



## EFFECT OF COLCHICINE AND MALEIC HYDRAZIDE ON DIFFERENT CULTIVARS OF CHEILANTHES (*C. RUFA*, *C. TENUIFOLIA* AND *C. FARINOSA*).

Santosh Kumar Singh\*, Satish Kumar Verma\*\*, Md Aslam Siddiqui\*\*\* & Brij Mohan Sharma\*\*\*\*

\*Department of Biotechnology Sai Institute of Management and Technology, Dehradun.

\*\*Department of Microbiology, Gayatri College of Biomedical Sciences, G.M.S. Road, Dehradun

\*\*\*Department of Chemistry, BFIT, Dehradun

\*\*\*\*Society of Pollution and Environmental Conservation Scientists (SPECS), Dehradun.

Three cultivars of *Cheilanthes* were chosen for present study to observe the alterations in morphological and physiological parameters of plants exposed to colchicines and maleic hydrazide. Treatments at very low doses were found to show various deleterious effects. Total amount of protein and chlorophyll contents showed varying degree of sensitivity in all cultivars of *Cheilanthes* species. Proline accumulation was found to be high in treated plants compared with control. *Cheilanthes farinosa* showed the maximum contents of proline and thus the highest antioxidant potential. All the three species showed high proneness towards maleic hydrazide in comparison with colchicine treatments. Improved tolerance in treated plants might be attributed to the elevated level of antioxidants.

Ferns grow in many different habitats around the world. The ferns were at their height during the Carboniferous Period (the age of ferns) as they were the dominant part of the vegetation at that time. Most of the ferns of the Carboniferous became extinct but some later evolved into our modern ferns. There are about 12,000 species in the world today<sup>1</sup>. *Cheilanthes* sps. (Greek: From cheilos, lip + anthos, flower), have a lip-like false indusium covering the sporangia. Its rhizome are usually erect to long-creeping, scales brown to black or often bicolored with dark central stripe and evergreen hairy frond. The plants prefer light (sandy), medium (loamy) and heavy (clay) soils<sup>2</sup>. The plants prefer acid, neutral and basic (alkaline) soils.

Many environmental factors and human activities are increasing the level of pollutants in the environment day by day, affecting most of the plant communities adversely. The damage to the biological ecosystems are measured in terms of the morphological and biochemical alterations in primary producers. Numerous studies have been conducted on photosynthetic enzymes, pigments<sup>3</sup>, proteins, seed patterns and antioxidant compound contents in plants. Maleic hydrazide is one of the agents that have been found to bring heritable alterations in the genes, chemical mutagens are undoubtedly very potent ones which can induce genetic or physical alterations in dormant seed or spore. This is a strong mutagen that induces mitotic inhibition and cytological abnormalities in a number of higher plants<sup>4,5,6</sup>. It possesses growth regulating properties<sup>7,8</sup>. It is a known depressor of auxin transport in plant. Stem growth, root growth and seed germination can be regulated by its treatment. Colchicine is a polyploidizing agent and a stimulant of mitosis. Its effect on growth and differentiation of fern gametophytes is varied. Morphological abnormalities following treatment of fern spores with colchicine have been reported by several authors.

The presence/absence and increasing/decreasing property of antioxidant compounds, production of free radicals and the amount of lipid peroxidation in terms of elevated level of antioxidants might provide significant clues to assess and evaluate the antioxidant potential of various *Cheilanthes* species against environmental stresses. Plants need to have special mechanisms for adjusting the changed environment. During photosynthesis, plants harvest solar energy and assimilate it into carbon compounds which provide cellular energy and carbon skeleton for various metabolic processes. Furthermore, many groups of stresses like heavy metals, ultraviolet radiations etc are shown to generate singlet oxygen and other active oxygen species at various sites of photosynthetic electron transport chain<sup>9</sup> and affect the growth of plant. Many studies have been done with emphasis on morphological, biochemical and genetic characteristics<sup>10</sup> of *Cheilanthes* species, with respect to ultraviolet radiations, gamma radiations and various light qualities like red light, blue light etc. Considering the importance of *Cheilanthes* in the ecosystem and their capacity to protect it under stress conditions; the authors have set forth the objective of studying the effect of Maleic hydrazide and colchicines treatments on different *Cheilanthes* species to see their proneness to the stresses. These estimations could play important role in the assessment of adverse impact of stresses on *Cheilanthes* sps, growing in different habitats.