



## **Conservation of Least Concerned *Physalis angulata* (L.) Through *In Vitro* Organogenesis**

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### **ABSTRACT**

*P. angulata* (L.) a huge spread weed of tropical, subtropical districts of the world is utilized as remedy to fix different health issues like asthma, kidney bladder, jaundice, gout, aggravations, and unsafe turn of events, stomach related issues and diabetes. The current examination was centered on duplicating the clones of the plant through aseptic innovation. In this course hub of *Physalis angulata* L. was refined on MS basal medium improved with various growth hormone groupings of BAP, KIN for shoot establishment. The most absurd measures of shoots were refined in a month and a half period. 10 micromolar BAP gave 47.2 number of shoots while 8 micromolar KIN gave 40.2 number of shoots while the length was almost 15 - 15.66 cm for both the hormones. The solid and appropriate shootlets were fused in to the rooting medium to have clones. 8 and 6  $\mu$ M auxins (NAA and IAA separately) created better outcomes on establishing. Progressive subculture of the plantlets in the hormonal culture media of MS and B5 supplements delivered hereditarily indistinguishable plantlets that were taken out for ex vitro perceptions.

**Keywords:** *Physalis angulata*, clones, nodal, MS basal medium, BAP, KIN

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### **INTRODUCTION**

*P. angulata* (L.) is a large scattered weed of tropical, subtropical and more blazing regions of the world. It is neighbor to the regions from USA to Argentina. The plant is sweeping in Asia and Africa and less extensively in Europe. In any case, a part of the creature bunches have large scattering. The plant is usually used as medicine to fix various health issues like asthma, kidney bladder, jaundice, gout, aggravations, sickness, stomach related issues and diabetes, etc., The plant eliminates from different parts have unmistakable pharmacological activities, for instance, unfriendly to perilous, immunomodulatory, against diabetic, diuretic and threatening to bacterial. The leaves are torment diminishing, parasiticide and relaxant. They are eaten to fix stomach-pulsate, colic, lithiasis and anuria, disgorging, the runs and resting issue. The leaves are used from a distance to deal with skin ailments like smallpox pustules, whitlow wounds, wounds, shivering and rheumatic torture. The leaves are applied to Guinea worm wounds. *Physalis angulata* has been reported to have 26 types of disease curing traditional usages in ten tropical countries[1]. The plant is a least concerned species as per the IUCN red list. The plant has been studied for the *in vitro* callogenic properties by Ayyadurai and Ramar, [2]. Several *in vitro* studies have been conducted in the family on various species like *Solanum trilobatum* [3, 4] *Physalis minima* [5], *Plectranthus ventiveroides* [6], *Physalis angulata* [7] and many more. Though the plant has medicinal uses only few works are published so to explore the wide usage and conserve the plant we have opted plant tissue culture methodology. The investigation aims to develop a standard protocol to enhance the multiplication ratio of the plant.

### **MATERIAL AND METHODS**

The node from first class field plants were surface cleaned and were disinfected under aseptic condition (70% liquor briefly + 0.1% mercuric chloride for 3-5 min+ two fold refined water for 4-5 times) to dispense with the hints of brilliant precious stone ( $\text{HgCl}_2$ ). The review was acted in basal medium with MS salts [8], B5 nutrients [9], 3% sucrose, 0.8% agar and factorial mixes 2-10  $\mu$ M BAP for shoot commencement and duplication. Roots were recovered in (2.0 - 10.0  $\mu$ M) of NAA and IAA. The medium was adjusted to a pH of 5.8 and incubated after inoculation of the explant. The investigation of change (ANOVA) filled in as the device for factual examination with Duncan's Multiple Range Test (DMRT) [10] at

5% importance. The well developed plantlets were hardened in paper cups of diameter 10 cm and were watered regularly and were finally acclimatized after 2 weeks.

