



ISSN (E): 2277- 7695

ISSN (P): 2349-8242

NAAS Rating: 5.23

TPI 2021; 10(7): 240-244

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[www.thepharmajournal.com](http://www.thepharmajournal.com)

Received: 04-05-2021

Accepted: 12-06-2021

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## Assess the performance of different pearl millet varieties on different growth stage and post-harvest economics under different dates of sowing

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### Abstract

Pearl millet is commonly known in India as *Bajri* or *Bajra*. It is the most widely grown type of millet. Pearl millet is a good source of protein and carbs and a decent source of fiber. It's also a good source of vitamins and minerals (All India Coordinated Research Project). Overall, millet is a nutritious carbohydrate source. An experiment was conducted during the *Kharif* season of 2016 at College of Agriculture, RVSKVV, Gwalior. The present investigation aimed to estimate the performance of different pearl millet varieties on growth and economics under different dates of sowing. With the treatment combination of three Date of Sowing (20th, 30th July and 9th August) and five varieties of pearl millet (Big B, Crystal Dhoom, Boss-65, Ankur-045 and 86M86). The result revealed that higher Dry matter (g /plant) at 30, 60 DAS and at harvest stage, number of productive tiller / plant at harvest stage was recorded maximum under the variety crystal Dhoom with sowing date of 9 august of pearl millet. And plant population were not affected significantly as per treatment respectively. The economic attributes were also follow the same trend as / growth characters and the maximum gross Return (Rs/ha), net Return (Rs/ha) and B:C ratio was obtained under the variety crystal Dhoom, which was followed by Big B, Ankur-045, 86M86 and the minimum was recorded in the variety Boss - 65 and sowing date of 9 august of pearl millet.

**Keywords:** Pearl millet, growth stage, varieties, economics

### Introduction

Pearl millet (*Pennisetum glaucum* L.) is most widely grown type of millet and an important food and forage crop in Africa and Asia. Pearl millet has an ability to offset the effects of severe water and nutrient stress firstly by being able to withstand high temperatures (Ong, 1983) and by having sensitive and adaptive tillering capability (Ong and Monteith, 1985; Singh *et al.*, 1998) [12].

Pearl millet (*Pennisetum glaucum* L.) is widely known as a multipurpose crop in many regions of the world. It provides nutritious food for humans, feed for poultry and fodder for ruminants. Compared to other cereal crops, pearl millet is advantaged with its high nutritive value, in terms of high lipids, carbohydrates and proteins, beside its high vitamins, zinc and iron contents (Jukanti *et al.* 2016) [8]. Its flour was, therefore, suggested to substitute 10-20% of wheat flour in baking different types of bread (Dahlbert *et al.* 2004) [5]. Therefore, pearl millet as a cereal crop has become an important source of nutrition for populations with substandard economic conditions that inhibit different parts of the world, especially in Asia. In addition, pearl millet is tolerant to drought and high temperatures (Salman *et al.* 2010). Adverse conditions that may cause yield reductions or crop failure in other summer crops. Moreover, pearl millet produces a reasonable amount of yield when grown in low fertility soils (Ali *et al.* 2010) [11].

Planting time recommendations for Pearl millet is commonly made based on calendar day or soil temperature (Andrews *et al.*, 1998) [3]. Delay in sowing decreased values of all parameters (Iping 1997) [7]. Yield can be increased by the identification of higher yielding varieties and proper planting time (Khan *et al.* 2009 and Arif *et al.*, 2001) [9, 4]. 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). Direct seeding offers such advantages as faster and easier planting, reduced labor, earlier crop maturity by 7–10 days, more efficient water use and higher tolerance of water deficit, less methane emission and often higher profit in areas with an assured water supply.

The sowing date for direct seeding of millet plays vital role in improving its growth and increasing the yield. (Farrell *et al.*, 2003) [6].

