INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH & DEVELOPMENT

ISSN 2278 – 0211 (Online)

Effect of IAA and NAA on the Vegetative Propagation of *Aeschybanthus Sikkimensis* (Clark) Stapf

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Abstract:
Aechynanthus sikkimensis (Clark) Stapf, an endemic epiphytic shrub of Sikkim Himalaya with bright and long lasting flower is a potential ornamental plant. However, its habit and changes in the composition of host species have brought it to a precarious condition calling for attention towards it. Therefore, vegetative propagation with the aid of various concentrations of growth regulators like IAA and NAA were studied. Optimum concentration of both growth hormones showed a healthy result in sprouting of shoot as well as formation of root of the cuttings. Concentrations above the optimum level of both hormones proved inhibitory and brought about a reduction in all the characters under the present study.

Keywords: *Endemic, epiphytes, vegetative propagation, growth regulators*

1. Introduction

Eastern Himalaya, particularly Sikkim-Darjeeling Hills is well known for the richness of its native plant wealth and has received considerable attention of both explorers and traders since the remote past. It is also acknowledged as one of the 'Hot spot' region in India. This region is particularly prized for its endemic genetic diversity available in landraces and wild relatives of numerous crop plants, vegetables, plants of medicinal and aromatic value and ornamental plants. This region has long been reputed for a vast and diverse collection of epiphytic species, including plants of commercial interest (Biswas 1940, Chatterjee 1940, Rai and Chettri, 1988, Chettri and Rai, 1996). However, due to random deforestation, various host plants have been destroyed, thereby reducing the growth of epiphytic plants.

Even within the whole Himalayan range, the State of Sikkim and Darjeeling Hills have a unique ecosystem, which is greatly influenced by varying altitude, aspect and steepness of the mountains and by the strong moisture laden winds from the south. These winds first strike the lofty ridges of Mount Kanchendzonga range and deposit heavy rainfall, which results in the formation of moist temperate and tropical forests. These in turn develops a typical moist temperate forest clad with many Cryptogams, ferns and epiphytes. The epiphytic flora is no doubt an important component of tropical as well as temperate forest ecosystems. Went (1944), Grubb and Whitemore (1966), Rai et al. (1988) and Chettri and Rai (1996) have noted the distribution of epiphytes in the lowland sub-montane forest, Palaeotropics and Eastern Himalaya. Increasing degradation of natural habitats of native vegetation in the region, drastic changes in land-use pattern, mounting development pressures and alarming over-exploitation of floral wealth in some areas have also attracted much attention. Having varied climatic and ecological conditions in its entire length and breadth the whole region offers a congenial situation for the existence of considerable number of potential ornamental plants in epiphytic condition as well.

Aschnanthes sikkimensus (Clarke) Stapf. , member of the family Gesnariaceae is a common pendulous epiphytic shrub in the (1200-2100m) forests. It bears prominent, spectacular crimson flowers in a dense cluster and lasts about a month long. The ornamental potentiality of the genus has been indicated like epiphytic orchids (Polunin and sdtainton 1984, Mukherjee and Rai 1984, Das and Chand 1990, Chettri and Rai 1996). However, natural regeneration and maturation period of seedlings take a long period of time. Its propagation and maturation period from seedlings takes a very long time. *In vivo*, rooting of stem cuttings is one of the important means of vegetative propagation generally practiced in forestry and horticulture to obtain plants of desired genetic constitution, mass multiplication and sometimes in bringing out flowering and fruiting within a short period of time. Recently, it is almost well established that the growth regulators play a significant role in controlling the rooting ability of stem segments (Singh 1962, Nanda 1977, Mandal and Basu 1982, Singh and Panday 1990). Though propagation through stem cuttings is not so easy but treatment with growth regulators when applied in optimum concentration promote rooting in stem cuttings. Keeping in view of the variability of rooting pattern, an effort has been made to propagate vegetatively by exogenous application of IAA and NAA on the species.

2. Materials and Methods

Healthy *Aeschynanthus sikkimensis* (Clarke) Stapf. plants were collected from the forest in the month of June 2012. Uniform stem cuttings of 20 cm length were selected and divided in 11 groups consisting of 20 cuttings. While the first group served as control, other 10 groups were treated with 1, 10, 100, 1000, and 2000ppm each of IAA and NAA respectively. For treatment about 8 cm basal cuts were dipped in the respective solution for 24 hours. Distilled water was used for control set. After treatment the cuttings were planted in earthen flower pots of 60cm. diameter containing 10 specimens in each pot. To nurture it, sand, garden soil and composed leaf manure were used in equal proportion. These pots were kept at experimental nursery of campus and watered regularly.

Data regarding sprouting shoot growth and rooting of cuttings were recorded after 70 days of planting. After recording the above data, each plant was transferred to another pot containing manure prescribed by Pradhan (1976) for epiphytic orchids. The established data of the specimens were recorded after another 70 days of first observation.

3. Result and Discussion

3.1. Sprouting Percentage

The maximum percentage of sprouted cuttings was recorded with 1000 ppm of IAA (86.40%) and 100ppm.of NAA (78.00%) treatment. Higher concentration of both the growth hormones revealed poor sprouting. IAA at 2000 ppm and NAA at 1000 ppm showed deleterious effect and the sprouting were reduced as compared to other lower concentration (Table 1).These results are called in to bear testimony to Singh (1962) and Rajan and Ram (1983).

