



Evaluation of Pearl Millet Varieties under Rainfed Region of Eastern India

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ABSTRACT

Field experiments were carried out at Dry land research station, KVK Munger during *kharif* seasons of 2013 and 2014 to evaluate the yield potential and economics of pearl millet varieties under the rainfed condition of sub-humid sub-tropical environment of South Bihar. The sandy-loam soil of the experimental field was low in organic carbon (0.26%), available N (182.5 kg ha⁻¹), and available P₂O₅ (19.5 kg ha⁻¹) and medium in K₂O (168.kg ha⁻¹) content, having pH 6.8. Experiment was laid out in randomized block design and replicated thrice with nine pearl millet varieties viz. Pusa hybrid 1201, Pusa hybrid 1202, Pusa composit 443, Pusa composit 612, Proagro 9444, Proagro 9444 GOLD, Proagro 9330+, Proagro Tejas and Proagro 9450. The highest plant dry matter accumulation (126.68g plant⁻¹) at harvest stage was noticed with hybrid 'Proagro 9444' which was at par to 'Pusa hybrid 1201', 'Pusa hybrid 1202' and 'Proagro 9450'. Significantly higher grain yield (33.87 q ha⁻¹) was in hybrid 'Proagro 9450' which was comparable to 'Proagro 9444' (32.09 q ha⁻¹) and 'Pusa hybrid 1201' (30.67 q ha⁻¹) but superior over other varieties. The significantly more net return (Rs 67815 ha⁻¹) and B:C ratio(3.41) was with Proagro 9450 but at par to Proagro 9444.(Rs 66188 and 3.33).

Keyword : Pearlmillet, growth, yield and economics.



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INTRODUCTION

Growing of high yielding and fertilizers responsive crops and varieties in recent times have threatened agrobiodiversity leading to rapid degradation of natural resources and consequently affecting nutritional security (Singh *et al.*, 2008). The possible pathways for conservation of such neglected agro-biodiversity resources is to bring them into use thereby making them viable crops within the contemporary social and economic context (Singh *et al.*, 2009). Climate change portends less and erratic rain, more heat, reduced water availability and increased malnutrition (Prakash *et al.*, 2017). Under such situation pearl millet crop can withstand these challenges and produce multiple securities (food, fodder, nutrition, livelihood and ecological). Pearl millet (*Pennisetum glaucum L.*) is an important millet crop adapted to various adverse conditions of weather and provides staple food for the poor as well as fodder purpose in the arid and semiarid tracks of the country. Pearl millet is dual purpose crop as it provides nutritious food for human being, feed for poultry birds and dry and green fodder for cattle.

Pearl millet is also a nutritious food among cereals. The nutritive value of pearl millet is higher than many other cereal crops. Pearl millet grains contain protein 11%, fat 5%, carbohydrates 70.5%, crude fibre 1.5%, ash 2.0%, lysine 3.5% and triphosphane 2.4%, respectively. All these qualities of millet farming system make them climate change compliant crops and helping in mitigation of climate change. Hence keeping these things in view, the present investigation was undertaken.

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MATERIALS AND METHODS

Field experiment was carried out at Dry land Research Station, Krishi Vigyan Kendra, Munger during *kharif* season of 2013 and 2014 to evaluate the yield potential and economics of pearl millet varieties under the rainfed condition of sub-humid sub-tropical environment of South Bihar. The sandy-loam soil of the experimental field was low in organic carbon (0.26%), available N (182.5 kg ha⁻¹), and available P₂O₅ (19.5 kg ha⁻¹) and medium in K₂O (168.kg ha⁻¹) content, having pH 6.8. Experiment was laid out in randomized block design and replicated thrice with nine pearlmillet varieties viz. Pusa hybrid 1201, Pusa hybrid 1202, Pusa composit 443, Pusa composit 612, Proagro 9444, Proagro 9444 GOLD, Proagro 9330+, Proagro Tejas and Proagro 9450. Seed are sown in line at 45 cm on 2nd August 2013 and 1st August 2015 and fertilizer dose of 90 kg N, 45 kg P₂O₅ and 45 kg K₂O ha⁻¹ was applied. Full dose of Phosphorus as di-ammonium phosphate (DAP) and potassium as murate of potash (MOP) were applied as basal. Nitrogen as urea was applied in 3 splits, 1/3 at sowing as basal application, 1/3 at tillering after rains and remaining 1/3 at boot leaf stage. The grain, stover and biological yield were recorded as per treatments and expressed in q ha⁻¹.

