

# Effect of Growth Regulators and Growing Media on Seed Germination of Ber (*Ziziphus mauritiana*)

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## ABSTRACT

The present investigation was carried out at Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, during the period 2023. The experiment was laid in completely randomized block design with 11 treatments and was replicated three times. Ber c.v. Gola Ber were collected from Department of Horticulture, Sam Higginbottom University of Agriculture Technology and Science, Praygaraj. Seeds were Germinate in polybags. Seeds were soaked for 12 hours in both GA<sub>3</sub>. The treatment T10 Soil + FYM + VC + PM (1:1:1:1) + GA<sub>3</sub> @150ppm (Seed soaked for 12 hours) registered significantly maximum vegetative growth, Germination Percentage % Stem diameter (mm). On the basis of our experimental finding it can be concluded that the best result was found in treatment T11 Soil + FYM + VC + PM (1:1:1:1) + IBA @50 ppm (Seed soaked for 12 hours) in term of vegetative growth parameters viz., plant height (cm), Number of leaves per plant Survival Percentage%, leaf area (cm<sup>2</sup>) and , chlorophyll content of Ber (*Ziziphus mauritiana*) c.v. Golaber.

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**Key words:**-FYM, Vermicompost, Soaked, GA<sub>3</sub>, IBA and Be

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## INTRODUCTION

The Indian Ber (*Ziziphus mauritiana* Lamk.) belong to family Rhamnaceae and genus *Ziziphus* which includes about fifty species, and among those, 18 -20 species are native to India (Pareek et al., 1983). It is tetraploid in nature with a chromosome number  $2n=4x=48$ . Origin place of fruit ber is believed to be India to South - Western Asia. Ber is a very famous ancient fruit crop of India and China. It is also called as Chinese date or Chinese fig or plum. It is considered as religious fruit of India, grown at various religious places of Hindus, Muslims and Sikhs. Ber is considered to be favorite fruit of Hindu Lord Shankar, whose devotion is

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believed to be unacceptable without offering him ber fruits especially during festival of MahaShivratri.

The use of this fruit is found in several Puranas, Vedas and other ancient literatures of India. In India, ber is cultivated in various parts of the country particularly in arid and semi-arid regions comprising of 53,000 ha area, producing 5.70 lakh MT of fruits (National Horticulture Board, 2021-22).

The major ber growing regions are Punjab, Haryana, Uttar Pradesh, Rajasthan, Gujarat, Maharashtra, Andhra Pradesh, Bihar, Madhya Pradesh, Tamil Nadu and Assam where as in Uttar Pradesh ber orchards are found around Varanasi, Ayodhya, Agra and Raibareilly districts but it is an ideal fruit for cultivation in the dryland semi-arid zones of Northern India (Bal et al., 1982).

## MATERIAL AND METHODS

**Experimental Setup:** - The experiment was conducted at the Horticulture Research Farm, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology & Sciences, located in

Prayagraj (UP), from 2022 to 2023.

Prayagraj, located at an elevation of 78 meters above sea level (25.87° N latitude and 81.150° E longitude), experiences a subtropical climate with notable temperature fluctuations. Winters can be chilly, with temperatures dropping to 20°C in December and January, while summers are scorching, with temperatures soaring to 50°C in May and June. Frost occurs in winter, and hot, dry winds are common in summer. The region receives an average rainfall of approximately 1013.4 cm, with the heaviest rainfall typically occurring from July to September, supplemented by occasional winter.

### Running Status-

#### Germination percent (%)

Germination percent was calculated as the number of seeds sown and the number of seeds.

## RESULTS AND DISCUSSIONS

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How could you grow the experiment ????  
Which program have you used to analysis data ?

The result of the investigation based on the various observations viz., sapling length (cm), Number of leaves per plant, stem diameter (cm), leaf area (cm<sup>2</sup>) and, chlorophyll content and survival % are presented and discussed in this chapter under appropriate headings and subheadings. The data given in the table are the mean values and have been statistically analysed.

**Table 1** indicate the seed treatment of golaber hybrids

Treatments	Germination percent (%)
T <sub>0</sub> -CONTROL	58
T <sub>1</sub> -Soil+vermicompost(1:1)	91
T <sub>2</sub> -Soil+vermicompost(1:1)+seedsoakingwithGA3@150ppm	91
T <sub>3</sub> -Soil+vermicompost(1:1)+seedsoakingwithIBA@50ppm	96
T <sub>4</sub> -Soil+Poultrymanure(1:1)	92
T <sub>5</sub> -Soil+Poultrymanure(1:1)+seedsoakingwithGA3@150ppm	92
T <sub>6</sub> -Soil+Poultrymanure(1:1)+seedsoakingwithIBA@50ppm	90
T <sub>7</sub> -Soil+FYM(1:1)	87
T <sub>8</sub> -Soil+FYM(1:1)+seedsoakingwithGA3@150ppm	91
T <sub>9</sub> -Soil+FYM(1:1)+seedsoakingwithIBA@50ppm	92
T <sub>10</sub> -Soil+FYM+VC+PM(1:1:1:1)+GA3@150ppm	92
T <sub>11</sub> -Soil+FYM+VC+PM(1:1:1:1)+IBA@50ppm	90
F-Test	<b>50.095</b>
SE.d(±)	<b>1.962</b>
C.V.	<b>2.716</b>
C.D.at5%	<b>4.096</b>

