The Allelopathic Effects of Natural Plant Extracts on Seed Germination of Invasive Species Lolium Perenne

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The limited variety of weed suppression treatments has contributed to herbicide resistance in several invasive species, threatening crop yields and global food security. Allelopathy—the natural release of biochemicals by organisms that affect neighboring plant growth—offers a sustainable alternative. This project investigates the allelopathic effects of aqueous plant extracts on the invasive species Lolium perenne to identify sustainable methods for protecting the agronomic crop Zea mays. Extracts were prepared from the leaves of Juglans nigra and Salvia apiana, known for their allelopathic properties, and applied to Petri dishes containing seeds of Zea mays and Lolium perenne. Germination was measured after 7 days, with any visible protrusion counted. The vigor index was calculated as the average total length (mm) of the respective seed's root and shoot multiplied by the germination rate per plate. Compared to the control, the highest concentration of Juglans nigra extract significantly promoted Zea mays germination while inhibiting Lolium perenne growth. On the other hand, though the Salvia apiana extract at each selected concentration suppressed weed growth, it also negatively impacted corn development. An ANOVA statistical analysis and a post-hoc test (Tukey's HSD) confirmed statistically significant differences between the control groups and each of the experimental groups. These results suggest that Juglans nigra at high concentrations has strong potential as an organic herbicide. Further research on the optimization of extract concentrations, testing under real crop field conditions, and investigation into the integrity of the plant biochemicals in their extracted aqueous forms could support the practical application of these findings in agricultural settings.

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