

栗山天牛幼虫龄数和龄期的测定

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Determination of larval instar number and duration in the oak longhorn beetle, *Massicus raddei* (Coleoptera: Cerambycidae)

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摘要 栗山天牛 *Massicus raddei* (Blessig) 是危害我国东北柞树天然林的重要蛀干害虫, 长期营隐蔽性生活, 3年发生1代, 防治困难。幼虫的龄数和龄期测定是害虫预测预报以及制订其科学治理策略的重要依据。本研究于2008-2011年通过林间定期解剖受害树进行取样, 在辽宁省宽甸县采集不同发育阶段的栗山天牛幼虫, 分别测量幼虫上颚长、主单眼间距、前胸背板宽、中胸气门长和体长等5项形态指标, 利用频次分析的统计方法, 测定了栗山天牛幼虫的龄数。结果表明: 栗山天牛幼虫有6龄, 雌雄性幼虫龄数相同。上颚长、主单眼间距和前胸背板宽3项指标均可用于分龄, 中胸气门长和体长变异较大, 不宜用作幼虫龄数划分。利用种群众数龄期法计算1-6龄幼虫的平均龄期分别为9.25, 266.85, 48.09, 51.29, 260.33和385.71 d, 幼虫期共1 021.52 d。在我国东北地区, 自然条件下栗山天牛世代发生非常整齐而且高度同步, 完成1代发育需跨越4个年份, 幼虫经历3次越冬, 第1年以2-3龄幼虫越冬, 第2年主要以4-5龄幼虫越冬, 第3年全部以末龄幼虫越冬。研究结果进一步明确了栗山天牛幼虫期的生物学特性, 为生产上合理防治该害虫提供了参考依据。

关键词: 栗山天牛 幼虫 形态特征 龄数 龄期 Dyar氏法则 种群同步性

Abstract: The oak longhorn beetle, *Massicus raddei* (Blessig) (Coleoptera: Cerambycidae) is an important wood borer pest in natural oak forests (*Quercus* spp.) in northeastern China. This beetle takes 3 years to complete one generation and is difficult to be controlled due to a highly concealed life history in its larval and pupal stages. Determination of larval instar number and duration is the important foundation for the insect pest forecasting and the scientific management. The number of larval instars was determined using statistical method of frequency analysis through sampling periodically by dissecting infestation trees at Kuandian County, Liaoning Province during 2008-2011, during which the oak longhorn beetle larvae at different developmental stages in forests were collected and five morphological variables of the longhorn beetle larvae, including length of mandible, distance between main ocelli, width of the prothoracic plate, length of the mesothoracic spiracle, and body length, were measured under binocular microscope with an eyepiece micrometer. The results showed that the larvae of oak longhorn beetle have 6 instars without difference between male and female. The three variables including mandible length, distance between main ocelli and width of the prothoracic plate can be used for the separation of larval instars as the sclerotized structures, while length of the mesothoracic spiracle and body length were not reliable due to high variation. The average duration of 1-6 instars measured by the method of median population stadia in fields were 9.25, 266.85, 48.09, 51.29, 260.33 and 385.71 d, respectively. The total larval stage duration was over 1 021.52 d in fields. In northeastern China, the occurrence of oak longhorn beetle was very uniform and the development of population was highly synchronous in natural conditions. The larvae of the oak longhorn beetle need to undergo 3 winters to complete one generation. In the first year larvae overwinter as 2nd-3rd instar stage, the next year the 4th-5th instar larvae overwinter and the third winter all larvae enter the full grown larval stage. These findings further reveal the larval biology of the oak longhorn beetle and provide valuable information for the rational control of the pest in practice.

Key words: *Massicus raddei* larva morphological characters instar number instar duration Dyar's rule population synchrony

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