

Vegetative Propagation of *Coleus forskohlii* (Wild) Briq using their Stem Cutting for *Ex-situ* Conservation in Herbal Garden

Patel DK*

Department of Rural Technology, Guru Ghasidas Vishwavidyalaya (A Central University), Bilaspur, Chhattisgarh, India

Abstract

Coleus forskohlii is a plant renowned for its medicinal as well as for aromatic values. It is medium heighted, herbaceous nature plant belonging to family Lamiaceae. Medium water supply is needed for this plants successful growth and development. This plant is also produces a beautiful violet coloured flower which further develops in to seeds of small size and round in shape. Mature stems are easily cut and found to be potential to convert in to its new small plants similar to their parental plants. The plant is well known for their propagation using their seeds and by stem cutting in the presence of favourable environmental conditions. The current paper deals with the study on its vegetative propagation using their mature stem cuttings in poly bags including sand, manure and soil mixture equally. Selected stem cuttings for the above purpose were allowed to grow in each one of the poly bags with medium water supply at the starting of the experimentation. Later on as per need of the developing plants facilities were given and managed to support the rich growth and development of the plant to make the experiment success. After development of the new plants these are carefully removed from poly bags and are further grown in the prepared beds in Herbal garden to multiply as well for *ex-situ* conservation. Related findings are discussed further more in this paper.

Keywords: *Coleus forskohlii* (Wild) Briq; *Ex-situ* conservation; *Coleus forskohlii*; Stem; Vegetative propagation; Herbal garden

Introduction

Biodiversity includes variation and variability among the different living species of different natural habitats. Out of them plant diversity also placed in significant construction of biodiversity. Plant diversity is affected by several biotic and abiotic factors and is also regulated by their genes. Plant life is always affected by their population structure, natural effect in different phases of their life.

Interaction between environmental components and biota is important concern among the nature and living species. Each one species in nature willing to live long and to sustain in nature. Aimed for above reason the plants are forming numerous seeds after pollination and fertilization. A seed includes resting embryo between the cotyledons and are also protected by a cover known as seed coat. Seeds are variable in their size, shape, colour and weight etc. These are also unique for their germination tendency in the presence of favorable environmental condition. Resting phase of embryo in seeds is also variable in different plant species in nature.

Plants are remarkable source of a variety of products such as food, fodder, fuel, medicine etc. Due to presence of certain chemical compounds in plants these are performing their role in treatment of specific disorders. The group of the plants used for such purpose is referred as Medicinal and Aromatic Plants. Demand of these plants among the society is increasing day by day because of their rich potential of treatment, low cost and better effect.

Focusing on above points Conservation of these plants are of great concern in current situation over the world. To support the conservation process not only protection but their rapid propagation is also an urgent need so, plant/plant parts should be applied to regenerate them. Plants can be propagated either by seeds or by applying their vegetative parts including modified plant structures like bulb, tuber, rhizome and corm etc. All plants in nature are not equally capable to produce seeds but are well gifted by nature that they can propagate by their vegetative parts.

Many plants like *Coleus forskohlii* (Wild) Briq etc. are capable to develop seeds for further development of the new plants in coming season.

The plant is also well adapted to regenerate using their stem cutting. Stem cutting made following proper length and mature stem focusing on the presence of nodes and small buds. The plant is marked for their wide range of propagation using both sexual and asexual modes.

The current is focusing the rapid vegetative propagation of *Coleus forskohlii* (Wild) Briq using their mature stem cutting aimed for their multiplication as well as for *Ex-situ* conservation in Herbal Garden. Kavitha et al. [1] found *Coleus forskohlii*: A comprehensive review on morphology. Ahmed and Vishwakarma [2] found Coleoside, a monoterpene glycoside from *Coleus forskohlii*. Kala [3] studied on antimicrobial Activity of *Coleus forskohlii* (Wild) Briq and *Costus igneus* N.E.Br.

Kavitha et al. [4] Analyzed variability for qualitative and quantitative traits in *Coleus forskohlii* Briq. Schaneberg and Khan [5] focused on quantitative analysis of forskolin in *Coleus forskohlii* (Lamiaceae) by reversed-phase liquid chromatography. Sharan et al. [6] recorded effective Propagation and Evaluation of Salt Tolerance in *Coleus forskohlii*, an Endangered Herb. Lakshmanan et al. [7] focused on *Plectranthus forskohlii* (Wild) Briq. (Syn: *Coleus forskohlii*) – A Compendium on its Botany and Medicinal uses.

