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## Seed quality parameters assessment in Pearl millet (*Pennisetum glaucum*)

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### Abstract

The genotypes 94555B (95.00%), HHB 327 (94.00%), HB/0001(90.00%) and 41 B (85.67%) have shown maximum germination percentage. Maximum root length was observed in the genotypes HHB 327 (15.50cm), 53 B (14.50cm), HHB 272 (14.50cm) and HHB 299 (13.50cm). The genotypes 53 B, 4888B, 94555B, 47 B and 41 B all are having the values of 7.93cm showed maximum shoot length. Maximum seedling length was observed in the genotypes 53 B (22.43cm), HHB 327 (21.93cm), HHB 272 (21.77cm) and 4888B (21.43 cm). The genotypes 94555 B (2184.33), 41 B (2054.33) and HHB 327 (1972.67) have shown maximum seedling vigor index and the values are significant at 5 per cent.

**Keywords:** Germination, root length, seed vigor and shoot length

### Introduction

Pearl millet [*Pennisetum glaucum* (L.) R. Br.] is the fifth most important crop in the world and fourth in India, after rice, wheat and sorghum. Pearl millet, which accounts for about two-thirds of millet production in India. It is also known as spiked millet, bajra, bulrush millet, cat tail millet *etc.* Pearl millet is a cross pollinated, annual C<sub>4</sub> plant species has high photosynthetic efficiency and dry matter production, originated in West Africa and belongs to Poaceae family with chromosome number (2n=14). It is mostly cultivated as rainfed crop in the arid and semi-arid tropical areas of Africa and the Indian sub-continent. In these areas, it is grown in hardest environments, where other coarse grain cereal crops like sorghum and maize fail to give economic grain yield.

Pearl millet is a staple diet for vast majority of poor farmers and also forms an important fodder crop for livestock population in arid regions. Pearl millet has also established its place as an irrigated summer crop in parts of India besides major cultivation in *kharif* season. It is a warm season crop grown in annual rainfall in the range of 150-700mm, mainly cultivated in states *viz.*, Rajasthan, Maharashtra, Uttar Pradesh, Haryana, Gujarat, Andhra Pradesh, Madhya Pradesh and Karnataka having total area 7.41 million hectares with production of 10.34 million tonnes and productivity of 1391 kg/ha, respectively (Anonymous, Project coordinator review, 2022) [2]. Pearl millet was cultivated in an area of 0.56 million hectares with a production of 1.35 million tonnes and an average productivity of 2372 kg/ha (Anonymous, Department of agriculture and farmers welfare, Government of Haryana, 2020) [3].

Its grain is comparatively high in protein (14-20%) with 70% carbohydrates and has a good amino acid balance. It is high in lysine, methionine and cytosine levels. It is rich in dietary fibre, minerals such as iron, zinc *etc.* Its regular consumption helps in risk reduction of many of the life style diseases like diabetes, heart diseases, hypertension, obesity *etc.*

Several factors affect the quality of seeds at different developmental stage of the crops. Therefore, seed quality assessments in the pearl millet. Major growing areas are very important to determine the planting value of seed produced in the study area.

### Materials and Methods

#### Description of the study area

The study was conducted from seed technology department, CCS HAU, Hisar, Haryana

#### Method of data collection

##### Seed weight

Thousand seed weight was determined by counting two hundred seeds and weighing and

multiply the weight (g) by five to get a thousand-seed weight. This was done on three times to be counted (replicate) to get information that is more accurate from pure seed sample.

### Germination test

Germination test was conducted as per the International Seed Testing Association (ISTA) procedure by adopting between paper method in a germinator maintained at 25-30°C and 95±3 per cent relative humidity in three replications each of 100 seeds. The first count on fourth day and second count on tenth day of germination for normal seedling was made and expressed as germination percentage.

### Root length (cm)

Five normal seedlings from the germination test were randomly selected for measurement of root length on tenth day. The root length was measured from the collar region to the base of root. The mean root length was expressed in centimetres.

### Shoot length (cm)

Five normal seedlings from the germination test were randomly selected for measurement of shoot length on tenth day. The shoot length was measured from the collar region to the tip of shoot. The mean root length was expressed in centimetres.

### Seedling length (cm)

Five normal seedlings from the germination test were randomly selected for measurement of seedling length on tenth day. The seedling length was measured from the collar region to the tip of the primary leaf. The mean seedling length was expressed in centimeters.

### Seedling vigor index (SVI)

Seedling vigor index was calculated by using the below formula as suggested by Abdul- Baki *et al.*,<sup>[1]</sup> expressed in whole number.

Seedling Vigor Index (SVI) = Germination (%) x Seedling length (cm)

### Method of data analysis

Data collected from laboratory test was analyzed using indostat software for analysis of variance (ANOVA). Mean comparison was done using least significant difference (LSD)

test at 5% level.

