

EFFECTS OF HOST WOOD MOISTURE ON THE LIFE CYCLE DEVELOPMENT OF THE ASIAN LONGHORNED BEETLE

Alexandra N. Whitney¹ and Melody A. Keena²

¹Yale University, School of Forestry and Environmental Studies,
New Haven, CT 06511

²U.S. Forest Service, Northern Research Station,
Hamden, CT 06514

ABSTRACT

The Asian longhorned beetle, *Anoplophora glabripennis*, is an alien invasive species recently introduced to the United States in larval form within solid wood packing material from China. Larvae develop within the xylem of apparently healthy trees. In the U.S., the species has been found infesting 21 species of hardwoods, across 12 genera, with maple species being the most preferred hosts. While there is seasonal variability in the moisture content of the xylem of living maples, when the trees are cut for firewood, moisture levels can decrease rapidly and reach levels significantly lower than in living trees. Such environmental perturbation could have life history consequences for this xylem feeding insect. It could also mean that increased concern for further anthropogenic dispersal is warranted.

In the study described here, we sought to evaluate the effects of declining host wood moisture on larval development and adult fitness. We hypothesized that decreasing moisture in the larval environment could cue larvae to accelerate development in order to escape declining host wood quality. Adults from larvae that pupated earlier would have lower weights, and there would be correlated reductions in fitness, as measured by total egg production and viability of offspring.

We reared larvae from two populations (Worcester, MA, and Chicago, IL) on artificial diets with experimentally manipulated moisture contents. Beetles developing within both low moisture and incrementally decreasing moisture environments pupated sooner than beetles reared in the standard, high moisture diet. Earlier pupation resulted in smaller adults, but contrary to expectations, there was no significant treatment effect on total egg production. This may be due to the lack of significant difference between the treatment groups in longevity, given the strong correlation between longevity and fecundity shown in a previous study.

These results highlight the need for further work to determine if there are significant tradeoffs between size and some other aspect of fitness (e.g., egg size or mate selection). From an applied perspective, firewood and pallets represent potential host wood with low and declining moisture contents. *A. glabripennis* developing within these low moisture environments may develop earlier than existing models predict, thus emerging earlier in the spring and potentially having a longer time to reproduce and disperse. This may also increase the risk of establishment associated with movement of firewood as a pathway for human-mediated dispersal.