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In vitro rooting studies in spine gourd *(Momordica dioica* Roxb)

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Healthy shoots, which have there own root system, are able to survive and become complete plantlets. The healthy well developed multiple shoots were individually separated and kept for rooting on various media composition. 80 per cent rooting was obtained in AKSG-5 on RM_6 ($MS+AdSO_4$ 80 mg/l + IBA 1.0 mg/l). The highest rooting percent in AKSGM-1 (93%) was obtained on RM_3 (MS+IBA 1.0 mg/l) followed by AKSG-35 (86.67%) was observed. Similar results reported by Deokar et al. (2003) and they obtained 80% roots in spine gourd on MSHP + ADS 80 mg/l + IBA 1.0 mg/l + 0.9% agar agar and Geeta Kulkarni obtained (86.66%) rooting response to Kartoli on MS+3ppm NAA + 0.8% Agar + 3% sucrose with activated charcoal. In present investigation, in AKSG-5 (4.33) primary roots per culture with 4.17 cm root length and in AKSG-35 (4.67) primary roots per culture with 4.67 cm root length in AKSGM-1 (4.67) primary roots with 4.67 cm root length were recorded on RM_6 ($MS+AdSO_4$ 80 mg/l + IBA 1.0 mg/l) were recorded.

Key words : Rooting, In vitro.

INTRODUCTION

IT possesses several medicinal properties and are good for those suffering from cough and other diabatic problems young leaves, flowers and seeds are also edible. Fruits are also used in ulcers, piles, sores and obstruction of liver and spleen as appetizer and astringent. The seeds are used for chest problem and stimulate urinary discharge. The roots contains triterpenoid saponins are applied in bleeding piles, bowl infections and urinary complaints. The paste of roots can be applied over body as a sedative in fever (Chakravorty, 1959). Considering to multifold uses of kartoli, the systematic improvement in cultivation would be a boon both for horticulture as well as pharmaceutical industries especially in Ayurveda. The demand for kartoli is increasing. The fruits are sold at premium prices in the metropolitan cities as well as in small towns.

Propagation by seed and cuttings is not common in Kartoli. The highly cross pollinated dioicious nature of Kartoli exhibit genetic variation for morphological and growth parameters. Tubers are suitable for propagation but it have some limitations, first is dormancy and sprout only at the onset of monsoon secondly multiplication rate of tuber is very low. (Mishra and Sahu, 1983 and Ram et al, 2002).High multiplication ratio can be achieved by micropropagation technique, which enables rapid multiplication of disease pest free elite plants within short space and time. (Morel and Martin, 1952).

MATERIALS AND METHODS

The explants of spine gourd i.e., shoot tip and axillary buds were washed under tap water and surface sterilized after washing in 0.1% Teepol detergent for 2 minutes and followed by 0.1% Hgcl2 treatment for 2 minutes. The explants were then washed with sterile distilled water. The explants were then cultured in vitro on MS medium singly or in combination with various concentrations of BAP and NAA for establishment in test tubes (autoclaved at 115 degree C for 25 minutes in an autoclave.) cultures were maintained in a laboratory at 25 degree celcius .The cultures were sub cultured at an interval of 15 days on fresh MS with similar combination. A single shoot from well established culture were transferred to shoot proliferation media to study their response for induction and development of multiple shoots. After 30 days, multiple shoots were observed and data was recorded on number of multiple shoots produced per culture.

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RESUITS AND DISCUSSION

For induction of roots to proliferated multiple shoots the in-vitro developed well lignified shoots of spine gourd were individually

Table 1: Effect of different concentrations of cytokinins and auxins on per cent rooting

Medium	AKSG-5	AKSG-35	AKSGM-1	Mean
RM1	26.67	33.33	40.00	33.33
RM2	46.67	53.33	60.00	53.33
RM3	73.33	86.67	93.00	84.33
RM4	43.33	46.67	40.00	43.33
RM5	20.00	26.67	33.33	26.66
RM6	80.00	80.00	76.67	78.89
RM7	43.33	40.00	53.33	45.55
RM8	33.33	20.00	33.33	28.89
Mean	45.83	48.33	53.75	49.30

	Variety	Medium	Variety x Medium
SE+	1.85	3.02	5.23
CD at 5%	5.26	8.59	14.87

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separated and transferred to media meant for root induction using MS or ½MS media enriched with IBA alone on in combination with Adenine sulphate growth hormones. The observations were recorded on per cent rooting, after 30 days of culturing and results are presented in Table 1.

Rooting percentage significantly differed, the highest rooting gave by AKSGM-1 (93%) followed by AKSG-35 (86.67%) on RM_3 *(MS+IBA 1.0 mg/l).*

In AKSG-5 resulted into 80% rooting on RM_6 (MS+$AdSO_4$ 80 mg/l + IBA 1.0 mg/l) followed by 73.33% rooting on RM_3 (MS + IBA 1.0 mg/l). lowest i.e. 20% rooting was observed in RM_5 (MS + IBA 3.0 mg/l).