RESULTS AND DISCUSSION

Growth attributes

The growth characters (Table 1) viz., plant height, no of tillers plants⁻¹, plant dry matter accumulation was significant. The tallest plant (216 cm) was in hybrid 'Proagro 9444' which was on par to 'Proagro 9450' and 'Pusa hybrid 1201' and significantly more over remaining varieties. The number of tillers plants⁻¹ was significantly higher (7.19) in 'Proagro 9330' which remained at par to 'Proagro 9450' and 'Proagro 9444' but

significantly more over remaining varieties. This might be due their genetic characteristic and following under better growing conditions such as temperature, light, humidity and rainfall to fully exploit genetic potentiality of crop (Salunke *et al.*, 2003). The highest plant dry matter accumulation (126.68g plant⁻¹) at harvest stage was noticed with hybrid 'Proagro 9444' which was at par to 'Pusa hybrid 1201', 'Pusa hybrid 1202' and 'Proagro 9450'. The significantly

highest days taken to 50% anthesis in 'Proagro 9450' (61 days) but was at par to 'Proagro 9330', Pusa Composite 612' and 'Pusa hybrid 1201' (Table 2). The days taken to maturity were also varies significantly and in 'Proagro 9450' was maximum (89.67 days) which was at par to 'Proagro. Similar reports has been reported by (Prakash *et al.*, 2017) in his field investigation.

Table 1: Growth attributes of pearl millet varieties under rainfed condition of Bihar

Varieties	Growth attributes of pearl millet											
	Plant height (cm)			No of tillers plant ⁻¹			No of earhead plant ⁻¹			Dry matter (g plant ⁻¹) at harvest		
	2013	2014	Mean	2013	2014	Mean	2013	2014	Mean	2013	2014	Mean
V ₁ Pusa compo sit 443	166.83	167.61	167.22	3.21	3.26	3.24	1.50	1.47	1.49	98.06	95.73	96.90
V ₂ Pusa composit 612	195.83	198.62	197.23	3.35	3.27	3.31	1.63	1.62	1.63	104.50	101.04	102.77
V ₃ Pusa hybrid 1201	203.37	206.37	204.87	6.21	6.07	6.14	2.45	2.40	2.43	119.69	121.11	120.40
V ₄ Pusa hybrid 1202	194.83	197.50	196.17	5.83	5.95	5.89	2.40	2.34	2.37	107.07	110.43	108.75
V ₅ Proagro 9444	217.87	213.80	215.84	6.97	6.88	6.93	2.55	2.52	2.54	124.96	128.39	126.68
V ₆ Proagro 9444 Gold	186.87	188.62	187.75	6.14	5.94	6.04	2.48	2.45	2.47	114.37	112.41	113.39
V ₇ Proagro 9330+	181.77	182.13	181.95	7.11	7.27	7.19	2.58	2.55	2.57	103.85	107.91	105.88
V ₈ Proagro Tejos	168.00	170.18	169.09	5.64	5.77	5.71	1.78	1.73	1.76	79.01	81.35	80.18
V ₉ Proagro 9450	210.00	214.18	212.09	6.91	7.14	7.03	2.53	2.50	2.52	117.24	115.85	116.55
S Em ±	3.39	3.50	3.45	0.13	0.15	0.14	0.08	0.08	0.08	2.89	2.45	2.67
CD(P=0.05)	10.15	10.50	10.33	0.39	0.45	0.42	0.23	0.25	0.24	8.68	7.35	8.02

