

Netherlands Food and Consumer Product Safety Authority Ministry of Agriculture, Nature and Food Quality

Quick scan number: ENT2018-001

	Quick scan date: 16 February 2018	
1	What is the scientific name (if possible up to species level + author, also include (sub)family and order) and English/common name of the organism? Add picture of organism/damage if available and publication allowed.	<i>Nipponaclerda biwakoensis</i> (Kuwana, 1907) (Hemiptera: Coccoidea: Aclerdidae), <i>Phragmites</i> scale or Roseau Cane Mealybug.
2	What prompted this quick scan? Organism detected in produce for import, export, in cultivation, nature, mentioned in publications, e.g. EPPO alert list, etc.	The Netherlands is a major importer of reed from Asia. During an inventory (literature search) of possible pests that may be associated with reed consignments from Asia, information was found about a major outbreak of an Asian species, <i>Nipponaclerda biwakoensis</i> , in reed vegetation in North America. A preliminary risk assessment (Quik scan) was made for this pest. In the USA (United States of America) the <i>Phragmites</i> scale, <i>Nipponaclerda biwakoensis</i> native to Asia, was discovered and identified by Scott Schneider (USDA-ARS) during the fall of 2016 causing massive impacts on reed vegetation in the Mississippi delta. As a result, the media (e.g. Baurick 2017a, Baurick 2017b, Baurick 2017c), state authorities (Anonymous 2017a) and an internet forum (Anonymous 2017b) paid a lot of attention concerning its impact on <i>Phragmites australis</i> stands in the Mississippi delta (USA) and the ecosystem in which it is growing. The Netherlands is importing reed (<i>Phragmites</i>) from China, used as thatching material, for building a roof. Import of reed may be a pathway for <i>Nipponaclerda biwakoensis</i> .
3	What is the current area of distribution?	The species is native to Korea (Kawai 1980 in: Kaneko 2005), China and Japan (García Morales et al. 2016). In China, <i>N. biwakoensis</i> occurs in the province Hebei, Beijing, Jiangsu (region Shanghai), Ningxia, Liaoning, Shandong and Tibet (Wang 2001; Xu & Wang 2003; Zhong 2016). It has been introduced in the USA in the Mississippi Delta (Louisiana) where it was discovered during fall 2016 and infested vast stands of its host (e.g. Anonymous 2017, Cronin et al 2017, Diaz 2017). This prompted a warning against transporting or transplanting the reed into other parts of Louisiana (Louisiana Wildlife and Fisheries 2017). How it arrived to Louisiana is unknown (Diaz 2017).

4	What are the host plants?	<i>N. biwakoensis</i> is known to live on <i>Juncus</i> (Juncaceae), <i>Agropyron</i> and <i>Phragmites australis</i> (Poaceae) (Wang 2001; García Morales et al. 2016). It is unknown whether one of these hosts may be categorized as a primary host.
	Does the organism cause any kind of plant damage in the current area of distribution and/or does the consignment demonstrate damage suspected to have been caused by this organism? Yes/no + plant species on which damage has been reported + short description of symptoms. Please indicate also when the organism is otherwise harmful (e.g. predator, human/veterinary pathogen vector, etc.).	Nymphs and young adults are living behind the leaf sheaths. Female scales die with eggs for the next generation still inside. Nymphs suck the sap, weakening the plant or killing it if infestation levels are high. The species goes mobile, crawling or hitching a ride on a bird or floating debris to infect new stands of its host. In heavily infested areas especially in the far south end of the Mississippi Delta there is a die-off of all reed stands, converting section of the marsh to open water (Baurick 2017c). Once killed by the scale which has been found in densities up to 728 scales per stem, the reed is turning into brown, lifeless stalks to rotting black sticks (Diaz 2017). In this way thousands of acres of <i>Phragmites australis</i> (common reed or Roseau cane) are dying in the Mississippi delta and infested areas are now shallow, open water. Of the 110.000 acres with <i>Phragmites</i> about 80% is affected by the scale insect (Baurick 2017a, Baurick 2017b). The rate at which it seems to be expanding and the severity of its impacts is alarming (Louisiana Wildlife and Fisheries 2017).
6	Assess the probability of establishment in the Netherlands (NL) (i.e. the suitability of the environment for establishment). a. In greenhouses (low, medium, high) b. Outdoors (low, medium, high) c. Otherwise (e.g. storage facilities, human environment)	The species can survive periods of severe frost and can probably survive winter periods in the temperate and colder zones of Europe. In Japan, where <i>N. biwakoensis</i> is native, parasitoid species have a limited impact on scale populations (Kaneko 2004). In the Mississippi delta three parasitoids were found causing substantial mortality; two of these species are endemic to Japan that have been introduced alongside with their host (Japoshvili et al. 2016; Diaz et al 2017). Whether parasitoids would play a role in establishment potential and population management in Europe is unknown.
7	Assess the probability of establishment in the EU (i.e. the suitability of the environment for establishment).	Based on its current area of distribution, the species is expected to be able to establish in large parts of the EU.
8	What are the possible pathways that can contribute to spread of the organism after introduction? How rapid is the organism expected to spread (by natural dispersal and human activity)?	Import of common reed from areas where the species is present. After introduction short distance dispersal may happen by crawlers moving to neighbouring plants and the species may passively be transported long distances by boats, humans, birds, wind and floating stems (Cronin et al. 2017). In the USA reed is used for roofing, paper products, constructed wetlands for wastewater treatment,

