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Spectral fingerprinting revealed modulation of plant secondary metabolites in providing abiotic stress tolerance to invasive alien plants *Lantana camara* (L.), *Parthenium hysterophorous* (L.), *Ricinus communis* (L.), and *Ageratum conyzoides* (L.) (plant metabolites in stress tolerance to invasive plants)

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Abstract

Invasive alien species are non-native plant species that displace native species and pose adverse effects to environment, ecosystem, economy, and human health by diminishing the growth of native plants and by exhibiting higher stress tolerance. In our present study, four invasive alien species, namely *Lantana camara, Parthenium hysterophorous, Ricinus communis*, *and Ageratum conyzoides*, were studied from different locations. Plants growing under natural environmental conditions were sampled at random in the vicinity of Jalandhar. To gain insights into the biochemical basis of invasiveness of these plants, the samples were subjected to chemical fingerprinting by using UV-Vis, fluorescent, and Fourier transform-infrared (FT-IR) techniques under natural abiotic stress conditions (moderate and hot conditions). Indices of oxidative stress, such as malondialdehyde (MDA), were also studied. MDA levels were enhanced under hot conditions. Elevated peaks (major and minor) were observed in UV fingerprinting during adverse abiotic conditions. Fluorescent spectroscopy also validated the enhanced levels of secondary metabolites. FT-IR spectroscopy confirmed the presence of alkaloids and phenolics during stress conditions. Peaks were identified as rutin, vanillic acid, ascorbic acid, and glutathione reduced. The obtained results showed that under stressful conditions, the studied plants may produce an increased level of metabolites that might play a role in minimizing the oxidative stress faced by these plants. It was concluded that the studied plants, namely *P. hysterophorus, L. camara, R. communis*, *and A. conyzoides*, have the potential to cope with abiotic stress such as high temperature, which could be the reason for their invasiveness and vast adaptability.

Key words: chemical fingerprinting, invasiveness, lipid peroxidation, secondary metabolites

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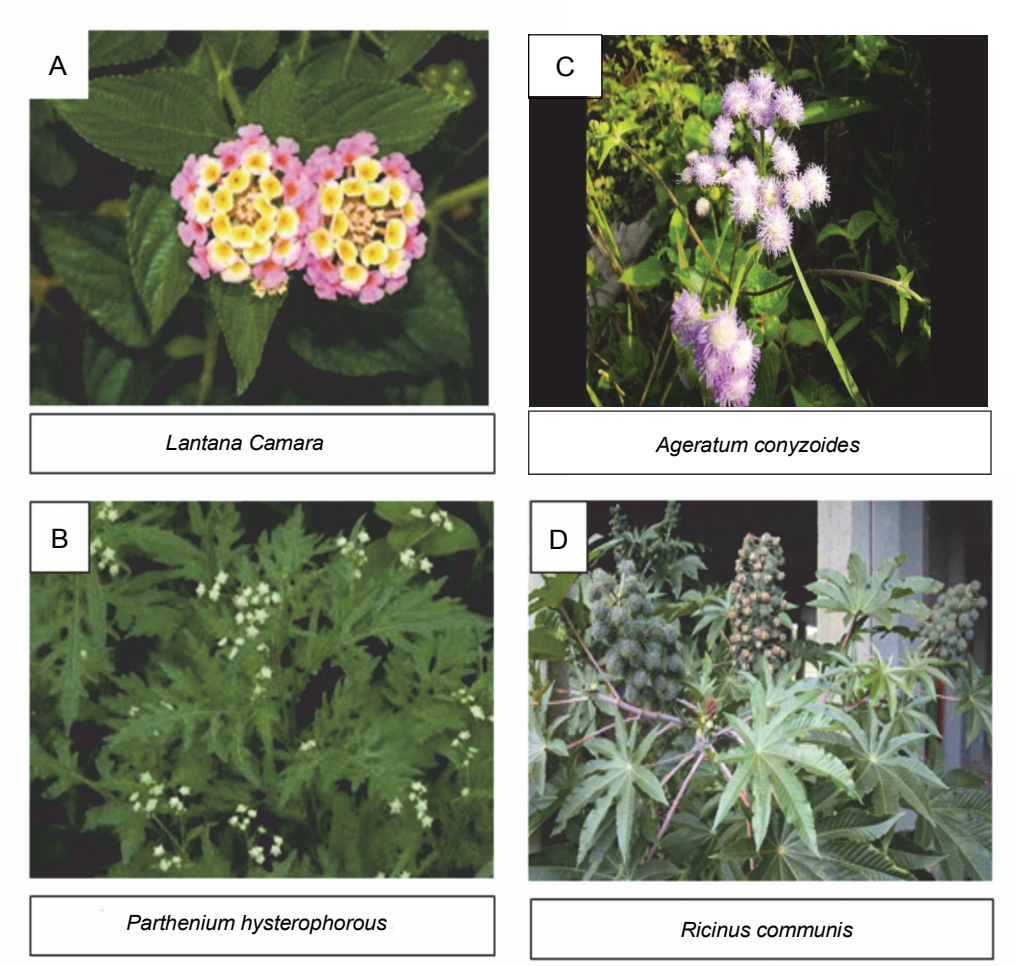
Pictures of invasive plants studied



Supplementary Figure 1. Pictures of A) *Lantana camara* B) *Parthenium hysterophorus*, C) *Ageratum conyzoides*, D) *Ricinus communis*