Plant Protection Service
P.O. Box 9102
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Short PRA

STATHMOPODA AURIFERELLA

November 2009

1. Reason for performing the PRA

The Dutch Plant Protection Service intercepted a single moth of *Stathmopoda auriferella* on a *Melodorum fruticosum* plant imported from Thailand in August 2009. *S. auriferella* is not a regulated pest in the EU but is regulated in the USA, New Zealand and Australia (APHIS, 2004; Biosecurity New Zealand, 2005; Biosecurity Australia, 2009). This short PRA was conducted to assess the potential impact of *S. auriferella* for the Netherlands. The impact of *S. auriferella* has been assessed for Australia in a Import Risk Analysis (Biosecurity Australia, 2009) and information from that PRA is used in the present PRA.

2. Scientific names and taxonomy

Class: Insecta
Order: Lepidoptera
Family: Oecophoridae
Genus: *Stathmopoda*
Species: *auriferella* (Walker)

Source: CABI, 2007.

Common names: apple heliodinid (APHIS, 2002; Biosecurity Australia, 2009)

3. Key aspects of biology

Moths are relatively small about 1 cm in size and live for about one month (Park et al., 1994; Biosecurity Australia, 2009). *S. auriferella* is known as a pest of which the larvae damage flower buds and fruits of various plant species (Prevett, 1963; Park et al, 1994: APHIS, 2004). Cold tolerance, threshold temperatures for development are not known for this species. In South Korea, the pest has 2 generations a year (Park et al., 1994).

4. PRA-area

The Netherlands

5. Host plant range (Worldwide)

CABI (2007) lists the following species as host plants: *Citrus sinensis, Mangifera indica*.
The NHM Host plant database (Robinson et al., 2009) list the following species from 10 different families: *Acacia nilotica, Albizia altissima, Cocos nucifera, Coffea sp., Helianthus sp., Mangifera indica, Nephelium ophiodes, Pinus roxburghii, Punica granatum, Sorghum sp., Tristania sp.*

The following other records of host plant species were found in literature:

- *Actinidia sinensis* (kiwi) (Park et al, 1994)
- Mangoes and oranges (Badr et al, 1989)
- Sorghum (Prevett, 1963; Nonveiller, 1969)
- Mango (Taher Sayed, 1946)

Ramzan & Judge (1994) reported that larvae of *S. auriferella* damaged jute carpet in a building in India

S. auriferella is a post-harvest pest of sorghum but infection begins already in the field (Prevett, 1963).

A common name of *S. auriferella* is apple helidionid and AQIS (1998) listed *S. auriferella* as a pest with a high risk potential to be associated with Fuji apple from Japan. No literature was, however, found

describing the insect on apple (*Malus* sp.). APHIS (2004) also considers *S. auriferella* as a pest of concern for grapes from South Korea.

According to above information *S. auriferella* is polyphagous and may be able to attack (fruits of) more plant species than listed above.

6. Host plant range (PRA area, including acreage)
Vitis sp.: about 180 ha (Wim Brunsveld, Wijngaardeniersgilde, September 2007). These are the plants in commercial vineyards. Plants of *Vitis* sp. are also grown in tree nurseries and in private gardens (total acreage unknown). In protected cultivation, one non-commercial *Vitis* crop is known (http://www.westlandsedruif.nl/; accessed September, 2009).

Actinidia sp.: only grown for ornamental purposes on a limited scale (acreage unknown).

Malus domestica (apple orchards): about 9300 ha in 2008 (http://www.cbs.nl accessed September 2009). Additionally, young *Malus* spp. plants are grown on tree nurseries including those for ornamental purposes (acreage unknown).

Cocos palm trees in protected cultivation.

S. auriferella is polyphagous (see question 5) and may be able to attack more plant species in the PRA area.

7. What is the current area of distribution of the pest?
South-Eastern Asia: a.o. Thailand, Japan, Taiwan, China (a.o. Shanghai), Korea, Pakistan, India, Maleisië, Sri Lanka (Kasy, 1973; www.jpmoth.com; Park et al., 1994). In Japan, *S. auriferella* is present in Honsyu (=mainland Japan), Sikoku, Kyusyu, Yaku-Island, Kume-Island, Miyako-Island, and Iriomote-Island (Hirasima, 1989).

