

Sustainable production model (system) in pearl millet-wheat cropping system

S. B. Singh¹ and A. C. Singh²

¹Cropping Systems Research Centre (ICAR) Department of Agronomy, R.B.S., College Bichpuri, Agra -283105 (U.P.)

²Department of Agronomy, K.A. (P.G.) College, Allahabad-211001 (U.P.)

Abstract

A field experiment was conducted in Randomized Block Design (R.B.D.) with four treatments during kharif and Rabi seasons, in "pearl millet-wheat" rotation, keeping years as replication (Five years) during 2007-2011 at Agricultural Research Farm, R.B.S., College Bichpuri, Agra to develop sustainable production Model (System) with the efficient use of agro inputs and sustaining all resources for sustained production. On the basis of data recorded during experimentation it was concluded that in the Kharif, the maximum grain yield (27.08 q/ha) of pearl millet was obtained with T₂ (100% R.D.F.+ full package of practices + 10 t FYM/ha). Recommended dose of N, P₂O₅ and K₂O was 80:60:40 Kg/ha, respectively. Similar trend was noted in Rabi season for wheat as T₂ (100% R.D.F. + full package of practices + 10 t F.YM./ha) produced maximum grain yield (50.60 q/ha). The recommended dose of N, P₂O₅ and K₂O was 120:60:40 Kg/ha. The response of F. Y.M. @ 10 t/ha was appeared quite clear and along with the relevance of soil test based fertilizer recommendation correcting marginal deficiency of Zn and S.

Keywords: pearl millet-wheat cropping system, sustainable production, kharif

Introduction

'Pearl millet- Wheat' is a traditional, popular and un replicable cereal based cropping system, being widely adopted in western U.P., particularly in Agra region, besides in other states like; Rajasthan, Madhya Pradesh, Haryana and Gujarat. In order to sustain high yields of crops particularly maximum yield research (MYR), it is necessary to maintain the soil health with high amount of N, P and K nutrients which is deteriorating /depleting year to year, especially after 1990. This system is very exhaustive and a crop giving 2.9 t/ha of pearl millet and 4.2 t/ha of wheat which may remove 238, 54 and 131 kg nitrogen, phosphorus and potassium per hectare, respectively (Hegde *et al.* 1992). The grain yield increased in different crops have been obtained in soil rich in organic matter. Sustainable agriculture mainly depends on soil organic matter for nutrients supply through FYM, compost, vermi-compost, green manures etc. Presently, the research has been oriented on organic farming because of fast depleting soil status.

Materials and methods

A field study was conducted at R.B.S., College Agricultural Research Farm Bichpuri, Agra (U.P.) during 2007-2011 in Randomized Plot Designing for five years taking years as replication (five) by keeping four treatments for example T₁- recommended dose of NPK +full package of practices (without weed control), T₂ - Recommended dose of NPK + full package of practices of + 10 t FYM /ha, T₃ - Recommended dose of NPK + full package practices + weed control/chemical & mechanical and T₄- Soil test based NPK + full package of practices + micro/macro nutrients deficiency, if any. The soil was sandy loam with pH 7.9, E.C. 1.8 and organic carbon 0.35%. In winter minimum temperature was recorded around 20 °C while in summers maximum temperature was recorded around' 48 °C. An average rain fall of 610 mm was recorded during experimental period.

Results and Discussion

Pearl millet: Yield attributing characters such as ear length (cm), ear weight (g) and 1000- grain weight were affected significantly by various treatments. Maximum test weight, ear length, ear

weight were obtained with T₂ - (100% RDF + full package of practices of + 10 t FYM /ha) significantly superior over all other treatments. As far as pearl millet grain yield is concerned

highest production was also obtained with T₂ treatment (27.08 q /ha) significantly superior over T₄, T₃ and T₁, treatments, respectively, Jain & Poonia (2003) reported similar trends.

Table 1 Effect of various treatments on grain yield and yield attributes of pearl millet

Treatments	Ear length (cm)	Ear weight (g)	1000 -grain weight	Grain yield (q/ha)
T ₁	19.00	18.15	9.40	24.02
T ₂	21.21	20.54	11.52	27.08
T ₃	19.35	19.00	10.35	24.85
T ₄	20.28	19.65	10.80	25.71
CD at 5%	0.30	0.26	0.19	0.4

Wheat: Maximum spike length was noted with T₂ (Recommended NPK + full package of practices + 10 t FYM ha") being significantly superior over T₁ and at par with T₄ and T₃. No. of grain / spike and 1000- grain weight were maximum with T₂ also being significantly superior over all other treatments. Best treatment

T₂ out yielded rest of the treatments significantly as it gave a yield of 50. 60 q/ha, T₂ produced 4.7, 16.9 and 20.16% more yield over T₃, T₂ and T₁, respectively. Similar results were noted at Durgapura (AICARP On CS 1998), Gangwar *et al.* (2000) and Satyajeet *et al.* (2007) on either of the crops.

Table 2 Effect of various treatments on grain yield and yield attributes of wheat.

Treatments	Spike length (cm)	Grain / spike	1000 grain weight	yield (q/ha)
T ₁	9.8	36.15	39.72	42.11
T ₂	10.45	48.52	42.32	50.60
T ₃	10.00	40.12	40.30	43.28
T ₄	10.34	42.75	41.78	48.32
CD at 5%	0.62	2.4	0.19	0.93

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