

## Effects of hormones, growth regulators and dormancy breaking chemicals on the seed germination of *Ocimum* spp.

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### Abstract

Effects of hormones, growth regulators and dormancy breaking chemicals on the germination and its related characters of *Ocimum basilicum* and *Ocimum gratissimum* were assessed. Out of eleven seed treatments tried in the lab, soaking of seeds in 50ppm Gibberellic acid solution recorded highest germination percentage, root length, shoot length, vigour index and lowest days taken for germination when compared to untreated controls in both the species of *Ocimum*.

**Keywords :** dormancy breaking chemicals, germination percentage, growth promoters, *Ocimum* species, vigour index

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### INTRODUCTION

*Ocimum* species viz., *Ocimum basilicum* L. and *Ocimum gratissimum* L. is an important biennial labiate plant containing a high percentage of eugenol which is a costly flavouring agent used in confectionery, food products, perfumery, soaps and cosmetics (Choudhari and Bordoloi, 1984). The germination percentage of *Ocimum basilicum* and *Ocimum gratissimum*, was only 28% and 8.75%, respectively, as observed by Echeverry *et al.* (1990). Hence, the present study was undertaken to devise methods to improve the germination of *Ocimum* seeds by using different chemicals.

### MATERIALS AND METHODS

Seeds of *Ocimum basilicum* and *Ocimum gratissimum* species were collected at the hillocks of Horticultural College and Research Institute, Periyakulam, Tamil Nadu, South India. Different chemicals viz., Thio urea (0.5 and 1%), Potassium nitrate (0.5 and 1%), Gibberellic acid (25 and 50ppm), Naphthalene Acetic Acid (25 and 50 ppm) and Indole Butric Acid (100 and 150 ppm) were tested for their effects on germination with plain water as control. One hundred seeds of each species were soaked in each treatment solution for 3 hours. After that the seeds were placed in Petri dishes containing moisture paper, closed with cover and kept in the lab at ambient room temperature for germination. The Petri dishes were moistened at 4 days interval. The trials were laid out in completely randomized block design with four replications. Number of days taken for germination, germination percentage, root length, shoot length and vigour Index were recorded. The

Vigour Index (VI) was calculated by using the methods suggested by Abdul - Baki and Anderson (1973) and expressed in whole number.

Vigour Index (VI) = Germination percentage x (root length(cm) + shoot length(cm) )

### RESULTS AND DISCUSSION

In *Ocimum basilicum*, among the various chemical treatments tried, soaking of seeds in 50 ppm Gibberellic acid solution registered the earliest germination (6.50 days) followed by 1% Potassium nitrate solution (8 days) which is significantly higher than the control (Table 1). The other treatments viz., IBA 150 & 100 ppm, NAA 25 & 50 ppm, Potassium nitrate 0.5%, Gibberellic acid 25 ppm, Thio urea 0.5 & 1% have taken 16.50, 14.50, 15.00, 14.00, 11.75, 10.00, 10.00 and 12.00 days for germination, respectively, which are significantly lesser than the untreated control (20.00 days). 50 ppm Gibberellic acid treatment recorded the highest germination percentage (93.33%), highest root length (1.34 cm), shoot length and vigour index (195.77) (Table 1).

Similarly soaking of the seeds of *Ocimum gratissimum* in 50 ppm Gibberellic acid registered earlier germination (8.50 days), highest germination percentage (76.67%) highest shoot length (0.88 cm) and highest vigour index (168.53) (Table 1).

On the other hand the fresh seeds did not germinate. There was an initial dormancy period for about 30 days after extracting the seeds from the plants. Shylaraj and Thomas (1992) reported similar type of dormancy in the seeds of *Ocimum gratissimum*. Dey and Choudhari (1982) also observed that in *Ocimum sanctum* the seeds collected during April to June were found to have dormancy and when the dormant seeds were

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Table 1. Effects of different hormones, growth regulators and dormancy breaking chemicals on the germination of seeds in *Ocimum* species