Africa: Sudan (ref 6), Madagascar (www.jpmoth.com), Egypt (Badr et al., 1986), Nigeria (Zhang, 1994), Gambia, Sierra Leone, Comoren (Kasy, 1973)

Europe: Greece (Crete: 1e report from Europe) (Nel & Nel, 2003). No reports from other European countries.

8. What is the international phytosanitary status?
Stathmopoda auriferella is a quarantine pest in:
- Australia (Biosecurity Australia, 2009)
- USA (Anonymous, 2004)
- New Zealand (Biosecurity New Zealand, 2005)

9. Does it occur in the Netherlands?
No

10. Probability of entry: preliminary pathway analysis
A single moth has been intercepted on an imported ornamental plant showing that the pest can enter the Netherlands with plants for planting imported from areas where the pest is present. It is unknown if the plant species *Melodorum fruticosum* on which the moth was found is a host plant. The plant had been transported in a container with several other plant species. One of the other plant species may have been a host plant or the pest could have been a contaminant. It is, however, concluded that *S. auriferella* can enter the Netherlands by import of plants for planting from area where the pest is present. A detailed pathway-analysis is not part of this short PRA.

11. Probability of establishment?

(a) Outdoors

The pest is present in areas with a warmer climate than the Netherlands (see question 7). However, the pest is present in for example South Korea where winter temperatures are comparable or even lower than in the Netherlands (Fig. 1).

According to Kasy (1973), *S. auriferella* appears in Palearctic (South Korea is part of this ecozone) to be only present in areas where winters are mild; winter temperatures, however, not specified.

No information was found on minimum temperatures for survival or on temperature threshold for development. In Chonnam Province in South Korea, *S. auriferella* has 2 generations a year (Park et al., 1994). In the Netherlands where summers are cooler than in South Korea the pest might have one generation per year.

The pest is sofar only known from areas where summer temperatures are much higher than in the Netherlands. It is, therefore, concluded that the climate in the Netherlands is less favourable for the pest than in its present area of distribution. The pest may, however, be able to establish in the Netherlands since Dutch winter temperatures do not seem to prevent establishment.

