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Effect of nodal position and season on *in vitro* shoot proliferation in aonla (*Emblica officinalis* Gaertn.)

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Abstract

Micropropagation studies conducted in aonla (*Emblica officinalis*) revealed that *in vitro* bud induction from the shoot of aonla was dependent on season of explanting and position of node on the mother tree. The shoots collected during August to November showed better establishment in cultures, rapid bud induction and growth of microshoots followed by shoots collected during April to July. Slightly green and moderately hard (10-15 nodes) shoots gave highest *in vitro* bud induction and proliferated profusely than the soft (1-10 nodes) or very hard, brown (20-30) nodal segments.

Key words: Aonla, *Emblica officinalis,* micropropagation, explant, season, *in vitro*

Introduction

Aonla or Indian gooseberry (*Emblica officinalis* Gaertn.) is one of the important fruit crops which thrives well in saline sodic soils and other wasteland situations. Vegetative propagation of aonla through traditional methods is at slow rate and season dependent. Micropropagation technique, if standardized, can be employed gainfully for mass multiplication of true to type plantlets of anola. *In vitro* bud induction and shoot proliferation are the two most important factors which affects the success of any micropropagation system. Many factors such as physiological state of mother plant, season of explanting and nature of explant contributes to the successful bud induction and proliferation of shoots. The present studies, therefore, examines the role of explanting season and explant position on *in vitro* establishment of nodal shoot cultures in anola.

Materials and methods

The present investigation was carried out at Tissue Culture Laboratary, N.D. University of Agriculture and Technology, Kumarganj, Faizabad. Narendra Aonla –7 (NA-7) being the most prolific variety of anola was chosen as experimental material. The indeterminate shoots from top or mid portion of canopy were collected in distilled water. Axillary shoots having one node were selected as explant. The shoots were trimmed to 1-2 cm length and determinate shoots attached with nodes were removed leaving 0.5 cm from base before processing the explant for *in vitro*. The shoots were excised through out the year from the bearing tree. *In vitro* oxidative browning and contaminations were controlled as per method suggested by Mishra *et al.* (1998,1999). The shoots were inoculated in modified MS medium (Murashige and Skoog, 1962) supplemented with 0.8% agar, 3% sucrose, 0.4 mg/l kinetin and 1.0 mg/l GA_3. The pH of media was 5.7 and cultures were kept at 25 ± 2°C temperature, 50-55% RH and 2000 lux of florescent tube light illumination with 16/8 hour of light and dark cycling.

Results and discussion

It is evident from Table 1 that nodal shoots excised from 10th to 15th nodes gave significantly higher bud induction. Two indeterminate shoots emerged from the nodes having 4-6 determinate shoots. The shoots excised from 1-10th nodes did not survive due to their inability to withstand the toxic effect of sterilant and antioxidants. The shoots taken from 20 to 30th nodes showed low bud induction probably due to mature tissue. Maximum bud induction and growth of determinate shoots was observed from the explants collected during August-November followed by April to July. The greater responsiveness of induction in most woody species have been considered as spring coinciding bud break and late summers (Bonga, 1987,

Table 1. Effect of explanting season and position of nodal shoot on *in vitro* bud induction in aonla

Nodal Position	Bud induction (%)		
	Apr. to July	Aug. to Nov.	Dec. to Mar.
1 - 10	25.30	31.40	-
10-15	70.30	76.40	-
15-20	62.30	72.40	-
20-25	39.00	45.00	-
25-30	20.30	23.60	-
SEm ±	2.07	1.97	-
CD (*p*=0.05)	4.60	4.40	-

Table 2. Effect of nodal position on shoot proliferation of aonla

Nodal Position	Number of indeterminate shoots /explant	Length of indeterminate shoots (cm)
1 - 10	1.00	0.76
10-15	2.00	0.83
15-20	2.00	0.73
20-25	1.66	0.73
25-30	1.60	0.54