## Results and Discussion

The major attributes of pearl millet seed quality considered in this study were physiological performances. Following analyses were interpreted.

### Germination percentage

The germination was significantly ( $P \leq 0.05$ ) affected by the seed source (Table 1). The highest mean value of germination were observed from 94555 B (95%) while the lowest from HB 15/085 (51%).

### Root length

The highest mean value of root length were observed from HHB 327 (15.50 cm) while the lowest from HBL 11 (12.5 cm).

### Shoot length

The highest mean value of Shoot length were observed from 53B (7.93 cm) while the lowest from SGB-10-107 (5.93 cm).

### Seedling length

The highest mean value of Seedling length were observed from 53B (22.43 cm) while the lowest from HHB 197 (19.10 cm).

### Seedling vigor index

The highest mean value of Seedling vigor index were observed from 94555B (2184.33) while the lowest from HB 15/085 (969.67).

It is assumed that seedlings with well-developed shoot and root systems originated from vigor seed and would likely withstand any adverse conditions and provide better seedling emergence and seedling establishment in the field (Zewdie, 2004). According to Isely (1957)<sup>[4]</sup>, vigorous seeds mobilize reserves from storage tissues to the embryo axis more efficiently and this capacity is reflected in seedling growth that could ultimately be explained on plant productivity.

## Conclusion

This study was conducted to assess the quality of seeds obtained from different genotypes of pearl millet. The genotypes with high germination percentage and high seedling vigor can be a better adoptable to diverse conditions in the interest of researchers and farmers.

**Table 1:** Mean performance of pearl millet genotypes

SI	Genotypes	Root length	Shoot length	Seedling length	Germination %	Seedling vigor index
	53B	14.50	7.93	22.43	79.33	1665.00
1.	SGB-10-107	13.50	5.93	19.43	62.00	1239.33
2.	HHB272	14.50	7.27	21.77	84.67	1606.67
3.	4888B	13.50	7.93	21.43	64.00	1537.33
4.	HBL-11	12.50	7.60	20.10	56.33	1012.33
5.	94555B	12.50	7.93	20.43	95.00	2184.33
6.	HB/0001	13.50	7.27	20.77	90.00	1438.33
7.	843-22B	12.50	7.73	20.23	75.00	1651.33
8.	HHB226	13.00	6.93	19.93	56.00	1287.33
9.	HHB197	12.50	6.60	19.10	58.00	1218.67
10	HB15/085	12.50	7.27	19.77	51.00	969.67
11.	47B	13.00	7.93	20.93	65.00	1361.67
12.	HHB327	15.50	6.43	21.93	94.00	1972.67
13.	41B	13.33	7.93	21.27	85.67	2054.33
14.	HHB299	13.50	7.07	20.57	77.00	1693.33
15	Mean	13.36	7.32	20.67	72.87	1526.16

CV	4.90	4.97	4.84	4.31	4.95
F ratio	5.61	9.04	14.78	67.53	68.57
SE (m)	0.38	0.21	0.59	1.81	43.58
CD 5%	1.09	0.61	1.70	5.26	126.25