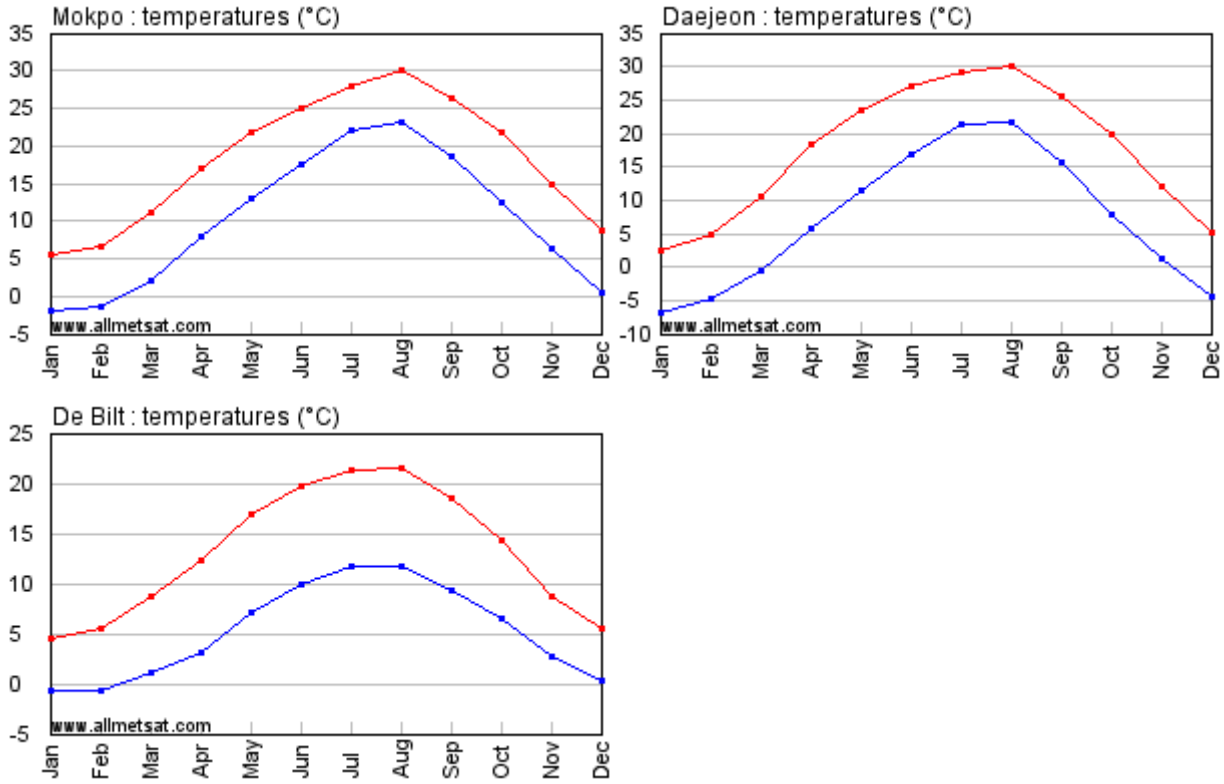

Fig. 1: Mean temperatures on locations north and south of Chonnam Province, South Korea, and in the Netherlands (De Bilt). Note: Y-scales are not similar!
Source: http://en.allmetsat.com/climate/; accessed October 2009.

Probability of establishment outdoors: low – medium (uncertainty: medium)

(b) In protected cultivation

Climate conditions in glasshouse where temperatures usually do not drop below 10°C, are usually around 20°C and are probably favourable for establishment. The pest is not known as a pest of glasshouse crops and it is uncertain if host plants are grown in Dutch commercial glasshouses. One glasshouse (non-profit crop) is known in the Netherlands that grow *Vitis* sp (see also question 6). The availability of suitable host plants in commercial glasshouses is, however, uncertain.

Probability of establishment in protected cultivation: medium (uncertainty: medium)

12. How likely is the pest to spread in the PRA-area? (*naturally and by human assistance*)
Adults of *S. auriferella* are good fliers according to Biosecurity Australia (2009). Flight distances are, however, not indicated. No other information could be found on flight behaviour of the species.

Potential of natural spread: medium (uncertainty: medium)

The pest may be spread over larger distances by movement of infested plant material (as shown by the recent interception in the Netherlands (see question 1). Eggs are very small (about 0.1 mm) and they are unlikely to be detected (Biosecurity Australia, 2009).

Potential of spread by human assistance: high (uncertainty: low)

13. **What is the potential damage when the pest would become introduced?** (*without the use of control measures*)

(a) Impact in its current area of distribution
Limited information is available about the impact of *S. auriferella* in its current area of distribution. The following reports were found in literature (CAB Abstracts 1910 to 2009 Week 30):

Park et al (1994) reported that on an average 45.9% of grape fruits were damaged by *S. auriferella* in Chonnam Province in South Korea in 1991 – 1993. The damaged fruit parts were mainly fruit apex (70%) and fruit stalk (11%). It was not stated to which extent the fruit damage lead to yield losses.

Ramzan & Judge (1997) reported damage of jute carpet but did not mention damage levels.

Prevett (1963) reported that *S. auriferella* was found in heads of freshly harvested and in stored sorghum in Northern Nigeria. Nonveiller (1969) reported that *S. auriferella* attacks mainly the unhulled grains of sorghum in North Cameroun. Prevett (1963) wrote that infestation by *S. auriferella* begins in the field: "the larva, ..., feeds outside the grains, spinning a tube of webbing within which it feeds and to which frass adheres".

