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Unlike the phytomedicines, synthetic medicines are known to create various side effects and eventually develop resistance to the drugs which certainly demands to find new combinations of various synthetic analogues. This situation has certainly increased the cost of health measures which is not affordable to society in developing countries like India. Also, major population of developing countries mostly rely upon traditional folk medicines acquired from wild resources. Thus, it is essential to include various phytomedicines in the development of medical treatments which may prove more efficient without the chances of side effects. Along with this, the urban middle and higher class society population have attracted towards the herbal medicines due to their efficient and safe nature.

_Plectranthus barbatus_ syn. _Coleus forskohlii_ is an exclusive source of a labdane diterpene forskolin along with diversified chemical contents. Forskolin has wide spectrum of therapeutic value in varied health ailments. So, day by day it's demand is increasing in national and international market which had exerted a burden on its wild natural resources. This situation also demands extensive research on most prominent and efficient cultivation management techniques to improve the productivity and sustainability of this plant _C. forskohlii_. There are so many ways to restore important medicinal plants out of which cultivation of such medicinal plant will definitely help to remove the load on natural resources. It will certainly aid in the management of ever-increasing demand of forskolin in pharma industry. It will share the burden on natural sources.

A massive figure of plant species are being used in Indian medicine systems such as homeopathy, folk, Ayurveda, Sidha, Unani and more. More than 4500 species till today are used in different folk medicines, about 2000 in Ayurveda, 500 to1000 in Sidha, Unani and homeopathy (Sunilkumar, 2005).

The importance of medicinal plant in health care results from the combination of secondary products present either in whole plant or in plant parts. These secondary products may be phytochemicals, steroids, biologically active compounds, alkaloids, antioxidants, flavonoids, pigments etc. and day by day the demand of these compounds is increasing. Herbal and medicinal plant export from India is increasing enormously (Sunilkumar, 2005). India is a major source of medicinal plants with about 8000 species. (Bahadur et al., 2007)
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The global status of medicinal and aromatic plant (MAP) material can be well understood from the figures indicating a huge volume of trade at the national and international levels. Countries like Japan and Korea as the main consumers of medicinal plants and China and India are the world’s leading producing nations (Rao et al., 2004).

It is estimated that the total figure of medicinal and aromatic plants in international trade is around 3000 species worldwide (Schippmann et al., 2002). This increasing demand for medicinal plants and their indiscriminate harvesting has caused serious threats to natural habitats. Because of over exploitation from natural habitats, many potential plant species have become extinct and some have become critically endangered. Over exploitation of medicinal plants had led to loss of biodiversity and indiscriminately over exploited forests. In India, about 70% of medicinal plants are originated in tropical and subtropical forests and 30% are found in temperate and high-altitude forests (Reddy, 2004). Most of the plant species in India are being utilized for medicinal purposes are collected by local inhabitants from wild sources that is from forests so, majority of medicinal plants have become extinct or endangered from natural habitats. *Plectranthus barbatus* syn. *Coleus forskohlii* is one of such threatened medicinal plant species (Biswas et al., 2000). It is therefore essential that systematic cultivation of such a medicinal plant should be introduced in order to conserve biodiversity and protect endangered species (De silva., 1997) and also to encounter the ever-increasing demand of medicinal market.


It is known by vernacular names like in English- Coleus, Indian Coleus, Hindi- Patharchur, Patharcheer, Marathi- Mainmul, Sanskrit- Pashan Bhedi, Makandi, Gandhmulika, Gujarati- Garmalu, Tamil- Karpooravalli (Karpuravalli), Pashan Bheda, Marunthu Koorkan, Kannada- Makandiberu.

It is a subtropical and warm temperate species originated in lower elevations of India. It is found wild in arid and semi-arid zones of India. It is perennial,
branched, aromatic, medicinal herb with thick fleshy tuberous root stock and fibrous roots used in Ayurveda since centuries. It has broad range of therapeutic value. Its roots are medicinally important as these are the only source of an active alkaloid diterpene forskolin/forskohlin which was isolated in 1970s (Bhat et al., 1977 and De souza., 1983). The diterpene forskolin is medicinally important due to its ability to stimulate the synthesis of cAMP by stimulating the enzyme adenylate cyclase which brings about the cascade of number of physiological and biochemical activities in the body of an animal. It has been reported to have broad range of health benefits as anti-allergic, antiglaucoma agent, Broncho spasmyotic, anti-asthmatic, in skin diseases against eczema, psoriasis, for cardiovascular support (lowering blood pressure) and in body weight management and against angina and cancer (Ammon et al, 1982; Ammon and Muller, 1985; Lakshmanan et al., 2013).