## RESULT AND DISCUSSION

### Shooting

The nodal explants with axillary bud were moreover advanced on MS basal medium more desirable with BAP or KIN on my own in diverse fixations going from 2 - 10  $\mu$ M. From the nodal explants moreover BAP was located to actuate greater multiplication ratio of shoots while contrasted with KIN. The basal medium greater with 10 $\mu$ M BAP showed a 100% shoot growing recurrence, with 47.2 range of shoots with a shoot length of 15.66 cm followed by 8 $\mu$ M BAP with 90 % shoot growing recurrence with 43.2 number of shoots with shoot length of 14.48 cm. The basal medium is more advantageous with 8 $\mu$ M KIN showed one 100% shoot developing recurrence, with 40.2 number of shoots with a shoot length of 15.02 cm followed via 10 $\mu$ M KIN with 95% shoot developing recurrence with 33.4 quantity of shoots with shoot length of 14.62 cm. Of the two cytokinins BAP changed into discovered to provoke more number of shoots whilst contrasted with KIN in each nodal explants. Among specific explants resources the BAP turned into found to one 100% shoot enlistment recurrence and to create 47.2 (NE) separately. From this measurable overview 10  $\mu$ M BAP became found to be higher for shoot duplication from the nodal explant.

### Rooting

The two distinctive explants sources inferred shoots were refined on MS basal medium enhanced with various centralizations of NAA and IAA going from 2 - 10 $\mu$ M. Roots were started and multiplied inside 3 weeks of after incubation. The various centralizations of NAA to create greatest number of roots were instigated on MS basal medium enhanced with 8 $\mu$ M NAA 42.2 (NE) separately. The 100% root enlistment recurrence and most extreme root length 5.98 cm (NE) was seen in 8 $\mu$ M NAA. The MS basal medium enhanced with 6 $\mu$ M IAA showed 100% root acceptance recurrence 32.8 (NE) roots per shoot and the root length was 5.52 (NE) individually. On this factual review it is distinguished that MS basal medium enhanced with NAA was found to initiate more number of roots contrasted with IAA.

The study report of Ayyadurai V. and Ramar K [2] On Leaf and internodal explants of *Physalis angulata* L. to evaluate the effect of growth regulators on the *in vitro* callus induction and plant regeneration incorporated Leaf segments on MS basal medium fortified with (BAP (2.0 mg/l) + 2, 4-D (1.0 mg/l) presented highest callus growth (11.75%) which were yellowish Green Friable Callus (YGFC). The internodal segments provided best shoot induction response in MS medium containing BAP (2.0 mg/l) + KIN (1.0 mg/l) and IAA (1.0 mg/l) having mean value 14 number of shoots per explant. Excised shoots were transferred to rooting medium of various concentrations. The maximum numbers of 35 roots per shoot were produced on MS medium supplemented with 3.0 mg/l IBA. The well rooted plantlets were transplanted for acclimatization. The result of our study on shoot numbers and other parameters exceeded his report.

The nodal explants of our investigation showed 100% regeneration frequency in both shoot and root while the Mastuti and Munawarti [11] reported high frequency of shoot (75.2%) and root (57.1%) regeneration but also (38.9%) callus formation. We conclude that the combination is much suited for the regeneration of clones from the nodal explants the result was in harmony with Mastuti and Munawarti [11].

Higher recurrence of shoot recognition and multiplication were seen on MS basal medium superior with 2 - 10  $\mu$ M of the 2 Cytokinins. Of best explants sources utilized for this on the spot recovery, fairly the nodal explants are efficiently intricate shoot duplication on MS basal medium enhanced with diverse centralizations of Cytokinins. The numerous convergences of BAP 10 $\mu$ M turned into efficiently associated with 100 % shoot recognition recurrence and to supply greatest number of 47.2 (NE) shoots from the nodal explants. 8 $\mu$ M KIN suggests better shoot acceptance recurrence and to supply greatest range of 40.2 (NE), shoots separately from shoot tip. In the modern-day examination two auxins have been attempted, NAA was found to activate more number of roots. In 8  $\mu$ M NAA incited the finest wide variety of 42.2 (NE) roots per shoot in my investigation. In the MS basal medium better with 6  $\mu$ M IAA initiated 32.8 (NE) roots in line with shoot. To foster infection unfastened plant advent nodal explants are the better resources. A plant of excessive drug must be culture in huge scope. So plant tissue subculture may be an imperative tool for big scope advent of *Physalis angulata* for pharma enterprise and further studies.

