

Direct Organogenesis of *Passiflora foetida* L. through Nodal Explants

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Key words: Passiflora foetida, Node explant, Direct organogenesis

Passiflora foetida L. belongs to the family Passifloraceae, one of the best known remedies for asthma and biliousness, is cultivated in different parts of India. It was regenerated from nodal explants through direct organogenesis without intervening callus phase. High frequency multiple shoots were formed on MS supplemented with 2.0 mg/l BAP + 1.0 mg/l Kn with 85% of survival rate. Maximum range of shoot elongation was successfully obtained on MS with 1.5 mg/l BAP + 0.5 mg/l NAA. The best root induction was found on 0.5 mg/l NAA + 0.5 mg/l IBA. This protocol seems to have enough potentiality for micropropagation of this valuable germplasm.

The use of medicinal plants is increasing world-wide. According to the World Health Organization (WHO), approximately 80% of the world's population currently use herbal medicines directly as tea, decocts or extracts with easily accessible liquids such as water, milk, or alcohol (Julsing et al. 2007). In vitro cell and tissue culture methodologies are envisaged as a mean for germplasm conservation to ensure the existance of endangered plant species, rapid mass propagation for large scale regeneration, and for genetic manipulation studies. Combinations of in vitro propagation techniques (Fay 1992) may help in conservation of biodiversity of locally used medicinal plants. *In-vitro* propagation of plants holds tremendous potential for the production of high-quality plant-based medicines (Murch et al. 2000).

Passiflora foetida (L.) is an important medicinal plant. In English it is called as stinking passion flower or wild water lemon or love-in-a-mist flower plant and in Tamil. It is dialect as mosukkattaa or poonaipidukku. It has been introduced to

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tropical regions of the world, The specific name, *foetida*, means "stinking" in Latin and refers to the strong aroma emitted by damaged foliage (Nellis 1997). It is a herbaceous climber emitting a foetial smell when bruised. It is distributed in several parts of India at plains from the coast and abundant on river bed. Flowers during November-May. Fruits normally found in February onwards. It is in orange colour when ripens (Matthew 1983).

Passiflora foetida having the numerous medicinal properties such as, fruits are said to be emetic and a decoction of them is used for asthma and biliousness, leaves are used as dressing for wounds, roots are said to be an emmenagogue and useful in hysteria and curing itches. The fruits are edible when ripe. But unripe fruits are poisonous and contain a cyanogenic glucoside. The edible portion of the ripe fruit contains 12% ash, 10 mg calcium, 6 mg phosphorus, 0.8 mg iron, 0.4 mg/100 mg niacin. Peelings of the fruits, seeds and leaves contain an unstable compound which yields hydrocyanic acid and acetone (Deshaprabhu 1966). Plants yield an edible fruit, the fruits are eaten. Young leaves and plant tips are edible. Dry leaves are used in tea in Vietnamese folk medicine to relieve sleeping problems. *P. foetida* is able to trap insects on its bracts, which exude a sticky substance that also contains digestive enzymes. This minimizes predation on young flowers and fruits (Radhamani et al. 1995).

The whole plants were collected by plucking with roots from the bank of river Kollidam in Tiruchirappalli, Tamil Nadu, India. They were replanted in Botanical Garden of St. Joseph's College, Tiruchirappalli, India.

Node explants were used for direct organogenesis in MS supplemented with 2,4-D, NAA, IAA and Kn was also used at 0.5 - 5.0 mg/l.

Cultures were maintained at $25 \pm 2^\circ\text{C}$ at 16 hrs light and 8 hrs dark per day of fluorescent light (2000 - 3000 lux) for all treatments. Subcultures were made on the same medium after 15 days.

The rooted plantlets were removed from the culture tubes and washed in running tap water. Then they were transplanted into plastic cups containing sterilized vermiculite. The plants were covered with plastic bags with perforations or holes. After 15 days the plantlets in the plastic cups were transferred to a shadow for about 30 days and then transferred to the soil.

The nodal explants were cultured on MS supplemented with BAP (2.0 mg/l) + Kn (1.0 mg/l) (Fig. 1A, Table 1) produced high range of multiple shoot (36.33 ± 5.90) buds after 20 days. Abubacker and Ramanathan (2004) reported that MS fortified with BAP and Kn was suitable for best shoot regeneration.

Best shoot elongation was obtained from nodal explants in MS supplemented with 1.5 mg/l BAP + 0.5 mg/l NAA (Fig. 1C). Similar results were reported by Mohapatra and Rath (2005) in *Baccopa moniera*.

