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## Mass vegetative propagation of an aromatic medicinal plant *Melissa officinalis* Linn for Ex-situ conservation in Herbal Garden

**Durgesh Dixena and DK Patel**

### Abstract

Growth tendency of the plants are variable among the varied plant species in nature. The variation among the species is important segment for forming biological diversity in particular habitat. To maintain the diversity status plants are adopted for many ways to regenerate themselves as their parental ones. Such modes are referred as mode of multiplication and is classified in two major category as Seed/Sexual and vegetative/Asexual propagation. Many of the plants are efficiently producing seeds which further grow in coming favorable season At the same time it is also noticed that many plants are not capable to produce seeds and are potentially capable to propagate using their Vegetative plant parts.

Current study is based on the study of vegetative propagation using stem cutting of the *Melissa officinalis* Linn in Herbal garden in GGV campus. The study followed by the stem cutting propagation in poly bags filled with soil, sand and manure mixture. The experiment was properly monitored to fulfill the requirements of the developing plant part in each a poly bags separately. Changes were recorded following capturing of images in ten days interval.

**Keywords:** *Melissa officinalis* Linn. herbal garden, stem cutting, vegetative propagation

### Introduction

There is a wide diversity of plants over the world. Some plants are found in specific area are known as endemic species. Based on the presence of rich diversity of flora and fauna specific ecological areas are marked as hotspots. There are two hot spots are located in India viz Western Ghat and Eastern Himalaya. These are rich center of biological diversity associated with variety of plants and animals. It is due to variation in climatic condition and potential adaptability of certain bio species in changeable climatic condition.

Plants are valuable bio-resource utilized among the human society in multifold directions such as for food fodder and fuel. These are also participating a great role in formation of biodiversity in certain ecological areas. Plants showing wide range of variation in terms of their presence, growth pattern, regeneration modes etc. Plant adaption is an important aspect towards their presence in specified ecological areas. Plants are unique regarding their adaption capacity in changeable environmental conditions and are also showing variation to adopt in their local climatic condition. Some plants are found in specific ecological areas which are termed as endemic plant species are showing variation in different eco regions. Presence of the plants in nature is leading and determined by several biotic and abiotic factors. Temperature, Light, Soil etc are termed as abiotic ecological factors significantly playing their role in starting to ending of plant life. Each one of the plants in nature is trying to maintain their existence for the same purpose plants are efficiently producing numerous seeds.

There is enough variation in seeds size, shape, colour, weight etc. these are also showing difference in their development period in individual plant life. Some plants producing seeds annually where as some are well registered to produce seeds seasonally in a year. Among the rich diversity of the plants, many are not efficiently capable to produce seeds. These categories of the plants are significantly regenerating by the potential application of their vegetative plant parts like root, stem, leaf etc. The modified plant structures such as bulb, tuber, rhizome, corm etc are potent for developing new plants similar o their parental plants. The rate of plant regeneration in nature is not equal for all the plants.

Current study is based on the propagation of *Melissa officinalis* Linn using their stem cutting in prepared/filled with media in Herbal Garden developed for the purpose of propagation as

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well as for ex-situ conservation in GGV Campus Bilaspur (Chhattisgarh) in central India. The study leading mass vegetative propagation of the aromatic plant *Melissa officinalis* Linn.

Some earlier works carried out by some researchers on the plant *Melissa officinalis* Linn are as Abdellatif *et al* 2014 [1] studied on chemical composition and antimicrobial activity of the essential oil from leaves of *Melissa officinalis* L. Adinee *et al* 2008 [2] found essential oil component in flower of Lemon Balm (*Melissa officinalis*). Allahverdiyev *et al* 2004 [3] recorded antiviral activity of the volatile oils of *Melissa officinalis* L. against Herpes simplex virus type-2. Amina *et al* 2013 [4] studied on in Vivo Potential Anti-Inflammatory Activity of *Melissa officinalis* L. Essential Oil. The aromatic and polyphenolic composition of lemon balm (*Melissa officinalis* L.) tea was studied by Carnat *et al* 1998 [5].

