ABSTRACT:

In our state of West Bengal *Desmostachya bipinnata* L. Stapf (Poaceae), *Parthenium hysterophorus* L. Asteraceae*, Alternanthera sessilis* (L.) R. Br. ex DC. (Amaranthaceae), are three profusely growing weeds with potential allelochemicals. An investigation therefore was carried out for the determination and evaluation of their allelopathic potential in terms of their relative allelopathic vigour from a physiological, biochemical (metabolic changes), software prediction and cytological approach. Allelochemicals in various concentrations [1:5, 1:10 and 1:20 (w/v)] of leaf extracts and leachates of the three weeds respectively are tested on *Vigna radiata and Senna occidentalis* seed germination, TTC stainability and several metabolic parameters like- changes in insoluble and soluble carbohydrates, amino acids, protein, DNA, RNA and enzymes like dehydrogenase ,catalase, peroxidase and amylase. Computational tools evaluate numerous compounds for innumerable toxicological end-points. Screening method, using Chem*ID* plus is easy, highlighting compounds for which experimental evaluation is recommendable. It produces a system for predicting the allelochemical toxicity and/or mutagenicity. This system can also give additional information, by identifying genotoxic properties in a fast and convenient way on the basis of the analogus chemical structure prediction. Cytological evaluation of allelopathic potential is done by microscopic study of allelochemical induced alterations of cytological characters of root tip cells of *Vigna radiata and Senna occidentalis* with particular reference to various anomalies during cell-division and chromosomal structural abnormalities i.e. Chromosomal Abnormality Index reveal that *Desmostachya bipinnata> Parthenium hysterophorus > Alternanthera sessilis* in terms of allelopathic potential indicating that the monocotyledonous weed *Desmostachya* is more allelopathically vigorous than the other two dicotyledonous weeds. *Parthenium* and *Alternanthera.* Further research might thus be relevant to know the interaction of other invasive dicotyledonous and monocotyledonous weeds on other weed and crop species opening a new plethora of research.