

## **SUMMARY AND CONCLUSIONS**

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In the recent years exploitation of natural resource especially drugs and useful chemical substances and natural products has been in vogue in this respect, India and especially Western Ghats is rich source of plants which are known to yield important drugs, alkaloids, tanins, and steroids etc. Coleus forskohlii a member of the Labiatae is widely under cultivation in Maharashtra, Gujarat, Karnataka. It is mainly cultivated because it's root tuber is used in pickling. However, it also grows wild in the Western Ghats. The active principle forskolin used as a antihypertensive drug has been detected in the recent years in the roots of Coleus forskohlii. In the natural population there is lot of variation both due to variation in the soil as well as due to genetic variability. The quantitative as well as the qualitative variation by and large is influence by the soil nutrition also. To understand all these intricacy it is necessary to carry out systematic work on cytology, genetics as well as physiology. In the present investigation karyotypic analysis of cultivated stock has been carried out. Besides the effect of NPK nutrition on the quantitative root biomass yield, the effect of foliar application of  $Mg^{2+}$  and  $Mn^{2+}$  which is known to stimulate the drug has been carried out. With a view to isolating mutant for high yield, the cuttings were Gamma-irradiated and they were studied at M1 and M2 generations. Quantification of drug

from the experimental stocks raised on different conditions has been carried out by TLC method. The results have been statistically analyzed wherever necessary. Methodology of study employed is based on the recent literature. The findings are as follows :

1. Cytological study revealed that Coleus forskohlii has a chromosome number  $2n = 30$ .
2. There are 3 categories of chromosomes,  
 Type A - Long chromosome with satellite,  
 Type B - Long chromosome with secondary constriction,  
 Type C - Long chromosome with median primary constriction .
3. Karyotypic formula is -

$$Kn = A^{st} + B^m + C^{sm} + 2D^m + 3E^{sm} + F^t + 2G^{st} + H^m + I^{st} + J^{st} + K^{sm}$$

4. The size range of the somatic chromosomes is 1.5 u to 5.04 u. Therefore, it is considered as small chromosomes.
5. It is speculated  $n = \frac{1}{2}5$  number of Coleus forskohlii has originated by aneuploid means.
6. The mineral analysis of the leaf and the root tuber has revealed that :
  - a) Calcium rich soil facilitates better growth of Coleus forskohlii.

- b) The Mg and Mn requirement of the root is more than that of leaf.
  - c) The higher proportion of Fe in the root than the leaf reflects on its requirement.
  - d) The trace element such as Cu, Zn, Co are in adequate quantity both in the roots as well as in the leaf.
7. The poor nitrogen content of leaf and root of Coleus forskohlii is a reflection on the need to apply more nitrogen.
  8. The NPK trial of different doses of different combinations revealed that neither nitrogen nor phosphorus but potassium requirement of the plant is more. Higher amount of K application significantly increases the root and the shoot biomass.
  9. As revealed by the TLC separation the high K application also stimulates high forskolin contents of the root.
  10. Foliar application of Mg and Mn have revealed that Mg<sup>2+</sup> rather than Mn<sup>2+</sup> not only stimulate high biomass yield of root tuber but even the forskolin content.
  11. The combination of Mg and Mn 50 ppm each is much more effective in stimulating increased root biomass as well as forskolin content.
  12. The gamma-irradiated clonal population propagated upto M2 generation revealed that, there are mutants, which

yield more forskolin content along with high root biomass.

13. The 500 R radiation has brought out desernable effect on stomatal behaviour by reducing the CO<sub>2</sub> conductance along with the transpiration rate.