The Effect of Different Concentration of Knop's Solution on the Rooting Behaviours of 5th Leaf (Excised) of *Bryophyllum*

Dr. Manohar Deka
Assistant Professor,
Department of Botany,
Haflong Govt. College, Haflong -788 819
(Assam), India

Received Jan. 14, 2016 Accepted Feb. 7, 2016

ABSTRACT Knop's solution was supposed to contain all the chemical nutrients. Dilute concentration of Knop's solutions were better for adventitious root production. The 5th leaf of *Bryophyllum* is effective for adventitious root production and subsequent growth. The effect of Knop's solution on rooting and subsequent growth on excised *Bryophyllum* leaf was carried out in this experiment. The effect of 0.021% and 0.0035% Knop's solution on the rooting behavior of notches was studied. These notches were cultured separately for rooting in 0.021% Knop's solution for 4 days. For another set of experiment 0.0035% Knop's solution was prepared. Notches were excised separately from the 5th leaf. Notches were excised as 1 cm^2 in size. These notches were cultured separately for rooting in 0.0035 % Knop's solution for 4 days. It was seen that notch number 4 (isolated) was most suitable for adventitious root production in Knop's solution.

Key words**:** *Bryophyllum*, Knop's solution, rooting behaviors.

Introduction

Bryophyllum pinnatum (family Crassulaceae) is a perennial herb. A mature *Bryophyllum* plants attain a height of three to four feet. Leaf is succulent and opposite decussate forming four vertical rows of leaves on the stem or a branch. Leaf is modified for storage of food materials, Water, minerals etc. *Bryophyllum* leaves are important for special type of vegetative reproduction which takes place frequently by means of adventitious buds found to be present on the notches of the leaf margin. Notches of *Bryophyllum* leaf are important since they are the site of future generation plants; i.e., the notches produce initially adventitious roots and subsequently adventitious buds which grew in to new generation. Adventitious root formation is a complex phenomenon. Essentially, the root formation consists of two phases root initiation and root growth (Lovel *et.al.*, 1971) and plant species differ with regard to the duration of each phase. In view of the complex function of root, various aspects have been studied to understand the physiology of root growth and development under different growth conditions, several reviews have appeared during the last decade on various aspects of growth and development (Scott, 1972; Torry and Clarkson, 1975 and Torry, 1976). The importance of an internal balance among various promoters and inhibitors in the regulation of regeneration of role has been emphasized by Tizio *et.al.* (1968) and Basu (1971). Adventitious rooting had been studied most closely in sunflower hypocotyls, in which Primordia are initiated within 24 hrs. of water logging Wample and Reid, (1978) however, its cause has so far remain

unknown, Kawase (1974) reported an increase in ethylene content below water in tap root and hypertrophied hypocotyl which adventitious roots were emerging. Molybdenum has been shown to stimulate rooting on 'Lisbon' Lemon Cuttings (Brusca and Hass, 1956). Minor elements, may also play a part in root growth Zinc has been found to induce rooting in cuttings (Samish and Spigel, 1957). Generally high phosphorous level enhances rooting ability of cutting (Haun and Cornell, 1951). Root initiation and root growth on excised *Bryophyllum* leaf notches are determined synergistically by a number of factors. Therefore, the studies were conducted to understand the effect of Knop's solution on rooting behaviors.

