to heading stage of the crop through N top dressing at 25 kg ha⁻¹ for sustainable production of the rice-wheat cropping system in subtropical India.

Key words: Chlorophyll meter (SPAD), Grain yield, N management, N use efficiency, Rice-wheat system