

A Survey on the Kinds of Leaf Rollers in Mulberry Trees

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뽕나무 加害 잎말이나방 類에 關한 調査

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農村振興廳 蠶業試驗場

摘 要

뽕나무를 加害하는 잎말이나방類의 種類와 優占種을 調査하기 위해 1979년부터 蠶業試驗場 圃場에서 調査한 結果,

1. 뽕나무 加害잎말이나방類는 뽕나무 害蟲으로 未記錄種인 뽕나무애기잎말이나방(假稱, *Olethreutes hemiplaca* MEYRICK)과 *Olethreutes doubledayana* BARRET을 包含 7種이 調査되었다.
2. 우리나라에서 優占種은 *Olethreutes hemiplaca* MEYRICK였으며 애모무늬잎말이나방(*Adoxophyes orana* F.&R.)이 그 다음이었다.

Introduction

Leaf rollers have known to give damage to various host plants including mulberry trees, orchards, forest trees, garden trees and agricultural crops as major insect pests. Honma(1970) reported that the smaller tea tortrix, *Adoxophyes orana*, attacked 56 species in 31 families as its host plants. On the leaf rollers injuring mulberry trees, Yokoyama(1923, 1925, 1929) listed 9 species of the insect pests distributed in Japan and Umeya(1935) reported 8 species including new 2 species in Korea. A total of 11 species have been found in mulberry trees according to all literatures cited in this paper.

From the last half of the 1930s, Nakayama(1936) observed the life cycle and ecological features of leaf rollers of some fruit trees and clarified the biological characters of some apple tree leaf rollers. In a paper on Tortricinae, a total of 47 species including 11 unrecorded and 3 undetermined species in Korea were listed by Park(1976) and 5 species among 39 forest leaf rollers in "A list of forest insect pests in Korea

(1969) have been known to give damage to mulberry trees.

The purpose of present study was to find out the kinds of mulberry leaf rollers and determine the dominant species. On the other hand, the authors felt it was necessary to use the recent designated names since the scientific names of leaf rollers have often been confused.

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Materials and Methods

The larvae and pupae of leaf rollers were collected in the mulberry field of the Sericultural Experiment Station, Suweon, at intervals of 7 to 11 days for 2 years beginning in 1979. The collected larvae were reared individually in a small plastic vial (dia. 1.8 cm×length 10cm) in the laboratory being fed fresh leaves every 2 days until emergence and the emerged adults were stored in a vial for the identification.

Table 1. Leaf rollers of mulberry trees

Scientific name	Common name	Korean name	Distribution	Literature*
Tortricinae				
** <i>Adoxophyes orana</i> F.&R. = <i>A. orana fasciata</i> Wal. = <i>A. privatana</i> Wal.	Smaller tea tortrix	애모두늬잎 말이나방	Korea, Japan	1, 11 4, 10 12, 14, 15
<i>Archippus asiaticus</i> Wal. = <i>A. asiatica</i> Wal. = <i>Cacoesia asiatica</i> Wal. = <i>A. c. asiatica</i> Wal. = <i>Homona meneiana</i> Wal.	Asiatic leaf roller	아새아잎말 이나방	Korea, Japan	9, 10 1, 13 12 15 14
** <i>Archippus breviplicanus</i> W. = <i>Cacoecia breviplicana</i> W. = <i>Archips breviplicana</i> Wal.	Narrow apple tortrix	사과무늬잎 말이나방	Korea, Japan	10 4, 12 1
<i>Archips crataeganus</i> Hüb. = <i>A. crataegana</i> Hüb. = <i>Cacoecia crataegana</i> Hüb. = <i>A. c. crataegana</i> Hüb. <i>Archips minor</i> Shiraki = <i>A. cacoecia minor</i> Shi.	Mulberry tortrix	뽕나무잎말 이나방	Korea, Japan Japan	10, 11 4, 13, 14 12 15 13 15
** <i>Archips fuscocupreanus</i> Wal. = <i>Cacoecia fuscocupreanus</i> W. <i>Cacoecia capua reticulana</i> Hüb. = <i>Capua reticulana</i> Hüb. <i>Cacoecia ishidae</i> Mats. = <i>Tortrix ishidae</i> Mats.		검모두늬잎 말이나방	Korea, Japan Japan Japan	10, 11 1, 4 15 13, 14 14, 15 13
** <i>Hoshinoa longicellana</i> Wal. = <i>Cacoecia longicellana</i> W. = <i>Archips longicellana</i> W.	Common apple leaf roller	사과잎말이 나방	Korea	10, 11 4 1
<i>Pandemis chlorograptus</i> Mey. = <i>P. cerasana</i> Hüb. = <i>P. ribeana</i> Hüb.	Cherry brown tortrix	벗갈색잎말 이나방	Korea, Japan	10 9 1, 4, 12, 13, 14, 15
** <i>Pandemis heparana</i> Sch. & Den.	Brown tortrix	갈색잎말이 나방	Korea	1, 4, 10, 11
Olethreutinae				
<i>Argyroplaca albipalpis</i> Mey. <i>Cymolomia morivora</i> Mats. = <i>Olethreutes morivora</i> M. = <i>Exartema morivora</i> M. = <i>C. morivolla</i> Mats. = <i>E. morivollera</i> Mats.	Smaller mulberry leaf roller		Korea Korea, Japan	12 9 1, 6 1, 4, 12, 15 14 13
<i>Olethreutes mori</i> Mats. = <i>Exartema mori</i> Mats. = <i>Cymolomia mori</i> Mats.	Mulberry leaf roller		Korea, Japan	6, 9 1, 4, 12, 13, 15 14
** <i>Olethreutes hemiplaca</i> Mey.		뽕나무애기 잎말이나방 (가칭)	Korea	
** <i>Olethreutes doubledayana</i> Bar.			Korea	

