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Research Note

Newly Recorded Noctuid Pest, *Leucapamea askoldis* (Lepidoptera: Noctuidae) from Amur Silver Grass, *Miscanthus sacchariflorus*

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Abstract

Amur silver grass, *Miscanthus sacchariflorus* is one of the promising biofuel weeds. A damage of noctuid pest, *Leucapamea askoldis* was firstly observed from Amur silver grass in Hwasun silver grass plantation during the survey of insect pests of Amur silver grass in Iksan, Hwasun, and Sancheong plantation areas in Korea. The host of *L. askoldis* was not known yet in Korea. The *L. askoldis* damage was observed as larval feeding on newly grown shoots and roots of *M. sacchariflorus* close to soil surface from early May in 2013. Investigated larval density was 1.6±1.1 per m^2 on April 4 and damage rate of shoots was 0.8±0.4% on May 4, 2013. The larvae bore into shoots of *M. sacchariflorus* and feed on the inside of plant. The damaged shoots are easily pulled out and distinguished by the boring hole on the shoots. *L. askoldis* was potential insect pest in *M. sacchariflorus* plantation areas.

Keywords: Amur silver grass, Biofuel, *Leucapamea askoldis*, *Miscanthus sacchariflorus*, Noctuid

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INTRODUCTION

Weeds can be used for useful materials (food for humans, feed for animals, medical, industrial and ornamental uses and so on) (Zimdahl, 2013). One of utility values of weeds was used as biofuel material for the chemical industry and energy production in which cellulose-containing biomass in plant is used (Heaton et al., 2008). More than 90 genera and species of plants such as wheat, oat, maize, nettle, hemp, sunflower, and flex show the potential for value in use described above (Shumny et al., 2011). In addition, the *Miscanthus* grasses are promising source of cellulose-containing raw materials (Shumny et al., 2011). Amur silver grass, *M. sacchariflorus* is a vigorous, upright deciduous grass to 1.5 m or 2.5 m in height, the long arching leaves 1-2 cm wide, with a prominent white midrib; in August to September, fan-shaped silky flowering panicles appear, lasting into winter (Hong et al., 2005). Because this weed has received attention recently as biofuel products in Korea, three mass-producing plantations for Amur silver grass were artificially organized in area of 60,000 m^2 at Iksan in Jeonbuk province, 7,500 m^2 at Hwasun in Jeonnam province, and 6,600 m^2 at Sancheong in Gyeongnam province, respectively. Although *Miscanthus* has been planted as a bioenergy crop in the United States in 2002, there have been no reports of pests which have caused yield loss in *Miscanthus* fields (Dohleman et al., 2010). In spite of the fact that *M. sacchariflorus* is known to be generally pest and disease free, this is questionable owing to lack of detailed information on pests of Amur silver grass. Because systematic insect pest survey from Amur silver grass was not performed yet in Korea, insect pest survey was made from given plantations. While insect pest survey, noctuid larvae were found from the shoots and roots of Amur silver grass and identified as *Leucapamea askoldis*, which was recorded in Korea, China, Japan, and Russia (Esaki et al., 1971; Shin, 2001; Park et al., 2012).

Ecological studies including host ranges are not made up to present, although *L. asokoldis* has been intermittently recorded in Korea (Park and Han, 2001; Chung and Yang, 2012). This is the first report of damage on Amur silver grass by *L. askolidis* in Korea.

Three plantations, in which insect pest survey of Amur silver grass was studied, were located at Iksan, Jeonbuk province (36°8’44.22’’N, 126°56’22.26’’E; Iksan plantation; planted in 2011), Hwasun, Jeonnam province (34°59’33.66’’N, 127°5’15.05’’E; Hwasun plantation; planted in 2010), and Sancheong, Gyeongnam province (35°16’3.72’’N, 127°532’34.98’’E; Sancheong plantation; planted in 2010), respectively. The rivers were close to all given plantations and rice was cultivated neighboring fields. In Hwasun plantation, chestnut orchard was also close to the plantation. The insect pest survey area from each plantation was as follows; 2,000 m^2 out of 60,000 m^2 in Iksan plantation, 2,700 m^2 out of 7,500 m^2 in Hwasun plantation, and 3,500 m^2 out of 6,600 m^2 in Sancheong plantation from April to November, 2013, respectively.

L. askoldis larvae collected from the inside of damaged Amur silver grass shoots were transported to the laboratory from Hwasun plantation. Seven *L. askoldis* larvae were discovered at the sampling of 4 May. Each collected larva was placed in 10×4 cm insect breeding dish (SPL, Korea) which had two filter papers (Whatmann #2) on the bottom of dish. The larvae were reared in the growth chamber (25±3°C with 16L:8D) with supplying fresh chopped shoots and roots of silver grass. Developmental stages were monitored and recorded 24h interval and identified after emergence.

