Plant Archives Vol. 14 No. 2, 2014 pp. 1023-1024 *ISSN 0972-5210*

EFFECT OF CROP-ESTABLISHMENT TECHNIQUES ON PRODUCTION POTENTIAL OF PEARL MILLET (*PENNISETUM GLAUCUM*) UNDER SUB-OPTIMAL CONDITIONS

M. Z. Siddiqui, R. A. Yadav and Naushad Khan

Department of Agronomy, C. S. Azad University of Agriculture and Technology, Kanpur (Uttar Pradesh), India.

Abstract

An experiment was conducted during rainy season (*Kharif*) 2003, 2004 and 2005 at Kalai (Aligarh), Regional Research Station of C. S. Azad University of Agriculture and Technology, Kanpur (U.P.), India; to find out effect of crop-establishment techniques on production potential of pearl millet (*Pennisetum glaucum*) under sub-optimal conditions. The mean values of three years revealed that grain yield improved with seed soaking, the highest being under 0.1% thiourea closely followed by 10 ppm kinetin. The experimental results indicated that compaction after sowing and spreading of FYM @ 5 t/ha over planted rows yielded higher over traditional practice of planking after sowing and control. Pre-sowing seed treatment with 0.1% thiourea recorded highest net return (Rs. 9366/ha) and benefit : cost ratio (1.98) followed by seed treatment with kinetin.

Key words : Crop establishment, thoiurea, kinetin and pearlmillet.

Introduction

Pearl millet is the major crop grown during rainy season in south-western semi-arid zone of Uttar Pradesh. It is mostly grown under rainfed conditions. In present scenario of agronomic management besides cultural manipulations, a great deal of interest has been shown in regulating plant growth and development through bio-physiological manipulations. Use of plant growth regulators, enables the plant to develop their morphological and physiological behaviour in such a way that they can have best use of existing as well as applied inputs (Humpries, 1968). Application of bio-regulators also increases grain filling and test weight in crops (Deotale *et al*., 1995). Therefore, it is important to investigate appropriate bio-physiological manipulators for pearl millet crop and include them in agronomic management. With this view the present study was aimed to determine the suitable technique for yield maximization in pearl millet under sub-optimal condition.

Materials and Methods

The field experiment was conducted at Regional Agriculture Research Station Kalai, Aligarh of C. S. Azad University of Agriculture & Technology, Kanpur (U.P.), India; during rainy season (*Kharif*) of 2003, 2004 and 2005. The experimental soil was sandy loam in texture having pH 7.5, organic carbon 0.46% and available P and K contents as 17.5 and 163.5 kg/ha, respectively. The experiment was conducted in randomized block design with three replications having twelve treatments *viz.* $\mathbf{T_1}$- Control (untreated and unsoaked); $\mathbf{T_2}$- Spreading of FYM @ 5 t/ha over planted rows; $\mathbf{T_3}$- Planking after sowing, $\mathbf{T_4}$- Dry sowing one week before monsoon, $\mathbf{T_5}$- Compaction after sowing, $\mathbf{T_6}$- Seed soaking in 1% NaCl solution, $\mathbf{T_7}$- Seed soaking in 1% KCl solution, $\mathbf{T_8}$- Seed soaking in 2% $CaCl_2$ solution, $\mathbf{T_9}$- Seed soaking in 10 ppm kinetin solution, $\mathbf{T_{10}}$- Seed soaking in 0.1% thiourea solution, $\mathbf{T_{11}}$- Seed soaking in 1% KNO_3 solution, $\mathbf{T_{12}}$- Seed soaking in water. The required quantity of seed was soaked for six hours and was used after drying in shade for two hours. A uniform does of 60 kg N + 40 kg P_2O_5/ha was applied to all treatments. Crop was sown at 45 cm row space and plants were thinned at 15 cm plant space after 15-20 days of sowing. The statistical analysis was carried out according to standard method.