**Table 1: Effect of different concentrations of cytokinins on shoot induction from the nodal explant of *Physalis angulata* L.**

BAP	KIN	Percentage of response (%)	Number of shoots	Shoots length (cm)
2 $\mu$ M	--	90	16.8 $\pm$ 1.92	10.82 $\pm$ 1.52
4 $\mu$ M	--	85	21.4 $\pm$ 3.04	12.06 $\pm$ 0.43
6 $\mu$ M	--	90	36.6 $\pm$ 2.30	13.58 $\pm$ 0.81
8 $\mu$ M	--	90	43.2 $\pm$ 2.77	14.48 $\pm$ 0.68
10 $\mu$ M	--	100	47.2 $\pm$ 1.92	15.66 $\pm$ 0.23
--	2 $\mu$ M	85	19.6 $\pm$ 4.39	10.96 $\pm$ 0.48
--	4 $\mu$ M	90	20.4 $\pm$ 2.96	11.68 $\pm$ 0.94
--	6 $\mu$ M	95	21.6 $\pm$ 2.40	13.24 $\pm$ 0.51
--	8 $\mu$ M	100	40.2 $\pm$ 1.92	15.02 $\pm$ 0.49
--	10 $\mu$ M	95	33.4 $\pm$ 2.70	14.62 $\pm$ 0.37

The data were recorded after 4 week culture.

**Table 2: Effect of different concentrations of auxins on root induction from the nodal explants derived shoots of *Physalis angulata* L.**

NAA	IAA	Percentage of response (%)	Number of roots	Root length (cm)
2 $\mu$ M	--	90	20.2 $\pm$ 1.92	4.08 $\pm$ 0.30
4 $\mu$ M	--	90	22.2 $\pm$ 2.38	4.66 $\pm$ 0.50
6 $\mu$ M	--	90	33.6 $\pm$ 2.79	4.72 $\pm$ 0.30
8 $\mu$ M	--	100	42.2 $\pm$ 1.92	5.98 $\pm$ 0.37
10 $\mu$ M	--	90	37.2 $\pm$ 1.92	5.08 $\pm$ 0.23
--	2 $\mu$ M	85	20.6 $\pm$ 1.81	4.42 $\pm$ 0.32
--	4 $\mu$ M	90	21.6 $\pm$ 2.70	4.96 $\pm$ 0.24
--	6 $\mu$ M	100	32.8 $\pm$ 2.86	5.52 $\pm$ 0.31
--	8 $\mu$ M	95	28.6 $\pm$ 1.51	5.18 $\pm$ 0.25
--	10 $\mu$ M	90	22.6 $\pm$ 2.07	5.06 $\pm$ 0.68

