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PERFORMANCE STUDY OF DIFFERENT POTATO VARIETY ON MERISTEM CULTUREM.H. KHANAM¹, M.N.A. CHOWDHURY², M.J. ISLAM³, M.A. ROUF⁴ AND A.C. DAS⁵

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ABSTRACT

Khanam MH, Chowdhury MNA, Islam MJ, Rouf MA, Das AC (2013) Performance study of different potato variety on meristem culture. *Int. J. Sustain. Crop Prod.* 8(1), 28-31.

An experiment was conducted to select the suitable variety through meristem tip culture for potato chips production. Six varieties were used in this study viz. Laddy Rosseta, Astarik, Joity, Kenny Back, Kufri Bahar and Atlanta, at the Biotechnology Laboratory, A.H.Z Biotech Limited, Vadra, Rajshahi, Bangladesh during the period from November 2011 to March 2012. The chemical GA₃ @ 0.25 mg/l + and NAA @ 0.02 mg/l with Murashige and Skoog (MS) medium were used in this study. It was observed that the variety Joity showed the highest explants survived (54%) and produced shoots and the lowest (39%) was found Atlanta. Days required for shoot appearance was significantly influenced on variety. The minimum (18) days for shoot appearance was found from Joity variety and took maximum days required for the variety of Atlanta (28). In respect of shoot length, node number, shoot diameter and root length always performed better in variety Joity than other variety. It was observed that variety Joity gave the highest fresh weight of shoot (0.75) and root (0.436 g). The highest yield (45 t/ha) and dry matter (28%) were found in Joity. It is concluded that the combination of GA₃ @ 0.25 mg/l + NAA @ 0.02 mg/l performed better for regeneration and multiplication of potato cv. Joity and also yield and dry matter.

Key words: potato, regeneration, growth regulator, tip

INTRODUCTION

The potato (*Solanum tuberosum* L.) is the fourth ranked world crop which had 20 million ha planting area in the world in 2005 and produced nearly 325 million tons annually (FAO 2007). It is the most widely cultivated food crop after wheat, rice and maize (Anon. 2000). It originates from the western hemisphere and the Andes mountain range in southern America (Woolf 1986). Micro propagation is the alternative to conventional propagation of potatoes (Chandra and Birhman, 1994). In vitro Propagation methods using meristem tips, nodal cuttings and micro tubers are more reliable for maintaining genetic integrity of the multiplied clones sieve de-differentiation and the subsequent organogenesis/embryo genesis with the accompanying genetic changes have been reported (Wang and Hu, 1982). Meristem culture provides a reproducible and economically viable method for producing pathogen free plants. As meristem tips are free from viruses, elimination and generation of virus free plants are possible through meristem (Jha and Ghosh, 2005). Through several workers have reported the use of MS medium without hormones during proliferation stage (Aburkhes *et al.* 1984; Rosell *et al.* 1987; Gopal *et al.* 1980) but the growth was slow and it took 3-4 weeks to grow 30-50 high shoots (Hussey and Stacey, 1981). Improvement has been made possible by addition of growth regulators to the medium. Gas stimulated development of nodal cutting on MS but at high concentration it produce narrow and elongated shoot (Novak *et al.* 1980) depending on genotypes. Longest main shoot and highest node numbers are reported to be obtained in medium containing NAA and BAP (Yousef *et al.* 1997). Pennazio and Vecchiare (1976) used MS medium supplemented with GA and NAA for proliferating meristem tip. The A.H.Z Biotech Limited collected some variety from India for quality potato chip production. Among of them Laddy Rosseta, Astarik, Joity, Kenny Back, Kufri Bahar and Atlanta are the good in respect of keeping quality, yield and dry matter. For keeping this view, the study was undertaken to select the best variety through meristem tip culture for potato chips production.

MATERIALS AND METHODS

The experiment was conducted to select the suitable variety through meristem tip culture for potato chips production at the Biotechnology Laboratory, A.H.Z Biotech Limited, Vadra, Rajshahi, Bangladesh during the period from November 2011 to March 2012. Six varieties were used in this study viz. Laddy Rosseta, Astarik, Joity, Kenny Back, Kufri Bahar and Atlanta. The experiment was designed in single factor CRD with 5 replications. The chemical GA₃ @ 0.25 mg/l + NAA @ 0.02 mg/l with Murashige and Skoog (MS) medium were used in this study. For obtaining meristem tips above mentioned varieties were planted at A.H.Z. Biotech Limited field laboratory at vadra, Rajshahi, for collecting explants. Shoots tips of different varieties were collected from actively growing twigs and washed under running tap water. Then the shoot tips were disinfected with 0.1% mercuric solution containing approximately 0.02% tween-20 [Polyoxyethelen (20) sorbitan, oleate] for 2 min inside the running laminar air flow cabinet. Treated explants were washed 4-5 times with sterile distilled water to remove the effect of sterilizing agent. Shoot apical meristem consisting of the apical dome with one to two leaf primordia was isolated using sterile hypodermic needle and scalpel under a dissecting microscope (Alam *et al.* 2004). To avoid dehydration, isolated meristems (0.3-0.5mm) were transferred quickly

on the filter paper bridge in test tubes containing sterilized liquid MS medium (Murashige and Skoog, 1962) supplemented with of GA₃ and NAA (Fig. 1). After 4-5 weeks, the developed meristems of different varieties were sub-cultured on semi-solid medium with plant growth regulator for next 4-6 weeks for shoot elongation. The data were recorded on explants producing shoots (%), days required to shoot appearance, shoot diameter (mm), root & shoot length (cm), number of node per shoot, fresh weight of shoot and root, maturity days, yield and dry matter. Results were analyzed using MSTAT-C statistical package.



