

## ABSTRACT

### Effect of Application of *Ascophyllum nodosum* Seaweed Extract in Field Tomatoes

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Tomato is a major vegetable crop cultivated in Trinidad and Tobago, the most southerly tropical island of the Caribbean region. Diseases and pests are major constraints of crop productivity. Environment-friendly methods of plant protection are much desired in view of obvious hazards associated with routine plant protection agro-chemicals. Applications of seaweed extracts (SWE) in several vegetable field crops have resulted in improved yields, produce quality and enhanced tolerance levels to several diseases.

In this study tomato plants were sprayed with *Ascophyllum nodosum* extract (SWE) (0.2% or 0.5%) every 15 days after planting (DAT). The higher SWE concentration (0.5%) was more effective than the lower concentration (0.2%) for both field and greenhouse experiments. Foliar spray application method was more effective than soil drenching or combined application of spray and soil drench. The 0.5% SWE treatment on greenhouse plants resulted in significant increases in plant height (37%), plant yields (95%), plant biomass, root: shoot ratio. Significant improvements in tomato fruit quality were also observed. These beneficial effects could be due to increased chlorophyll content (12%), nutrient mobilization in plant shoots and nutrient partitioning in tomato fruits.

Integrated application of SWE in alternation with minimal fungicide spray dosages was found to be significantly effective compared to individual applications. Application of 0.5% SWE alternated with 2 fungicides resulted in significantly ( $p < 0.05$ ) greater plant height (20%), plant yields (71%) and reduced incidence of diseases in field tomato plants. Disease suppression was constantly observed in SWE sprayed plants for *Xanthomonas* leaf spot (44%), *Alternaria* blight (63%) and *Sclerotium* rot (70%). Disease reductions could be attributed to the significant increases in defence enzyme activity levels (PPO, PAL, Chitinase, Glucanase, and Peroxidase) and augmentation of total phenolic content resulting from SWE spray applications. Quantitative PCR analyses of SWE treated plants revealed significant increase of transcript levels in Jasmonic/Ethylene defence related pathway genes.

**Keywords:** *Ascophyllum* extract; field tomatoes; growth; yield; quality; disease severity; defence enzymes; defence pathway genes.