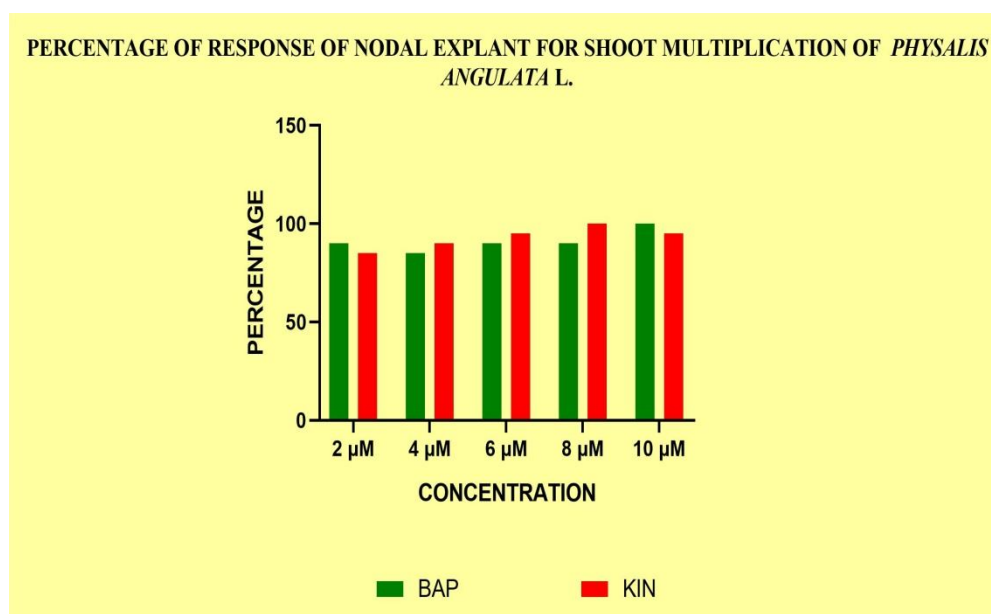
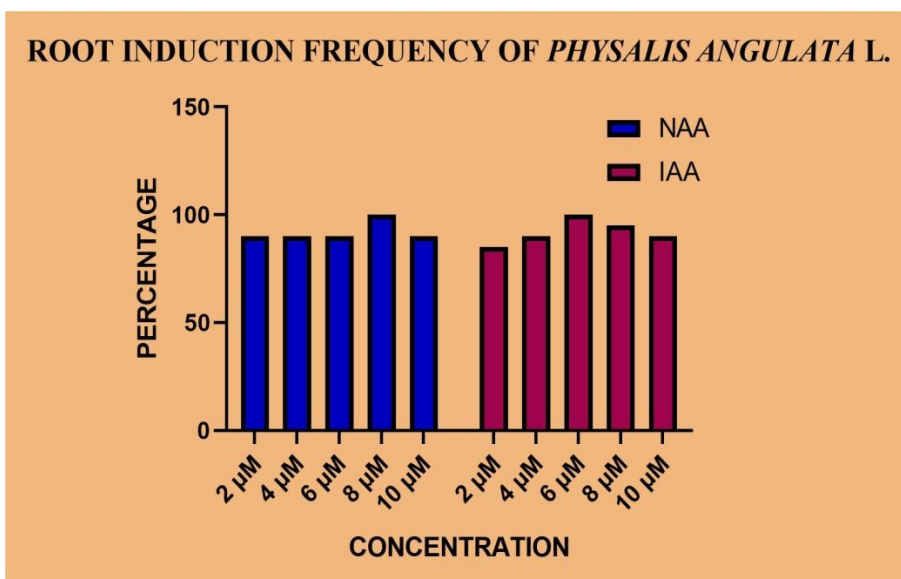
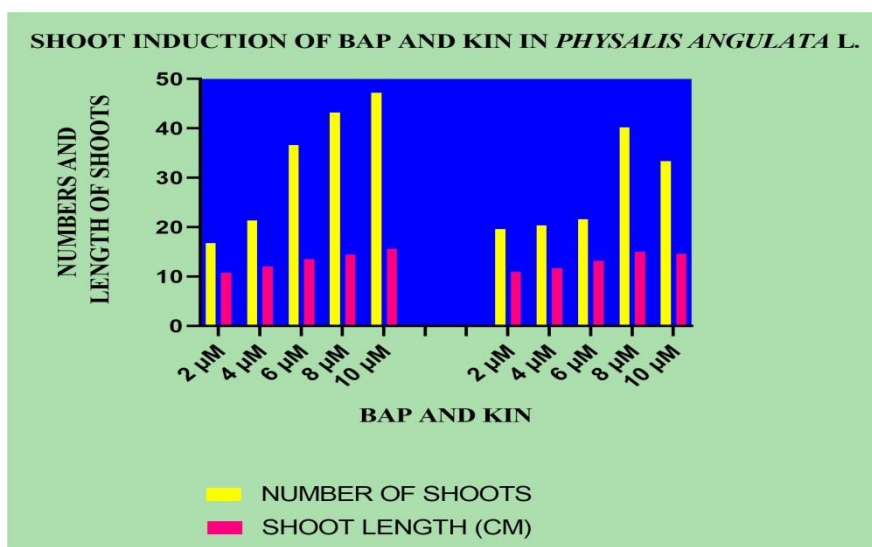
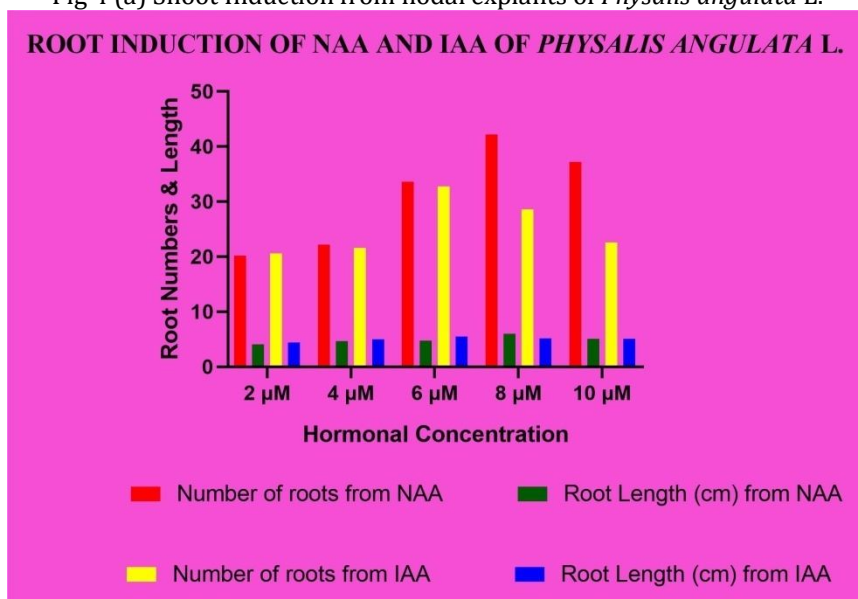


