The Clarion Volume 7 Number 1 (2018) PP 17-21
The Clarion
International Multidisciplinary Journal
ISSN : 2277-1697

Study the effect of $Ca(NO_3)_2 4H_2O$ on root initiation in notch no. 3, 4, 5, 6 of the 5th leaf of *Bryophyllum.*

Manohar Deka
Department of Botany, Haflong Govt. College, Haflong, India

Abstract

The role of ages of leaf, the position of notch on the leaf, supplemented nutrients and growth regulators etc. on the initiation of adventitious roots and their subsequent growth in excised Bryophyllum leaves was investigated, notches of Bryophyllum leaf was the most important site for the initiation of adventitious roots. Adventitious roots were initiated from the notches when isolated leaves were placed on soil or sand sprayed with water frequently. The number of notches in a Bryophyllum leaf ranged between six to thirty-six but adventitious roots didnot develop equally on all the notches present. It might so happen that the root hormones present at the notches responsible for root initiation were not present in the notches in suitable concentrations other physiological conditions prevailing at the notches might also be responsible for root initiation. Depending on the interesting behaviour of Bryophyllum leaves, a study on the physiology of initiation of root and subsequent growth of those roots in 5th leaf particularly 3rd, 4th, 5th and 6th notches in presence of externally supplied Chemicals like Ca $(NO_3)_2$ $4H_2O$ carried out. As various factors played major role in production of adventitious roots and buds in the notches, a preliminary screening was done to ascertain the most suitable leaf in regard to root initiation number of root produced per notch, length of each root time taken for root initiation, in the notches. Further it was thought essential to select the most suitable notch for early initiation of root production of maximum number of roots and the maximum growth of roots. During the course of the research, it was found. That in the young Bryophyllum plants the 5th leaf (counted from the apex toward the base, leaving the young terminal bud) showed early rooting, maximum number of roots and longest roots. Then could possibly be attributed to the most capable leaf.

Keywords: Bryophyllum leaf, notch, 5th leaf $Ca(NO_3)_2 . 4H_2O$, adventitious roots.

1. Introduction

Bryophyllum pinnatum (family Crassulaceae) is an interesting perennial herb. Though it is a mesophytic plants it is found to grow in dry rocky places exhibiting xerophytes characters .Leaf is succulent and opposite decussate forming four vertical rows of leaves on the stem or a branch. The leaf of Bryophyllum is modified for storage of food materials, water minerals etc. presence of hydathodes in the leaves and water storage tissues in the leaves are the peculiar characters, stomata are sunken. Besides photosynthesis and storage of food materials 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.

Besides being ornamental, it is also an important medicinal plant. Dry leaf powder is useful for certain diseases. Leaf juice is good for piles. Flatulence, syphilis, retention of urine, strongury etc. (Sarma 1978; Namlogao Hazarika 1992)

The leaf blade of a mature leaf may range from three to six inches in length and three to four inches in breath. Notches of Bryophyllum leaf is important since they are the site of future generation plants i.e. the notches produce initially adventitious roots and

Corresponding author : dekamonohar@gmail.com
DOI number: 10.5958/2277-937X.2018.00003.5

subsequently adventitious buds with grow into new generation plants.

Adventitious root formation is a complex phenomenon essentially, root formation consists of two phases, root initiation and root growth (Lovell *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).

In adventitious roots formation, the water status of cuttings plays a great role. According to Evans (1952) even a slight water deficit which may be insufficient to cause any visual symptoms of distress results in considerable delay or reduction in the rooting response.

The importance of an internal balance among various promoters and inhibiters in the regulation of regeneration of role has been emphasized by Tizzo *et.al.* (1968) and Basu (1971).

Adventitious rooting had been studied most closely in sunflower hypocotyls, in which primordia are initiated within 24hr. of water logging. Wample and Reid (1978) however, it causes has so far remained unknown Kawase (1974) reported an increase in ethylene content below water in tap root and hypertrophied hypocotyls while adventitious roots were emerging .

