

## Soil productivity as influenced by integrated nutrient management and cropping system

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### ABSTRACT

A long term field experiment on sorghum–sunflower cropping sequence was conducted at Marathwada Agriculture University, Parbhani from 1997-2001 on vertisols to study integrated nutrient management with inorganic fertilizers in conjunction with organic sources (farm yard manure, wheat straw, green manure, press mud, compost). Pooled data of 1997-1998 to 2000-2001 in respect of grain yield indicated that substitution of 50% recommended N through organic sources (FYM / PMC / WS / GM) and 100% recommended NPK dose and micronutrient dose through inorganic fertilizer to sorghum resulted in higher grain productivity in sorghum –sunflower sequence cropping.

**Key words :** Cropping system, Integrated Nutrient Management, Grain yield

Sorghum –sunflower cropping sequence is most dominant system in Maharashtra where inorganic fertilizer is considered to be the major input of plant nutrition. Use of organic materials like FYM, Green Manuring, press mud, compost, wheat straw is now advocated for partial substitution of inorganic fertilizer due to heavy cost of fertilizer and beneficial effect of these sources fertility (Deshmukh *et al.*, 1995). The present paper is an attempt of plant nutrient study in Sorghum –sunflower sequence cropping.

### MATERIALS AND METHODS

The field experiment was conducted during *kharif* and *rabi* season of 1997-98 to 2000-01 on Sorghum –sunflower crop sequence in vertisols at Parbhani. The experiment soil was clay in texture having the pH 7.97, EC 0.13 dsm<sup>-1</sup>, organic carbon 6.8 kg<sup>-1</sup>, CaCO<sub>3</sub> 4.8g kg<sup>-1</sup>, bulk density 1.2 g cm<sup>-1</sup>, available N 241.47 kg ha<sup>-1</sup>, available S 21.95 kg ha<sup>-1</sup>, available Zn 0.98 mg kg<sup>-1</sup> available and B 0.55 kg ha<sup>-1</sup>.

The experiment was laid out in randomized block design with twelve treatments and four replications. The treatments of this experiment were the soil test based optimal doses (100%NPK) and super-optimal dose (150% NPK) of fertilizers worked out in 1997 which were 80 kg N, 40 kg P<sub>2</sub>O<sub>5</sub>, 40 kg K<sub>2</sub>O ha<sup>-1</sup> for hybrid sorghum and 60 kg N, 40 kg P<sub>2</sub>O<sub>5</sub>, 30 kg K<sub>2</sub>O/ha for hybrid sunflower. The inorganic fertilizers were supplied through straight fertilizers urea, single super phosphate and muriate of potash. The organic materials used in the experiment were FYM, WS, PMC, and GM.

### RESULTS AND DISCUSSION

Data on grain yield of sorghum and sunflower as affected by various treatments during 1997-98 to 2000-01 and pooled analysis are presented in the Table 1.

Data during 1997-98 presented in Table 1 revealed that the highest grain yield was obtained with application of NPK at super optimal level (150%) + S, Zn, B and followed by the T<sub>1</sub> and T<sub>2</sub> as 100% NPK+ S, Zn, B and 100 NPK, Zn, B, (-S), respectively and the lowest grain yield was obtained in T<sub>12</sub> as control. Application of organic + inorganic fertilizer treatment gave at par results.

During the year 1998-99 the highest sorghum grain was obtained from the treatment T<sub>11</sub> as application of NPK at super optimal level (150% NPK + S, Zn, B) and the treatment T<sub>1</sub> (100% NPK +S, Zn, B) and the lowest grain yield was obtained in T<sub>12</sub> as control.

During 1999-2000, the highest grain yield was recorded with the application of NPK at super optimal level (150% NPK + S, Zn, B) and lowest in treatment, T<sub>12</sub>, whereas, the treatment T<sub>5</sub>, T<sub>6</sub>, T<sub>7</sub>, T<sub>8</sub> were at par where organic + inorganic fertilizers were used.

During 2000-01, 150% NPK + S, Zn, B recorded highest sorghum grain yield which was somewhat similar to treatment in which N was substituted through organic material and lowest grain yield was obtained in treatment T<sub>12</sub>.

Pooled data of four years presented in Table 1 revealed the highest sorghum grain yield was registered with super optimal dose of fertilizers. The N substituted through wheat straw registered significantly lower yield than it's substitution through FYM. The Patil *et al.* (1993) and Deshmukh *et al.* (1995) reported the similar results.