Investigating the Synergistic Effect of Hesperidin and Fisetin on Aspergillus niger and Hippodamia convergens

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Pesticides are used in agriculture to deter plant pests and pathogens, but are known to have a detrimental effect on the environment and ecosystem because of their ability and frequency to kill non-target organisms. Hippodamia convergens (Ladybugs) are an important organism in the ecosystem as they protect plants from pests, but their mortality is ever increasing due to pesticides. Aspergillus niger (A. niger) is a fungal mold that causes food spoilage and post-harvest decay and is a part of the group of pathogens that pesticides are designed to control. This study focuses on flavonoids called hesperidin and fisetin and exploring their potential as bio-pesticides. In this study, A. niger was individually and synergistically treated with hesperidin and fisetin, while H. convergens were used as the non-target organism. Using varying concentrations of hesperidin and fisetin in individual and synergistic treatments, inhibition of spore growth was measured using a hemocytometer. To determine the effects of these flavonoids on non-target organisms, similar concentrations were tested on H. convergens. Using an ANOVA test, it was determined that hesperidin and fisetin had a statistically significant synergistic effect at reducing spore count with a p-value < 0.05, with a linearly regressive relationship ($r^2=0.978$). Additionally, an ANOVA test was conducted showing none of the treatments demonstrated a statistically significant effect on the mortality of H. convergens with a p-value > 0.05. Alternative hypothesis was accepted because the synergy of hesperidin and fisetin was found to inhibit the spore growth of A. niger and while having no effect on H. convergens. These results suggest that hesperidin and fisetin may be used as potential natural alternatives to pesticides.

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