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Strategies to develop effective, innovative and practical approaches to protect major European fruit crops from pests and pathogens

Work package 1. Pathways of introduction of fruit pests and pathogens

Deliverable 1.3.

PART 6 - REPORT on TABLE GRAPES – Fruit pathway and Alert List

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An Excel file containing supporting information is available at https://upload.eppo.int/download/111o40dea8df7

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1. Introduction

The aim of this report is the establishment of an Alert List of pests that may be introduced with fresh grapes/table grapes (fruit of grapevine *Vitis* spp.) and potentially represent a risk for plant production in Europe. Grape was selected after an *Analysis of fruit production and imports in the EU to select species for pathway studies* – thereafter *Selection of fruit* (see relevant Deliverable[1]).
The cultivation of *Vitis* for fresh consumption and pressing wine has a long tradition within Europe and shaped entire regions with a characteristic landscape. Additionally, the only remaining wild taxon of *Vitis* (*Vitis vinifera* L. ssp. *sylvestris* (Gmelin)) in Europe as ancestor of grapevine is already endangered by habitat loss and the introduction of invasive pests (Arrigo and Arnold 2007).
There is an extensive trade of table grapes from outside the EU, as well as a substantial cropping within the EU. In order to better target searches, a short review was made to get an overview of the pathway 'table grape'.

1.1 Background on *Vitis*

The genus *Vitis* contains about 60 inter-fertile wild species and over ten thousand cultivars/ varieties which descended mainly (more than 90% (FAO 2005)) from the species *Vitis vinifera* but also from *Muscardinia rotundifolia*, *V. labrusca*, *V. riparia*, *V. rupestris*, *V. aestivalis, V. amurensis, V. champini, V. berlandieri*, *V. mustangensis* and other wild species without or with interspecies hybridisation (also multiple hybridizations). Additionally, the grafting of commercially used (fruiting) cultivars on a rootstock of resistant species or hybrids is a common cultivation method. The origin of registered Vitaceae varieties (all utilisations) is given in Table 1. In total the Vitis International Variety Catalogue specifies 95 species and 18545 cultivars (VIVC 2007).

Table 1: Number of cultivars descended from the main commercial grown Vitaceae species (source VIVC 2007)

Species	Number of cultivars	%
Vitis vinifera L. subsp. *vinifera*	12.473	58.49 %
interspecific crossing	7.530	35.31 %
Vitis labrusca L.	310	1.45 %
Vitis riparia Michaux	190	0.89 %
Vitis vinifera L. subsp. *sylvestris* Gmelin	128	0.60 %
Muscardinia rotundifolia Michaux	125	0.59 %
intergeneric crossing	82	0.38 %
Vitis berlandieri Planchon	58	0.27 %
Vitis aestivalis Michaux	52	0.24 %
Vitis rupestris Scheele	52	0.24 %

Commonly, the transcaucasian region is assumed as the origin of the genus *Vitis*, but a recent study indicates North America as the place of origination (Wan *et al.* 2013). Wild native *Vitis* species are distributed in regions of Asia, Europe and North America under subtropical, Mediterranean and continental-temperate conditions (Terral *et al*. 2010). The wide geographical distribution and climatic spectrum indicates a high number of potential pests associated with *Vitis* and a high probability of establishment of these pests in variable habitats.
Commercial cultivated grapes are used for wine production, raisins, juice, fruit concentrate and as table grapes for fresh consumption (see Table 2).

Table 2: Number of cultivars registered for specific utilization (source VIVC 2007).

Utilization	Number of cultivars	%
Wine grape	10205	55.03 %
Table grape	5415	29.20 %
Table and Wine grape	1365	7.36 %
Rootstock	1396	7.53 %
Raisin grape	164	0.88 %
Total number of cultivars	18545	

[1] Available at https://upload.eppo.int/download/102o0eec69a8b

In this report, we focus on table grapes as fresh form of international traded and shipped grapevine fruit. The following species (and familiar varieties) and their hybrids are commonly grown as fruiting species for table grape production: ***Vitis vinifera*** (`Red Globe`, `Thompson seedless'), ***V. labrusca*** (`Concord`, `Delaware`, `Flame seedless`), ***Muscardinia rotundifolia*** (`Muscadine`, `Cowart`), *V. rupestris* (just as hybrid), *V. riparia* (just as hybrid), *V. aestivalis* (just as hybrid) (VIVC 2007).
Although we found no indication for noteworthy international trade with fresh grapes for processing, this pathway cannot be completly excluded. We assumed that the risks of this pathway would be equal to or less than the import of table grapes for fresh consumption because processing will destroy most pests and reduce the probability of transfer, and it is unlikely that such trade occurs from far distances. However, grapes for processing may be lower quality as table grapes (and therefore more infested by pests) and are more likely to be associated with plant residues (as they are harvested mechanically).

1.2 Production and trade of table grapes

Table grape production worldwide accounts for 21 million tons (Seccia *et al.* 2015) in 50 countries. China produces 12% of global table grapes, followed by Italy (9.1%), USA (8.7%), France (7.6%), Spain (7.4%), Turkey (5,5%) and Chile (4%) (Seccia et al. 2015). The main grapevine growing countries in Europe (for all uses, not only table grapes) are listed in table 3.

Table 3: Main grapevine growing countries in Europe for 2012 and 2014, ordered by cultivation area in 2012 [1000ha]. Source: EUROSTAT.

Year	2012	2014
European Union	3219.3	3175.9
Spain	947.1	947.3
France	760.9	757.3
Italy	687.2	682.2
Turkey	462.0	467.0
Portugal	179.5	179.0
Romania	176.5	174.6
Greece	99.2	110.8
Germany	99.5	100.1
Hungary	72.3	70.7
Austria	43.6	44.8
Bulgaria	60.4	31.9
Croatia	29.3	25.8
Macedonia (Former Yugoslav Republic)	21.0	22.7
Slovenia	16.4	16.0
Czech Republic	15.7	15.8
Switzerland	0	14.8
Slovakia	10.5	8.8
Cyprus	6.8	6.2
Bosnia and Herzegovina	5.6	5.4
United Kingdom	1.5	2.0
Luxembourg	1.2	1.3
Poland	0.5	0.7
Malta	0.6	0.7
Sweden	0.03	0.05

The EU produced an estimated amount of 24.4 million tonnes (MT) of grapes in 2014. More than 91% of these grapes were used for wine production. 7.4% were produced for fresh consumption as table grapes (1.7 million tonnes). Only 0.65% was processed to raisins from Greece, France, Spain and Cyprus (data EUROSTAT). Between 25% and 28% of fresh consumed table grapes were imported from non-EU countries (table 4).

Table 4: Table grape production, export and import from non-EU countries [MT] in the EU from the years 2012-2014. Data compiled from EUROSTAT and USDA to determine the total demand (consumption) and the percentage of imported table grapes for fresh consumption.

Year	Production EU [MT]	Exports from EU [MT]	Imports to EU [MT]	Consumption [MT]	ratio of import on total consumption [%]
2012	1 717 900	150 000	559 500	2 127 400	26.3
2013	1 839 360	152 000	576 800	2 264 160	25.5
2014	1 658 430	102 000	603 000	2 159 430	27.9

The main import of table grapes into Europe comes from the southern hemisphere in the first half of the calendar year (counter-seasonal production) (USDA 2014). In 2013 the major countries exporting into the EU are South Africa (29%), Chile (25%), Peru, India, Egypt, Brazil, Turkey and Namibia (Figure 1). The main European importers are the Netherlands (mainly for trade to other EU countries), Germany and the UK (USDA 2014). Among these 3 countries, only Germany has a large grape production.

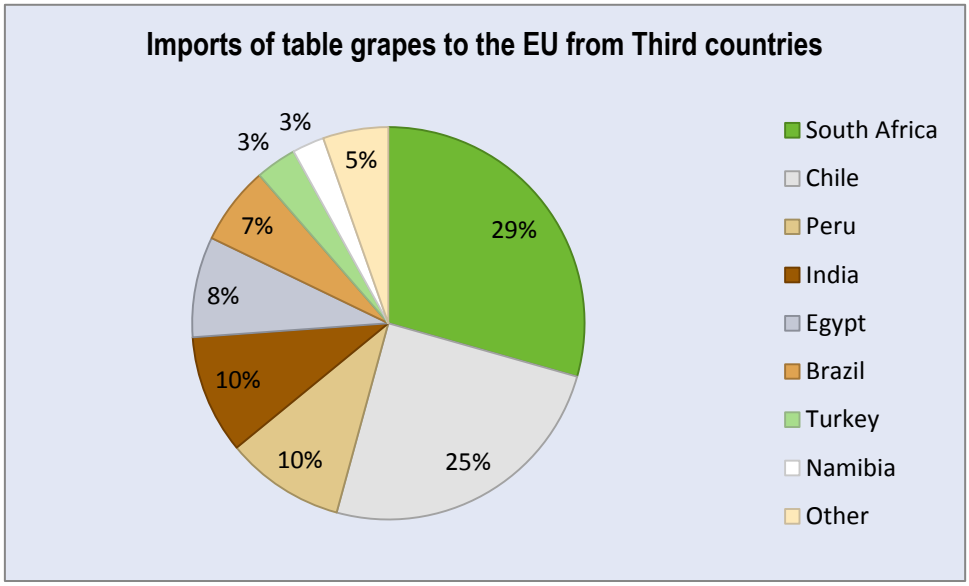

Figure 1: Import of table grapes for fresh consumption from non-EU countries into the EU in 2013.

1.3 Characteristics of the pathway 'table grapes'

1.3.1 Commodity 'table grapes': characteristics and regulations

Table grapes for fresh consumption are in the EU always traded as bunch/cluster composed of fleshy berries (grapes), pedicels (stalk of the single fruit) and peduncle (stalk of the fruit cluster). Grapes are up to 3 cm long, are coloured green (`white`) or red and can contain seed or be seedless. The complex structure of the grape bunch increases the ability of small and medium-sized pest organisms to hide within the bunch and escape detection.

The marketing standard of the EU for fresh fruit and vegetables (543/2011; Part 9) regulates the quality requirements for table grapes for fresh consumption after preparation and packaging. Berries and bunches must be sound without rotting or deterioration, they have to be clean and free from visible foreign matter. Additionally they must be practically free from pests and pest damage, abnormal external moisture and foreign smell or taste. The berries must be intact, well-formed and normally developed. A fragment of vine shoot no more than 5 cm may be left on the "stem" (peduncle) of the bunch (European Commission 2011). The EU Directive 2000/29 (Annex III.A.15) prohibits the introduction of 'plants of *Vitis*, other than fruits' from Third countries other than Switzerland. 'Plants' are defined as "all living plant parts including seeds, cut flowers, branches with foliage, bud-wood, cuttings, scions tubers, bulbs, rhizomes, cut trees retaining foliage, live pollen and leaves and foliage" (European Commission 2000).

Regarding regulated pests, the following broad categories are regulated in EU Directive 2000/29/EC (Annex I/A1), and any species under them should be considered as being already regulated in the EU: 'Non-European viruses and virus-like organisms of *Vitis* L', 'Tephritidae (non-European)', 'Cicadellidae (non-European) known to be vector of Pierce's disease (caused by *Xylella fastidiosa*)'). Vectors of *X. fastidiosa* are also addressed under emergency measures in Commission Implementing Decision (EU) 2015/789 of 18 May 2015.

This study aimed at identifying exclusively organisms that are associated with table grape bunches (berries, pedicels and peduncle), and not pests located only at leaves, bark, stem or roots. It does not include wine, dried or processed grape berries. Organisms already regulated are excluded from further investigation.

1.3.2 Harvest, sorting and packaging

Table grapes for fresh consumption are harvested by hand (FAO 2005) and carefully treated to ensure high product quality. The bloom (waxy covering) should be intact. Grapes are harvested completely ripe, because they do not ripen after harvest. Damaged (sunburn, disease, wind, insect) berries will be removed and the clusters will be packed in most cases immediately on the field ("field-packing") to avoid further handling. Alternatively (often when the weather conditions are inappropriate for field packing) the clusters are transported untrimmed to a packinghouse and cleaned and packed there ("shed packing"). If the cluster shape is changed by removing too many berries, the cluster is not marketable any more. Usually, bunches are stored and shipped in boxes (7.5-10kg) and as soon as possible pre-cooled (cooling to 0-1°C) to minimize dehydration. *Vitis vinifera* grapes tolerate depending on variety temperatures down to -2°C without damage by freezing. To ensure a rapid cooling, the boxes should enable a sufficient air movement over the berries. Washing or cooling by water is not feasible for grapes, due to the risk of disease spread (Creasy and Creasy 2009). Table grapes are generally harvested around September/October in the northern hemisphere and March/April in the southern hemisphere (Biosecurity New Zealand 2009).

1.3.3 Duration and conditions of storage and transport

Table grapes should be stored at -1°C to 2°C (depending on the variety and sugar content) at 95-98% relative humidity. Usually, at least for long time storage and for shipment, table grapes are fumigated with Sulfur Dioxide (SO_2) at high concentrations (100ppm) for a short time (1hour) and/ or are exposed to low concentrations of 20-30ppm over the whole storage/shipment time (Creasy and Creasy 2009; FAO 2005) to devitalize *Botrytis cinerea*, prevent browning of cluster stems and fruit decay. During shipments exceeding more than 10 days, SO_2-generating pads ensure constant concentration (WFLO 2008). The treatment allows table grape storage for several months. Too high concentrations of SO_2 can cause damages of the berries, fruit bleaching (Creasy and Creasy 2009) and blocking of the product from the European market (FAO 2005). In general, the treatment with SO_2 and the low storage temperatures should kill most arthropod pests as well as several microorganisms (spores of *Botrytis*) on the surface of the commodity, but it is possible that the gas concentration does not reach every fruit in sufficient concentrations (WFLO 2008). Due to the problems with SO_2, alternative treatments for decay-controlling may be used increasingly in future like acetaldehyde vapours, carbon-dioxide enriched atmosphere, ozone gas treatments and natural volatile plant components (Creasy and Creasy 2009).
The duration of storage and transport is very variable. The transport time from South Africa, from Chile and from India (Mumbai) to the Netherlands with container-vessels averages each three weeks (18-23 days time at sea) (SeaRates 2016), but table grapes are also transported via airfreight within less than a day (International Trade Centre 2007): the proportion is was about 2% according to Eurostat and has not increased between 2000 and 2012.

2. Methods as used for table grapes

2.1 Step 1

The *Methods for the preparation of alert lists of pests for individual fruit species*[2] ('Methods' in thereafter) were used, with the following adjustments:

- A threshold of presence in the EU was applied to exclude a pest from further consideration. If a species is present in at least one EU country confirmed outdoors and established (not restricted to glasshouses, transient, under eradication), the species was excluded from further consideration.
- European consumers prefer seedless grape cultivars (USDA 2011). The harvest of grapes is between March and April in the southern hemisphere. Seeds in grapes for fresh consumption would not be able to undergo their needed winter dormancy (at least 12 weeks at 0- 4°C) without elaborate human assistance (Biosecurity New Zealand 2009). Seeds not determined for planting are considered as a negligible risk for the introduction of harmful organisms; therefore exclusively seed-transmitted organisms (Viruses, Bacteria and Fungi) were excluded from further investigation at this step. Seed feeders which are likely to reside in the berries, were not excluded at this step.
- The column 'parts of plant attacked' was not used (this information was instead given either in the pathways columns or under 'other information').
- There was no complete screening of all known *Vitis* species and their specific related pests. Only the main species, which are known for hybridization of fruiting cultivars for table grapes were considered in details. Pests only known to infest *Vitis* species which are exclusive used as rootstock for grafting, where excluded, because they are not pests of the fruiting species (NO4).
- Organisms clearly not associated with the commodity (like woodborer, root-pests) were usually not registered at step 1.
- All non-European Tephritidae were rated as already regulated (NO1) at Step 1, because there were no arguments to handpick this species for further consideration (no strong host association and no recorded impact on *Vitis*, already introduced or namely regulated).
- For Cicadellidae, the fact that they were or were not vectors of *Xyllella fastidiosa* was generally identified only at Step 2, and they were rated as NO1 at Step 1 only if listed by names in the EU Directive.

[2] Available at https://upload.eppo.int/download/103o7b00f8216

- 'Non-European viruses and virus-like organisms of *Vitis* L' were rated as NO1 at Step 1. Only when they are not listed by names in the EU Directive and have additional characteristics (intercepted on the fruit pathway, emerging, high damaging potential) they were handpicked and considered at step 2.
- As a result of the branched structure of the grape clusters, there is a considerable risk for the introduction of seeds from weed species. Weeds were only considered at step 1 when explicitly mentioned as contaminant. All identified species were excluded at this step as already present in the EU (NO3).
- Organisms already intercepted on table grapes were kept for step 2 for further investigation, independent of their taxonomy, if there was no other reason (like presence in the EU, namely regulated in the EU Directive) to exclude them.

2.2 Step 2

The *Methods* were used, with the following adjustments:
- The level of polyphagy (criterion C) was not rated. *Vitis* ssp. is widely grown in Europe and therefore an easy available host. Grapevine cultivation is of high economic concern.
- If pests were clearly associated with table grapes in trade, with frequent interceptions on this commodity, but proved to not be pests of *Vitis* the sub-rating 'c' (contaminants) was used (criterion A).
- Climatic similarity (criterion D) was not used, due to the wide range of climates in which grapevine is grown.

As explained in the *Methods*, the search for information stopped as soon as a pest did not meet basic criteria, or a rating was attributed that would exclude the pest from the Alert List (e.g. A3 – associated with green parts; B2 – present in 1 EU country or more etc.). Consequently, the data gathered for pests other than those retained for the Alert List is still preliminary and partial (in particular the distribution data or host list may be incomplete or erroneous). There may be inconsistencies between pests as to in which column the data is mentioned. Finally, editing and consistency adjustments were done only for the pests retained for the Alert List.

Ratings in the Step 2 List may sometimes seem inconsistent between species, but they were based on the information available. It was not always possible to judge whether there is a real difference between species or whether the relevant the information was not found. Different sources of information may lead to different ratings, so pests may have been rated differently depending on the information available to each assessor. Only for the pests retained in several Alert Lists was all information cross-checked for consistency.

2.3 Step 3

The selection system described in the *Methods* was applied to select pests for the Alert List.
The list is divided into two Parts:
Part 1 with pests with high economic importance and more likely to transfer and
Part 2 with pests with lesser economic importance and more likely to transfer, or with high economic importance but less likely to transfer.

The combinations of criteria used to build the table grape Alert List are presented in Annex 1. It corresponds to that described in the *Methods*.

3. Results and their discussion

3.1 Considerations on pests listed at Step 1 and Step 2, and selected for the Alert List

3.1.1 Step 1 List

1040 species were included in this study.
The following were excluded from further consideration (some for several reasons, but only one is mentioned below):

84	already quarantine pests for the EU (category NO1)
354	no possibility of association with the fruit pathway (category NO2)
306	present in the EU (category NO3)
101	not pests of *Vitis* (category NO4)
69	other reasons (e.g. natural enemy, not a pest of any crop, or pests mentioned at genus level in interceptions, or cases impossible to analyze) (category NO5)

➡ Consequently, 126 pests remained for consideration at Step 2.
A list of species excluded at step 1 is provided in Annex 2. This includes all NO categories and contaminants.

3.1.2 Step 2 List

126 pests were rated at Step 2, belonging to the following pest groups:

108 Insects	(~86%)
9 Fungi	(~7%)

6 Arachnida (<5%)
2 Gastropoda (<2%)
1 Bacterium

The most numerous pest group rated are insects. Figure 2 shows the species proportion of considered insect orders at Step 2. The 9 fungi species are all Ascomycetes. 4 Tetranichidae and each one species from families of Tenuipalpidae and Eriophyidae represent the Acarida (Arachnida). The Gastropoda are both Stylomatophora. The list of all rated species is provided in Annex 3.

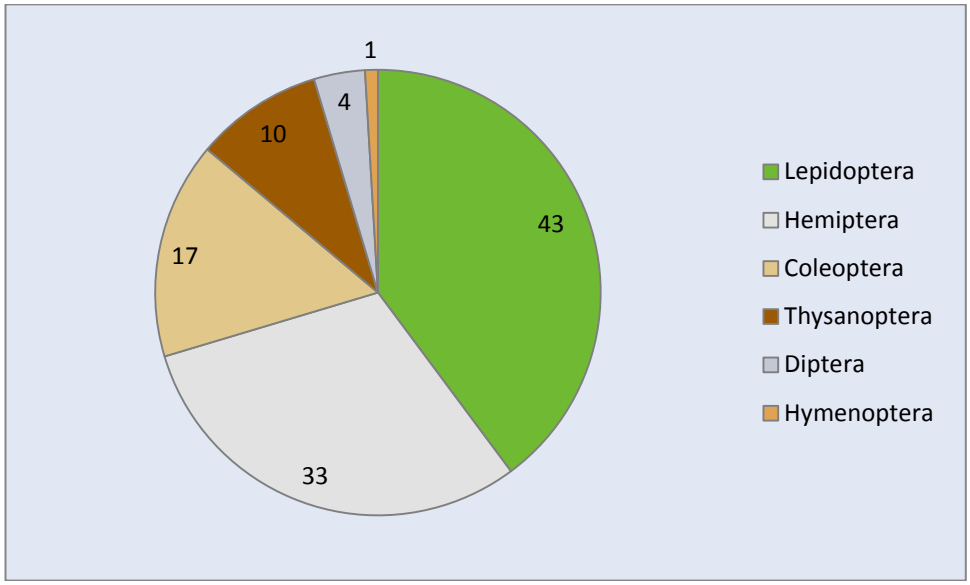

Figure 2: Species numbers of insect orders rated at Step 2.

3.1.3 Alert List

The selection system in Annex 1 was applied in order to select pests for the Alert List.

➡ Consequently, **30** pests were selected on the Alert List (given as Annex 5).

The pests are divided in the two parts of the Alert List as follows:

12 Part 1 - Pests with high economic importance and more likely to transfer
18 Part 2 - Pests with lesser economic importance and more likely to transfer, or high economic importance but less likely to transfer

3.1.4 Possible gaps in data and pests missing from the lists

A large number of organisms were identified when listing pests at Step 1 and additional organisms were identified at Step 2. The study is not a complete list of pests of economic relevant *Vitis* and wild species that do not occur in the EU, and it is certain that some pests have not been found. In particular, the searches relied extensively on the Internet to find information, and some earlier publications or publications from some areas were less accessible.
Among the pests categories considered, there was a good coverage of all groups in terms of compiling a list of pests, but it was difficult to find basic information for some species (especially fungi, for which taxonomic difficulties also complicated the analysis).

The world coverage, in terms of identifying pests of *Vitis*, was clearly more complete for Oceania (Australia and New Zealand), Asia and North America. For North America, Australia and New Zealand numerous scientific publications are available, including Import Risk Analyses, cropping manuals, pest management advice and databases. For Asia (China, India, Japan, Korea) several substantial Import Risk Analyses exist, but the Asian scientific literature was only partly available to the assessor. For South America, there are some Import Risks Analyses and additionally many scientific publications. However, there was a lack of information of the biology and impact of endemic species shifting recently to *Vitis* as a host. Limited information could be found on *Vitis* pests in Africa, which may be problematic as 40% of table grapes imported into the EU come from Africa (South Africa 29%, Egypt 8% and Namibia 3%). Nevertheless, it is considered that the major species of high quarantine concern have been identified.

3.2 Other findings of interest during the preparation of Alert Lists

The following elements do not relate directly to the risk of introduction of pests with table grapes, but arose in the framework of the study.

3.2.1 Pest already regulated in the EU

Many EU regulated pests were identified at Step 1, including some that are considered as major pests of *Vitis* where they occur. In the EU Directive 2000/29/EC (with subsequent amendments), table grapes fruit are no subject to a requirement for inspection prior to export. In Part B of the EU Directive the special requirements for the introduction and movement of table grapes into and within certain protected zones are regulated:

« The fruits shall be free from leaves and official statement that the fruits: (a) originate in an area known to be free from *Daktulosphaira vitifoliae* (Fitch); or (b) have been grown at a place of production which has been found free from *Daktulosphaira vitifoliae* (Fitch) on official inspections carried out during the last two complete cycles of vegetation; or (c) have been subject to fumigation or other appropriate treatment against *Daktulosphaira vitifoliae* (Fitch). »

Non-European Tephritidae are regulated in the EU as a group. 7 species where identified as being associated with *Vitis*, four of this species are mentioned by name in EU Directive 2000/29/EC. Not namely mentioned are *Bactrocera correcta*, *Bactrocera invadens* (EPPO A1 List) and *Bactrocera neohumeralis*. This species were not considered further, because there was no strong association with grapevine (minor host, no recorded damage, respectively no host record apart from one source). Finally, 8 out of 13 Cicadellidae were vectors of *Xylella fastidiosa* and not considered further as covered in EU Directive 2000/29/EC (as Cicadellidae (non-European) known to be vectors of Pierce's disease (caused by *Xylella fastidiosa*)) and emergency measures. These include the major pest *Homalodisca vitripennis* (on EPPO A1 List – see 3.2.2).

3.2.2 Pests recommended for regulation by EPPO

On the species of the Step 2 List, only *Thaumatotibia leucotreta* is on the EPPO A2 Lists of pests recommended for regulation as quarantine pest, although not necessarily because of its association with *Vitis*. It is it is in the process of being regulated in the EU, but this had not happened to date (September 2016): *Prodiplosis longifila* and*Platynota stultana* are being considered for addition to EPPO Lists after the completion of a PRA.

3.2.3 Pests already present in the EU

The study identified major *Vitis* pests recently introduced into the EU. The assessment of presence in the EU, and whether a pest was absent was not always straightforward. For example for minor pests, it may be that the distribution is wider than found, because they would not have attracted specific attention where introduced, and their presence may not be recorded. In addition, a level of uncertainty is also attached to the assessment of presence in the EU due to taxonomic inconsistencies. Many sources had to be consulted to ascertain the presence in the EU. Most difficulties arose for fungi, and many were cases of species either recently described or with taxonomic difficulties attached. For insects, the assessment of presence relied partly on Fauna Europeae (which does not indicate sources), and for fungi on Farr and Rossman (2015).

The pests present in the EU were excluded from further consideration at Step 1. Some of them have already spread to a large part of the EU, such as *Drosophila suzukii*. However, others still have a limited distribution in the EU.

Pests present with restricted distribution in the EU (sometimes with an uncertainty), may be of interest for EU countries where they do not occur. *Physalospora baccae* represents a particular case: it is the only species twofold listed, as we considered the Asian and European fungi as two distinct species (or at least pathovar / strain). Therefore *P. baccae* was once excluded as present with restricted distribution in Europe (NO3) and additionally listed on the Alert list in Part 1 (Annex 5). *Pseudococcus maritimus* is present only indoors in Poland and was retained for the Alert list. *Platynota stultana* has a very restricted distribution in Spain with low, not damaging populations established outdoors. It was handpicked for the Alert list. A few additional pests of interest with restricted distribution in the EU are indicated in Table 5.

Table 5: *Vitis* pests with a very limited distribution in Europe.

Pest (taxonomic group)	Distribution	Basic information	Hosts
***Maconellicoccus hirsutus* (Hemiptera: Pseudococcidae)**	Asia (probably native); Africa (introduced, established). North America (restricted distribution): Hawaii, Mexico; Central America and Carribean: numerous introductions ; South America: Brazil, Colombia, French Guyana, Suriname, Venezuela; Oceania: numerous introductions and; Europe: Cyprus	Pest of grapes in India, with up to 90% of bunches destroyed and heavily infested bunches made unfit for consumption or marketing. In Grenada, severe devastation of natural habitats was seen. Other crops seriously damaged by *M. hirsutus* include cotton, *Hibiscus sabdariffa* var. *altissima*, *H. cannabinus, Boehemeria nive*, cacao, *Zizyphus mauritiana*. The saliva that *M. hirsutus* injects into the host plant while feeding probably contains a substance that is phytotoxic. Established infestation can cause total defoliation and even death of the whole plant. The first-instar crawler stage can disperse passively by wind.	Polyphagous (more than 40 species) incl. *Vitis* spp.