**Materials and Methods**

The research work was conducted at Rajmata Vijayaraje Scindia Krishi Vishwavidyalya Gwalior, Madhya Pradesh (26.130 N and 76.140 E) in Madhya Pradesh during monsoon season of 2016- 17. The area has Region comes under semi-arid subtropical climate with extreme weather condition having hot and dry summer and cold winter. He monsoon start in the month of June and often remains active up to September in Gwalior region. This region receives mean a nnuall rainfall about 900 mm. Sometimes, continuous cloudy weather with heavy rains for a longer period badly affects the local agricultural system. The maximum temperature goes up to 46 0C during.

Summer and minimum as low as 2 0C during winter. The average rainfall ranges between 80 to 90 cm, most of which is received in the month of July, August, and September with an average maximum and minimum temperature during growing period as 41.6 0C and 13.2 0C. Main plot, three sowing dates:D1: 20th July, D2: 30th July and D3: 09th August and sub plot five varieties of pearl millet (Big B, Crystal Dhoom, Boss-65, Ankur-045 and 86M86) were tested in a split plot design, replicated thrice and sandy clay loam with 56.75% sand,19.82% silt and 21.00% clay. During the treatment,

**Treatment details**

**(I) Main plot (Sowing dates)**

- D1: 20th July
- D2: 30th July
- D3: 09th August

**(II) Sub plot – Varieties**

- V1: Big B
- V2: Crystal Dhoom
- V3: Boss 65
- V4: Ankur – 045
- V5: 86M86

**Result and Discussion**

Result shows in the experiment, better performance of variety and date of sowing was concluded on the basis of yield with the help of given growth factors at different growth stages.

**Plant Population / meter <sup>2</sup>**

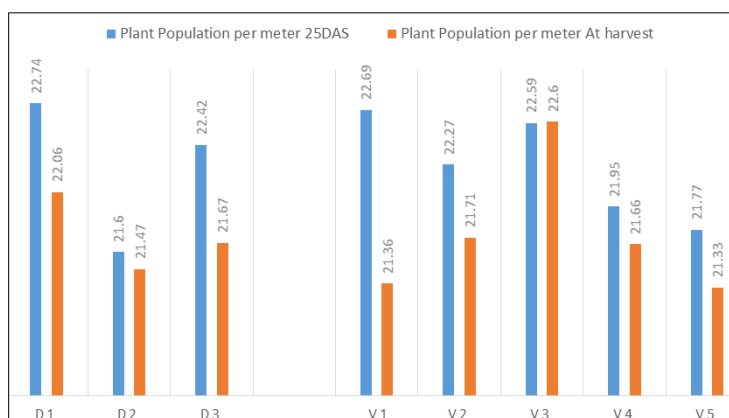
The recorded data were statistically analyzed and presented in Table 1 which indicated that there was a significant difference in grain yield due to different dates of sowing and varieties. The plant population of Pearl millet crop recorded / meter <sup>2</sup> at 25 DAS and just before harvest stage are presented in Table 1 and Fig 1. The results indicated that at both stages, the plant populations were not affected significantly by different dates of sowing and varieties. The plant population ranged from 21.60 to 22.74 and 21.33 to 22.60 / m<sup>2</sup> at 25 DAS and just before harvest stage, respectively.

**Table 1:** Effect of different treatments on the plant population / meter square

Treatment Details	Plant Population / meter <sup>2</sup>	
	25DAS	At harvest
D <sub>1</sub>	22.74	22.06
D <sub>2</sub>	21.60	21.47
D <sub>3</sub>	22.42	21.67
S.Em±	0.40	0.41
CD (at 5%)	NS	NS
V <sub>1</sub>	22.69	21.36
V <sub>2</sub>	22.27	21.71
V <sub>3</sub>	22.59	22.60
V <sub>4</sub>	21.95	21.66
V <sub>5</sub>	21.77	21.33
S.Em±	0.46	0.79
CD (at 5%)	NS	NS
Interaction (D×V) <sub>I</sub>	NS	NS
Interaction (V×D) <sub>II</sub>	NS	NS

The varieties were also gave significant difference regards to number of tiller/plant. And interaction between date of sowing and varieties was found to be non-significant in the

experiment, respectively. Computed data in table -1. Also presented in fig-1.