Fig3: (A) Percentage of response of nodal explant for shoot multiplication of *Physalis angulata* L

Fig 3: (B): Root induction frequency of *Physalis angulata* L.Fig 4 (a) Shoot Induction from nodal explants of *Physalis angulata* L.Fig 4 (b) Root Induction from nodal explants of *Physalis angulata* L.



**Fig.1. *In vitro* Multiple shoot induction from the nodal explant of *Physalis angulata***  
**a. Shoot initiation after 7 days of inoculation;**  
**b&c. Shoot multiplication after 14 & 20 days respectively**  
**d,e&f. Shoot multiplication after 24, 30, & 35 days respectively**



## CONCLUSION

*Physalis angulata* is a least concerned commonly found plant medicinal herb which has numerous beneficiaries in traditional system of medicine. The plant was explored to develop a standard protocol for direct organogenesis and 10 micromolar BAP and 8 micromolar NAA gave finer results for shoot and root multiplication respectively. This hormonal concentration can be used for commercialization and conservation of this plant species.

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## CONFLICT OF INTEREST

The authors have no conflict of interest

**AUTHOR CONTRIBUTIONS:** Dhinesh Kumar S- Contributed in conducting experiment, collecting and analysing data, paper preparation; Dr. Parvathi S - Research Supervision and article correction; Dr. Jahirhussain G - Assistance in research and protocol designing; Dr. Saravanan A - Contributed in data analysis; Karuniya Raja Viella G - Assistance in data interpretation.

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