

Effect of different concentrations of phytohormones on seed germination of *Swertia chirayita*

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Of the hundred species of *Swertia* (family Gentianaceae) (Willis 1966) twenty seven species are reported from Nepal (Hara *et. al* 1992). *Swertia chirayita* (Roxb. ex Fleming) Karsten. is one of the highly potential species of medicinal value. It is used as tonic, stomachic, antipyretic and anti-diarrhoetic. Found in the Himalay from Kashmir to the Khasia hills of Megalaya (Chanda 1976) the herb shows a rosette form whereas the two years old plants have elongated stems with greenish yellow flowers (Bhattarai and Shrestha 1996).

Nepal exported 419 tonnes of *Swertia Chirayita* to India during 1995-96 (Bhattarai and Acharya 1997), indicating a huge potential of international market. At the same time owing to its over-exploitation from the natural habit, it has become one of the threatened species of the Nepal Himalaya. There is an utmost need to domesticate this species in order to save from being extinction. Identifying factors responsible for seed germination is an important task, and the present work attempts to assess the effect of phytohormones on seed germination of this important species.

Methods

Seed samples were collected from the northern part of Gorkha District. They were dried in sunlight for 3 days and stored in cold and dry condition at a well ventilated place. Seeds washed in distilled water were treated with 2% sodium hypochloride (NaOCl) solution for five minutes; washed again and pre-treated with six different concentrations (viz. 1, 100, 200, 300, 400, and 500 mg l⁻¹) of Gibberellic acid, Kinetin and Indole acetic acid for 24 hours at room temperature. The pre-treated seeds were washed once again in distilled water and then sown at petridishes containing two-layers of moist filter papers and left at room temperature (23) for forty-four days. The filter papers were moistened periodically. Each petridishes contained twenty seeds and each experiment were in four replications.

For the present study purpose, seed were considered germinated once the radicle came out of the seed, and percentage germination were recorded at the interval of every four days.

Results and discussion

Stimulatory effects of Gibberellic Acid (GA₃) and Kinetin on seed germination of *Swertia Chirayita* has been observed (Table 1 and 2). Ninety percent germination percentage was found in 200, 300, 400, and 500 mg l⁻¹ concentrations of Gibberellic Acid. Beyond 300 mg l⁻¹ concentrations, seed germinated after eight days, while below 300 mg l⁻¹ or in control it took twelve days to germinate. Germination continued upto thirty two days in the case of control, while in the case of seeds treated with Gibberellic acid, no germination occurred beyond twenty four days.

As with Gibberellic acid, the stimulatory effect of Kinetin on seed germination varies according to the variation on concentration. The seeds pretreated with 200 and 300 mg l⁻¹ concentrations of Kinetin showed the highest (90 %) germination. Kinetin also shortened the period required for completion of germination. However, enhancement of germination was not significant beyond 400 mg l⁻¹ concentration of Kinetin.

Indole-acetic acid had neither stimulatory nor inhibitory effect on germination upto 100 mg l⁻¹ concentration (Table 3). The effect was slightly inhibitory beyond 200 mg l⁻¹ concentration. Indole Acetic Acid had no significant effect on seed germination of *Swertia Chirayita*. As in control, the germination was observed after 12 days after sowing which continued upto thirty-six days.

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Table 1: Effect of various concentrations of GA₃ on seed germination of *Swertia chirayita*: recorded at the interval of four days

Concentrations (mg l ⁻¹)	4	8	12	16	20	24	28	32	36	40	44
Control	-	-	5	30	50	60	65	75	75	75	75
1	-	-	25	52.5	77.5	77.5	77.5	77.5	77.5	77.5	77.5
100	-	-	37.5	70	82.5	82.5	82.5	82.5	82.5	82.5	82.5
200	-	-	50	82.5	90	90	90	90	90	90	90
300	-	10	65	87.5	90	90	90	90	90	90	90
400	-	10	65	87.5	90	90	90	90	90	90	90
500	-	10	65	87.5	90	90	90	90	90	90	90

Table 2: Effect of various concentrations of Kn on seed germination : recorded at the interval of four days

Concentrations (mg l ⁻¹)	4	8	12	16	20	24	28	32	36	40	44
Control	-	-	5	30	50	60	65	75	75	75	75
1	-	-	10	35	40	70	75	75	75	75	75
100	-	-	15	35	60	75	85	85	85	85	85
200	-	-	20	35	65	90	90	90	90	90	90
300	-	-	20	25	65	90	90	90	90	90	90
400	-	-	10	20	70	87.5	87.5	87.5	87.5	87.5	87.5
500	-	-	10	30	60	75	75	87.5	87.5	87.5	87.5

Table 3: Effect of various concentrations of IAA on seed germination : recorded at the interval of four days

Concentrations (mg l ⁻¹)	4	8	12	16	20	24	28	32	36	40	44
Control	-	-	5	30	50	60	65	75	75	75	75
1	-	-	5	30	40	60	70	75	75	75	75
100	-	-	2.5	27.5	57	63	65	72.5	75	75	75
200	-	-	2.5	27.5	50	65	72.5	72.5	72.5	72.5	72.5
300	-	-	7.5	25	57.5	67.5	67.5	67.5	72.5	72.5	72.5
400	-	-	5	25	52.5	67.5	72.5	72.5	72.5	72.5	72.5
500	-	-	5	30	57.5	70	72.5	72.5	72.5	72.5	72.5

Reference

- Bhattarai, K. R. and Acharya, N. 1997 Identification, Trade and Economic Significance of Chiraito (*Swertia* spp) of Nepal. Paper presented at Workshop on "The Utilization of NTFPs for Environment Conservation and Economic Development in Nepal". Asia Network for Small Scale Agricultural Bio-resources (ANSAB), PO Box 16, Kathmandu
- Bhattarai, K. R. and Shrestha, S. 1996 Ecological Study on "Chiraito" (*Swertia chirayita*) in Northern Gorkha. *Jr. Nat. Hist. Mus.* 15: 13-16.
- Chanda, Y. R. 1976 **The Wealth of India**, Vol. X Council for Scientific and Industrial Research, New Delhi.
- Hara, H, Chater, A. O. and Williams, L. H, J. 1982. An Enumeration of the Flowering Plants of Nepal. British Museum, London.
- Willis, J. C. 1966 - **Dictionary of Flowering Plants and Ferns** (Seventh edition). Cambridge England.