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Report

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Summary of the 2024 survey for quarantine plant pests

The Swedish Board of Agriculture conducts annual surveys in Sweden for plant pests listed as quarantine pests under the EU Plant Health Regulation¹. The 2024 survey was coordinated across nine different environments: coniferous forests, mixed forests, ports, nurseries and garden centers, potato cultivation, high-risk urban areas, urban green spaces, greenhouses, and fruit orchards. The survey is risk-based and focuses on high-risk locations with the greatest likelihood of quarantine plant pest introduction.

The presence of potato cyst nematodes was confirmed in 19 cases (potato cultivation), brown rot of potato in one case (potato cultivation), and cotton whitefly in nine cases (greenhouses). None of the other quarantine pests included in the 2024 survey were detected.

Coniferous forests

In coniferous forests, the survey targeted the pine wood nematode (*Bursaphelenchus xylophilus*), non-European species of longhorn beetles (*Monochamus* spp.), which are potential vectors of the nematode, and the Siberian silk moth (*Dendrolimus sibiricus*). The survey was conducted in clear-cut areas that were 2 to 3 years old. A total of 534 visual inspections of logging residues were carried out. Additionally, 482 wood samples were collected from residues showing signs of longhorn beetle activity. Longhorn beetles were also captured at 16 different clear-cut sites using three pheromone traps per site. Traps were emptied weekly for six weeks during the beetles' active flight period, and 51 live beetles were analysed for the presence of the pine wood nematode. For the detection of the Siberian silk moth, pheromone traps were used, resulting in 80 samples that were morphologically analyzed for the presence of the species. In total, 580 wood and insect samples were submitted for analysis.

Neither the wood nor the insect samples showed any presence of these quarantine pests.

¹Commission implementing regulation (EU) 2019/2072 of 28 November 2019 establishing uniform conditions for the implementation of Regulation (EU) 2016/2031 of the European Parliament and the Council, as regards protective measures against pests of plants, and repealing Commission Regulation (EC) No 690/2008 and amending Commission Implementing Regulation (EU) 2018/2019

Mixed forests

Two spore traps for capturing airborne fungal spores were placed at the Grimsö Research Park and the Tönnersjöheden Field Station, in collaboration with the Department of Forest Mycology and Plant Pathology at the Swedish University of Agricultural Sciences (SLU). Both Grimsö and Tönnersjöheden are predominantly coniferous forest areas. The spore traps were emptied weekly from April to August, and a total of 41 samples were analysed using metagenomic analysis. A total of 1,726 and 1,734 fungal species were detected at Grimsö and Tönnersjöheden, respectively. The trap catches were specifically screened for the following wind-dispersed fungal species: *Anisogramma anomala*, *Botryosphaeria kuwatsukai*, *Chrysomyxa arctostaphyli*, *Coniferiporia sulphurascens*, *Cronartium coleosporioides*, *Cronartium comandrae*, *Cronartium quercuum*, *Davidsoniella virescens* (syn. *Ceratocystis virescens*), *Guignardia laricina* (syn. *Neofusicoccum laricinum*), *Gymnosporangium asiaticum*, *Gymnosporangium clavipes*, *Gymnosporangium globosum*, *Gymnosporangium juniperi-virginianae*, *Gymnosporangium kernianum*, *Gymnosporangium libocedri*, *Gymnosporangium nelsonii*, *Gymnosporangium unicorn* (syn. *Gymnosporangium asiaticum*), *Gymnosporangium yamadae*, *Phytophthora ramorum*, *Pseudocercospora pini-densiflorae*, *Septoria malagutii*, *Sphaerulina musiva*, *Stagonosporopsis andigena*, *Thecaphora solani*, and *Tilletia indica*. None of the above-mentioned fungal species were detected.

Fruit orchards

Eighteen fruit orchards in the counties of Skåne and Blekinge were surveyed for the presence of plum weevil (*Conotrachelus nenuphar*), ring rot of apple (*Botryosphaeria kuwatsukai*), Japanese beetle (*Popillia japonica*), and apple maggot fly (*Rhagoletis pomonella*).