**Fig 1:** Effect of different treatments on the plant population per meter square

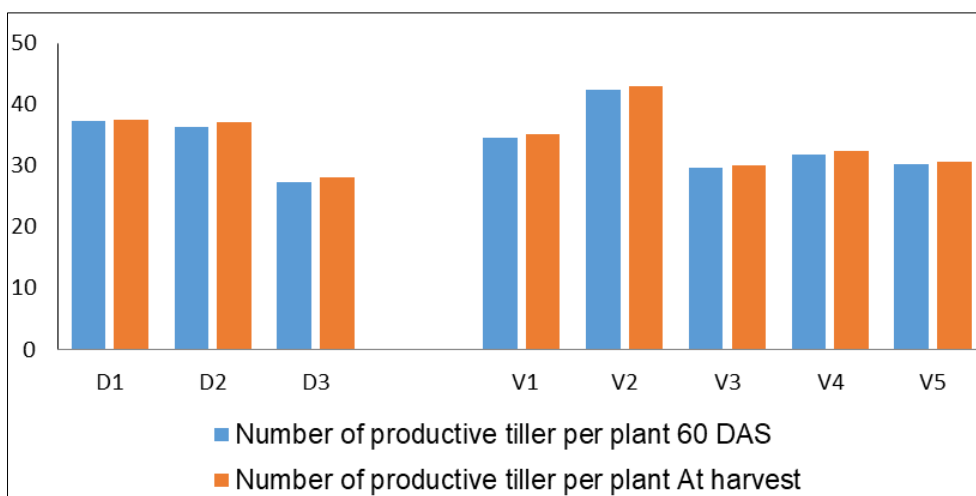
**Number of productive tiller / plant**

Number of productive tillers / plant was recorded at 60 and harvest stage of crop. The maximum productive tillers were also produced with the timely sowing of pearl millet crop at 20<sup>th</sup> July (1.61 and 1.69) at 60 DAS and harvest stage respectively. The minimum was produced during 09<sup>th</sup> August sowing of Pearl millet at both the stage. Similar records were showing in fig 2.

The productive tiller / plant was also affected by the different varieties and the maximum productive tillers were recorded with crystal Dhoom 1.73 and 1.81 at 60 DAS and harvest stages respectively. This was followed by variety Big B Ankur-045, 86M86, and Boss-65, at both the stages. However, the minimum was produced by the boss 65 variety-1.22 at 60 DAS. The varieties were produced significantly different number of productive tiller / plant in Pearl millet at 60 DAS crop stage. And also variety boss 65 produced minimum number of productive tiller / plant 1.22 at harvest stage respectively.

**Table 2:** Effect of different treatment on number of productive tiller /plant.

Treatment Details	Number of productive tiller / plant	
	60 DAS	At harvest
D1	1.61	1.69
D2	1.53	1.62
D3	1.16	1.21
S.Em±	0.07	0.07
CD (at 5%)	0.29	0.29
V1	1.40	1.47
V2	1.73	1.81
V3	1.22	1.28
V4	1.44	1.51
V5	1.38	1.45
S.Em±	0.08	0.08
CD@5%	0.24	0.24
Interaction I (D×V)	NS	NS
Interaction II (V×D)	NS	NS



**Fig 2:** Number of productive tiller per plant of Pearl millet at 30, 60 DAS and at harvest as influenced by different treatments

**Dry matter production (g /plant)**

The dry matter production / plant was recorded with oven drying of plant samples. The average dry matter were worked out and analyzed statistically. The mean data were presented in the table 4.5 and illustrated with Fig. 4.3.

The maximum dry matter production / plant was recorded with the 20<sup>th</sup> July sowing 3.26g. At 30 DAS, 17.09.g. at 60 DAS and 24.03 g. at harvest. Followed by sowing date 30<sup>th</sup> July (D<sub>2</sub>) 1.79g. At 30 DAS, 17.06.g. at 60 DAS and 23.69 g. at harvest. While the minimum was recorded in delayed

sowing on 09<sup>th</sup> August 1.77g. At 30 DAS, 14.91.g. at 60 DAS and 20.73 g. at harvest. Of Pearl millet.