In Japan, commercially grown crops that are possibly attacked by Stathmopoda auriferella are apple, kiwi, plum, peach, citrus and grapes (Anonymous, 2006). However, no reports could be found in English literature on damage of plants in Japan. The biology and morphology of this species, and the damage caused by it are only brief described in the textbooks of Japanese agricultural pests written in Japanese (Okuno et al.,1977; Umeya and Okada, ed., 2003). This lack of information suggests that S. auriferella is not an economically important pest in Japan.

A finding of *S. auriferella* on Crete Island has been reported by Nel & Nel (2003). However, *S. auriferella* is not known as a pest of any crop on Crete island, also not of citrus and grapes which are grown on about 5.100 and 22.670 ha, repsectively (pers. comm. Dr. E. Rodatikis, October 2009, Plant Protection Institute of Heraklion, Crete).

S. auriferella is a quarantine pest in the USA, Australia and New Zealand. APHIS and Biosecurity Australia report the following:

According to APHIS (2004), larvae of *S. auriferella* "cause webbing of the flower buds and newly set fruit, often causing affected plant parts to drop from the vine and burrow into the green berries, which may split, shrivel, or fall off when damaged".

In a qualitative, pathway-initiated pest risk assessment of the USDA for the importation of grapes from Korea into the US, the economic and environmental impact is assessed as low (APHIS, 2002). It is, however, not stated on which information this "low impact" is based. A "low economic impact" in the PRA means that the pest cause any one or none of the following impacts (APHIS, 2000):

- "Lower yield of the host crop, *e.g.*, by causing plant mortality, or by acting as a disease vector.
- Lower value of the commodity, *e.g.*, by increasing costs of production, lowering market price, or a combination.

- Loss of foreign or domestic markets due to presence of new quarantine pest."

A low environmental impact means no significant impact on biodiversity or on endangered species. It also means no stimulation of biological or chemical control programs (APHIS, 2000). The PRA does, however, not give information or data sources on which the "low impact" is based.

Biosecurity Australia (2009) has assessed the potential impact of *S. auriferella* as "low" and expects a significant impact on plant life or health only at the local level. The assessment refers to several reports that list host plants of *S. auriferella* but do not report about damage levels. Impact on international trade (was assessed as "significant at the district level" as the presence of the pest may lead to additional phytosanitary requirements by other countries, e.g. the USA and New Zealand.

In conclusion, the impact in its current area of distribution is assessed as low (generally little damage, locally or incidentally significant damage may happen). The lack of information on yield losses and one report from South Korea that describes significant damage on Kiwi fruit base the "low impact". PRA's from Australia and the USA also assess the impact as "low". The uncertainty of the rating is medium because of the limited information.

(b) Potential impact in the PRA area

Outdoor crops, urban and natural environment
Assuming that *S. auriferella* can establish outdoors, it can attack grapes and maybe also apples and other crops and plants in urban and environmental areas. It is expected that potential damage will be lower than in its present area of distribution because the pest may only have one generation a year in the Netherlands (see question 12). On the other hand, specific natural enemies that may be present in its original area of distribution may retard population development and their absence in new areas of introduction might favour population build up of S. auriferella. However, no information is available about natural enemies and the potential damage is assessed as low with a medium uncertainty.

Protected cultivation
The host range of the pest is highly uncertain. The pest is mainly known from tropical food crops and grapes (see question 5) which are not grown in commercial glasshouses in the Netherlands. No reports are known of (cosmetic) damage to ornamental plant species but such kind of damage may be less often reported than damage to food crops. However, based on the current information, we assess the expected damage as "low" (some damage may occur, but generally no significant yield losses). However, as the host range is uncertain as well as the damage level this rating is uncertain.

Potential impact in the PRA area (outdoor crops and protected cultivation): low (uncertainty: medium)

14. Which control measures are available?

Outdoor crops
Grapes
In grapes, deltamethrin-based products are the only registered insecticides against caterpillars and moths (www.ctb.agro.nl). Deltamethrin is a broad spectrum insecticide and does not fit into an integrated control strategy because it will also kill natural enemies of pests and its use is, therefore, unwanted by growers of grapes.

