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Sudheer Ghuraiya

M.Sc. Agronomy 4th Semester
Student, Department of
Agronomy, Sam Higginbottom
University of Agriculture,
Technology and Sciences,
Prayagraj, Uttar Pradesh, India

Rajesh Singh

Assistant Professor, Department
of Agronomy, Sam
Higginbottom University of
Agriculture, Technology and
Sciences, Prayagraj, Uttar
Pradesh, India

Ekta Singh

Ph.D., Research Scholar,
Department of Agronomy, Sam
Higginbottom University of
Agriculture, Technology and
Sciences, Prayagraj, Uttar
Pradesh, India

Corresponding Author:

Sudheer Ghuraiya

Department of Agronomy, Sam
Higginbottom University of
Agriculture, Technology and
Sciences, Prayagraj, Uttar
Pradesh, India

Effect of different varieties and row spacing on growth and yield of Pearl Millet (*Pennisetum glaucum* L.)

Sudheer Ghuraiya, Rajesh Singh and Ekta Singh

Abstract

A field experiment was carried out at Crop Research Farm, Department of Agronomy, Naini Agricultural Institute, SHUATS, Prayagraj (U.P) in *Zaid*2021 to study the Effect of Different Variety and Spacing on Growth and Yield of Pearl Millet (*Pennisetum glaucum* L.). It was consisting of combination of three levels of Variety and three Spacing (30 cmx15cm, 45 cm x15cm and 60 cm x15cm). The experiment was laid out in Randomized Block Design with nine treatments each replicated thrice. The experiment results revealed that the growth parameters such as yield attributes are, plant height (192.1 cm), dry weight (1.17 g/plant), crop growth rate (22.52 g/m² /plant), Relative growth rate (0.027) leaf area index (4.41) and Ear head length (29.72/plant) were found significantly higher with 45cm x 15 cm+ JBV-4. Maximum seed yield (2.51 t/ha) and Stover yield (6.30 t/ha) were significantly recorded with the application of 45cm x 15 cm+ JBV-4 and Maximum Gross return (Rs.87700.00/ha), Net return (Rs.64600.00/ha) and B: C ratio (2.79) were recorded in (45cm x 15 cm+V3) compared to all other treatments.

Keywords: Pearl millet, varieties, spacing, recommended dose of fertilizer (N-P-K), yield

Introduction

Pearl millet (*Pennisetum glaucum* L.) is the most important crop in the drier parts of semi-arid tropics and accounts for almost half of the global production of the millet species from amongst different species of millets cultivated (Singh *et al.*, 2017; Vinoth and Ravindhran, 2017)^[9, 11].

In contrast, millet is the major source of energy and protein for millions of people in Africa. It has been reported that millet has many nutritious and medical functions (Yang *et al.*, 2001)^[12]. Pearl millet (*Pennisetum glaucum* L.) is multipurpose cereal crop belongs to the Poaceae family. It is commonly called as Bajra, Bajri, Sajje, Kambu, Kamban, Sajjaluetc in various Indian local languages. It is commonly used for food, feed, and forage's purpose (Arora *et al.*, 2003)^[3].

Due to the excellent nutritional properties and resilience to climate change, pearl mill *et al.* ong with other millets is renamed as nutri-cereal (Gazette of India, No. 133 dated 13th April, 2018) for production, consumption and trade and included in public distribution system.

Planting time recommendations for Pearl millet is commonly made based on calendar day or soil temperature (Andrews *et al.*, 1998)^[11].

Timely planting of crops generally ensures sufficient time for root development and vegetative growth for optimum harvesting of available soil nutrients and radiant energy (Soler *et al.*, 2007)^[10]. Delay in sowing decreased values of all parameters (Iping 1997)^[6]. Pearl millet has differentiated into many ecotypes owing to diverse kinds of environmental isolation or to various cropping systems (Kurauchi *et al.*, 2000)^[8].

Cultivars with different make up respond differently to various climatic conditions. Hybrids performs well with irrigation facilities or with good and evenly distributed rainfall, whereas varieties are well adapted to harsh growing areas and usually perform better than modern cultivars (Yadav *et al.*, 2003)^[13].

Yield can be increased by the identification of higher yielding varieties and proper planting time (Khan *et al.* 2009 and Arif *et al.*, 2001)^[7, 2].

Materials and Methods

The present examination was carried out during *Zaid* 2021 at Crop Research Farm, Department of Agronomy, SHUATS, Prayagraj, UP, which is located at 25.28°N latitude, 81.54°E longitude and 98 m altitude above the mean sea level. Different variety and spacing are used in experiment.

The experiment laid out in Randomized Block Design which consisting of nine treatments with T₁:30 cm X 15 cm + JBV-2, T₂:45 cm X 15 cm + JBV-3, T₃:60 cm X 15 cm + JBV-4, T₄:30 cm X 15 cm + JBV-3, T₅:45 cm X 15 cm + JBV-4, T₆:60 cm X 15 cm + JBV-2, T₇:30 cm X 15 cm + JBV-4, T₈:45 cm X 15 cm + JBV-2, T₉:60 cm X 15 cm + JBV-3 used were replicated thrice.

