Examination of the Variability of Fall Armyworm Infestations in Arkansas and the Potential for Biopesticide Treatment of Soybeans

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Fall armyworms(FAW) cause around 500 million dollars in economic damage each year in the U.S., and pesticidal treatments are becoming increasingly ineffective. Meanwhile, management solutions have been employed to rid Hot Springs National Park (HOSP) of its invasive plant species, but none have been wholly successful. In an effort to remedy these problems, biopesticides were made from Nandina domestica and Wisteria sinensis, two especially problematic invasive species in HOSP, and Callicarpa americana, a native species within the Ouachita Mountains, to combat soybean infestations. This study collected and mapped data on FAW infestations across Arkansas counties in 2021 and 2022. The average temperature in 2022 was 85.77°F, up from 79.5°F in 2021, while 2022 average precipitation (in.) was 0.5, down from 2.07 last year. The multiple linear regression returned a p-value of 0.005, suggesting hotter and drier Arkansas summers have fewer FAWs. 32.23% of the variation in infestations can be attributed to temperature and precipitation. The results of an experiment designed to test deterrent properties of biopesticides were not significant. Significant results were obtained from biopesticide oil toxicity testing, with nandina and wisteria killing 62.5% and 75% of FAWs, respectively, compared to Sevin and the control killing 100% and 12.5%, respectively. Nandina and wisteria were the most toxic, and GC/MS analysis identified each's pesticidal compounds. This experiment opens the door to more environmentally-friendly biopesticides synthesis to combat FAW infested soybeans in Arkansas using invasive plants that need to be eradicated.

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