Appearance of *Neotoxoptera formosana* (Homoptera: Aphididae) in The Netherlands

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KEY WORDS
Sternorrhyncha, Aphidoidea, onion aphid, global warming, virus transmission

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***Neotoxoptera formosana* (Takahashi) is a pest of wild and cultivated *Allium* species, but never with disastrous consequences. In 1984, *N. formosana* was found in France. This was the first finding in Europe. Since then, *N. formosana* has been observed also in other European countries. The first record for The Netherlands dates from 1993. However, this finding is very doubtful, because the aphids found were not properly identified; rather the names of three species known to occur on the food plant were suggested, including *N. formosana*. To my knowledge the present report documents the first occurrence of *N. formosana* in The Netherlands.**

Distribution

Originally the onion aphid, *Neotoxoptera formosana* (Takahashi), was described from Formosa (Taiwan) (Takahashi 1921), but later it has been detected in countries all over the world. The onion aphid was first found in Europe, in 1984 in France (Leclant 1999). Since then, the aphid has been observed regularly in low numbers: in 1999 in the United Kingdom (MacLeod 2007), in 2000 in Italy (Barbagallo & Ciampolini 2000), and in 2007 in Germany (Schrameyer 2008).

In 1993 Paul van Dijk observed aphids infesting various *Allium* species that he cultured for virus research (Van Dijk 1993). He suggested that they were either *N. formosana*, *Myzus ascalonicus* Doncaster or *Myzus cymbalariae* Stroyan. Since he had brought a number of *Allium* bulbs from Indonesia, some of these bulbs could already have been harbouring individuals of any of these aphid species. In the worldwide distribution map of *N. formosana* per June 2001 (map 620), The Netherlands is not mentioned as a finding place of *N. formosana* (CAB International 2001).

In April 2008, I spotted wingless onion aphids on *Allium schoenoprasum* (chives) from a garden centre in Barneveld, The Netherlands (the origin of the plants is unknown), which I had placed in my garden. Identification of the aphids was done using the key in Blackman & Eastop (2000). During two months of observation, no winged forms occurred.

Diagnostics

The onion aphid appears blackish, but under a loupe or microscope its true colour becomes visible: reddish/dark-brown (figure 1). The legs have more or less the same colour, only the slightly swollen siphunculi and the antennae are somewhat lighter and have approximately the same length as the body. Since these dark onion aphids prefer to feed on the lower parts of the plant, they are hard to find when in low numbers. When the colony starts to grow, they are more conspicuous (figure 2). Dying stems of the plants can also be a sign of the aphids' presence.

Biology

Although the onion aphid has been discovered almost a century ago in Taiwan, not much is known about its biology. Only parthenogenetic reproduction is described and no sexuals have been found (Schrameyer 2008). Therefore, it seems to be anholocyclic. Also unknown is whether or how the onion aphid survives during winter time in Western Europe, since it originates from a subtropical climate. However, the last decade mean temperatures rose in Europe (Schreuder 2009) and milder winters occur, so it may be possible that the aphids survive outdoors in the south of France. Perhaps warming of the climate is not even necessary, since it certainly can live on seedlings of *Allium* species in greenhouses and/or on *Allium* bulbs in stores, where temperatures are relatively high year-round.

Development of the onion aphid is fast. Within 3-5 weeks the colony is so large that plants do not survive. In contrast to other species, no winged individuals could be found in my garden despite the size of the colony.

Host range

Until now, only *Allium* species have been recorded as host of the onion aphid: *Allium ascalonicum*, *A. cepa*, *A. chinense*, *A. fistulosum*, *A. porrum*, *A. sativum*, *A. schoenoprasum*, *A. tuberosum*, and others, wild as well as cultivated (MacLeod 2007). In my own garden, onion aphids were recorded on chive. After the chives were dead the aphids spread through the garden and had to walk at least 7 m to reach other plants. I have found apterae on stems of hyacinth that had finished flowering and on toad rush (*Juncus bufonius*). However, the viviparae and newborn nymphs hardly grew on those plants, they just survived, and most of the offspring didn't mature. It is as if the 'crowding effect' – when colonies reach their maximum size and food runs out, aphids develop wings for dispersal – hardly has any effect on the onion aphid. Still – in the countries mentioned before, a few winged onion aphids have been trapped in suction traps; in Germany no winged individuals were caught in traps, just some were found on onion plants by Schrameyer (2008).

1. *Neotoxoptera formosana* on *Allium schoenoprasum*. Photo: P. Piron
1. *Neotoxoptera formosana* op bieslook.

2. Colonization of *Allium schoenoprasum* by *Neotoxoptera formosana*. Photo: P. Piron
2. Kolonisatie van *Neotoxoptera formosana* op bieslook.

Damage

The onion aphid population can build up rapidly resulting in feeding damage and very soon after that loss of plants. Surprisingly, not the whole field will be lost (Schrameyer 2008). Intriguing is why the rapid population build up suddenly stops. Schrameyer (2008) monitored *N. formosana* during the whole season in 2007 and did not find parasitoids or even mummies, so parasitization is probably not the explanation. Until now it never became an economical pest (Leclant 1999). Moreover, I could not find any report of serious damage in the literature, despite the build-up of enormous populations.