Apple
In the production of apple fruits, the following insecticides which are generally effective against caterpillars are registered. These are deltamethrin, *Bacillus thuringiensis*, diflubenzuron, fenoxycarb and methoxyfenozide based products (www.ctb.agro.nl). These active ingredients have all been registered in the EU except fenoxycarb (see EU Pesticides database on http://ec.europa.eu/sanco_pesticides/public/).

Protected cultivation
In floricultural crops, several insecticides that are generally effective against caterpillars are currently registered in the Netherlands. These insecticides are based on the active ingredients deltamethrin, methoxyfenozide, spinosad, *Bacillus thuringiensis*, azadirachtin, indoxacarb and teflubenzuron

(www.ctb.agro.nl). These active ingredients have all been registered in the EU except azadirachtin (see EU Pesticides database on http://ec.europa.eu/sanco_pesticides/public/). In the Netherlands, registration of the product based on azadirachtin, Neemazal, will expire on 31 December 2010 and it is uncertain if it will be available in the future.

In several glasshouse vegetables, deltamethrin, methoxyfenozide, spinosad, *Bacillus thuringiensis*, azadirachtin, indoxacarb and teflubenzuron based products are also registered.

In literature, no information is available about the efficacy of insecticides against *S. auriferella* or about resistance development against insecticides. Various insecticides are available and it is expected that at least some of these insecticides can (partially) control the pest.

15. What is the expected damage when the pest would become introduced?

Outdoor crops
Grapes
In general, growers will not use deltamethrin-based products since it does not fit into an integrated control system. Thus, we expect that growers will not use specific measures to control the pest and we, therefore, rate the expected damage the same as the potential damage: generally low but locally or incidentally some significant damage may occur (see question 13).

Apples
Uncertain if the pest attacks apple and how much damage it will cause. Expected damage: generally low (see question 13)

Expected damage outdoor crops: low (uncertainty: medium)

Protected cultivation
The pest is mainly known from tropical crops and grapes (see question 5) that are not grown in commercial glasshouses in the Netherlands. If the pest would attack floricultural crops in Dutch glasshouses, the expected damage is expected to be low since growers can use various insecticides that will likely prevent economic losses. In glasshouse vegetables, fewer insecticides are available and in fruit vegetables the use of insecticides is minimized to maintain an integrated control system. However, *S. auriferella* is not known as a pest of vegetables that are grown in commercial glasshouses in the Netherlands and, therefore, we expect the damage for protected cultivation to be low with a medium uncertainty (because of the uncertainty about host range and damage levels).

Expected damage glasshouse crops: low (uncertainty: medium)

16. Effect on export markets
In the Netherlands, grapes are produced for local wine production and therefore the presence of *S. auriferella* will not affect export markets of grapes. Dutch apples are mainly exported to EU-countries and Russia (Productschap Tuinbouw, 2009). Apples are not exported or only at low volumes to the USA, Australia or New Zealand where *S. auriferella* is a quarantine pest. Because of this and because the Dutch climate does not seem very favourable for pest development we expect that the presence of the pest will have a low impact for Dutch export with a medium uncertainty. We assess a medium uncertainty because the pest may attack plant species that are currently unknown as host plants and the attack of those host plants may affect export markets.

Potential impact for export markets: low (uncertainty: medium)

17. Conclusion

Stathmopoda auriferella is considered a pest with a low phytosanitary risk in the Netherlands for the following reasons:

- The impact of the pest is generally and as far as known low in its present area of distribution (However, the uncertainty of this rating is medium: one publication is known that report significant economic damage; the low rating is based on the fact that this organism is generally not known/reported as an important pest).
- The climatic conditions in the Netherlands are less favourable for the pest than in its present area of distribution and it is even uncertain if the pest can establish outdoors.
- Establishment of the pest will probably not affect export markets since grapes and apples are not exported (or at low volumes) to countries where the organism is a quarantine pest.

It should be noted that the conclusions of the present PRA have uncertainties because of the lack of information on the host range of *Stathmopoda auriferella*, its current impact and because it is uncertain if the pest can establish outdoors in the Netherlands.

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