

## **Growth of tea nursery plants as influenced by different rates of protein hydrolysate derived from chicken feathers**

### **ABSTRACT**

The conversion of chicken feathers, generated annually worldwide on a large scale as a by-product of the poultry industry into value-added products, has economic and environmental benefits. Protein hydrolysate produced from feathers has attracted significant attention in agriculture as a potential plant growth stimulant. Therefore, a study was established with the aim to produce and characterize chicken feather protein hydrolysate (CFPH) and investigate the effects of this product on the early growth of nursery tea plants. Alkaline hydrolysis was used to produce CFPH with the yield of 165 mg amino acids per gram of feathers. Then, the produced CFPH was applied on nursery tea plants as a soil drench at different doses (0.5, 1, 2, 3, and 4 g L<sup>-1</sup>) in 2-week intervals until the 10th application. Commercially available fish protein hydrolysate (FPH) was included as a treatment to compare the effects with CFPH. The treatments were arranged in a completely randomized block design with three replications. CFPH and FPH significantly improved the shoot and root growth parameters. Plant height (+98%), leaf number (+61%), shoot dry biomass (+128%), root length (+94%), root surface area (+15%), and root dry biomass (+152%) were significantly increased by the application of CFPH (2 g L<sup>-1</sup> dose) compared to control. Although the highest CFPH dosage (4 g L<sup>-1</sup>) showed a reduction in growth parameters, the values obtained were similar or higher than the untreated control plants. The chlorophyll content (a, b, and total) was enhanced by the CFPH dosage of 1 g L<sup>-1</sup>, whereas the highest photosynthetic rate was recorded in the CFPH 3 g L<sup>-1</sup> treatment. The application of protein hydrolysates (PH) did not positively influence stomatal conductance and intercellular CO<sub>2</sub> concentration. Leaf nitrogen, phosphorous, manganese, and copper were positively affected by the CFPH application. The effect of CFPH on growth parameters was more pronounced than FPH. Our findings reveal that CFPH produced by alkaline hydrolysis could be used as a growth booster in raising vigorous tea nursery plants, which are most suitable for field planting and subsequently higher yields.

**Keyword:** Chicken feather; Alkaline hydrolysis; Protein hydrolysate; Growth promoter; Tea nursery plants