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Comment [m18]: Effect of seed treatment on germination (%) of ber

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This Data of leaf area (cm<sup>2</sup>) influenced by seed treatment are presented in table 1. Germination percent (%) recorded at 90 DAT showed significant variation among the treatment. Statistical analysis at 90 DAT revealed a highest Germination percent (%) of

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(96%) was found in treatment T3 Soil+VC(1:1)+IBA@50ppm, which was on par with T10 Soil+FY M+ VC + PM(1:1:1:1) + GA3@150ppm and differed significantly from other treatments. It was followed by T9 Soil +FYM(1:1)+ seedsoaking with IBA@50ppm 92 , T8 Soil +FYM(1:1)+seedsoaking with GA3@150ppm 91. Whereas the minimum leaf area (58) was found in treatment T<sub>0</sub> Control. The increase in girth might be due to optimum supply of plants nutrients and growth hormones in right amount during the entire crop period caused vigorously inducing the vegetative development of the plants and ultimately more photosynthesis.

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## (2) Effect of Seed Treatment on Survival Percent (%) of ber

The data obtained on survival percent (%) in ber after application of seed treatment is illustrated in table 2. Statistical analysis of the results indicated that the survival (%) in ber differed significantly. The treatment T<sub>11</sub> Soil + FYM + VC + PM (1:1:1:1) + IBA @ 50 ppm registered significantly maximum survival percent (92.00). It was followed by T<sub>10</sub> Soil + FYM + VC + PM(1:1:1:1)+GA<sub>3</sub>@150ppm 85.00 and T<sub>2</sub> Soil + vermin compost (1:1) + seed soaking with GA<sub>3</sub>@150 ppm. Where as, the minimum survival percent (61.33) was found in treatment T<sub>7</sub> Soil + FYM(1:1).

Table (2): **Effect of Seed Treatment on Survival Percent (%) of ber**

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Treatments	Survival percentage
T <sub>0</sub> -CONTROL	52.66
T <sub>1</sub> -Soil+vermicompost(1:1)	66.52
T <sub>2</sub> -Soil+vermicompost(1:1)+seedsoakingwithGA <sub>3</sub> @150ppm	76.67
T <sub>3</sub> -Soil+vermicompost(1:1)+seedsoakingwithIBA@50ppm	72.78
T <sub>4</sub> -Soil+Poultrymanure(1:1)	65.67
T <sub>5</sub> -Soil+Poultrymanure(1:1)+seedsoakingwithGA <sub>3</sub> @150ppm	74.33
T <sub>6</sub> -Soil+Poultrymanure(1:1)+seedsoakingwithIBA@50ppm	65.67
T <sub>7</sub> -Soil+FYM(1:1)	61.33
T <sub>8</sub> -Soil+FYM(1:1)+seedsoakingwithGA <sub>3</sub> @150ppm	66.33
T <sub>9</sub> -Soil+FYM(1:1)+seedsoakingwithIBA@50ppm	64.58
T <sub>10</sub> -Soil+FYM+VC+PM(1:1:1:1)+GA <sub>3</sub> @150ppm	85.00
T <sub>11</sub> -Soil+FYM+VC+PM(1:1:1:1)+IBA@50ppm	92.00
F-Test	100.262
SE.d(±)	1.503
C.V.	2.620
C.D.at5%	3.138

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## Effect of Seed treatment on Number of leaves of Ber

Data of number of number of leaves influenced by application of GA<sub>3</sub> and IBA are presented in table 3. Observation on number of leaves recorded at 90 DAT showed significant variation among the treatment.

Statistical analysis at 90 DAT revealed a highest number of leaves of (9.85) was found in treatment T<sub>1</sub> Soil+FYM+VC+PM(1:1:1:1)+IBA @ 50ppm, which was on par with T<sub>10</sub> Soil+FYM+VC+PM(1:1:1:1)+GA<sub>3</sub> @ 150ppm and differed significantly from other treatments. It was followed by T<sub>5</sub> Soil+Poultry manure(1:1)+seed soaking with GA<sub>3</sub> @ 150ppm, T<sub>9</sub> Soil+FYM(1:1) + seed soaking with IBA @ 50ppm 8.85. Where as the minimum leaf area (6.48) was found in treatment T<sub>0</sub> Control. The increase in girth might be due to optimum supply of plant nutrients and growth hormones in right amount during the entire crop period caused vigorously inducing the vegetative development of the plants and ultimately more photosynthesis.

