

## **Allelopathic Effect of *Zea mays*, *Senna spectabilis* and *Muntingia calabura* on Weeds: Potential Implication for Controlling Weeds in Tea Lands**

D.U.K.L. Jayalath, S.R.W.M.C.J.K. Ranawana\*, P.E. Kaliyadasa and P.W. Jeewanthi

Department of Export Agriculture, Uva Wellassa University, Badulla, Sri Lanka

\*chandima@uwu.ac.lk

Identification of eco-friendly weed control measures is imperative due to the adverse effects of excessive use of synthetic herbicides. Thus, a series of bioassays and field studies were conducted to evaluate the allelopathic potential of three plant spp., namely, Maize (*Zea mays*), Kaha-kona (*Senna spectabilis*) and Jam (*Muntingia calabura*) in tea lands. The specific objectives were to identify the most phytotoxic extract, its effective concentration and effective extraction method, synergistic/antagonistic effects, allelochemical releasing mode and field efficacy to control weeds. Plant extracts for bioassays were prepared with dry powders of leaves/husk in four concentrations (4, 6, 8 and 10% w/v) using hot and cold-distilled water. Synergistic/antagonistic effects were tested using cocktails of different extracts mixed at different ratios. Allelochemical releasing mode (decomposition, volatilization and leaching) was identified by pot bioassay, dish-pack and sandwich methods, respectively. These treatments were evaluated on lettuce as an indicator plant. Meanwhile, the three most allelopathic extracts/materials were tested in the field by spraying/mulching. Results revealed no significant difference among hot and cold-water extraction ( $p>0.05$ ). 10% concentration showed the highest phytotoxicity (lowest germination of lettuce). Jam and Kaha-kona showed the highest phytotoxicity evidenced by the lowest germination (22-23%), followed by Maize (44%). Germination was inhibited at 100% in all cocktails indicating their synergistic effect. Leaching was prominent in Kaha-kona evidenced by the lowest germination (61%) and the highest inhibitory effect on radical (77%) and hypocotyl (71%) elongation. Volatilization was prominent in Kaha-kona and Jam while decomposition was notable in Maize (leaves) and Kaha-kona. Mulching was effective compared to spraying (10%, 450 ml m<sup>-2</sup>), where maize mulching recorded the lowest weed emergence, followed by Jam (77-84% weed dry weight reduction). In conclusion, *S. spectabilis* and *M. calabura* demonstrate high allelopathic potential, followed by *Z. mays* highlighting its potential implication for eco-friendly weed control. Further investigations are needed to evaluate the field efficacy of these botanicals in controlling different weed species.

**Keywords:** Allelopathic potential, Bioassay, Decomposition, Leaching