

# Investigating the Causes for Poor Control of *Erigeron sumatrensis* (Alawangupillu) by Glyphosate in the Uva Region

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## Introduction

*Erigeron sumatrensis* (Alawangupillu) could be considered as a hard-to-kill weed in tea plantations because it has become totally resistant to Paraquat (Marambe et al, 2002) and from the recent past, there are claims that this weed shows a poor control also by Glyphosate (Prematilake, 2010). Recent investigations under upcountry conditions have shown that such poor control of weed is attributed to the dosages of Glyphosate applied and age or growth phase of weeds under up country conditions (Prematilake and Nawaratne, 2010 ; Prematilake and Darshani, 2011) . Hence, this study was aimed to determine the degree of control of *E. sumatrensis* weed at its different stages of growth by different dosages of Glyphosate under the conditions of Uva region.

## Materials and Methods

Plants of *E. sumatrensis* at five different growth phases, having 3-5, 6-8, 9-11, 12-14 and more than 15 leaves per plant, were collated from Ury Estate, Passara (30 plants from each of the five growth phases) and planted them on a raised bed, randomly at a spacing of 50 x 50 cm. Plants were left on beds for 2 weeks period to establish. Plants of each of the five growth phases were treated with two dosages of Glyphosate (3ml/L and 5ml/L) at two weeks after planting. An untreated control was also maintained. A drenching application of Glyphosate was given to each plant during morning time using a hand sprayer. The experimental design was Complete Randomized Design with two factor factorial with 2 replications. Visual injury symptoms in the weed (chlorosis of leaves, wilting of leaves, drying and scorching of leaves and leaf fall) were observed and scored at 7, 14 and 21 days after application (DAA). The degree of damage on leaves and whole plant was taken in to account in scoring using a scale (0 to 9). The viable plants were counted and the dry weight of above ground part and roots were measured at 21 DAA.

## Results and Discussion

All visual symptoms such as chlorosis, wilting, scorching and drying of leaves and leaf fall were occurred at a higher intensity with Glyphosate at 5ml/L (2.75 L/ha) than the Glyphosate at 3 ml/L (1.65L/ha). Chlorosis of leaves and wilting of leaves were most prominent at seven DAA and scorching and drying of leaves and leaf fall prominent at 14 DAA.

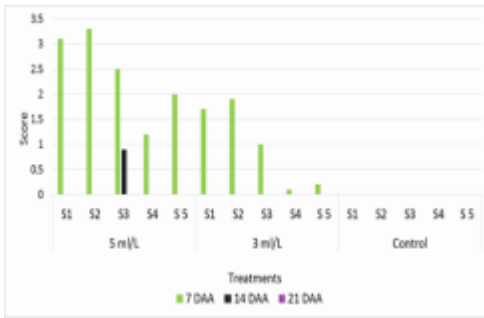


Fig 1: Chlorosis

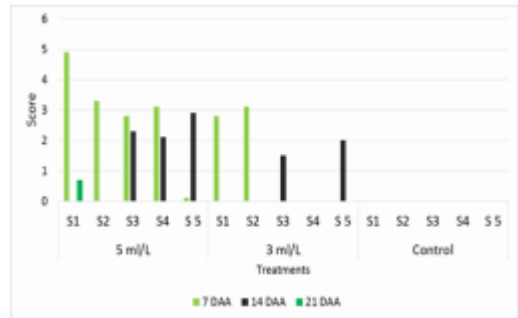


Fig 2: Wilting of leaves

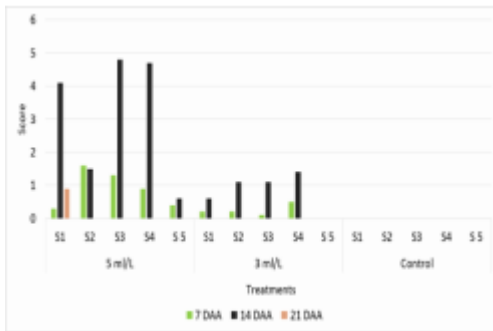


Fig 3: Scorching and drying of leaves

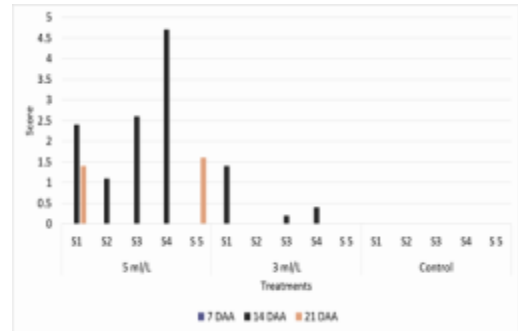


Fig 4: Leaf falling

The interaction effect between Glyphosate dosage and growth stages of *E. sumatrensis* on dead plant percentage and recovered percentage was significant ( $p < 0.05$ ).

