# "Identification of bioactive allelochemicals from the genus *Crotalaria*"

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## SUMMARY

Allelochemicals are secondary metabolites, biosynthesized from the metabolism of carbohydrates, fats and amino acids and arise from acetate or shikimic acid pathway. They are released either through volatilization or leaching root exudates or decomposition of biomass and after their release they affect (positively or negatively) the organism (plants, pathogens, insect pests etc.). *Crotalaria* is a leguminous plant, used as a ground cover and a green manure crop throughout the humid tropics. Several reports are available on the allelopathic effects shown by *Crotalaria juncea* L. The present study was carried out for screening various *Crotalaria* species present in Kerala for its allelopathic potential, isolation and identification of allelochemicals and bioassay to study its effects.

Seven species of Crotalaria were collected from various districts of Kerala state and grown in the botanical garden of All Saints' College, Thiruvananthapuram. The species are *Crotalaria pallida, Crotalaria retusa, Crotalaria verrucosa, Crotalaria micans, Crotalaria laburnifolia, Crotalaria mysorensis* and *Crotalaria spectabilis*. Serial extraction was done using the solvents petroleum ether, chloroform and methanol using a Soxhlet extractor and preliminary phytochemical screening was done. Preliminary phytochemical studies revealed the presence of secondary metabolites like alkaloids, phytosterols, terpenoides, glycosides, cardiac glycosides and tannins in the stem and leaf extracts of *Crotalaria*.

Phytotoxicity assay was done by testing seed germination studies on paddy variety Aishwarya. Of the various species studied, *Crotalaria pallida* showed maximum inhibition on germination. Hence this species was selected for further studies. The germination of paddy seeds treated with the methanol extracts of *Crotalaria pallida* was found to be lower than the germination of seeds

in the controls and other extracts. Radicle formation was almost completely inhibited. Compared to radicle, plumule formation was not completely inhibited, though there was significant reduction in plumule length compared to control.

The effects of leaf methanolic extract of *Crotalaria pallida* on mitotic index and the frequency of chromosome aberrations was also studied to analyze the genotoxic and cytotoxic effects of the plant. The decreased mitotic index values in the treated onion roots treated with *C. pallida* extracts may be an indication of the presence of cytotoxic substances in the aqueous leaf extracts, which causes inhibition of mitotic activities. Chromosome aberrations were observed in all stages of mitosis, though normal prophase was observed in all treatments. The major clastogenic abnormalities observed include chromosome stickiness, chromosome bridges and differential condensation of chromosomes. The nonclastogenic abnormalities detected were C- metaphase, multipolarity, chromosome laggards, diagonal metaphase, anaphase and telophase, micronuclei and disturbed metaphase and anaphase. The most frequent abnormalities observed were chromosome stickiness, diagonal orientation of chromosomes and micronuclei formation.