Fertilization for increased crop production and nutrient balance in the maize-legume-rice cropping pattern

ABSTRACT

The experiments were conducted at the experimental fields during 2005 to 2007 to see the effect of organic and inorganic fertilization on the crop yields and nutrient balance in maize-legume-rice cropping pattern. The experiments were laid out in a randomized complete block design with three replicates. For maize, there were five treatments i.e. T1 Control, T2 Moderate Yield Goal (MYG), T3 High Yield Goal (HYG), T4 Farmyard Manure (FYM) 5 t/ha + inorganic fertilizer for MYG as Integrated Plant Nutrition System (IPNS) basis, T5 FYM 5 t/ha + inorganic fertilizer for HYG as IPNS basis. Integrated use of manure and inorganic fertilizers on IPNS basis produced comparable seed yield of maize with the chemical fertilizers alone irrespective of moderate or high yield goal basis in both locations. After harvest of maize, as legume crops, mungbean and dhaincha (Sesbania) seeds were sown as per treatments. After plucking pods, mungbean residues and dhaincha biomass were incorporated to the soil as manure before transplanting of rice. Nitrogen content of the mungbean stover and dhaincha was determined. For rice, each of the plots of T2 and T3 treatments were subdivided into six, so there were altogether 15 treatments. At both locations, incorporation of dhaincha biomass and mungbean residue along with inorganic fertilizers for HYG gave identical grain yields of rice with the fertilizers alone applied for HYG. It appeared that the balance for N and K was highly negative at both locations. The balance of P was also negative at second location while in case first location, the mungbean-treated plots showed positive balance, but in both locations, S showed positive balance. It may be concluded that addition of mungbean residues or dhaincha biomass to the fertilizer schedule may ensure higher crop productivity and sustenance of soil fertility.

Keyword: Crop yield; Fertilizer; IPNS; Manure; Soil fertility; Sustainable production