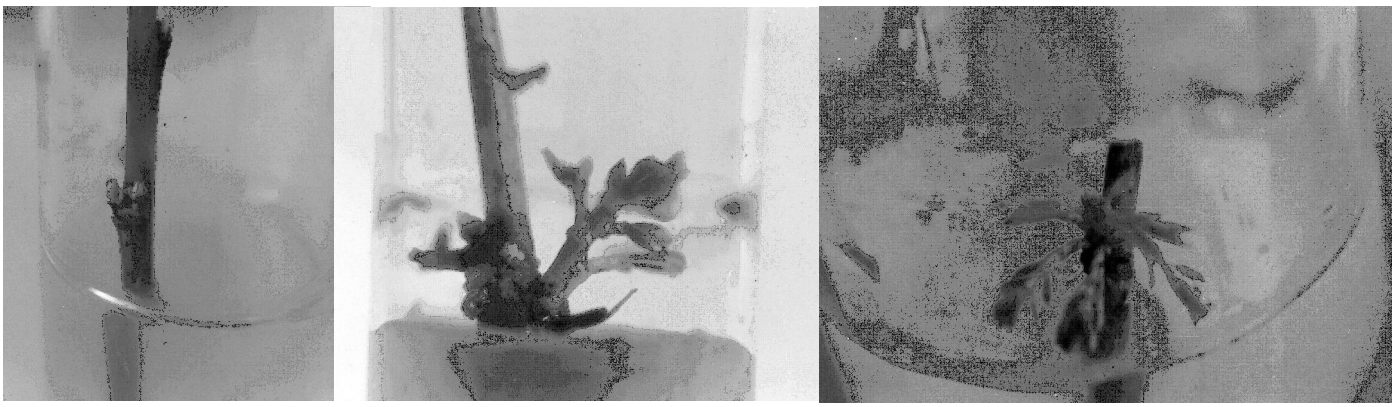

Fig. 1. Nodal shoot bud culture establishment and multiple shoot bud proliferation

Wealander, 1983). The explants taken during December-March failed to induce bud break because aonla trees undergo dormancy during this period in northern India. Higher concentration of inhibitors in shoots could be the reason for complete failure of cultures. The physiological state of mother plant tissue at the time of explant excision has a definite influence on response of buds. Explants from actively growing shoots of the begining of the season generally gave best results. (Seabrook *et al*., 1976, Anderson, 1980). Bonga (1987) observed that lower or mid portion of branches are easier to establish *in vitro* than upper part of the branch.

It is evident from Table 2 that the position of explant on the tree has dierect influence on the number and length of microshoots *in vitro.* The nodal shoots excised from 10-15th nodes produced more shoots (2.0 /culture) with increased length (0.83 cm).

It can be concluded that for micropropagation of aonla, the explants excixed between 10-15 nodes of indeterminate shoot would be ideal explant. Maximum bud burst can be achieved on modified MS medium supplemented with 0.4 mg/l kinetin and 1.0 mg/l GA_3.

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References

Anderson, W.C. 1980. Mass propagation by tissue culture: Pinciples and practices, *In*: Proc. conference on nursery production of fruits through tissue culture application and feasibility. Agric. Res. Sel. Edn. Adm: USDA, Beltsville p 1-10.

Bonga, J.M. 1987. Clonal propagation of mature trees, problem and possible solution in cell tissuse culture. In forestry. Martinus Nijhoff Pub; The Hague , Vol. 1, p 76-112.

Murashige, T. and F. Skoog, 1962 . A revised medium for rapid growth and bioassay with tobacco tissue culture. *Physiol. Plant*., 15:473-497

Mishra, M., R.P. Saxena, R.K. Pathak and A.K. Srivastava, 1998. Effect of antioxidants, phenol binding agents and explant waxing on *in vitro* browning of aonla. *Prog. Hort*., 30(3-4):128-134

Mishra, M., R.P. Saxena, R.K. Pathak and A.K. Srivastava, 1999. Studies on micropropagation of aonla *Prog. Hort*., 31(3-4):116-122

Seabrook, J.E.A., B.G. Cumming and L.A. Diomme, 1976. The *in vitro* induction of adventitious shoot and root apices on narcissus cultivar tissue. *Can. J. Bot*., 54:814-819

Wealander, M. 1983. Biochemical and anatomical studies of birot (*Betula pendula*) buds exposed to different climatic condition in relation to growth *in vitro*. Basic life sciences. Plenum press. New York. Vol 44, p 29-99.