The experimental site was uniform in topography and sandy loam in texture, nearly neutral in soil reaction (pH 6.7), medium in organic carbon (0.72%), available nitrogen (114.8kg/ha), available phosphorus (17.14 kg/ha), available potassium (156.2 kg/ha). Nutrient sources were Urea, SSP, MOP to fulfill the necessity of Nitrogen, phosphorous and potassium. The application of fertilizers was applied as basal at the time of sowing. Nitrogen applied as split dose half as basal dose remaining as top dressing.

In the period from germination to harvest several plant growth parameters were recorded at frequent intervals along with it after harvest several yield parameters were recorded those

parameters are growth parameters, plant height, Length of ear-head and plant dry weight are recorded. The yield parameters like grain weight per ear-head, grain yield, test weight (1000 seeds), Stover yield and harvest index were recorded and statistically analyzed using analysis of variance (ANOVA) as applicable to Randomized Block Design (Gomez K.A. and Gomez A.A. 1984)^[5].

Yield attributes

Grain weight/Ear head (Panicle) was recorded at 80 DAS, and presented in Table 1. Effect of different variety and spacing at 80 DAS, was non-significantly influenced due to different variety and spacing. And the data shows that there was a significant effect of different variety and spacing on the Test weight (g). However, maximum test weight (10.5 g) was recorded with variety and spacing (45cm X 15cm + V3) and (45cm X 15cm + V2), (60cm X 15cm + V2) was statistically at par with variety and spacing (45cm X 15cm + V3).

Table 1: Effect of Different Variety and Spacing on yield attributes of Pearl Millet

S. No	Treatments	Grain weight(g) per Ear-head	Test weight (g)
1.	30cm X 15cm + V1	19.56	8.83
2.	45cm X 15cm + V2	21.75	9.27
3.	60cm X 15cm + V3	21.04	9.40
4.	30cm X 15cm + V2	20.58	8.06
5.	45cm X 15cm + V3	22.88	10.5
6.	60cm X 15cm + V1	21.49	8.59
7.	30cm X 15cm + V3	22.45	9.03
8.	45cm X 15cm + V1	21.33	8.13
9.	60cm X 15cm + V2	20.83	9.07
	F- test	NS	S
	S. EM (±)	0.82	0.48
	C. D. (P = 0.05)	-	1.45

Results and Discussion

The yield and economics were significantly affected by spacing and variety.

Yield

Data in table 2 tabulated that Application of 45cm X 15cm + V3 resulted maximum seed yield (2516.67 kg/ha), Stover yield (6300 kg/ha) which are recorded maximum with T₅ and

T₇ which was significantly higher. 30cm X 15cm + V3 recorded seed yield (2400kg/ha) and Stover yield (6300kg/ha) respectively which were statistically at par with T₅ and T₇.

Different variety and spacing with NPK Recommended dose of fertilizer (RDF) improved the Grain and Stover yield by improving the source and sink relation due to increased translocation of photosynthates towards reproductive system. This agreement will be finding of Jat *et al.* (1992)^[4].

Table 2: Effect of Different variety and Spacing on economics of Pearl Millet

Treatment No.	Grain yield (t/ha)	Straw yield (t/ha)	Grain (Rs/ha)	Straw (Rs/ha)	Gross Return (Rs/ha)	Total cost of cultivation (Rs/ha)	Net Return	Benefit Cost Ratio
1.	1.98	5.69	49500.00	22760.00	72260.00	23100.00	49160.00	2.13
2.	2.31	5.82	57750.00	23280.00	81030.00	23100.00	57930.00	2.50
3.	2.26	5.61	56500.00	22440.00	78940.00	23100.00	55840.00	2.42
4.	2.30	5.49	57500.00	21960.00	79460.00	23100.00	56360.00	2.44
5.	2.51	6.3	62500.00	25200.00	87700.00	23100.00	64600.00	2.79
6.	1.91	5.43	49500.00	21720.00	71220.00	23100.00	48120.00	2.08
7.	2.40	6.37	60000.00	25480.00	85480.00	23100.00	62380.00	2.70
8.	1.98	5.72	49500.00	22880.00	72380.00	23100.00	49280.00	2.13
9.	2.21	5.28	55250.00	21120.00	76370.00	23100.00	53270.00	2.30

Economics

Data in table 2 tabulated Experimental results revealed that application of Maximum Gross return (Rs.87700.00/ha), Net return (Rs.64600.00/ha) and B: C ratio (2.79) were recorded in (45cm x 15 cm+V3), minimum net returns (Rs. 48120.00/ha) and minimum benefit: cost ratio (2.08) were recorded with the treatment of 60cm X 15cm + V1.

Conclusion

On the basis of one *Zaid* season experimentation, it was concluded that the different variety and spacing. With the recommended dose (RDF), NPK and T₅ (45cm x 15 cm+V3) this spacing and this variety was found economically viable with higher productive with B: C ratio of (2.79).

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