Pest (taxonomic group)	Distribution	Basic information	Hosts
	(widespread, established)	EPPO A2 List. Serious damage has been recorded between 7° and 30° North.	
Phenacoccus solenopsis **(Hemiptera: Pseudococcidae)**	Africa; South America: Brazil (2005), Chile, Colombia, Ecuador; Caribbean: Cuba, Dominican Rep.; Central America: Panama; North America: Mexico, USA; Asia; Oceania: Australia (2010); Europe: Cyprus (2010), Netherlands (2004, in greenhouses)	Pathways for this species are plants for planting, cut flowers and branches, fruits and vegetables, as contaminant of equipment. Outbreak in Cyprus on *Hibsicus rosa-sinensis*, *Lantana*, *Chrysanthemum*, *Abelmoschus esculentus*, *Vitis* spp., unspecified Solanaceae (origin unknown). Sap extraction leads to discolouration of leaves and malformed plants which leads to loss of plant vigour, foliage and fruit drop and sometimes plant death.	Polyphagous on more than 200 plant species, incl. *Vitis* spp., *Gossypium hirsutum*, *Hibiscus rosa-sinensis*, *Solanum lycopersicum*, *Abelmoschus moschatus*, *Anacardium occidentale*, *Chrysanthemum*, *Abutilon asiaticum*, *Malvastrum coromandelianum*.
Planococcus minor **(Hemiptera: Pseudococcidae)**	Africa: Guinea, Madagascar, Mauritius, Seychelles. Asia: widespread. North America: Mexico. Central America: Costa Rica, Guatemala, Honduras. South America: Argentina, Brazil, Columbia, Galapagos Islands, Guyana, Suriname, Trinidad and Tobago, Uruguay. Caribbean: Bermuda, Cuba, Dominican Republic, Grenada, Guadeloupe, Haiti, Jamaica, Saint Lucia, US Virgin Islands. Oceania: American Samoa, Australia, Cook Islands, Fiji, French Polynesia, Guam, New Caledonia, Niue, Papua New Guinea, Pohnpei, Samoa, Solomon Islands, Toklelau, Tonga, Vanuatu. Europe: Portugal, Madeira.	Serious pest of grapevine in California and occasional pest of Citrus. Also damage on apple, pear, kiwi, peach, capsicum, cotton. Over 1900 interceptions of this pest on various hosts from over 30 countries were reported from 1985 to 2000 and over 5400 times between 1995 and 2012 at US ports of entry. Vector of viruses that can cause plant death. Listed as harmful organism by China, the Republic of Korea and Japan.	More than 240 species in over 25 host families, incl. *Vitis*, *Zea mays*, *Capsicum annuum*, *Citrus*, *Gossypium*, *Medicago sativa*, *Prunus persica*, *Punica granatum*, *Pyrus*, *Beta vulgaris*, *Chrysanthemum*, *Citrus*, *Dianthus caryophyllus*, *Eucalyptus*, *Glycine max*, *Juglans regia*, *Juniperus*, *Malus*, *Mentha*, *Pelargonium*, *Persea americana*, *Phaseolus*, *Pinus*, *Poaceae*, *Ribes*, *Rosa*, *Rubus*, *Solanum lycopersicum*, *Sorghum bicolor*, *Taxus*, *Trifolium*.
Urophorus humeralis **(Coleoptera: Nitidulidae)**	Southern Asia, Oceania, North America (native), Hawaii (introduced), Africa, Europe: Italy	Intercepted on table grapes to New Zealand. *C. humeralis* is attracted to and infests virtually all decaying and fermenting vegetable and fruit matter. It rarely attacks fruit or vegetables that are intact. Economic losses due to this beetle have occurred mostly in pineapple, dates and sugarcane, especially at the seedling stage. It is also a pest of stored fruit and grain.	*Vitis vinifera* (not preferred host), *Citrus sinensis*, *Prunus persica*, *Prunus armeniaca*, *Malus domestica*, *Zea mays*, *Saccharum officinarum*, *Ananas comosum*, *Phoenix dactylifera*

3.2.4 Other pathways for *Vitis* pests

Due to the prohibition of import of living *Vitis* plant material from Third countries other than Switzerland (EU Directive 2000/29; Annex III.A.15), the probability of introduction of species not associated with fruit on *Vitis* is negligible. Other pathways (on other plant species or commodities) were not investigated in this study. However, as many pests identified are polyphagous and plants for planting are a potential pathway for virtually all pests on the Alert List and Step 2 List, they may be introduced on plants for planting of hosts that are not regulated in the EU. Some pests which were not retained as likely to be associated with fruit may occasionally become associated to fruit consignments as hitchhicker or contaminant.

3.2.5. Contaminants

There is a high number of species intercepted on table grapes as hitchhicker or contaminant (i.e. *Vitis* is not one of their host plants). A large proportion of these species are spiders and includes some species that could be harmful for human health. Ants are another group frequently intercepted on table grapes. They may cause heavy damage to ecosystems if introduced. However

introduction is unlikely to be linked with the import of fruit (on which only sterile workers, and no queen, are found). Some of the species excluded from further consideration at Step 1 or 2 are listed below in Table 6. Species present in Europe or already regulated are not shown.

Table 6. Species intercepted on table grapes but *Vitis* not a host

Species	Taxonomy	Other information
Arachnida		
Tarsonemus bakeri	Acarida: Tarsonemidae	feeding on sooty molt, maybe not very damaging; biology unclear, intercepted regularly on Citrus
Lampona cylindrata	Aranea: Lamponidae	poisonous for humans (necrotic lesions)
Phidippus johnsoni	Aranea: Salticidae	Predator; Regulated quarantine organism on *Vitis* in New Zealand
Latrodectus geometricus	Aranea: Theridiidae	Predator; toxic for humans
Latrodectus hasselti	Aranea: Theridiidae	Bites cause intolerable abdominal pain, sometimes lethal to humans
Latrodectus hesperus	Aranea: Theridiidae	Western black widow; local swelling and spasm; rarely lethal to humans
Latrodectus mactans	Aranea: Theridiidae	Southern black widow; spasm, heavy muscle pain, swellings; death rate without antiserum 5%
Cheiracanthium inclusum	Araneae: Eutichuridae	harmful for human health; causes altogether (year 2011 and 2014) the recall of 107000 Mazda automobiles in the USA, because the webs clogged the fuel system ventilation tubes
Caraboctonus keyserlingi	Scorpiones: Caraboctonidae	toxic for humans
Insecta		
Trogoderma variabile	Coleoptera: Dermestidae	Storage pest, not on living plant parts. Infests vegetable and flower seeds including sunflower, rice, carrot and tomato seed, fish food, cereal products including animal feed, rolled barley and oats, stored canola.
Agrypnus variabilis	Coleoptera: Elateridae	Main hosts: *Gossypium* (cotton), *Saccharum officinarium* (sugarcane), *Sorghum bicolor* (sorghum), *Zea mays*. No indication that *Vitis* is a host.
Sylvicola notatus	Diptera: Anisopodidae	saprophagous or causing myasis to
Leptoglossus chilensis	Hemiptera: Coreidae	Has been recorded as causing fruit damage on citrus. Punctures the fruit and sucks juice. Hosts: *V. corymbosum*, *Rubus idaeus*, *Asparagus officinalis*, *Solanum tuberosum*, *Lupinus*, *Vitis vinifera*, *Malus domestica*, *Prunus* spp., *Citrus* (grapefruit), *Ficus carica*. No information for damage on *Vitis*.
Nysius clevelandensis	Hemiptera: Lygaeidae	Polyphagous pest. No reference that *Vitis* is a host.
Remaudiereana inornata (Pachybrachius inornatus)	Hemiptera: Lygaeidae	Seed bug
Dictyotus caenosus	Hemiptera: Pentatomidae	Hosts: legumes (soybeans, mungbeans, navy beans, cotton, azuki beans)
Linepithema humile	Hymenoptera: Formicidae	Ranked amaong the 100 worst animal invaders worldwide. Often displaces all native ants. Indirect plant pest: aphid tending.
Monomorium destructor	Hymenoptera: Formicidae	*Monomorium destructor* (the Singapore ant) is described as a tramp ant as it is renowned for transporting itself around the world via human commerce and trade. *M. destructor* is known to cause extensive economic damage in urban environments by gnawing holes in fabric and rubber goods, removing rubber insulation from electric and phone lines and damaging polyethylene cable. Indirect plant pest: aphid tending.
Technomyrmex albipes	Hymenoptera: Formicidae	Native to the Indo-Pacific area, *T. albipes* has spread to Australia, Africa, North America, Caribbean and Asia. Often found on cut flowers and other imported plants. Management of *T. albipes* is difficult as chemical poisons are not transferred between workers. In New Zealand regulated on *Citrus*, *Poncirus* and *Fortunella*. Nuisance pest in houses, nesting in wall cavities, attracted to contact points of light switches, which causes the switches to fail after repeated contact. Tendering of aphids and scale insects: Sri Lanka has experienced problems with *T. albipes* spreading pineapple wilt disease because they protect the pink mealybug (*Dysmicocus brevis*). South African

Species	Taxonomy	Other information
		citrus orchards have seen localised outbreaks of red scale insects (*Aonidella aurantii*). *T. albipes* has also been implicated in the spread of fungal pod rot disease on cocoa plants.
Polistes chinensis	Hymenoptera: Vespidae	Adults eat the flesh of grape, apple and pear fruits. They are often found in vineyards, as the adults prey on other insects associated with grapes. *Polistes* species are aggressive and wary insects capable of inflicting a painful sting to humans.
Proteuxoa comma	Lepidoptera: Noctuidae	pest of brassicaceae; polyphagous on grassland and herbs
Harrisina americana	Lepidoptera: Zygaenidae	Quarantine Pest of *Vitis* (New Zealand), but not associated with fruit.
Gryllus assimilis	Orthoptera: Gryllidae	No reference that *Vitis* is a host. Hosts: Asteraceae, Brassicaceae, Cehnopodiaceae, Clusiaceae, Curcubitaceae, Fabaceae, Poaceae, Rubiaceae.
Macchiademus diplopterus	Hemiptera: Lygaeidae	Hosts are Poaceae, serious pest of cereals (wheat, oats, barley). Adults aggregate on fruit trees to aestivate (become quiescent to survive hot dry summer). They shelter at the stalk and calyx ends, and sometimes enter apples and pears at the calyx end and sheltering deeper inside the fruit. Numerous interceptions on apple, citrus, nectarine, peach, pear and plum fruits. Post-harvest methods of control such as cold treatment and fumigation with methyl bromide are not fully effective against *M. diplopterus* and the USA requires an additional declaration stating that the commodity from South Africa has been inspected and found free of this pest. Have caused rejections of table grapes from the Riebeek-Kasteel area. In the 2006/07 season 55% of cartons presented for export were rejected due to the presence of grain chinch bugs. Hosts: *Avena fatua*, *Avena sativa*, *Bromus catharticus*, *Bromus diandrus*, *Ehrharta longiflora*, *Hordeum murinum*, *Hordeum* sp., *Lolium multiflorum*, *Pentaschistis triseta*, *Poa annua*, *Triticum aestivum*. No feeding on *Vitis*.

3.2.6 Fruit-piercing Noctuidae for which only adults are associated with table grapes

15 species of fruit-piercing Noctuidae which are not present in the EU were identified. For these species, eggs and larvae are on the leaves of their host plants, which do not include *Vitis* (and, for the most part, are wild plants that do not occur naturally in the EU). There is no evidence that eggs may contaminate fruits of non-hosts. Adults feed on table grapes (and other fruit species), but are highly mobile. In addition adults of most species are nocturnal and are large. Evidence of international movement, other than by natural spread, is scarce and not linked to fruit. The only example found was *Othreis (Oraesia) excavata*, recently found in Hawaii, but it was probably introduced on its larval hosts. Therefore adults were considered unlikely to be associated with fruit at harvest, and these species were not retained for the Alert List (rated as NO2). Their impact was nevertheless rated to identify economically important species. Only two species would have met the criteria for the Alert List: *Oraesia excavata*, with a moderate impact but introduced into Hawaii, and *Eudocima fullonia*, which has a high impact and is regulated in many countries worldwide. In the literature, figures of damage for fruit-piercing moths in an area are generally combined. However, specific figures are given for *E. fullonia*, reflecting its high impact (such as primary damage of 50-70% on citrus and 70-90% on longan in Thailand; 95% of citrus and 100% of tomatoes damaged in New Caledonia in outbreak years (although it is minor in regular years); entire crops of navel oranges damaged during outbreaks in Queensland, Australia; 40-60% of citrus fruits damaged in China). Most other species were either minor or have an unknown economic importance. Finally, no fruit-piercing moth met all criteria for the Alert list.

3.2.7 Pests proposed in answer to the EPPO Questionaire on pests of concern for *Vitis*

All specific proposals made in answer to the EPPO questionnaire on pests of concern for *Vitis* are listed in Annex 4. Many pests proposed were eventually not retained for the Alert List because they were not associated with table grapes or were present in the EU, in countries other than the one proposing them. Eleven of the pests proposed met all the criteria and are on the Alert List.

3.2.8 Were major pests identified?

A number of pests had already been identified in the EPPO Alert List or by the analysis made by other authors; some others have already been introduced into the EU. The aim of this study was to identify additional pests that may be associated with fruit in trade. In a time-consuming process, a larger number of pests from various origins were identified. It should also be stressed that too little information was available from some areas, especially Africa, and that some important pests are probably missing from the Alert List. Unfortunately there is a lack of data for African pests in vineyards, even though the most important species that cause export rejections of table grapes are studied in South Africa which is a major exporter to the EU (Figure 1). Altogether, it is considered that

the most important pest species with a high likelyhood of introduction via table grapes and/or a high economic importance should have been identified in this study.

4. Conclusion

- A large number of pests were identified as being potentially associated with table grapes and not already present in the EU.
- 30 pests were retained for the Alert List, but a larger number were potentially associated with table grapes. Species without mobile life stages and/or without high economic importance were excluded from the List. The likelihood of transfer of pests to hosts at destination from the infested fruit consignments would require a more complete assessment, and it is not excluded that some of these many pests may have the capacity to transfer to vineyards.
- It would be useful that countries record intercepted non-regulated pests on table grapes, so that PRAs/specific requirements may be considered for some pests.
- The Alert List may be used in the framework of EPPO to raise awareness of pests that may be associated with fruit consignments. Relevant information will be presented to EPPO Panels and included in EPPO Global Database.
- The study also identified a few pests that are on the EPPO Lists of regulated pests (or in the process to be listed), but not yet regulated in the EU.

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ANNEX 1. Categories of pests retained on the Alert List

A detailed description of categories and ratings can be found in the *Methods (see also point 2)*.

Ratings retained on the Alert List (all pests are absent from the EU)

Subratings are covered in the ratings below (e.g. E1 covers E1u, E1h, E1d) except if explicitely excluded.

Place on Alert List	Combination of ratings covered in each part	Description. All pests below may be associated with fruit (A1 or A2) (applies to each description)
Part 1 - Pests with high economic importance and more likely to transfer	• A1t/A2t + E1 (except E1u, E1h) + any other	• pests able to transfer, with a high economic impact currently (not uncertain high impact or high impact in the past)
Part 2 - Pests with lesser economic importance but more likely to transfer or with high economic importance but less likely to transfer	• A1/A2 or A1ut/A2ut + E1 + any other	• pests less able to transfer (or with an uncertainty on transfer), with a high economic impact currently
	• A1t/A2t + E1u or E1h + any other	• pests able to transfer, with a high economic impact (but either with an uncertainty, or in the past)
	• A1t/A2t + E2+ (F1 or G1)	• pests able to transfer, with a moderate economic impact currently, but intercepted, spreading/invasive.
	• A1t + E2 + any other	• non-mobile life stage associated with the fruit, pest able to transfer, with a moderate recorded impact currently
	• A1t/A2t + E3v or EUv + (F1 or G1)	• pests able to transfer, known vector, with a low or unknown recorded impact currently, and intercepted, spreading/invasive
	• A1t/A2t + EU+ (F1 or G1)	• pests able to transfer, with an unknown recorded impact currently, but intercepted, spreading/invasive

Not retained on the Alert List

- Ac (contaminant)
- NO categories
- Combinations of ratings not fulfilling any of the combinations above

ANNEX 2. Organisms excluded from further consideration at Step 1 and Step 2

The table includes the following NO categories used to exclude the pests from further consideration. Some organisms fall under several NO categories, but only one was used to exclude it and is indicated here.

Warning: this is not a list of *Vitis* pests: the host status was not necessarily verified for pests in NO categories excluded for other reasons (e.g. present in the EU, associated to wood, regulated in the EU etc.).

Type of pests: A = Arachnida, B = Bacteria (incl. phytoplasma), C = Chromista, F = Fungi, G = Gastropoda, I = Insecta, N = Nematoda, P = Plant, V = Viruses and viroids. U = unknown (taxonomic group not be found)

NO categories for the exclusion of species for further consideration:

NO1 (regulated in the EU), NO2 (not associated with table grapes in trade), NO3 (present in the EU), NO4 (not associated with *Vitis*), NO5 (other reason)

Species	Taxonomy		Reason
Abagrotis barnesi	I	Lepidoptera: Noctuidae	NO2
Abagrotis cupida	I	Lepidoptera: Noctuidae	NO2
Abagrotis orbis	I	Lepidoptera: Noctuidae	NO2
Acanalonia conica	I	Hemiptera: Acanaloniidae	NO3
Achaearanea tepidariorum	A	Araneae: Theridiidae	NO2
Achaearanea veruculata	A	Aranea: Theridiidae	NO4
Acharia stimulea	I	Lepidoptera: Limacodidae	NO2
Achatia distincta	I	Lepidoptera: Noctuidae	NO2
Achatina fulica	G	Pulmonata. Achatinidae	NO2
Acia lineatifrons	I	Hemiptera: Cicadellidae	NO2
Acleris semipurpurana	I	Lepidoptera: Tortricidae	NO4
Acoloithus falsarius	I	Lepidoptera: Zygaenidae	NO2
Acosmeryx anceus	I	Lepidoptera: Sphingidae	NO2
Acosmeryx naga	I	Lepidoptera: Sphingidae	NO2
Acosmeryx socrates	I	Lepidoptera: Sphingidae	NO2
Acraea anemosa	I	Lepidoptera: Nymphalidae	NO2
Acraea asboloplintha	I	Lepidoptera: Nymphalidae	NO2
Acraea insignis	I	Lepidoptera: Nymphalidae	NO2
Acraea natalica	I	Lepidoptera: Nymphalidae	NO2
Acraea oncaea	I	Lepidoptera: Nymphalidae	NO2
Acraea poggei	I	Lepidoptera: Nymphalidae	NO2
Acraea quadricolor	I	Lepidoptera: Nymphalidae	NO2
Acraea tellus	I	Lepidoptera: Nymphalidae	NO2
Acrocercops cissiella	I	Lepidoptera: Gracillariidae	NO2
Acronicta oblinita	I	Lepidoptera: Noctuidae	NO2
Acronicta rumicis	I	Lepidoptera: Noctuidae	NO2
Acropolitis rudisana	I	Lepidoptera: Tortricidae	NO2
Acrospermum viticola	F	Ascomycota	NO2
Acrothinium gaschkevitschii	I	Coleoptera: Chrysomelidae	NO2
Actias ningpoana	I	Lepidoptera: Saturniidae	NO2
Adalia bipunctata	I	Coleoptera: Coccinellidae	NO3
Adoretus sinicus	I	Coleoptera: Scarabaeidae	NO2
Adoretus versutus	I	Coleoptera: Scarabaeidae	NO2
Adoxophyes honmai	I	Lepidoptera: Tortricidae	NO2
Adoxophyes orana	I	Lepidoptera: Tortricidae	NO3
Adris tyrannus	I	Lepidoptera: Noctuidae	NO2
Aegocera bimacula	I	Lepidoptera: Noctuidae	NO2
Aeolothrips fasciatus	I	Thysanoptera: Thripidae	NO3
Agarista agricola	I	Lepidoptera: Noctuidae	NO2
Agnorisma badinodis	I	Lepidoptera: Noctuidae	NO4
Agrius convolvuli	I	Lepidoptera: Sphingidae	NO3
Agrobacterium tumefaciens	B	Rhizobiales: Rhizobiaceae	NO3
Agrobacterium vitis	B	Rhizobiales: Rhizobiaceae	NO4
Agrotis ipsilon	I	Lepidoptera: Noctuidae	NO3
Agrotis segetum	I	Lepidoptera: Noctuidae	NO2
Agrotis vetusta	I	Lepidoptera: Noctuidae	NO2
Agrypnus variabilis	I	Coleoptera: Elateridae	NO4
Aleurocanthus spiniferus	I	Hemiptera: Aleyrodidae	NO1
Aleurocanthus woglumi	I	Hemiptera: Aleyrodidae	NO1
Alfalfa mosaic virus	V	Bromoviridae	NO1

Species	Taxonomy		Reason
Alternaria alternata	F	Ascomycota	NO1
Alternaria vitis	F	Ascomycota	NO2
Altica ampelophaga	I	Coleoptera: Chrysomelidae	NO2
Altica chalybea	I	Coleoptera: Chrysomelidae	NO2
Altica gravida	I	Coleoptera: Chrysomelidae	NO2
Altica torguata (torquata?)	I	Coleoptera: Chrysomelidae	NO2
Alypia octomaculata	I	Lepidoptera: Noctuidae	NO2
Amanthes c-nigrum	I	Lepidoptera: Noctuidae	NO3
Ampeloglypter ater	I	Coleoptera: Curculionidae	NO2
Ampeloglypter sesostris	I	Coleoptera: Curculionidae	NO2
Ampelophaga rubiginosa	I	Lepidoptera: Sphingidae	NO2
Amphion floridensis	I	Lepidoptera: Sphingidae	NO2
Amphipyra erebina	I	Lepidoptera: Noctuidae	NO2
Amphipyra livida	I	Lepidoptera: Noctuidae	NO3
Amphipyra pyramidoides	I	Lepidoptera: Noctuidae	NO2
Amphipyra tragopoginis	I	Lepidoptera: Noctuidae	NO3
Amplicephalus curtulus	I	Hemiptera: Cicadellidae	NO2
Anaphothrips vitis	I	Thysanoptera: Thripidae	NO3
Anasa tristis	I	Hemiptera: Coreidae	NO4
Anastrepha fraterculus	I	Diptera: Tephritidae	NO1
Ancylis hylaea	I	Lepidoptera: Tortricidae	NO2
Anomala corpulenta	I	Coleoptera: Scarabaeidae	NO2
Anomala cuprea	I	Coleoptera: Scarabaeidae	NO2
Anomala geniculata	I	Coleoptera: Scarabaeidae	NO2
Anomala japonica	I	Coleoptera: Scarabaeidae	NO2
Anomala luculenta	I	Coleoptera: Scarabaeidae	NO2
Anomala octiescostata	I	Coleoptera: Scarabaeidae	NO2
Anomala orientalis	I	Coleoptera: Scarabaeidae	NO2
Anomis mesogona	I	Lepidoptera: Noctuidae	NO2
Anomoneura mori	I	Hemiptera: Sternorrhyncha	NO2
Anoplophora chinensis	I	Coleoptera: Cerambycidae	NO1
Anoploplepsis custodiens	I	Hymenoptera: Formicidae	NO5
Anoploplepsis steingroeveri	I	Hymenoptera: Formicidae	NO5
Antheraea polyphemus	I	Lepidoptera: Saturniidae	NO2
Antherina suraka	I	Lepidoptera: Saturniidae	NO2
Anthostomella pullulans	F	Ascomycota	NO5
Antispila ampelopsifoliella	I	Lepidoptera: Heliozelidae	NO2
Antispila aristarcha	I	Lepidoptera: Heliozelidae	NO2
Antispila isabella	I	Lepidoptera: Heliozelidae	NO2
Antispila isorrhythma	I	Lepidoptera: Heliozelidae	NO2
Antispila oinophylla	I	Lepidoptera: Heliozelidae	NO2
Antispila rivillei	I	Lepidoptera: Heliozelidae	NO3
Antispila viticordifoliella	I	Lepidoptera: Heliozelidae	NO2
Antispila voraginella	I	Lepidoptera: Heliozelidae	NO2
Anystis baccarum	A	Acarida: Anystidae	NO3
Aonidiella aurantii	I	Hemiptera: Diaspididae	NO3
Aonidiella citrina	I	Hemiptera: Diaspididae	NO3
Apate monachus	I	Coleoptera: Bostrichidae	NO3
Aphelenchoides limberi	N	Aphelenchoididae	NO2
Aphis craccivora	I	Hemiptera: Aphididae	NO3

Species	Taxonomy		Reason
Aphis fabae	I	Hemiptera: Aphididae	NO3
Aphis gossypii	I	Hemiptera: Aphididae	NO3
Aphis illinoisensis	I	Hemiptera: Aphididae	NO3
Aphis spiraecola	I	Hemiptera: Aphididae	NO3
Aphrophora intermedia	I	Hemiptera: Aphrophoridae	NO2
Apoderus jekeli	I	Coleoptera: Attelabidae	NO2
Apolygus lucorum	I	Hemiptera: Miridae	NO3
Aporia crataegi	I	Lepidoptera: Pieridae	NO2
Arabis mosaic virus	V	Secoviridae: Nepovirus	NO1
Arboridia adanae	I	Hemiptera: Cicadellidae	NO2
Arboridia apicalis	I	Hemiptera: Cicadellidae	NO2
Arboridia kakogawana	I	Hemiptera: Cicadellidae	NO2
Arboridia maculifrons	I	Hemiptera: Cicadellidae	NO2
Archips podana	I	Lepidoptera: Tortricidae	NO3
Arcte coerula	I	Lepidoptera: Noctuidae	NO2
Arctia caja	I	Lepidoptera: Arctiidae	NO3
Arctia villica	I	Lepidoptera: Arctiidae	NO3
Argyrolepidia subaspersa	I	Lepidoptera: Noctuidae	NO5
Argyrotaenia ljungiana	I	Lepidoptera: Tortricidae	NO3
Argyrotaenia loxonephes	I	Lepidoptera: Tortricidae	NO2
Armillaria luteobubalina	F	Basidiomycota	NO4
Armillaria mellea	F	Basidiomycota	NO4
Armillaria tabescens	F	Basidiomycota	NO2
Artichoke Italian latent virus	V	Secoviridae	NO3
Ascochyta ampelina	F	Ascomycota	NO3
Aspergillus aculeatus	F	Ascomycota	NO3
Aspergillus niger	F	Ascomycota	NO3
Asperisporium minutulum	F	Ascomycota	NO4
Aspidiotus nerii	I	Hemiptera: Diaspididae	NO3
Aspidobyctiscus lacunipennis	I	Coleoptera: Attelabidae	NO2
Asteroid mosaic (virus like)	V		NO1
Asterolecanium pustulans	I	Hemiptera: Asterolecaniidae	NO4
Asteropetes noctuina	I	Lepidoptera: Noctuidae	NO2
Asynonychus cervinus	I	Coleoptera: Curculionidae	NO3
Athelia rolfsii	F	Basidiomycota	NO3
Athlia rustica	I	Coleoptera: Scarabaeidae	NO4
Aulacophora femoralis chinensis	I	Coleoptera: Chrysomelidae	NO2
Australian grapevine viroid (AGVd)	V		NO1
Autographa californica	I	Lepidoptera: Noctuidae	NO2
Autographa gamma	I	Lepidoptera: Noctuidae	NO3
Bactrocera correcta	I	Diptera: Tephritidae	NO1
Bactrocera dorsalis	I	Diptera: Tephritidae	NO1
Bactrocera invadens	I	Diptera: Tephritidae	NO1
Bactrocera neohumeralis	I	Diptera: Tephritidae	NO1
Bactrocera tryoni	I	Diptera: Tephritidae	NO1
Badumna insignis	A	Araneae: Desdidae	NO4
Badumna longinqua	A	Araneae: Desdidae	NO5
Barypeithes pellucidus	I	Coleoptera: Curculionidae	NO3
Basilepta fulvipes	I	Coleoptera: Chrysomelidae	NO2
Batodes angustiorana	I	Lepidoptera: Tortricidae	NO3
Batracomorphus mundus	I	Hemiptera: Cicadellidae	NO2
Blastobasis tarda	I	Lepidoptera: Blastobasidae	NO4
Blattella germanica	I	Blattodea: Blattellidae	NO3
Blueberry leaf mottle virus	V	Secoviridae	NO1
Bothrogonia japonica	I	Hemiptera: Cicadellidae	NO2
Botryosphaeria dothidea	F	Ascomycota	NO3
Botryosphaeria obtusa	F	Ascomycota	NO3
Botryosphaeria stevensii	F	Ascomycota	NO3
Botrytis cinerea	F	Ascomycota	NO3

Species	Taxonomy		Reason
Botrytis pseudocinerea	F	Ascomycota	NO3
Brachyclytus singularis	I	Coleoptera: Cerambycidae	NO2
Bratislava mosaic virus	V		NO1
Brevipalpus californicus	A	Acarida: Tenuipalpidae	NO3
Brevipalpus lewisi	A	Acarida: Tenuipalpidae	NO3
Brevipalpus obovatus	A	Acarida: Tenuipalpidae	NO3
Brevipalpus phoenicis	A	Acarida: Tenuipalpidae	NO3
Briosia ampelophaga	F	Ascomycota	NO2
Broad bean wilt fabavirus	V		NO1
Bromius obscurus	I	Coleoptera: Chrysomelidae	NO2
Bryobia praetiosa	A	Acarida: Tetranychidae	NO3
Bryobia rubrioculus	A	Acarida: Tetranychidae	NO3
Butragulus flavipes	I	Hemiptera: Membracidae	NO2
Byctiscus lacunipennis	I	Coleoptera: Rhynchitidae	NO2
Cacotherapia unipuncta	I	Lepidoptera: Pyralidae	NO5
Cadophora luteo-olivacea	F	Ascomycota	NO3
Cadophora melinii	F	Ascomycota	NO3
Cadra calidella	I	Lepidoptera: Pyralidae	NO3
Cadra cautella	I	Lepidoptera: Pyralidae	NO3
Cadra figulilella	I	Lepidoptera: Pyralidae	NO3
Calepitrimerus vitis	A	Acarida: Eriophyidae	NO3
Callygris compositata	I	Lepidoptera: Geometridae	NO2
Calyptra gruesa	I	Lepidoptera: Noctuidae	NO2
Calyptra lata	I	Lepidoptera: Noctuidae	NO3
Calyptra thalictri	I	Lepidoptera: Noctuidae	NO3
Candidatus Liberibacter asiaticus	B	Rhizobiales: Rhizobiaceae	NO4
Caraboctonus keyserlingi	A	Scorpiones: Caraboctonidae	NO4
Carpophilus hemipterus	I	Coleoptera: Nitidulidae	NO3
Carpophilus ligneus	I	Coleoptera: Nitidulidae	NO3
Carpophilus obsoletus	I	Coleoptera: Nitidulidae	NO3
Carystoterpa fingens	I	Hemiptera: Aphrophoridae	NO5
Catocala actaea	I	Lepidoptera: Noctuidae	NO2
Catocala duplicata	I	Lepidoptera: Noctuidae	NO2
Catocala fulminea	I	Lepidoptera: Noctuidae	NO2
Catocala praegnax	I	Lepidoptera: Noctuidae	NO2
Cechenena lineosa	I	Lepidoptera: Sphingidae	NO2
Cepaea hortensis	G	Stylommatophora: Helicidae	NO3
Cepaea memoralis	G	Stylommatophora: Helicidae	NO3
Cerasphorus albofasciatus	I	Coleoptera: Cerambycidae	NO4
Cerastis tenebrifera	I	Lepidoptera: Noctuidae	NO5
Ceratitis capitata	I	Diptera: Tephritidae	NO3
Ceratitis rosa	I	Diptera: Tephritidae	NO1
Ceresa alta	I	Hemiptera: Membracidae	NO3
Ceresa bubalus	I	Hemiptera: Membracidae	NO3
Cernuella virgata	G	Sigmurethra: Hygromiidae	NO3
Cerococcus muratae=Asterococcus m.	I	Hemiptera: Cerococcidae	NO2
Ceroplastes cirripediformis	I	Hemiptera: Coccidae	NO3
Ceroplastes rusci	I	Hemiptera: Coccidae	NO3
Ceroplastes sinensis	I	Hemiptera: Coccidae	NO3
Cheiracanthium inclusum	A	Araneae :Eutichuridae	NO5
Cheiracanthium stratioticum	A	Araneae :Eutichuridae	NO5
Chlorophorus annularis	I	Coleoptera: Cerambycidae	NO4
Chondrilla juncea	P	Asterales: Asteraceae	NO3
Chrysomphalus aonidum	I	Hemiptera: Diaspididae	NO3
Chrysomphalus dictyospermi	I	Hemiptera: Diaspididae	NO3
Chrysorithrum amatum	I	Lepidoptera: Noctuidae	NO4
Cicada septemdecim	I	Hemiptera: Cicadellidae	NO4
Cicadella viridis	I	Hemiptera: Cicadellidae	NO3
Citrus exocortis viroid(CEVd-g)	V		NO1