2. Experimental methods

To Study of the effect of $Ca(No_3)_2 4H_2O$ on root initiation in notch 3, 4, 5, 6 of the 5th leaf of Bryophyllum when cultural for 5 days.

A set of experiments was performed to study the effect of $Ca(No_3)_2 4H_2O$ on rooting in notch 3, 4, 5, 6 of the 5th leaf of Bryophyllum.

$Ca(No_3)_2 4H_2O$ was used as the rooting medium and notch no.3, 4, 5, 6 of the 5th leaf of Bryophyllum was as the plant material.

Notches were excised as 1 cm^2 in size. In the experiment solution ($Ca(No_3)_2$ having concentration ranging from .01%.....04% were used. Without solution was taken as the control. Excised notches (numbering 3, 4, 5, 6) of the 5th leaf were placed separately on the solution medium, containing filter paper which was placed inside the petriplates previously. The petriplates containing the notches were placed in diffused sun light and kept for rooting. Solutions of $Ca(No_3)_2 4H_2O$ were added from time to time to maintain their levels in the petriplates. After 5 days average number of root produced in each notch in each concentrations and average length of each root in each concentrations were recorded. The results are presented in the table 1 and Graphs 1 to 4 respectively.

Table 1: To Study of the effect of Ca $(No_3)_2$ H_2O on root initiation in notch No.3, 4, 5, 6 of the Leaf of Bryophyllum when cultured for 5 days.

	Control			Notch No.3		Notch 4		Notch 5		Notch 6	
	Average no. of root at the notch	Average length of each root (mm)	Concentration solution	Average no. of root at the notch	Average length of each root (mm)	Average no. of root at the notch	Average length of each root (mm)	Average no. of root at the notch	Average length of each root (mm)	Average no. of root at the notch	Average length of each root (mm)
Notch No.3	2.000	2.000	.01%	3.000	3.330	3.000	4.500	6.000	3.830	0	0
Notch No.4	3.000	1.000	.02%	4.000	1.500	7.000	4.000	5.000	3.400	8.000	3.040
Notch No.5	1.000	1.000	.03%	3.000	3.000	4.000	4.120	0	0	5.500	2.180
Notch No.6	1.000	1.000	.04%	0	0	0	0	0	0	0	

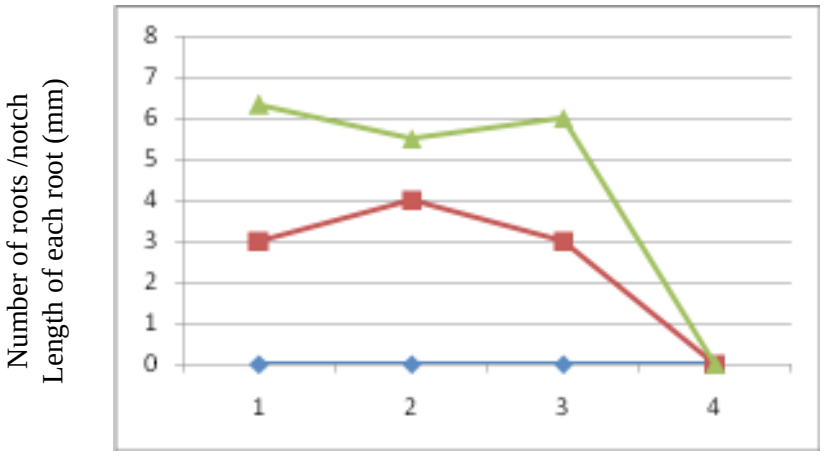

Fig. 1: Root produced in notch no.3 in each concentrations and average length.