According to Biswas et al., (2000), *P. barbatus* or most commonly known as *Coleus forskohlii* is among the threatened medicinal plants and needs urgent attention of conservationist. Although of great medicinal value, this plant is cultivated in Maharashtra and Karnataka for its carrot alike tuberous roots which are used as condiments and in the preparation of pickles. In Kolhapur district, it is reported to be grown in Nesari, Tarewadi, Kowad and Herale. (Yadav and Sardesai, 2002). The annual rainfall requirement for its cultivation is 100-160cm mainly during June-September. Warm and moist climate and a relative humidity of 85-95% with temperature within 10-25°C is best suited for its growth. It can be easily grown in loamy soil or sandy loam, well drained, fertile loam soil having pH 5.5 to 7.9. Red or Laterite soils are very good for its cultivation. But it can grow on soil with limited fertility. (Farooqui et al., 2004).

However, for large scale cultivation of medicinal plants, in developing countries like India, there is need to acquire better technologies and techniques for programmed cultivation of medicinal plants is current issue (Das et al., 2008). Cultivation of medicinally important plants has been recently started in several countries like Japan, China, Europe and America. However, the important parameters such as selection of planting material, mode of propagation, nursery techniques, nutrient cycles, growth regulator requirements and regulation of partitioning of photosynthates for specific plant species have not been considered in detail. Plant growth regulators (PGRs) can be used as promising factor to increase the efficiency of
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medicinal plant/plant parts. Growth and productivity/efficiency of medicinal plant can be improved either by application of nutrients or growth regulators (Swamy, 2004; Sunil Kumar, 2005, Swamy and Rao, 2008, 2009, Kim et al., 2009; Gupta et al., 2010 and many)

It is revealed from the literature survey that the plant growth regulators can be used most proficiently to improve the production of medicinally important plant or plant parts. In medicinal plant cultivation plant part or parts used as a source of drug, determine the value of the product and a combination of the treatment of growth regulators have been determined to improve the growth potential. Various groups of growth hormones (natural and synthetic) are known to alter the growth and development along with primary and secondary metabolism. In case of medicinal plants, growth as well as secondary metabolism is most imperative concerning to medicinal content or value. PGRs can modify plant’s growth, development and source-sink relationship of primary and secondary metabolites in a positive way w. r. t. its economic importance. The utility of plant growth regulators in modification or manipulation of medicinal plant growth, physiology and biochemistry is very well established. There are certain strategic planning attempts which have been made for the cultivation and management of *Coleus forskohlii* as a crop (Patil, (1989), Shah and Kalakoti, (1996), Padmpriya *et al.*, (2008) but very limited information is available on the influence of plant growth regulators on growth, physiology and biochemistry of *Coleus forskohlii*. Some attempts have been made to study the effect of plant growth regulators on *Coleus forskohlii* (Sunilkumar, 2005; Swamy and Rao, 2011). Gupta *et al.*, (2010) also noticed significant variation in tuberous root growth of of *Coleus forskohlii* as a effect of plant hormones such as IAA, GA₃, kinetin. Out of which IAA (10⁻⁵ M) concentration gave highest stimulation of number and fresh and dry weights of tubers followed by GA₃ (10⁻⁵ M) and kinetin (10⁻⁷ M) agains control. *In Vitro* studies of Balsubramanya *et al.*, (2011) on the effect of plant hormones on morphogenesis and forskolin production in *P. barbatus* revealed that 2,4-D, 2,4,5-TP, 2, 4 ,5-T, and picloram induced callus while NAA, IAA and IBA stimulated rhizogenesis. They found highest forskolin production in root culture grown on Gamborg's B5 medium provided with 0.5 mg l⁻¹ NAA.

*Coleus forskohlii* is one of the most utilized plants for its medicinal properties. Due to over exploitation, this plant is under serious threat of extinction. So, attempts
have to be made to overcome the threat on *Coleus forskohlii* and for this, maximum measures have to be considered. Although this plant bears so much of medicinal potential, its use is only limited for making pickles and as a condiment in many areas. The local variety of this plant is somewhat neglected or less attended species. Very less work has been done in case of local variety and regarding effect of PGRs on local variety the work is almost to null. This Indian curative plant undoubtedly demands the modern integrated disease managing technology and upgraded agriculture practices to increase the area of cultivation of this plant which will satisfy the growing demand of pharmaceutical industry and to increase the productivity of medicinal plant and to safeguard the wild plants from uncontrolled exploitation (Khatun et al., 2011). To increase the productivity of medicinally important plants utilization of plant growth hormones is one of the most promising and efficient technique applied in modern cultivation practices nowadays. The present study is aimed to understand the effect of some of plant growth regulators on medicinally important plant *Plectranthus barbatus* (Andr.) Syn. *Coleus forskohlii* (Briq. Willd.).

The thesis is divided into four chapters. The review of available literature on the genus *C. forskohlii* and the effect of various groups of plant growth regulators on medicinally important plants has been carefully compiled and it forms the substance of first chapter. In the second chapter, the methodology followed for present investigation has been explained in detail. The findings of the present investigation are discussed in the light of recent and relevant literature in the third chapter, ‘Result and Discussion’. The significant findings are briefly summarized in fourth chapter heading ‘Summary and Conclusions’. The literature cited in the thesis is systematically presented in the last part of the thesis ‘Bibliography.’