

Summary

The present study was initiated with a sole objective of ascertaining and also confirming if possible the role of cinnamic acid as a plant growth regulator (PGR). Obviously the natural form of cinnamate which is *trans*-isomer as a *trans*-cinnamic acid was employed in the experiments.

In furtherance of the objective a comparative condition had to be set. Hence the effects due to cinnamate are compared with the effects of other growth regulators already long established.

Bio – assay employed for this study was the isolated cotyledon system. The cotyledons were isolated from the germinated cucumber (*Cucumis sativus L.*) seeds under aseptic conditions. These were left for 24 hours for greening under constant illumination of around 1000 lux white fluorescent light radiation.

Treatment solutions were put on filter paper lining sterile petri plates and the cotyledons prepared as above floated on there for 48, 72 and 96 hour durations. Samplings were done at each 24 hour duration.

Three of the major plant growth promoters such as kinetin (KA), indole acetic acid (IAA) and gibberellin (GA₃) and one growth inhibitor - abscisic acid (ABA) were used with, without and in various combinations with cinnamic acid.

The parameters were carefully fixed and these included those of fresh and dry matter contents, chlorophyll a, chlorophyll b and total chlorophyll amounts. Further

the tissue metabolite fractions are determined by existing established routine methods and included total sugars, reducing sugars, non-reducing sugars, total protein and total phenol contents.

The enzymatic analysis was performed and the activity of enzymes like phenylalanine ammonia lyase, polyphenol oxidase, catalase, and peroxidase were estimated to ascertain the effects they show when subjected to treatments with cinnamic acid with and without kinetin, auxin, gibberellic acid and abscisic acid.

Further aqueous extracts of treated cotyledons were analysed for various carbohydrate fractions using high performance liquid chromatography (HPLC). The methanolic extracts of the variously treated cucumber cotyledons were also subjected to GC-MS analysis to ascertain changes in the accumulated chemical constituents due to various treatments.

The treated cotyledons were also subjected to protein profiling using SDS-PAGE and electrograms studied for the polypeptide changes induced due to cinnamate alone and in combinations with other growth regulators. The RAPD analysis has been performed using 10 random primers to see the differences among treatments using NMDS analyses.

The dissertation comprises of an introduction followed by eight chapters and bibliography. The chapters included review of literature, material and methods and separately included are based each on the cinnamate interaction with kinetin, auxin, gibberellin and abscisic acid followed by GC-MS supplementary data chapter. Another chapter is that of protein profiling with SDS-PAGE and DNA fingerprinting with RAPD. There is a separate chapter of discussion wherein all the results and observations are discussed into one single discussion.

The copies of the published papers and acceptance letters of those papers which are in the pipe line are attached with the dissertation. Only those publications which are peer reviewed with some impact factors are attached with the dissertation.