Species	Taxonomy		Reason
Cladosporium cladosporioides	F	Ascomycota	NO3
Cladosporium uvarum	F	Ascomycota	NO5
Cladosporium viticola	F	Ascomycota	NO4
Clepsis spectrana	I	Lepidoptera: Tortricidae	NO3
clover phyllody phytoplasma	B	Acheloplasmatales: Acheloplasmataceae	NO3
Cnephasia asseclana	I	Lepidoptera: Tortricidae	NO3
Cnephasia incertana	I	Lepidoptera: Tortricidae	NO3
Coccinella repanda	I	Coleoptera: Coccinellidae	NO5
Coccus hesperidum	I	Hemiptera: Coccidae	NO3
Cochlicella ventricosa	G	Gastropoda: Hygromiidae	NO3
Cochylis roseana	I	Lepidoptera: Tortricidae	NO3
Colaspis brunnea	I	Coleoptera: Chrysomelidae	NO2
Colaspis costipennis	I	Coleoptera: Chrysomelidae	NO2
Coleophora inaequalis	I	Coleoptera: Coccinellidae	NO5
Colletotrichum acutatum	F	Ascomycota	NO3
Colletotrichum fioriniae	F	Ascomycota	NO3
Colletotrichum karstii	F	Ascomycota	NO3
Colletotrichum siamense	F	Ascomycota	NO2
Colomerus vitis	A	Acarida: Eriophyidae	NO3
Coniella diplodiella	F	Ascomycota	NO3
Coniella petrakii	F	Ascomycota	NO3
Coptobasis lunalis	I	Lepidoptera: Pyralidae	NO5
Corticaria serrata	I	Coleoptera: Latridiidae	NO3
Coryphodema tristis	I	Lepidoptera: Cossidae	NO2
Corythucha ciliata	I	Hemiptera: Tingidae	NO3
Cossus cossus	I	Lepidoptera: Cossidae	NO3
Crematogaster peringueyi	I	Hymenoptera: Formicidae	NO5
Cristulariella moricola	F	Ascomycota	NO3
Cryptoblabes gnidiella	I	Lepidoptera: Pyralidae	NO3
Cryptomphalus aspersus	G	Sigmurethra: Helicidae	NO3
Cryptophagus cellaris	I	Coleoptera: Cryptophagidae	NO3
Ctenopseustis obliquana	I	Lepidoptera: Tortricidae	NO2
Cucumber mosaic virus	V	Bromoviridae: Cucumovirus	NO1
Cylindrocarpon olidum var. crassum	F	Ascomycota	NO2
Cylindrocladiella parva	F	Ascomycota	NO3
Dacne fungorum	I	Coleoptera: Erotylidae	NO5
Dactylonectria pauciseptata	F	Ascomycota	NO3
Daphnis nerii	I	Lepidoptera: Sphingidae	NO2
Darapsa choerilus	I	Lepidoptera: Sphingidae	NO2
Darapsa myron	I	Lepidoptera: Sphingidae	NO2
Dasychira feminula	I	Lepidoptera: Lymantriidae	NO2
Dasychira moerens	I	Lepidoptera: Lymantriidae	NO2
Dasychira tenebrosa	I	Lepidoptera: Lymantriidae	NO2
Davidiella tassiana	F	Ascomycota	NO3
Deidamia inscriptum	I	Lepidoptera: Sphingidae	NO2
Deilephila elpenor	I	Lepidoptera: Sphingidae	NO3
Deilephila porcellus	I	Lepidoptera: Sphingidae	NO2
Dermaleipa zuno	I	Lepidoptera: Noctuidae	NO2
Deroceras agreste	G	Stylommatophora: Agriolimacidae	NO3
Deroceras reticulatum	G	Stylommatophora: Agriolimacidae	NO3
Desmia ufeus	I	Lepidoptera: Pyralidae	NO5
Deuterocopus albipunctatus	I	Lepidoptera: Pterophoridae	NO2
Dexicrates robustus	I	Coleoptera: Bostrichidae	NO2
Diaphania indica	I	Lepidoptera: Pyralidae	NO3
Diaporthe foeniculina	F	Ascomycota	NO3
Diaspidiotus ancylus	I	Hemiptera: Diaspididae	NO4
Diaspidiotus perniciosus	I	Hemiptera: Coccidae	NO3
Diaspis boisduvalii	I	Hemiptera: Diaspididae	NO3

Species	Taxonomy		Reason
Dictyotus caenosus	I	Hemiptera: Pentatomidae	NO4
Didymosphaeria sarmentii	F	Ascomycota	NO4
Diplodia natalensis	F	Ascomycota	NO4
Dischista cincta	I	Coleoptera: Scarabeidae	NO5
Discohainesia oenotherae	F	Ascomycota	NO3
Dolycoris baccarum	I	Hemiptera: Pentatomidae	NO2
Draeculacephala minerva	I	Hemiptera: Cicadellidae	NO1
Drepanothrips reuteri	I	Thysanoptera: Thripidae	NO3
Drosicha maskelli	I	Hemiptera: Margarodidae	NO2
Drosophila melanogaster	I	Diptera: Drosophilidae	NO3
Drosophila simulans	I	Diptera: Drosophilidae	NO3
Drosophila suzukii	I	Diptera: Drosophilidae	NO3
Duplaspidiotus claviger	I	Hemiptera: Diaspididae	NO4
Dysdera crocata	A	Aranea: Dysderidae	NO5
Dysdercus fasciatus	I	Hemiptera: Pyrrhocoridae	NO4
Dysgonia algira	I	Lepidoptera: Noctuidae	NO3
Dysgonia palumba	I	Lepidoptera: Noctuidae	NO5
Dysmicoccus brevipes	I	Hemiptera: Pseudococcidae	NO3
Dyspteris abortivaria	I	Lepidoptera: Geometridae	NO5
Ecrizothis boviei	I	Coleoptera: Curculionidae	NO2
Elsinoë ampelina	F	Ascomycota	NO3
Empoasaca vitis	I	Hemiptera: Cicadellidae	NO3
Empoasca fabae	I	Hemiptera: Cicadellidae	NO2
Empoasca punjabensis	I	Hemiptera: Cicadellidae	NO2
Enation disease (virus like)	V		NO1
Endoclita signifer	I	Lepidoptera: Heliozelidae	NO2
Endoclyta excrescens	I	Lepidoptera: Hepialidae	NO2
Enyo lugubris	I	Lepidoptera: Sphingidae	NO2
Enyo ocypete	I	Lepidoptera: Sphingidae	NO2
Eotetranychus asiaticus	A	Acarida: Tetranychidae	NO2
Eotetranychus carpini	A	Acarida: Tetranychidae	NO4
Eotetranychus carpini (vitis)	A	Acarida: Tetranychidae	NO4
Eotetranychus geniculatus	A	Acarida: Tetranychidae	NO4
Eotetranychus kankitus	A	Acarida: Tetranychidae	NO4
Eotetranychus lewisi	A	Acarida: Tetranychidae	NO1
Eotetranychus pruni	A	Acarida: Tetranychidae	NO4
Eotetranychus sexmaculatus	A	Acarida: Tetranychidae	NO2
Eotetranychus smithi	A	Acarida: Tetranychidae	NO4
Ephestia elutella	I	Lepidoptera: Pyralidae	NO3
Ephestia parasitella	I	Lepidoptera: Pyralidae	NO3
Ephestiodes gilvescentella	I	Lepidoptera: Pyralidae	NO2
Epiacanthus stramineus	I	Hemiptera: Cicadellidae	NO2
Epichoristodes acerbella	I	Lepidoptera: Tortricidae	NO3
Epidola stigma	I	Lepidoptera: Gelechiidae	NO3
Epiphyas postvittana	I	Lepidoptera: Tortricidae	NO3
Episimus argutanus	I	Lepidoptera: Tortricidae	NO4
Erasmoneura vulnerata	I	Hemiptera: Cicadellidae	NO3
Eremnus cerealis	I	Coleoptera: Curculionidae	NO2
Erinnyis ello	I	Lepidoptera: Sphingidae	NO2
Eriococcus cingulatus	I	Hemiptera: Eriococcidae	NO3
Eriopis connexa	I	Coleoptera: Coccinellidae	NO3
Erthesina fullo	I	Hemiptera: Pentatomidae	NO2
Erythraspides vitis	I	Hymenoptera: Tenthredinidae	NO5
Erythroneura calycula	I	Hemiptera: Cicadellidae	NO2
Erythroneura coloradensis	I	Hemiptera: Cicadellidae	NO2
Erythroneura comes	I	Hemiptera: Cicadellidae	NO2
Erythroneura maculator	I	Hemiptera: Cicadellidae	NO2
Erythroneura tricincta	I	Hemiptera: Cicadellidae	NO2
Erythroneura variabilis	I	Hemiptera: Cicadellidae	NO2
Erythroneura vinealis	I	Hemiptera: Cicadellidae	NO2
Erythroneura vitifex	I	Hemiptera: Cicadellidae	NO2

Species	Taxonomy		Reason
Erythroneura vitis	I	Hemiptera: Cicadellidae	NO2
Erythroneura vulerata	I	Hemiptera: Cicadellidae	NO2
Erythroneura ziczac	I	Hemiptera: Cicadellidae	NO2
Euchloron megaera	I	Lepidoptera: Sphingidae	NO2
Euclidia cuspidea	I	Lepidoptera: Noctuidae	NO4
Eudocima fullonia	I	Lepidoptera: Noctuidae	NO2
Eudocima materna	I	Lepidoptera: Noctuidae	NO2
Eudryas grata	I	Lepidoptera: Noctuidae	NO2
Eudryas unio	I	Lepidoptera: Noctuidae	NO2
Eugivira philomela	I	Lepidoptera: Cossidae	NO5
Eugnorisma miniago	I	Lepidoptera: Noctuidae	NO2
Eulecanium cerasorum	I	Hemiptera: Coccidae	NO2
Eulecanium kunoense	I	Hemiptera: Coccidae	NO2
Eulithis diversilineata	I	Lepidoptera: Geometridae	NO2
Eulithis gracilineata	I	Lepidoptera: Geometridae	NO5
Eulithis ledereri	I	Lepidoptera: Geometridae	NO2
Eumeta variegata	I	Lepidoptera: Psychidae	NO4
Eumorpha achemon	I	Lepidoptera: Sphingidae	NO2
Eumorpha anchemolus	I	Lepidoptera: Sphingidae	NO2
Eumorpha fasciatus	I	Lepidoptera: Sphingidae	NO2
Eumorpha labruscae	I	Lepidoptera: Sphingidae	NO2
Eumorpha pandorus	I	Lepidoptera: Sphingidae	NO2
Eumorpha satellitia	I	Lepidoptera: Sphingidae	NO2
Eumorpha vitis	I	Lepidoptera: Sphingidae	NO2
Eupalopsis jamesi	A	Acarida: Stigmaeidae	NO5
Eupoecilia ambiguella	I	Lepidoptera: Tortricidae	NO3
Euproctis chrysorrhoea	I	Lepidoptera: Erebidae	NO3
Euproctis fraterna	I	Lepidoptera: Lymantriidae	NO2
Euproctis paradoxa	I	Lepidoptera: Lymantriidae	NO2
Euproctis piperita	I	Lepidoptera: Lymantriidae	NO2
Euproctis similis	I	Lepidoptera: Lymantriidae	NO2
Euproctis taiwana	I	Lepidoptera: Lymantriidae	NO2
Eurhinus magnificus	I	Coleoptera: Curculionidae	NO2
Eurhizococcus brasiliensis	I	Hemiptera: Margarodidae	NO4
Eutetranychus banksi	A	Acarida: Tetranychidae	NO3
Eutetranychus orientalis	A	Acarida: Tetranychidae	NO2
Eutypa lata	F	Ascomycota	NO3
Eutypella leprosa	F	Ascomycota	NO2
Eutypella vitis	F	Ascomycota	NO2
Euxoa aquilina	I	Lepidoptera: Noctuidae	NO2
Euxoa atomaris	I	Lepidoptera: Noctuidae	NO2
Euxoa messoria	I	Lepidoptera: Noctuidae	NO2
Euxoa nigricans	I	Lepidoptera: Noctuidae	NO2
Euxoa ochrogaster	I	Lepidoptera: Noctuidae	NO2
Euxoa scandens	I	Lepidoptera: Noctuidae	NO2
Euxoa tessellata	I	Lepidoptera: Noctuidae	NO2
Euxoa tritici	I	Lepidoptera: Noctuidae	NO2
Euzophera bigella	I	Lepidoptera: Pyralidae	NO3
Everes argiades	I	Lepidoptera: Lycaenidae	NO2
Exomala orientalis	I	Coleoptera: Scarabaeidae	NO2
Ferrisia virgata	I	Hemiptera: Pseudococcidae	NO3
Fidia viticida	I	Coleoptera: Chrysomelidae	NO4
Fomitiporia mediterranea	F	Basidiomycota	NO3
Fomitiporia polymorpha	F	Basidiomycota	NO2
Fomitopsis pinicola	F	Basidiomycota	NO3
Forficula auricularia	I	Dermaptera: Forficulidae	NO3
Formica rufa	I	Hymenoptera: Formicidae	NO3
Frankliniella occidentalis	I	Thysanoptera: Thripidae	NO3
Frankliniella tritici	I	Thysanoptera: Thripidae	NO3
Fusarium anthophilum	F	Ascomycota	NO3
Fusarium oxysporum	F	Ascomycota	NO3

Species	Taxonomy		Reason
Fusarium solani	F	Ascomycota	NO3
Gametis jucunda	I	Scarabaeidae: Cetoniinae	NO4
Gastrimargus marmoratus	I	Orthopthera: Acrididae	NO4
Geina periscelidactylus	I	Lepidoptera: Pterophoridae	NO2
Geina sheppardi	I	Lepidoptera: Pterophoridae	NO2
Gerra sevorsa	I	Lepidoptera: Noctuidae	NO4
Gibberella zeae	F	Ascomycota	NO3
Globisporangium splendens	C	Oomycetes: Pythiaceae	NO3
Glomerella cingulata	F	Ascomycota	NO3
Glossosphecia romanovi	I	Lepidoptera: Sesiidae	NO2
Glycyphana fulvistemma	I	Coleoptera: Scarabaeidae	NO2
Glyptoscelis squamulata	I	Coleoptera: Chrysomelidae	NO2
Gnathothlibus erotus	I	Lepidoptera: Sphingidae	NO2
Grammia arge	I	Lepidoptera: Arctiidae	NO2
Grape vine yellow speckle I(GYSVd-1)	V	Viroid	NO1
Grape vine yellow speckle II(GYSVd-2)	V	Viroid	NO1
Grapevine asteroid mosaic agent	V		NO1
Grapevine Bulgarian latent virus	V	Secoviridae	NO1
Grapevine chrome mosaic virus	V	Secoviridae	NO1
Grapevine corky bark-associated closterovirus	V	Closteroviridae	NO1
Grapevine deformation virus	V	Secoviridae	NO1
Grapevine fanleaf virus	V	Secoviridae	NO1
Grapevine flavescence dorée phytoplasma	B	Acheloplasmatales: Acheloplasmataceae	NO1
Grapevine fleck virus	V	Tymovirales: Tymoviridae	NO1
Grapevine infectious necrosis agent	B	Bacterium-like plant pathogen	NO1
Grapevine leafroll-associated virus 1	V	Closteroviridae	NO1
Grapevine leafroll-associated virus 2	V	Closteroviridae	NO1
Grapevine leafroll-associated virus 3	V	Closteroviridae	NO1
Grapevine leafroll-associated virus 4	V	Closteroviridae	NO1
Grapevine little leaf agent	V		NO1
Grapevine Pinot gris virus	V	Betaflexiviridae: Trichovirus	NO1
Grapevine red blotch-associated virus	V	Geminiviridae	NO1
Grapevine redglobe virus	V		NO1
Grapevine stunt virus	V		NO1
Grapevine vein clearing virus	V	Caulimoviridae	NO1
Grapevine vein mosaic agent	V		NO1
Grapevine vein necrosis agent	V		NO1
Grapevine viroid cucumber (GVd-c)	V		NO1
Grapevine virus A	V	Betaflexiviridae	NO1
Grapevine yellows phytoplasmas	B	Acheloplasmatales: Acheloplasmataceae	NO3
Graphocephala atropunctata	I	Hemiptera: Cicadellidae	NO1
Gryllotalpa africana	I	Orthoptera: Gryllotalpidae	NO4
Gryllus assimilis	I	Orthoptera: Gryllidae	NO4
Guignardia bidwellii	F	Ascomycota	NO3
Halyomorpha halys	I	Hemiptera: Pentatomidae	NO3
Halysidota tessellaris	I	Lepidoptera: Arctiidae	NO2
Haplothrips coloratus	I	Thysanoptera: Thripidae	NO3
Haptoncus luteolus	I	Coleoptera: Nitidulidae	NO3
Harmonia axyridis	I	Coleoptera: Coccinellidae	NO3
Harrisina americana	I	Lepidoptera: Zygaenidae	NO2

Species	Taxonomy		Reason
Harrisina coracina	I	Lepidoptera: Zygaenidae	NO5
Harrisina mystica	I	Lepidoptera: Zygaenidae	NO5
Hayashiclytus acutivittis	I	Coleoptera: Cerambycidae	NO2
Helicobasidium mompa	F	Basidiomycota	NO4
Helicoverpa zea	I	Lepidoptera: Noctuidae	NO1
Heliothrips haemorrhoidalis	I	Thysanoptera: Thripidae	NO3
Heliothrips sylvanus	I	Thysanoptera: Thripidae	NO2
Heliozela aesella	I	Lepidoptera: Heliozelidae	NO2
Helix aspersa	G	Sigmurethra: Helicidae	NO3
Helminthosporium spp.	F	Ascomycota	NO5
Hemiberlesia lataniae	I	Hemiptera: Diaspididae	NO3
Hemiberlesia rapax	I	Hemiptera: Diaspididae	NO3
Hemideina thoracica	I	Orthoptera: Anostostomatidae	NO4
Hemileuca eglanterina	I	Lepidoptera: Saturniidae	NO4
Heraclia butleri	I	Lepidoptera: Noctuidae	NO5
Heraclia superba	I	Lepidoptera: Noctuidae	NO5
Hercinothrips femoralis	I	Thysanoptera: Thripidae	NO3
Herpetogramma luctuosalis	I	Lepidoptera: Pyralidae	NO2
Heteronychus arator	I	Coleoptera: Scarabaeidae	NO4
Heterotermes aureus	I	Isoptera: Rhinotermitidae	NO4
Hippodamia convergens	I	Coleoptera: Coccinellidae	NO5
Hippotion celerio	I	Lepidoptera: Sphingidae	NO3
Hippotion eson	I	Lepidoptera: Sphingidae	NO2
Hippotion osiris	I	Lepidoptera: Sphingidae	NO2
Hippotion scrofa	I	Lepidoptera: Sphingidae	NO2
Holocacista capensis	I	Lepidoptera: Heliozelidae	NO2
Holotrichia diomphalia	I	Coleoptera: Scarabaeidae	NO2
Holotrichia oblita	I	Coleoptera: Scarabaeidae	NO2
Homalodisca coagulata	I	Hemiptera: Cicadellidae	NO1
Homalodisca vitripennis	I	Hemiptera: Cicadellidae	NO1
Homoma magnanima	I	Lepidoptera: Tortricidae	NO2
Hop stunt viroid	V	Pospiviroidae: Hostuviroid	NO1
Hoplia callipyge	I	Coleoptera: Scarabeidae	NO4
Hyalarcta herrichi	I	Lepidoptera: Psychidae	NO2
Hyalarcta huebneri	I	Lepidoptera: Psychidae	NO2
Hyalesthes obsoletus	I	Hemiptera: Cixiidae	NO3
Hyles gallii	I	Lepidoptera: Sphingidae	NO2
Hyles lineata	I	Lepidoptera: Sphingidae	NO2
Hyles livornica	I	Lepidoptera: Sphingidae	NO2
Hypera postica	I	Coleoptera: Curculionidae	NO3
Hyphantria cunea	I	Lepidoptera: Arctiidae	NO3
Hypoblemum albovittatum	A	Araneae: Salticidae	NO4
Hypogeocoris itonis	I	Hemiptera: Lygaeidae	NO2
Hypothenemus eruditus	I	Coleoptera: Curculionidae:	NO2
Icerya aegyptiaca	I	Hemiptera: Margarodidae	NO2
Icerya purchasi	I	Hemiptera: Margarodidae	NO3
Icerya seychellarum	I	Hemiptera: Margarodidae	NO3
Illiberis tenuis	I	Lepidoptera: Zygaenidae	NO2
Incisitermes minor	I	Isoptera: Kalotermitidae	NO4
Inocutis jamaicensis	F	Basidiomycota	NO2
Inonotus hispidus	F	Basidiomycota	NO3
Ipomoea purpurea	P	Solanales: Convolvulaceae	NO3
Irenimus aequalis	I	Coleoptera: Curculionidae	NO4
Iridomyrmex humilis	I	Hymenoptera: Formicidae	NO3
Ischyja manlia	I	Lepidoptera: Noctuidae	NO2
Isopedella cerussata	A	Aranea: Sparassidae	NO4
Ixeuticus martius	A	Aranea: Amaurobiidae	NO4
Jacobiasca lybica	I	Hemiptera: Cicadellidae	NO3
Kolla atramentaria	I	Hemiptera: Cicadellidae	NO2
Lacinipolia meditata	I	Lepidoptera: Noctuidae	NO5
Laemophloeus minutus	I	Coleoptera: Laemophloeidae	NO4

Species	Taxonomy		Reason
Lampona cylindrata	A	Aranea: Lamponidae	NO5
Latrodectus geometricus	A	Aranea: Theridiidae	NO5
Latrodectus hasselti	A	Aranea: Theridiidae	NO5
Latrodectus hesperus	A	Aranea: Theridiidae	NO5
Latrodectus mactans	A	Aranea: Theridiidae	NO5
Lecanium corni	A	Araneae: Theridiidae	NO5
Lema decempunctata	I	Coleoptera: Chrysomelidae	NO2
Lemyra imparilis	I	Lepidoptera: Arctiidae	NO2
Lepidopsyche unicolor	I	Lepidoptera: Psychidae	NO3
Lepidosaphes tubulorum	I	Hemiptera: Diaspididae	NO2
Lepidosaphes ulmi	I	Hemiptera: Diaspididae	NO3
Leptoglossus chilensis	I	Hemiptera: Coreidae	NO4
Leptoglossus gonagra	I	Hemiptera: Coreidae	NO3
Limonius canus	I	Coleoptera: Elateridae	NO4
Limothrips angulicornis	I	Thysanoptera: Thripidae	NO3
Linepithema humile	I	Hymenoptera: Formicidae	NO5
Listroderes difficilis	I	Coleoptera: Curculionidae	NO3
Lobesia aeolopa	I	Lepidoptera: Tortricidae	NO5
Lobesia botrana	I	Lepidoptera: Tortricidae	NO3
Loepa katinka	I	Lepidoptera: Saturniidae	NO2
Lopholeucaspis japonica	I	Hemiptera: Diaspididae	NO1
Lycorma delicatula	I	Hemiptera: Fulgoridae	NO2
Lygus hesperus	I	Hemiptera: Miridae	NO2
Lymantria dispar	I	Lepidoptera: Lymantriidae	NO2
Lyonetia clerkella	I	Lepidoptera: Lyonetiidae	NO2
Machaerotypus sibricus	I	Hemiptera: Membracidae	NO2
Maconellicoccus hirsutus	I	Hemiptera: Pseudococcidae	NO3
Macrophomina phaseolina	F	Ascomycota	NO3
Macrosiphum euphorbiae	I	Hemiptera: Aphididae	NO3
Macrostylus puberulus	I	Coleoptera: Curculionidae	NO2
Maladera orientalis	I	Coleoptera: Scarabaeidae	NO2
Mamestra brassicae	I	Lepidoptera: Noctuidae	NO3
Margarodes meridionalis	I	Hemiptera: Sternorrhyncha	NO4
Margarodes prieskaensis	I	Hemiptera: Margarodidae	NO1
Margarodes vitis	I	Hemiptera: Margarodidae	NO1
Margarodes vredendalensis	I	Hemiptera: Margarodidae	NO1
Maroga melanostigma	I	Lepidoptera: Oecophoridae	NO2
Marumba gaschkewitschii	I	Lepidoptera: Sphingidae	NO2
Megalopyge lanata	I	Lepidoptera: Megalopygidae	NO2
Melalqus confertus	I	Coleoptera: Bostrichidae	NO4
Melanophthalma gibbosa	I	Coleoptera: Latridiidae	NO3
Melanoplus devastator	I	Orthoptera: Acrididae	NO4
Melanotus erythropygus	I	Coleoptera: Elateridae	NO2
Melinoessa croesaria	I	Lepidoptera: Geometridae	NO2
Meloidogyne ethiopica	N	Meloidogynidae	NO3
Meloidogyne hapla	N	Tylenchida: Meloidogynidae	NO3
Meloidogyne mali	N	Tylenchida: Meloidogynidae	NO3
Metabolus impressifrons	I	Coleoptera: Scarabaeidae	NO2
Metacanthus (Yemma) exilis	I	Hemiptera: Berytidae	NO2
Metaphidippus vitis	A	Aranea: Salticidae	NO5
Metcalfa pruinosa	I	Hemiptera: Flatidae	NO3
Metoponium abnorme	I	Coleoptera: Tenebrionidae	NO2
Metrioglypha empalinopa	I	Lepidoptera: Tortricidae	NO2
Metschnikowia pulcherrima	F	Ascomycota	NO4
Micromus tasmaniae	I	Neuroptera: Hemerobiidae	NO5
Mimela fusania	I	Coleoptera: Scarabaeidae	NO2
Miridiba coreana	I	Coleoptera: Scarabaeidae	NO2
Monilinia fructicola	F	Ascomycota	NO3
Monilinia fructigena	F	Ascomycota	NO3
Monomorium destructor	I	Hymenoptera: Formicidae	NO5
Mycosphaerella angulata	F	Ascomycota	NO2