Number of primary roots per plantlets were significantly differed the highest number of primary roots (4.56) were observed on medium RM_6 *(MS+$AdSO_4$ 80 mg/l + IBA 1.0 mg/l) followed by 4.0 roots per culture on RM_3 (MS + IBA 1.0 mg/l).*

In AKSG-5 RM_6 (MS+$AdSO_4$ 80 mg/l + IBA 1.0 mg/l) resulted into 4.33 primary roots per culture followed by RM_3 (MS+IBA 1.0 mg/l) which resulted in primary root/culture. The lowest i.e. 1.67 primary roots per culture were obtained in RM_5 (MS+IBA3.0 mg/).

In AKSG-35 4.67 primary roots per culture on RM_6 (MS+$AdSO_4$ 80 mg/l + IBA 1.0 mg/l) followed by 3.67 primary roots per culture on RM_3 (MS+IBA 1.0 mg/l) and RM_4 (MS + IBA 2.0 mg /l). The lowest i.e. 2.33 primary roots per culture were

Table 2 : Effect of different concentrations of cytokinins and auxins on number of primary roots

Medium	AKSG-5	AKSG-35	AKSGM-1	Mean
RM1	2.33	2.67	3.00	2.62
RM2	3.33	3.33	3.67	3.44
RM3	4.00	3.67	4.33	4.00
RM4	3.33	3.67	4.00	3.67
RM5	1.67	2.33	2.33	2.11
RM6	4.33	4.67	4.67	4.55
RM7	3.00	2.67	3.00	2.89
RM8	2.67	2.33	2.67	2.56
Mean	3.08	3.17	3.46	3.24

	Variety	Medium	Variety x Medium
SE±	0.098	0.13	0.23
CD at 5%	0.28	0.38	0.66

In AKSG-35 resulted into 86.67% of rooting on RM_3 (MS+IBA 1.0 mg/l) followed by 80.00% rooting on RM_6 (MS+$AdSO_4$ 80 mg/l + IBA 1.0 mg/l). Lowest i.e. 20% rooting were observed in RM_8 (MS+$AdSO_4$ 80 mg/l + IBA 3.0 mg/l).

In AKSG-M1 resulted into 93% of rooting on RM_3 (MS+IBA 1.0 mg/l) followed by 76.67% rooting on RM_6 (MS+$AdSO_4$ 80 mg/l + IBA 1.0 mg/l). Lowest i.e. 33.33% rooting was observed in RM_5 (MS+IBA 3.0 mg/l) and RM_8 (MS+$AdSO_4$ 80 mg/l + IBA 3.0 mg/l).

Number of primary roots per plantlet

The observation recorded for number or primary roots are presented in Table 2.

obtained in RM_5 (MS+IBA 3 mg/l) and RM_8 (MS+$AdSO_4$ 80 mg/l + IBA 3.0 mg/l)

In AKSG-M1 resulted into 4.67 primary roots per culture on RM_6 (MS+$AdSO_4$ 80 mg/l + IBA 1.0 mg/l) followed by 4.33 primary roots per culture on RM_3 (MS + IBA 1.0 mg/l). The lowest i.e. 2.33 primary roots per culture were obtained in RM_5 (MS+IBA 3.0 mg/).

Average length of primary roots (cm)

The observation recorded for average length of primary roots are presented in Table 3.

Significant differences were observed for root length, the highest root length (4.50 cm) was observed on RM_6 (MS+$AdSO_4$ 80 mg/l + IBA 1.0 mg/l) followed by RM_3 (MS+IBA 1.0 mg/l) medium

Table 3 : Effect of different concentrations of cytokinins and auxins on root length (cm)

Medium	Root length (cm)			
	AKSG-5	AKSG-35	AKSGM-1	Mean
RM1	3.40	2.50	3.00	2.97
RM2	3.83	3.17	3.67	3.56
RM3	3.70	3.67	4.67	4.01
RM4	3.67	3.67	4.00	3.78
RM5	1.67	2.33	2.33	2.11
RM6	4.17	4.67	4.67	4.50
RM7	3.00	2.67	3.00	2.89
RM8	1.33	2.33	2.67	2.11
Mean	3.10	3.13	3.50	3.24

	Variety	Medium	Variety x Medium
SE±	0.082	0.16	0.28
CD at 5%	0.23	0.46	0.79

i.e. 4.01 cm.

In AKSG-5 resulted into 4.17 cm root length per culture on RM_6 (MS+$AdSO_4$ 80 mg/l + IBA 1.0 mg/l)followed by 3.83 cm rool length per culture in RM_2 (½MS + IBA 1.0 mg/l). The lowest i.e. 1.33 cm root length per culture were obtained in RM_8 (MS+$AdSO_4$ 80 mg/l + IBA 3.0 mg/l).

In AKSG-35 resulted in 4.67 cm root length per culture on RM_6 (MS+$AdSO_4$ 80 mg/l + IBA 1.0 mg/l) followed by 3.67 cm root length per culture on RM_3 (MS+IBA 1.0 mg/l.0) and RM_4 (MS + IBA 2.0 mg /l). The lowest i.e. 2.33 cm root length per culture was observed on RM_5 (MS+IBA 3.0 mg/l).

In AKSGM-1 RM_3 (MS+IBA 1.0 mg/l) and RM_6 (MS+$AdSO_4$ 80 mg/l + IBA 1.0 mg/l) resulted into 4.67 cm root length per culture followed by 4 cm root length per culture in RM_4 (MS + IBA 2.0 mg/l). The lowest i.e. 2.33 cm root length per culture was observed on RM_5 (MS+IBA 3.0 mg/l).

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