

OPTIMIZING TOMATO GROWTH BY PARTIALLY SUBSTITUTING CHEMICAL FERTILIZER WITH SEAWEED EXTRACT

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Abstract

Sri Lanka is endowed with a rich and abundant biodiversity of seaweeds along its coastal line, out of which certain species such as *Padina antrillarum* and *Sargassum crassifolium* have been identified through numerous research, to have the potential to partially replace synthetic fertilizer use in agriculture. In the present study, we conducted a poly bag experiment at the crop farm of Faculty of Agriculture, Eastern University, Sri Lanka to examine the effects of foliar application of seaweed extracts (SWE) made from *P. antrillarum* and *S. crassifolium* combined with the soil application of different doses of chemical fertilizers (Urea, Triple Super Phosphate, Muriate of Potash) as recommended by the Department of Agriculture (DOA) Sri Lanka, on the growth performance of the tomato (*Lycopersicon esculentum*) variety 'Rajitha'. The experiment was arranged in a 2 × 4 Factorial Completely Randomized Design with 8 treatments and 3 replicates; 20% (v/v) *S. crassifolium* + 100% DOA recommendation (T1), 20% *P. antrillarum* + 100% DOA recommendation (T2), 20% (v/v) *S. crassifolium* + 75% DOA recommendations (T3), 20% (v/v) *P. antrillarum* + 75% DOA recommendation (T4), 20% (v/v) *S. crassifolium* + 50% DOA recommendations (T5), 20% (v/v) *P. antrillarum* + 50% DOA recommendation (T6), 20% (v/v) *S. crassifolium* + 25% DOA recommendation (T7) and 20% (v/v) *P. antrillarum* recommendation + 25% DOA recommendation (T8). The results showed that the application of 20% (v/v) *S. crassifolium* + 25% DOA recommendation (T7) showed the highest leaf area (1292.69 cm²), root fresh weight (12.42 g) and root dry weight (2.89 g), at 10 Weeks After Transplanting (WAT) tomato seedlings. T7 also showed significantly higher values in the leaf chlorophyll content at 8 WAT (41.16), number of leaves at 10 WAT (46) and shoot dry weight at 10 WAT (15.15 g). In addition, the application of only 25% of the recommended amount of chemical fertilizer brings about a reduction in the cost of cultivation of tomato. Considering the main factors of the experiment, application of *S. crassifolium* SWE produced a higher leaf area (25.5%) and root dry weight (28.9%) compared to *P. antrillarum* SWE. Moreover, application of 25% DOA recommendation produced a higher number of leaves (20.8%), root fresh weight (85.4%) and root dry weight (85.4%) compared to 100% DOA recommendation. Therefore, it can be concluded from this study that the foliar application of 20% (v/v) *S. crassifolium* SWE combined with the soil application of 25% of DOA recommended chemical fertilizer could be used for the cultivation of tomato var. 'Rajitha' in order to enhance the vegetative growth of the crops and to reduce the use of chemical fertilizer in agriculture.

Keywords: Growth parameters, Liquid seaweed extract, *Padina*, *Sargassum*, Tomato

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