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Phenology of flatheaded borer developmental stages in red maple nursery crops

Abstract

Flatheaded borers are a serious pest of red maple (*Acer rubrum* L.) trees in middle Tennessee nursery crops and landscapes. The larval stage of the borer tunnels beneath the bark, which can girdle the cambium and vascular tissues, resulting in poor tree quality, death, and unmarketable trees. The objective was to determine borer phenology in red maples to better predict timing of adult emergence. 'Redpointe' red maples were selected at a middle Tennessee commercial nursery with flatheaded borer injury. Air temperatures were monitored hourly from 1 Jan. 2021 using a Watchdog datalogger. Four 'Redpointe' maples were harvested biweekly (20 January; 3 and 17 February; and 3, 16, and 30 March; 14 April; 6 May 2021), and borer specimens (larvae, pupae, or adults) were removed. Larvae were measured (thorax plate, width, and length and abdomen length) using a handheld digital caliper. Larvae and pupae were placed on an experimental diet to rear to adulthood. Larval total length was longer on the 30 March measurement ($\chi^2 = 22.58$; df = 5; $P < 0.0004$), but no length increase was detected in other body measurements. A change in larval size may indicate molting between instars; however, species identification and sexing of adults is needed to further refine larval growth measurements. Most trees had more than one larva (average 1.32 ± 0.16 [SE] / tree; maximum 3). Only larval specimens (n=27) were found until 30 March, when 1 pupa (20%) and 4 larvae (80%) were recovered. On 14 April, all specimens were pupae (n=4), and on 6 May one larva (20%) and 4 adults (80%) were recovered. Results indicate minimal larval growth from January to March, when larvae began pupation. May was the optimal time to dissect adults from 'Redpointe' maples. Phenology research is being repeating during spring 2022. We acknowledge USDA-NIFA Specialty Crop Research Initiative for funding support.