However the maximum dry matter at all respective stages of crop were produced by the variety crystal Dhoom 3.11g. At 30 DAS, 18.29.g. At 60 DAS and 25.57 g. at harvest. Which was followed by Big B, 86M86, Ankur -045 and Boss-65. The minimum Dry matter was produced by the Boss 65 1.96g. At 30 DAS, 17.06.g. At 60 DAS and 20.97 g. at harvest. Variety of Pearl millet at all the growth stages.

**Table 3:** Effect of different treatments on dry matter productivity of Pearl millet at 30, 60 DAS and at harvest.

Treatment Details	Dry matter (g /plant)		
	30 DAS	60 DAS	At harvest
D1	3.26	17.09	24.03
D2	1.79	17.06	23.69
D3	1.77	14.91	20.73
S.Em±	0.25	0.44	0.43
CD (at 5%)	0.96	1.72	1.70
V1	2.22	16.96	23.49
V2	3.11	18.29	25.57
V3	1.96	14.59	20.97
V4	2.06	16.55	23.43
V5	2.04	15.37	20.64
S.Em±	0.20	0.54	0.66
CD (at 5%)	0.59	1.57	1.91

Interaction I (D×V)	NS	NS	NS
Interaction II (V×D)	NS	NS	NS

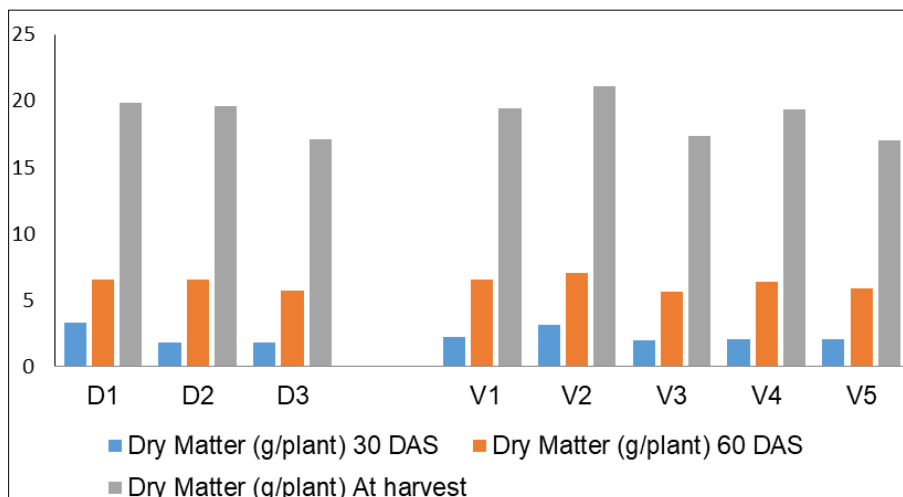


Fig 3: Dry Matter (g/Plant) of Pearl millet at 30, 60 DAS and at harvest as influenced by different treatments

**Economics**

Economics of Pearl millet crop cultivation is presented in table 4. Cost of cultivation per ha. Was common for all the treatments. The cost of cultivation for the different treatment was recorded Rs.19814/ha.

**Gross income**

Data presented in Table 4 and Fig 4. revealed that Maximum gross return was recorded in the 20<sup>th</sup> July sowing (Rs.37755/ha) while the minimum was recorded in 9<sup>th</sup> August delayed sowing (Rs.27584/ha).

Gross returns as influenced by varieties were presented in table 4.12. The maximum gross returns (Rs.38880/ha) was recorded in the variety V<sub>2</sub> (crystal Dhoom) which was by V<sub>1</sub> (Big B) Rs. 34880/ha. However, the minimum was recorded in V<sub>3</sub> (Boss-65) Rs.25527/ha.

**Net income**

Data encamped in Table 4, propel that all the early sowing

gave the more net return than delayed sowing. The maximum net return was recorded in 20<sup>th</sup> July sowing (Rs.17941/ha) while the minimum was recorded in 9<sup>th</sup> August delayed sowing (Rs.7770/ha).