Species	Taxonomy		Reason
Mycosphaerella personata	F	Ascomycota	NO2
Mythimna turca	I	Lepidoptera: Noctuidae	NO3
Myzus persicae	I	Hemiptera: Aphididae	NO3
Naupactus leucoloma	I	Coleoptera: Curculionidae	NO3
Naupactus rivulosus	I	Coleoptera: Curculionidae	NO2
Neargyractis slossonalis	I	Lepidoptera: Pyralidae	NO2
Neoclytus caprea	I	Coleoptera: Cerambycidae	NO4
Neofusicoccum vitifusiforme	F	Ascomycota	NO3
Neonectria radicicola	F	Ascomycota	NO3
Neotuerta platensis	I	Lepidoptera: Noctuidae	NO5
Nipaecoccus nipae	I	Hemiptera: Pseudococcidae	NO3
Noctua fimbriata	I	Lepidoptera: Noctuidae	NO3
Noctua orbona	I	Lepidoptera: Noctuidae	NO3
Noctua pronuba	I	Lepidoptera: Noctuidae	NO3
Nokona purpurea	I	Lepidoptera: Sesiidae	NO4
Notoncus ectatommoides	I	Hymenoptera: Formicidae	NO5
Nysius clevelandensis	I	Hemiptera: Lygaeidae	NO2
Nysius raphanus	I	Hemiptera: Lygaeidae	NO2
Nysius simulans	I	Hemiptera: Lygaeidae	NO2
Ochetellus glaber	I	Hymenoptera: Formicidae	NO4
Ochyrotica concursa	I	Lepidoptera: Pterophoridae	NO2
Ocnogyna loewii	I	Lepidoptera: Arctiidae	NO2
Octaspidiotus stauntoniae	I	Hemiptera: Diaspididae	NO2
Odites ricinella	I	Lepidoptera: Oecophoridae	NO2
Oecanthus indicus	I	Orthoptera: Gryllotalpidae	NO2
Oecanthus longicauda	I	Orthoptera: Gryllotalpidae	NO2
Oedaleonotus enigma	I	Orthoptera: Acrididae	NO4
Oemona hirta	I	Coleoptera: Cerambycidae	NO2
Oides decempunctata	I	Coleoptera: Chrysomelidae	NO2
Oides tarsata	I	Coleoptera: Chrysomelidae	NO2
Oligonychus biharensis	A	Acarida: Tetranychidae	NO4
Oligonychus coffeae	A	Acarida: Tetranychidae	NO2
Oligonychus mangiferus	A	Acarida: Tetranychidae	NO2
Oligonychus perseae	A	Acarida: Tetranychidae	NO3
Oligonychus peruvianus	A	Acarida: Tetranychidae	NO2
Oligonychus punicae	A	Acarida: Tetranychidae	NO2
Omophlus lepturoides	I	Coleoptera: Tenebrionidae	NO3
Oncometopia nigricans	I	Hemiptera: Cicadellidae	NO1
Oncometopia orbona	I	Hemiptera: Cicadellidae	NO1
Onthophagus tweedensis	I	Coleoptera: Scarabaeidae	NO4
Ophiusa tirhaca	I	Lepidoptera: Noctuidae	NO3
Opifex fuscus	I	Diptera: Culcidae	NO4
Oraesia excavata	I	Lepidoptera: Noctuidae	NO2
Orgyia postica	I	Lepidoptera: Lymantriidae	NO2
Orientus ishidae	I	Hemiptera: Cicadellidae	NO2
Orthobelus flavipes	I	Hemiptera: Membracidae	NO2
Orthodes rufula	I	Lepidoptera: Noctuidae	NO4
Orthorhinus cylindrirostris	I	Coleoptera: Curculionidae	NO2
Orthotydeus californicus	A	Acarida: Tydeidae	NO3
Orthotylus flavosparsus	I	Hemiptera: Miridae	NO3
Oryzaephilus surinamensis	I	Coleoptera: Silvanidae	NO3
Otiorhynchus corruptor	I	Coleoptera: Curculionidae	NO3
Otiorhynchus cribricollis	I	Coleoptera: Curculionidae	NO2
Otiorhynchus ligustici	I	Coleoptera: Curculionidae	NO3
Otiorhynchus rugostriatus	I	Coleoptera: Curculionidae	NO3
Otiorhynchus sulcatus	I	Coleoptera: Curculionidae	NO3
Oxycarenus hyalinipennis	I	Hemiptera: Lygaeidae	NO3
Oxycetonia jucunda	I	Coleoptera: Scarabaeidae	NO2
Oxydema longulum	I	Coleoptera: Curculionidae	NO4
Oxyptilus delawaricus	I	Lepidoptera: Pterophoridae	NO5
Pachnaeus litus	I	Coleoptera: Curculionidae	NO2

Species	Taxonomy		Reason
Pachnoda sinuata	I	Coleoptera: Scarabaeidae	NO2
Pachybrachius inornatus	I	Hemiptera: Lygaeidae	NO4
Panonychus citri	A	Acarida: Tetranychidae	NO3
Panonychus ulmi	A	Acarida: Tetranychidae	NO3
Pantoea agglomerans	B	Enterobacteriales: Enterobacteriaceae	NO5
Pantomorus ruizi	I	Coleoptera: Curculionidae	NO2
Paonias myops	I	Lepidoptera: Sphingidae	NO2
Papaipema nebris	I	Lepidoptera: Noctuidae	NO2
Parabagrotis formalis	I	Lepidoptera: Noctuidae	NO5
Paracles fusca	I	Lepidoptera: Arctiidae	NO5
Paracles persimilis	I	Lepidoptera: Arctiidae	NO5
Paracotalpa ursina	I	Coleoptera: Scarabeidae	NO2
Paralipsa gularis	I	Lepidoptera: Pyralidae	NO3
Paraneotermes simplicicornis	I	Isoptera: Kalotermitidae	NO4
Paranthrene regalis	I	Lepidoptera: Sesiidae	NO2
Parasteatoda tepidariorum	A	Aranea: Theridiidae	NO3
Parlatoria camelliae	I	Hemiptera: Diaspididae	NO3
Parlatoria cinerea	I	Hemiptera: Diaspididae	NO3
Parlatoria oleae	I	Hemiptera: Diaspididae	NO3
Parlatoria theae	I	Hemiptera: Diaspididae	NO2
Paropsides duodecimpustulata	I	Coleoptera: Chrysomelidae	NO2
Paropta paradoxa	I	Lepidoptera: Cossidae	NO2
Parthenolecanium corni	I	Hemiptera: Coccidae	NO3
Parthenolecanium persicae	I	Hemiptera: Coccidae	NO3
Parthenolecanium pruinosum	I	Hemiptera: Coccidae	NO2
Peach rosette mosaic virus	V	Secoviridae	NO1
Pelidnota punctata	I	Coleoptera: Scarabeidae	NO4
Penicillium digitatum	F	Ascomycota	NO3
Penicillium italicum	F	Ascomycota	NO3
Pergesa acteus	I	Lepidoptera: Sphingidae	NO2
Peribatodes rhomboidaria	I	Lepidoptera: Geometridae	NO3
Peridroma saucia	I	Lepidoptera: Noctuidae	NO3
Pestalotiopsis menezesiana	F	Ascomycota	NO3
Pestalotiopsis uvicola	F	Ascomycota	NO3
Petrobia harti	A	Acarida: Tetranychidae	NO4
Petrobia latens	A	Acarida: Tetranychidae	NO3
Phaeoacremonium aleophilum	F	Ascomycota	NO3
Phaeoacremonium alvesii	F	Ascomycota	NO4
Phaeomoniella chlamydospora	F	Ascomycota	NO3
Phaeoramularia heterospora	F	Ascomycota	NO2
Phaeosaccardinula javanica	F	Ascomycota	NO4
Phakopsora euvitis	F	Basidiomycota	NO2
Phellinus igniarius	F	Basidiomycota	NO3
Phenacoccus aceris	I	Hemiptera: Pseudococcidae	NO2
Phenacoccus solenopsis	I	Hemiptera: Pseudococcidae	NO3
Phidippus audax	A	Araneae: Salticidae	NO5
Phidippus johnsoni	A	Aranea: Salticidae	NO5
Phidippus regius	A	Araneae: Salticidae	NO5
Philaenus spumarius	I	Hemiptera: Cercopidae	NO3
Philotherma rosa	I	Lepidoptera: Lasiocampidae	NO2
Phlogophora meticulosa	I	Lepidoptera: Noctuidae	NO3
Phoma glomerata	F	Ascomycota	NO3
Phomopsis viticola	F	Ascomycota	NO3
Phyllocnistis ampelopsiella	I	Lepidoptera: Gracillariidae	NO2
Phyllocnistis toparcha	I	Lepidoptera: Gracillariidae	NO2
Phyllocnistis vitegenella	I	Lepidoptera: Gracillariidae	NO3
Phyllocnistis vitifoliella	I	Lepidoptera: Gracillariidae	NO2

Species	Taxonomy		Reason
Phyllodesma americana	I	Lepidoptera: Lasiocampidae	NO2
Phyllopertha diversa	I	Coleoptera: Scarabaeidae	NO2
Phyllosticta ampelicida	F	Ascomycota	NO2
Phyllosticta spermoides	F	Ascomycota	NO2
Phymatodes albicinctus	I	Coleoptera: Cerambycidae	NO2
Phymatodes maaki	I	Coleoptera: Cerambycidae	NO2
Phymatotrichopsis omnivora	F	Ascomycota	NO1
Physalospora baccae (European species or strain)	F	Ascomycota	NO3
Phytonemus pallidus	A	Acarida: Tetranychidae	NO3
Phytophthora cinnamomi	C	Oomycota	NO3
Phytophthora citricola	C	Oomycota	NO3
Phytophthora drechsleri	C	Oomycetes: Peronosporaceae	NO3
Phytophthora megasperma	C	Oomycota	NO3
Phytoplasma australiense	B	Acholeplasmatales: Acholeplasmataceae	NO2
Phytoplasma solani	B	Acholeplasmatales: Acholeplasmataceae	NO1
Pieris rapae	I	Lepidoptera: Pieridae	NO3
Pinnaspis strachani	I	Hemiptera: Diaspididae	NO3
Planococcus citri	I	Hemiptera: Pseudococcidae	NO3
Planococcus ficus	I	Hemiptera: Pseudococcidae	NO3
Planococcus minor	I	Hemiptera: Pseudococcidae	NO3
Plasmopara viticola	C	Oomycota	NO3
Platyapistes glaucus	I	Coleoptera: Curculionidae	NO2
Platyapistes venustus	I	Coleoptera: Curculionidae	NO2
Platynota idaeusalis	I	Lepidoptera: Tortricidae	NO2
Platynota nigrocervina	I	Lepidoptera: Tortricidae	NO5
Platypedia minor	I	Hemiptera: Cicadellidae	NO4
Plodia interpunctella	I	Lepidoptera: Pyralidae	NO3
Plutella xylostella	I	Lepidoptera: Plutellidae	NO3
Polistes chinensis	I	Hymenoptera: Vespidae	NO4
Polygonia c-auerum	I	Lepidoptera: Nymphalidae	NO2
Polyphagotarsonemus latus	A	Acarida: Tarsonemidae	NO3
Popillia japonica	I	Coleoptera: Scarabaeidae	NO1
Pratylenchus brachyurus	N	Tylenchida: Pratylenchidae	NO3
Proagopertha lucidula	I	Coleoptera: Scarabaeidae	NO2
Protaetia brevitarsis	I	Coleoptera: Scarabaeidae	NO2
Proteuxoa comma	I	Lepidoptera: Noctuidae	NO4
Proutia betulina	I	Lepidoptera: Psychidae	NO3
Pseudaulacaspis pentagona	I	Hemiptera: Diaspididae	NO3
Pseudocercospora vitis	F	Ascomycota	NO2
Pseudococcus calceolariae	I	Hemiptera: Pseudococcidae	NO3
Pseudococcus comstocki	I	Hemiptera: Pseudococcidae	NO3
Pseudococcus longispinus	I	Hemiptera: Pseudococcidae	NO3
Pseudococcus viburni	I	Hemiptera: Pseudococcidae	NO3
Pseudomonas syringae	B	Pseudomonadales: Pseudomonadaceae	NO3
Pseudomonas viridiflava	B	Pseudomonadales: Pseudomonadaceae	NO3
Pseudopezicula tetraspora	F	Ascomycota	NO3
Pseudopeziza tracheiphila	F	Ascomycota	NO3
Psilogramma menephron	I	Lepidoptera: Sphingidae	NO2
Psorosa taishanella	I	Lepidoptera: Pyralidae	NO2
Psychidea nudella	I	Lepidoptera: Psychidae	NO3
Psychomorpha epimenis	I	Lepidoptera: Noctuidae	NO2
Pulvinaria innumerabilis	I	Hemiptera: Coccidae	NO4
Pulvinaria vitis	I	Hemiptera: Coccidae	NO3
Pyrenochaeta vitis	F	Ascomycota	NO2
Pyrrharctia isabella	I	Lepidoptera: Arctiidae	NO2
Pythium aphanidermatum	C	Oomycota	NO3
Pythium vexans	C	Oomycetes: Pythiaceae	NO3
Quadraspidiotus juglansregiae	I	Hemiptera: Diaspididae	NO5

Species	Taxonomy		Reason
Quadraspidiotus perniciosus	I	Hemiptera: Diaspididae	NO2
Raglius apicalis	I	Hemiptera: Rhyparochromidae	NO3
Raspberry bushy dwarf idaeovirus (RBDV)	V		NO1
Raspberry ringspot virus	V	Secoviridae	NO1
Reesa vespulae	I	Coleoptera: Dermestidae	NO3
Reptalus panzeri	I	Hemiptera: Cixiidae	NO3
Reticulitermes hesperus	I	Isoptera: Rhinotermitidae	NO4
Rhacodiella vitis	F	Ascomycota	NO3
Rhagastis mongoliana	I	Lepidoptera: Sphingidae	NO2
Rhagastis olivacea	I	Lepidoptera: Sphingidae	NO2
Rhizobium vitis	B	Rhizobiales: Rhizobiaceae	NO3
Rhizoecus falcifer	I	Hemiptera: Sternorrhyncha	NO3
Rhizoecus kondonis	I	Hemiptera: Pseudococcidae	NO4
Rhizopus arrhizus	F	Zygomycota	NO3
Rhizopus stolonifer	F	Zygomycota	NO3
Rhyncholaba acteus	I	Lepidoptera: Sphingidae	NO2
Rhytidoponera metallica	I	Hymenoptera: Formicidae	NO4
Rhytisma vitis	F	Ascomycota	NO4
Rhyzopus arrhizus	F	Zygomycota	NO3
Ricania japonica	I	Hemiptera: Ricaniidae	NO2
Riptortus clavatus	I	Hemiptera: Alydidae	NO2
Roesleria subterranea	F	Ascomycota	NO4
Rosellinia necatrix	F	Ascomycota	NO2
Rupestris stem pitting (virus like)	V		NO1
Saissetia coffeae	I	Hemiptera: Coccidae	NO3
Saissetia oleae	I	Hemiptera: Coccidae	NO3
Saliunca chalconota	I	Lepidoptera: Zygaenidae	NO5
Sameodes holocrossa	I	Lepidoptera: Pyralidae	NO5
Sanogasta maculatipes	A	Aranea: Anyphaenidae	NO5
Sarbanissa subflava	I	Lepidoptera: Noctuidae	NO2
Sarbanissa transiens	I	Lepidoptera: Noctuidae	NO2
Sarbanissa venosa	I	Lepidoptera: Noctuidae	NO2
Scalmatica corticea	I	Lepidoptera: Tineidae	NO5
Scaphoideus titanus	I	Hemiptera: Cicadellidae	NO3
Scelodonta lewisii	I	Coleoptera: Chrysomelidae	NO2
Scelodonta strigicollis	I	Coleoptera: Chrysomelidae	NO2
Schistocerca alutacea shoshone	I	Orthoptera: Acrididae	NO4
Schistocerca gregaria	I	Orthoptera: Acrididae	NO3
Schistocerca nitens nitens	I	Orthoptera: Acrididae	NO2
Schizothyrium pomi	F	Ascomycota	NO3
Scirtothrips aurantii	I	Thysanoptera: Thripidae	NO1
Scirtothrips citri	I	Thysanoptera: Thripidae	NO1
Scirtothrips dorsalis	I	Thysanoptera: Thripidae	NO1
Scirtothrips mangiferae	I	Thysanoptera: Thripidae	NO2
Sclerotinia sclerotiorum	F	Ascomycota	NO3
Scoliopteryx libatrix	I	Lepidoptera: Noctuidae	NO3
Scrobigera vulcanica	I	Lepidoptera: Noctuidae	NO5
Septoria ampelina	F	Ascomycota	NO2
Septoria badhamii	F	Ascomycota	NO2
Serrodes campana	I	Lepidoptera: Noctuidae	NO2
Sinoxylon japonicum	I	Coleoptera: Bostrichidae	NO2
Sitona discoideus	I	Coleoptera: Curculionidae	NO3
Sitona humeralis	I	Coleoptera: Curculionidae	NO3
Solenopsis xyloni	I	Hymenoptera: Formicidae	NO4
Sowbane mosaic sobemovirus	V		NO1
Spaelotis clandestina	I	Lepidoptera: Noctuidae	NO2
Sparganothis directana	I	Lepidoptera: Tortricidae	NO2
Sparganothis pilleriana	I	Lepidoptera: Tortricidae	NO3
Sparganothis reticulatana	I	Lepidoptera: Tortricidae	NO2

Species	Taxonomy		Reason
Speia vuteria	I	Lepidoptera: Noctuidae	NO5
Sphecodina abbottii	I	Lepidoptera: Sphingidae	NO2
Sphecodina caudata	I	Lepidoptera: Sphingidae	NO2
Sphenarches ontario	I	Lepidoptera: Pterophoridae	NO2
Sphragisticus nebulosus	I	Hemiptera: Rhyparochromidae	NO3
Spilosoma lubricipeda	I	Lepidoptera: Arctiidae	NO3
Spilosoma virginica	I	Lepidoptera: Arctiidae	NO2
Spirama retorta	I	Lepidoptera: Noctuidae	NO2
Spissistilus festinus	I	Hemiptera: Membracidae	NO4
Spodoptera exiqua	I	Lepidoptera: Noctuidae	NO2
Spodoptera frugiperda	I	Lepidoptera: Noctuidae	NO1
Spodoptera latifascia	I	Lepidoptera: Noctuidae	NO2
Spodoptera littoralis	I	Lepidoptera: Noctuidae	NO1
Spodoptera litura	I	Lepidoptera: Noctuidae	NO1
Spodoptera praefica	I	Lepidoptera: Noctuidae	NO4
Stathmopoda auriferella	I	Lepidoptera: Oecophoridae	NO3
Stemphylium botryosum	F	Ascomycota	NO3
Stereum hirsutum	F	Basidiomycota	NO3
Strawberry latent ringspot virus	V	Secoviridae	NO1
Suana concolor	I	Lepidoptera: Lasiocampidae	NO2
Syllepte ovalis	I	Lepidoptera: Pyralidae	NO5
Sylvicola notatus	I	Diptera: Anisopodidae	NO4
Synanthedon hector	I	Lepidoptera: Sesiidae	NO2
Synanthedon tipuliformis	I	Lepidoptera: Sesiidae	NO3
Synanthedon vespiformis	I	Lepidoptera: Sesiidae	NO3
Taeniothrips discolor	I	Thysanoptera: Thripidae	NO3
Taeniothrips meridionalis	I	Thysanoptera: Thripidae	NO3
Taeniothrips pallidivestis	I	Thysanoptera: Thripidae	NO3
Taeniothrips traegandhi	I	Thysanoptera: Thripidae	NO5
Tanyrhynchus carinatus	I	Coleoptera: Curculionidae	NO5
Tapajosa rubromarginata	I	Hemiptera: Cicadellidae	NO1
Targionia vitis	I	Hemiptera: Diaspididae	NO3
Tarsonemus bakeri	A	Acarida: Tarsonemidae	NO5
Tarsonemus confusus	A	Acarida: Tarsonemidae	NO2
Tarsonemus waitei	A	Acarida: Tarsonemidae	NO4
Technomyrmex albipes	I	Hymenoptera: Formicidae	NO4
Tenothrips frici	I	Thysanoptera: Thripidae	NO3
Tenuipalpus granati	A	Acarida: Tenuipalpidae	NO3
Teratopactus nodicollis	I	Coleoptera: Curculionidae	NO2
Tetranychus kanzawai	A	Acarida: Tetranychidae	NO3
Tetranychus ludeni	A	Acarida: Tetranychidae	NO3
Tetranychus mcdanieli	A	Acarida: Tetranychidae	NO3
Tetranychus neocaledonicus	A	Acarida: Tetranychidae	NO2
Tetranychus pacificus	A	Acarida: Tetranychidae	NO2
Tetranychus piercei	A	Acarida: Tetranychidae	NO4
Tetranychus truncatus	A	Acarida: Tetranychidae	NO4
Tetranychus turkestani	A	Acarida: Tetranychidae	NO3
Tetranychus urticae	A	Acarida: Tetranychidae	NO3
Theba pisana	G	Sigmurethra: Helicidae	NO3
Theresimima ampelophaga	I	Lepidoptera: Zygaenidae	NO3
Theretra alecto	I	Lepidoptera: Sphingidae	NO2
Theretra boisduvalii	I	Lepidoptera: Sphingidae	NO2
Theretra capensis	I	Lepidoptera: Sphingidae	NO2
Theretra clotho	I	Lepidoptera: Sphingidae	NO2
Theretra gnoma	I	Lepidoptera: Sphingidae	NO2
Theretra jugurtha	I	Lepidoptera: Sphingidae	NO2
Theretra latreillii	I	Lepidoptera: Sphingidae	NO2
Theretra oldenlandiae	I	Lepidoptera: Sphingidae	NO2
Theretra pallicosta	I	Lepidoptera: Sphingidae	NO2
Thielaviopsis basicola	F	Ascomycota	NO3
Thinopteryx crocoptera	I	Lepidoptera: Geometridae	NO2

Species	Taxonomy		Reason
Thrips flavus	I	Thysanoptera: Thripidae	NO2
Thrips hawaiiensis	I	Thysanoptera: Thripidae	NO3
Thrips obscuratus	I	Thysanoptera: Thripidae	NO2
Thrips tabaci	I	Thysanoptera: Thripidae	NO3
Thyris sepulchralis	I	Lepidoptera: Thyrididae	NO5
Tobacco necrosis necrovirus	V		NO1
Tobacco ringspot virus	V	Secoviridae: Nepovirus	NO1
Toleria romanovi	I	Lepidoptera: Sesiidae	NO2
Tomato black ring virus	V	Secoviridae: Nepovirus	NO1
Tomato ringspot virus	V	Secoviridae: Nepovirus	NO1
Trachelas pacificus	A	Aranea: Clubionidae	NO5
Trialeurodes vaporariorum	I	Hemiptera: Aleyrodidae	NO2
Tribulus terrestris	P	Zygophylloles: Zygophyllaceae	NO3
Trichodorus viruliferus	N	Adenophorea: Trichodoridae	NO3
Trichoferus campestris	I	Coleoptera: Cerambycidae	NO4
Trichoplusia ni	I	Lepidoptera: Noctuidae	NO3
Trichoptilus wahlbergi	I	Lepidoptera: Pterophoridae	NO2
Trichosea champa	I	Lepidoptera: Pantheidae	NO2
Trichothecium roseum	F	Ascomycota	NO3
Trigonospila brevifacies	I	Coleoptera: Dermestidae	NO5
Trimetopia aetheraria	I	Lepidoptera: Geometridae	NO5
Trogoderma granarium	I	Coleoptera: Dermestidae	NO4
Trogoderma variabile	I	Coleoptera: Dermestidae	NO4
Truncatella angustata	F	Ascomycota	NO3
Uncinula necator	F	Ascomycota	NO3
Urophorus humeralis	I	Coleoptera: Nitidulidae	NO3
Vein necrosis (virus like)	V	Unassigned virus	NO1
Vespa mandarinia	I	Hymenoptera: Vespidae	NO4
Vitacea cupressi	I	Lepidoptera: Sesiidae	NO2
Vitacea polistiformis	I	Lepidoptera: Sesiidae	NO4
Vitacea scepsiformis	I	Lepidoptera: Sesiidae	NO2
Viteus vitifoliae	I	Hemiptera: Phylloxeridae	NO1
Vitula serratilineella	I	Lepidoptera: Pyralidae	NO3
Xestia baja	I	Lepidoptera: Noctuidae	NO3
Xestia c-nigrum	I	Lepidoptera: Noctuidae	NO3
Xyleborus adembratus	I	Coleoptera: Curculionidae	NO2
Xylella fastidiosa	B	Xanthomonadales: Xanthomonadaceae	NO1
Xylena exsoleta	I	Lepidoptera: Noctuidae	NO3
Xylophilus ampelinus	B	Burkholderiales: Comamonadaceae	NO1
Xylotrechus pyrrhoderus	I	Coleoptera: Cerambycidae	NO4
Xyphon fulgidum	I	Hemiptera: Cicadellidae	NO1
Zaprionus tuberculatus	I	Diptera: Drosophilidae	NO3
Zelus exsanguis	I	Hemiptera: Reduviidae	NO4
Zenophassus schamyl	I	Lepidoptera: Heliozelidae	NO2
Zetiasplozna thuemenii	F	Ascomycota	NO3
Zeuzera coffeae	I	Lepidoptera: Cossidae	NO2
Zeuzera pyrina	I	Lepidoptera: Cossidae	NO2
Zygnidia artvinicus	I	Hemiptera: Cicadellidae	NO4

ANNEX 3. List of pests remaining for consideration for the Alert List at Step 2

This list includes all pests retained for consideration.

Alert List pests are in bold

Type of pests: A = Arachnida; B = Bacteria, I = Insecta, F = Fungi, G = Gastropoda

Species	Type	Taxonomy
Accuminulia buscki	I	Lepidoptera: Tortricidae
Accuminulia longiphallus	I	Lepidoptera: Tortricidae
Adoxophyes privatana	I	Lepidoptera: Tortricidae
Aleurolobus taonabae	I	Hemiptera: Aleyrodidae
Alternaria viticola	F	Ascomycota
Amorbia cuneana	I	Lepidoptera: Tortricidae
Amyelois transitella	I	Lepidoptera: Pyralidae
Aonidiella comperei	I	Hemiptera: Diaspididae
Aonidiella inornata	I	Hemiptera: Diaspididae
Aonidiella orientalis	I	Hemiptera: Diaspididae
Archips argyrospilus	I	Lepidoptera: Tortricidae
Archips micaceana	I	Lepidoptera: Tortricidae
Archips philippa	I	Lepidoptera: Tortricidae
Argyrotaenia citrana	I	Lepidoptera: Tortricidae
Argyrotaenia sphaleropa	I	Lepidoptera: Tortricidae
Argyrotaenia velutinana	I	Lepidoptera: Tortricidae
Artena dotata	I	Lepidoptera: Noctuidae
Asperisporium vitiphyllum	F	Ascomycota
Aspidiotus excisus	I	Hemiptera: Diaspididae
Asterococcus muratae =Cerococcus m.	I	Hemiptera: Cerococcidae
Bonagota cranaodes	I	Lepidoptera: Tortricidae
Botryodiplodia palmarum	F	Ascomycota
Bradybaena similaris	G	Stylommatophora: Bradybaenidae
Brevipalpus chilensis	A	Acarida: Tenuipalpidae
Caliothrips fasciatus	I	Thysanoptera: Thripidae
Carpophilus davidsoni	I	Coleoptera: Nitidulidae
Carpophilus gaveni	I	Coleoptera: Nitidulidae
Cecidomyia sp.	I	Diptera: Cecidomyiidae
Chileulia stalactitis	I	Lepidoptera: Tortricidae
Chinavia hilaris	I	Hemiptera: Pentatomidae
Cnephasia jactatana	I	Lepidoptera: Tortricidae
Colgar peracutum	I	Hemiptera: Flatidae
Colomerus oculivitis	A	Acarida: Eriophyidae
Copitarsia decolora	I	Lepidoptera: Noctuidae
Copitarsia incommoda	I	Lepidoptera: Noctuidae
Costelytra zealandica	I	Coleoptera: Scarabaeidae
Cotinis nitida	I	Coleoptera: Scarabaeidae
Craponius inaequalis	I	Coleoptera: Curculionidae
Crisicoccus matsumotoi	I	Hemiptera: Pseudococcidae
Ctenopseustis herana	I	Lepidoptera: Tortricidae
Desmia funeralis	I	Lepidoptera: Pyralidae
Diaporthe australafricana	F	Ascomycota
Diaporthe melonis var. brevistylospora	F	Ascomycota
Dichocrocis punctiferalis	I	Lepidoptera: Crambidae
Dysgonia maturata	I	Lepidoptera: Noctuidae
Eotetranychus willamettei	A	Acarida: Tetranychidae
Eremnus atratus	I	Coleoptera: Curculionidae
Eremnus setulosus	I	Coleoptera: Curculionidae
Erythroneura elegantula	I	Hemiptera: Cicadellidae
Estigmene acrea	I	Lepidoptera: Arctiidae
Euschistus conspersus	I	Hemiptera: Pentatomidae
Evoxysoma vitis	I	Hymenoptera: Eurytomidae
Eysarcoris guttiger	I	Hemiptera: Pentatomidae
Ferrisia terani	I	Hemiptera: Pseudococcidae
Formicoccus robustus	I	Hemiptera: Pseudococcidae
Frankliniella cestrum	I	Thysanoptera: Thripidae
Frankliniella gardeniae	I	Thysanoptera: Thripidae
Frankliniella gemina	I	Thysanoptera: Thripidae
Frankliniella minuta	I	Thysanoptera: Thripidae
Geniocremmus chilensis	I	Coleoptera: Curculionidae
Gonocephalum simplex	I	Coleoptera: Tenebrionidae
Greeneria uvicola	F	Ascomycota
Harrisina brillians	I	Lepidoptera: Zygaenidae
Helopeltis antonii	I	Hemiptera: Miridae
Icerya palmeri	I	Hemiptera: Margarodidae
Isotenes miserana	I	Lepidoptera: Tortricidae
Lacinipolia renigera	I	Lepidoptera: Noctuidae
Lasiodiplodia pseudotheobromae	F	Ascomycota
Lasioptera vitis	I	Diptera: Cecidomyiidae
Lepidosaphes laterochitinosa	I	Hemiptera: Diaspididae
Lygris diversilineata	I	Lepidoptera: Geometridae
Macchiademus diplopterus	I	Hemiptera: Lygaeidae
Macrodactylus subspinosus	I	Coleoptera: Scarabaeidae
Macrodactylus subspinosus	I	Coleoptera: Scarabaeidae
Mahasena minuscula	I	Lepidoptera: Psychidae
Marmara gulosa	I	Lepidoptera: Gracillariidae
Meghimatium pictum	G	Stylommatophora: Philomycidae
Merhynchites sp.	I	Coleoptera: Rhynchitidae
Metopta rectifasciata	I	Lepidoptera: Noctuidae
Naupactus xanthographus	I	Coleoptera: Curculionidae
Nipaecoccus viridis	I	Hemiptera: Pseudococcidae
Nippoptilia vitis	I	Lepidoptera: Pterophoridae
Nirvana pallida	I	Hemiptera: Cicadellidae
Oligonychus vitis	A	Acarida: Tetranychidae
Oligonychus yothersi	A	Acarida: Tetranychidae
Oraesia emarginata	I	Lepidoptera: Noctuidae
Othreis ancilla	I	Lepidoptera: Noctuidae
Oxyptilus regulus	I	Lepidoptera: Pterophoridae
Paralobesia viteana	I	Lepidoptera: Tortricidae
Paraulacizes irrorata	I	Hemiptera: Cicadellidae
Pawiloma victima	I	Hemiptera: Cicadellidae
Pestalotia malicola	F	Ascomycota
Phalaenoides glycinae	I	Lepidoptera: Noctuidae
Phlyctinus callosus	I	Coleoptera: Curculionidae
Physalospora baccae	F	Ascomycota
Planococcus kraunhiae	I	Hemiptera: Pseudococcidae
Planococcus lilacinus	I	Hemiptera: Pseudococcidae
Platynota stultana	I	Lepidoptera: Tortricidae
Platyptilia ignifera	I	Lepidoptera: Pterophoridae
Plautia stali	I	Hemiptera: Pentatomidae
Popillia mutans	I	Coleoptera: Scarabaeidae
Popillia quadriguttata	I	Coleoptera: Scarabaeidae
Prodiplosis longifila	I	Diptera: Cecidomyiidae
Proeulia auraria	I	Lepidoptera: Tortricidae
Proeulia chrysopteris	I	Lepidoptera: Tortricidae
Proeulia triquetra	I	Lepidoptera: Tortricidae
Pseudaonidia trilobitiformis	I	Hemiptera: Diaspididae
Pseudococcus cribata	I	Hemiptera: Pseudococcidae
Pseudococcus jackbeardsleyi	I	Hemiptera: Pseudococcidae
Pseudococcus maritimus	I	Hemiptera: Pseudococcidae
Rastrococcus iceryoides	I	Hemiptera: Pseudococcidae
Retithrips syriacus	I	Thysanoptera: Thripidae
Rhadopterus picipes	I	Coleoptera: Chrysomelidae

Species	Type	Taxonomy
Rhipiphorothrips cruentatus	I	Thysanoptera: Thripidae
Scaphytopius acutus	I	Hemiptera: Cicadellidae
Scutiphora pedicellata	I	Hemiptera: Scutelleridae
Selenaspidus articulatus	I	Hemiptera: Diaspididae
Selenothrips rubrocinctus	I	Thysanoptera: Thripidae
Sparganothis sulfureana	I	Lepidoptera: Tortricidae
Taeniothrips reichardti	I	Thysanoptera: Thripidae

Species	Type	Taxonomy
Tetranychus desertorum	A	Acarida: Tetranychidae
Thaumatotibia leucotreta	I	Lepidoptera: Tortricidae
Thrips imaginis	I	Thysanoptera: Thripidae
Tortrix excessana	I	Lepidoptera: Tortricidae
Xanthomonas campestris pv. viticola	B	Xanthomonadales: Xanthomonadaceae
Zaprionus indianus	I	Diptera: Drosophilidae

ANNEX 4. Pests proposed in answer to the EPPO questionnaire (2016-04) on pests of concern for Vitis

Answers not used: Turkey NPPO: referring to their quarantine list.