A total of 238 visual inspections were conducted in the orchards, focusing on insects collected through branch beating. In addition, 114 baited traps were used to monitor for plum weevil, Japanese beetle, and apple maggot fly. A total of 798 trap catches were examined, with none of the target insect species detected.

One spore trap was placed in an urban-adjacent fruit orchard in Skåne to capture airborne fungal spores of the same species listed under the *Mixed Forest* section above. This spore trap survey was conducted in collaboration with the Department of Forest Mycology and Plant Pathology at the Swedish University of Agricultural Sciences (SLU). The trap was emptied weekly from April to August, resulting in 16 samples analysed using metagenomic analysis. In total, 644 fungal taxa were detected. None of the targeted pests were found.

Ports

In ports and surrounding areas to ports with timber imports, a survey was conducted for 14 species of wood-boring insects. The survey was carried out in the

ports of Gothenburg, Helsingborg, Karlshamn, Norrköping, and Norvik. A total of 70 traps were deployed, targeting the emerald ash borer (*Agrilus planipennis*), the bronze birch borer (*Agrilus anxius*), Siberian silk moth (*Dendrolimus sibiricus*), non-European species of *Monochamus* spp., pine weevils (*Pissodes* spp.), and the Asian ambrosia beetle (*Xylosandrus crassiusculus*). The traps for the Asian ambrosia beetle may also capture other bark beetle species. In total, 288 trap catches were analysed at the Department of Ecology, SLU. This included a total of 14,148 insects from both this survey environment and high-risk urban areas combined.

No quarantine pests or new pests for Sweden were found in the traps.

Nurseries and garden centers

During the survey in nurseries and garden centers, plants were visually inspected for 31 quarantine pests (see **Table 1**). The visual inspections were supplemented with sampling of plants showing relevant symptoms. Symptom-free plants were also sampled, as some quarantine pests do not always produce visible symptoms. A total of 182 survey visits were conducted at 172 businesses.

At 54 nurseries and 119 indoor garden centers, potential host plants for the cotton whitefly were surveyed. This pest is also monitored in greenhouse environments.

No quarantine pests or new pests for Sweden were detected in this survey environment.

Table 1. Quarantine plant pests surveyed in nurseries and garden centers and number of samples collected.

Quarantine plant pest	No. of collected samples
American plum line pattern virus	1
<i>Anoplophora chinensis</i> (citrus long-horned beetle)	0
<i>Anoplophora glabripennis</i> (Asian long-horned beetle)	0
<i>Anthonomus eugenii</i> (pepper weevil)	0
<i>Aromia bungii</i> (peach red necked longhorn)	0
<i>Bemisia tabaci</i> (cotton whitefly) ^a	1
Black raspberry latent virus	1
Buckland valley grapevine yellow phytoplasma	1
Candidatus phytoplasma (large number of strains)	4
Cherry rasp leaf virus	2
Cherry rosette virus	1
Cherry rusty mottle associated virus	1
Cherry twisted leaf associated virus	1
<i>Cryphonectria parasitica</i> (chestnut blight) ^a	0
<i>Dendrolimus sibiricus</i> (Siberian silk moth)	0
<i>Emaravirus rosae</i>	0
Grapevine berry inner necrosis virus	1

Quarantine plant pest	No. of collected samples
Grapevine red blotch virus	2
Grapevine vein-clearing virus	1
Peach mosaic virus	1
Peach rosette mosaic virus	2
<i>Phyllocoptes fructiphilus</i>	0
<i>Phytophthora ramorum</i> ^b	1
<i>Polygraphus proximus</i> (Japanese silver-fir bark beetle)	0
Raspberry latent virus	1
Raspberry leaf curl virus	1
Temperate fruit decay-associated virus	1
Strawberry leaf curl virus	1
Strawberry necrotic shock virus	2
Strawberry witches' broom phytoplasma	11

^a Quarantine plant pest for which Sweden is a protected zone

^b Only non-EU isolates of *Phytophthora ramorum* are considered EU quarantine pests.

Potato cultivation

A total of 12 quarantine pest species were surveyed through soil sampling, tuber sampling, trap catches, and field inspections (see **Table 2**).

Table 2. Quarantine plant pests surveyed in potato cultivation and number of samples collected.

