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Mass multiplication of *Mentha piperita* L. using stem cutting in Herbal garden for Ex-situ conservation

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Abstract

Every one species of the medicinal and aromatic plants are unique due to presence of certain chemical compounds. Multiplication of the varied plants is followed by many modes like by their seeds as well as by their vegetative parts including the various modified plant parts such as bulb, tuber, rhizome, corm etc. *Mentha piperita* L. is a aromatic plant of medicinal values after its pharmacological preparations. The plant is not capable to reproduce seeds but well adapted to multiply using their stem cuttings. Older stem cuttings are showing much efficiency in term of their mass multiplication using stem cuttings. Collected stem cuttings were introduced in Herbal Garden and applied for their rapid multiplication by using small parts of the mature stem cuttings. Soil with nutrients, well water facilities is supporting its reproduction vegetatively. Fifty poly bags were used for developing the new individuals of the *Mentha piperita* L. individually followed by fulfilling the requirements of developing stem cutting parts.

Keywords: Stem cutting, *Mentha piperita* L, Vegetative Propagation, Herbal Garden.

1. Introduction

A plant includes rich potential in term of treatment of various disorders among the human population. Presence of specified chemicals supports the effect of plants on human body. Rich plant diversity showing a major role in formation of biodiversity in certain ecological areas. Plant diversity is a important segment for biodiversity in nature. Alteration in plant types, diversity and richness of the plant species is affected by several factors like their genes and is regulated by the changing environmental conditions.

A variation in environmental components is leading by nature which further decides the presence of the individual species in natural habitat. Plants are focusing to complete their life cycle in a specific season of the year or over the year. On this basis plants are categorized as annual, biannual and perennial in nature. As per need of the plants if natural facilities available than they can grow and multiply significantly to form a major plant population.

Complex plant population leading the formation of rich plant community and further these are registered as a rich segment of the natural biodiversity.

Tendency of the plants to grow in nature is variable as most of plants in a plant population are efficiently reproducing their new own individuals using their seeds for maintaining their existence in nature. Seed dispersal of varied plants is also unique in nature.

The plants which are not capable to producing seeds are well adapted to regenerate by using their other plants like root, stem, leaf etc. Modifications of the vegetative plant parts such as bulb, tuber, rhizome etc are also a better source for its rapid regeneration to form new plants similar to their mother plants *Mentha piperita* L. is a short, herbaceous plant with aroma and is not capable to produce seeds but includes rich potential to regenerate in to their new copies following the utilization of the mature stem cuttings with support of the suitable environmental condition.

Buta *et al.* 2014 Studded on the Vegetative Propagation through Cuttings of *Mentha x piperita* Hybrid using Various Rooting Substrates. Chalchat *et al.* 1997^[2] studied variation of the chemical composition of essential oil of *Mentha piperita* L. during the growing time. Productivity and biochemical composition of *Mentha piperita* L. of different origin was studied by Dambrauskiene *et al.* 2008^[3]. Galib and Al-Kassie. 2013^[5] marked the role of peppermint (*Mentha piperita* L.) on performance in broiler diets. Antimicrobial screening: *Mentha piperita* L essential oil made by Iscan *et al.* 2002^[6]. Khorasaninejad *et al.* 2010^[7] find out the effect of salinity stress on growth parameters, essential oil yield and constituent of peppermint (*Mentha piperita* L.).

Koul *et al.* 2008^[8] recorded essential oils as green pesticides: potential and constraints. Mimica-Dukic *et al.* 2003^[9] experimented on antimicrobial and antioxidant activities of three

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Mentha species essential oils. Moghtader 2013 recorded in vitro antifungal effects of the essential oil of *Mentha piperita* L. and its comparison with synthetic menthol on *Aspergillus niger*. Antioxidant properties and composition of aqueous extracts from *Mentha* species, hybrids, varieties, and cultivars was carried out by Dorman *et al.* 2003 [4].

Rao *et al.* 2000 [12] studied comparative composition of whole herb, flowers, leaves and stem oils of cornmint (*Mentha arvensis* Lf. *piperascens* Malinvaud ex Holmes). Antibacterial and antioxidative characterization of essential oils from *Mentha piperita* and *Mentha spicata* grown in Iran was observed by Rasooli *et al.* 2008 [13]. Rita *et al.* 2011 [14] recorded an Updated overview on peppermint (*Mentha piperita* LL). Antimicrobial Activity and Medicinal Values of Essential Oil of *Mentha Piperita* L was studied by Neeraj *et al.* 2008 [11].

Shrivastava 2009 [16] made a review on peppermint oil. Rohloff *et al.* 2005 studied on effect of harvest time and drying method on biomass production, essential oil, and quality of peppermint (*Mentha x piperita* L).

Suresh Kumar and Murali. 2007 [17] find out antibacterial activity of *Mentha piperita* L. (peppermint) from leaf extracts - a medicinal plant. Essential oil composition of menthol mint (*Mentha arvensis*) and peppermint (*Mentha piperita* L) cultivars at different stages of plant growth from Kumaon region of western Himalaya was studied by Verma *et al.* 2010 [18].

2. Material and Methods

Mentha piperita L. is an herbaceous, aromatic plant developing runner inside of soil which further found to be helpful to develop new plants. Healthy plants older stem cuttings were made around 18cm long. These are deep in water overnight than applied for further its propagation. Each one of the stem cuttings should include 4-6 nodes are well performing in terms of their multiplication.

Selected stem cuttings were directly grown in prepared soil till the deep 04cm followed by light irrigation and proper monitoring made for success of its vegetative propagation.

The plants were also propagated in poly bags (8cm broad and 13cm deep) filled with fertile soil, manure and sand mixture equally and is used as a medium for growth and development of the stem cuttings to convert them as their mother plants. Stem cuttings were deeping by 04cm in prepared poly bags separately. Above vegetative propagation was observed and as per need of the developing stem cuttings facilities were managed for easily development of the new plants separately in different fifty poly bags.

Images of varied stages of plant Multiplication



Plants on 0 Day - 18 July 2015



Plants growth after 10 Days



Plants growth after 20 Days



Developed plants plantation in prepared Beds in Herbal Garden



Plants growth after 30 Days



Plants Morphological changes



3. Result and Discussions

The plant is marked for its fast aroma from aerial part of the body. Porous soil with better water removal facilities leads its proper growth and development. Plant height 30-40cm, Root length 15-20cm, Root diameter 3-4cm, branched. Stem are green and herbaceous in top and basal part hard in comparison to the top part of the stem, Stem branches 10-15, Stem diameter 2.5 -3.5cm,

Internodes 2-3cm, Angular, Branched, Aroma present. Leaves are Green, Simple, Petiolate, Dentate margin, Leaf length 4-5 cm, Leaf broad 2-3cm, Opposite and Decussate, Smooth surface with presence of aroma. Flowers are white and in clusters, does not forming seeds.

The plant is performing better in vegetative propagation using its mature stem cutting in favourable environmental condition. It is also a source of aroma useful for extraction of essential oil. Soil which includes sand and manure equally are utilized as a source of media for its rapid multiplication in Herbal garden.

Each one mature stem cuttings were further applied in 50 poly bags separately were found to success in developing new individuals of the *Mentha piperita* L.

New runners also producing by the plant inside of soil which further capable to convert in to new individuals of this plant. After success of rapid vegetative propagation the developed plants in each one poly bags were further shifted to the selected and prepared beds in Herbal garden for their better growth and development. Necessary management and plant protection measures were applied for their rich growth and development to spreading in the cultivated beds.

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