

Effect of Different GA3 Concentration on *in vitro* Propagation of Potato Variety Desiree

Ihsan Ullah, Mubashar Jadoon, Anayat ur Rehman, Tahseen Zeb and Khalid Khan
Hazara Agriculture Research Station, Abbottabad, KPK, Pakistan

Abstract: The present study aimed to find out effect of different GA3 concentration on *in vitro* propagation of Potato variety "Desiree". Three treatments of GA3 i.e., 0.1, 0.25, 0.5 mg/L in MS medium were under observation. Minimum (5) number of days to root initiation was recorded in 0.25 mg/L dosage of GA3 in the MS medium. 0.25 mg/L dosage of GA3 in the MS medium also gave best results as compared to other dosages when data was recorded for Shoot length, Root length and no of leaves plantlet. 0.25 mg/L dosage of GA3 in the MS medium can be used for *in vitro* culture of potato plantlets, as this dosage gave best results as compared to other dosages.

Key words: Desiree, GA3, *in vitro* culture, MS medium, potato, propagation

INTRODUCTION

Potato (*Solanum tuberosum* L.) belongs to the family Solanaceae and is grown worldwide. Potato production in Pakistan is far below as compared to the developed countries. One of the reasons is low quality seed. Pakistan meets only 4% of its seed requirements and rest rely on low quality and infected seed.

Potato is usually propagated asexually by means of tubers. However, *in vitro* regeneration of potato is easily done from different explants on MS medium supplemented with different auxin and cytokinin for diseases free good quality seeds and pathogen free planting materials (Hossain, 1994; Rabbani *et al.*, 2001; Zaman *et al.*, 2001). Appropriate combinations and concentrations of plant growth regulators in the culture media are required for rapid plant regeneration from explants (Ehsanpour and Jones, 2000). For rapid multiplication, addition of GA3 to the MS media has been reported to improve growth and development of shoots (Roest and Bokelmann, 1976; Muller and Lipschutz, 1984). Farhatullah *et al.* (2007) also have reported that dosage of 0.248 mg l⁻¹ of GA3 in the MS medium boosted all morphological characters.

Keeping in view the results of previous studies, present study was conducted to investigate the effect of different GA3 concentrations on *in-vitro* propagation of Potato variety "Desiree".

MATERIALS AND METHODS

The present investigation was carried out at Department of Environmental Sciences, COMSATS IIT

Table 1: Media combinations in different treatments

T1 = MS (control)
T2 = MS+0.01 mg/L GA3
T3 = MS+0.25 mg/L GA3
T4 = MS+0.50 mg/L GA3

Abbottabad during the year 2007/08. Potato variety "Desiree" was used, which is a red potato seed variety and is grown on 78% of potato growing areas of Pakistan. MS medium with different concentrations of GA3 were used in this study. Media combination in different treatments shown in Table 1:

Each treatment had three replications. The pH of media was 5.8. Agar @ 5 mg/L was used for solid medium. Media was then autoclaved for 25 min at 121°C. Cultures were inoculated in the laminar flow bench and incubated at 25±1°C under 16 h of light.

For each treatment three observations were recorded on days to root initiation, shoot length (cm), leaves plantlet⁻¹, root length (cm). LSD test was applied for the comparison of means.

RESULTS AND DISCUSSION

Results were obtained after 30 days of culturing except number of days to root initiation, as shown in Table 2.

Days to root initiation: Statistical analysis of data regarding days to root initiation showed that there is significant difference among treatments except T2 and T4 which are non-significant from each other. T3 showed minimum no of days required for root initiation i.e., 5 days. The present results are similar to earlier observation of Farhatullah *et al.* (2007).

Table 2: Effect of different GA3 concentration on *in vitro* propagation of potato

Parameters	T1	T2	T3	T4	LSD
Days to root initiation	7.67C	6.33B	5C	6.33B	0.94
Shoot length (cm)	5.07C	7.43B	8.33A	7.47	0.25
Leaves plant	2.17C	3.17B	3.53A	3B	0.24
Root length (cm)	2.67B	3.33B	5.67A	3.67B	1.08

T1: 0 mg/L (control); T2: 0.1 mg/L; T3: 0.25 mg/L; T4: 0.5 mg/L

Shoot length: In case of shoot length statistical analysis showed that the treatment T3 gave maximum (9.37 cm) shoot length. Results of this study are in agreement to with Farhatullah *et al.* (2007) who obtained maximum shoot length at 2.5 mg/L in M.S medium. Levitt (1974) and Webb *et al.* (1983) also have reported that GA3 is involved in cell elongation and its addition in MS medium enhances shoot growth.

Number of leaves plantlet⁻¹: In term of leaves plantlet⁻¹, maximum (8.33) numbers of leaves were recorded in T3. Similar response was noticed by Farhatullah *et al.* (2007) and Al-momani *et al.* (1999).

Root length: Statistical analysis showed that T3 was the best combination for maximum root length i.e., (3.53 cm). Webb *et al.* (1983) also noticed that addition of hormones and GA3 to MS medium eased rooting of shoot obtained.

REFERENCES

Al-momani, F., R. Shibli and M. Ajlouni, 1999. *In vitro* performance of potato (*Solanum tuberosum* L.) cv. Spunta explants. *Agrotropica Publ.*, 11: 31-34.

- Ehsanpour, A.A. and M.G.K. Jones, 2000. Evaluation of direct shoot regeneration from stem explants of potato (*Solanum tuberosum* L.) cv. Delaware by Thidiazuron (TDZ). *J. Sci. Tech. Agric.*, 3: 47-54.
- Farhatullah, Z.A. and J.S. Abbas, 2007. *In vitro* effects of gibberellic acid on morphogenesis of potato explant. *Int. J. Agri. Biol.*, 9: 200.
- Hossain, M.J., 1994. *In vitro* propagation of potato (*Solanum tuberosum* L.). *J. Plant Tissue Cult.*, 1: 33-37.
- Levitt, J., 1974. *Introduction to Plant Physiology*. The C.V. Mosby Company, Saint Louis., pp: 318.
- Muller, S.A. and L. Lipschutz, 1984. Potato. In: Ammirato, P.V., D.A. Evans, W.R. Sharp and Y. Yamada, (Eds.), *Handbook of Plant Cell Culture*, Collier Mcmillan Publishers, London, 3: 295.
- Rabbani, A., B. Askari, N.A. Abbasi, M. Bhatti and A. Quraishi, 2001. Effect of growth regulators on *in vitro* multiplication of potato. *Int. J. Agric. Biol.*, 2: 181-182.
- Roest, S. and G.S. Bokelmann, 1976. Vegetative propagation of *Solanum tuberosum* L. *in vitro*. *Potato Res.*, 19: 173-178.
- Webb, K.J., E.O. Osifo and G.G. Henshaw, 1983. Shoot regeneration from leaflet discs of six cultivars of potato (*Solanum tuberosum* L.). *Pl. Sci. Lett.*, 30: 1-8.
- Zaman, M.S., A. Quershi, G. Hasan, R.U. Din, S. Ali, A. Khabir and N. Gul, 2001. Meristem culture of potato (*Solanum tuberosum* L.) for production of virus free plantlets. *Online J. Bio. Sci.*, 1: 898-899.