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**Effects of Soil Type and Moisture on the Pupation Behaviour and Emergence of *Heortia vitessoides* (Lepidoptera: Crambidae)**

**Subasingha, S.M.A.B.<sup>1\*</sup>, Perera, A.G.W.U.<sup>2</sup>, Diyabalanage, R.S.<sup>3,4</sup>,  
Subasinghe, S.M.C.U.P.<sup>1</sup>**

<sup>1</sup>*Department of Forestry and Environmental Science, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.*

<sup>2</sup>*Department of Zoology, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.*

<sup>3</sup>*Instrument Centre, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.*

<sup>4</sup>*Ecosphere Resilience Research Centre, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.*

*\*bhagyaamashi@gmail.com*

**Abstract**

*Heortia vitessoides* belongs to Crambidae: Lepidoptera, is the major defoliator of *Aquilaria* species, significantly lowering agarwood resin production due to partial or complete defoliation. This infestation has led to severe economic losses in several countries, including Sri Lanka. The larval instars of *H. vitessoides* feed gregariously and voraciously on *Aquilaria* leaves. Upon maturation, the larvae pupate in the soil which is an essential step in their life cycle. Identifying factors essential for the pupation process is crucial to understand their pupation behaviour, which has not been studied in Sri Lanka, despite the substantial impact of *H. vitessoides* on *Aquilaria* tree growth. This study aimed to identify the effect of substrate type and moisture content on the pupation behaviour and to study various stages of its life cycle. First, the saturation level preferred by larvae to pupate in their natural conditions was estimated. No choice tests were conducted using sandy clay loam, clay loam and sandy loam soils under five saturation levels (0%, 25%, 50%, 75% and 100%) with fifth larval instars under controlled conditions in the laboratory. Various stages of life cycle, burrowing and emerging rates were recorded. The experiment was replicated. The study revealed that it takes approximately two days for the fifth instar larvae of *H. vitessoides* to burrow into the soil for pupation. Adult emergence occurred 13 days after the start of burrowing. The adult moths had a lifespan of about seven days after their emergence. There is a significant effect of soil saturation level and soil type on burrowing and emergence rates, with a significant interaction between these factors. Larvae successfully burrowed into the 25% and 75% saturated substrates in all three soil types, but the emergence rates were significantly very low. In all three substrate types, extremely wet (100%) and extremely dry (0%) saturated substrate resulted in the significantly lowest burrowing rates with zero emergence. Sandy clay loam saturated with 50% was mostly preferred for burrowing and emerging of *H. vitessoides*, aligning with the natural pupation conditions of *H. vitessoides*. This study provides insights into the pupation ecology of *H. vitessoides*, aiding in the development of effective control measures through soil treatment techniques.

**Keywords:** *Heortia vitessoides*, *Aquilaria*, Pupation, Emergence, Saturation level