EFFECT OF GIBBERELLIC ACID (GA) ON SEED GERMINATION OF *COLCHICUM LUTEUM*

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ABSTRACT

A study to assess the effect of growth regulator (Gibberellic acid) on seed germination of Colchicum luteum was conducted at PFI, Peshawar. Different lots of seeds were treated against 100, 200, 300 and 400 ppm solution of Gibberellic acid for 24 hours at room temperature and were sown in polythene tubes filled with a mixture of soil, sand and farm yard manure in equal proportion for germination test. It was found that seed lot treated with 300 ppm solution of Gibberellic acid give highest germination percentage.

INTRODUCTION

Colchicum luteum commonly known as “Suranjan-i-talkh” is a famous remedy for diseases of liver and spleen. Colchicine is the physiologically active constituent in this plant which is a pale yellow amorphous alkaloid, Colchicine extracted from corms and seeds have great utility to induce chromosomal aberration and polyploid for cytogenetical studies. The extents of alkaloid in the indigenous samples of corms and seeds were assayed, which ranges from 0.25% in corms and 0.42 to 0.43% in seeds. The alkaloid contents compare favorably with that of *Colchicum autumnale* Linn., which is an official source of Colchicine the latter plant contains 0.2 to 0.6% and 0.2 to 0.8% in corms and seeds respectively. Ruminska *et al*. (1978) studied the effect of growth regulators on seed germination and concluded that growth regulators induced metabolization of stored reserves during germination. The collection of colchicine from the wild source to feed the indigenous industry is practically impossible, since the plants are distributed sporadically in Hazara, Swat, Dir, Chitral and adjoining areas of Pakistan up to elevation of 1500 meter.

There are many practical difficulties in the collection of bulbs as these are collected shortly after withering of leaves in early summer. The plant is very small and as soon as the flowers wither, the plants are not traceable on the ground, similarly seeds are also not easy to collect and the capsules on maturing are equally less conspicuous. The plants are generally identified by the colour of petals. Collection is possible during flowering stage but at this stage the alkaloid content has not yet reached the ultimate limit. It is only after withering of flowers that the alkaloid content reaches its maximum. There are also difficulties in getting smooth germination of *Colchicum luteum* even under cultivated condition remains less prominent along with weeds. For efficient germination results seeds of *Colchicum luteum* were treated with different concentrations of various growth regulators. Analyzing the scope of this study an experiment to assess the effect of 100, 200, 300 and 400ppm solution of Gibberellic acid on seed germination of *Colchicum luteum* was conducted at PFI, Peshawar.

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MATERIALS AND METHOD

The present study was initiated at Pakistan Forest Institute, Peshawar to find out the effect of Gibberellic acid on the seed germination of *Colchicum luteum*. In this content, seeds were divided into five lots of 200 seeds each and different concentrations; 100, 200, 300 and 400ppm of Gibberellic Acid were prepared, four lots were treated with different concentrations of GA for 24 hour at room temperature and fifth lot was kept as control. The seeds were sterilized with 0.01% solution of Mercuric chloride for five minutes and then washed with distilled water twice before placing for germination test. The pre-treated seeds were later on sown in polythene tubes filled with a mixture of soil, sand and farm yard manure in equal proportion on 15 September, 2011. Germination studies were set up in RCB Design. Time taken for initiation of seed germination and number of days for complete germination were recorded. (Kumaran *et al*, 1994 in Neem germination by IAA 200ppm.). Radical emergence was taken as criterion of seed germination (Jann and Aman, 1977).

RESULTS AND DISCUSSION

The recorded data is statistically analyzed and results of the influence of Gibberellic Acid (GA) on seed germination are presented in following Tables.

