

Control of *Parthenium hysterophorus* L. and its Impact on Yield Performance of Tomato (*Solanum lycopersicum* L.) in the Northern Province of Sri Lanka

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Abstract: Impact of weed control methods on the persistence of *Parthenium hysterophorus* L., and tomato (*Solanum lycopersicum* L.) yield was studied in two farmer fields *i.e.* a site heavily infested with *P. hysterophorus* (Parthenium-site) and Parthenium free site, in the Jaffna peninsula of the Northern Province of Sri Lanka. The split-plot design consisted of two main plots *i.e.* manual weeding and ploughing (both followed by harrowing), and three sub-plots *i.e.* use of a pre-emergent herbicide (Oxyfluorfen; 240 g/L EC at 2 days before planting), mulching [*Gliricidia sepium* (Jacq.) Kunth ex Walp. leaves at 12 kg per plot on fresh weight basis], and un-weeded plot after crop establishment (control), in three replicates. The soil seed bank of the Parthenium-site was dominated by *P.hysterophorus* as expected, and the Parthenium-free site was dominated by the perennial sedge *Cyperus rotundus* L. At tomato harvest, the un-weeded sub-plots recorded the highest weed densities ($p<0.05$) when compared to the rest, The Parthenium-site showed a higher weed dry weight ($p<0.05$) when compared to that of the Parthenium-free site, due to higher emergence of the Parthenium weed in the former. Mulching was the best sub-plot treatment for Parthenium control in combination with the main plot treatments. The average fruit weight of tomato at the Parthenium-free site was 7.8 % higher than that of the Parthenium site (47.8 g per fruit). In the Parthenium-site, mulching resulted in a 6.4% higher fruit weight and 58% higher total yield ($p<0.05$) when compared to the rest of the sub-plot treatments. The weed competition negatively affected the tomato yield ($Y=-0.7551X+7.88$; $R^2=0.58$; $p<0.05$), with Parthenium weed playing a dominant role. Mulching with *G. sepium* coupled with manual weeding during land preparation or ploughing would suppress growth and development of weeds including *P. hysterophorus* and enhance yield of tomato.