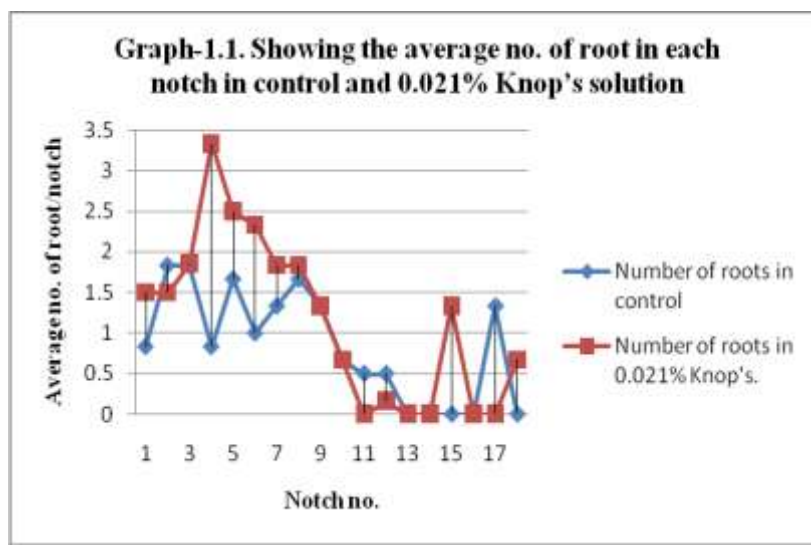
Materials and Method

The 5th leaf of *Bryophyllum* was collected. Notches (1 to 18 from each halves numbering from base to apex of the leaf) were excised separately from the 5th leaf. Notches were excised as 1 cm^2 in sized. These notches were cultured separately for rooting in 0.021% Knop's solution for 4 days. Excised notches (numbering 1 to 18) of the 5th leaf were placed separately on the solution medium, containing filter paper which was placed in the petri-plates previously. The pertri-plates contain the notches were placed in diffused sum light .Solution were added to the petri-plates 2 times daily to prevent the notches from drying. A control sample was taken without Knop's solution. The results are presented in Table-1 and plotted on Graph-1.1 & 1.2 respectively. For another set of experiment 0.0035% Knop's solution was prepared. Notches (1 to 18 each halve, numbering from base to apex of the leaf) were excised separately from the 5th leaf. Notches were excised as 1 cm^2 in size. These notches were cultured separately for rooting in 0.0035 % Knop's solution for 4 days; excised notches (Numbering 1 to 18) of the 5th leaf were placed separately on the solution medium, containing filter paper which was placed inside the pertri-plates previously. The pertri-plates contain the notches were placed in diffused sunlight. Solutions were added to the pertri-plate twice daily to prevent the notches from drying. A control sample was taken without Knop's solution. The results are presented in Table-2 and plotted on Graph-2.1 & 2.2 respectively. 5th leaf was taken because it is neither fully mature nor very young the gradual decline in the photosynthetic activity with leaf age had also been established by Rabinowith (1951). Generally leaf area of 5th leaf of *Bryophyllum* is broad. The production of adventitious root on the notch of *Bryophyllum* leaf probably depends upon the leaf area. Production of adventitious roots indirectly depends upon the photosynthetic activity .The photosynthetic rate is significantly more in the large leaf area then a small one (Panwar *et.al.*, 1986).

Table-1: Effect of 0.021% Knop's solution of rooting behavior of 5th leaf (Excised) of *Bryophyllum* when cultured for 4 days.

Notch No.	Control (water)		0.021% Knop's Solution	
	Average no. of root each notch	Average length of each root (mm)	Average no. of root each notch	Average length of each root (mm)
1	0.833	1.000	1.500	2.333
2	1.833	2.272	1.500	1.500
3	1.833	2.818	1.853	3.000
4	0.833	2.100	3.330	4.500

5	1.666	2.214	2.500	2.000
6	1.000	2.250	2.330	1.500
7	1.333	2.187	1.833	2.363
8	1.666	1.642	1.833	2.909
9	1.333	1.312	1.333	3.437
10	0.666	3.125	0.666	1.125
11	0.500	0.833	0	0
12	0.500	0.833	0.166	0.500
13	0	0	0	0
14	0	0	0	0
15	0	0	1.333	0.500
16	0	0	0	0
17	1.333	0.500	0	0
18	0	0	0.666	1.125



