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Mass vegetative propagation of *Cissus quadrangularis* L. in Herbal Garden

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Abstract

Vegetative propagation is a remarkable characteristic of certain plant species to multiply their number like its parental ones. Mass propagation of Medicinal and Aromatic plants is carried out by following seeds germination as well as by using their suitable plant parts to fulfill the basic aim of mass multiplication to protect their existence in nature.

Cissus quadrangularis L. is a tetragonal, climber, herbaceous Medicinal plant of family vitaceae. The plant is marked for its rapid propagation using by their mature stem. Mature stem easily cut from main plant body and are found to be much efficient for further propagation in large scale. Primarily it was mass propagated in prepared poly bags in Herbal Garden than transferred to suitable/selected fields for further growth. Porous soil with well water drainage system is suitable for its mass vegetative propagation by stems in presence of favourable environmental condition.

Keywords: *Cissus quadrangularis* L., Stem cutting, Vegetative Propagation, Herbal Garden.

1. Introduction

Plants are unique components of nature showing a remarkable diversity and variation among the different species and also affected by the changeable environmental condition. Each one species in nature willing to sustain and survive for long period to maintain their existence of species diversity in natural habitats. For this purpose plants are adapted to propagate itself following several modes such as by their seeds developed in their life phase.

Vegetative parts also found to be useful for propagation to develop in to new individuals like their parental ones. Most of the plants are also capable to propagate by using their modified plant parts like bulb, tuber, rhizome etc whereas the plants which does not forming seeds are referred the use of vegetative parts as a source of generation of the new individuals similar to their parental ones in the presence of the suitable climatic conditions.

If the plants modified forms are to be used as a source of the new plant propagule it should be taken in care the presence of 2-4 adventitious small buds. Stem cuttings are most frequently used for propagation of a variety of the plant species like *Cissus quadrangularis* L. etc.

This one plant is of a great medicinal proprieties and well performing to propagate using their stem cuttings mode. Each one stem part used for such purpose should include 4-6 nodes and it should be applied in prepared poly bags/fields as per needs to develop in to new plants of *Cissus quadrangularis* L. Each plant developed in Poly bags are suitable for its transfer to required sites and is playing a remarkable role in its conservation.

Current study based on mass propagation of *Cissus quadrangularis* L. using their stem cuttings. This process applied for significant production of its new plants in Herbal Garden aimed for its ex-situ conservation.

Fernandes and Banu 2012 ^[4], recorded on Medicinal properties of plants from the genus *Cissus*: A review. Gupta and Verma 1990 ^[5], found Unsymmetric tetracyclic triterpenoids from *Cissus quadrangularis* L. Jakikasem *et al.* in 2000 ^[6], made Phytochemical study of *cissus quadrangularis* L. Ethnobotany of *Cissus quadrangularis* L. from India studied by Kumbhojkar *et al.* 1991 ^[7].

Pharmacological and therapeutic activity of *Cissus quadrangularis* was noticed by Mishra *et al.* 2010 ^[8]. Austin *et al.* 2004 ^[1], carried out Pharmacognostical studies on *Cissus quadrangularis* L. variant I & II. Bharti *et al.* 2014 ^[2], studied Evaluation of wound healing activity of *Cissus quadrangularis* L. An assessment of the Phytochemical and Nutrient composition of the pulverized root of *Cissus quadrangularis* L was made by Enechi and Odonwodo 2003 ^[3].

Anti-ulcer activity of hydroalcoholic extract of *Cissus quadrangularis* stem studied by Saravanabhavan *et al.* 2013 ^[12]. Sen 1966 ^[13], Studied on the active constituents of *Cissus*

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quadrangularis L. Murthy *et al.* 2003 [9], recorded Antioxidant and Antimicrobial activity of *Cissus quadrangularis* L. Pluenjai and Saifah 1986 [10], experimented on Constituents of *Cissus quadrangularis* Linn. Raj 2011 [11], recorded Pharmacognostic and traditional properties of *Cissus quadrangularis* Linn -An overview.

Senthamari *et al.* 2013 [14], recorded Anti Arthritic Activity of *Cissus quadrangularis* L and *Justicia tranquebariensis* in the Treatment of Rheumatism. Shah 2011 [15], studied *Cissus quadrangularis* L. Phytochemicals, traditional uses and pharmacological activities - a review. Antiosteoporosis effect of ethanol extracts of *Cissus quadrangularis* Linn. Was analyzed by Shirwaikar *et al.* 2003 [16].

Cissus quadrangularis L in healing of fractures. A clinical study Made by Udupa and Prasad 1962 [17], Udupa and Prasad in 1963 [18], recorded the effect of *Cissus quadrangularis* L on healing of cortisone treated fracture. Vijay and Vijayvergia 2010 [19], found Analgesic, anti-inflammatory and antipyretic activity of *Cissus quadrangularis* L. Yogita in 2012 [20], studied on *Cissus quadrangularis* L: Boon to fractures.