*: See the number of literature cited.

** : Species which were found in this survey.

The identification was based on the external morphological features and inspection of genitalia under the optical microscope. The ecological features of *Olethreutes hemiplaca* MEY. and *Olethreutes doubledayana* BAR. were described briefly on the basis of field and laboratory habitats.

Results and Discussion

The leaf rollers belong to the family, Tortricidae which is divided into 3 subfamilies such as Tortricinae, Olethreutinae (Eucosminae) and Spaganothinae. We have often confused most leaf rollers found in mulberry field with mulberry leaf rollers which are different from the other leaf rollers in life cycle and scientific names. For instance, the mulberry tortrix, *Archips crataeganus*, the mulberry leaf roller *Olethreutes mori* Mats. and the small mulberry leaf roller, *Cymolomia morivora* Mats, have been commonly called Bbong-na-mu-ip-ma-ri-na-bang (meaning mulberry leaf roller) in Korea. In Japan, these species have been known as the most harmful insect pests to mulberry trees, but they are not dominant species in Korea. The names of leaf rollers recorded in literatures and new species found in Korea are listed in table 1 and those names are followed by "A list of plant diseases, insect pests and weeds in Korea" (1972) and Park (1975).

As shown in Table 1, a total of 16 species are recorded as leaf rollers injuring mulberry trees but some species among them have doubtful recognition from the view point of change of scientific names.

The number of leaf roller species found in Japan is 11 and 13 species are recorded in Korea, of which 8 were reported by Umeya (1935) and 5 species were added by authors. He reported *A. crataeganus*, *O. mori*, *C. morivora*, and *A. albipalpis* found in Gyeonggi, Jeonnam and Pyungbuk Province, but have not been seen in recent years. *H. longicellana* and *P. heparana* which are well known in orchards also give damage to mulberry trees. According to Park (1977), 8 species have been confirmed attacking the apples and apple trees. *O. hemiplaca* and *O. doubledayana* are reported for the first time in this paper. They have not been known yet as mulberry insect

pests, else where. In this field survey, it is known that *O. hemiplaca* is the dominant species followed by *A. orana* in Korea. For further study on the biological features of some fruit leaf rollers, more literatures will be helpful and we state the morphological characters of only dominant species and the rare species, *O. doubledayana*.

Olethreutes hemiplaca MEYRICK

This species has been mistaken as *C. morivora* which is the dominant species in Japan. It is said that the host plant of this insect pests has not been known yet exactly.

In the middle of the wing there is a dark brown and thick band close to the outer margin and it is arranged in a grey band, alternately over the wings. The wing span of adult is about 15mm in size. The shape of egg is colorless and transparent and round in size of 0.95mm in length and 0.53mm in diameter. The pupa is dark brown and the length of its body length was 6.96mm. The head and sclerite of larva are black and the color of larval body is green or light green. The length of larval body is 1.95mm in the first instar and 14.8mm in the last instar.

Olethreutes doubledayana BARRET

This species is one of microlepidoptera and the only one pupa was collected in the field in the middle of August, 1979. The pupa is slender and about 5.3 mm in length. While the pupa of *O. hemiplaca* is dark brown, this species is light. The marks of the wing in the part of thorax show green mixed various color and there is a thick mark showing light green in the middle of the wing. The host plant has not yet been found in any place in this country.

Summary

This survey was carried out at the Sericultural Experiment Station, Suweon to clarify the kinds of leaf rollers damaging mulberry leaves and determine the dominant species of them.

The results obtained are as follow:

1. A total of seven species including 2 unrecorded species, *Olethreutes hemiplaca* MAYRICK, and *Olethreutes doubledayana* BARRET, were found as mulberry attacking leaf rollers.
2. The dominant species of mulberry leaf rollers in Korea was identified as *O. hemiplaca* M. followed by *Adoxophyes orana* B.

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