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**AFFECTIVITY OF CHEMICAL WEED CONTROL
IN COMMERCIAL TEA PLANTATIONS:
A CASE STUDY IN HAPUGASTENNE ESTATE, MASKELIYA, SRI LANKA**

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Abstract

The usage of agro chemicals on food crops is getting restricted day by day with the sanctions set by the institutes devoted in food security, mainly due to the disclosure of their harmful residual effects on human health. Thus, several Commercial Tea Plantation companies have voluntarily suspended the use of many Herbicides on Tea under their charge, which are still permitted to use in Sri Lanka. Intense emergence of Herbicide tolerant weed species on treated areas was noted in the mean time, although this crucial factor had been remained un-noticed as a result of frequent manual weeding under taken by the Tea estates under various other accounts such as plucking, fertilizer application, mowing and ferning green manure etc. Therefore, an investigation was carried out to ascertain the affectivity of Herbicides recommended for Commercial Tea Plantations, over a period of 24 months in Hapugastenne Tea Garden, Maskeliya, since year 2012 at five different elevations, with five replicates set at each elevation. Results show that over 20 weed species out of 23 acutely problematic weeds which cause great damage to Tea crop, are entirely tolerant to Diurone, Paraquat and Glyphosate and cannot be controlled by using said Herbicides. It was further revealed that such weed species have the ability to turn a Tea Plantation into a totally unproductive and economically non-viable unit within a time period of one to two years depending on the herbicide tolerant weed species present. These weeds are capable of suppressing the growth of the Tea bushes by making them stunted in growth with poor bush frames, turn the foliage yellowish and induce defoliation, unless they were removed completely by manual uprooting.

Keywords: Food security; Herbicide tolerant weeds; Manual weeding; Commercial Tea Plantations.

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1. Introduction:

The usage of agro chemicals on food crops is getting restricted day by day with the injunctions set by the international organizations, governments, food product dealers and consumer organizations etc., mainly due to the disclosure of their harmful residual effects on human health. Accordingly, the usage of many *Herbicide* chemicals on Commercial Tea plantations had to be voluntarily discontinued within the past decade in Sri Lanka, owing to the vetoes imposed by Tea buyers led with various international food product and process certifying authorities, although some of those agro chemicals are not banned in the Island by the state government. Suspension of the use of MCPA and 2,4-D (*Propanil*) in Tea Gardens by several Regional Plantation Companies (RPCs) on their own accord in the recent years is a good example to this effect. Hence the real affectivity of permitted *Weedicides* recommended for weed control in Commercial Tea Plantations has become greatly questionable due to the intense emergence of Herbicide tolerant weed species on treated areas causing persistent economic crop loss. (Syngenta.2015). However this crucial factor had been deeply masked and remained un-noticed as a result of frequent manual weeding under taken by the Tea estates whilst plucking and some other field operations as well. Therefore, a considerable fraction of the true cost of effective weed control in Commercial Tea too, partially hidden in the expenditure incur in other field operations carried out in plantations, such as plucking, mossaing and ferning, fertilizer application, and green manure etc., undertaken outside the budgeted allocation for weeding.

Methodology:

Therefore a study was launched in year 2012 in Hapugastenne Tea Garden, Maskeliya, to determine the affectivity of permitted Herbicides recommended for Commercial Tea Plantations at the time, using *Diuron*, *Paraquat* and *Glyphosate*. This experiment was designed to ascertain the sole affectivity of chemical Herbicides in controlling the natural regeneration of floral species on Commercial Tea Plantation soils. Randomly selected 03m X 03m experimental plots in clusters of five replicates were established in five different elevation ranges. That is, **A**) 850 m to 900 m, **B**)1000 m to 1030m, **C**)1120 m to 1150m, **D**)1210 m to 1240m and, **E**)1360m to 1400m above *average mean sea level* (amsl). The study commenced following pruning and a thorough Mossing & Ferning, also coupled with a complete manual removal of all chemical resistant weeds from the ground. The entire land extent under the experiment including the experimental plots, were periodically treated alike, exclusively with Glyphosate 36% (2.0 l ha⁻¹), Paraquat 6.5% (3.3 l ha⁻¹) and Diuron 80% (1.2kg ha⁻¹) in 480 l of water ha⁻¹ (TRI 2012) over a period of two years in Vegetatively Propagated Tea (VPT) fields aged between 15 to 40 years, adhering to Tea Research Institute (TRI) recommended dosages. Type of herbicide/s, were chosen based on the variety and stage of weed growth. Usual manual weeding carried out following the applications of Herbicides, to remove remaining weeds unaffected, (Bhowmic,1997) was considered as the experimental treatment. Thus the demarcated field plots were taken as the control plots. Manual and mechanical weeding was completely arrested in the control plots declared. Both experimental and control areas were sprayed alike, during herbicide applications. Whereas, chemical resistant weeds remained and grown in tea extent outside the control plots, were removed by frequent manual uprooting. (Nathaniel,

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