The maximum net return was found with variety crystal Dhoom (Rs. 19066/ha) which was by Big B (Rs.15066/ha). However, the minimum net return was found in variety Boss-65 (Rs.5713/ha).

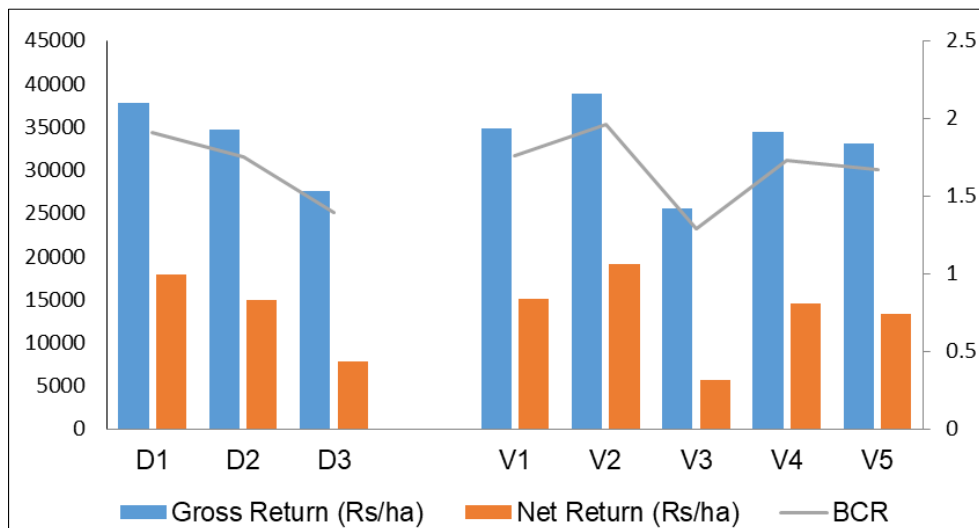
**Benefit: cost ratio**

Data encamped in Table 4 and Fig 4. propel that all the early sowing gave the more B:C ratio than delayed sowing. The maximum Benefit cost ratio was recorded in 20<sup>th</sup> July sowing (1.91) while the minimum was recorded in 9<sup>th</sup> August delayed sowing (1.39).

The maximum B: C ratio was found with variety crystal Dhoom (1.96) which was closely followed by Big B (1.76). However, the minimum benefit cost ratio was found in variety Boss-65 (1.29).

Table 4: Economics of Pearl millet as affected by different dates of sowing and varieties

Treatment	Cost of cultivation (Rs/ha)	Gross Return (Rs/ha)	Net Return (Rs/ha)	B:C
<b>Date of sowing</b>				
D <sub>1</sub>	19814	37755	17941	1.91
D <sub>2</sub>	19814	34733	14919	1.75
D <sub>3</sub>	19814	27584	7770	1.39
<b>Variety</b>				
V <sub>1</sub>	19814	34880	15066	1.76
V <sub>2</sub>	19814	38880	19066	1.96
V <sub>3</sub>	19814	25527	5713	1.29
V <sub>4</sub>	19814	34364	14550	1.73
V <sub>5</sub>	19814	33135	13321	1.67



**Fig 4:** Economics of pearl millet as affected by different date of sowing and varieties

### Conclusion

Application of variety V<sub>2</sub> crystal Dhoom was have higher dry matter (g /plant) at 30,60 DAS and at harvest stage, number of productive tiller / plant at harvest stage meanwhile V<sub>2</sub> crystal Dhoom perform best at all different growth stages with date of sowing 20<sup>th</sup> July sowing (D<sub>1</sub>), respectively.

Similar, trend followed in economic computed data on post-harvest stage. Maximum gross Return (Rs/ha), net Return (Rs/ha) and B:C ratio was obtained under the variety crystal Dhoom, which was followed by Big B, Ankur-045, 86M86 and the minimum was recorded in the variety Boss - 65 and sowing date of 9 august of pearl millet.

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