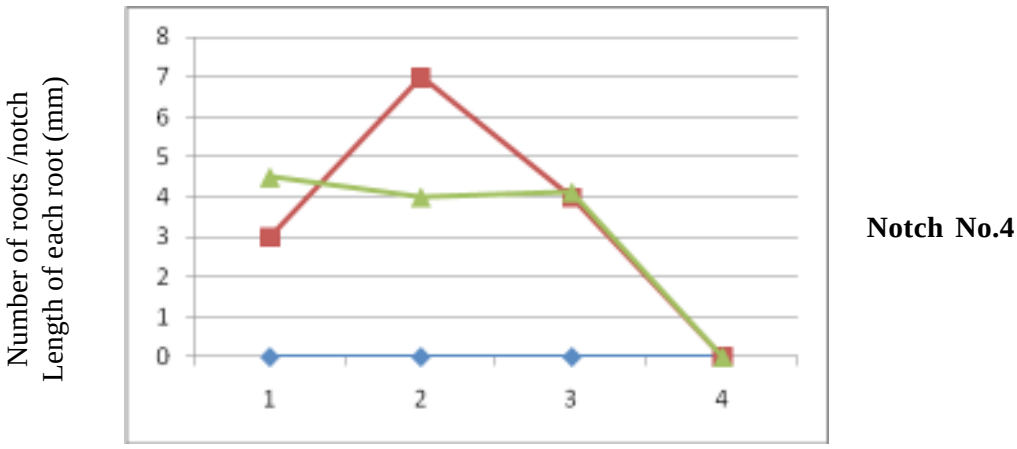

Fig. 2: Root produced in notch no.4 in each concentrations and average length.

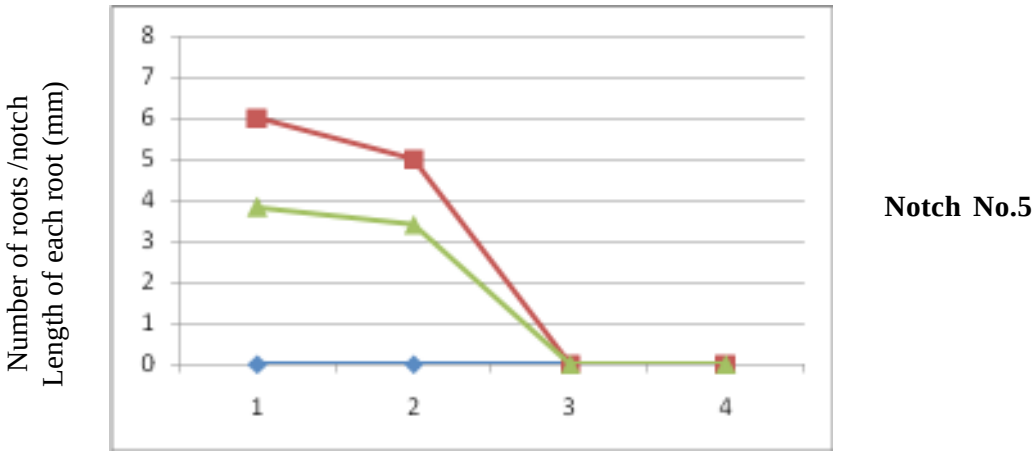

Fig. 3: Root produced in notch no.5 in each concentrations and average length.