Fig. 1. Development of isolated apical meristem on filter paper bridge in liquid MS medium

RESULTS AND DISCUSSION

The Present investigation was conducted to find out the suitable variety through meristem tip culture. Data on explants producing shoots (%), days required to shoot appearance, shoot diameter (mm), root & shoot length (cm), number of node per shoot, fresh weight of shoot (g) and root (g), maturity days, yield and dry matter were recorded. It was found that explants producing shoot significantly varied on different variety (Table 1). The variety Joity showed best results in respect of explants producing shoots (%), shoot length (cm), number of node per shoot, root length (cm), fresh weight of root (g) & shoot (g), yield (t/ha) and dry Matter. The variety Joity showed the highest explants survived (54%) and produced shoots followed by Kufri Bahar (52%) and Kenny Back (48%) and the lowest (39%) was found Atlanta. Days required for shoot appearance significantly influenced on variety. The explants of Joity and lady Rosseta took minimum days for shoot appearance (18) followed by Kufri Bihar (19) and Kenny (20) and took maximum days required for the variety of Atlanta (28). Shoot length influenced significantly due to the effect of different variety. The highest shoots length was recorded from Joity (10.40 cm) followed by Kenny Back (9.20 cm) and Kufri Bahar (8.20 cm) and the lowest was found from Atlanta (5.40 cm) which was statistically significant (Table 1). In case of node number, it was observed that the maximum (8.10) number of node was recorded from Joity followed by Kufri Bahar (6.80) and Kenny Back (5.20) and the lowest was found Atlanta (5.20) (Table 1).

Table 1. Performance of different variety on explants producing shoots, shoot length and node number after 40-45 days of culture

Treatments	Explants producing shoots (%)	Days required for shoot appearance	Shoot length (cm)	Node number
Lady Rosseta	40.00	18.00	6.40	3.20
Astrik	45.00	25.00	8.00	3.00
Joity	54.00	18.00	10.40	8.10
Kenny Back	48.00	20.00	9.20	5.20
Kufri Bahar	52.00	19.00	8.20	6.80
Atlanta	39.00	28.00	5.40	3.36
LSD (0.05)	3.130	4.369	0.399	0.967
Level of significance (0.05)	**	**	**	**
CV (%)	3.76	11.26	4.69	10.67

It was found that the highest shoot diameter was observed in Joity (13 mm) and the lowest was recorded from Atlanta (3.36 mm). The highest root length (10.33 cm) was recorded from Joity followed by Kenny Black (9.20 cm) and Kufri Bahar (8.80 cm) but it was the lowest (5.20 cm) was found in Atlanta. On the other hand, same results was found incase of fresh weight of shoot. It was observed that variety Joity gave the highest fresh weight of shoot and root (0.747 and 0.436 g, respectively) (Table 2).

Table 2. Performance of different variety on root length, shoot weight and root weight after 40-45 days of culture

Treatments	Shoot diameter (mm)	Root length (cm)	Fresh wt. of shoot (g)	Fresh wt. of root (g)
Lady Rosseta	9.00	6.20	0.418	0.304
Astrik	8.00	8.43	0.536	0.354
Joity	13.00	10.33	0.747	0.436
Kenny Back	10.00	9.20	0.612	0.311
Kufri Bahar	8.00	8.80	0.599	0.328
Atlanta	6.00	5.20	0.315	0.250
LSD (0.05)	3.593	**	**	**
Level of significance (0.05)	*	0.572	0.115	0.575
CV (%)	11.94	4.91	11.05	4.11

In respect as field performance of different plantlet it was found that minimum maturity days showed on lady Rosseta (105) followed by Joity (108) (Table 3). The highest yield and dry matter were found in Joity (45 t/ha and 28%, respectively).

Table 3. Field performance of different variety on maturity days, yield and dry matter

Treatments	Maturity days	Yield (t/ha)	Dry matter (%)
Lady Rosseta	105	40.00	21.00
Astrik	115	30.00	24.00
Joity	108	45.00	28.00
Kenny Back	110	40.00	25.00
Kufri Bahar	120	35.00	23.00
Atlanta	110	25.00	20.00
LSD (0.05)	19.21	1.789	4.694
Level of significance (0.05)	*	**	*
CV (%)	9.48	4.74	11

CONCLUSION

From the above study it is concluded that the variety Joity is the best for regeneration and multiplication of explants through meristem culture (using GA₃ @ 0.25 mg/l + NAA @ 0.02 mg/l with MS medium) and yield with dry matter also. It's used as a good variety for potato chips production industries.

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