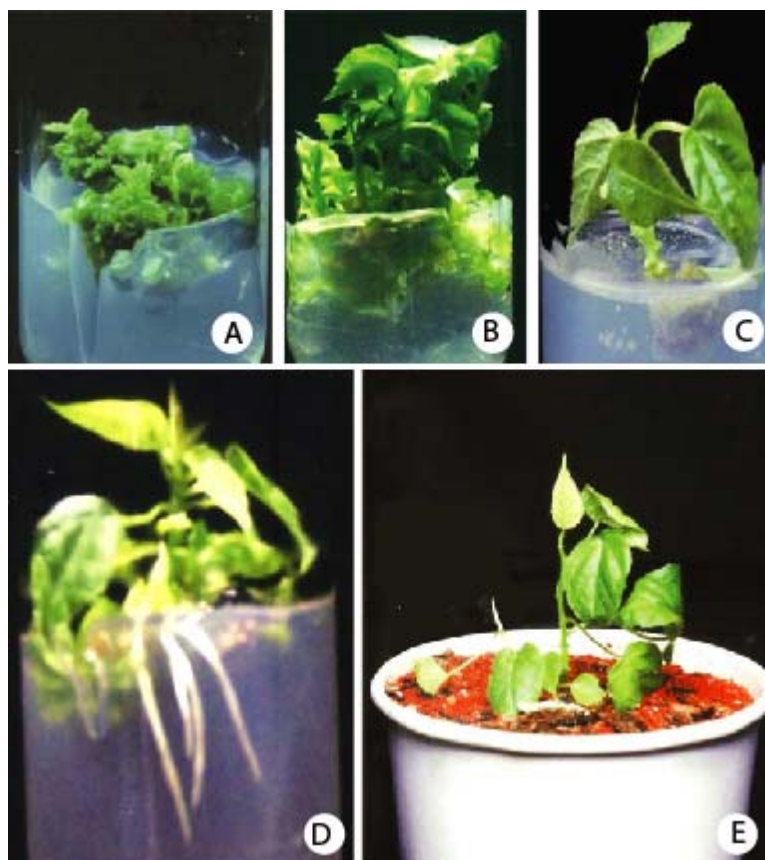


Fig. 1. Micropropagation of nodal explant of *Passiflora foetida* L. A. Multiple shoot formation on MS + 2.0 mg/l BAP and 1.0 mg/l Kn. B. Maturation of multiple shoots on MS + 1.5 mg/l BAP and 0.5 mg/l NAA. C. Shoot elongation on MS + 1.5 mg/l BAP and 0.5 mg/l NAA. D. Root proliferation on MS + 0.5 mg/l NAA and 0.5 mg/l IBA. E. Acclimatized plantlet.

Table 1. Response of the *Passiflora foetida* nodal explants for the production of multiple shoots in BAP and Kn.

Hormone conc. (mg/l)		Multiple shoots from nodal explant (Mean \pm Sd)
BAP	Kn	
1.5	0.5	28.33 \pm 2.86
2.0	1.0	36.33 \pm 5.90
3.0	1.5	25.66 \pm 3.29
4.0	2.0	15.66 \pm 3.29

The elongated shootlets derived from node of *Passiflora foetida* were transferred on to MS supplemented with different concentrations of NAA + IBA.

The best root induction was found on 0.5 mg/l NAA + 0.5 mg/l IBA (Fig. 1D & Table 2). Binoy and Kumar (2004) reported similar in *Ophiorrhiza mungo*.

Table 2. Root induction from the *Passiflora foetida* nodal explants with various concentrations of IBA and IAA

Hormone conc. (mg/l)		Node
IBA	NAA	
0.1	0.1	-
0.2	0.2	-
0.3	0.3	++
0.4	0.4	+++
0.5	0.5	++++
0.6	0.6	+++

++++ = High, +++ = Moderate, ++ = Poor, - = Nil.

The rooted plantlets were removed from the culture tubes and washed to free MS liquid media. They were then transferred into tea cups containing vermiculite and sterilized soil (1 : 1) for acclimatization (Fig. 1E). The survival rates of the hardened plants were found to be 85%.

The present study describes a well documented and reliable protocol of *Passiflora foetida* from nodal explants with much higher rate of multiplication. This protocol can be used as a basic tool for commercial cultivation of stinking passion flower plant.

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