Malta had no additional proposals than those already regulated; Lithuania and France had no proposals

Pest Latin name (if possible also family, type)	Why should it be considered / Why is it important?	Source to be indicated in Project deliverable	Final rating in this study
Acia lineatifrons (Hemiptera: Cicadellidae)	Narrow host range. Distribution: Africa. Important pest of grapevine in tropical Africa. The pest is not present in Poland. The feeding on grapevines causes browning or discoloration of the leaves from the periphery inwards, eventually resulting in early leaf fall. These symptoms resemble the "hopper-burn" symptoms and appear to be the result of a phytotoxic reaction.	Research Institute of Horticulture, Poland	Excluded at Step 1 (no fruit pathway)
Aleurocanthus spiniferus, (Hemiptera: Aleyrodidae)	Wide host plants including ornamental and fruits plants (*Pyrus, Malus, Prunus* and *Vitaceae*). The pest is not present in Poland. Dense colonies of immature stages develop on leaf undersides; the adults fly actively when disturbed. Leaves and fruit have spots of sticky, transparent honeydew, which become covered in black sooty mould fungus. A heavy infestation gives trees an almost completely black appearance.	Research Institute of Horticulture, Poland	Excluded at Step 1 (regulated in the EU)
Aleurocanthus woglumi, (Hemiptera: Aleyrodidae)	Pest of tropical and subtropical crops. Host plants: wide range of host plants including fruit plants. The pest is not present in Poland. Dense colonies of immature stages develop on leaf undersides; the adults fly actively when disturbed. Leaves and fruit have spots of sticky, transparent honeydew, which become covered in black sooty mould fungus. A heavy infestation gives trees an almost completely black appearance.	Research Institute of Horticulture, Poland	Excluded at Step 1 (regulated in the EU)
Altica ampelophaga, (Coleoptera: Chrysomelidae)	Minor pest of grapevine. The pest is not present in Poland.	Research Institute of Horticulture, Poland	Excluded at Step 1 (no fruit pathway)
Aonidiella orientalis (Hemiptera: Diaspididae)	Associated to fruit, widely distributed throughout the world, polyphagous (*Acacia, Vitis, Guajava, Magnolia, Mangifera, Morus, Olea, Phoenix, Carica, Ligustrum*), it depreciates the fruit and reduces the plant vigour and harvest.In the Caribbean it is regarded as an economic plant pest of quarantine importance. [rated 4 / 11 proposals, of pests associated with fruit]	Spanish NPPO	Step 2 (considered)
*Apate monachus, (*Coleoptera: Bostrichidae)	The pest of secondary economic importance. Wide range of host. Distribution: tropical and subtropical areas of Africa, Near East, South America, Europe. The pest is not present in Poland.	Research Institute of Horticulture, Poland	Excluded at step 1 (present in the EU)
Aphis illinoisensis, (Hemiptera: Aphididae)	Pest of grapevine. Distribution: North America, South America, Central and Caribbean America, Africa, Europe. The pest is not present in Poland. Damages young shoots, leaves. When populations are high, some may feed on fruit clusters, causing some berries to drop.	Research Institute of Horticulture, Poland	Excluded at step 1 (present in the EU)
Arboridia kakogawana (Hemiptera: Cicadellidae)	Horizon scanning identified this cicadellid leafhopper as a Far Eastern Asian pest of grapevine, which has spread into European parts of Russia in recent years. Due to the change in distribution and the fact that it is a pest of vines (*Vitis* spp.), an increasingly important sector in the UK, it was considered appropriate to add this pest to the Risk Register. Extract from UK internal Risk Register document (2015). Full document (c. 2 pages including some references) could be supplied on request. [rated 2 / 2 proposals]	UK Plant Health Service	Excluded at Step 1 (no fruit pathway)
Blueberry leaf mottle virus	Occurs in North America; it is seed-transmitted; the virus is already listed in Annex IAI of Directive 2000/29/EC	Julius Kühn Institute, Germany	Excluded at Step 1 (regulated in the EU)
Botryosphaeria dothidea (syn. *Botryosphaeria ribis*) – macropoma rot (Ascomycota)	Polyphagous fungus. In Poland it causes canker on woody shoots of many plant species, however till now it was not found on grapevine. In other countries this disease is more prevalent and destructive on muscadine grapes (*V. rotundifolia)* (losses 20-	Research Institute of Horticulture, Poland	Excluded at step 1 (present in the EU)

	30%).		
Botryosphaeria stevensii (syn. *Physalospora mutila*) – black dead arm (Ascomycota)	The disease has been observed in Hungary, Italy, Canada and South Africa. In general the symptoms are on the vine shoots but sometimes on the berries. The fungus does not appear in Poland..	Research Institute of Horticulture, Poland	Excluded at step 1 (present in the EU)
Brevipalpus chilensis (Acarida: Tenuipalpidae)	It is a polyphagous pest of hosts like *Vitis, Citrus, Actinidia deliciosa, Annona cherimola, Ficus benghalensis, and Ligustrum sinense*. It is a quarantine pest in USA which implies important trade restrictions and fruit rejections (Methyl Bromide required). An important mite for vineyards, affecting leaves and spreading to the grape bunches. As far as it is known is only present in Chile. [rated 1 / 11 proposals, of pests associated with fruit]	Spanish NPPO	Step 2 & Alert List
Candidatus Liberibacter spp.	Huanglongbing disease, tree and fruit losses, insect vectors [rated 1 / 2 proposed]	University of Girona, Spain	Excluded at step 1 (*Vitis* is not a host)
Ceratitis capitate (Diptera: Tephritidae)	Wide host range. Distribution: Africa, South America, Central America, Europe. The pest is not present in Poland. The pest is of great economic importance in many countries. One of the most significant quarantine pests for the EPPO region. Polyphagous, with a wide host range. Adults can fly up to 20 km. Females pierce the skin of fruit and lay eggs. Larvae feed internally on fruit. Reported hosts include over 200 species from the families Anacardiaceae, Chrysobalanaceae, Cucurbitaceae, Ebenaceae, Loganiaceae, Malpighiaceae, Meliaceae, Oleaceae, Podocarpaceae, Rosaceae, Rubiaceae, Rutaceae, Sapotaceae, and Solanaceae	Research Institute of Horticulture, Poland	Excluded at step 1 (present in the EU and regulated in the EU)
Ceratitis rosa (Diptera: Tephritidae)	Serious pest of in tropical and subtropical areas. Wide host range of fruit crops.. The pest is not present in Poland. Attacked fruit usually shows signs of oviposition punctures.	Research Institute of Horticulture, Poland	Excluded at Step 1 (regulated in the EU)
Ceroplastes rusci, (Hemiptera: Coccidae)	Wide range of host plants. Major insect pest of fig. In Poland the pest was recorded on ornamental plants under covers.	Research Institute of Horticulture, Poland	Excluded at step 1 (present in the EU)
Coniella diplodiella (syn. *Coniothyrium diplodiella*, *Phoma diplodiella*) (Ascomycota)	The widespread fungus across many countries (also European countries). The fungus does not appear in Poland. The disease causes the greatest damage especially after hailstorms (losses 20-80% of the crop).	Research Institute of Horticulture, Poland	Excluded at step 1 (present in the EU)
Cryptophlebia leucotreta, (Lepidoptera: Tortricidae)	Significant pest of fruit plants (particularly citrus). Pest of tropical areas. The pest is not present in Poland. Symptoms vary according to host. On oranges there is sometimes a scar on the fruit surface, on most other crops, the habit of internal feeding leaves few symptoms.	Research Institute of Horticulture, Poland	Step 2 & Alert List as *Thaumatobia leucotreta*
Diplodia natalensis (syn. *Botryodiplodia theobromae*, *D. viticola*) (Ascomycota)	The disease (diplodia cane dieback and bunch rot) has been reported in Egypt, Israel, India and United States. The fungus is not present in Poland. This disease occurs in warm to hot weather and high relative humidity.	Research Institute of Horticulture, Poland	Excluded at Step 1 (no fruit pathway)
Drosophila suzukii (Diptera: Drosophilidae)	Many host plants (highly polyphagous) rapid reproduction, reported in many EU countries.	Department of Agriculture, Cyprus	Excluded at step 1 (present in the EU)
Drosophila suzukii (Diptera: Drosophilidae)	Invasive species for many fruit crops including grapevines. Recorded in Poland since 2014. The pest is of great economic importance in many countries. Causes damage to a wide range of soft skinned fruits, primarily through oviposition into the fruit where larvae feed internally.	Research Institute of Horticulture, Poland	Excluded at step 1 (present in the EU)
Eotetranychus lewisi, (Acarida: Tetranychidae)	Pest of warmer climate. Wide host range including ornamentals and strawberry, peach, raspberry, grapevine. Distribution: South America, Central America and Caribbean, North America, Africa, Europe (Portugal). The pest was detected in Poland in 2008 on the seedlings of poinsettia imported from Holland. Mites are known to feed and lay eggs on both fruit and leaves of other species of hosts. It is expected that mites will be found on stems, during their transit from leaf to leaf.	Research Institute of Horticulture, Poland	Excluded at step 1 (present in the EU and regulated in the EU)
Eotetranychus	It is not associated to the fruit but it is very polyphagous over	Spanish NPPO	Excluded at

sexmaculatus (Acarida: Tetranychidae	important hosts such as Vitis, *Citrus, Avocado, Diospyros, Lycopersicum*... In addition, it is a quarantine pest in Israel. [rated 8 / 11 proposals, of pests associated with fruit]		Step 1 (no fruit pathway)
Epiphyas postvittana (Lepidoptera: Tortricidae)	Extremely polyphagous. Introduced recently to California. [rated 2 / 4 proposed]	Institute for Plant Protection, CCAFRA, Croatia	Excluded at step 1 (present in the EU)
Frankliniella cestrum (=australis, argentinae) (Thysanoptera: Thripidae)	Polyphagous: Genus of importance such as *Diospyros, Prunus, Pyrus* and *Vitis* are affected. The damage is caused by adults and larvae feeding from the vegetal tissue and injecting the ovipositor. It is a quarantine pest in USA and Argentina. [rated 6 / 11 proposals, of pests associated with fruit]	Spanish NPPO	Step 2 (considered)
Greeneria uvicola (syn. *Melanconium fuligineum*) (Ascomycota)	Bitter rot is common in the United States. The fungus does not appear in Poland. The acceptability of the diseased fruit for either table or wine use is markedly reduced. The bitter flavor is carried through the winemaking process and gives the wine an unpleasant, burnt-bitter taste.	Research Institute of Horticulture, Poland	Step 2 (considered)
Harmonia axyridis, (Coleoptera: Coccinellidae)	Invasive insect recorded in Poland since 2007. This specimen is *displacing* the *native* European *ladybirds.* The ladybug destroying pests, but could be threaten other beneficial organisms. It can also cause losses in the production of grapevine fruit.	Research Institute of Horticulture, Poland	Excluded at step 1 (present in the EU)
Holocacista capensis (Lepidoptera : Heliozelidae)	Monophagous pest localized in South Africa. It is a tiny moth with a wingspan of 4 mm, with some silvery white spots on its wings. The eggs are inserted in the leaf, and the larva eats a tunnel inside the leaf, creating the so-called leafmine. The effect of the leafmines on the grape vine itself appears to be limited, but collateral damage may be more serious, especially when larvae descend from the vine canopy to form a dense curtain of suspended larvae. [rated 9 / 11 proposals, of pests associated with fruit]	Spanish NPPO	Excluded at Step 1 (no fruit pathway)
Jacobiasca lybica (Hemiptera: Cicadellidae)	Major pest of cotton, grapevines and many Solanaceae. The pest is not present in Poland. The pest pierces grape cells and sucks their contents. Infested leaves change color, appear scorched and often curl downwards. Severe attacks result in massive shedding of leaves, exposing them to the sun, thus causing berry "scalding", reducing grape quality and quantity. In addition, such injury reduces the plant nutrient reserves for the following season.	Research Institute of Horticulture, Poland	Excluded at step 1 (present in the EU)
*Marmara gulosa (*Lepidoptera: Gracillariidae)	Fruit borne, but peelminer rather than internal feeder. Highly polyphagous of *Vitis* and many economically important hosts, including Citrus and plum, and some ornamentals. Quoted as potentially dangerous for *Citrus* (Josep Anton Jaques, Aurelio Gómez, Plagas potenciales para la citricultura española: Scirtothrips aurantii y Marmara gulosa, LEVANTE AGRICOLA, 371, pp: 250-251, 2004) [rated 2 / 11 proposals, of pests associated with fruit]	Spanish NPPO	Step 2 & Alert List
Meghimatium pictum (Gastropoda; Stylommatophora: Philomycidae)	A land mollusc which affects *Vitis labrusca* and *Vitis vinifera*. It is distributed in Brazil, Argentina, Chile, Malaysia, Taiwan and Thailand. It causes damage by leaving residual mucus on grapes and by consuming grapes already perforated by other organisms, such as insects or birds, or mechanically damaged by in situ compression. Land mollusks are known to move successfully through human-mediated movement. It is believed that *M. pictum* was introduced accidentally into Brazil through agricultural products. [rated 10 / 11 proposals, of pests associated with fruit]	Spanish NPPO	Step 2 (considered)
Metcalfa pruinosa, (Hemiptera: Flatidae)	Serious pest of ornamental plants and field crops. Wide range of hosts including fruit plants. The pests is not present in Poland. Dense populations of nymphs cause stunting of the shoots, while those of adults produce large quantities of honeydew on which sooty mould develops. Mould damage is common in gardens but has also increasingly been observed in vineyards.	Research Institute of Horticulture, Poland	Excluded at step 1 (present in the EU)
Naupactus xanthographus (=*Pantomorus xanthographus*): (Coleoptera: Curculionidae)	It is a very polyphagous pest over important hosts. In addition, it is a quarantine pest in USA, Canada and Jordan with distribution in Argentina and Chile which are citrus exporters to the EU. The adult feeds on leaves and larvae on roots. Recently formed	Spanish NPPO	Step 2 & Alert List

	bunches can be also damaged by this pest. It is associated to a wide range of ornamental plants. [rated 7 / 11 proposals, of pests associated with fruit]		
Naupactus xanthographus, (Coleoptera: Curculionidae)	Distribution: South America. The pest is not present in Poland. Wide host range, Quarantine pest in Canada USA, Jordan, Japan. Larvae damage the roots of grape vines and adults are known to be found on foliage. Has been detected in table grapes exported to the USA from Chile.	Research Institute of Horticulture, Poland	Step 2 & Alert List
Non European Coccoidea	Mealybugs are easily moved with grapevine material including bunches; They cause damage by weakening the vines, producing honeydew leading to sooty mold and are important vectors of grapevine viruses like leafroll	Julius Kühn Institute, Germany	Taken into account at Step 2 for individual species
Non European Eriophyidae		Julius Kühn Institute, Germany	No non European species related to *Vitis* identified
Non European Tenuipalpidae	species like *Brevipalpus chilensis* are grapevine pests and present in bunches; they are polyphagous and may affect other crops or uncultivated plants, too	Julius Kühn Institute, Germany	*B. chilensis* (Step 2 and Alert List)
Non-European fruit flies	Easily transferred with infested fruit, may cause important damage (e.g. *D. suzukii*)	Julius Kühn Institute, Germany	*Zaprionus indianus* (Step 2 and Alert List)
Oligonychus punicae (Acarida: Tetranychidae)	Pest of warmer climate. Pest can feeding on 27 host plants including vines and other economically important plants. Important pest of avocado. Distribution: Australia, South America, Central America, North America (USA), Asia (India China), Africa (Egypt), Europe (France). The pest is not present in Poland. Feeds on the upper leaf surface. During heavy infestations, the entire leaf surface may be attacked.	Research Institute of Horticulture, Poland	Excluded at Step 1 (no fruit pathway)
Oligonychus vitis (Acarida: Tetranychidae)	Pest of warmer and dry climates. Distribution: South Africa, South America (Chile), India, Africa (Egypt). Pest of minor importance. Host plants: *Eucalyptus* sp.; *Heteropyxis natalensis*; *Pyracnatha* sp.; *Vitis vinifera.* The pest is not present in Poland. Primarily feeds on foliage and lays eggs on the bases of buds or in scars in wood. Larvae move towards leaves and are found on upper and lower surfaces of leaves and shoots. The main damage to the plant consists of browning of the leaf laminae and a slight web production that favors dust deposition. The attack on the foliage can lead to early defoliation in certain grape cultivars.	Research Institute of Horticulture, Poland	Step 2 (considered)
Pachnaeus litus (Coleoptera: Curculionidae)	The southern citrus root weevil has 70 known host plants. It is present in USA and Mexico. Adults feed on leaves and larvae on roots. It is not associated to fruits but considered by Cuba and India in their import requirements. Maybe a pest to consider in other plants for planting species. [rated 11 / 11 proposals, of pests associated with fruit]	Spanish NPPO	Excluded at Step 1 (no fruit pathway)
Panonychus citri, (Acarida: Tetranychidae)	The pest feeds mainly on foliage, and occasionally on fruits JAKICH?. Distribution: widespread across many continents including Europe. Wide range of host plants. Serious pest of citrus crops. In Poland the pest was found on imported ornamental potted plants.	Research Institute of Horticulture, Poland	Excluded at step 1 (present in the EU)
Paralobesia viteana (Lepidoptera: Tortricidae)	North American grape berry moth; second generation larvae are hidden in berries; grape berry moths are among the most important insect pests of grapevine, causing direct damage and spread of bunch-rots; Recent transfer of European grape berry moth to California caused considerable damage and required intensive insecticide applications	Julius Kühn Institute, Germany	Step 2 & Alert List
Peach rosette mosaic virus	Occurs in North America; is also a pest of grapevine; at least in some cultivars it is known to be seed-transmitted; the virus is already listed in Annex IAI of Directive 2000/29/EC	Julius Kühn Institute, Germany	Excluded at Step 1 (regulated in the EU)
Phakopsora euvitis (Basidiomycota)	Only very minor risk associated with possible introduction with grapevine fruit. [rated 4 / 4 proposed]	Institute for Plant Protection, CCAFRA, Croatia	Excluded at Step 1 (no fruit pathway)
Phlyctinus callosus	Polyphagous. According to recent reports, *P. callosus* become a	Institute for Plant	Step 2 & Alert

(Coleoptera: Curculionidae)	serious pest of grapevine in South Africa and Australia. [rated 3 / 4 proposed]	Protection, CCAFRA, Croatia	List
Phlyctinus callosus (Coleoptera, Curculionidae)	A single adult was found on a potted azalea plant at a public market in England, in March 2004. *P. callosus* is a pest of a wide range of economically important plants that are grown in the U.K., and in the wider EPPO region. *P. callosus* has not been reported from the EPPO region before, although it has been assessed as a quarantine pest in Israel, with the potential to become an important pest in that country. *P. callosus* is a quarantine pest in the U.S.A., having been intercepted since at least the late 1960's on consignments from South Africa. Extract from UK PRA (2004). Full PRA could be supplied on request. [rated 1 / 2 proposals]	UK Plant Health Service	Step 2 & Alert List
Phlyctinus callosus (Coleoptera, Curculionidae)	Polyphagous of important hosts such as *Daucus carota, Malus domestica, Prunus persica* and *Vitis vinifera*. A quarantine pest in USA, adults can be traded externally over the fruits. Adults could also be carried in trade via 'table ready' fruit, such as apples or table grapes intended for human consumption. Distributed in Oceania, south Africa and intercepted in USA. It is a pest of economically important crops in every state where it is established - generally regions with a Mediterranean or warm temperate climate. [rated 5/ 11 proposals, of pests associated with fruit]	Spanish NPPO	Step 2 & Alert List
Phlyctinus callosus, Curculionidae, insect	Locally significant pest. Pest occurs in regions with warm climate. Wide range of host including grapevine and apple. The pest is not present in Poland. Adult attacks leaves, green stems and fruit. Typical leaf damage symptoms appear as shot-holes rather than as leaves with ragged edges. Adults can cause scarring to grapes. Stalks of individual berries can be chewed off entirely or young grape bunches can be ring-barked, thus destroying the bunch completely. Young vines whose roots are attacked by *P. callosus* larvae are stunted and can appear water-stressed. Root feeding in mature vines is not usually as damaging.	Research Institute of Horticulture, Poland	Step 2 & Alert List
Planococcus citri, Pseudococcidae, insect	Polyphagous pest. In Poland the pest is present on plants under covers.	Research Institute of Horticulture, Poland	Excluded at step 1 (present in the EU)
Planococcus ficus, Pseudococcidae, insect	Wide range of host plants including fruit crops and ornamental plants. Serious pest of grapevine. The pest is not present in Poland.	Research Institute of Horticulture, Poland	Excluded at step 1 (present in the EU)
Platynota stultana (Lepidoptera: Tortricidae, insect)	Extremely polyphagous. A serious pest of grapevine in North America. [rated 1 / 4 proposed]	Institute for Plant Protection, CCAFRA, Croatia	Handpicked for the Alert List: present in the EU with very restricted distribution
Proeulia auraria, Tortricidae, insect	Wide host range including grapevine and other fruit plants. Distribution: South America (Chile), significant pest of table grapes. Quarantine pest in USA. The pest is not present in Poland. Larvae of leaf roller the genus *Proeulia* are also reported as feeding on the surface and boring into the fruit of host plants.	Research Institute of Horticulture, Poland	Step 2 & Alert List
Proeulia chrysopteris, Tortricidae, insect	Wide host range including grapevine and other fruit plants. Distribution: South America (Chile). Quarantine pest in USA. The pest is not present in Poland. Larvae of leaf roller the genus *Proeulia* are also reported as feeding on the surface and boring into the fruit JAKICH?of host plants.	Research Institute of Horticulture, Poland	Step 2 & Alert List
Proeulia triquetra, Tortricidae, insect	Wide host range including grapevine and other fruit plants. Distribution: South America (Chile). Significant pests of table grapes. The pest is not present in Poland. Larvae of leaf roller the genus *Proeulia* are also reported as feeding on the surface and boring into the fruit of host plants.	Research Institute of Horticulture, Poland	Step 2 & Alert List
Pseudococcus calceolariae,	Wide range of host plants including ornamental and fruit plants. Serious pest of citrus crops. Distribution: South America, Central	Research Institute of Horticulture,	Excluded at step 1 (present

Pseudococcidae, insect	America, North America, Africa, Oceania, Europe. The pest was not recorded in Poland in the field crops. Damage is caused by adults and nymphs feeding on the host tissue. This produces tiny grey or silvery spots on leaves and fruit (stippling). Infestations on leaves are frequently greater than on fruits. Damage to leaves inhibits photosynthesis and can lead to necrosis. Severe infestations can lead to premature leaf fall, dieback and decreased vigour.	Poland	in the EU)
Pseudococcus longispinus, Pseudococcidae, insect	Usually not serious pest on any crop. Wide range of hosts. In Poland the pest was recorded on ornamental plants under covers.	Research Institute of Horticulture, Poland	Excluded at step 1 (present in the EU)
Pseudococcus maritimus, Pseudococcidae, insect	Wide range of host plants including ornamental and fruit plants. Serious pest of grapevines. In Poland the pest was only recorded on plants under covers. Overwintered first instar nymphs feed at bases of shoots or pedicels of grape clusters. This mealybug contaminates grapes with one or more of the following: the cottony ovisac, eggs, immature larvae, adults, and honeydew or black sooty mould growing on honeydew.	Research Institute of Horticulture, Poland	Step 2 & Alert List
Quadraspidiotus perniciosus, Diaspididae, insect	Invasive species for Polish crops. The detection of this pest was confirmed in Poland 1948-1949. In 2015, it was detected again, but only in one apple orchard. The pest is of great economic importance in many countries. The insects feed on the surface of the plant organs, primarily attacking the woody plant parts, but when they are numerous appear also on leaves and fruits.	Research Institute of Horticulture, Poland	Excluded at Step 1 (no fruit pathway)
Scaphoideus titanus, Cicadellidae, insect	The pest is vector of grapevine flavescence dorée phytoplasma. The pest is not present in Poland.	Research Institute of Horticulture, Poland	Excluded at step 1 (present in the EU)
Selenaspidus articulatus (Morgan) [Insecta, Hemiptera, Sternorrhyncha, Diaspididae] Queresa redonda de los cítricos o roja de la Indias Occidentales	Associated to fruit where damage is caused by sap-depletion and through injection of toxic saliva, discolouring the area of penetration. A polyphagous pest, of hosts of importance to EU including Olea, Vitis, Ficus and ornamentals. Widely distributed through central America and sub-Saharan Africa and quarantine in South Africa, this pest has been intercepted three times in Spain over Citrus sinensis from Peru and once in UK over Arecas from the Netherlands. Quoted as potentially dangerous for Citrus (Josep Anton Jaques, Aurelio Gómez, Selenaspidus articulatus (Morgan), Homoptera: Diaspididae, LEVANTE AGRICOLA, 362, pp: 306-307, 2002) [rated 3 / 11 proposals, of pests associated with fruit]	Spanish NPPO	Step 2 (considered)
Spodoptera littoralis, Noctuidae, insect	Wide range of host plants. Significant pest tropical and subtropical ornamental, vegetable and fruit plants. The pest is not present in Poland. On most crops, damage arises from extensive feeding by larvae, leading to complete stripping of the plants.	Research Institute of Horticulture, Poland	Excluded at Step 1 (regulated in the EU)
Targionia vitis, Diaspididae, insect	Host plants: *Arbutus*, *Castanea*, *Fagus*, *Platanus*, *Quercus* spp., *Salix* and *Vitis*. Pest of grapevine. The pest is not present in Poland.	Research Institute of Horticulture, Poland	Excluded at step 1 (present in the EU)
Tenuipalpus granati, Tenuipalpidae, mite	Host plants: grapevine, pomegranate, pistachio. The pest is not present in Poland.	Research Institute of Horticulture, Poland	Excluded at step 1 (present in the EU)
Tobacco ringspot virus	Originates in America but occurs in many other countries, including EPPO countries; has a broader host range including Vitis; seed-transmission has been demonstrated; the virus is already listed in Annex IAI of Directive 2000/29/EC	Julius Kühn Institute, Germany	Excluded at Step 1 (regulated in the EU)
Xylella fastidiosa sbsps.	Pierce disease, tree and fruit losses, insect vectors [rated 2 / 2 proposed]	University of Girona, Spain	Excluded at Step 1 (regulated in the EU)

ANNEX 5: Vitis alert list

This Alert List is divided into two parts. Please refer to section **3.1.3** of this report for details of the categories retained in each Part.

