

Integrated nutrient management in rice-maize crop sequence

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ABSTRACT

The field experiment was conducted during rainy and winter seasons of 1998 and 99 at the Agronomy Farm, College of Agriculture, Dapoli, dist. Ratnagiri to study the integrated nutrient management in rice – maize crop sequence. The grain yield of rainy season rice was higher under 50% recommended NPK through fertilizers + 50% N either through glyricidia or FYM. Application of NPK at suboptimal dose *i.e.* 75 % and 50 % recommended dose of fertilizer reduced grain yield of rice significantly. The total productivity of rice – maize crop sequence was higher when 50% recommended NPK through fertilizers + 50% N through glyricidia was applied to rice and 75 % recommended dose of fertilizer to succeeding maize crop. The maize crop supplied with 100% recommended dose of fertilizer registered significantly higher cob yield. The total productivity (net return, B: C ratio) was higher when both the crops supplied with 100 % recommended dose of fertilizer. The N, P, K uptake was more when rice crop received 50 % N substitution either through glyricidia or FYM. Where as in winter season, the maximum uptake of nutrients by maize was recorded when 100 % NPK was supplied as inorganic source.

Key words : Rice-maize sequence, Integrated nutrient management, Net profit, Nutrient uptake

INTRODUCTION

In absence any significant scope for horizontal expansion and to meet the ever increasing demand for food, fuel and fodder, the vertical expansion in agriculture through increased production per unit area and per unit time is the only alternative, which involves the intensive use of resources and input. But inadequate / unbalanced use of fertilizers and organic manures are resulting in the improvement of soil health. Therefore, increasing the production and productivity on sustainable basis is a challenge before the agricultural scientists and planners.

The rice – maize is a major cropping system of the country but the average productivity of the system, which was less. Rice – maize sequential cropping is an important cropping system needs large amount of nutrients to achieve high productivity. The long term experiment at many locations have indicated that even with application of recommended dose of fertilizers (NPK), it will not be possible to sustain the productivity of rice – maize system and emphasize the importance of integrated nutrient supply system in sustaining productivity (Hedge, 1996). This involves the use of chemical fertilizers in conjunction with organic sources such as green manuring, FYM etc. This approach restores and sustains soil health and productivity in long term (Mitra *et al.*, 1992), besides meeting the nutritional deficiencies which are likely to occur due to continuous and intensive cultivation (Hegde, 1996). Therefore, the present investigation was initiated to study the effect of integrated nutrient supply of chemical fertilizers and organic sources on productivity and soil fertility in rice – maize sequence under South Konkan coastal zone of Maharashtra.

MATERIALS AND METHODS

The field experiment was conducted in the rainy (*khari*) and winter (*rabi*) seasons of 1998 and 1999 at Agronomy farm, College of Agriculture, Dapoli, dist. Ratnagiri. The soil of experimental plot was clay loam in texture with pH 6.36, organic carbon 1.30 g kg⁻¹; and the available nitrogen 295.22 kg ha⁻¹, phosphorus 12.96 kg ha⁻¹ and potassium 105.03 kg ha⁻¹. There were 11 different treatment combinations (Table 1) replicated thrice in Randomized Block Design. Rice (var. Sahyadri) and maize (var. Konkan tapora) were grown as the test crop. The recommended dose of fertilizer was 100:50:50 and 120:60:60 N, P and K kg ha⁻¹ for rice and maize, respectively. In case of rice, fertilizers was applied in three slit doses, 40 % N + full P and K was applied as a basal dose *i.e.* at transplanting, 40 % N was applied 30 DAT (maximum tillering) and remaining 20 % N was applied at 60 DAT (panicle initiation) whereas in case of maize, half N and whole quantity of P and K was applied as a basal dose and half N 30 DAS. The treatment comprised application of different combinations of inorganic and organic sources of nutrients to rice and inorganic sources to maize. The grain and straw of rice, and grain, stover of maize samples were analyzed for their N content by Kjeldahl method. The samples were digested in diacid (HNO₃, HClO₄, 4:1) mixture. Phosphorus was estimated in diacid digest by vanadomolybdo phosphoric yellow colour method. The extract was used for determination of potassium by flame photometer. Data on grain and straw yield, total productivity/ha/year (grain and biomass), gross monetary returns, net monetary returns and benefit: cost ratio were obtained from the