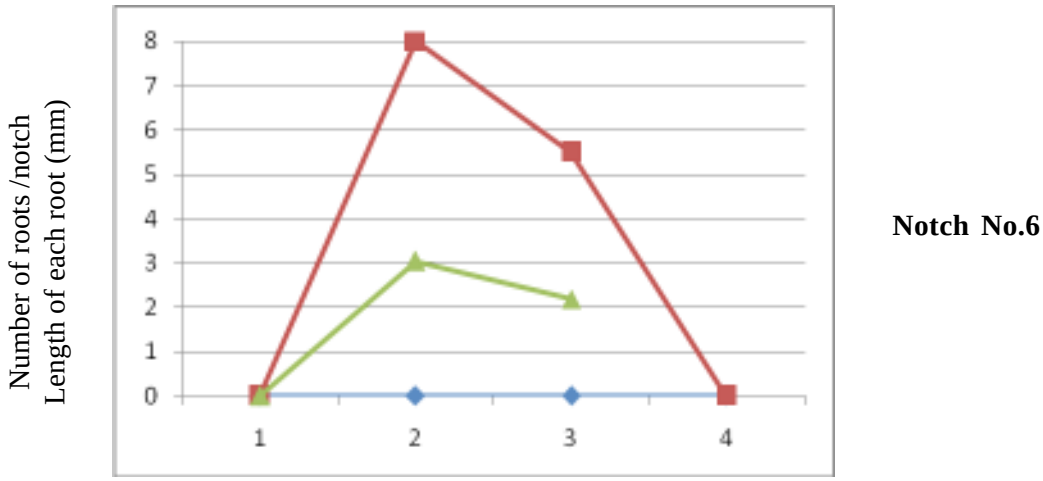

Fig. 4: Root produced in notch no.6 in each concentrations and average length.

3. Result and discursion

An attempt was made to study the rooting behaviours and growth of adventitious roots produced from the leaf notches of Bryophyllum detached leaf notch in vitro condition. The result obtained from the experiments were presented in the table. It was seen that almost all the mature leaves in general and the lowermost leaves in particular gives rise to adventitious roots. Regardless of root development from a leaf or from other part of plant, it develop inside the parent structures. However in some plants root first develop exogenously on the surface of the stem and are subsequently connected to the internal tissues of the parent stem (Grinziburg, 1967). Rooting of cuttings depends on external factors as well as internal factors (Nanda 1975; Spiegel 1954). It was seen that 0.01% Calcium nitrate solution was most effective in the 4th notch in respect of length of root while 0.02% solution exhibited the highest number of roots in the 6th notch. From this experiment it could be concluded that calcium nitrate solution was essential for root initiation and root growth. However mobilization of the nitrate solution and its utilization for emergence of root and its growth might depend on the local condition of the notches or in other words their positional effects.

This experiment, have been able to throw few light on the understanding of the complex process of initiation and growth of adventitious roots in Bryophyllum leaf notches. However, by no means this study is self sufficient to account for the entire mechanism of rooting and root growth and further studies are very much essential to understand the complex problem fully.

References

Basu R.N. 1971. Hormonal basis of regeneration of root on cuttings, Indian Agric,15:69-85.

Evans, H. 1952. Physiological aspects of the propagation of CaCaO from Cuttings .In:Proc.13th Int.Hortic. Congr.2:1179-1190.

Ginzburg, C. 1967. Organization of the adventitious root apex in Tamarix aphylla Amer, Jour. Bot.54:4-8.

Kawase 1974. Role of ethylene induction of flooding damage in sunflower physiol plant 31:29-38.

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.

Namlogao Hazarika, D. 1992. Rogar Karan aru Sachitra Banadaraba 21-99-100.

Nanda, K.K. 1975. Physiology of adventitious root formation, Indian jour pl.physiol.18:80-89.

Sarma, R.C. 1978. Banausadhi Dravyar Guna Aru Byawhar pages.79.

Scott 1972. Aukin and roots. Annual Rev. of pl.phy.23: 235-258.

Spiegel, P. 1954. Auxins and inhibitors in canes of vitis, Bull. Res Israel.4:176-183.

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.

Torry, J.G. and Clarkson, D.T. 1975. Development and function of roots. A cad. Press London.618.

Torry, J.G. 1976. Root hormones and plant growth, Annual review of plant physiology 27:435-459.

Wample, R.L. and Rcid, D.M. 1978. Control of adventitious root production and hypocotyl hypertrophy of sunflower (*Helianthus annus*) in respons to flooding.physil.plant 44:357-358.

□ □ □