The Effects of Climate Change on Evergreen Bagworm Development and Immunity

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Developing pest control strategies is challenging when urban environments are affected by climate change. The relationship between climate and herbivorous pests in urban environments has become increasingly important to understand as global temperatures rise. Evergreen bagworm (Thyridopteryx ephemeraeformis) is a major pest on Leyland cypress (Cupressus × leylandii), a fast growing tree that provides much needed shade and heat relief to the urban ecosystem. By observing the ways in which evergreen bagworms react to climate change, pest management specialists will be able to plan more effective ways to combat evergreen bagworms in changing urban conditions. Bagworms collected in Raleigh, North Carolina were held in incubators set to low, median, or high temperatures. Temperatures were chosen based on climate maps of Raleigh of typical summer temperatures in the city which range from 28°C to 32°C, with median temperatures of 30°C. Twenty evergreen bagworms from each treatment were removed from experimentation every three weeks to measure growth and immune response. Factors assessed included bag length and weight, larval weight, and sclerotized head capsule size. Immunological response was measured by the amount of internal melanization on nylon fibers. Testing showed that the median temperature of 30°C was optimal for evergreen bagworm growth and development, with growth being depressed at both the low (28°C) and high (32°C) temperature treatments. Based on the immune response data, it was found that encapsulation by melanization was least active at 35°C. Implications for the effect of climate change on the dispersal and management of evergreen bagworms are discussed.

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