

Black Soldier Fly (*Hermetia illucens*) Frass as a Fertilizer for Cucumber Cultivation

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The impact of chemical fertilizer on environmental and human health has directed this research towards investigating an eco-friendly means of fertilizing by using black soldier fly (BSF) frass, the residue and digested material from insect larvae. BSF frass is a natural source of nitrogen, possessing chitin and chitosan credited with plant health benefits. Cucumber cultivation was conducted under greenhouse conditions in Pingtung, Taiwan using a peat base amended with concentrations of BSF frass collected from a local rearing farm. BSF frass at a 10% volume concentration was most efficient according to measured parameters of plant height, leaf and fruit numbers. Therefore, a calculated range of BSF frass (70g, 90g, 110g/pot) was established for a longer cultivation period to assess fruit production. Qualified fruits ($\geq 120\text{g}$) all came from the BSF frass groups that were combined with chemical fertilizer. An analyzed sample of the BSF frass returned results of nitrogen (2.14%) as the dominant macronutrient, while the estimated chitosan concentration was a low 583 $\mu\text{g/ml}$. BSF frass liquid extract dilutions also tested on cucumber seedlings for growth performance of height, leaf number and chlorophyll content indicated that lower dilutions are most effective. This research concluded that though complete replacement of inorganic fertilizers with this tested BSF frass is not likely, supplementing it with chemical fertilizers can provide quality crop production.

Keywords: Black soldier fly, Chitin, Chitosan, Cucumbers, Fertilizer, Frass