In Part 1 pest organisms with high economic importance and more likely to transfer are listed (1 TOP and 2 TOP). Part 2 contains species with lesser economic importance and more likely to transfer or high economic importance and less likely to transfer. The pests in both parts are in alphabetical order and not further ranked by categories.

The Alert List was finalized at December 2016 and does not contain new information that may have become available after that date.

Content

PART 1 – PESTS WITH HIGH ECONOMIC IMPORTANCE AND MORE LIKELY TO TRANSFER

Pathogens

Alternaria viticola (Ascomycota)

Fruit pathway: Mainly attacks young, tender rachises, peduncles, fruits and pedicels of grape fruit with no symptoms seen in old inflorescences (Biosecurity New Zealand 2009, Biosecurity Australia 2011). Immature infected berries may be present in a cluster of mature uninfected berries when berry development is uneven across a cluster. The fungi may be transmitted as spores on asymptomatic grapes (Biosecurity New Zealand 2009). Uncertain: Spots on the fruit skin probably consist of mycelium and fall off when the berries reach half size. The berries apparently continue to develop normally. Fruit that have lost their spots are potentially infected but appear normal (Biosecurity Australia 2011).

Other pathways: Plants for planting. Soil: *A. viticola* mainly attacks young, tender stalks. This fungus overwinters on tendrils, branches and in bud scales (DAFF 2013, Biosecurity New Zealand 2009). The first invasion occurs via overwintering conidiospores the tendrils of branches, epidermis, bud scales and diseased debris (Liu *et al*. 1996).

Hosts: *Vitis vinifera* and some hybrid grapes (DAFF 2013).

Distribution: Asia: China (DAFF 2013, Biosecurity New Zealand 2009, Biosecurity Australia 2011).

Damage: *Alternaria viticola* can cause serious drop off of flowers and young fruit. Grape production has been seriously damaged in some areas of China. Yield losses of 30–40% have been reported from Xinjiang province and 30–50% in southeast Shandong (Biosecurity Australia 2011, citing others). *A. viticola* affects stems, inflorescences and berries and in these plant parts the disease development and symptoms are distinct. Infection of the stalks starts with the peduncle and spreads to the pedicels (Biosecurity Australia 2011, citing others). Wounds favour infection, but the pathogen can invade through natural openings (Biosecurity New Zealand 2009). Infected stalks go brown and dry out causing the flower buds and young fruit on the infected inflorescences to shrink, dry out and drop off (Biosecurity Australia 2011, citing others). The fungus infects repeatedly on pedicels and berries within a bunch (Biosecurity Australia 2011, citing others). Infected berries develop dark brown or black spots on the skin, which fall off within the berry development (Biosecurity Australia 2011).

Other information: Quarantine Pest status in Australia (DAFF 2013). Conidia can be spread via wind and rain (Ma *et al.* 2004).

Impact: High	**Intercepted:** not known	**Spreading/invasive:** not known

References:

Biosecurity Australia 2011. Final import risk analysis report for table grapes from the People's Republic of China. Department of Agriculture, Fisheries and Forestry, Canberra.

Biosecurity New Zealand 2009. Import risk analysis: table grapes (*Vitis vinifera*) from China. MAF Biosecurity New Zealand, Wellington, New Zealand, 314 p.

DAFF 2013. Final Review of policy: importation of grapevine (Vitis species) propagative material into Australia. Department of Agriculture, Fisheries and Forestry, Canberra

Liu SF, Cheng ZJ, Zhang CX 1996. Study on occurrence and integrated control of Alternaria viticola. China Proceedings of the third national conference of integrated pest management, Beijing, China, just abstract available: 341–345.

Ma J, Zhu X, Zhao L 2004. Preliminary study on spike: stalk brown spot of grape. Xinjiang Agricultural Sciences, just abstract available 41:353–354.

Physalospora baccae (Ascomycetes: Xylariales)

Fruit pathway: *P. baccae* mainly infects peduncles, pedicels and fruits of grapes. Conidia and ascospores are spread to grape clusters by wind, rain and insects. Infections are most likely to occur from the onset of ripening to harvest (Biosecurity Australia 2011 citing others, DAFWA 2010 citing others). The infected mummified berries remain in the grape cluster on the vine and do not drop off. Sorting, packing and harvesting procedures will not remove fruit with symptomless infection and is unlikely to remove all mummified fruit (DAFWA 2010 citing others; Biosecurity Australia 2011 citing others).

Other pathways: Plants for planting, soil: *P. baccae* overwinters as pycnidia and perithecia on infected peduncles, pedicels and fruit as well as on fallen leaves and trash within the vineyards. It can also overwinter as mycelia in the infected tissues and produce perithecia the next spring (DAFWA 2010 citing others).

Hosts: *Vitis vinifera*, *Vitis* spp. (Biosecurity Australia 2011).

Distribution: Asia: China, Korea, Japan (Biosecurity Australia 2011).

Damage: The fungus generally only causes serious damage in areas with poor horticultural practices in seasons that are warm and wet (DAFWA 2010 citing others). Infected pedicels develop light brown spots around the junction with the fruit. Pedicels dry and shrink when the brown spots encircle them and infections then spread to the fruit and peduncles (Biosecurity Australia 2011 citing others). The fungi causes cluster rot of the fruit, peduncle and pedicel (APHIS 2013 citing others). The incidence of disease is high in years with hot and humid weather in summer and early autumn in vineyards that are not well managed. High disease incidences, with a fruit infection rate of about 30% have been reported in vineyards in the provinces of Hunan, Fujian and Shanxi and up to 75% of fruit were infected in a vineyard in Jiangxi province (Biosecurity Australia 2011 citing others).

Other information: The information on this pest was condensed from three risk analyses which cite references which were not accessible or in Chinese. The identity of the fungus is unclear. The name *Physalospora baccae* Cavara is a *nomen dubium* of unknown application. It is not known if the grape pathogen to which this name is applied in Japan and Korea is the same as the original European pathogen (APHIS 2013, Biosecurity Australia 2013). In this list, we considered the Asian and European fungi as two distinct species or respectively at least pathovars or strains. Wind, rain and insects spread the conidia and ascospores to infect grape (APHIS 2013; DAFWA 2010 citing others).

Impact: High	**Intercepted:** not known	**Spreading/invasive:** not known

References:

APHIS 2013. Pest Risk Assessment for Table Grapes from China. Importation of Grapes from China into the Entire United States. United States Department of Agriculture, Animal and Plant Health Inspection Service, 119pp.

Biosecurity Australia 2011. Final import risk analysis report for table grapes from the People's Republic of China. Department of Agriculture, Fisheries and Forestry, Canberra, 368 p.

DAFWA 2010. Submission to the draft import risk analysis report for table grapes from the People's Republic of China. 53pp

***Xanthomonas campestris* pv. *viticola* (Xanthomonadales: Xanthomonadaceae)**

Fruit pathway: Symptoms develop on petioles, pedicels and rachis of grape clusters. On the berries lesions are brown to black; cankerous and severely infected berries are small and shrivelled (Chand and Kishun 1990). The bacteria can be present on asymptomatic berries (USDA 2016).

Other pathways: plants for planting: epiphyte of aerial plant parts (DAFF 2013), leaf spots. Soil: survive in crop debris between production periods (Naue *et al.* 2014).

Hosts: *Vitis vinifera*, *Alternanthera tenella*, *Amaranthus* spp., *Glycine* spp., *Senna obtusifolia* (DAFF 2013), *Azadirachta indica* (CABI CPC); artificially *Mangifera indica* (Chand and Kishun 1990)

Distribution: South America: Brazil; Asia: India (DAFF 2013), Thailand (uncertain (USDA 2016); The high genetic similarity between Brazilian isolates and the Indian type strain supports the hypothesis that this bacterium may have originated in India, and that it was disseminated and introduced through contaminated planting material (Trindade *et al.* 2007). Ukraine (unconfirmed) (CABI CPC).

Damage: The disease causes about 60-80 % loss in yield in severely infected vineyards in India (Chand and Kishun 1990). This bacterium causes leaf blight, cankers on stems and petioles, extensive foliage death. Additionally it causes irregular colour and size in berries and may cause necrotic lesions, reducing the yield and quality of the grapes. Grapevine bacterial canker due to *Xanthomonas campestris* pv. *viticola* in Brazil has caused severe crop losses (DAFF 2013). Actually the most important disease of grapevine in Brazil (Naue *et al*. 2014).

Other information: Quarantine Pest status in Australia (DAFF 2013) and USA (USDA 2016). The pathogen spreads via rain or irrigation, but mainly through infected plant material and vehicles (clothes, cutting tools) (Naue

et al. 2014). The introduction to Brazil was supposedly via contaminated stock of Red Globe grapes from India (USDA 2016).

Impact: High	**Intercepted:** Yes	**Spreading/invasive:** Yes

References:

Chand R, Kishun R 1990. Outbreak of grapevine bacterial cancer disease in India. Vitis 29, p183-188.

DAFF 2013. Final review of policy: importation of grapevine (Vitis species) propagative material into Australia. CC BY 3.0. Department of Agriculture, Fisheries and Forestry, Canberra.

Naue CR, Costa VSO, Barbosa MAG, Batista DC, Souza EB, Mariano RIR 2014. *Xanthomonas campestris* pv. *viticola* on grapevine cutting tools and water: Survival and Disinfection. Journal of Plant Pathology 96(3), 451-458.

Trindade L, Marques E, Lopes DB, Ferreira MA 2007. Development of a molecular method for detection and identification of *Xanthomonas campestris* pv. *viticola*. Summa Phytopathologica, 33(1), p.16-23.

USDA 2016. Importation of Grape (*Vitis vinifera* L.) from India into the Continental United States. A Qualitative, Pathwy-Initiated Pest Risk Assessment.United States Department of Agriculture, Animal and Plant Health Inspection Service.

Insects

***Argyrotaenia sphaleropa* (Lepidoptera: Tortricidae)**

Fruit pathway: larvae feed externally on grape berries; when they are once settled on the bunches, the larvae ignore leaves (Bentancourt *et al.* 2003)

Other pathways: plants for planting, soil (on its own or associated with plants or tubers); larvae are also on flowers, buds, leaves of their host plants, no information was found on the location of pupae, but the pupae of the related species *A. velutina* and *A. citrina* are in leaves or debris on the ground. Uncertain pathways: cut flowers and branches, herbs.

Hosts: Polyphagous, on a wide range of hosts, incl. *Vitis vinifera*, *Malus sylvestris*, *Vaccinium corymbosum* (Rocca and Brown 2013), *Prunus persica*, *Diospyros kaki*, *Pyrus*, *Citrus*, *Citrus sinensis* (Meneguim and Hohmann, 2007), *Zea mays*, *Acacia*, *Medicago sativa*, *Chrysanthemum*, *Pelargonium*, *Prunus*, *Rosa*, *Mentha piperita*, *Capsicum annuum*, *Solanum lycopersicum*, *S. tuberosum* (Trematerra and Brown 2004).

Distribution: South America: Argentina (Rocca and Brown 2013), Bolivia (Trematerra and Brown 2004, citing others), Brazil, Uruguay (Meneguim and Hohmann 2007). Uncertain records: South America: Peru; Central America: Panama (collection specimens; Trematerra and Brown 2004).

Damage: *A. sphaeleropa* is a major pest in vineyards and apple orchards in Southern Uruguay (Bentancourt *et al.* 2003). On grapevines the highest damages take place on bunches after the onset of ripening. The larvae damage the grape berries, and cover the area with silk filaments to which excrement and other remains of their activity adhere. The extent of the damage increases because they cause injuries that result in bunch rot (Bentancourt *et al.* 2003). Additionally the larvae feed on leaves of *Vitis vinifera* (SATA 2012). This species also damage *Diospyrus kaki* in Brazil (Bentacourt *et al.* 2003) and pear (Botton *et al.* 2003). Damage was observed in 85% of sampled persimmon orchards in one region of Brazil (Bavaresco *et al.* 2005). On blueberry, larvae feed primarily on flowers, buds and fruit (for 4 Tortricidae species newly reported on *V. corymbosum* (Rocca and Brown 2013)). On *Citrus*, the pest causes damage on foliage and fruit (newly formed or ripening) (Meneguim and Hohmann 2007).

Impact: High	**Intercepted:** not known	**Spreading/invasive:** not known

References:

Bavaresco A, Botton M, Garcia MS, Nondillo A 2005. Danos e insetos em frutos de caquizeiro em pomares da Serra Gaucha. (In Portuguese.) Agropecuaria Catarinense 18(3): 56-59.

Bentancourt CM, Scatoni IB, Gonzalez A, Franco J 2003. Effects of Larval Diet on the Development and Reproduction of Argyrotaenia sphaleropa (Meyrick) (Lepidoptera: Tortricidae). Neotropical Entomology 32(4):551-557 (2003)

Botton M, Bavaresco A, Garcia MS 2003. Ocorrência de Argyrotaenia sphaleropa (Meyrick) (Lepidoptera: Tortricidae) Danificando Pêssegos na Serra Gaúcha, Rio Grande do Sul. Neotropical Entomology 32(3):503-505.

Meneguim AM, Hohmann CL 2007. Argyrotaenia sphaleropa (Meyrick) (Lepidoptera: Tortricidae) in Citrus in the State of Paraná, Brazil. Neotropical Entomology 36(2):317-319 (2007)

Rocca M, Brown JW 2013. New Host Records for Four Species of Tortricid Moths (Lepidoptera: Tortricidae) on Cultivated Blueberries, Vaccinium corymbosum (Ericaceae), in Argentina. Proceedings of the Entomological Society of Washington 115(2):167-172.
SATA 2012. Argyrotaenia sphaeleropa (from Betancourt et al., 2010). SATA. Guia para la proteccion y nutricion vegetal. http://laguiasata.com/joomla/index.php?view=article&catid=68%3Anombres%C2%ADcientifico&id=610%3Aargyrotaenia%C2%ADsphaleropa&tmpl=component&print=1&la%E2%80%A6
Trematerra P, Brown JW 2004. Argentine Argyrotaenia (Lepidoptera: Tortricidae): Synopsis and descriptions of two new species. Zootaxa 574: 1–12.

Harrisina brillians **(Lepidoptera: Zygaenidae)**

Fruit pathway: Larvae of *H. brillians* are primarly leaf feeder, but also attack grape clusters (AQIS 1999, Biosecurity New Zealand 2009); when the populations are high, older larvae feed on the grape berries (Stern *et al.* 1980).

Other pathways: plants for planting: the larvae feed on leaves and sometimes move to the stem to molt (Stern *et al.* 1980)

Hosts: Wild and cultivated grape plants: *Vitis vinifera*, *Parthenocissus cuspidata*; *Parthenocissus quinquefolia*. Possible incidental hosts include: *Prunus armeniaca*; *Prunus avium*; *Prunus dulcis*, *Rosa* spp. (AQIS 1999)

Distribution: North America: USA, Mexico (AQIS 1999)

Damage: *H. brillians* is the most important grape defoliator in the major grape-growing area in Mexico Guerra-Sobrevilla 1991). In parts of California the larvae cause serious defoliation of vineyards, backyard grapevines and wild grapes in parks and along rivers and streams (AQIS 1999). The larvae can defoliate entire vineyards (Stern *et al.* 1980). This pest causes serious damage to vines before and after harvest. Defoliation before harvest affects grape production and reduces the quality of grapes as the grape bunches are exposed to excessive sunlight. After harvest, defoliation hinders normal wood maturing and provokes marked haphazard regrowth, which weakens the vines and is detrimental to grape production for the following seasons (Guerra-Sobrevilla 1991). Damage to the berry skin by older larvae causes bunch rot, which destroys the whole cluster (Stern *et al.* 1980).

Other information: The common name is western grape leaf skeletonizer. This species is listed as quarantine pest of *Vitis* in New Zealand (Biosecurity New Zealand 2009). *H. brillians* was intercepted on table grapes to New Zealand (Biosecurity New Zealand 2009).

Impact: High	**Intercepted:** yes	**Spreading/invasive:** not known

References:

AQIS 1999. Draft import risk analysis for the importation of fresh table grapes [*Vitis vinifera* L.] from California (USA). Australian Quarantine & Inspection Service. 60p.
Biosecurity New Zealand 2009. Import risk analysis: table grapes (*Vitis vinifera*) from China. MAF Biosecurity New Zealand, Wellington, New Zealand, 314 p.
Guerra-Sobrevilla L 1991. Parasitoids of the grapeleaf skeletonizer, *Harrisina brillians* Barnes and McDunnoug (Lepidoptera: Zygaenidae) in northwestern Mexico. Crop Protection 10(6), p. 501-503.
Stern VM, Flaherty DL, Peacock WL 1980. Control of the grapeleaf skeletonizer. California Agriculture 34(5): 17–19.

Marmara gulosa **(Lepidoptera: Gracillariidae)**

Fruit pathway: larvae form serpentine mines on the rachises and berries of table grapes and live in the fruit. The damage is often difficult to see (Grafton-Cardwell and Haviland 2013). Eggs are laid directly on the fruit, and when they hatch, the larvae tunnel within the rind of the fruit. The larvae pupate outside the mines in silken cocoons with small spheres on the exterior. (Weeks *et al.* 2012). In grapes stems, petioles, tendril, bunch rachis and berries are affected (Eichlin and Kinnee 2001).

Other pathways: Plants for planting: eggs on stems/fruits of the host and neighbouring crops; the pupa develops on twig, leaf or stem of the host (Weeks *et al.* 2012).

Hosts: Highly polyphagous in more than 31 plant families (Stelinski 2011), *Vitis* and many economically important hosts, including *Citrus*, *Prunus domestica* and some ornamentals. *Citrus* is the main host (Eichlin and Kinnee 2001).

Distribution: North America: USA (Arizona, California, Florida, Texas), Mexico; Carribean: Cuba (Weeks *et al.* 2012).

Damage: no economic important damage to table grapes or raisins (Grafton-Cardwell and Haviland 2013); mines on fruit, 5-80% damage on fruit in susceptible *Citrus* varieties like grapefruit, pummelo, oranges (UC IPM 2008), economically important pest in California, Arizona, Northern Mexico and Cuba. Causes cosmetic damage, but makes the fruit unmarketable (UC IPM 2008). In 1995, in California, one outbreak caused 80-90 % fruit loss in certain groves (Stelinski 2011).

Other information: There is no overwintering stage; the insect continues development throughout the year, but the length of a generation is shorter during warm temperatures. There are 6-8 generations a year occurring at about monthly intervals from May to November (UC IPM 2008). Species identity was unclear till 2001(Eichlin and Kinnee 2001). Proposed in answer to the EPPO questionnaire on pests of concern for *Vitis*.

Impact: High (on another crop)	**Intercepted:** not known	**Spreading/invasive:** not known

References:

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***Paralobesia viteana* (Lepidoptera: Tortricidae)**

Fruit pathway: eggs are laid on berries, larvae feed on and in berries; severely affected bunches may contain several larvae at harvest. Often entire clusters are webbed together (Gilligan and Epstein 2014).

Other pathways: plants for planting, soil: Females lay also eggs on blossoms and stems. Larvae of the first generation feed on blossoms or small berries. Mature larvae exit the clusters and pupate in a cresent-shaped fold cut into a leaf. Larvae of the last generation may also drop to the ground and pupate in leaf litter. Overwintering occurs in the pupal stage (Gilligan and Epstein 2014).

Hosts: *Vitis* sp. (preferred larval host), *Vitis vinifera*, *Vitis riparia*, *Rubus*, *Sassafras* (Gilligan and Epstein 2014).

Distribution: North America: USA (Gilligan and Epstein 2014).

Damage: *P. viteana* is the primary lepidopteran pest of grapes in eastern North America (Gilligan and Epstein 2014). Up to 90% of fruit are destroyed in unmanaged vineyards. First-generation larvae web flower buds or berries together and feed on them or tender stems. Second generation tunnel into green berries and feed internally, reddish spots develop on the point of larval entry ("stung" berries). A single larva is able to destroy 2 to 6 berries of a cluster and several larvae may feed within one cluster. At harvest, several larvae may be within the clusters, which are often secondary infested with bunch rot fungi and *Drosophila* spp. (The Ohio State University nd.).

Other information: This species was formerly known as *Endopiza viteana*, the common name is grape berry moth. Quarantine Pest of Vitis for New Zealand. This species has 3-4 generations per year (Gilligan and Epstein 2014). Proposed in answer to the EPPO questionnaire on pests of concern for *Vitis*.

Impact: High	**Intercepted:** not known	**Spreading/invasive:** not known

References:

Gilligan TM, Epstein M 2014. Tortricids of Agricultural Importance. Interactive Keys developed in Lucid 3.5. Last updated August 2014. http://idtools.org/id/leps/tortai/index.html

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***Phlyctinus callosus* (Coleoptera: Curculionidae)**

Fruit pathway: Adults attack fruit and can cause scarring to grapes (CABI CPC). Stalks of individual berries can be chewed off entirely or young grape bunches can be ring-barked, thus destroying the bunch completely (Plantwise nd) or leading to reduced bunch size. Adults can bore holes into berries and stems of bunches (de Villiers 2006).

Other pathways: plants for planting, soil; larvae and pupae in soil, larvae feed on roots, adult also attacks leaves and green stems (CPC)

Hosts: polyphagous on monocotyledons and dicotyledons, hosts include *Daucus carota* subsp. *sativus*, *Malus domestica*, *Vitis vinifera*, vegetables (EPPO GD). CABI CPC lists additional hosts such as *Fragaria ananassa*, *Juglans regia*, *Pastinaca sativa*, *Pelargonium*, *Prunus persica*, *Prunus domestica*, *Prunus salicina*, *Pyrus communis*.

Distribution: Africa: South Africa (native); Oceania (introduced): Australia, New Zealand (EPPO GD, CABI CPC)

Damage: This species is regarded as one of the most serious pests of grapes in the Western Cape (Pryke 2005), a key pest of apples and nectarines in the South Western Cape (de Villiers 2006; Ferreira 2010) and a key phytosanitary pest of South African table grapes (Pryke and Samways 2007). Adults of *P. callosus* cause damage to fruit on apple, nectarine, pear, plum and peach, and on grapevine mostly to leaf and stems (incl. those of bunches or berries) (CABI CPC) lesions on fruit make it unmarketable and infestations cause rejections of fruits for exports (de Villiers 2006; Pryke and Samways 2007). Leaves have shot-holes and scalloped edges. Additionally cherries and strawberries are damaged. The weevil attacks fruit, leaves, flowers, buds and stems (Learmonth 2016). Young fruit trees can be defoliated entirely at high adult population densities (Ferreira 2010). Larvae cause damage to roots, which is important on root vegetables (CABI CPC) and can severely damage young vines which become stunted and water-stressed (Learmonth 2016). In South Africa, most damage is caused by adults; *P. callosus* causes 40% of all damage to apple in Elgin area (Western Cape Province). Main crop losses in untreated apple orchards ranged from 5 to 29% between seasons. In general, damage by *P. callosus* ranges from less than 1% up to 66% without adequate control measures (Ferreira 2010). In Tasmania, economic damage is caused by larvae on vegetable root crops. In Australia, it is a polyphagous pest of economically important crops where it has established, also in nurseries (CABI CPC). In New Zealand this species is a pest of grapevines grown in glasshouses (Ferreira 2010).

Other information: *P. callosus* (vine calandra) was intercepted on table grapes to New Zealand (Biosecurity New Zealand 2009) and frequently intercepted in USA (including table grapes) (CABI CPC). *P. callosus* is a quarantine pest in North America, having been intercepted since at least the late 1960's on consignments from South Africa. It is also a quarantine pest in Israel. So far, the species was not able to establish in northern hemisphere despite several interceptions (CABI CPC). Proposed in answer to the EPPO questionnaire on pests of concern for *Vitis*.

Impact: High	**Intercepted:** yes	**Spreading/invasive:** yes

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***Proeulia auraria* (Lepidoptera: Tortricidae)**

Fruit pathway: Larvae of the genus *Proeulia* are reported as feeding on the surface and boring into the fruit of host plants (Biosecurity Australia 2005); larvae feed externally on fruit (Gilligan and Epstein 2014).

Other pathways: plants for planting; larvae are leaf rollers (Biosecurity Australia 2005; CABI CPC), but feed also on buds and flowers and growing points (Plantwise 2016), eggs are laid on leaves (Gilligan and Epstein 2014). The pest overwinters as larvae on plants (twigs, bark, mummified fruit) (ArystaLifeScience 2003). Uncertain pathway: cut flowers and branches.

Hosts: polyphagous, hosts include *Vitis vinifera*, *Malus domestica*, *Vaccinium* (Blueberries Chile, 2011-2012), *Actinidia deliciosa*, *Citrus sinensis*, *Platanus orientalis*, *Prunus armeniaca*, *Prunus avium*, *Prunus domestica*, *Prunus persica*, *Pyrus communis*, *Robinia pseudoacacia* (CABI CPC), *Juglans regia*, also new hosts records, incl.: *Cotoneaster*, *Cercis siliquastrum*, *Rosa*, *Nothofagus obliqua*, *Pittosporum tobira*, *Punica granatum*, *Buddleja davidii* (Cepeda and Cubillos 2011).

Distribution: South America: Chile (CABI CPC).

Damage: Damage is caused by larvae feeding on buds, flowers, leaves and fruit. They are very voracious, and able to destroy large numbers of buds, cut flowers, and bore open galleries on fruits (at the surface, but varying in depth) (ArystaLifeScience 2003). *P. auraria* has moved to plants that are exotic to its native range, such as apple, stone fruits, grapevine (CABI CPC). *P. auraria* was initially considered a citrus pest, but has grown in importance as a serious pest of *Vitis*; it is the most common *Proeulia* species in Chile (Biosecurity Australia 2005). On grapevine, it destroys buds and berries (superficial damage or complete destruction. Botrytis rots develop inside infested bunches) and vegetative material (Biosecurity Australia 2005). Increasing severity of infestations is reported (Reyes-Garcia *et al.* 2014). *P. auraria* is considered as an emergent pest (Plantwise 2016; Reyes-Garcia *et al.* 2014) and a species with a high potential quarantine risk (Plantwise 2016).

Other information: In relation to transport in trade, mature larvae cannot withstand low cold storage temperatures for over 2-3 weeks; first-instar overwintering larvae are hidden on plant parts and may withstand cold conditions (6-8°C) for over a month (CABI CPC). *P. auraria* has quarantine significance for at least China, Korean Republic, Taiwan and the USA. 34 interceptions to USA on blueberries, also 2 interceptions in Japan (Blueberries Chile 2011-2012). Proposed in answer to the EPPO questionnaire on pests of concern for *Vitis*.

Impact: High	**Intercepted:** yes	**Spreading/invasive:** not known

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***Retithrips syriacus* (Thysanoptera: Thripidae)**

Fruit pathway: *R. syriacus* cause serious berry scraping (AGDA 2015); nymphs and adults feed on plant sap and fruit skin (CABI CPC). These thrips may easily remain in the complex structure of table grape bunches after harvest.

Other pathways: plants for planting; eggs on leaves, nymphs and adults feed on leaves (CABI CPC)

Hosts: polyphagous, hosts include *Vitis*, *Malus* spp., *Cocos*, *Diospyros kaki*, *Musa*, *Prunus*, *Pyrus*, *Rosa*, *Coffea*, *Persea americana*, *Populus* (CABI CPC)

Distribution: North America: USA; Africa: Malawi, Tanzania, Tunisia (CABI CPC), additionally Egypt, Lybia, Sudan, Kenya, Mali, Mozambique, Uganda, Somalia, South Africa (Elimem *et al.* 2011); Asia: Iraq, India, Israel (CABI CPC), Sri Lanka (Oda *et al.* 1997), Lebanon, Syria, Palestine, Turkey, United Arab Emirates (Elinem *et al.* 2011); South America: Brazil (Monteiro 2002); Carribean: Puerto Rico (Medina-Gaud and Franqui 2001). Introduced to at least Guadeloupe (Etienne 2015), Florida, Puerto Rico (Hamon and Edwards 1994) and Tunisia (Elimem *et al.* 2011).

Damage: Devastating grapevine pest in Andhra Pradesh, India. Affecting yield and quality (Reddy 2006). This species affects its host by defoliating and shrivelling the leaves, scarring fruit and contaminate fruit with excreta (AGDA 2015). *R. syriacus* causes considerable economic damage in grapevine and a few other crops in Israel; principally a grapevine pest, but also severe losses in cotton recorded in South India, Malawi and Tanzania when conditions are hot and dry. There were serious infestations of *Ricinus* in the Near East recorded (CABI CPC). *R. syriacus* is an important pest in viticulture in Brazil (Moreira *et al.* 2012); already numerous hosts recorded in Florida (Hamon and Edwards 1994).

Other information: Intercepted on cuttings of *Jatropha* in Puerto Rico (Hamon and Edwards 1994).