Results and Discussion

The grain and stover yields showed significant variation to different treatments (table 1). The mean values of three years revealed that grain yield improved with seed soaking, the highest being under 0.1% thiourea closely followed by 10 ppm kinetin. The increase in grain yield due to seed treatment with chemicals may be ascribed to improvement in seed viability by preventing

Table 1: Effect of Treatments on yield and economics of pearlmillet

Treatments	Grain yield (q/ha)				Stover yield (q/ha)				Economics (average of 3 years)	
	2003	2004	2005	Mean	2003	2004	2005	Mean	Net return (Rs/ha)	B:C ratio
T_1	21.71	25.61	22.98	23.43	52.58	64.02	60.59	59.06	5403	1.57
T_2	28.11	29.83	30.29	29.41	69.72	70.88	76.02	72.21	7744	1.71
T_3	26.06	26.98	25.95	26.33	64.01	69.73	64.59	66.11	7234	1.76
T_4	27.54	27.89	30.29	28.57	65.15	68.59	76.02	69.92	8568	1.90
T_5	28.12	31.21	29.39	29.61	67.44	80.01	75.45	74.30	8826	1.88
T_6	25.94	28.58	29.09	27.87	74.01	59.73	74.88	59.54	8161	1.86
T_7	26.97	28.52	28.52	28.00	64.01	68.59	72.59	68.40	4170	1.86
T_8	22.29	28.81	28.86	26.92	60.68	59.16	74.88	68.21	7388	1.77
T_9	29.39	29.49	31.21	30.03	70.86	59.73	78.88	73.16	9291	1.96
T_{10}	28.80	29.61	31.78	30.06	68.58	64.30	69.91	70.93	9366	1.98
T_{11}	24.23	27.78	26.06	26.02	58.30	68.30	66.30	64.30	5955	1.73
T_{12}	22.91	26.18	25.09	24.59	56.01	68.59	66.19	63.60	6207	1.65
CD (P=0.05)	**1.73**	**0.73**	**0.71**	**-**	**8.91**	**2.38**	**1.74**	-	-	-
Rainfall (mm) during crop season (July-November)					**806**	**478**	**375**	**-**	**-**	**-**

Average market price of grain and stover was Rs. 510/q and Rs. 50/q, respectively. Economics is based on average of 3 years.

catabolic activity under stress condition and water absorption of seed by greater membrane permeability (Balasubramaniyan and Palaniappan, 2002). It will be worthwhile to mention here that beneficial effects produced by thiourea increased with decreasing level of rainfall as evident from grain yield (table 1). It appears that such an enormous increase in response may obviously be associated with improved plant metabolism and translocation of sugars from seed to young growing point under stress condition. The experimental results indicated that compaction after sowing and spreading of FYM @ 5 t/ha over planted rows yielded higher over traditional practice of planking after sowing and control. Increase in grain yield may be attributed to improvement in field emergence by preventing formation of hard layer due to rains after sowing, which intern provided better plant growth and ultimately led to higher production per unit area. The grain yield of pearl millet was reduced when seed was sown without soaking in either water or any chemical (Mondal *et al*., 2004). However, dry sowing before monsoon registered higher yield over control. The reason for higher yield may be early establishment of plants due to favourable weather condition. It was observed that sowing before monsoon ameliorates late planting but risk factor of frequent crop failure remains to be adverse weather condition under dry sowing in sandy loam soils. The stover yield showed similar trend as in grain yield.

The economic analysis of various treatments revealed that pre-sowing seed treatment with 0.1% thiourea recorded highest net return (Rs. 9366/ha) and benefit : cost ratio (1.98) followed by seed treatment with kinetin. The compaction after sowing and application of FYM @ 5 t/ha over planted rows recorded higher yield, but benefit: cost ratio could not be realized due to their higher input cost.

The study revealed that among various techniques tested, seed treatment with 0.1% thiourea proved better technique for yield maximization in pearl millet. The results clearly indicated that pearl millet may efficiently and profitably be grown with pre- sowing seed treatment of 0.1% thiourea under sub-optimal conditions. The technique can easily be adopted by farmers to increase productivity of pearl millet under south-western semi-arid zone of Uttar Pradesh, India.

Acknowledgment

Authors express gratefulness to ICAR for providing financial assistance through AICPMIP to carry out present study.

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