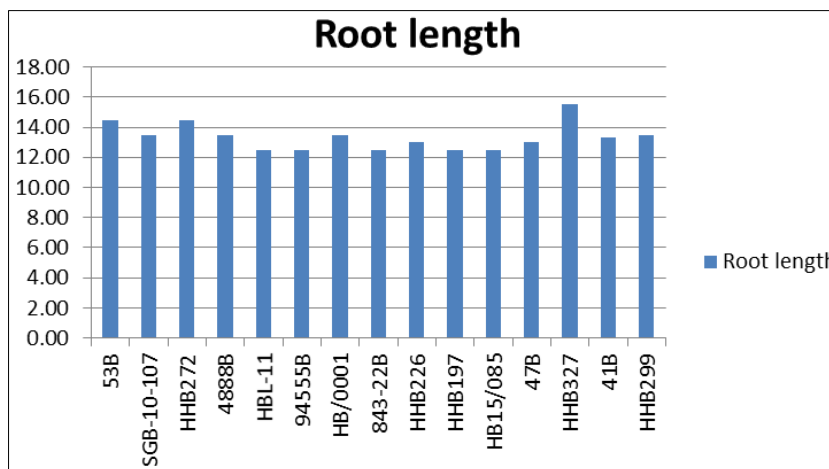


Fig 1: Root length

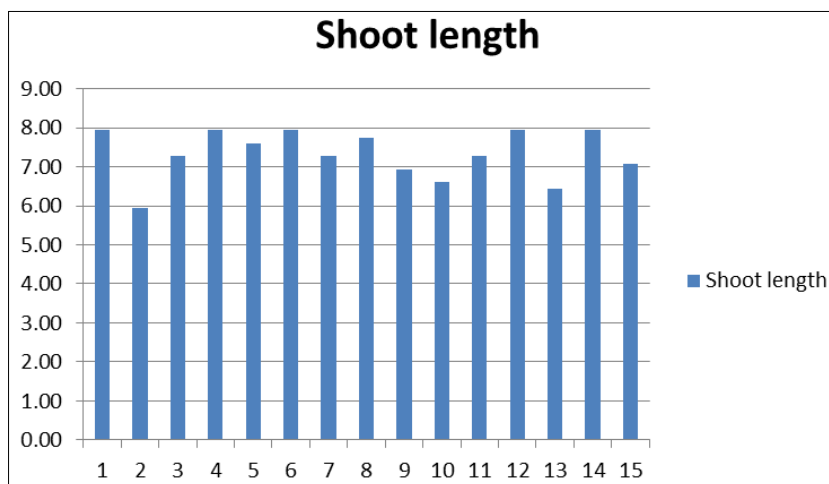


Fig 2: Shoot length

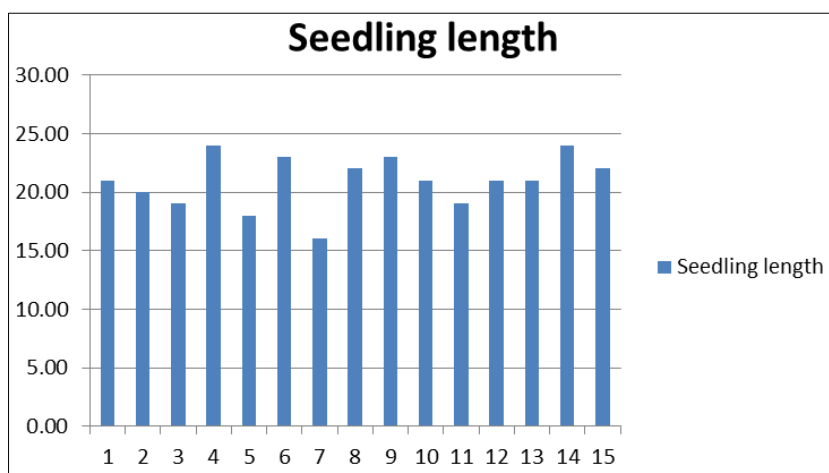


Fig 3: Seedling length

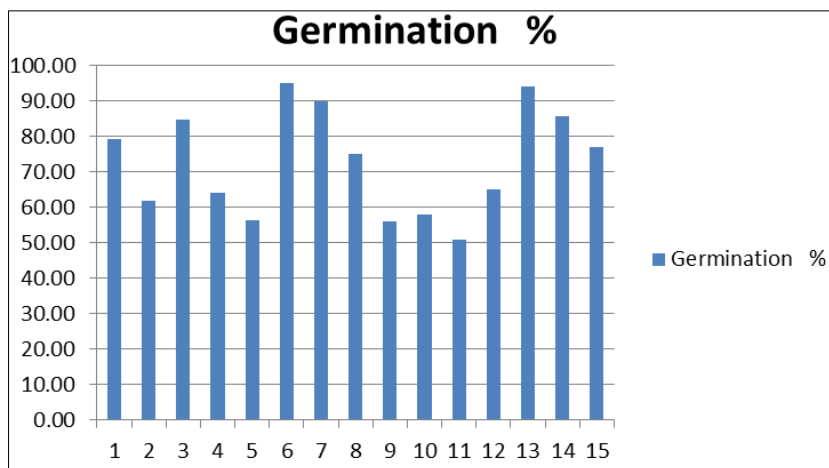


Fig 4: Germination percentage

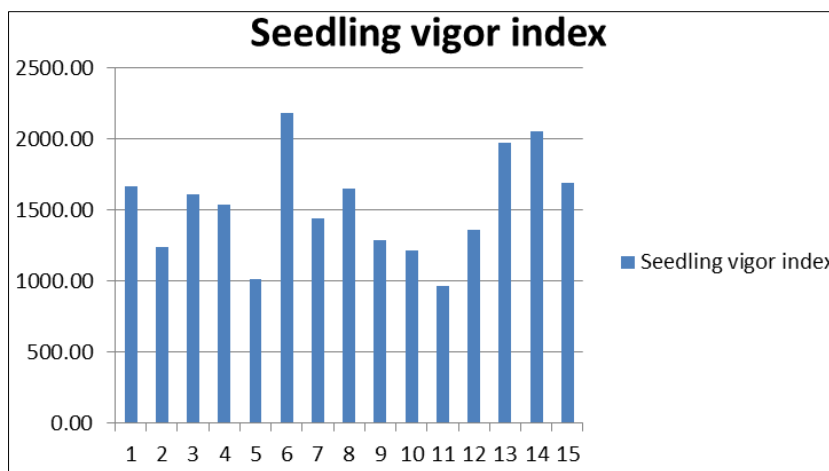


Fig 5: Seedling vigor index

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