Growth performance of Malaysian Parthenium hysterophorus under various environmental variables

ABSTRACT

Parthenium weed is an invasive weed species of economic importance worldwide. Native to the American tropics, the infestation ability of Parthenium weed to a new habitat is largely influenced by environmental factors. Despite Parthenium weed invasion in Malaysia dated back to 2013, investigation on its ecological behavior is still lacking. Hence, extensive studies on the ecological behavior of two predominant Malaysian Parthenium weed populations were executed. In the Petri dish seed bioassay, germination of Parthenium weed seeds was evident at temperatures up to 80 °C. Parthenium weed was also germinable in saline condition of up to 250 mM, osmotic pressure ranging from −1.2 to 0 MPa, and a wide range of pH (4–9), thus these abiotic conditions are by no means the limiting factors for the Parthenium weed. The pot trial observed that this invasive weed grew readily in various Malaysian soil textures. Parthenium weed successfully emerged from 0 cm to not beyond 2 cm soil burial and retained its emergence capacity under different submergence periods in water. The most favorable soil moisture condition for Parthenium weed emergence was saturated (0 kPa), followed by field capacity (−30–−50 kPa), while no emergence occurred in drought (−70 kPa) as well as flooded soils. These indicate that both Parthenium weed populations possess high tolerance to various abiotic conditions in Malaysia. Results obtained in the current study have crucially become guidelines for the local government authorities in predicting wide spread of Parthenium weed in diverse ecological zones, to further manage this pernicious weed efficiently.

Keyword: Ecological niche space; Growth responses; Invasive plant species; Parthenium weed