Active defense strategies for invasive plants may alter the distribution pattern of pests in the invaded area

Jun Zhai\(^1\), Bin Hou\(^1\), Fang Hu\(^1\), Guo Yu\(^1\), Zhi Li\(^1\), Evan Palmer Young\(^2\), Hui Xiang\(^1\), and Lei Gao\(^1\)

\(^1\)South China Normal University College of Life Sciences
\(^2\)USDA-ARS Beltsville Agricultural Research Center

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Abstract

In the invaded areas, it is believed that invasive species reduce their investment in defense due to the absence of natural enemies. This study explored the defense strategies of invasive plants through research on the invasive species. Field investigation indicated that invasive plants have a driving effect on herbivorous pests, and the frequency of leaf damages of native plant reaches a peak at 2–3 m distance from the invasive species. A feeding preference assay with two generalist herbivorous insects (native insect Spodoptera litura and invasive insect Spodoptera frugiperda) showed that the invasive plants have a stronger antifeedant effect on generalist herbivores than native plants. By analyzing the content of secondary metabolites in the leaves of three invasive plants (Sphagneticola trilobata, Mikania micrantha, Ipomoea cairica) and three native plants (Ipomoea nil, Paederia foetida, Polygonum chinense), the leaves of invasive plants had higher concentrations of substances associated with defenses, including total phenols, flavonoids, jasmonic acid, tannin, H2O2, and total antioxidant capacity, and lower soluble protein concentrations than the native plants. After leaf damage, compared to native plants, the leaves of invasive plants showed an overall increase in substances associated with defense, except for soluble sugar. These results suggest that invasive plants maintain active defense strategies in invaded areas, and these strategies may alter the distribution patterns of herbivorous insects in a manner that facilitates invasion.

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