An Asian Journal of Soil Science, (December 2009 to May-2010) Vol. 4 No. 2 : 201-207

Research Paper :

Response of transplanted rice to levels, splits and timing of NPK application : Effect on uptake and use efficiencies of P and K

MANJUNATHA HEBBARA, B.G. MASTHANAREDDY, S.G.PATIL AND V.C. PATIL

Accepted : *August, 2009*

See end of the article for authors' affiliations

Correspondence to :

MANJUNATHA HEBBARA
Department of Soil Science, Agriculture College, University of Agricultural Sciences, DHARWAD (KARNATAKA) INDIA

ABSTRACT

The effect of levels, splits and timings of NPK application on losses, uptake and use efficiency of P and K in transplanted rice (*Oryza sativa* L) was studied at Agricultural Research Station, Gangavathi, Karnataka, during *kharif* 2000 and summer 2001. A higher level of NPK application (L_2) was beneficial which increased both P and K uptake resulting in higher yields. Application of split doses of either N or NPK did not influence P and K uptake and grain yield. Though the yields were higher with L_2, their agronomic efficiency decreased over L_1. The agronomic efficiency of P and K were unaffected by N / NPK splits with BPT-5204 (*kharif*) but NPK splits significantly increased the AE of both P and K over only N splits with IR-64 (*rabi*/ summer). Though the recovery of P was not influenced by its level, its extended application increased P recovery. However, in case of K, both increased levels and extended levels of K increased K recovery.

Key words : Transplanted rice, Phosphorus, Potassium, Uptake, Recovery efficiency, Agronomic efficiency

Management of soil P and K in intensive irrigated rice has rather received less attention than increasing cropping intensity and new cultivars, irrigation and fertilizer N (Dobermann *et al*., 1998). Removal of nutrients such as P and K has markedly increased with the higher yields of new systems involving improved germplasm and intensive fertilization; particularly under high N application. In the early years of green revolution, crop responses to fertilizer P and K were marginal (De Datta and Mikkelsen,1985). With continuous intensive cropping, P became first deficient nutrient as revealed in long-term experiments whereas, it usually took longer until significant responses to K application were found (Shiga,1982).

Relationships between nutrient supply, nutrient uptake, tissue concentration and its use efficiency in rice have been well documented by Dobermann *et al*. (1998); mostly on the basis of long term experiments conducted at IRRI. As revealed from surveys world wide, intensification of agriculture always meant intensive use of inorganic fertilizers, mainly of N, while P and K back seated. This led to imbalanced nutrition and became a hurdle in obtaining significant response to added nutrients. Nutritional imbalances may also prevent new cultivars from expressing their full yield potential. Interaction among nutrients is also considered as a key factor in deciding the agronomic efficiency of added nutrients in irrigated rice. In a long-term experiment at IRRI, large-scale interactions between P and K were reported by De Datta *et al*. (1988). Both N response ratio and agronomic efficiency of N decreased drastically due to imbalanced nutrition of P as manifested by decreased uptake of P.

A preliminary survey, prior to this investigation was conducted in the Tungabhadra Project (TBP) area to know the existing agronomic and fertilizer practices followed in rice by random sampling across farmers' and locations. The mean fertilizer NPK consumption was in the range of 230:90:110 kg / ha of NPK per season. This application far exceeded the recommended dose of 150:75:75 kg / ha of NPK per season for rice in this area. It is evident from the above that there is both qualitative and quantitative imbalance in nutrient management which is a major constraint in further increasing rice production. This has resulted in increased fertilizer application rates due to decreased use efficiencies over years; yield levels remaining almost static. Under these circumstances, the present investigation was undertaken to study the effect of levels, splits and timing of NPK application on losses, uptake and use efficiency of P and K.

MATERIALS AND METHODS

The experiment was conducted at Agricultural Research Station, Gangavathi of University of Agricultural Sciences, Dharwad Karnataka of India. The soil of the experimental site was medium deep black clay belonging to order vertisol. The soil has a pH of 8.3, available N of 247 kg ha^{-1}, available P (Olsen) of 23.5 kg ha^{-1} and exchangeable K (ammonium acetate) of 378 kg ha^{-1} in