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Effect and economics of integrated nutrient management for sustainable production under cereal-cereal cropping system in Western Maharashtra, INDIA

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ABSTRACT

A field experiment is being conducted since 1984 with integrated nutrient supply to sorghum- wheat system in vertisols to study, the contribution of organic manures to nitrogen economy and sustainability of soil fertility and productivity with 12 treatments Viz. Control, 50 % RDF, 75 % RDF, 100 % RDF, 50 % RDF + 50 % N through FYM., 75 % RDF + 25 % N through FYM, 50 % RDF + 50 % WCS, 75 % RDF + 25 % N through WCS, 50 % RDF + 50 % N through green manuring, 75 % RDF + 25 % N through green manuring and last is farmers practice (45 kg N :20 kg P_2O_5 kg/ha) in randomized block design with four replications, farm yard manure (0.54 % N), green manuring (Glyricidia 2.73 % N), wheat cut straw (0.46 % N) were incorporated into the soil before sowing of the crop. Nitrogen, Phosphorus, and Potassium was applied as per the recommended dose of fertilizers through urea, single super phosphate and Muriate of potash. In sorghum – wheat sequence, maximum productivity was obtained under treatment involving use of 50 % RDF in conjunction with 50 % N through FYM in terms of sorghum grain equivalent ((98.93 q/ ha). Addition of organic manure spectacularly increased crop productivity as compared to sub optimum dose of fertilizer. Gross and net returns as well as B: C ratio was also similar in the same treatment. On pooling the data from 1984-2005 indicated similar trends of results. Sub optimum doses of chemical fertilizer alone could not sustain in long run under sorghum- wheat sequence. Maximum SYI for sorghum grain ((0.71) was recorded due to application of 50 % RDF + 50 % N through FYM to sorghum crop in *kharif*. Continuous application of organic manure in conjunction with inorganic fertilizers maintains / improved organic carbon and available Nitrogen in the soil.

Key words : Intergrated nutrient management, Croping, Economics

INTRODUCTION

In intensive cropping system fertilizer has more importance for increasing yield of individual crop. But use of only organics were precious than inorganic. Therefore, there is a need to substitute part of it through organic wastes and organics residues. For improvement of soil fertility status and sustainable crop production, only organic source can be used. Because of their long-range effects, soil physical, chemical and biological conditions can be improved. Therefore, this experiment was taken for study on integrated nutrient supply system on crop sequence.

The experiment was started from 1984-85, total nineteen crop cycles have been completed. Twelve treatment combinations including FYM, green manuring, wheat cut straw and chemical fertilizers were studied for both the crops. In the nineteen crop cycles, physical properties as well as organic carbon, and available NPK soil fertility status has improved with significantly increased yield of both the crop in sequence. Besides this 50 % RDF + 50 % Nitrogen through FYM for *kharif* sorghum followed by 100 % RDF to the wheat crop shown significant results in all respect so as to save 50 % chemical fertilizer due to residual effect of 50 % N through FYM.

Objective was to develop suitable integrated nutrient supply system for a cereal crop based sequence involving more efficient use of fertilizers in conjunction with judicious combination of organic manures by effective recycling technique without detriment to long term soil fertility and by improving crop productivity.

MATERIALS AND METHODS

The initial characteristics of experimental soil which is clayey loam in texture (*Typic Haplustert*) pH 8.1, Ec 0.35 dSm^{-1}, organic carbon 0.64 % available N 153.0 kg / ha, available phosphorus 14.7 kg/ha and available potassium 705.0 kg/ha. Regarding physical properties, initial value of Bulk density 1.32 mgm^{-3}, hydraulic conductivity 1.5 cm/hr, field capacity 39.50 %, permanent wilting point 19 %, etc. In every previous 20 year surface soil samples (0-0.15 cm depth) were taken for analysis of their physico-chemical properties and analyzed by using standard methods. The experiment was laid out in randomized block design with

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