Table 1. Influence of Gibberellic Acid (GA) on seed germination

Control		T1		T2		T3		T4	
Mean	54	Mean	120	Mean	130	Mean	140	Mean	120
Standard Error	1.08	Standard Error	0.91	Standard Error	1.29	Standard Error	0.91	Standard Error	0.91
Median	54.5	Median	120	Median	130	Median	140	Median	120
Standard Deviation	2.16	Standard Deviation	1.82	Standard Deviation	2.58	Standard Deviation	1.82	Standard Deviation	1.82
Sample Variance	4.66	Sample Variance	3.33	Sample Variance	6.66	Sample Variance	3.33	Sample Variance	3.33
Kurtosis	1.5	Kurtosis	-3.3	Kurtosis	-1.2	Kurtosis	-3.3	Kurtosis	-3.3
Skewness	-1.19	Skewness	0	Skewness	0	Skewness	0	Skewness	0
Range	5	Range	4	Range	6	Range	4	Range	4
Minimum	51	Minimum	118	Minimum	127	Minimum	138	Minimum	118
Maximum	56	Maximum	122	Maximum	133	Maximum	142	Maximum	122
Sum	216	Sum	480	Sum	520	Sum	560	Sum	480
Count	4	Count	4	Count	4	Count	4	Count	4

H_0: Difference between treatments = 0
H_1: Difference between treatments ≠ 0

Table 2. Analysis of Variance table

Anova

Source of Variance	SS	df	MS	F	P-Value	F crit. 0.05	F crit. 0.01
Treatment	18128	3	6042.66	1342.81	2.01E-15	3.49	5.95
Error	54	12	4.5				
Total	18182	15					

Seeds of *Colchicum luteum* treated with different concentrations of Gibberellic acid i.e., 100ppm, 200ppm, 300ppm, 400ppm and in control condition sown in four replications each. After germination, count the number of plants and take the mean value of each replication. Minimum number of plants germination in control, treatment 1, treatment 2, treatment 3 and treatment 4 are 51, 118, 127, 138 and 118 respectively, also count the maximum number of plants germination in each treatment i.e. 56, 122, 133, 142 and 122 respectively and mean values of each treatment are 54, 120, 130, 140 and 120. All these estimates clearly indicate that seeds of *Colchicum luteun* treated with 300ppm solution of GA have highest germination percentage. Sample variance in each treatment is 4.66, 3.33, 6.66, 3.33 and 3.33 respectively. In statistical analysis we estimate F value in ANOVA table which indicates that even at 1% level of significance F_{cal} is significant. This means that we reject null hypothesos H_0. So we conclude that difference between all treatments is significant. By comparing plants germination in control condition and in each treatment we found that seeds treated with 300ppm solution of Gibberellic acid for 24 hours at room temperature results in maximum seed germination of 70%, while minimum germination 27% is recorded in control. The seed germination percentage increased with an increase in the concentration of GA up to 300ppm and thereafter showed a decreasing trend as concentration increased. The statistical analysis of the data showed that seed germination percentage recorded in different concentrations is statistically higher than control. Minimum and maximum germination percentage of 27% and 70% is recorded from control and 300ppm concentration for GA respectively. (Singh & Murthy, 1887 GA_3 200ppm showed a positive influence on root length, fresh and dry weight of roots in *Cassia obtusifolia*). Singh, (1990) Enhancement of germination and seedling growth has been reported earlier in *Picea smithiana* by IBA and IAA 200ppm, Verma and Tandon, (1988) carried out the same study in *Pinus kasiya* and *Schima khasiana* seeds.

CONCLUSION

The study clearly indicates that prior to sowing seeds of *Colchicum luteum* should be treated with 300ppm solution of GA for 24 hours at room temperature for smooth germination.

REFERENCES

Jann, R. C. and R. D. Aman, 1977. What is germination? *The physiology and biochemistry of seed dormancy and germination* (A.A. Khan, ed.). North Holland Publishing Co., Amsterdam. Pp. 7-28.

Kumaran, K., M. Palani, R. Jerlin and C. Surendran, 1994. Effect of growth regulators on seed germination and seedling growth of Neem (*Azadirachta indica*). J. Trop. For. Sci., 6: 529-532.

Ruminska, A., K. Suchorska and Z. Weglard, 1978. Effect of GA on seed germination of some vegetable and medicinal plants. Acta. Hort., 73: 131-136.

Singh, C. and Y. S. Murthy, 1987. Effect of some growth regulators on seed germination and seedling growth of *Cassia obtusifolia*. Acta Botanica Indica, 15: 77-79.

Singh, V., 1990. Influence of IAA and IBA on seed germination of Spruce. Indian Forester, 116 (7): 450-453.

Verma, A. N. and P. Tandon, 1988. Effect of growth regulators on germination and seedling growth of *Pinus kasiya* and *Schima khasiana*. Ind. J. For., 11: 32-36.