2. Material and Methods

The plant is efficiently reproducing using its mature stem cuttings. A diseases free, healthy and mature plant *Cissus quadrangularis* L identified and was used as a source of stem cuttings for further development of the new individuals like their parental ones. 30 cm long, mature stems were removed from their mother plant without damaging it.

Well prepared soil, manure and sand mixture was made to support the further initiation of the new shoots and roots which further support the new development of the same plants.

It is a succulent nature plant so excess water is leading its adverse effect on the growth. In initial stage of the grown stem cuttings were supplied light irrigation/water and further water supplied as per need of the plants. Proper caring and management followed to support the rapid vegetative propagation using stem cuttings. It can be directly grown in prepared beds with moderate supply of water and suitable substratum to climb it.

50 poly bags of size 13 cm length and 8 cm width were selected and filled with fertile soil, manure and sand equally which acts as a medium for its regeneration using their stems (10 cm deep in poly bag individually) in Herbal Garden. After few days of stem cutting propagation new buds development starts and gradually plant convert in to new plant like their mother plant.

Developed plants of *Cissus quadrangularis* L was found to be helpful to transfer the plants easily from one place to another as per need. Above activities not only support the plants rapid multiplication but also for their dissemination and for conservation for future generations.

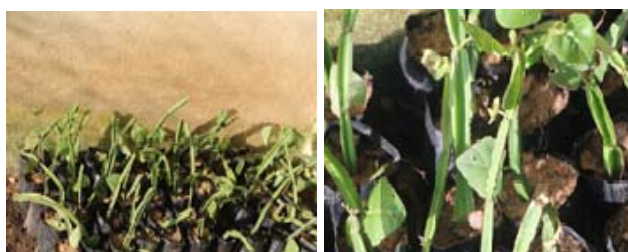
Mass vegetative propagation views on different stages



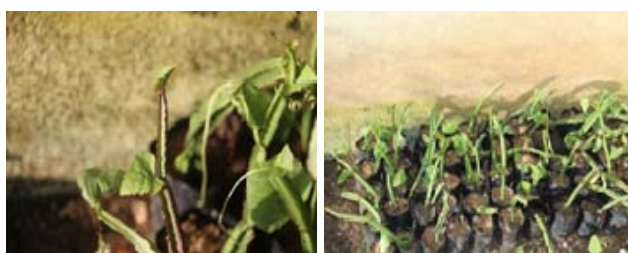
On starting of the experiment – (0 Day - 18 July 2015)



Variation in Stem cutting after 10 Days



Variation in Stem cutting after 20 Days

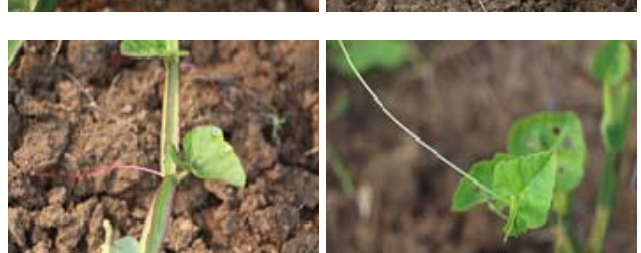




Variation in Stem cutting after 30 Days



Planting of the Developed plants in Beds in Herbal Garden



Variations in plant Morphological structure

3. Result and Discussions

The plant is quadrangular, Long, Herbaceous, Climber. It is capable to regenerate using its mature stem cuttings. Root originates from nodular part of the plant. It is in less branched and deep in soil, Root length 30 - 40 cm. Root diameter 5 – 8 cm in older plant. Stem - Herbaceous, Green, Quadrangular, Climbing tendency, Internodes 8 – 12 cm, Stem diameter 5 – 8 cm, Tendrils are found to be useful to climb on any substratum, Branched including high percentage of water. Leaves are petiolate, oval in shape, Simple, Green, Reticulate leaf venation, Leaf length 3.5 – 5.5 cm, Leaf broad 4-6 cm, Smooth surface, Shiny. Flowers are small and in clusters.

The plant forming dense canopy after maturation on any substratum with better climbing on it. It requires moderate range of water but need for support for climbing. The plant grows almost all type of soil with better water drainage system to avoid water logging.

Selected stem cuttings which further grown in each one of the poly bags were followed by the supply of their essential requirements. One stem cutting in each poly bags were introduced for regeneration of the plant *Cissus quadrangularis* Linn. A total of 50 poly bags were used for this purpose.

After of grown stem cuttings in poly bags around 10-15 days it initiates to develop in to new buds indicating the success of the experiment. Above experiment followed by moderate water supply in all poly bags separately. Each one developed plant of *Cissus quadrangularis* L in poly bags were utilized to grow further in prepared sites/beds in Herbal garden. Now these are also maintained as per need of the plant. The method of vegetative propagation is well performing for this plant to multiply the plant species useful for its conservation.

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