GOVERNMENT DEGREE COLLEGE, ETURNAGARAM

MULUGU DISTRICT, TS – 506165

(RE ACCREDITED WITH 'B++' GRADE BY NAAC)

ACHIEVEMENTS OF DEPARTMENT

1. **Department of Botany Publish total Five research Article to National and International Journals.**
2. **Total Three students got M.Sc Botany seats in the Academic year 2021-22**

European Journal of Medicinal Plants

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Effect of Plant Growth Regulators on Somatic Embryogenesis and Plantlet Development of Turkey Berry (*Solanum torvum* SW)

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

In the present study it was reported on direct somatic embryogenesis and plant regeneration from cotyledon and leaf explants of Turkey berry/pea egg plant (*Solanum torvum* SW), a medicinally important plant. Somatic embryogenesis has several advantages over other routes of *in vitro* plant regeneration. Somatic embryogenesis was induced directly from cotyledon and leaf explants on MS medium fortified with BAP (0.5 mg/L)+NAA (0.5-6.0 mg/L). High percentage of somatic embryogenesis (90%), maximum number of somatic embryos formation (62±0.18) along with high percentage (76%) conversion of somatic embryos into bipolar embryos was observed on cotyledon explants in 0.5 mg/L BAP+2.5 mg/L NAA. At the same concentration of BAP (0.5 mg/L)+NAA (2.5 mg/L) also resulted on the maximum percentage of somatic embryogenesis (92%), the highest number of somatic embryos formation (88±0.15) and the highest percentage (76%) of somatic embryos conversion into bipolar embryos in leaf explants. A mixture of globular, heart and torpedo-shaped embryos were germinated on MS medium supplemented with 0.5 mg/L IAA+1.0-4.0 mg/L BAP. Maximum germination frequency (75±0.14) of somatic embryos and plantlet formation was

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Research Article

High efficiency direct *in vitro* regeneration from different explants of medicinal plant turkey berry (*solanum torvum sw*)

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Abstract

In the present investigation the role of different plant growth regulators (PGRs) on direct regeneration from various explants, cotyledon, hypocotyl and leaf was studied to find out the regeneration potentiality of the explant and also role of PGRs in Turkey berry/pea egg plant, *S. torvum*. The explants such as hypocotyl (0.4-0.8 cm long), cotyledon (0.6-0.8 cm^2) from 3 week old and leaves (1.0 cm^2) from 6 week old *in vitro* grown seedlings were excised and cultured on MS medium with various concentrations of BAP/KIN alone and also in combination with 0.5-1.0 mg/L IAA showed the direct shoots regeneration. All the explants have shown the maximum percentage of response (>90%) and highest number of direct induction of multiple shoots per explant (55±0.15 cotyledon, 52±0.13 leaf and 31±0.17 hypocotyl explants) was found at 0.5 mg/L IAA+2.5 mg/L BAP in comparison to different concentrations of cytokinins alone used and as well as in combination with IAA. Thus, it is clear that cotyledon explants were found to be more potential in producing high frequency number of shoots per explant among all other explants tested in the present investigations. Cytokinnes BAP/KIN alone or in combination with IAA was found more effective in inducing shoot regeneration in all the explants of *S. torvum*. However, 2.5 mg/L BAP/KIN with 0.5 mg/L IAA combination induced highest number of shoots. At 3.5 and 4.0 mg/L BAP in combination with 1.0 mg/L IAA, shoots were formed along with the callus. For *in vitro* rooting the elongated microshoots were transferred on to root induction medium (RIM) fortified with 0.25-2.0 mg/L NAA/IAA. Maximum percentage of response (92%), average number of roots (20.3±0.03) per micro shoot with highest length of roots (9.6±0.09) was observed at 1.0 mg/L IAA. *In vitro* rooted plantlets were transferred in to sterile vermiculate and soil (1:1) mix and subsequently these were acclimatized in the green house. The *in vitro* rooted plantlets were transferred into field. The survival percentage was found to be 90% and the plantlets were normal in morphology, flowering and fruiting. Thus, the regeneration protocol developed in the present investigation can be used for conservation and genetic transformation experiments in *S. torvum*, not only a medicinal plant but also a model plant.

Keywords: Plant growth regulators; cotyledon; leaf; hypocotyl explants; *in vitro* rooting; plantlet establishment.