Quarantine plant pest	Survey type	No. of samples collected
<i>Bactericera cockerelli</i> (potato psyllid)	visual/trapping	72/48
<i>Clavibacter sepedonicus</i> (ring rot of potato)	tuber sampling	364
<i>Epitrix</i> spp.	visual	0
<i>Globodera pallida</i> (white potato cyst nematode, PCN)	soil sampling	1201
<i>Globodera rostochiensis</i> (yellow potato cyst nematode, PCN)	soil sampling	1201
<i>Leptinotarsa decemlineata</i> (Colorado potato beetle) ^a	visual	72
<i>Meloidogyne fallax</i> (false Columbia root-knot nematode)	soil/tuber sampling	181/296
<i>Meloidogyne chitwoodi</i> (Columbia root-knot nematode)	soil/tuber sampling	181/296
<i>Ralstonia solanacearum</i> (brown rot of potato)	tuber sampling	364
<i>Synchytrium endobioticum</i> (wart disease of potato)	tuber sampling	0

^a Quarantine plant pest for which Sweden is a protected zone

72 visual field inspections for *Bactericera cockerelli*, *Epitrix* spp., and the Colorado potato beetle were conducted at 24 different locations. In Sweden, the counties of Skåne, Blekinge, Halland, Kalmar, and Gotland are designated as protected zones for the Colorado potato beetle, which is the reason for monitoring this pest.

At eight locations, traps were deployed and each one was emptied six times for the potential capturing of *Bactericera cockerelli*. The trap contents were analyzed by the Danish Veterinary and Food Administration (Fødevarestyrelsen), and the pest was not detected.

The nematodes *Meloidogyne chitwoodi* and *M. fallax* were surveyed through soil and tuber sampling. A total of 181 soil samples were collected for the root-knot nematodes *M. chitwoodi* and *M. fallax*, of which 21 were taken from seed potato cultivation. Additionally, 296 tuber samples were collected.

For the potato cyst nematodes *Globodera pallida* and *G. rostochiensis*, 1,073 soil samples were taken, corresponding to 1,073 hectares from fields intended for seed potato cultivation, and 128 soil samples corresponding to 128 hectares from potato fields intended for food and starch production. In seed potato cultivation, five cases of *G. rostochiensis* were confirmed. In food and industrial potato cultivation, three cases of *G. pallida*, eight cases of *G. rostochiensis*, and three cases of both *G. pallida* and *G. rostochiensis* were confirmed. In total, 19 cases of potato cyst nematodes were confirmed in 2024.

A total of 364 tuber samples from seed potatoes were also collected to investigate the presence of ring rot of potato (*Clavibacter sepedonicus*) and brown rot of potato (*Ralstonia solanacearum*). For food and industrial potatoes, 242 visual inspections of tubers were conducted by cutting them open to survey for ring rots. All tuber samples were also visually inspected for wart disease of potato (*Synchytrium endobioticum*).

Cases of *G. pallida*, *G. rostochiensis*, and *R. solanacearum* were confirmed through the potato survey.

High-risk urban areas

The survey of high-risk points in urban areas focused on the plant pests listed in **Table 3**. Survey locations within this environment included private gardens (in collaboration with Fritidsodlingens Riksorganisation (FOR), and 32 citizen scientists), areas surrounding garden centers and wholesalers, as well as locations where fruits or fruit waste were handled. Wood-boring pests were surveyed at sites involved in the trade of timber and wood packaging material.

Table 3. Quarantine plant pests surveyed in high-risk urban areas and number of trap catches analysed for each species.

Quarantine plant pest	No. of analysed trap contents
<i>Agrilus anxius</i> (bronze birch borer)	63
<i>Agrilus planipennis</i> (emerald ash borer)	68
<i>Anoplophora chinensis</i> (citrus long-horned beetle)	26
<i>Anoplophora glabripennis</i> (Asian long-horned beetle)	22
<i>Conotrachelus nenuphar</i> (plum weevil)	-
<i>Dendrolimus sibiricus</i> (Siberian silk moth)	2

Quarantine plant pest	No. of analysed trap contents
<i>Popilla japonica</i> (Japanese beetle)	38+43 ^a
<i>Rhagoletis pomonella</i> (apple maggot fly)	38+77 ^a

^a Trapping conducted by citizen scientists

Citizen scientists contributed a total of 43 trap catches for Japanese beetle and 77 for apple maggot fly, all of which were analysed with no detections. Additionally, citizen scientists submitted 21 visual observations of fruit for signs of damage indicative of plum weevil.

