



Water Use and Soil Fertility under Rice–Wheat Cropping System in Response to Green Manuring and Zinc Nutrition

Devideen Yadav^{a,b,c,d,e}, Y. S. Shivay^{a,b,c,d,e}, Y. V. Singh^{a,b,c,d,e}, V. K. Sharma^{a,b,c,d,e}, and Arti Bhatia^{a,b,c,d,e}

^aScientist, Division of Soil Science and Agronomy, Indian Institute of Soil and Water Conservation, Dehradun, India; ^bPrincipal Scientist, Division of Agronomy, Indian Agricultural Research Institute, New Delhi, India; ^cPrincipal Scientist, Centre for Conservation and Utilization of Blue Green Algae, Indian Agricultural Research Institute, New Delhi, India; ^dPrincipal Scientist, Division of Soil Science and Agricultural Chemistry, Indian Agricultural Research Institute, New Delhi, India; ^ePrincipal Scientist, Centre for Environment Science and Climate Resilient Agriculture, Indian Agricultural Research Institute, New Delhi, India

ABSTRACT

Soil fertility and water use are two important aspects that influence rice productivity. This study was conducted to evaluate the performance of *in-situ* (sesbania and rice bean) and *ex-situ* (subabul) green manuring along with zinc fertilization on water productivity and soil fertility in rice under rice–wheat cropping system at Indian Agricultural Research Institute, New Delhi, India. Sesbania incorporation recorded higher total water productivity (2.20 and 3.24 kg ha⁻¹ mm⁻¹), available soil nutrients, organic carbon, alkaline phosphatase activity, microbial biomass carbon and increased soil dehydrogenase activity by 39.6 and 26.8% over subabul and rice bean respectively. Among interaction of green manures and zinc fertilization, subabul × foliar application of chelated zinc-ethylenediaminetetraacetic acid at 20, 40, 60 and 80 days after transplanting recorded highest total water productivity (2.56 and 3.79 kg ha⁻¹ mm⁻¹). Foliar application of chelated Zn-EDTA at 20, 40, 60 and 80 days after transplanting recorded significantly higher water productivity than other Zn treatments, however it was statistically similar with foliar application of zinc at active tillering + flowering + grain filling. Sesbania × 5 kg Zn ha⁻¹ through chelated Zn-EDTA, recorded highest available nitrogen, phosphorus, potassium, zinc, manganese, copper and iron than other green manure and Zn fertilization interactions, although it was statistically similar with rice bean × 5 kg Zn ha⁻¹ through chelated Zn-EDTA as soil application. Sesbania × foliar application of 5 kg Zn ha⁻¹ through chelated Zn-EDTA as soil application recorded highest soil enzymatic activities and microbial biomass carbon.

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