		biofuels and ethanol production (Cronin 2017) and thus may be introduced by different pathways. In the EU, reed is imported as thatching material, used for roofing, and possibly also for other purposes. Its import is not regulated and, therefore, phytosanitary inspections are not required. The most important European countries which import thatching reed are Belgium, Denmark, Finland, Germany, Ireland, Luxembourg, Netherlands, and the United Kingdom (Wichmann & Köbbing 2015). Austria, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Ukraine and Turkey are predominantly exporting thatching reed. According to Wichmann & Köbbing (2015), "the Netherlands are the largest thatching reed consumer and at the same time the most important hub for reed distribution in Europe. Producing, importing and exporting reed in and out of the Netherlands makes it difficult to determine the domestic reed production and consumption". Reed is exported from China's Northeast, the volume to Europe was 2-4 million bundles in 2010 (Wichmann & Köbbing 2015).
		The life cycle of <i>N. biwakoensis</i> resembles that of the European mealybug <i>Chaetococcus phragmitis</i> . First stage nymphs of that species overwinter and survive several months and crawl from dried reed to new shoots (Kosztarab & Kozár 1988). Although Central European populations are considered to have one generation, La Face (1921) reported three generations from Italy. In contrast, the overwintering stage of <i>N. biwakoensis</i> is eggs in "dead" female (Diaz 2017). There is a chance that living <i>N. biwakoensis</i> scales on imported plant material, stored next to stands with a natural <i>Phragmites</i> vegetation, enter these stands. In the USA, <i>N. biwakoensis</i> has been intercepted on reed from Japan in 1960 (Hawaii) and 1961 (California) (Diaz 2017). In the Netherlands, consignments with imported reed have never been inspected since the start of the import of reed for roofing from China in 2005 (Steen et al. 2010).
9	Provide an assessment of the type and amount of direct and indirect damage (e.g. lower quality, lower production, export restrictions, threat to biodiversity, etc.) likely to occur if the organism would become established in NL and the EU, respectively?	 <i>N. biwakoensis</i> feed on the plant sap both xylem and phloem (Cronin et al. 2017) The sap sucking reduces plant energy reserves in the rhizomes. Eventually this causes the host plant to appear brown and mostly leafless. Kaneko (2004, 2005) studied the within shoot distribution of five parasitoids attacking the scale insect and predation by wintering birds. The studies showed that in central Japan the abundance of adult female scales increased exponentially from July (first generation) to December (third generation). The rate of overall parasitism of female scales was 80% between 0.5-1.0 m in height on the shoots and 20% parasitism between 1.5-2.0 m in height. The overall parasitism rate of the scales

remained at low levels throughout the year, both before and after winter. Therefore to control the scale and the lepidopterous pests *Archanara phragmiticola* (Staudinger) and *Pseudobissetia terrestrellus* (Christoph) reed stands in China are actively managed by winter burning, removal of crop residues and spring submersion of plants (Brix et al. 2014; Browne 2016).