Field larval density was sampled at the given surveyed plantations. Sampling areas were prepared in each plantation as follows; each plantation was divided into nine rectangular shape sampling sets with equal size. In each sampling set, one 1 m^2 area was randomly selected for sampling area to sample larvae from Amur silver grass. In each sampling area, the roots of silver grass were pulled out and transported to the laboratory, then carefully cut through inside to find out the larvae of *L. askoldis*. When *L. askoldis* was found, the number of larvae per plant was recorded. The sampling date was 9 April in Iksan, 4 April in Hwasun, and 2 April in Sancheong, respectively.

The damage by *L. askoldis* larvae was investigated by presence of *L. askoldis* at the given plantations. One hundred shoots of silver grass were randomly sampled in each divided rectangular sampling set in each plantation. The damage level was evaluated by larval presence and larval holes and tracks on the shoots of Amur silver grass. The investigation date was 30 April in Iksan, 4 May in Hwasun, and 23 April in Sancheong, respectively.

Leucapamea askoldis (Oberthür, 1880) from Amur silver grass (Fig. 1).

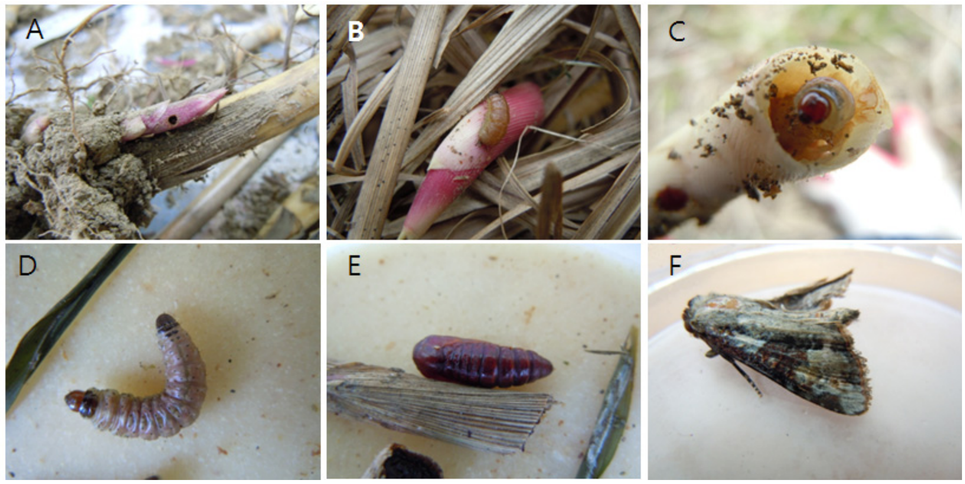

Fig. 1. Larval damage of Amur silver grass shoot and *Leucapamea askoldis*. A: Damage hole; B: Larva on shoot; C: Larva in the shoot; D: Larva; E: Pupa; F: Adult.

Hadena askoldis Oberthür, 1880
Apamea askoldis Oberthür, 1880
Apamea nivalis Butler, 1881
Trachea ascoldis Hampson, 1908
Trachea yoshinoensis Wileman, 1911
Metachrostis niphandothauma Bryk, 1948

DESCRIPTION

Mature larvae: Range from 20-25 mm long with reddish background color and small black dots on the body; Head capsule brown with reddish brown big spot on the back of head capsule; last abdomen brown (Fig. 1D).

Pupae: Range from 12-15 mm long, initially brown and gradually change to dark brown as they mature (Fig. 1E).

Adults: Body 14-15 mm, Wingspan about 36 mm; Front wing brown; darker in wing margin than base; white spot on basal and hind margins and anal vein; white strips along the vein; hind margin with long cilia (Fig. 1F).

DISTRIBUTION

Korea except Ulneung island, Japan, China and Russia (Esaki et al., 1971; Shin, 2001)

L. askoldis was not discovered from silver grass plantations in Iksan and Sancheong, but found from the plantation in Hwasun. In Hwasun *Mischanthus* plantation, larval density was 1.6±1.1/m^2 on 4 April.

Damage rate of *M. sacchariflorus* by *L. askoldis* in Hwasun silver grass plantation was 0.8±0.4% per hundred plants on 4 May. In preliminary monitoring in mid- February, we found larvae of *L. askolidis* in the roots of Amur silver grass, after that, shoot and root damage of Amur silver grass were observed from early May. Thus, *L. askoldis* were considered to overwinter as larvae and developed to pupae in the shoot of silver grass, then emerge in late May or early June. In field collection, two and three adults were collected from light trap in late May (30 May) and mid-June (13 June), respectively.

L. askoldis larvae feed on shoot of *M. sacchariflorus*.

The larvae feed on shoot of *M. sacchariflorus* close to soil surface in the spring. The larvae were observed boring into shoot and locating in the shoot (Fig. 1A, B and C). The damaged shoot was easily pulled out and distinguished by the boring hole of *L. askoldis* (Fig. 1C). The damaged shoot went rotten and wilted.

L. askoldis was potential insect pest in *M. sacchariflorus* plantation areas. So need to find control methods against *L. askoldis* larvae in *M. sacchariflorus* plantation areas.

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