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Rapid *In vitro* propagation of medicinally important plant *Solanum surattense* Burm F.

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Abstract

An efficient and reproducible protocol was established *via* organogenesis from nodal explants of *Solanum surattense*. The nodes are incubated and generated many buds on Murashige and Skoog (MS) medium supplemented with different concentrations of 6-benzylaminopurine 4.44-17.76 µM/l (BAP) and naphthaleneacetic acid 2.69 µM/l (NAA) in the 16 days. The highest rate of multiple shoot induction was observed on BAP (8.88 µM) and in combination with NAA (2.69 µM/l). The well-developed Plantlets were rooted on MS medium after being immersed in 4.90 µM/l of IBA for 24 h, 98.25% of the roots grow up two weeks later. After 20 days rooted plantlets that survived acclimatization grow well in the pots.

Keywords: *Solanum surattense*, Nodal explant, Micropropagation, BAP and IBA

Introduction

Solanum surattense Burm F. (Solanaceae) is a perennial herb and is considered as one of the most useful traditional medicine in India. The plant medicinally used to treat for cough, asthma and rheumatism. Phytochemical investigation of the *Solanum surattense* reported to have number of alkaloids[1-2], sterols[3], saponins[4] and flavonoids and their glycosides[5] and especially it has high concentration of solasodine, a starting material for the synthesis of cortisone and sex hormones. Pharmacological activities such as antibacterial and antifungal[6], antinociceptive[7], antioxidant[8], hypoglycaemic[9] and larvicidal[10] have been reported in this plant. The *in vitro* regeneration has been also reported in the leaf explant of *Solanum surattense*[11]. The potential values in the population of this species demands launching of conservation efforts. Such conservation efforts would ensure continuous and ample supply of this valuable material which is in great demand by the pharmaceutical industry. Only a small percentage of medicinal plants, used in the industry are cultivated. Most of them are collected from the wild, very often in a destructive and unsustainable manner.

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The conventional method of propagation of this herb is limited to seeds only, which retain their viability for only a minuscule period. Keeping the above facts in mind the present study was undertaken to develop a suitable protocol for its rapid multiplication.

Material and Methods

Solanum surattense Burm F. explants were collected from Kavery river region of Tiruchirappalli district, Tamil Nadu, India. The collected explants were surface sterilized by using 70% alcohol for one minute followed by 0.1% mercuric chloride for 4 minutes. The further sterilant was removed by washing the explants in double distilled water for five times. Surface sterilized nodal explants were excised and inoculated by vertical orientation on the medium containing different combinations of growth regulators viz. BAP (4.44, 8.88, 13.32 and 17.76 µM/l), NAA (2.69 µM/l) and IAA (4.65 µM/l). Explants were kept randomly to each treatment and cultures were placed under 16 hr light/day for photoperiod at 25 ± 2°C. After the inoculation of explants multiple shoots induction was observed after 16 days. During the process of shoot induction, 15 days subculture was strictly followed. Otherwise browning of explants on medium was noticed. During each experiment 250 explants were taken for multiple shoot induction and each experiment was repeated three times. After regeneration, the elongated shoots were excised and

transferred to a rooting medium consists of MS basal + IBA (Table 2). The *in vitro* rooted plants were taken out from the medium, washed under sterile distilled water to remove agar and the plant was transferred to pots containing soil and sand (1:1) for the hardening.

Results and Conclusion

The various concentrations of BAP in combination with IAA and BAP in combination with NAA were helpful for growth of multiple shoot induction (Table 1; Plate1a, b). However, the best and rapid growth was observed on MS medium with B5 vitamins, BAP (8.88 µM) and NAA (2.69 µM/l). Further increase in the concentration of BAP and NAA has less effect on the number of multiple shoots. In contrast, Individual treatment of BAP and combined treatment of BAP along with IAA showed less percentage of multiple shoots induction. Similar results were reported in *Daucus carota* L.[12], *Tristellateia australis*[13] and *Ricinus communis*[14]. These results confirmed that the plant *Solanum surattense* have less amount of endogenous hormones and require high levels of exogenous growth regulators for plant regeneration. Multiple shoots were separated and transferred to MS (half strength), containing different concentrations of IBA for root induction. Emergence of roots occurred within a period of 12-15 days. Further incubation of one week led to a very vigorous root growth (Plate1c). The maximum root growth was recorded on MS with 4.90 µM/l of IBA as a supplement (Table 2). The rooted plantlets were transferred to a mixture of sterilized soil and vermiculite (1:1) in the portrays for further development and hardening (Plate1d). These results are in agreement with earlier findings of *Datura metal*[15] and *Basilicum polystachyon*[16]. From our experimental data, it is evident that BAP and NAA are best suited for inducing multiple shoots and IBA for rooting. In conclusion, these results emphasized that the efficient and rapid propagation protocol of *Solanum surattense*.