3.2. Number, Length and Diameter of Sprout

The number, length and diameter of shoots significantly increased with the influence of various concentrations of growth regulators as compared to the control set (Bajwa et al. 1977, Singh et al. 1980). In this study the maximum number of shoots was recorded in 100 and 1000 ppm of IAA and 1000 ppm of NAA concentration, above this concentration the number of shoots were decreased. The length and diameter of the shoots were maximum in 100 and 1000ppm of IAA with the length of 4.50 and 4.40 cm, and diameter 0f 2.50 and 1.30 mm respectively. The diameter of shoot reached 1.9 mm in 1 ppm of IAA. In 1000 ppm of NAA the length and diameter of shoot reached its maximum level with the length of 5 cm and diameter of 2 mm respectively (Table1).

3.3. Number of Leaves per Sprout

IAA and NAA affected the number of leaves too in compression to control. Maximum number of leaves was recorded in 10 ppm of IAA with an average of 4.00 leaves per shoot and 100 ppm of NAA with an average of 4.50 leaves per shoot (Table 1). Higher concentration of growth hormones, 2000 ppm, of IAA and 1000 ppm of NAA showed the negative effect on the number of leaves. The result of earlier studies (Mukherjee and Chatterjee, 1979 and Singh, 1962) confirms present observation.

3.4. Root formation

The result obtained on the effect of growth regulators on rooting behavior of *Aeschynanthus sikkimensis* stem cuttings are presented in Table 2. The higher rooting percentage and length of roots were recorded at 1000 ppm of IAA and 100 ppm of NAA. Likewise, the optimum number of root per cutting resulted in 10 ppm and 1000ppm of NAA. All the treatment significantly exhibited higher rooting percentage, number of roots and length of roots as compared to the control. But higher concentration of growth hormones showed inhibitory effect on rooting of the cuttings is presumed to be dedicated through its effect on mobilizing the reserve food material by enhancing the activities of hydrolytic enzymes.

3.5. Establishment

The survival percentage of rooted cuttings planted in the pots was also studied. 10 ppm IAA and NAA treatment resulted in the highest solvability percentage (Table 2). 10 ppm of IAA proved more effective and produced successful plants with 61.00% of survivability than NAA with 48.00% only in the same dose. The establishment of rooted cuttings gradually reduced with the increasing level of growth regulators from the optimum. But, for the IAA growth regulator, the result remarkably deviated from the normal order in 100pp, and 1000ppm of IAA with the survivability percentage of 48,00% and 52.00% respectively. However, our findings are in agreement with earlier studies of Singh (1962), Bajwa et al. (1977) and Rajan and Ram (1983) and indicate to provide a successful means for mass propagation.

4. Conclusion

Sikkim –Darjeeling hills is rich in medicinal as well as wild ornamental plant wealth. These need to be protected and at the same time cultivated for their sustainable use. But, a lot remains to be done for systematic realization of the full potential of epiphytic ornamentals and linking it with the economic development of the region. *Aschynanthus sikkiminensis* (Clark) Stapf. , an epiphytic shrubs, a potential wild ornamental have a long gestation period, can be domesticated and cultivated along with orchids and medicinal plants as an accessory cultivation. So the farmers can realize the supplementary economic benefit. The study depicts the species has low germination and survival rate. However, it has good potential for multiplication through vegetative means. Raising the plant from seeds is a lengthy process but growing the crop through the vegetative means seems to be advantageous not only for eliminating the difficulties associated with seed germination and seedling survival but also for reducing the length of cultivation cycle. Vegetative

propagation of the species through stem cuttings has been found successful. For the rooting of stem cuttings, it is found essential to keep the cuttings under high humidity condition in a playhouse. Further, about 50% cuttings rooted even without any treatment. This percentage is improved further by treating the cuttings with Naphthyl acetic acid (NAA). Indole acetic acid (IAA) was also very effective in bringing out rooting.

5. References

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Annexure

	Treatment (conc.)	Sprouting (%)	Shoot Number	Length (Cm)	Diameter(mm)	Leaves No./shoot
Control	-	52.00	2.oo	2.oo	1.5o	2.20
	1ppm	59.50	2.50	3.50	1.90	3.40
	10 ppm	72.10	2.40	3.80	1.20	4.00
IAA	100 ppm	82.50	3.00	4.50	1.30	3.50
	1000 ppm	86.40	3.00	4.40	2.00	3.00
	2000 ppm	80.00	2.50	3.60	1.10	2.30
	1ppm	50.00	2.60	1.70	1.60	2.40
	10 ppm	64.00	2.40	3.20	1.85	4.00
NAA	100 ppm	78.00	3.00	4.00	1.30	4.50
	1ooo ppm	75.oo	3.40	5.00	2.00	3.60
	2000 ppm	72.00	3.00	4.30	1.50	4.30

Table 1: Effect of IAA and NAA on sprouting and shoot growth of Aeschynanthus sikkiminensis (Clark) stapf.

	Treatment (Conc.)	Rooting %/ cutting	No. of roots/ cutting	Length of roots (in Cm)	Survival of rooted Cuttings (%)
Control	-	53.00	11.00	3.00	34.50
	1 ppm	60.50	15.00	5.80	50.00
	10 ppm	64.00	18.50	4.00	61.00
IAA	1000 ppm	85.00	17.40	6.20	48.00
	1000 ppm	89.00	14.8o	6.40	52.00
	2000 ppm	83.00	17.20	5.30	33.00
	1 ppm	53.00	15.50	5.00	47.00
	10 ppm	61.00	16.00	4.60	48.00
NAA	100 ppm	77.50	16.50	4.80	43.00
	1000ppm	76.00	18.50	3.20	34.00
	2000 ppm	70.50	16.20	4.90	30.00

Table 2: Effect of IAA and NAA on rooting and Survival of Aeschynanthus sikkimensis(Clark)Stapf.