Garlic and Ginger Combined Crude Extract as a Novel, Cost-Effective and Eco-Friendly Locust Repellent

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Grasshoppers of the locust variety devour agricultural crops, costing 2.2 billion USD for winter crops and 2.88 billion USD for summer crops in damages annually. Due to this, 20.2 million people in Africa face severe acute food insecurity in 2020. For decades, the use of synthetic insecticides against locusts has been proven to be toxic to aquatic organisms and other insects, damaging the ecosystem. This research proposes Garlic and Ginger Combined Crude Extract (GGCE) as a repellent that is eco-friendly, inexpensive, and easily extracted from the Allium sativum (garlic) bulb and Zingiber officinale (ginger) rhizome using water as solvent. FTIR spectra showed that allicin is of high probable existence in GGCE. The effect of GGCE on the repellency of Valanga nigricornis, a grasshopper similar to locust species, was studied. The experiments were made up of 111 bioassays consisting of no-choice tests (NCT) and choice tests (CT) of garlic, ginger, and GGCE from concentration of 500 to 3000 ppm, at 500 ppm intervals. Results showed that repellency percentage (RP) increased with concentration increment. Consumption of leaves by Valanga nigricornis was effectively reduced over 24 hours at 2000ppm of GGCE (NCT: RP=80.11±3.88%, CT: RP=92.13±0.77%), after which the results reached plateau. Its effectiveness is higher than garlic (NCT: RP=72.95±6.3%, CT: RP=76.79±1.52%) and ginger (NCT: RP=57.71±3.23%, CT: RP=73.95±0.13%), individually. GGCE was shown to be significantly cheaper than fipronil by 90.75%. This study shows that GGCE is a novel, low-cost and eco-friendly repellent that can protect the well-being of both humanity and the environment while solving the problems of locust-brought crop destruction and famine.

Awards Won:
Fourth Award of $500