Treatments	<i>Ocimum basilicum</i>						<i>Ocimum gratissimum</i>					
	Mean No. days taken for germination	Germination (mean percent)	Mean Root length (cm)	Mean Shoot length (cm)	Mean Vigour Index (VI)	Mean No. days taken for germination	Germination on (mean percent)	Mean Root length (cm)	Mean Shoot length (cm)	Mean Vigour Index (VI)		
T <sub>1</sub>	10.00	83.33	1.22	0.68	159.36	13.00	67.50	1.25	0.72	133.60		
T <sub>2</sub>	12.00	76.67	1.22	0.69	147.18	15.00	64.17	1.24	0.74	127.69		
T <sub>3</sub>	11.75	76.67	1.27	0.73	153.72	14.75	64.17	1.29	0.81	135.37		
T <sub>4</sub>	8.00	86.67	1.28	0.72	174.19	11.00	66.67	1.31	0.84	144.15		
T <sub>5</sub>	10.00	83.33	1.31	0.71	169.16	13.00	66.67	1.30	0.86	144.20		
T <sub>6</sub>	6.50	93.33	1.34	0.76	195.77	8.50	76.67	1.32	0.88	168.53		
T <sub>7</sub>	15.00	66.67	1.22	0.71	129.34	17.00	58.33	1.22	0.72	113.75		
T <sub>8</sub>	14.00	69.16	1.24	0.72	136.24	15.00	56.67	1.21	0.71	109.34		
T <sub>9</sub>	14.50	64.17	1.26	0.70	126.42	15.25	54.17	1.26	0.70	106.82		
T <sub>10</sub>	16.50	60.00	1.24	0.71	117.76	20.00	45.83	1.26	0.74	92.12		
T <sub>11</sub>	20.00	42.50	1.20	0.63	77.89	22.00	33.33	1.19	0.61	60.31		
S.E.	0.55	2.10	0.01	0.00	4.18	0.58	4.51	0.00	0.00	9.23		
CD at 5%	1.11	4.28	0.01	0.01	8.50	1.19	9.17	0.01	0.01	18.79		

T<sub>1</sub> - Thio urea 0.5%, T<sub>2</sub> - Thio urea 1%, T<sub>3</sub> -Potassium nitrate 0.5%,  
 T<sub>4</sub> - Potassium nitrate 1%, T<sub>5</sub> - Gibberellic acid 25 ppm, T<sub>6</sub> -Gibberellic acid 50 ppm,  
 T<sub>7</sub> - Naphthalene Acetic Acid 25 ppm, T<sub>8</sub> - Naphthalene Acetic Acid 50 ppm,  
 T<sub>9</sub> - Indole Butric Acid 100 ppm, T<sub>10</sub> - Indole Butric Acid 150 ppm,  
 T<sub>11</sub> - Water soaking(control)

treated with hormones and growth promoters (GA-3, Kinetin, Etherel, Boric acid and Ascorbic acid) there were significant improvements in the germination percentage of the seeds. Among the different dormancy breaking chemicals and growth regulators tested in the present study, Gibberellic acid at 50 ppm increased the germination percentage, shoot length, root length and vigour index in both the species of *Ocimum*. It also induced early germination in both *Ocimum basilicum* and *Ocimum gratissimum*. This effect of Gibberellic acid might be due to inducing the formation of hydrolytic enzymes that regulate the mobilisation of reserves. According to Groot and Karssen (1987) Gibberellins either endogenous or exogenous are considered to be an important factor in inducing germination. Thus, the present investigation revealed that 50 ppm Gibberellic acid treatment could be effectively used to improve the germination percentage, root length, shoot length, vigour index and number of days taken for germination for *Ocimum basilicum* and *Ocimum gratissimum*.

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#### REFERENCES

- Abdul-Baki, A.A. and Anderson, J.D. 1973. Vigor determination of Soybean seed by multiple criteria. *Crop Sci.*, 13: 630-633.
- Choudhari, S.N. and Bordoloi, D.N. 1984. Yield and eugenol content of *Ocimum gratissimum* Linn. under different plant densities. *Pafai. J.* 6: 24-28.
- Dey, B.B. and Choudhari, M.A. 1982. Studies of leaf aging and its effect on the essential oil of *Ocimum sanctum* L. *Indian Perfumer* 26: 12.
- Echeverry, O., Munoz, F. and Tamayoc, C.H. 1990. Studies on the growth and phenology of *Ocimum basilicum* L., *Ocimum minimum* L. and *Ocimum gratissimum* Hook. *Acta Agronomica, Universidad Nacional de Colombia.* 40: 51-63.
- Groot, S.P.C. and Karssen, C.M. 1987. The role of Gibberellins in germination. *Planta* 171: 525.
- Shylaraj, K.S. and Thomas, J. 1992. Seed viability and germination of *Ocimum gratissimum*. *Indian Perfumer* 36: 111-112.