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**RESEARCH ARTICLE**

# *IN VITRO* SHOOT PROLIFERATION FROM SHOOT TIP EXPLANTS OF WINGED BEAN (*PSOPHOCARPUSTETRAGONOLOBUS*)

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**ABSTRACT**

The present paper reports on *in vitro* shoot tip proliferation using MS medium and various concentrations of Kn, BAP and TDZ respectively. Shoot tip proliferation were observed in combination with MS+TDZ (0.25 mg/L) induced 8.24±0.64 shoots per explants, while MS+Kn and MS+BAP (1.5 mg/L) induced 3.28±0.55 and 5.04±0.53 shoots per explants respectively. With MS+ TDZ maximum number of shoots was observed, while with KN and BAP minimum responsive were observed.



## INTRODUCTION

Winged bean (*Psophocarpus tetragonolobus)* belongs to Papilionaceae family. It has originated in Africa continent and then spread to Asia. In Asia it has been cultivated in India, Bangladesh, Indonesia, Thailand, Bangladesh, Sri Lanka and Malaysia.

Pulses are essential food grains because they are responsible for body growth and development. Day to day as increasing population there is need of more nutritional diet. The main task of agriculture is to ensure sufficient supply of food (good quality) for growing world population. Food production can be augmented by increasing the area of crop production and by increasing yield per hectare.

Underexploited crops, may be useful in contributing nutritional supplements. Group of crop plants which are potentially useful, while they have remained under utilized (anon, 1975; 1981). There are many underutilized crops have important nutritional qualities, such as high quality proteins (essential amino acids), high fat content, carbohydrates, minerals (such as iron) and vitamins (Chandel *et al.,* 1979), hence they are adapted to specific marginal agricultural conditions.

Winged bean is a self-pollinated crop. It can be grows as a tuber crop, green vegetable crops which contains high amount of protein in all parts of the plant i.e., seeds, leaves, pods and roots (National Academy of Sciences 1975; Chandel *et al.,* 1984), unripe seeds are used in soups and curries (Pospisil *et al.,* 1971) and mature seeds may be roasted and eaten like peanut (Aykroyd and Doughty, 1964).

The present paper reports on the development of protocol for *in vitro* shoots proliferation from shoot tip explants.

## MATERIAL AND METHODS

*Psophocarpus tetragonolobus* variety NS 122 were procured from Malaysia, Nature Seeds Store. Shoot tip explants were collected from research field, department of botany, Kakatiya University. Shoot tip were surface sterilized with tween 20 for 3 mints, followed by treatment with 0.1% mercuric chloride for 3-4 minute. Inoculation procedure fallowed by Ahmed *et al.,* (1996).

## RESULTS AND DISCUSSION

A number of treatments were tried to regenerate shoots from shoot tip explants that were excised from grown seedlings cultured in research field. A number of explants responded to regenerate multiple shoots in different concentrations of Kn (0.5-3 mg/L), BAP (0.5-3 mg/L) and TDZ (0.10-1 mg/L) in *P. tetragonolobus* variety NS 122, after two weeks of culture. Shoot tip proliferation were observed in combination with MS+TDZ (0.25 mg/L) induced 8.24±0.64 shoots per explants, while MS+Kn and MS+BAP (1.5 mg/L) induced 3.28±0.55

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and 5.04±0.53 shoots per explants respectively. With MS+ TDZ maximum number of shoots was observed, while with KN and BAP minimum responsive were observed.(Table-1, Fig. a-d). The proliferated shoots were used for induction of roots cultured on MS medium with different concentration of IBA alone or in combination with Charcoal.

IBA (0.75mg/L) + Charcoal (5%) the maximum mean number of roots (6.28±0.19) and root length (1.72±0.29) was observed (Table-2, Fig-e). Plantlets with 5-6 well expanded leaves and well developed roots were transferred to soil, plantlets (68%) survived in field conditions (Fig-f). Micropropagation is an alternative to the conventional method of vegetative with the objective of enhancing the rate of multiplication. This is the first report related to the *in vitro* shoot tip proliferation of *P. tetragonolobus* variety NS 122 cultured on MS medium supplemented with TDZ.

In our investigation shoot tip grown on TDZ supplemented medium showed better growth and more responsive to TDZ than Kn and BAP. Similar result was reported in leaf explants on MS+NAA+BAP by Gregory *et al.*, (1980).

Nodal explants cultured on MS+BAP Naik & Naik (2011), Bottino *et al.*,1979; Mehta and Mohan Ram 1981; Tran Thanh Van *et al.*, 1986, Venkateswaran *et al.*,1992, Vinayak Singh *et al.*, 2014, reported direct and indirect shoot regeneration in cotyledon, epicotyls and hypocotyls explants.

Praveen *et al.*, (2012) reported multiple shoot induction from shoot tip explants of *Cicer arietinum* cultured on MS+TDZ (3.0 mg/L).

**Table 1**Effect of Kn, BAP & TDZ individually on axillary shoot proliferation from shoot tip explants of *P. tetragonolobus*

| Growth regulators mg/L | Concentration | Shoot tip explants Mean±S.E |
|---|---|---|
| Kn | 0.5 | 1.60±0.33 |
| | 1.0 | 2.64±0.43 |
| | 1.5 | **3.28±0.55** |
| | 2.0 | 2.20±0.34 |
| | 2.5 | 1.44±0.25 |
| BAP | 0.5 | 1.04±0.23 |
| | 1.0 | 2.32±0.36 |
| | 1.5 | **5.04±0.53** |
| | 2.0 | 1.72±0.28 |
| | 2.5 | 1.64±0.04 |
| TDZ | 0.10 | 2.52±0.37 |
| | 0.25 | **8.24±0.64** |
| | 0.50 | 2.04±0.44 |
| | 0.75 | 1.56±0.18 |
| | 1.00 | 0.84±0.21 |

**Table 2** Effect of different levels of IBA+Charcoal (5%) on the rooting ability of *P. tetragonolobus*

| Growth regulators (mg/l) IBA+ Charcoal(5%) | % of response | Roots/explant | Root length |
|---|---|---|---|
| | | Mean±S.E | Mean±S.E |
| 0.25 | 56 | 5.60±0.19 | 0.58±0.23 |
| 0.50 | 60 | 4.14±0.36 | 0.72±0.36 |
| 0.75 | 76 | **6.28±0.19** | **1.72±0.29** |
| 1.00 | 52 | 1.36±0.21 | 0.24±0.22 |


**Fig.1** *In vitro* shoot proliferation in shoot tip explants cultured on MS medium supplemented with different concentrations of Kn, BAP &TDZ, in *P.tetragonolobus*

- **A.** Axillary shoot proliferation in shoot tip explants cultured on MS+Kn (1.5 mg/L)
- **B.** Axillary shoot proliferation in shoot tip explants cultured on MS+BAP (1.5 mg/L)
- **C.** Axillary shoot proliferation in shoot tip explants cultured on MS+TDZ (0.25 mg/L)
- **D.** Shoot elongation cultured on MS+$GA_3$ (1.0 mg/L**)** + Charcoal (10%)
- **E.** Regenerated plantlets cultured on MS+IBA (0.75 mg/L) + Charcoal (5%)
- **F.** Hardening in earthen pot filled with garden soil

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