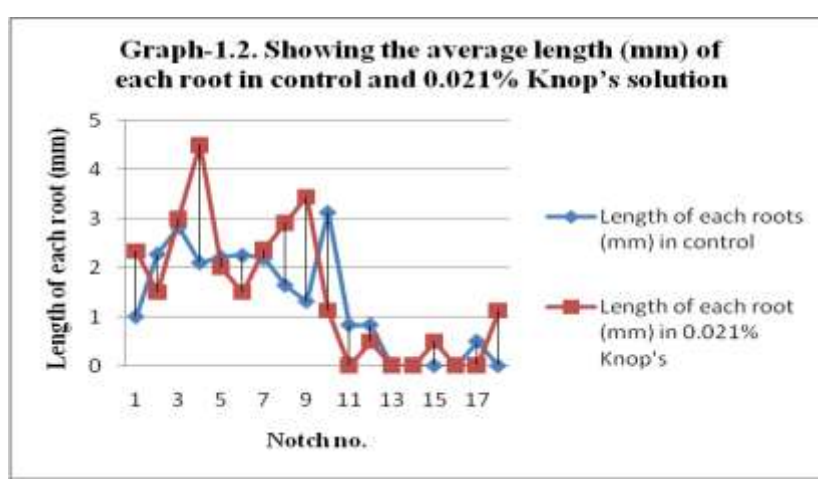
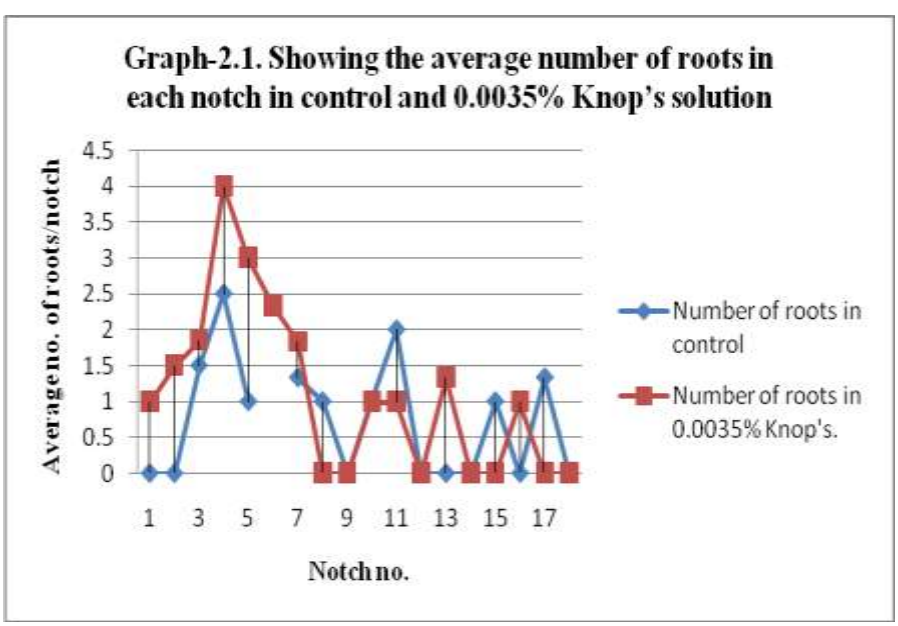
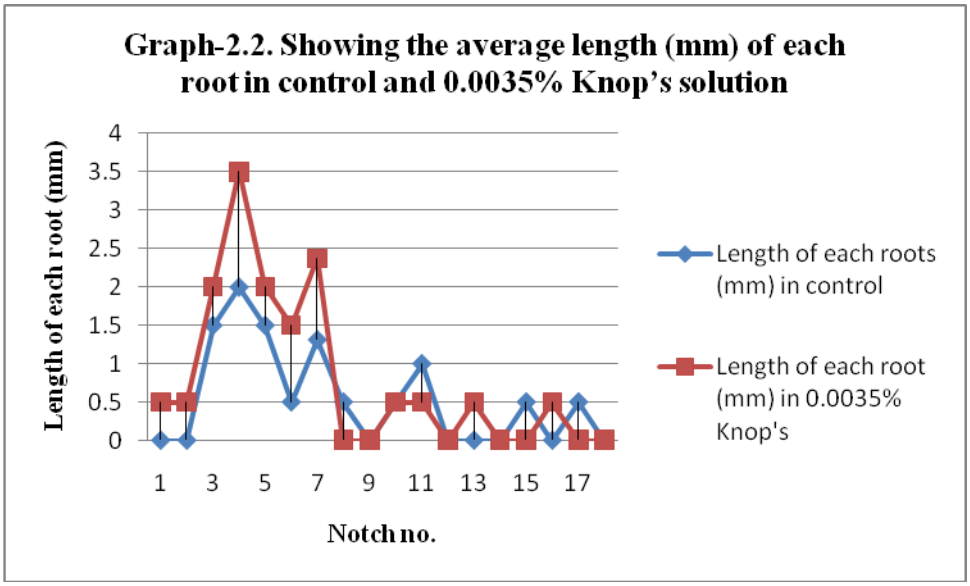


Table-2: Effect of 0.0035% Knop's solution of rooting behavior of 5th leaf (Excised) of *Bryophyllum* when cultured for 4 days.