Misra et al. [8] studied on variability in the chemical composition of the essential oil of *Coleus forskohlii* genotypes. Mastiholi and Hiremath [9] studied on influence of spacing and time of harvest on forskolin content and yield in *Coleus forskohlii*. Neelam et al. [10] studied on *in vitro* propagation of *Coleus forskohlii* Briq., a threatened medicinal

*Corresponding author: Patel DK, Department of Rural Technology, Guru Ghasidas Vishwavidyalaya (A Central University), Bilaspur-495 009, Chhattisgarh, India, Tel: +919993660173; E-mail: dplantscience@yahoo.co.in

Received June 16, 2016; Accepted July 11, 2016; Published July 14, 2016

Citation: Patel DK (2016) Vegetative Propagation of *Coleus forskohlii* (Wild) Briq using their Stem Cutting for *Ex-situ* Conservation in Herbal Garden. Med Aromat Plants (Los Angel) 5: 261. doi: 10.4172/2167-0412.1000261

Copyright: © 2016 Patel DK. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

plant. Paul et al. [11] focus on the High value Medicinal plant, *Coleus forskohlii* Briq. Reddy et al. [12] experimented on shoot organogenesis and mass propagation of *Coleus forskohlii* from leaf derived callus.

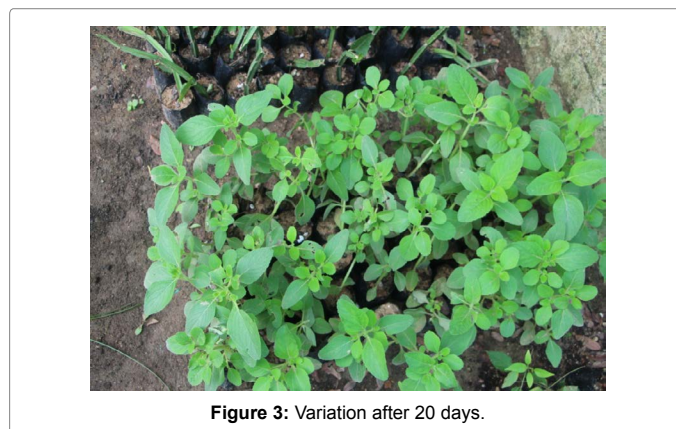
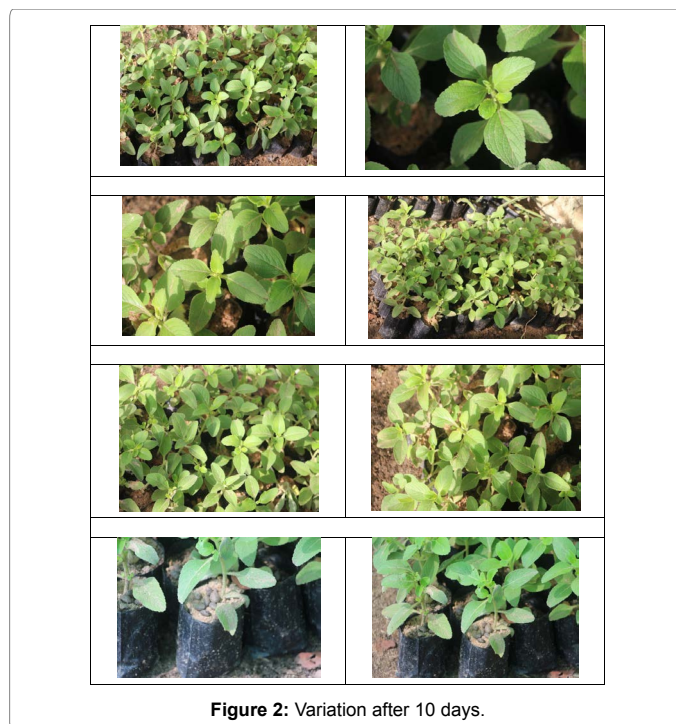
Veeraragavathatham et al. [13] focused on performance of two varieties of *Coleus forskohlii* under different spacing levels. Yao et al. [14] found chemical constituents of *Coleus forskohlii*. Vishwakarma et al. [15] recorded variation in forskolin content in the roots of *Coleus forskohlii*. Sen and Sharma [16] studied on *in vitro* propagation of *Coleus forskohlii* Briq. for forskolin synthesis. Sharma et al. [10] studied on *in vitro* propagation of *Coleus forskohlii*. Briq., A threatened medicinal plant, Plant Cell Rep.