*Melissa officinalis* L. essential oil: antitumor and antioxidant activities recorded by Carvalho *et al* 2004 [6]. Antiviral activity of *Melissa officinalis* (Lemon balm) extract was recorded by Cohen *et al* 1964 [8]. Dastmalchi *et al* 2008 [9] analyzed on chemical composition and in vitro antioxidative activity of lemon balm (*Melissa officinalis* L.) extract. *Melissa officinalis* L. extract – an effective remedy noticed by Chwil *et al* 2014 [7].

The chemical composition of Lemon balm and basil plants grown under different light conditions was gained by Frąszczak *et al* 2015 [10]. Holla *et al* 1997 [11] found composition of the essential oil from *Melissa officinalis* L. cultivated in Slovak Republic. Anxiolytic effects of a combination of *Melissa officinalis* and *Valeriana officinalis* during laboratory induced stress was studied by Kennedy *et al* 2006 [12]. Modulation of mood and cognitive performance following acute administration of *Melissa officinalis* (Lemon balm) was done by Kennedy *et al* 2002 [13]. Lin *et al* 2012 studied on antioxidant, anti-proliferative and cyclooxygenase-2 inhibitory activities of ethanolic extracts from lemon balm (*Melissa officinalis* L.) leaves. Chemical composition of volatile oil in lemon balm was done by Masakova *et al* 1979 [15]. Mimica *et al* 2004 [16] noticed on antimicrobial and antioxidant activities of *Melissa officinalis* L. (Lamiaceae) essential oil. A review of chemical components and pharmacological effects of *Melissa officinalis* L was made by Miraj *et al* 2016 [17]. Miroslav *et al* 2012 [18] focused on optimisation of Antioxidant Extraction from Lemon Balm (*Melissa officinalis*).

Study on Multiplication of some important Medicinal plants in G.G.V. Bilaspur, C.G. India was done by Patel D. K. 2012 [20]. *Melissa officinalis* L., a valuable medicine plant: A review made by Moradkhani *et al* 2010 [19]. Chemical composition, antioxidant and anticholinesterase activity of *Melissa officinalis* was studied by Pereira *et al* 2014 [24]. Patel D. K. 2016 [21] studied on *Piper longum* Linn. Application of Stem cutting for rapid vegetative propagation in herbal garden.

Patora *et al* 2003 [23] found variability in the content and composition of essential oil from lemon balm (*Melissa officinalis* L.) cultivated in Poland. Shoot propagation of *Paederia foetida* Linn in herbal garden for Ex-situ conservation was made by Patel D. K. 2016 [21]. Pirtarighat *et al* 2017 [25] found antimicrobial effects of green synthesized silver nanoparticles using *Melissa officinalis* grown under in vitro condition. Constituents of the essential oil from *Melissa officinalis* was analyzed by Sarer and Kokdil 1991 [27]. Saeb and Gholamrezaee 2012 [26] found variation of essential oil composition of *Melissa officinalis* L. leaves during different stages of plant growth. Sari and Ceylan 2002 [28] studied on yield characteristics and essential oil composition of Lemon

balm (*Melissa officinalis* L.) grown in the Aegean region of Turkey. New antioxidative, benzodioxole from *Melissa officinalis* L was recorded by Tagashira and Ohtake 1998 [29].

## Material and Methods

The plant *Melissa officinalis* Linn is aromatic, herbaceous nature plant with water loving tendency. It also includes rich medicinal values and is efficiently propagating by the vegetative methods by potential application of stem cuttings. For the purpose of present study where hundred poly bags were used aimed for its vegetative propagation. Poly bags including fertile soil, sand and manure mixture equally and experimental set up done in herbal garden. Every poly bags were used individually for growing one-one stem cuttings by deeping four cm depth with proper water supply.

In presence of suitable environmental condition the grown stem cuttings starts to develop new root, shoot which further convert in to new plants similar as their mother plants. Regular observations were done on the experiment to record the changes as well as supply water as per the need of the experimental plants. Images were taken following ten days interval. After successful development of *Melissa officinalis* Linn in poly bags these are transferred in the field in herbal garden and are maintained by supply necessary requirements to the newly developing plants.