Neotoxoptera formosana is known to act as a vector of non-persistent plant viruses. In Japan, *N. formosana* has been shown to transmit garlic latent potyvirus (Sako *et al.* 1990) and alstroemeria mosaic potyvirus (Yasuda *et al.* 1998). Jensen (1949) reported the infection of one papaya plant with papaya ringspot potyvirus, out of seven tests in which he placed 200 onion aphid individuals per plant! Unfortunately, Van Dijk (1993) did not carry out transmission experiments with the aphid species on his plants and the available *Allium* viruses, he only tested *Myzus ascalonicus* Doncaster from another source. The absence of winged individuals will probably prevent rapid spread of viruses by this aphid species.

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References

Barbagallo S & Ciampolini M 2000. The onion aphid, *Neotoxoptera formosana* (Takahashi), detected in Italy. Bolletino di Zoologia Agraria at di Bachicoltura, Serie II, 32: 245-258.

Blackman RL & Eastop VF 2000. Aphids on the world's crops. An identification and information guide (second edition). John Wiley & Sons, Ltd.

CAB International 2001. *Neotoxoptera formosana*. Distribution Maps of Plant Pests. 2001. June, Map 620. CAB International.

Jensen DD 1949. Papaya ringspot virus and its insect vector relationships. Phytopathology 39: 212-220.

Leclant F 1999. Les pucerons des plantes cultivées. Clefs d'identification. II. Cultures maraîchères. Acta/INRA.

MacLeod A 2007. CSL pest risk analysis for *Neotoxoptera formosana*. The food and Environment Research Agency, Plant Health Risk Management.

Sako I, Taniguchi T, Osaki T & Inouye T 1990. Transmission and translocation of garlic latent virus in rakkyo (*Allium chinense* G. Don.). Proceedings of the Kansai Plant Protection Society 32: 21-27.

Schreuder A 2009. KNMI: No reason for panic over climate change. NRC Handelsblad, 29 July 2009.

Schrameyer K 2008. Blattläuse auch bei *Allium*-Arten. Gemüse 2/2008: 24-25.

Takahashi R 1921. Aphididae of Formosa. Part I. Agricultural Experiment Station of the Government of Formosa. Report 20: 1-97.
Van Dijk P 1993. Survey and characterization of potyviruses and their strains of *Allium* species. Netherlands Journal of Plant Pathology 99 (Suppl. 2): 1-48.
Yasuda S, Saka K & Natsuaki KT 1998. Characterisation and serodiagnosis of alstroemeria mosaic potyvirus. Japanese Journal of Tropical Agriculture, 42: 85-93.

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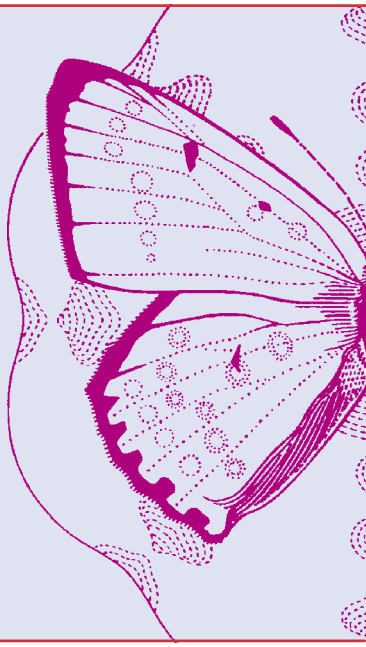
Samenvatting

De waarneming van *Neotoxoptera formosana* (Homoptera: Aphididae) in Nederland

In 1984 is de uienbladluis, *Neotoxoptera formosana* (Takahashi), voor het eerst in Europa gesignaleerd, in Frankrijk. Sindsdien is ze ook in Engeland, Italië en Duitsland waargenomen, en in 2009 in Nederland op bieslook. De uienbladluis kan behoorlijk schadelijk zijn voor allerlei wilde en geteelde *Allium*-soorten zoals ui, bieslook, knoflook, enz. Als gevolg van de zuigschade kan de gehele plant afsterven. *Neotoxoptera formosana* is moeilijk te vinden vanwege haar donkere uiterlijk en bovendien koloniseert ze de plant vlak boven de grond. Pas als er planten beginnen af te sterven valt het op dat de bladluis aanwezig is. Net als andere Aphididae, kan *N. formosana* non-persistente plantenvirussen overbrengen. Deze dreiging is echter niet groot, want gevleugelde dieren ontstaan er slechts mondjesmaat. In een kolonie op bieslook heb ik gedurende twee maanden geen enkele gevleugelde uienbladluis waargenomen. Opmerkelijk was wel dat toen de bieslook afgestorven was, ik ongevleugelde exemplaren heb gevonden op de uitgebloeide bloemstelen van hyacinth en op *Juncus bufonius*. Weliswaar vermeerderden ze zich nauwelijks, maar ze bleven wel ruim een week in leven. De paar nakomelingen die geboren werden, werden uiteindelijk niet volwassen.



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