None of the surveyed pests were detected in this survey environment.

Urban green spaces

In the survey of urban green spaces, plants were visually inspected for damage and signs of the following quarantine pests: Asian longhorned beetle (*Anoplophora glabripennis*), citrus longhorned beetle (*Anoplophora chinensis*), *Polygraphus proximus*, peach red necked longhorn (*Aromia bungii*), Siberian silk moth (*Dendrolimus sibiricus*), and *Phytophthora ramorum*. A total of 35 urban green spaces, such as city parks, were visited.

None of the surveyed pests were detected.

Greenhouses

Plants in greenhouses were surveyed through visual inspection and some sampling, focusing on the quarantine pests listed in **Table 4**. At 26 different locations, tomato (*Solanum lycopersicum*, total production area 312,286 m²) and sweet pepper (*Capsicum annuum*, total production area 2,223 m²) were surveyed through both visual inspection and sampling. No quarantine pests were detected on either tomato or sweet pepper.

At 50 locations, plants such as poinsettias and begonias were visually inspected to detect cotton whitefly, a pest also surveyed in *Nurseries and garden centers*. In 16 cases, visual inspections were supplemented with sampling due to suspected presence, and in 9 of these cases, the pest was confirmed. These 9 detections were made at 6 different inspection sites and originated from poinsettias, sticky traps placed in poinsettias, and pineapple sage.

Table 4. Quarantine plant pests surveyed for in greenhouses 2024.

Quarantine plant pest	No. of samples collected
<i>Anthonomus eugenii</i> (pepper weevil)	0
<i>Bactericera cockerelli</i> (potato psyllid)	0
<i>Bemisia tabaci</i> (cotton whitefly) ^a	16
Tomato brown rugose fruit virus	26
Tomato chocolate virus	0
Tomato leaf curl New Delhi virus	4
Tomato marchitez virus	0

Quarantine plant pest	No. of samples collected
Tomato mild mottle virus	0

^a Quarantine plant pest for which Sweden is a protected zone

Statistically sound and risk-based surveys

Since 2023, we have conducted an annual statistically based survey for the pest *Xylella fastidiosa*, which involves sampling regardless of symptom presence in high-, medium-, and low-risk environments. This survey effort was coordinated with existing activities in various survey environments within the counties of Blekinge, Gotland, Halland, Skåne, Jönköping, and Kronoberg. A total of 556 plants were collected, resulting in 114 composite samples, as multiple plants of the same species can be combined into a single sample for analysis. Nurseries and garden centers are considered high-risk environments (handling plant material from Italy, Portugal, Spain, or France) or medium-risk environments (no handling of plant material from those countries) for the introduction of *X. fastidiosa*. From these environments, 31 samples were submitted for analysis. The remaining 83 samples were collected from low-risk environments where host plants for *X. fastidiosa* were found. This was coordinated with surveys in coniferous forests (49 samples), high-risk urban areas (28 samples), and potato cultivation (6 samples). *Xylella fastidiosa* was not detected in any of the samples.

Collaboration

The survey was conducted by the Swedish Board of Agriculture in collaboration with the Danish Veterinary and Food Administration (Fødevarestyrelsen), the Swedish University of Agricultural Sciences (SLU), the Rural Economy and Agricultural Societies (Hushållningssällskapet), the County Administrative Boards (Länsstyrelsen), the Nematode Laboratory at Alnarp, and Fritidsodlingens Riksorganisation.

Geographical distribution of survey sites

Figure 1. Overview of the sites surveyed in 2024, categorized by the different survey environments. Please note that 11 data points are missing due to incomplete coordinate data: 6 in coniferous forests, 1 in nurseries and garden centers, 3 in potato cultivation, and 1 in urban green spaces.