Yield attributes and yield

Yield parameters i.e. number of ear head plant⁻¹, ear head length, test weight, grain and stover yield differed significantly among the pearl millet varieties (Table 2). The pearl millet hybrid 'Proagro 9330' recorded significantly more number of ear head plant⁻¹ (2.55) but was at par to 'Proagro 9450' and 'Proagro 9444', Pusa hybrid 1201 and pusa hybrid 1202. The longer earhead was noticed in 'Pusa hybrid 1201' (35.25 cm) which was significantly longer over other hybrids. The test weight of grains differs significantly and highest in

'Proagro 9450' (6.92 g) but was at par to pusa composite 612, 'Pusa hybrid 1201' and 'Pusa hybrid 1202'. Average grain yield varies significantly. Significantly higher grain yield (33.87 q ha⁻¹) was in hybrid 'Proagro 9450' which was comparable to 'Proagro 9444' (32.09 q ha⁻¹) and 'Pusa hybrid 1201' (30.67 q ha⁻¹) but superior over other varieties (Table 3). The higher yield may be due to better growth and yield attributes, and similar finding was suggested in sorghum By Salunke (2003) and Bahar *et al.* (2015) in sorghum millet and Singh *et al.* (2017) in finger millet.

Table 2: Yield attributes of pearl millet varieties under rainfed condition of Bihar

Varieties	Yield attributes of pearl millet											
	Ear length (cm)			Test weight (g)			50 % Anthesis (days)			Maturity duration (days)		
	2013	2014	Mean	2013	2014	Mean	2013	2014	Mean	2013	2014	Mean
V ₁ Pusa composit 443	30.10	29.31	29.71	6.62	6.84	6.73	53.00	52.67	52.84	77.67	78.00	77.84
V ₂ Pusa composit 612	33.50	32.61	33.06	6.79	6.97	6.88	57.33	58.00	57.67	85.00	83.67	84.34
V ₃ Pusa hybrid 1201	35.13	35.37	35.25	6.80	6.90	6.85	57.00	57.33	57.17	84.33	83.67	84.00
V ₄ Pusa hybrid 1202	33.00	33.21	33.11	6.74	6.81	6.78	56.00	56.67	56.34	84.00	83.33	83.67
V ₅ Proagro 9444	32.87	33.08	32.98	6.63	6.64	6.64	55.33	56.00	55.67	84.33	83.33	83.83
V ₆ Proagro 9444 Gold	29.83	30.03	29.93	6.60	6.66	6.63	53.67	53.00	53.34	78.67	78.00	78.34
V ₇ Proagro 9330+	29.50	29.89	29.70	6.54	6.68	6.61	58.00	58.67	58.34	87.00	88.00	87.50
V ₈ Proagro Tejos	26.57	26.92	26.75	6.23	6.32	6.28	45.67	46.00	45.84	70.67	70.00	70.3
V ₉ Proagro 9450	32.72	32.83	32.78	6.87	6.96	6.92	61.33	60.67	61.00	90.33	89.00	89.67
S Em ±	0.52	0.58	0.55	0.04	0.08	0.06	1.03	0.93	0.98	1.26	1.57	1.42
CD(P=0.05)	1.54	1.73	1.64	0.13	0.25	0.19	3.09	2.80	2.95	3.78	4.71	4.25

Stover yield was significantly higher in 'Proagro 9444'(126.54 q ha⁻¹) which was remained comparable to 'Proagro 9450', and 'Proagro 9444 Gold' but superior over other varieties. That is the result of better growth, dry matter production and more number of tillers plant⁻¹ was recorded with the

respective varieties (Kumar *et al.*, 2015). The growth duration reflected in attributes like green leaves/plant, dry matter production, which contributed better stover yield (Prakash *et al.*, 2017).