Table 1: Effect of cytokinins and auxin on adventitious shoot proliferation from nodal explants of *S. surattense*

Plant growth regulators conc. (µM/l)			% of shoots	No. of shoots/nodal explant
BAP	IAA	NAA		Mean ± SD
4.44	4.65		54.8	11.6±0.62
8.88	4.65		71.2	21.2±0.67
13.32	4.65		53.2	10.8±0.18
17.76	4.65		68.6	18.4±0.41
4.44		2.69	42.6	8.8±0.90
8.88		**2.69**	**83.4**	**25.81±0.94**
13.32		2.69	64.8	14.6±0.32
17.76		2.69	58.4	12.0±0.10

Table 2: Effect of different concentration of IBA on root induction

IBA conc. (µM/l)	% of root induction	No. of roots/explant Mean±SD
4.65	42.6	8.8±0.90
4.90	**87.6**	**28.8±3.40**
9.80	62.4	12.9±0.90
14.70	53.4	10.0±0.10

References

1. Siddiqui S. and Faizi S. (1983). Studies in the chemical constituents of the fresh berries of *S. xanthocarpum*. *Journal of Chemical Society of Pakistan*, **5**: 99-101.
2. Manjunath B. L. & Shadaksharaswamy M. (1942). Reexamination of the alkaloids of the fruits of *Solanum xanthocarpum*, *Journal of Mysore University*, **3B**:117.
3. Kusano G., Beisler J. and Sato Y. (1973). Steroidal constituents of *Solanum xanthocarpum*. Phytochemistry, **12**:397-401.
4. Tupkari S. V., Saoji A. N. and Deshmukh K. (1972). Phytochemical study of *Solanum xanthocarpum*. *Planta Medica*, **22**:184-187.
5. Debey P. & Gupta P.C. (1936). A new flavonol glycosides from the flowers of *Solanum xanthocarpum*. *Phytochemistry*, **17**- 613.
6. Kannabiran K., Mohan Kumar and Gunasekar V. (2009). Evaluation of antimicrobial activity of saponin isolated from Solanum xanthocarpum and *Centella asiatica*. *Int. J Nat Engg Sci*, **3**:22-25.
7. Rahman M. T., Alimuzzaman M. and Shilpi J. A. (2003). Antinociceptive activity of the aerial parts of *Solanum xanthocarpum*. *Fitoterpia*, **74**: 119-121.
8. Siddharthan S., Yi-Zhong C., Harold C. and Mei S. (2007). Systematic evaluation of natural Phenolic antioxidants from 133 Indian Medicinal Plants. *Food and Chemistry*, **102**: 938-953.
9. Kar D. M., Maharana L., Pattnaik S. and Dash F. K. (2006). Studies on hpoglycaemic activity of *Solanum xanthocarpum* Schrad. & Wendl.

ISSN: 0976-7126

fruit extract in rats. *J. Ethnopharmacol*, **108**: 251-256.

10. Sharma L.M. S. and Srivastava C. N. (2007). Comparative efficacy of *S. xanthocarpum* extracts alone and in combination with a synthetic pyrethroid, cypermethrin, against Malaria vector, *Anopheles stephensi*. *South Asian Journal of Tropical Medicine and Public Health*, **38**: 256-260.
11. Baburaj S. and Thamizhchelvan P. (1991). Plant regeneration from leaf callus of *Solanum surattense* Burm. F. *Indian J. Exp. Biol.,* **29**: 391–392.
12. Pant B. and Manandhar S. (2007). *In vitro* propagation of carrot (*Daucus carota*). *Scientific World*, **5**: 5.
13. Poornima D. and Shivamurthy G.R. (2004). Micropropagation of *Tristellateia australi,* A rich through nodal explants culture. *Journal of Swamy Botanical Club*, **21**:31-32.
14. Suresh R. and Rao M.V (1994). *In vitro* clonal multiplication of castor (*Ricinus communis* L.). *Journal of Swamy Botanical Club*, **11**: 56-57.
15. Nithya P. and Arockiasamy D. I. (2006). *In vitro* mass multiplication of *Datura metal* L. from root explants. *Journal of Swamy Botanical Club*, **23**:131-134.
16. Amutha R., Jawahar M. and Ravi Paul S. (2008). Plant regeneration and *in vitro* flowering from shoot tip of *Basilicum Polystachyon* (L.) Moench – An important medicinal plant. *Journal of Agricultural Technology*, **4(2)**: 117-123.

In vitro* regeneration of *Solanum surattense

PLATE - I

a - Multiple shoot induction of nodal explant
b - 30 days old multiple shoot
c - Rooting of regenerated shoots
d - Hardening