

Integrated nutrient management in sorghum (*Sorghum bicolor*) – chickpea (*Cicer arietinum*) cropping sequence under irrigated conditions

H.M. PATIL*, S.S. TUWAR AND A.G. WANI

Department of Agronomy, Mahatma Phule Krishi Vidyapeeth, Rahuri, AHMEDNAGAR (M.S.) INDIA

ABSTRACT

A field experiment was conducted during 2001-02 and 2002-03 at Cropping System Research Project, Rahuri, Maharashtra, to study the effect of integrated nutrient management in sorghum [*Sorghum bicolor* (L.) Moench]-chickpea (*Cicer arietinum* L.) cropping sequence under irrigation. Application of 75 % recommended dose of fertilizer (RDF) + farm yard manure (FYM) + biofertilizer [*Azospirillum* and phosphate-solubilizing bacteria (PSB)] gave significantly higher plant height, dry matter, yield attributes and grain and fodder yields of sorghum and was at par with application of 100 % RDF through inorganics alone showing 25 % saving of nutrients. The residual effect of application of 5 tonnes FYM/ha to preceding sorghum resulted in significantly higher growth, yield attributes and yield of chickpea owing to 100 % RDF to chickpea and at par with that of 50 % RDF showing 50 % saving of nutrients. The net monetary returns and benefit : cost (B:C) ratio of a sequence were significantly higher owing to 100 % RDF which were at par with that of 75 % RDF + FYM + biofertilizer. The fertilizer levels to chickpea showed the highest net monetary return owing to 100 % RDF and highest B:C ratio owing to 50 % RDF. Significantly higher nutrient balance was recorded because of 75 % RDF + FYM + biofertilizers applied to sorghum and 100 % RDF applied to chickpea.

Key words : INM, Sorghum-chickpea sequence, Growth, Yield, Economics, Nutrient Balance.

INTRODUCTION

Nutrient supply is a key factor in crop production but the global crises of energy and due to escalation in the price of chemical fertilizers, a greater emphasis has to be laid on supplementing the chemical fertilizers with low priced sources of nutrients such as organics and biofertilizers. Application of organic materials along with inorganic fertilizers into soil leads increase in productivity of the system and also sustained the soil health for longer period. Organic sources of nutrients applied to the preceding crop benefits the succeeding crop to a great extent (Hedge and Dwivedi, 1992). It is well known that the organic sources cannot meet the total nutrients need to modern agriculture, integrated use of nutrients seems to be more appropriate. Incorporation of organic sources and later on its decomposition determines the availability of the nutrients. Therefore, the present study was undertaken with a view to find out the efficient combination of organic and inorganic fertilizers under sorghum-chickpea cropping sequence under irrigated conditions.

MATERIALS AND METHODS

A field experiment was conducted at Cropping Systems Research Project, Rahuri, Maharashtra, during

the rainy (*kharif*) and winter (*rabi*) seasons of 2001-02 and 2002-03 on clayey soil, having pH 8.0 and electrical conductivity 0.29 dS/m. It was medium in organic carbon (0.52 %), low in available nitrogen (175.62 kg/ha), medium in available phosphorus (15.05 kg/ha) and very high in available potassium (553.62 kg/ha). The experiment was laid out in randomized block design during the *kharif* with 8 main plot treatments of integrated nutrient management to *kharif* sorghum replicated thrice (Table 1) and during the winter (*rabi*) season each main plot treatment was subdivided into 3 sub-plot treatments with 3 levels of RDF to chickpea, resulting in 24 treatment combinations in *rabi* replicated thrice in split-plot design (Table 2). Recommended doses of inorganic fertilizers consisting of 120 kg N and 60 kg each of P₂O₅ and K₂O/ha to sorghum and 25 kg N and 50 kg P₂O₅/ha were applied to chickpea. For sorghum N was applied in 2 splits, half at sowing along with entire quantity of P₂O₅ and K₂O and remaining 30 days after sowing and that for chickpea as entire quantity of N and P₂O₅ at sowing. Nitrogen, phosphorus and potassium were applied through urea, single superphosphate and muriate of potash, respectively. The FYM was added @ 5 tonnes/ha and biofertilizers used in the form of seed inoculation were *Azospirillum* and phosphate-solubilizing bacteria (PSB) according to

* Author for correspondence.