

Investigation of Potential Allelopathic Shade Tree Species for Controlling Weeds in Tea Lands

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Identification of eco-friendly organic weedicides has become a need of the day. There are evidences on some allelochemicals in mature leaves of some shade trees. A study was undertaken to evaluate the bio efficacy of different concentration of mature leaf extracts of shade trees (*Gliricidia sepium*, *Calliandra calothyrsus*, *Acacia pruinosa*, *Erythrina lithosperma*, *Gravillea robusta*) and the most effective extraction technique. This research was conducted as two studies (bioassay and pot study). Mature leaves of selected shade tree species were first oven dried and milled. Leaf extracts were prepared each in four concentrations (20, 40, 60, 80% w/v) using cold and hot distilled water extraction methods. A bioassay conducted using lettuce seeds as the indicator plant. Distilled water was used as the control. Bioassay results revealed no significant difference between cold and hot distilled water extraction methods ($p>0.05$). *G. sepium* at 80% recorded the lowest germination percentage (17.8%) and lowest germination index (0.4) followed by *G. robusta* at 80% (21.9%, 0.5), *E. lithosperma* at 80% (29.5%, 0.6), *G. sepium* at 60% (31.8%, 0.7), *G. robusta* at 60% (39.8%, 0.9) and *E. lithosperma* at 60% (51.0%, 1.1), respectively. Lowest hypocotyl (3.0 mm) and radical lengths (1.8 mm) and lowest seedling vigor index (0.1) was recorded in *G. sepium* at 80%. Based on those results, most phytotoxic extracts (*G. sepium*, *G. robusta* and *E. lithosperma* each at two different concentrations i.e. 60, and 80% w/v) were selected and further tested on three weed species (*Cleoma aspera*, *Bidens pilosa* and *Ageratum conyzoides*) planted on pots in three replicates. According to the pot study *G. sepium* at 80% recorded significantly highest dead weed count (*C. aspera*, 100%; *B. pilosa*, 66.6%; *A. conyzoides*, 66.6%) 14 days after applications. Thus, *G. sepium* at 80% can potentially be used to control succulent broad leaf weeds in tea lands. Further investigations are required under field conditions.

Keywords: Allelopathy, Bioassay, Pot study, Shade trees, Weeds