INTRODUCTION

Solanum torvum Sw (Turkey Berry/Pea egg plant) is an ethnobotanical species growing wild in India. it is closely related to eggplant (*S. melongena* L.). Different parts of this ingredient in Thai cuisine (Arthan et al., 2002). The species contains steroidal alkaloids, viz., solasonine, torvogenin, torvoside and torvanol (Iida et al., 2005; Smith et al., 2008). It also possesses an antioxidants, antibacterial and

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High Frequency Callus Mediated Plantlet Regeneration from Different Explants of Ethno-medicinal Plant Turkey Berry (*Solanum torvum* Sw)

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Abstract: We report on the influence of different plant growth regulators (PGRs) as well as the type of explants on callus mediated regeneration in Turkey berry/pea egg medicinal plant, *S.torvum*. The explants viz., hypocotyl (0.4-0.8 cm long), cotyledon (0.6-0.8 cm^2) from 3 week old and leaves (1.0 cm^2) from 6 week old *in vitro* grown seedlings were cultured on MS medium with various concentrations (0.5-4.0 mg/L) of BAP/KIN alone and also in combination with 0.5 mg/L NAA/IAA. The calli developed from all the explants have shown the maximum percentage of response (94% leaf and cotyledon, 88% hypocotyl) and highest number of multiple shoots induction (36.2±1.50 leaf, 33.2±0.25 cotyledon and 23.4±0.11 hypocotyl explants) per explant with maximum length of shoots (3.9±0.18 leaf, 4.0±0.11 cotyledon and 3.7±0.19 hypocotyl) at 0.5 mg/L NAA+2.5 mg/L BAP (leaf), 0.5 mg/L IAA+2.5 mg/L BAP (cotyledon) and 0.5 mg/L IAA+3.0 mg/L BAP (hypocotyl) in comparison to different concentrations of cytokinins used alone and as well as in combination with IAA/NAA. The calli induced from cotyledon explants were found to be more potent in inducing high frequency number of shoots per explant among all other explants tested in the present investigations. Cytokinins BAP/KIN alone or in combination with IAA/NAA was found to be more effective in inducing callus mediated shoot regeneration in all the explants of *S. torvum*. For *in vitro* rooting, the elongated microshoots were transferred on to genetic transformation experiments in *S. torvum*, not only as a medicinal plant but also as a model plant, based on its regeneration potentiality.

Index Terms: Plant Growth Regulators, Cotyledon, Leaf, Hypocotyl, *In Vitro* Rooting, Plantlet Establishment.

I. INTRODUCTION

Solanum torvum SW (Solanaceae), a wild relative of eggplant (*Solanum melongena*) is commonly known as **Turkey Berry/Pea egg plant.** Different parts of this plant are used in the treatment of various diseases. Fumes of the burning seeds are inhaled for toothache (Bhakuni et al, 1969). In addition, the plant is reported to be a common ingredient in Thai cuisine (Arthan et al, 2002). The species contains steroidal alkaloids, viz., solasonine, torvogenin, torvoside and torvanol (Iida et al, 2005; Smith et al, 2008). It also possesses antioxidants, antibacterial and antidiabetic activities (Agrawal et al, 2010). Fruits of *S. torvum* are generally consumed by local tribal community as vegetable and infrequently available in the local markets (Choudhury et al, 2008, 2010; Deb et al,

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Transgenic Peanut (*Arachis hypogaea* L.) Plants Conferring Enhanced Protection Against Fungal Pathogens by Expressing *Tc chitinase-I* Gene

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Abstract

In this study, an efficient *Agrobacterium*-mediated genetic transformation method followed by *Tc chitiI* gene for enhanced expression in peanut (*Arachis hypogaea* L.) cv ICG 7827 is reported. *A. tumefaciens* strain LBA 4404 harboring the plant transformation plasmid pBinAR contains the *Tc chitI* gene and *nptII* gene as a selectable marker. The precultured leaflet (LL) explants were infected with *A. tumefaciens* containing *Tc chitiI* gene and cocultivated on SIM (MMS+10 mg/L BAP+1 mg/L NAA+2 mg/L $AgNO_3$) for four days. After co-cultivation, these explants were transferred to selection medium (SIM+75 mg/L Kan+250 mg/L Cefotaxime). In T_0 generation, 70 % of transformation efficiency was recorded. T_1 generation derived from the primary transgenic (T_0) events revealed a Mendelian inheritance pattern (3:1) for the *Tc chit I* transgene. T_1 transgenic peanut plants were tested for resistance against *C. arachidicola*, *C. personatum,* and *P. arachidis* by infection with the microspores using detached leaf assay. The *Tc chitI* gene expressed in T_1 transgenic plants have shown longer incubation, longer latent period, and lower infection frequencies than non-transformed (WT) plants. A significant negative correlation was recorded between chitinase activity and the frequency of infection to the *C. arachidicola*, *C. personatum* and *P. arachidis* pathogens.