Impact: High	**Intercepted:** Yes	**Spreading/invasive:** Yes

References:

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***Rhipiphorothrips cruentatus* (Thysanoptera: Thripidae)**

Fruit pathway: *R. cruentatus* can attack blossoms and developing berries, which develop a corky layer and become brown (Biosecurity Australia 2011). *R. cruentatus* is readily observed on leaves and fruits, and should be found relatively easily during quarantine inspections (CABI CPC), but adults and nymphs could be hidden in the grape bunch (Biosecurity New Zealand 2009).

Other pathways: Plants for planting; Eggs on leaves, usually on older leaves not newly emerged foliage. The pest feed on the lower surface of leaves, often in groups (Biosecurity Australia 2011; CABI CPC). Pupation occurs mainly on leaves (Biosecurity New Zealand 2009). Overwintering as pupae in the soil (Biosecurity Australia 2011).

Hosts: *Vitis vinifera* (major host), *Anacardium occidentale*, *Juglans*, *Syzygium*, *Terminalia*, *Ricinus*; Plantwise: *Anacardium occidentale*, *Annona squamosa*, *Jatropha curcas*, *Mangifera indica*, *Psidium guajava*, *Punica granatum*, *Rosa rugosa*, *Syzygium cumini*, *Syzygium samarangense*, *Terminalia catappa* (Biosecurity New Zealand 2009).

Distribution: Asia: India, China, Sri Lanka, Pakistan, Taiwan (Chiu 1984), Afghanistan, Bangladesh, Myanmar, Oman, Thailand (Biosecurity New Zealand 2009).

Damage: *R. cruentatus* is one of the most important insect pests of grapevines in India (Biosecurity New Zealand 2009). It is a widespread and serious pest in all major vine production areas (Biosecurity Australia 2011). Attacked leaves turn brown and fall prematurely; the grape berries develop a corky surface when attacked. Also severely attacked are roses in India and *Syzygium samarangense* in Taiwan. Several other crops were also damaged including mango and guava, leading to yield reductions and to loss of market value (Plantwise 2016).

Other information: It is not known if this species is a vector. This species has five to eight generations per year in India (Biosecurity Australia 2011). The natural enemies of this species are important for population control (Plantwise 2016). Dispersal over long distances is wind driven. The common reproduction mode is sexual, but the females are able to produce males by parthenogenesis (Biosecurity New Zealand 2009). The common name is grapevine thrips.

Impact: High	**Intercepted:** not known	**Spreading/invasive:** not known

References:

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***Zaprionus indianus* (Diptera: Drosophilidae)**

Fruit pathway: Yes, as eggs or larvae. *Z. indianus* adults were successfully reared out of table grapes sampled in the field (van Timmeren and Isaacs 2014). Eggs are laid on eggs in unripe fruits (possibly referring mostly to figs, Pires *et al.* 2008). Larvae develop in fruit. It has been intercepted in the EU, incl. on *Citrus*, *Diospyros kaki*, *Mangifera indica*, *Psidium guajava*. There is an uncertainty on whether it attacks undamaged fruit on a number of host species. However, it was considered here as possibly associated with table grapes in trade.

Other pathways: plants for planting with fruit.

Hosts: Highly polyphagous, 74 hosts species in 31 families, including *Vitis* (Al-Jboory and Katbeh-Bader 2012; van Timmeren and Isaacs 2014), *Actinidia*, *Phoenix dactylifera*, *Ziziphus*, *Musa* (Al-Jboory and Katbeh-Bader 2012), *Citrus*, *Ficus carica*, *Phoenix dactylifera*, *Psidium guajava* (EPPO GD), *Malphigia emarginata*, *Punica granatum*, *Eriobotrya japonica*, *Dimocarpus longan* (Renkema *et al.* 2013), *Annona glabra*, *Anacardium occidentale*, *Citrofortunella microcarpa*, *Citrus sinensis*, *Citrus aurantium*, *Citrus* × *paradisi*, *Fortunella* (van der Linde *et al.* 2006). It has adapted to new host species. In the USA and Canada where it was introduced recently, adults were trapped in a number of crops whose host status is not yet known, such as: *Prunus persica*, *Vaccinium* (as blueberry), *Rubus idaeus* (as raspberry), *Rubus* (as blackberry), *Fragaria* (as strawberry), *Prunus* (as plums, cherry), *Solanum lycopersicum* (Pennsylvania, Joshi *et al.* 2014; Canada, Renkema *et al.* 2013; van Timmeren and Isaacs 2014).

Distribution: Africa: Benin, Cape Verde, Congo, Cote d'Ivoire, Egypt, Kenya, Madagascar, Malawi, Mauritius, Morocco, Mozambique, Niger, Nigeria, Reunion, Sao Tome & Principe, Seychelles, South Africa, Tanzania, Madeira (Portugal), Islas Canarias (Spain) (EPPO GD), Cameroon, Comoros, Gabon, Guinea, Senegal, Sudan (CABI CPC). Asia: India, Iran, Israel, Saudi Arabia (EPPO GD), Lebanon (2009; Moussa 2009), Jordan (Al-Jboory and Katbeh-Bader 2012), Iraq, Nepal, Oman, Pakistan (Al T'Oma and van der Linde 2010), United Arab Emirates (CABI CPC); also unpublished report for Azerbaijan (Al T'Oma and van der Linde 2010). South America: Argentina, Brazil (1998), Uruguay (EPPO GD); Van der Linde (2013) also maps records for Ecuador, Peru; unpublished record for Venezuela mentioned in Al T'Oma and van der Linde (2010); North America: Canada (Ontario, Quebec, first records; uncertainty if can overwinter and will establish; Renkema *et al.* 2013); Mexico (2002); USA (2005) (first Arizona, California, Florida, Virginia, then spread North, to e.g. Michigan, New York; Joshi *et al.* 2014, CABI CPC); Central America: Panama (2003); Caribbean: unpublished reports for Cayman Isl. cited in Al T'Oma *et al.* (2010).

Europe: uncertain record: Spain (mainland: Carles-Tolra 2009). No confirmation could be found, and this was considered with an uncertainty. Unreliable records: Italy and Austria (EPPO GD).

Damage: *Z. indianus* is often associated with damaged or fallen rotting fruit, but it is able to invade figs (Renkema *et al.* 2013), *Malphigia emarginata* and *Dimocarpus longan* (Steck 2005). Crop damage is also reported in grapevine in Virginia (Markow *et al.* 2014 citing others). For grapevine in Michigan, it is still unclear whether it will become a pest or will attack only damaged fruit (van Timmeren and Isaacs 2014). Unless the impact on grape industry is not yet known, it is assumed as a `potentially destructive` grape pest (Werle *et al.* 2013). There are also records of infestation of tree-ripened *Punica granatum* and *Eriobotrya japonica* (Renkema *et al.* 2013). In Brazil, it caused 40% losses of fig harvest when it was introduced (Mattos Machado *et al.* 2005). It is reported to infest ripened peaches in Brazil (Joshi *et al.* 2014) and some authors (e.g. van der Linde *et al.* 2006) report substantial losses in *Citrus* (oranges), peach and fig in Brazil (based on Santos 2003; the original publication could not be consulted).

Other information: Intercepted in the EU on fruits of *Citrus aurantium*, *Citrus paradisi*, *Diospyros kaki* (no host record), *Mangifera indica*, *Psidium guajava*, and on *Passiflora edulis* (commodity not specified) (Dropsa review, using Europhyt data). *Z. indianus* is ecologically versatile. In Brazil, a single introduction in 1998 was followed by rapid spread (Mattos-Machado *et al.* 2005) and subsequent spread within South and North America.

Impact: High (on another crop)	**Intercepted:** Yes	**Spreading/invasive:** Yes

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PART 2 – PESTS WITH LESSER ECONOMIC IMPORTANCE AND MORE LIKELY TO TRANSFER, OR HIGH ECONOMIC IMPORTANCE BUT LESS LIKELY TO TRANSFER

Accuminulia buscki (Lepidoptera: Tortricidae)

Fruit pathway: The larvae *A. buscki* bore into grape berries (DAFF 2013) and are intercepted on grapes (Brown 1999).

Other pathways: Not known. No information available if any other plant parts or soil may be affected.

Hosts: *Vitis vinifera* (Cepeda 2014); *Vitis*, *Prunus armeniaca*, *Prunus domestica*, *Prunus persica* (Brown *et al.* 2008). Unknown native plants in Chile *(A. buscki* is considered to be a native species of Chile that has expanded its host range to include agricultural crops (Brown 1999)).

Distribution: South America: Chile (native) (Brown 1999).

Damage: Little information on damage was found. *A. buscki* is considered as a 'potential future pest problem' for Chile (Biosecurity Australia 2005, citing an article from 2000). Cepeda (2014) mentions that it has occasional economic importance and quarantine significance and it is mentioned as a cause of rejection of consignments in BlueberriesChile (2011-2012).

Other information: Intercepted on table grapes (Brown 1999) and *Vaccinium* (BlueberriesChile 2011-2012). *A. buscki* is known to have expanded its host range to agricultural plants that are exotic to Chile (*Prunus, Vitis*) (Brown 1999).

Impact: unknown	**Intercepted:** Yes	**Spreading/invasive:** not known

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Aleurolobus taonabae (Hemiptera: Aleyrodidae)

Fruit pathway: Adults and their nymphs may be imported in table grape bunches as they suck sap from grape berries. Adults and hatching nymphs feed on ripening fruit of grapevines (Biosecurity Australia 2011). The nymphs remain with the food source until pupating and emerging into adults (ADA2014).

Other pathways: plants for planting: adults and nymphs also on leaves (Biosecurity Australia 2011). Eggs of first generation are laid on leaves (ADA 2014).

Hosts: *Vitis vinifera*, *Cercis chinensis*, *Mallotus japonicus*, *Pittosporum tobira*, *Taonabo japonica*, *Terstroemia japonica*, *Crataegus* ssp., *Pittosporum tobira*, *Osmanthus fragrans* (ADA2014).

Distribution: Asia: China, Japan, India, Taiwan (ADA 2014).

Damage: Hatched nymphs mostly feed on the back of grape leaves. Adults and hatching nymphs continue to damage leaves and ripening fruit of grapevines. Damage to the grape bunches occurs when second generation *A. taonabae* adults and nymphs suck nutrients from ripening berries, leading to damage that reduces both yield and quality of the fruit (ADA 2014). During the feeding process, whiteflies excrete honeydew, which can encourage the growth of sooty moulds on the plant host and may affect the quality of grape bunches (Blodgett 1992). Whiteflies are major pests of tropical and subtropical crops and of protected crops in temperate regions (Caciagli 2007).

Other information: Quarantine pest for table grapes from Japan to Australia.

Impact: Moderate	**Intercepted:** not known	**Spreading/invasive:** not known

References:

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Caciagli P 2007. Survival of Whiteflies during Long-Distance Transportation of Agricultural Products and Plants. In Czosnek H (ed) Tomato yellow leaf curl virus disease management, molecular biology, breeding for resistance 57–63. Springer-Verlag, Amsterdam.

Amyelois transitella **(Lepidoptera: Pyralidae)**

Fruit pathway: larvae feed in the fruit and larvae are most often found in the dried and decaying berries of clusters. Eggs are usually laid in fissures on the ripening fruit or under bud scales. Larvae are most often present in fruit which would not be packed due to quality issues (AQIS 1999). Uncertain if this species would be on the pathway.

Other pathways: Plants for planting: Eggs are usually laid in fissures on the ripening fruit or under bud scales (AQIS 1999).

Hosts: *Vitis vinifera*, *Acacia farnesiana, Brachychiton* sp., *Carya illinoensis*, *Ceratonia siliqua*, *Citrus* sp., *Citrus limon*, *Citrus* x *paradise*, *Citrus sinensis*, *Coffea* sp., *Cydonia oblonga*, *Eriobotrya japonica*, *Ficus* sp., *Forchhammeria* sp., *Genipa Americana*, *Gleditsia triacanthos*, *Heteromeles arbutifolia*, *Juglans regia*, *Malus pumila*, *Phoenix dactylifera*, *Pistacia vera*, *Pithecellobium flexicaule*, *Prunus armeniaca, Prunus domestica*, *Prunus dulcis*, *Prunus*, *Punica granatum*, *Pyrus communis*, *Yucca* sp., *Ziziphus* sp. (AQIS 1999).

Distribution: North America: Mexico; USA (Arizona, California, Florida, Georgia, Oklahoma, Texas, Washington); Central America: Costa Rica; South America: Brazil (AQIS 1999), Argentina (USDA, 2015). Biosecurity Queensland (2011) mentions Canada but no other record was found. Absent from the EU. Italy is mentioned in several publications (e.g. AQIS 1999; USDA 2015); this record appears to originate from an interception (Trematerra 1988). Similarly, *A. transitella* entered Austria (Essl and Rabitsch 2002), but is rated as not established. Although Lopez-Vaamonde (2010) reports these countries as 'invaded' the pest does not seem to be established. *A. transitella* is also recorded as present in Germany according to Fauna Europaea (de Jong *et al.* 2014); however, no record was found, and it may also refer to an interception. Consequently, the pest was considered absent from the EU, with an uncertainty.

Damage: No data was found for grapes. *A. transitella* is a serious pest of some nut crops (e.g. almonds, pistachios, walnut), and also grazes on Citrus fruit, causing surface scarring that favours entry by decay-causing organisms, leading to fruit quality reduction and fruit drop. Larvae are in splits and wounds of citrus fruit, feeding in or near the core (Biosecurity Queensland 2011). The pest is identified as the most important and damaging pest of pistacchio (UC IPM 2015) and the most important insect pest of almonds (Agudelo Silva *et al.* 1995). It causes extensive losses to nut crops in the USA, through feeding damage and contamination of nuts with frass and webbing, and it also vectors saprophytic fungi that infect crops (Ampt *et al.* 2015). Routine spraying is done (UC IPM 2014). On almond, it vectors *Aspergillus flavus* (Palumbo *et al.* 2014).

Other information: Intercepted in Korea on fresh oranges (first case) and walnuts (in the past) from the USA (Hong *et al*. 2012). A. transitella is a pest of concern for Australia and is subject to alerts (Biosecurity Queensland 2011, NSW 2012).

Impact: High (on another crop), also vector	**Intercepted:** yes	**Spreading/invasive:** yes

References:

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USDA 2015. Risk Assessment for the Importation of Fresh Lemon (*Citrus limon* (L.) Burm. f.) Fruit from Northwest Argentina into the Continental United States. August 3, 2015. Rev: 14. United States Department of Agriculture.

Argyrotaenia citrana **(Lepidoptera: Tortricidae)**

Fruit pathway: Eggs may be on fruit, larvae feed on developing fruit (Gilligan and Epstein 2009). Larvae of later generations feed at the surface of berries (AQIS 1999). On grapes, larvae make a nest between berries and include leaves, stems and berries (UC IPM 2014). The larvae produce generally webbings which would be detected at harvest and packing procedures (AQIS 1999).

Other pathways: plants for planting, soil: eggs and feeding larvae may also be on leaves, twigs (Gilligan and Epstein 2009) and buds. Female moths lay egg clusters on any smooth plant surfaces, such as upper leaf surfaces, stems, canes or fruit. Pupation generally takes place in the host (webbing) where the larvae have been feeding (AQIS 1999). Larvae overwinter on the ground or in plants (Gilligan and Epstein 2009).

Hosts: Over 80 hosts incl. *Vitis vinifera* (UC IPM 2014, Gilligan and Epstein 2009), *Vaccinium*, *Citrus*, *Malus domestica*, *Pinus radiata*, *Prunus armeniaca* (CABI CPC).

Distribution: North America: Canada, USA (West) (USPest 2014, UC IPM 2014), Mexico (AQIS 1999).

Damage: On grape, it is an occasional pest in California (UC IPM 2014); damage levels of 25% are mentioned. The damage caused by larvae feeding in fruit clusters facilitates the entry of organisms that induce rots (AQIS 1999). Overwintering larvae may attack emerging grape buds or young shoots. This injury may be confused with damage by cutworms, however, webbing points are indicative of larval damage. Pest populations usually remain low in orchards treated against codling moth. *A. citrana* can cause significant damage even at relatively low populations and is an important pest on apple and other important fruit crops in Western USA (Walker and Welter 2009, Zalom and Pickel 1988). Minor greenhouse pest. Heavy infestations are sporadic. *A. citrana* injuries to the surface of developing fruit may develop scarring. The damage on older fruit leaves a depression, which may not heal if the damage occurs close to harvest (AQIS 1999). Feeding on leaves causes relatively minor damage; on growing points on young plants, it can promote stunting and undesirable branching; on blossoms, it can spread *Botrytis*. *A. citrana* can cause economic damage to citrus, apple, and grapes (Gilligan and Epstein 2009). It is mentioned as an 'occasional and less well-known' pest of apple for Mexico (Lopez 2007).

Other information: *A. citrina* was intercepted in Japan (no indication of the commodity; Amano and Higo 2015). *A. citrana* was intercepted on table grapes to New Zealand (Biosecurity New Zealand 2009). The species is uni- or bivoltine (Gilligan and Epstein 2009). Gilligan and Epstein (2009) and Amano and Higo (2015) use the synonym *Argyrotaenia franciscana*.

Impact: Moderate	**Intercepted:** yes	**Spreading/invasive:** not known

References:

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***Argyrotaenia velutinana* (Lepidoptera: Tortricidae)**

Fruit pathway: The larvae construct webbing within the grape clusters, chewing holes into the berries and feeding on the cluster stems. The third generation may cause considerably more damage than the first two (The Ohio State University nd.).

Other pathways: Plants for planting: larvae also feed on leaves, eggs are on trunks and branches or leaves, pupae are in leaves on the ground (Gilligan and Epstein 2014).

Hosts: Highly polyphagous on many herbaceous and woody plants. Primary hosts are *Malus* and other Rosaceae (e.g. *Prunus*, *Rosa*; Gilligan and Epstein 2014). Other hosts incl. *Vitis vinifera*, coniferous or deciduous trees (e.g. in genera *Abies*, *Pinus*, *Picea*, *Larix*, *Tsuga*, *Betula*, *Alnus*, *Populus*, *Salix*, *Ulmus*), ornamentals (e.g. *Chrysanthemum*, *Geranium*, *Viola*) (Gilligan and Epstein 2014).

Distribution: North America: Canada, USA (University of Alberta 2016).

Damage: In grape, serious infestations of *A. velutinana* are not common. A few infested clusters may be found every year (The Ohio State University nd.). In apples, feeding of larvae causes rot and early drop of fruit. Considered as a major apple pest in the Eastern USA around the middle of the 20th century, today mostly under control with IPM strategies (Gilligan and Epstein 2014).

Impact: High (on another crop, in the past)	**Intercepted:** not known	**Spreading/invasive:** not known

References:

Gilligan TM, Epstein M 2014. Tortricids of Agricultural Importance. Interactive Keys developed in Lucid 3.5. Last updated August 2014. http://idtools.org/id/leps/tortai/Argyrotaenia_velutinana.htm

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Brevipalpus chilensis **(Acarida: Tenuipalpidae)**

Fruit pathway: feeds on fruit, leave and stem; It is known to be associated with table grapes and has been intercepted on table grape from Chile to the USA (Biosecurity Australia 2005). However CABI CPC states that table grape cultivars, with the exception of a couple of old red varieties, are practically not attacked by the mite and bunches can be harvested without mobile stages on the berries. There is an uncertainty if this species may be on the pathway.

Other pathways: plants for planting. Mites lay eggs on the young shoots and leaves or in the unopened buds of grapevines (DAFF 2013).This mite overwinters as fertilised females, usually in colonies under the bark crevices of host plants (DAFF 2013).

Hosts: *Vitis vinifera*, *Actinidia deliciosa*, *Annona cherimola*, *Citrus*, *Diospyros kaki*, some others (CPC); *Malus*; It also attacks species of forest trees, ornamentals and annual weeds (Biosecurity Australia 2005)

Distribution: South America: Chile (native).

Damage: *B. chilensis* is an important pest of various horticulture crops in Chile, and is capable of causing significant reductions in the production of marketable fruit. *B. chilensis* has been described as a very destructive pest of grapevine, affecting leaves and spreading to grape bunches (Biosecurity Australia 2005). Among fruit trees, grapevines are the most economically affected crops, particularly red grape wine cultivars; on table grapes, with few exceptions (e.g. the black cultivar Ribier), economic damage has never been observed (CABI CPC). This mite is recognised as a significant pest of grapes in Chile and causes as much as 30% crop loss (DAFF 2013). Olivares (2008) refers to yield reductions of 30-40% in grapevine, due to necrosis of tissues in leaves and buds and reduced vigour of the grapevine plants.

Other information: Quarantine pest in USA (CAPS 2007) and in New Zealand (DAFF 2013). Intercepted on lemons from Chile (CABI CPC). The quarantine concern through fruit exports is limited by the cold storage treatments to which citrus fruits and grapes are subjected, provided that storage at 3-4°C extends beyond 3 to 4 weeks. The mites are active throughout the year on citrus, but inactive in winter on grapes, kiwifruit and other deciduous crops (CABI CPC). Proposed in answer to the EPPO questionnaire on pests of concern for *Vitis*.

Impact: High	**Intercepted:** Yes	**Spreading/invasive:** not known

References:

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CABI CPC. Crop Protection Compendium. CAB International, UK. http://www.cabi.org/cpc
CAPS 2007. Grape Commodity-based Survey Reference. Cooperative Agricultural Pest Survey, 227pp.
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Olivares N 2008. Manejo organico de *Brevipalpus chilensis*. Informativo. INIA Raihuen. Gobierno de Chile.

Carpophilus davidsoni **(Coleoptera: Nitidulidae)**

Fruit pathway: Adults feed on fresh or dried fruit (Bartelt and Hossain 2006). Some authors states that only fallen fruit is attacked on crops other than peaches, nectarines and apricots (Learmonth and Woods 2015, refering to the Genus *Carpophilus*). Other authors mention that *C. davidsoni* prefers fruit in early stages of ripening (Brown 2014). As *C. davidsoni* was intercepted on table grapes, it was considered that it can be associated with this pathway with an uncertainty.

Other pathways: soil, plants for planting; almonds; larvae pupate in the ground. Eggs of *Carpophilus* spp. are laid in rotten or damaged fruit on the ground and larvae develop in those fruit; adults may overwinter in tree cracks or under the bark (Learmonth and Woods 2015). Adults and larvae of *C. davidsoni* bore into almonds (Brown 2014).

Hosts: polyphagous, incl. *Vitis*, *Prunus* spp.*, Malus domestica, Citrus, Fragaria, Rubus, Ficus carica, Solanum* spp.*, Zea mays* (James *et al*. 2000, Bartelt and James 1994, Leschen and Marris 2005)

Distribution: Oceania: New Zealand (introduced; Leschen and Marris 2005), Australia (Bartelt and James 1994).

Damage: belongs to most serious pests of stone fruit in South Australia, crop losses of more than 20% reported (Bartelt and Hossain 2006). Crop losses of 30 % of ripening peaches, nectarines and apricots and serving as carrier for *Monilinia* spp. in Australia has also been reported (Munroe 2005). Carpohilus beetle are the major vector of brown rot, due to their preference for rotting fruits (Learmonth and Woods 2015). Since the year 2013 it is a raising problem in almond production in Australia. Adults and larvae feed on and tunnel inside the almonds (Brown 2014). Its economic importance has grown since the 1950s (Aluja *et al*. 2009). The host range of the Genus *Carpophilus* is broadening and it became a significant pest of new crops like cherries and strawberries (Brown 2014). Carpophilus beetle are a difficult pest to control with insecticides because they infest crops around the harvest time (SummerGreen IFP Manual 2008).

Other information: Intercepted in New Zealand on table grapes (Biosecurity New Zealand 2009). Vector for *Monilinia* spp. or other microorganisms (Bartelt and Hossain 2006). The pest seems to have several characteristics that may favour transfer and establishment from imported fruit: rotting of fruit provides the best conditions for breeding and it is a strong flier (Learmonth and Woods 2015). It has several generations a year and hibernate as mature larvae, pupae or adults (Brown 2014).

Impact: High (on another crop), also vector	**Intercepted:** Yes	**Spreading/invasive:** Yes

References:

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Munroe A (ed.) 2005. Integrated pest and disease management for Australien summer fruit. The State of New South Wales, NSW Department of primary industries, Orange, Australia, 171 p.

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***Cotinis nitida* (Coleoptera: Scarabaidae)**

Fruit pathway:. The adults feed in groups on ripening or ripe fruits. Adults measure 25mm, they are attracted to undamaged grapes, very attracted to damaged fruits and conspecifics and remaining aggregation pheromones, most attracted to grapes with conspecifics and *Popilia japonica* (see damage; Hammons *et al.* 2009). The large beetles may be detected and removed at harvest but they may return on the harvested bunches if strong attractants are the commodity. Uncertain if this pest may be on the pathway, however, it was intercepted on table grapes to New Zealand (Biosecurity New Zealand 2009).

Other pathways: Soil and roots: eggs, larvae and pupae develop in the soil on roots and decaying matter. Overwintering stage are partially grown larvae (Flanders and Johnson nd.).

Hosts: *Vitis* spp., *Nicotiniana tabacum*, *Prunus persica*, *Ficus carica*, stone fruits; larvae damage grasses and young plants (Brown and Hudson 2008, Flanders and Johnson nd.), pollen and leaves of many shrubs (adults), *Medicago sativa*, vegetables, ornamental plants (larvae) (Bartlett 2004).

Distribution: North America: USA (Flanders and Johnson nd.).

Damage: Serious pest most commonly found in vineyards in the southern part of the USA. In years with severe infestations, direct feeding damage by adults can leave behind completely dried-up grape clusters (Coneva 2014). This species can devour nearly an entire crop. It is the most severe harvest-time insect pest of grapes in

Kentucky (Hammons *et al*. 2010). *C. nitida* damage clusters by feeding on ripening or ripe berries. Beetles gain entry into undamaged fruit by gouging with the horn on the front of the head, then feed on the flesh of the fruit. Their odor and excrement may ruin fruit even if feeding damage is not severe (Mulder 2015, Oklahoma State University nd.). Hammons *et al.* 2009 mention that *C. nitada* is not able to damage intact berries; its high economic importance in North America appears after the introduction of the invasive *Popilia japonica* (EU Annex I/A2, recently introduced in Italy) which damages the berries first and summon *C. nitada* by the fruit odour and aggregation pheromones. *C. nitada* is a common pest of most fruits in Midwest, feeding on sweet sap as any of these fruits begin to ripen (Mulder 2015). Adults of *C. nitida* cause injuries to many fruits, including grape, peach, raspberry, blackberry, apple, pear, quince, plum, prune, apricot and nectarine. They frequently feed as well on the sap of oak, maple and other trees, and on the growing ears of corn (Oklahoma State University nd.). This species was described as a pest of tobacco and vegetables in the early 1900s. The burrowing behaviour of the larvae damages turf and grasses (Flanders and Johnson nd.).

Other information: intercepted on table grapes to New Zealand (Biosecurity New Zealand 2009).

Impact: High	**Intercepted:** yes	**Spreading/invasive:** not known

References:

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Flanders KL, Johnson D nd. Green June Beetle. http://www.ent.uga.edu/peach/peachhbk/insects/greenjunebeetle.pdf, Accessed 12.10.2016.

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***Dichocrocis punctiferalis* (Lepidoptera: Crambidae)**

Fruit pathway: On grapes, adults lay eggs individually on stalks; larvae bore into stalks or feed on berries. Larvae web the fruit together and feed on them. Pupation occurs in feeding galleries (Biosecurity New Zealand 2009a).

Other pathways: plants for planting; larvae overwinter in stems or under the bark of fruit trees, adults feed on nectar (CABI CPC, Biosecurity New Zealand 2009 a and 2009b)

Hosts: Polyphagous, recorded on 65 host plants from 30 different families (Molet 2015). Major hosts include *Prunus persica*, *Sorghum bicolor* and *Helianthus annuus*, minor hosts are e.g. *Vitis vinifera*, *Malus domestica*, *Carica papaya*, *Citrus nobilis*, *Diospyros*, *Ficus carica*, *Zea mays*, *Mangifera indica*, *Morus alba*, *Nephelium lappaceum* (CABI CPC)

Distribution: Asia: China, India, Indonesia, Japan, Korea DPR, Malysia, Myanmar, Sri Lanka, Taiwan (EPPO GD), Bangladesh, Burma (USDA 2016); Oceania: Australia, Papua New Guinea (EPPO GD). The pest occurs mostly in the subtropics, but it is also recorded from Hokkaido prefecture (north Japan), and northern China (Korycinska 2012). CABI CPC includes several countries that were not listed when the distribution was studied in EPPO GD, and are therefore considered uncertain: Asia: Brunei Darussalam, Cambodia, Korea Rep., Laos, Philippines, Thailand, Vietnam (originating from one publication). Doubtful record: Pakistan (interception only; Korycinska 2012). Absent, intercepted only: UK is recorded in Fauna Europeae (de Jong *et al.* 2014), but the pest is not present (intercepted only) (Korycinska 2012).

Damage: Damage is caused by larvae, which bore into stems, shoots, buds, fruits and seeds of many plants. Boring by this species can predispose the fruits to secondary pathogens (Molet 2015). *D. punctiferalis* is one of the most important insect pests of peaches in South China and an important pest of apples in North China and contributes to significant maize damage in southern China (CABI CPC); in north Queensland it is one of the major pests on *Nephelium lappaceum* and *Durio zibathinus*, 5% yield loss reported in Chinese maize (Korycinska 2012). Without control measures it is able to destroy 90% of rambutan fruit clusters (Biosecurity New Zealand 2009b) and it is an important pest of Chinese chestnut (Zu and Qin 2009). *D. punctiferalis* can reach high population levels, due to multiple generations per year and damages the stem, fruit and seeds of their host plant. Their excretions have a high sugar content, which promote secondary infections by other arthropods and pathogens (Biosecurity New Zealand 2009b). There is an uncertainty on the impact; however the information available tends to indicate a high impact.