**Table 3 : Effect of Seed treatment on Number of leaves of Ber**

Treatments	No. of leaves
T <sub>0</sub> -CONTROL	6.48
T <sub>1</sub> -Soil+vermicompost(1:1)	7.83
T <sub>2</sub> -Soil+vermicompost(1:1)+seedsoakingwithGA <sub>3</sub> @ 150ppm	8.58
T <sub>3</sub> -Soil+vermicompost(1:1)+seedsoakingwithIBA@ 50ppm	8.22
T <sub>4</sub> -Soil+Poultrymanure(1:1)	8.64
T <sub>5</sub> -Soil+Poultrymanure(1:1)+seedsoakingwithGA <sub>3</sub> @ 150ppm	8.85
T <sub>6</sub> -Soil+Poultrymanure(1:1)+seedsoakingwithIBA@ 50ppm	8.52
T <sub>7</sub> -Soil+FYM(1:1)	7.96
T <sub>8</sub> -Soil+FYM(1:1)+seedsoakingwithGA <sub>3</sub> @ 150ppm	8.28

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T <sub>9</sub> -Soil+FYM(1:1)+seedsoakingwithIBA@50ppm	7.53
T <sub>10</sub> -Soil+FYM+VC+PM(1:1:1:1)+GA3@150ppm	9.47
T <sub>11</sub> -Soil+FYM+VC+PM(1:1:1:1)+IBA@50ppm	9.85
F-Test	43.192
SE.d(±)	<b>0.190</b>
C.V.	<b>2.780</b>
C.D.at5%	<b>0.396</b>

**Table 4 Effect of Seed treatment on leaf area (cm<sup>2</sup>) of Ber**

Treatments	Leaf area
T <sub>0</sub> -CONTROL	2.89
T <sub>1</sub> -Soil+vermicompost(1:1)	3.36
T <sub>2</sub> -Soil+vermicompost(1:1)+seedsoakingwithGA3@150ppm	3.72
T <sub>3</sub> -Soil+vermicompost(1:1)+seedsoakingwithIBA@50ppm	3.49
T <sub>4</sub> -Soil+Poultrymanure(1:1)	3.35
T <sub>5</sub> -Soil+Poultrymanure(1:1)+seedsoakingwithGA3@150ppm	3.80
T <sub>6</sub> -Soil+Poultrymanure(1:1)+seedsoakingwithIBA@50ppm	3.62
T <sub>7</sub> -Soil+FYM(1:1)	3.69
T <sub>8</sub> -Soil+FYM(1:1)+seedsoakingwithGA3@150ppm	3.82
T <sub>9</sub> -Soil+FYM(1:1)+seedsoakingwithIBA@50ppm	3.85
T <sub>10</sub> -Soil+FYM+VC+PM(1:1:1:1)+GA3@150ppm	4.00
T <sub>11</sub> -Soil+FYM+VC+PM(1:1:1:1)+IBA@50ppm	4.04
F-Test	47.35
SE.d(±)	0.066
C.V.	2.236
C.D.at5%	0.139

**4) Effect of Seed treatment on leaf area (cm<sup>2</sup>) of Ber**

Data of leaf area ( $\text{cm}^2$ ) influenced by application of GA3 and IBA are presented in table 4. Observation on leaf area ( $\text{cm}^2$ ) recorded at 90 DAT showed significant variation among the treatments. Statistical analysis at 90 DAT revealed a highest leaf area ( $\text{cm}^2$ ) of (4.04) was found in treatment T11 Soil+FYM+VC+PM(1:1:1:1)+IBA@50ppm, which was on par with T10 Soil+FYM+VC+PM(1:1:1:1)+GA3@150ppm and differed significantly from the other treatments. It was followed by T9 Soil +FYM(1:1)+seed soaking with IBA@50ppm 3.85, T8 Soil +FYM(1:1)+seed soaking with GA3@150ppm 3.82. Whereas the minimum leaf area ( $\text{cm}^2$ ) (2.89) was found in treatment T<sub>0</sub> Control. The increase in girth might be due to optimum supply of plant nutrients and growth hormones in right amount during the entire crop period caused vigorously inducing the vegetative development of the plants and ultimately more photosynthesis.

## CONCLUSION

On the basis of four experimental findings it can be concluded that the best result was found in treatment T11 Soil+FYM+VC+PM(1:1:1:1)+IBA@50ppm in terms of vegetative growth parameters viz., sapling length (cm), Number of leaves per plant, leaf area ( $\text{cm}^2$ ), shoot length, root length and root to shoot ratio followed by T10 in terms of stem diameter (cm) and chlorophyll content (mg) of ber (*Ziziphus mauritiana* L.) cv. Golaber.

## Reference

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