P. australis has a role in preventing erosion by land subsiding (Cronin 2017). Its strong rhizomes and strong growth cause soil accumulation, prevent shoreline erosion from direct exposure to storm surge and protect oil and gas pipelines (Diaz et al. 2017). Common reed is a dominant plant of stream and lake margins and coastal habitats and is important in nutrient cycling (Rodwell 1998). It is a critical nesting habitat for several bird species and the introduction of the scale insects may negatively affect the habitat quality by a reducing animal and plant biodiversity. Many habitats may be less suited or decreased in number for bird or insect species which make special demands on the environment such as the Eurasian Bittern Botaurus stellaris, purple heron (Ardea purpurea), bearded reedling (Panurus biarmicus) and the large copper (Lycaena dispar) (Bureau Waardenburg 2016). P. australis is an indicator species or a member of many plant sociological communities. It is the name baring and character species of a range of plant communities which are combined under the plant community class Phragmitetea (Rodwell 1998; Weeda et al 2000). This class of swamps and fens is usually dominated by tall monocotyledons in often nutrient rich waters throughout the Eurasian and North American lowlands. In other classes *Phragmites* may be present as a constant element in the floral composition. P. australis may occupy vast areas of species poor vegetations in brackish estuarine circumstances alongside the coast. Coastal communities with Phragmites australis not rarely have equivalents under continental climatic conditions. Introduction of the scale may change the vegetation structure of all communities at least in which P. australis is name baring or dominating (Rodwell 1998).

The introduction of *N. biwakoensis* may have major ecological impact on marshy vegetations in which common reed is growing: the ecosystem itself, the landscape and the local cultural heritage of reed vegetations. There are more Poaceae on which it may propagate and it may attack other plants not yet known as a host. In the USA a lot of time and energy is spend to develop information and education printed material and video presentations and there are the costs of monitoring in the field and the research to develop adequate control measures (Diaz et al. 2017).

Uncertainty: European genotypes of *Phragmites australis* might be less susceptible than the

		genotypes that are heavily attacked by <i>N. biwakoensis</i> in the Mississippi delta. In the Mississippi delta four different "varieties" of <i>Phragmites australis</i> are known (Lambertini 2012) and Diaz et al. (2017) have suggested that these "varieties" may differ in their resistance to <i>N. biwakoensis</i> in particular and herbivores and pathogens in general.
		The potential impact of <i>N. biwakoensis</i> may be lower in areas with lower summer temperatures because population densities of the species may reach lower levels. Summer temperatures are for example much lower in the Netherlands than in the Mississippi delta.
10	Has the organism been detected on/in a product other than plants for planting (e.g. cut flowers, fruit, vegetables)? If "no", go to question 12	Not relevant. This quickscan was initiated based on reports from the USA, see Q2.
11	If the organism has been found on/in a product other than plants for planting (e.g. cut flowers, fruit, vegetables), what is the probability of introduction (entry + establishment)? Only to be answered in case of an interception or a find.	Not relevant.
12	Additional remarks	USA entomologists recommend not to transport or transplant <i>Phragmites</i> from areas where the pest is present (Louisiana Wildlife and Fisheries 2017). It is recommended that boaters wash their boats after each trip so that they do not inadvertently transport the scale to other areas. There are more Poaceae on which it may propagate and it may attack other plants not yet known as a host.
		Three species of the genus <i>Phragmites</i> occur in China: <i>Phragmites australis, P. japonicus</i> and <i>P. karka</i> (Liu & Phillips 2004). <i>N. biwakoensis</i> has only been recorded from <i>P. australis</i> (García Morales et al. 2016). The recent outbreak of <i>N. biwakoensis</i> in the Mississippi delta suggests that the species can live in much warmer climatic conditions and actually may have a wider geographical distribution. The recognition of the manifold benefits of wetlands (e.g. Millennium Ecosystem Assessment 2005) fostered the protection of remaining areas, but also attempts at sustainable utilisation (Wichmann & Köbbing 2015). A possible introduction of the scale in Europe may hamper and interfere with country initiatives that aimed the restoration and protection of wetlands e.g. for rare bird species and plant communities. Short and long term management plans for monitoring the health of reed stands for

		erosion control may be imperative to develop.
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14	Conclusions	In the USA (United States of America) the <i>Phragmites</i> scale, <i>Nipponaclerda biwakoensis</i> native to Asia, was discovered and identified during the fall of 2016 causing massive impacts on reed vegetation in the Mississippi delta. The species can likely establish in Europe where it may also cause massive impacts on reed vegetation. Reed is being imported from Asia and may be a pathway for the species. Currently, reed it is not subject to phytosanitary inspections.
15	Follow-up measures	The NPPO of the Netherlands will include inspections of reed consignments from Asia in their survey programme for 2018.