Table 3: Yield pearl millet varieties under rainfed condition of Bihar

Varieties	Grain yield (q ha ⁻¹)			Straw yield (q ha ⁻¹)			Harvest index (%)		
	2013	2014	Mean	2013	2014	Mean	2013	2014	Mean
V ₁ Pusa composit 443	20.00	20.83	20.42	80.70	82.22	81.46	19.86	20.28	20.07
V ₂ Pusa composit 612	22.60	21.77	22.19	88.49	86.68	87.59	20.34	20.07	20.21
V ₃ Pusa hybrid 1201	31.00	30.33	30.67	104.41	105.67	105.04	22.92	22.32	22.62
V ₄ Pusa hybrid 1202	28.53	29.00	28.77	102.73	103.08	102.91	21.74	21.98	21.86
V ₅ Proagro 9444	32.05	32.13	32.09	125.03	128.04	126.54	20.41	20.08	20.25
V ₆ Proagro 9444 Gold	30.07	29.07	29.57	121.11	120.16	120.64	19.91	19.50	19.71
V ₇ Proagro 9330+	28.05	27.60	27.83	109.42	110.00	109.71	20.40	20.04	20.22
V ₈ Proagro Tejos	17.53	18.03	17.78	75.12	76.00	75.56	18.92	19.17	19.05
V ₉ Proagro 9450	35.03	32.70	33.87	124.16	122.00	123.08	22.00	21.12	21.56
S Em ±	1.06	1.02	1.04	2.12	2.60	2.36	0.68	0.65	0.67
CD(P=0.05)	3.17	3.05	3.11	6.37	7.78	7.08	2.02	1.96	1.99

Economics

The economics of pearl millet hybrids varies significantly (Table 4). Significantly higher net return (Rs 67815 ha⁻¹) and B:C ratio(3.41) was with Proagro 9450 but at par to Proagro 9444.(Rs 66188 and 3.33). This might be due the higher yield associated with the respective cultivars

during the experimentation. The similar results were also reported by several research workers in their field investigation (Prakash *et al.*, 2017), Bahar *et al.*, (2015) in sorghum millet and Singh *et al.*, (2017) in finger millet.

Table 4: Economics of pearl millet varieties under rainfed condition of Bihar

Varieties	Cost of Cultivation		Net return (Rsha ⁻¹)			B:C Ratio		
	19910	2013	2014	Mean	2013	2014	Mean	
V ₁ Pusa composit 443	19910	34300	36005	35153	1.72	1.81	1.77	
V ₂ Pusa composit 612	19910	40538	38743	39641	2.04	1.95	2.00	
V ₃ Pusa hybrid 1201	19910	57912	57292	57602	2.91	2.88	2.90	
V ₄ Pusa hybrid 1202	19910	53710	54514	54112	2.70	2.74	2.72	
V ₅ Proagro 9444	19910	65673	66703	66188	3.30	3.35	3.33	
V ₆ Proagro 9444 Gold	19910	61532	59749	60641	3.09	3.00	3.05	
V ₇ Proagro 9330+	19910	54992	54491	54742	2.76	2.74	2.75	
V ₈ Proagro Tejos	19910	28925	29941	29433	1.45	1.50	1.48	
V ₉ Proagro 9450	19910	69889	65741	67815	3.51	3.30	3.41	
S Em ±	-	1721	1848	1785	0.09	0.09	0.09	
CD(P=0.05)	-	5160	5540	5350	0.26	0.28	0.27	

CONCLUSION

It may be concluded from the above study that the pearl millet the hybrids 'Proagro 9450' produced highest yield (33.87 q ha⁻¹) which was comparable to 'Proagro 9444' (32.09 q ha⁻¹) and

'Pusa hybrid 1201' (30.67 q ha⁻¹), these hybrids are more profitable and recommended for cultivation under the rainfed region of south Bihar.

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