Notch No.	Control (water)		0.0035% Knop's Solution	
	Average no. of root each notch	Average length of each root (mm)	Average no. of root each notch	Average length of each root (mm)
1	0	0	1.000	0.500
2	0	0	1.500	0.500
3	1.500	1.500	1.853	2.000
4	2.500	2.000	4.000	3.500
5	1.000	1.500	3.000	2.000
6	1.000	0.500	2.330	1.500
7	1.333	1.312	1.833	2.370
8	1.000	0.500	0	0
9	0	0	0	0
10	1.000	0.500	1.000	0.500
11	2.000	1.000	1.000	0.500
12	0	0	0	0
13	0	0	1.333	0.500
14	0	0	0	0
15	1.000	0.500	0	0
16	0	0	1.000	0.500
17	1.333	0.500	0	0
18	0	0	0	0



e ISSN 2348 –1269, Print ISSN 2349-5138
IJRAR Impact Factor 3.215



Results and discussion

An attempt was made to study the rooting behavior and growth of adventitious roots from the leaf notches of *Bryophyllum*, by Appling Knop's solution. The results obtained from the experiment were presented on the Tables-1 & 2. The experiment was conducted with the 5th leaf in 0.021% Knop's solution (Table-1). It was seen that the highest number of roots were produced on notch no.4 highest length of each root was also observed on notch no.4. The control however, showed the highest number of root on notch no.2, 3 and highest length of each root on notch no.10. Experiment was repeated with 0.0035% Knop's solution which indicates (Table-2) that out of all the notches present on the leaf (5th) the 4th notch emerged as the most responsive so far as number of roots and lengths of roots are concerned. This behavior of 4th notch in presence of Knop's solution might perhaps indicate the necessity of various elements present in the Knop's in very dilute conditions. Those conditions present in very dilute conditions might emerge as the pre requisites for root initiation and root growth in the notches of *Bryophyllum*. Dilute concentrations of Knop's solution were responsible for better root production and root growth. As Knop's solution was supposed to contain all the chemical nutrients. Therefore its contribution to root production and root growth was expected. Nutritional status of the stock plants plays a significant role in the development of roots and shoots on cutting taken from them. In this respects, the role of nitrogenous and carbohydrate is most important (Krous and Karybill, 1918).

References

1. Basu, R.N. (1971): Hormonal basis of regeneration of roots on cuttings. *Indian Agric*. 15:69-85.
2. Brusca, J.N. and Hass, A.R.C. (1956): Growth of citrus as affected by molybdenum. *Calif. Citrogr.* 41:158-159.
3. Haun, J.R. and Cornell, P.W. (1951): Rooting response of geranium (*Pelargonium hortorum Bailey. Var. Ricard*) cutting as influenced by nitrogen, phosphorous and potassium nutrition of the stock plant. *Proc. Amer. Soc. Hort. Sci.* 58:317-323.

4. Kawase, A. (1974): Roll of ethylene induction of flooding damage in sunflower. *Physiol. Plant,* 31:29-38.
5. Kraus, E.J. and Kraybill, H.R. (1918): Vegetation and reproduction with special reference to the tomato. *Ore. Agr. Exp. Sta. Bul.* 149.
6. Lovell, P.H.; Cobb, A. and Moore, K.G. (1971): The control of root initiation and development in detached cotyledons of *Sinapis alba* L. And *Raphanus sativus* L. *Ann. Bot.* 35:501-509.
7. Panwar, J.D.S.; Shukla, D.S. and Sirohi, G.S. (1986): Growth and development aspects in relation to yields of mung bean. *Indian Jour. Pl. Phy.* 29:312-317.
8. Rabinowith, E.I. (1951): Photosynthetic and related process. *Inter. Sci*. New York.
9. Samish, R.M. and Spiegel, P. (1957): The influence of the nutrition of the mother vine on the rooting of cutting. *Ktavim*. 8:93-100.
10. Scott, T.K. (1972): Auxin and roots. *Annual Rev. of Pl. Phy*. 23:235-258.
11. Tizio, R.; Moyano, J.S. and Morales, H. (1968): Inhibitor like substances in the cuttings and their possible relationship to the rooting process. *Phyton*, 25:123-128.
12. Torry, J.G. and Clarkson, D.T. (1975): Development and function of roots. *Acad. press*. London, 618.
13. Torry, J.G. (1976): Root hormones and plant growth. *Annual Review of plant Physiology*. 27:435-459.
14. Wample, R.L. and Rei, D.M. (1978): Control of adventitious root production and hypocotlyl/ hypertrophy of sunflower (*Helianthus annus*) in response to flooding. *Physiol. plant*. 44:351-358..

No great person survived without great dreams.
~ Robin Sharma