Materials and Methods

The plant *Coleus forskohlii* (Wild) Briq having efficient potential to develop new plants like their parental plants following by the seeds and by stem cuttings. The plant is well propagated using their mature stem cuttings. Each one cut part of the stem selected from mother plant based on their diseases free and maturity were further grown in directly in prepared beds.

For the same purpose there are fifty poly bags, sand, soil manure etc were collected. Mature plant parts/ stem cuttings were also selected and carefully removed from mother plant without damaging it.

Each poly bags were filled with sand, soil, manure and are further used for developing new plants of *Coleus forskohlii* (Wild) Briq using stem cuttings. Each one cut part of them included 4-6 buds and 10-15 cm long was cut from mother plant without damaging it. These stem cuttings were further used to develop the new plants following deeping in prepared fields and also in fifty poly bags. Well-developed plants in poly bags were shifted to required beds in Herbal garden (Figures 1-5). Proper monitoring was done to know the requirement of the developing plants in poly bags time to time. As per need of the plants facilities were provided.



Results and Discussion

The plant *Coleus forskohlii* (Wild) Briq is a herbaceous, green, branched herb of a great medicinal and aroma source. It includes many medicinal values giving it a rich value in market. Proper water facility and drainage system needed in the cultivated fields for avoiding water logging and to control on plant damages. Tap root present, branched. Stems are cylindrical, branched, hairy, upper part weak and green whereas below portion of the plant are solid in comparison to the top. Leaves are simple, small petiole, green, hairy, rough surface, dentate margin, thick and including aroma.

Flowers are small, attractive, blue-violet in colours and originating in a single flower axis. After pollination these are capable to forming several small, round seeds having potential to develop new individuals of this plant in favourable environmental conditions. Mixed media in poly bags performed their excellent combination which supports the easy and fast development of root as well as for shoot system in grown stem cuttings of *Coleus forskohlii* (Wild) Briq.

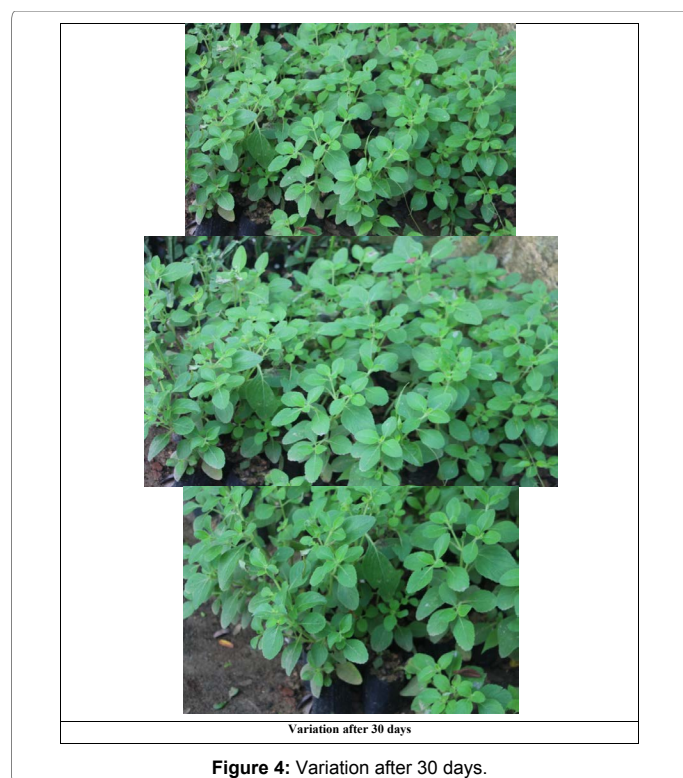


Figure 4: Variation after 30 days.



Figure 5: Shifting of developed plants.