## Result and Discussions

*Melissa officinalis* Linn is commonly known as Sweet balm, Blue balm, Balm Plant, Dropsy plant, Honey Plant, Balm mint, Lemon mint, Sweet marry, Melissa, Heart's delight, Lemon balm, Garden balm etc. It is belonging to the family Lamiaceae.

The plant is Low growing, delicate, perennial, highly scented, vigorous medicinal and aromatic herb with lemon like smelling. Plant height is around three feet. It includes tap root system. It has heart-shaped/oval, simple, green, serrated and pointed leaves with aroma. The leaves are mostly utilized as medicinal purpose. Stems are angular, smooth and branched in nature. It also include aroma. Small white/yellow, tube shaped flowers produced by the plant during May – August. The flowers attract insects. It is water loving plant need for proper harvesting to support their regular growth throughout the year. It is potentially propagating by utilization of its Stem cutting like their mother plants. The plant requires moderate range of water during initial phase of growing.

All plant species in nature includes specific quality due to presence of certain chemical compounds and are differ between plant to plant species. Based on the presence of chemicals plants are varying their potential application in treating different disorders. Regular cultivation process of varied Medicinal and aromatic plants not only supporting economic benefits to the farmers/cultivars but also it is playing significant role in conservation of such Medicinal and Aromatic flora in nature. Propagation using Vegetative parts/Stem cutting of the plant *Melissa officinalis* Linn is influenced supported by the moisture level during initial stage of plants growth in poly bags separately by potential utilization of their stem cuttings.

Current paper is dealing with the study on rapid propagation using its vegetative plant parts such as stem cuttings. To gain the above targets stem cuttings of the plant *Melissa officinalis* Linn were used for developing Poly bag nursery. It is further leading its propagation as well as transfer of the same plant as per required sites. All the requirements needed for successful bud and root initiation as well as for stem cutting growth were

supplied in sustain manner.

Different events related to the experiments were recorded following by taking images in every ten days interval. Current study supporting the mass vegetative propagation of *Melissa officinalis* Linn in Herbal Garden developed in University campus for the same purpose. The study also supporting further conservation of the rich aromatic as well as medicinal plant *Melissa officinalis* Linn. The plant *Melissa officinalis* Linn has efficient potential in the term of medicinal qualities to treat several disorders and is potentially utilized among the human society in multifold directions.

**Active constituents in *Melissa officinalis* Linn.**

*Melissa officinalis* Linn including several chemical compounds like phenolic compounds, flavonoids, rosmarinic acid, rhamnazin, campesterol, chlorogenic acid, beta-sitosterol, succinic acid, glycosides monoterpene, terpenoid components including citral, citronellal, citronellate, eugenol and pomolic acids, polyphenols, triterpenoids; caryophyllene, linalol, limonene.

***Melissa officinalis* Linn - Medicinal Values –**

The plant *Melissa officinalis* Linn is registered for its wide range of utilization for varied purposes such as Analgesic, Anti-anxiety, Antibacterial, Anti-depressant, Antifungal, Anti-inflammatory, Anti-microbial, Antioxidant, Antipyretic, Antispasmodic, Antithyroid, Antiviral, Carminative, Digestive, Hypertension, Hyperthyroid, Insect bites, Sedative, Skin problem, Stimulant, Wounds,

**Conclusions**

Finally it is concluded that the media Sand, Manure and Soil equally are better for this plants root initiation as well for success of the plant growth.

Due to presence of rich Aroma as well as medicinal property the plant *Melissa officinalis* Linn is most valuable needed for rapid propagation/cultivation. The above process directly supporting the rich degree of their propagation using mature stem cutting and supporting their conservation for future generation.

***Melissa officinalis* Linn: Different stages of development**



*Melissa officinalis* Linn: 17-09-2017



*Melissa officinalis* Linn: 27-09-2017



*Melissa officinalis* Linn: 07-10-2017





*Melissa officinalis* Linn: 17 – 10 -2017



*Melissa officinalis* Linn: 27 – 10 -2017

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