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Allelopathic Influence of *Monochoria vaginalis* (Burm.f.) C.Presl Extracts on Seed Germination and Emergence of Mustard (*Brassica* spp.)

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Background: Allelopathy refers to the release of allelochemicals by plants that influence germination and growth of neighboring species, affecting crop–weed interactions and agroecosystem dynamics.

Objective: This study evaluated the allelopathic potential of aqueous extracts from aerial parts of *M. vaginalis*, a dominant aquatic weed in Sri Lankan rice ecosystems, on germination and emergence of mustard.

Methods: Aqueous extracts were prepared by soaking 50 g powdered aerial parts of *M. vaginalis* in 1 L distilled water for 24 h, followed by filtration (Whatman No. 1). Five concentrations (0% control, 25%, 50%, 75%, 100%) were applied (5 mL per Petri dish) with 20 mustard seeds in a completely randomized design (CRD) with three replicates. Seeds were incubated at 25 °C and 80% RH for three days. Germination percentage, germination rate index (GRI), mean germination time (MGT), and radicle and plumule length were recorded. Data were analyzed using the general linear model (GLM) and means compared with LSD at $p < 0.05$.

Results: Germination percentage was not significantly affected by concentration. However, significant differences occurred in GRI, radicle, and plumule lengths. The 25% extract yielded the highest GRI (91.39 ± 1.27), radicle length (7.83 ± 0.30 cm), and plumule length (5.77 ± 0.17 cm), all greater than the control. In contrast, 100% extract inhibited vigor, showing the lowest GRI (77.50 ± 1.67), radicle length (0.70 ± 0.29 cm), and plumule length (1.80 ± 0.18 cm). Although MGT was longest in the 100% extract (1.21 ± 0.17 days), the difference was not significant. Extract pH declined slightly with concentration (6.5–6.7 vs. 6.8 control) but remained within the favorable range for mustard germination.

Conclusion: The findings demonstrate the concentration-dependent allelopathic effects of *M. vaginalis*, suggesting potential use as natural herbicides at higher concentrations or bio-stimulants at lower concentrations in sustainable crop management.

Keywords: Allelopathy, *Brassica* spp., *Monochoria vaginalis*