Vol. 41, No. 1, pp 52-60, 2013
Indian Journal of Soil Conservation
Online URL:http://indianjournals.com/ijor.aspx?target=ijor:ijsc&type=home

Productivity of winter sorghum and chickpea as influenced by integrated nutrient management in deep black soils of Bellary region, India

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ARTICLE INFO

Article history :
Received : December, 2012
Revised : March, 2013
Accepted : March, 2013

Key words :
Chickpea,
Nutrient management,
Sorghum,
Water use efficiency,
Winter season

ABSTRACT

A field experiment was conducted at Research farm of Central Soil and Water Conservation Research and Training Institute, Research Centre, Bellary, Karnataka State, India to know the effect of integrated nutrient management in winter sorghumchickpea cropping sequence on rainwater conservation, nutrient availability and crop productivity in deep black soils during winter seasons of 2005-06 and 2006-07. In sorghum block, treatment with 15 kg N through *Leucaena loppings* and 20 kg N through *urea* (T_8) recorded significantly higher sorghum grain yield by 64% during 2005-06 (2200 kg ha^{-1}) and in the pooled data (1486 kg ha^{-1}) over control. Greater grain yield in T_8 was attributed to higher dry matter accumulation in head with greater head weight, grain weight per plant, 1000 grain weight and higher soil moisture and nutrient availability. During 2006-07, application of N through organic amendments alone conserved the lower annual and crop season rainfall thus producing 67% higher sorghum yields *i.e.,* 792 kg ha^{-1} with application of 15 kg N through farmyard manure + 10 kg N through *Leucaena loppings* (T_9) over control. Application 15 kg N through *Leucaena loppings* and 20 kg N through *urea* (T_8) produced significantly higher water use efficiency (WUE) of 8.14 kg ha^{-1} mm^{-1} and lower WUE of 5.22 kg ha^{-1} mm^{-1} in control. In chickpea block also, significantly higher grain yield of 1035 kg ha^{-1} and 1001 kg ha^{-1} was observed in T_8 treatment and application of 15 kg N through *Leucaena loppings* and 10 kg N through *urea* (T_7) and were higher by 87% and 81%, respectively over grain yield of 554 kg ha^{-1} produced in control. Higher nutrient availability in T_8 and T_7 produced more pods per plant with greater dry matter accumulation in pods thus resulting in higher grain and straw yields. Even significantly higher WUE of 6.16 and 6.00 kg ha^{-1} mm^{-1} was observed in T_8 and T_7 respectively over lower WUE of 3.69 kg ha^{-1} mm^{-1} observed in control plots in chickpea block. In sorghum and chickpea strip cropping block also, higher sorghum grain equivalent (SGE) of 1757 kg ha^{-1} was observed in T_8 treatment and it was higher by nearly 45% over lower SGE of 1211 kg ha^{-1} produced in control. Higher SGE in T_8 treatment was attributed to production of higher grain and straw yields of sorghum and chickpea in strips with greater soil moisture and nutrient availability. It can be concluded that application 15 kg N through *Leucaena loppings* and 20 kg N through *urea* (T_8) resulted in greater soil moisture conservation with higher nutrient availability thus producing significantly higher sorghum and chickpea yields during winter season in deep black soils of Bellary.