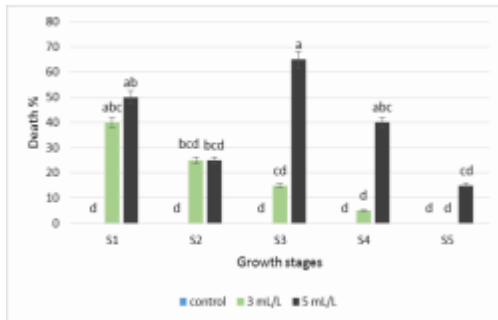


Fig 5: Dead plant percentage

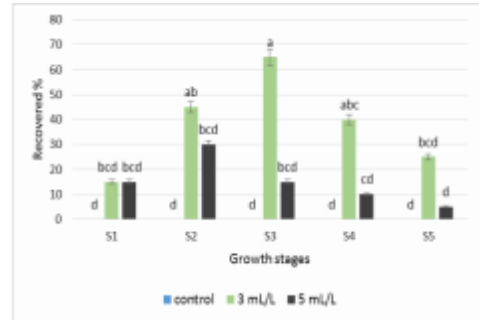


Fig 6: Recovery percentage

The highest dead plant percentage was observed with 5ml/L (2.75 L/ha) Glyphosate compared to that of 3ml/L (1.65L/ha) Glyphosate. Furthermore, the highest dead percentage was reported from 9-11 leaf stage, and it was comparable at 3-5, 9-11 and 12-14 leaf stages. Highest recovery percentage was observed with 3 ml/L Glyphosate than that of Glyphosate at 5 ml/L at 9-11 leaf stage and it was comparable at 6-8, 9-11 and 12-14 leaf stage.

Dry weight of above ground part was not significantly affected by the dosage of Glyphosate at any of the growth phases. However, there was relatively a lower dry weight with Glyphosate at 5 ml/L

than that of 3 ml/L. Similar to the dry weight of above ground parts there was no significant difference in dry weight of roots between the Glyphosate dosages at all the leaf stages and also compared with the control except 12-14 leaf stage. However, comparatively a lower dry weight was recorded with Glyphosate treatments than the control and comparatively lower dry weight with 5 ml/L than that of 3 ml/L of Glyphosate.

Table 1: Mean dry weight (g/ plant) of above ground parts of at different growth stages (*E. sumatrensis*) by different Glyphosate dosages at 21 DAA

Glyphosate dosage	Mean dry weight of above ground parts at different growth stages (g/ plant)				
	3-5 leaf stage	6-8 leaf stage	9-11 leaf stage	12-14 leaf stage	Above 15 leaf stage
5 ml/L	0.056 <sup>e</sup>	0.188 <sup>de</sup>	0.185 <sup>de</sup>	0.354 <sup>cde</sup>	0.728 <sup>bc</sup>
3ml/L	0.064 <sup>e</sup>	0.211 <sup>de</sup>	0.532 <sup>bcd</sup>	0.710 <sup>bc</sup>	0.917 <sup>ab</sup>
Control	0.061 <sup>e</sup>	0.254 <sup>de</sup>	0.343 <sup>cde</sup>	0.808 <sup>b</sup>	1.284 <sup>a</sup>

(In each column mean followed by the same letter are not significantly different at  $p < 0.05$ )

Table 2: Mean dry weight (g/ plant) of roots of *E. sumatrensis* at different growth stages as affected by two Glyphosate dosages at 21 DAA

Glyphosate dosage	Mean dry weight of roots at different growth stages (g/ plant)				
	3-5 leaf stage	6-8 leaf stage	9-11 leaf stage	12-14 leaf stage	Above 15 leaf stage
5 ml/L	0.037 <sup>f</sup>	0.057 <sup>f</sup>	0.154 <sup>cde</sup>	0.162 <sup>cd</sup>	0.304 <sup>ab</sup>
3ml/L	0.055 <sup>f</sup>	0.073 <sup>ef</sup>	0.156 <sup>cde</sup>	0.234 <sup>bc</sup>	0.339 <sup>a</sup>
Control	0.086 <sup>ef</sup>	0.073 <sup>ef</sup>	0.223 <sup>bc</sup>	0.329 <sup>a</sup>	0.352 <sup>a</sup>

(In each column mean followed by the same letter are not significantly different at  $p < 0.05$ )

## Conclusion

*E. sumatrensis* can be controlled to a certain level with the use of higher dosages of Glyphosate exceeding 5 ml/L or 2.75 L/ha. Lower dosage of Glyphosate such as 3 ml/L or 1.65L/ha was sufficient to get good control. The maturity of the weed has some attribution to resist to Glyphosate herbicide. Thus 9-11 leafy stage and 3-5 leafy stages are found to be more susceptible phases of *E. sumatrensis* for Glyphosate when used at 5 ml/L or 2.75 L/ha. Finally can be suggested that further higher dosages of Glyphosate (>5 ml/L or 2.75 L/ha) could be tested for an effective control of *E. sumatrensis*.

## References

Marambe, B., Nissanka, S.P., Silva L. De, Ananadacoomaraswamy, A. and Priyanth, M.G.D.L. 2002. Occurrence of paraquat- resistant *Erigeron sumatrensis* (Retz) in upcountry tea Lands in Sri Lanka. *Journal of Plant diseases and protection*. Sonderheft XVIII. pp. 973-978.

Prematilake, K.G. and Nawarathna, W.P.A.S. 2010. In investigation on resistant development in *Crassocephalum crepidiodes* (Benth) & *Erigeron sumatrensis* (Retz) for glyphosate herbicides. Bachelor Thesis. Faculty of Agriculture, University of Ruhuna, Sri Lanka

Prematilake, K. G. and Darshani, S.A.N. 2011. In investigation on possible causes for poor control of *Erigeron sumatrensis* (Retz) and *Crassocephalum crepidiodes* (Benth) by glyphosate herbicides. Bachelor Thesis. Faculty of Agriculture, University of Ruhuna, Sri Lanka