Keywords: *Agrobacterium*-mediated transformation; Fungal resistance; *Tc chitinase-I* gene; *Cercospora arachidicola; Cercospora personatum*; *Puccinia arachidis*.

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RESEARCH ARTICLES

Micropropagation of an ethnomedicinal plant *Solanum torvum* Swartz

Ghan Singh Malothu[1,2] · Rajinikanth Marka[2] · Rama Swamy Nanna[2]

Received: 10 August 2022 / Revised: 30 September 2022 / Accepted: 1 October 2022

Abstract
In the current study, we described the impact of various plant growth regulators (PGRs) on the micropropagation of *S. torvum* (Turkey Berry), a crucial species for ethanomedicine. The explants were cultured on MS medium without PGRs (MSO) as well as MS medium that was fortified with 0.1/0.5 mg/L IAA and various concentrations of BAP/KIN alone. In comparison to KIN alone and IAA + KIN combination, BAP alone and in combination with IAA elicited more numerous shoots in both of the explants of *S. torvum* that were examined. At 0.1/0.5 mg/L IAA + 1.0–5.0 mg/L BAP/KIN, both explants demonstrated the highest response percentage (80–96%). As opposed to all other concentration combinations of PGRs employed, the highest frequency number of shoots (42.0 ± 0.23) with long (15.2 ± 0.13 cm) shoots were discovered at 0.5 mg/L IAA + 4.0 BAP from shoot tip explants. Thus, it is evident that in the current experiments, shoot tip explants were discovered to have a greater potential for producing a high frequency number of shoots per explant than nodal explants. The elongated micro-shoots produced in both cultures were transferred to root induction medium (RIM), which was supplemented with auxins at concentrations ranging from 0.25 to 2.0 mg/L NAA, IBA, and IAA, for in vitro rooting. At 1.0 mg/L IAA, the highest response rate (90%), the most roots per micro-shoot (17.6 ± 0.15), and the longest roots (8.5 ± 0.16) were seen. In vitro rooted plantlets were placed in sterile vermiculite and soil (1:1) mixture before being adjusted to the greenhouse environment. Plantlets that had been in vitro rooted were transplanted to the field. 90% of the plantlets survived, and their morphology, flowering, and fruiting were all deemed normal. The micropropagation procedure created in the current study can therefore be employed for genetic transformation research to introduce novel genes in the ethnomedicinal plant *S. torvum* as well as for conservation.

Keywords Plant growth regulators · Micropropagation · Shoot tip explants · Nodal explants · *In vitro* rooting · Plantlet establishment

Introduction

Turkey Berry/Pea eggplant is the popular name for *Solanum torvum* SW (Solanaceae). The Ivory Coast uses the fruits in soups and sauces and incorporates them into Thai cuisine (Horzog and Gautier-Beguin 2001). Bangladesh's commoners, particularly the tribes, eat *S. torvum* fruits as vegetables on a daily basis (Royal Horticultural Society 2001).

Solasonine and solamargine, two glycosilated derivatives of solasodine, were also found in *S. torvum*, according to Maiti et al. (1979). Traditional Chinese medicine frequently employs the fruits of *S. torvum*, also known as terung pipit, as antihypertensive and antinematodal medicines (Fui 1992; MacKeen, 1997a). Due to their excellent nutritional qualities, the fruits of *S. torvum* are used as food in addition to their therapeutic usefulness (MacKeen et al. 1997b). The primary components of *S. torvum* fruits include steroidal alkaloids, tannins, and saponins (Chah et al. 2000). According to Cowan (1999), tannins are a superior source of anti-

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