With support of the favourable climatic condition *Coleus forskohlii* (Wild) Briq stem cuttings were started to develop new buds on their nodular part. These buds are further developing shoot system whereas roots are developing from nodular part of the stem at the base deep in soil in poly bags. Low temperature and high moisture level support the process of root and shoot development.

Finally it is concluded that the current study support the process of *Coleus forskohlii* (Wild) Briq rapid vegetative propagation in poly bags and is supporting their wide dissemination in required fields. This practice is helpful for *Ex-situ* conservation of this Medicinal plant *Coleus forskohlii* (Wild) Briq.

Acknowledgements

The current work supported by UGC New Delhi as providing Start up Grant research project on the Topic "*Ex-situ* Conservation of important Medicinal and Aromatic Plants (MAPs) Resources from Chhattisgarh in Guru Ghasidas Vishwavidyalaya (A Central University) Campus, Bilaspur, C.G." No. F. 20-17(3)/2012 (BSR) - Dated 8 March 2013.

References

- Kavitha C, Rajamani K, Vadivel E (2010) *Coleus forskohlii*: A comprehensive review on morphology. Phytochemistry and pharmacological aspects 4: 278-285.
- Ahmed B, Vishwakarma RA (1988) Coleoside, a monoterpene glycoside from *Coleus forskohlii*. Phytochemistry 27: 3309-3310.
- Kala S (2014) Antimicrobial Activity of *Coleus forskohlii* (Wild) Briq and *Costus igneus* N.E.Br. IOSR. Journal of Pharmacy and Biological Sciences 9: 1-6.
- Kavitha C, Vadivel E, Thangamani C, Rajamani K (2007) Analysis of variability for qualitative and quantitative traits in *Coleus forskohlii* Briq. J Horticult Sci 2: 44-46.
- Schaneberg BT, Khan IA (2003) Quantitative analysis of forskolin in *Coleus forskohlii* (Lamiaceae) by reversed-phase liquid chromatography. J AOAC Int 86: 467-470.
- Sharan AK, Singh BP, Dubey SR, Kumar R, Kishor A, et al. (2014) Effective Propagation and Evaluation of Salt Tolerance in *Coleus forskohlii*, an Endangered Herb. International Journal of Advanced Science, Engineering and Technology 3: 24-31.
- Lakshmanan GMA, Manikandan S, Panneerselvam R (2013) *Plectranthus forskohlii* (Wild) Briq. (Syn: *Coleus forskohlii*) - A Compendium on its Botany and Medicinal uses. International Journal of Research in Plant Science 3: 72-80.
- Misra LN, Tyagi BR, Ahmad A, Bahl JR (1994) Variability in the chemical composition of the essential oil of *Coleus forskohlii* genotypes. J Essent Oil Res 6: 243-247.
- Mastiholi AB, Hiremath SM (2009) Influence of spacing and time of harvest on forskolin content and yield in *Coleus forskohlii*. J Medicinal and Aromatic Plant Sci 31: 101-104.
- Neelam S, Chandel KPS, Srivastava VK (1991) In vitro propagation of *Coleus forskohlii* Briq., a threatened medicinal plant. Plant Cell Reports 10: 67-70.
- Paul MA, Radha D, Kumar S (2013) On the High value Medicinal plant, *Coleus forskohlii* Briq. Hygeia. JD Med 5: 69-78.
- Reddy NS, Sairam P, Rodrigues R, Rajasekharan R (2001) Shoot organogenesis and mass propagation of *Coleus forskohlii* from leaf derived callus. Plant Cell, Tissue and Organ Culture 66: 183-188.
- Veeraragavathatham D, Venkatachalm R, Sundararajan S (1985) Performance of two varieties of *Coleus forskohlii* under different spacing levels. South Indian Hortic 33: 389-392.
- Yao CS, Shen YH, Xu YL (2002) The chemical constituents of *Coleus forskohlii*. Nat Prod Res Dev 14: 1-6.
- Vishwakarma RA, Tyagi BR, Ahmed B, Hussain A (1988) Variation in forskolin content in the roots of *Coleus forskohlii*. Planta Medica 54: 471-472.
- Sen J, Sharma AK (1991) In vitro propagation of *Coleus forskohlii* Briq. for forskolin synthesis. Plant-Cell-Rep. Berlin, Germany. Springer International 9: 696-698.