Investigating the causes for poor control of *Crassocephalum crepidioides* (Thandam pillu) weed by Glyphosate in the Uva region

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Introduction

Weed management in tea field is great importance among other agronomic practices as weeds are the number one pest and they can lower the productivity of tea by 10 to 50 percent due to their competition for light, space, water and nutrients. Various weed management practices are used in tea cultivation such as manual, mechanical, cultural, chemical, and biological methods. Chemical weed control is the most convenient and effective methods among the various weed management techniques available. Unlike manual weeding, chemical weed control minimizes soil erosion and largely eliminates the loss of plant nutrients, which were carried away in the weeds removed from the field and less labour required. Other than normal classifications, weeds can be grouped as common weeds, hard-to-kill weeds and favorable herbs. Among the weeds Thandam pillu was considered as a common weed, but it is becoming a hard-to-kill weed. It was already become resistant to Paraquat herbicide and now there are complaints that it is difficult to control even by Glyphosate herbicide. Recent investigations under up country conditions have shown that such poor control is attributed to the dosage of Glyphosate applied and the age or growth phase of weeds, (Pre matilake and Nawarathne, unpublished). Therefore, the objective of the present study was to elucidate the possible causes of poor control of Thandam pillu weed under Uva region.

Materials and methods

An experiment was carried out at the Uva Wellassa University during July-August 2014. C.crepidioides weed plants at five different growth phases such as 3-4, 5-6, 7-8, 9-10 and > 10 leaf phase, were collated from Ury Estate and they were planted randomly on raised beds, (30 plants per each growth phase) and left for 2 weeks to established. Two Glyphosate (36%) dosages (5 ml/L and 3 ml/L) were sprayed on plants by isolating the plant to prevent contaminations with other plants. An untreated Control was also maintained. Herbicide application was done as drenching application, by using hand sprayer during morning. The degree of chlorosis, wilting of leaves, scorching and drying of leaves and leaf fall occurred at 7, 14 and 21 days after application (DAA) of Glyphosate. Thandam pillu weed was observed and rated. Dead plant percentage, dry weight of viable plants and recovery of plants were recorded at 21 DAA.

Results and Discussion

Chlorosis was more prominent at 7 DAA and it occurred at significantly higher rate with Glyphosate at 5 ml/L than at 3 ml/L at 3-4 and 5-6 leaf growth phases. Leaf wilting was more prominent at 14 and 21 DAA and it occurred at significantly higher rate with Glyphosate at 5 ml/L at all five growth phases. Scorching and drying of leaves took place at the same rate with both Glyphosate at 5 ml/L and at 3 ml/L at 3-4, 5-6 and 9-10 leaf growth phases. However, symptoms were more severe with

Glyphosate at 5 ml/L than at 3 ml/L at 7-8 and >10 leaf phases. Leaf fall also occurred more severely with Glyphosate at 5 ml/L than at 3 ml/L at 7-8 leaf phase. Mean percentage of dead plants of C.crepidioides was significantly higher with Glyphosate at 5ml/L than that of 3ml/L at all growth phases. There was no death of the weed after phase 3 onwards with Glyphosate at 3ml/L and at phase 4 and 5 with Glyphosate at 5ml/L.

Table 01: Mean percentage of dead plants of C.crepidioides at different growth phases as affected by two dosages of Glyphosate

Treatments	Stage 1 (3-4 leaf)	Stage 2 (4-5 leaf)	Stage 3 (6-7 leaf)	Stage 4 (8-9 leaf)	Stage 5 (>10 leaf)
T1 (Gly: at 5 ml/L)	90 a	50 b	10 c	0	0
T2 (Gly: at 3 ml/L)	70 b	30 c	0	0	0
T3 (Control)	2 c	0	4 c	0	0

(Means followed by the same letter are not significantly different at P<0.05)

Mean dry weight per plant was not recorded at 3-4 and 5-6 leaf phases, but a lower weight was recorded at mature phases above 6-8 leaf phase. There was no significant different in weight between herbicide treatments and the Control. Poor response to Glyphosate at the maturity stages may be due to the hairiness of the leaves and stems and leaf angel (erect) act as barrier to absorb herbicide in to the plant.There was high recovery rate at latter phases in 3 ml/L Glyphosate treated plants than Glyphosate at 5 ml/L treated weed plants.

Table 02: Mean recovery of *C. crepidioides* at different phases with two Glyphosate dosages

Treatments	Stage 1 (3-4 leaf)	Stage 2 (4-5 leaf)	Stage 3 (6-7 leaf)	Stage 4 (8-9 leaf)	Stage 5 (>10 leaf)
T1 (Gly: at 5 ml/L)	0 c	0 c	0.2 b	0.3 b	0.3 b
T2 (Gly: at 3 ml/L)	0 c	0 c	0.2 b	0.2 b	0.5 a
T3 (Control)	0 c	0 c	0 c	0 c	0 c

(Means followed by the same letter are not significantly different at P<0.05)

Finally, *C.crepidioides* at early growth phases with 3-6 leaf is more susceptible to Glyphosate herbicides and with higher dosage it is more susceptible for Glyphosate.

Conclusions

The degree of control of C. crepidioides weed is dependent upon the dosage of Glyphosate. The higher the dosage the greater the controlling efficacy.The growth phase or maturity level of C.crepidioides also a factor that cause to tolerate the control of Thandam pillu weed by Glyphosate (36 %). The initial growth phase of C.crepidioides up to 6 leaf per plant phase is more susceptible for Glyphosate.

References

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

Rueppel, M.L., Brightwell, B.B. Schaefter, J. and Marvel, J.T. 1977. Metabolism and degradation of glyphosate in soil and water. Journel of Agricultural and Food Chemistry.25:517-528