Other information: Synonym *Conogethes punctiferalis* used in Korycinska 2012, CABI CPC and Biosecurity Australia (2010). Intercepted on fruit from several countries in the UK (18 interceptions in 2007-2012, on *Annona squamosa*, *Mangifera indica*, *Psidium*) and in the Netherlands (Korycinska 2012). Over 100 interceptions of *D. punctiferalis* larvae in the USA (Molet 2015). *D. punctiferalis* is a very poorly defined species complex, and there is confusion in the literature over the identity of the species studied (Korycinska 2012). The complex *D. punctiferalis* contains at least two species, one polyphagous form that feeds on fruits and several plant families and an oligophagous leaf-feeder on Pinaceae in Japan and China (Biosecurity New Zealand 2009a). Listed as pest of phytosanitary concern by New Zealand, USA and Canada (Biosecurity New Zealand 2009b, USDA 2016, Canadian Food Inspection Agency 2016).

Impact: High (on another crop, uncertain)	**Intercepted:** Yes	**Spreading/invasive:** Not known

References:

Biosecurity Australia 2010. Final import risk analysis report for fresh apple fruit from the People's Republic of China. Department of Agriculture, Fisheries and Forestry, Canberra, 370 p.

Biosecurity New Zealand 2009a. Import risk analysis: table grapes (*Vitis vinifera*) from China. MAF Biosecurity New Zealand, Wellington, New Zealand, 314 p.

Biosecurity New Zealand 2009b. Import Risk Analysis: Pears (*Pyrus bretschneideri*, *Pyrus pyrifolia*, and *Pyrus* sp. nr. *communis*) fresh fruit from China. Ministry of Agriculture and Forestry.

CABI CPC. Crop Protection Compendium. CAB International, UK. URL: http://www.cabi.org/cpc

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USDA 2016. Importation of Grape (*Vitis vinifera* L.) from India into the Continental United States. A Qualitative, Pathwy-Initiated Pest Risk Assessment.United States Department of Agriculture, Animal and Plant Health Inspection Service.

***Naupactus xanthographus* (Coleoptera: Curculionidae)**

Fruit pathway: adults feed superficially on fruit (CABI CPC), intercepted on table grapes; reported on table grapes in Chile (Biosecurity Australia 2005); adults flightless, not highly mobile.

Other pathways: plants for planting, soil; eggs are laid on or under the bark, larvae feed on roots, pupae in soil, adults feed also on leaves (CABI CPC)

Hosts: polyphagous, hosts include *Vitis vinifera* (main host), *Daucus carota* subsp. *sativus*, *Malus domestica*, vegetables (EPPO GD). CABI CPC lists additional hosts such as *Fragaria ananassa*, *Juglans regia*, *Pastinaca sativa*, *Pelargonium*, *Prunus persica*, *Prunus domestica*, *Prunus salicina*, *Pyrus communis*.

Distribution: South America: Argentina, Chile, Uruguay (EPPO GD). In Chile introduced, incl. Easter Isl. and Juan Fernandez (CABI CPC). Absent, unreliable records: Brazil, Paraguay (EPPO GD).

Damage: *N. xanthographus* attacks deciduous fruit trees, like peach and vine. In Uruguay, it is not known to be very damaging. In Chile (where it was introduced), it is one of the most important pests of grapevine (based on references from the 1980s-90s)(CABI CPC). Direct damage is caused by larvae feeding on roots. Adult feeding causes superficial damage to leaves and fruit (Biosecurity Australia 2005). *N. xanthographus* also causes contamination of fruit with excrements. Damage is usually more severe in areas where grapevine, peach or alfalfa are planted (Ripa and Larral 2008).

Other information: Adults are flightless. The common name of this pest is South American fruit tree weevil. Adults of these weevils may be concealed within bunches of table grapes and have been intercepted on the table grapes from Chile in the US and Peru (Biosecurity Australia 2005). Potential contaminant of fruit while it is being picked or standing in open bins (CABI CPC). *N. xanthographus* is a Quarantine pest in USA, Canada and Jordan. The peaks of adult emergence are in September-October and December-February. This overlaps with the main season for table grapes in Chile. Females are capable of producing offspring in the absence of males for up to 6 months (Biosecurity Australia 2005). Proposed in answer to the EPPO questionnaire on pests of concern for *Vitis*.

Impact: High	**Intercepted:** yes	**Spreading/invasive:** yes

References:

Biosecurity Australia 2005. Revised Draft Import Risk Analysis Report for Table Grapes from Chile.
CABI CPC. Crop Protection Compendium. CAB International, UK. URL: http://www.cabi.org/cpc
EPPO Global Database, European and Mediterranean Plant Protection Organization, France. URL: https://gd.eppo.int
Ripa R, Larral P (editors) 2008. Manejo de plagas en paltos y cítricos.
http://www.avocadosource.com/books/ripa2008/ripa.htm.

***Nipaecoccus viridis* (Hemiptera: Pseudococcidae)**

Fruit pathway: external feeder on table grapes (APHIS 2013)

Other pathways: plants for planting: all plant parts, except roots (CABI CPC).

Hosts: Highly polyphagous: Vitaceae and more than 20 other plant families including *Citrus*, *Coffea*, *Mangifera indica*, *Punica granatum*, *Nerium oleander* (CABI CPC).

Distribution: Africa: Algeria, Angola, Benin, Burkina Faso, Comoros, Cote d'Ivoire, Egypt, Eritrea, Kenya, Madagascar, Malawi, Mali, Mauritius, Niger, Nigeria, Senegal, Seychelles, South Africa, Sudan, Tanzania, Togo, Uganda, Zimbabwe; North America: Bahamas, Mexico, USA; Asia: Afghanistan, Bangladesh, Cambodia, China, India, Indonesia, Iran, Iraq, Israel, Japan, Jordan, Malaysia, Nepal, Oman, Pakistan, Philippines, Saudi Arabia, Sri Lanka, Taiwan, Thailand, Vietnam; Oceania: Australia, Guam, Kiribati, New Caledonia, Northern Mariana Islands, Papua New Guinea, Solomon Islands, Tuvalu (EPPO GD). Found in Florida for the first time in 2009 (Stocks and Hodges 2010).

Damage: *N. viridis* caused up to 5% damage in two vineyards in Bangalore, India. In Hawaii, *N. viridis* was long considered the most destructive mealybug species. Losses in citrus orchards are due firstly to fruit drop caused by large infestations of mealybugs. On *Citrus*, feeding on twigs cause deformation, may stunt trees, produce honeydew, cause fruit deformation, discoloration and fruit drop. In South Africa, half or more of the navel crop can be lost in this way (CABI CPC). In Southern China on *Citrus*, it is considered as very widespread and important (Li *et al.* 1997). It is an agricultural pest in Asia, attacking food, forage, ornamental and fiber crops, and is a pest of stored potatoes. It often causes considerable damage (Stocks and Hodges 2010).

Other information: *N. viridis* poses an important phytosanitary risk. Individuals often settle in cryptic places on plant material, such as under sepals of citrus fruits, and can easily be distributed on exported plants or plant products (CABI CPC). Intercepted on *Citrus* (not indicated as fruit) in Korea (Suh *et al.* 2013). Intercepted in the USA including on Citrus fruit (Evans and Dooley 2013). The females of this species are flightless (CABI CPC).

Impact: High (on another crop, uncertain)	**Intercepted:** Yes	**Spreading/invasive:** not known

References:

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CABI CPC. Crop Protection Compendium. CAB International, UK. URL: http://www.cabi.org/cpc
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Evans GA, Dooley JW 2013. Potential Invasive Species of Scale Insects for the USA and Caribbean Basin. J.E. Pena (Ed.), Potential Invasive Pests of Agricultural Crops, CABI, Wallingford, UK (2013), pp. 320–341.
Li L, Wang R, Waterhouse DF 1997. The Distribution and Importance of Arthropod Pests and Weeds of Agriculture and Forestry Plantations in Southern China. ACIAR, Canberra, Australia.
Stocks IC, Hodges G 2010. *Nipaecoccus viridis* (Newstead), a New Exotic Mealybug in South Florida (Coccoidea: Pseudococcidae). Florida Department of Agriculture and Consumer Services, Division of Plant Industry Pest Alert.
Suh S, Yu HM, Hong K 2013. List of Intercepted Scale Insects at Korean Ports of Entry and Potential Invasive Species of Scale Insects to Korea (Hemiptera: Coccoidea). Korean Journal of Applied Entomology, 52(2) p.141-160.

***Nippoptilia vitis* (Lepidoptera: Pterophoridae)**

Fruit pathway: Larvae of *N. vitis* damage leaves, stems and fruit (Biosecurity New Zealand 2009). Damage results in severe fruit fall and partially abnormal fruit (Biosecurity Australia 2011). Larvae feed inside the fruit and seeds of grape, usually causing the young fruit to drop (Biosecurity Australia 2011a). The larvae bore into the fruit from the stem end, feeding on the pulp and seed, eggs are laid on pedicels within the grape bunch. The larvae pupate on leaves or on fruit. Some fruit shrink, dry and remain on the bunch, but most berries drop to the ground after 3-5 days (Biosecurity Australia 2011). The larvae are large. If they remain on grape bunches at harvest, they are likely to be detected and removed during harvesting or packing processes. One larva can damage over ten berries. Grape bunches with several berries missing are unlikely to be picked or packed for export (ADA 2014). There is an uncertainty if this species would be on the pathway.

Other pathways: Plants for planting, soil: The larvae also feed on the leaves, stems (Biosecurity New Zealand 2009) and flowers (Biosecurity Australia 2011) of grapevines. Adults overwinter in grasses, cracks in the soil or within dead branches or leaf folds (ADA 2014). In southern China are three generations a year and mature larvae overwinter in infested branches or leaf litter (Biosecurity Australia 2011).

Hosts: *Vitis vinifera* (main host), *Vitis thunbergii*, *Cayratia japonica*, *Ampelopsis brevipedunculata* (Yano 1963), *Parthenocissus tricuspidata* (Biosecurity New Zealand 2009)

Distribution: Asia: Japan, Korea, Thailand (Yano 1963), China, Taiwan (APHIS 2013), Nepal (Kim *et al*. 2010)

Damage: *N. vitis* larvae cause damage to the flowers, leaves, fruit, and stem of grapes. Each larva can attack more than 10 berries (Biosecurity Australia 2011). In Jilin province, China, *N. vitis* is one of the most significant grape pests. In recent years it has become a common pest in mountainous areas and backyard vineyards where it can cause serious yield reduction. In poorly-managed vineyards, up to 100% plants were infested, and 30-100% of fruit were damaged, causing significant decline in yield and fruit quality (Biosecurity Australia 2011). *N. vitis* has emerged as a pest of grapes in China in recent years (Biosecurity New Zealand 2009).

Other information: Adults of *N. vitis* are poor fliers and short-lived (mean 3-4days) (Biosecurity Australia 2011).

Impact: High	**Intercepted:** not known	**Spreading/invasive:** not known

References:

ADA 2014. *Final report for the non-regulated analysis of existing policy for table grapes from Japan.* Australian Department of Agriculture, Canberra, 373pp.
APHIS 2013. Pest Risk Assessment for Table Grapes from China. Importation of Grapes from China into the Entire United States. United States Department of Agriculture, Animal and Plant Health Inspection Service, 119pp.
Biosecurity Australia 2011. Final import risk analysis report for table grapes from the People's Republic of China. Department of Agriculture, Fisheries and Forestry, Canberra, 368 p.
Biosecurity New Zealand 2009. Import risk analysis: table grapes (*Vitis vinifera*) from China. MAF Biosecurity New Zealand, Wellington, New Zealand, 314 p.
Kim S, Choi H, Park K, Lee S 2010. Taxonomic Review of the Genus Platyptilia Hübner (Lepidoptera, Pterophoridae) from Korea with the Description of a New species. Just abstract available. http://db.koreascholar.com/Article?code=291012, accessed 14.10.2016.
Yano K 1963. Taxonomic and biological studies of Pterophoridae of Japan. Pacific Insects (5(1), p. 65-209.

***Platynota stultana* (Lepidoptera: Tortricidae)**

Fruit pathway: *P. stultana* feeds internally (AQIS 1999) and externally on table grapes and can be carried within the bunch, as nests can be also found in bunches (Reino de España 2016). Low temperature storage and sulphur dioxide release as it is common for the transport and storage of table grapes leads to 100% mortality of the least susceptible second instar larvae after 3 weeks (Yokoyama *et al.* 1999). The likelihood of entry of this species with table grapes was rated as "high" by a recent PRA (Reino de España 2016).

Other pathways: plants for planting, cut flowers, soil: eggs on leaves, larvae usually feeding on leaves; newly hatched larvae move towards the top of the plant and feed within buds or between two leaves. Later stages feed within a shelter of folded or rolled leaves. Pupation occurs in a folded leave. The fifth instar overwinters in webbed nests in the ground cover of the crop (Hoover and Biddinger 2014), dried berries and ground detritus (CABI CPC).

Hosts: Highly polyphagous on more than 20 plant families incl. *Vitis* spp., *Vitis vinifera*, *Citrus*, *Arachis*, *Glycine max*, *Medicago sativa*, *Phaseolus*, *Juglans*, *Pinus*, *Sorghum*, *Zea mays*, *Capsicum*, *Solanum lycopersicum* (Gilligan and Epstein 2014).

Distribution: North America: Mexico, USA: California, Arizona, Hawaii (introduced), Texas (Gilligan and Epstein 2014), Pennsylvania (Hoover and Biddinger 2014), Arkansas, Florida, Illinois, Maryland, Massachusetts, Michigan, Virginia (CABI CPC); Europe: detected in Spain 2009 during routine monitoring of agricultural areas mostly on *Capsicum* (Groenen and Baixeras 2013), restricted distribution. Outbreak 2004 in the UK, eradicated (Reino de España 2016).

Damage: *P. stultana* can be an important pest in vineyards and greenhouses (Gilligan and Epstein 2014). *P. stultana* can cause serious damage to vineyards in California. Main damage to grapes is caused by bunch-rot organisms which enter through larval feeding holes in the skin. About 25% yield loss is recorded. Damaged berries have an abnormal shape, reduced size and lesions on the fruit skin. The leaves of the host plants may be skeletonised by the larvae (CABI CPC). Additionally the larvae damage grapevine flowers (Reino de España 2016). Damages by this species is also reported from other economic important crops like *Actinidia deliciosa*, *Capsicum annuum*, *Citrus*, *Gossypium*, *Malus domestica*, *Pyrus*, *Prunus persica*, *Prunus domestica*, *Rubus* (Reino de España 2016).

Other information: *P. stultana* expanded its range into northern California and Pennsylvania and additionally expanded its host range to plants not native to North America (Gilligan and Epstein 2014). This species is able to complete 4-6 generations in California. Young larvae are able to move to other host plants by ballooning. The species was formerly (1998-2002) on the EPPO Alert list. It is a quarantine pest in Japan and a pest of quarantine significance in New Zealand and Australia (regulated for table grapes, peaches, nectarines) (Reino de España 2016). *P. stultana* was often intercepted in fruits of *Capsicum* from Mexico (NPPO 2012).

Impact: Moderate	**Intercepted:** Yes	**Spreading/invasive:** Yes

References:

AQIS 1999. Draft import risk analysis for the importation of Fresh table grapes [*Vitis vinifera* l.] From California (USA). March 1999. Australian Quarantine & Inspection Service, Canberra, Australia.

CABI CPC. Crop Protection Compendium. CAB International, UK. URL: http://www.cabi.org/cpc

Gilligan TM, Epstein M 2014. Tortricids of Agricultural Importance. Interactive Keys developed in Lucid 3.5. Last updated August 2014. http://idtools.org/id/leps/tortai/Platynota_stultana.htm, accessed 21.12.2016

Groenen F, Baixeras J 2013. The "Omnivorous leafroller", *Plantynota stultana* Walsingham, 1884 (Tortricidae: Sparganothini), a new moth for Europe. Nota lipid. 36 (1), p. 53-55.

Hoover GA, Biddinger DJ 2014. Penn State Extension Pest Alert: Omnivorous Leafroller, Platynota stultana (Lepidoptera: Tortricidae). Pennsylvania Department of Agriculture. http://ento.psu.edu/publications/omnivorous-leafroller, accessed 21.12.2016.

NPPO 2012. Quick scan Platynota stultana. National Plant Protection Organization, 6pp.

Reino de España 2016. Pest Risk Analysis for *Platynota stultana* Walsingham, 1884. Ministerio de Agricultura, Alimentacion y medio Ambiente, 72pp.

Yokoyama VY, Miller GT, Crisosto CH 1999. Low temperature storage combined with sulphur dioxide slow release pads for quarantine control of omnivorous leafroller *Platynota stultana* (Lepidoptera: Tortricidae). Journal of Economic Entomology, 92(1): p. 235-239.

Platyptilia ignifera **(Lepidoptera: Pterophoridae)**

Fruit pathway: larvae have been observed feeding in large numbers on grape berries (ADA 2014, Yano 1963). The association of eggs, larvae and pupae with grape bunches is moderated by the fact that bunches affected by this species are likely to be culled during harvesting or packing processes due to their large sizes and the obvious signs of damage they cause (ADA 2014). Uncertain if this species would be on the pathway.

Other pathways: Not known. No information available if any other plant parts or soil may be affected.

Hosts: *Vitis vinifera* (Yano 1963)

Distribution: Asia: Japan (Honshu, Kyushu, Tsushima), India (Yano 1963), Korea (Kim *et al.* 2010)

Damage: Damage is particularly serious on young grape berries. The larvae can damage over 23% of berries in infested vineyards or over 39% if the vineyard is protected from rain (ADA 2014 citing others).

Other information: Very few information on this species was available, but the genera *Nippoptilia* and *Platyptilia* are closely related, with member species having similar physiology and life histories (ADA 2014). The Korean and Japanese literature could not be used.

Impact: High (uncertain)	**Intercepted:** not known	**Spreading/invasive:** not known

References:

ADA 2014. *Final report for the non-regulated analysis of existing policy for table grapes from Japan.* Australian Department of Agriculture, Canberra, 373pp.

Kim S, Choi H, Park K, Lee S 2010. Taxonomic Review of the Genus Platyptilia Hübner (Lepidoptera, Pterophoridae) from Korea with the Description of a New species. Just abstract available. http://db.koreascholar.com/Article?code=291012, accessed 14.10.2016.

Yano K 1963. Taxonomic and biological studies of Pterophoridae of Japan. Pacific Insects (5(1), p. 65-209.

Proeulia chrysopteris **(Lepidoptera: Tortricidae)**

Fruit pathway: Larvae of the genus Proeulia are leaf rollers, also reported as feeding on the surface and boring into the fruit of host plants; larvae feed on fruit (Gilligan and Epstein 2014, Biosecurity Australia 2005).

Other pathways: plants for planting: larvae also feed on leaves, buds, flowers, eggs are laid on leaves (Gilligan and Epstein 2014), larvae overwinter in bark (CABI CPC)

Hosts: polyphagous, hosts include *Vitis*, *Malus domestica*, *Prunus* spp., *Citrus sinensis*, *Acer*, *Actinidia*, *Pyrus*, *Diospyros* (CABI CPC)

Distribution: South America: Chile (CABI CPC)

Damage: *P. chrysopteris* is native to Chile and is a significant pest of table grapes (Biosecurity Australia 2005). It has moved from natural habitats into crop systems, including exotic species of berries and ornamental trees. Recently it was recorded on *Vaccinium corymbosum* (Cubillos-Vallejos 2011). Direct damage is due to larvae feeding on buds, leaves, flowers and fruit; fruits are cut and pierced with large galleries. On grapevine, it is harmful to buds; on apple, fruits may be emptied, on kiwi, fruit pedicels are attacked; on orange, it bores into the rind and may reach the pulp (Cubillos Vallejos 2011). *P. chrysopteris* has infested kiwifruit orchards in less than a decade. It is considered as a secondary or incidental pest problem in fruit trees, but the whole genus is considered as an emergent pest problem of fruit trees and vineyards (CABI CPC). It is occasionally important, especially on apple, and is of quarantine importance on kiwi as larvae are present at the time of harvest (Cubillos Vallejos 2011).

Other information: *Proeulia* sp. are intercepted in the USA. The pest is of quarantine concern to some countries, such as the USA, China, Korea Rep, Japan, Mexico (CABI CPC). *P. arauria* is the most common species of the genus in Chile and other *Proeulia* spp. are considered to be of less significance (Biosecurity Australia 2005). Proposed in answer to the EPPO questionnaire on pests of concern for *Vitis*.

Impact: Moderate	**Intercepted:** not known	**Spreading/invasive:** not known

References:

Biosecurity Australia 2005. Revised Draft Import Risk Analysis Report for Table Grapes from Chile. Part B. Commonwealth of Australia.
CABI CPC. Crop Protection Compendium. CAB International, UK. URL: http://www.cabi.org/cpc
Cepeda DE, Cubillos GE 2011. Descripción del último estado larvario y recopilación de registros de hospederos de siete especies de Tortrícidos de importancia económica en Chile (Lepidoptera: Tortricidae). Gayana 75(1): 39-70.
Cubillos Vallejos GE 2011. Caracterización Taxonómica Del Último Estado Larvario De Proeulia auraria (Clarke) Y Proeulia chrysopteris (Butler) (Lepidoptera: Tortricidae) [thesis]. Universidad de Chile, Santiago.
Gilligan TM, Epstein M 2014. Tortricids of Agricultural Importance. Interactive Keys developed in Lucid 3.5. Last updated August 2014. http://idtools.org/id/leps/tortai/Proeulia_spp.htm, accessed 31.10.2016

***Proeulia triquetra* (Lepidoptera: Tortricidae)**

Fruit pathway: Larvae of *Proeulia* spp. feed on fruit (Gilligan and Epstein 2014); Larvae of the genus *Proeulia* are leaf rollers, also reported as feeding on the surface and boring into the fruit of host plants. On grapes, larvae feed on berries (Biosecurity Australia 2005).

Other pathways: plants for planting; larvae also feed on leaves, eggs are on leaves, flowers, buds (Gilligan and Epstein 2014).

Hosts: Polyphagous, incl. *Vitis vinifera* (Brown *et al*. 2008), *Vaccinium* (Gilligan and Epstein 2014), *Malus domestica*, *Hebe*, *Rubus occidentalis*. New host records on *Citrus reticulata*, *Myoschilus oblonga*, *Convolvulus arvensis*, *Maytenus boaria*, *Lonicera japonica*, *Prunus cerasifera*, *Buddleja davidii*, *Fuchsia magellanica* (Cepeda and Cubillos 2011).

Distribution: Chile (Cepeda and Cubillos 2011).

Damage: Little information on impact was found. The pest causes direct damage to buds, flowers, leaves and fruit (Gilligan and Epstein 2014). On grape, berries can be damaged superficially or completely destroyed (Biosecurity Australia 2005). Occasional pest in fruit orchards in central-southern Chile (Bergmann *et al*. 2016).

Other information: *Proeulia* sp. are intercepted in the USA. There are many interceptions of *Proeulia* spp. on blueberries (630 in the USA, 6 in Japan in BlueberriesChile 2011-2012). The pest is of quarantine concern to some countries, such as the USA, China, Korea Rep, Japan, Mexico (CABI CPC). Although *P. arauria* is the most common species of the genus in Chile and other *Proeulia* spp. are considered to be of less significance (Biosecurity Australia 2005). Proposed in answer to the EPPO questionnaire on pests of concern for *Vitis*.

Impact: not known	**Intercepted:** Yes (uncertain)	**Spreading/invasive:** not known

References:

Biosecurity Australia 2005. Revised Draft Import Risk Analysis Report for Table Grapes from Chile. Part B. Commonwealth of Australia.
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Bergmann J, Reyes-Garcia L, Ballesteros C, Cueveas Y, Flores MF, Curcovic T 2016. Identification of the Female Sex Pheromone of the Leafroller *Proeulia triquetra* Obraztsov (Lepidoptera: Tortricidae). Neotropical Entomology 45(4), pp. 351-356. Only abstract available, http://link.springer.com/article/10.1007/s13744-016-0372-3, accessed 1.11.2016.
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Gilligan TM, Epstein M 2014. Tortricids of Agricultural Importance. Interactive Keys developed in Lucid 3.5. Last updated August 2014. http://idtools.org/id/leps/tortai/index.html

***Pseudococcus maritimus* (Hemiptera: Pseudococcidae)**

Fruit pathway: Overwintered first instar nymphs of *Pseudococcus maritimus* feed at bases of shoots or pedicels of grape clusters. The ovisac, eggs, immature larvae and adults of this species may be on the grapes (Biosecurity Australia 2005).

Other pathways: Plants for planting. Larvae and females feed on leaves; females also wander to shoot forks (Goszczyński and Golan 2011). On any part of plants, incl. leaves, fruit, roots. Early stages damage the young roots of grapevines before moving up onto the vine to damage shoots, stems and fruit. The eggs overwinter in the soil near grapevine roots (Biosecurity Australia 2011). This species is mainly found on leaves and under bark on trunks (Biosecurity New Zealand 2009b).

Hosts: Many incl. *Vitis*, *Vaccinium*, *Persea*, *Passiflora*, *Malus*, *Pyrus*, *Rubus*, *Citrus* (Ben-Dov *et al.* 2016); *Vitis*, *Diospyros kaki* (Koch and Waterhouse 2000). In Poland, found indoors on *Abutilon striatum*, *Citrus grandis*, *Passiflora auriculata*, *P. quadrangularis*, *S. arboricola*; additionally *Pyrus*, *Prunus armeniaca* are mentioned (Goszczyński and Golan 2011).

Distribution: North America: Canada, Mexico, USA; Asia: Armenia, Indonesia (Garcia Morales *et al.* 2016; indicates that the pest seems confined to the New World and has frequently been misidentified as *Pseudococcus affinis*), China (Abudujapa and Sun 2007); South America: Argentina, Brazil, Chile, Colombia, French Guiana; Caribbean: Guadeloupe, Puerto Rico; Central America: Guatemala; Puerto Rico; Madeira (possibly misidentification) (Ben-Dov *et al.* 2016); Europe: Poland (indoors only, greenhouses, offices) (Goszczyński and Golan 2011). Former USSR, Hungary, NL (unconfirmed - CABI CPC). Not present in Hungary according to Kozar *et al*. (2013). No record found for the Netherlands.

Damage: *Pseudococcus maritimus* is the primary North American mealybug pest in vineyards (Daane *et al*. 2012). Additionally it is known as a pest of pear and apricot in California (Biosecurity New Zealand 2009b). Feeding damage is primarly on leaves, honeydew and sooty moulds on fruit, vector transmission (Biosecurity New Zealand 2009b). This mealybug contaminates grapes with one or more of the following: the cottony ovisac, eggs, immature larvae, adults, and honeydew or black sooty mould growing on honeydew (Biosecurity Australia 2005). *P. maritimus* is one of the five important vineyard mealybug species in Brazil (da Silva *et al.* 2014). Damage also as vector of grapevine leafroll-associated virus-3 (GLRaV-3) (Daane *et al*. 2012, Grasswitz and James 2008). Since the 1970s *P. maritimus* has become an increasingly severe pest of pear and apple in the USA (Biosecurity New Zealand 2009b).

Other information: The females are wingless, but mealybugs can disperse by wind within vineyards (Grasswitz and James 2008). Intercepted on table grapes (Biosecurity New Zealand 2009a) and apricot and pear fruit (Biosecurity New Zealand 2009b) to New Zealand. *P. maritimus* intercepted 29 times between 1995 and 2012 in the USA (Miller *et al.* 2014). Intercepted on *Citrus* and *Vitis* fruit in Korea, as well as on *Schefflera* (Suh *et al.* 2013). In Europe, intercepted on *Malus* fruits from US to Israel (Dropsa review). Proposed in answer to the EPPO questionnaire on pests of concern for *Vitis*. Biosecurity New Zealand requires risk mitigation measures for *P. maritimus* for apple and other fruits from USA (Biosecurity New Zealand 2009b).

Impact: High (also as vector)	**Intercepted:** Yes	**Spreading/invasive:** Yes

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***Thaumatotibia leucotreta* (Lepidoptera: Tortricidae)**

Fruit pathway: Larvae are internally in fruits. In general few symptoms are visible on fruit. In table grapes, fresh larval penetration holes can be seen, but require careful inspection of the fruit. Sometimes a few granules of frass can be found around a fresh penetration hole or a mass of frass may be found around older penetration holes. Sometimes frass is not visible (CAPS 2007); EPPO GD mentions fruits and vegetables as a pathway. Fruits are most likely to be infested with eggs or larvae with Citrus fruit as main pathway. *T. leucotreta* has only been detected occasionally on grapes in the field and *Vitis* is considered a marginal host. EPPO 2013 considered that the commodity 'table grapes' is not an important pathway. However, as *T. leucotreta* has incidentally been detected at pre-clearance inspections in consignments intended for the USA, it was kept in the Alert List. Uncertain if table grapes are a pathway for this species.

Other pathways: Plants for planting with growing medium attached, cut flowers of *Rosa* sp.; pupae in soil, larvae also in buds (EPPO 2013).

Hosts: more than 50 cultivated and wild host plants (Rentel 2013); *Vitis*; *Capsicum*; *Capsicum annuum; Capsicum chinense*; *Citrus paradisi*; *Citrus reticulata*; *Citrus sinensis*; *Gossypium hirsutum*; *Citrus*; *Citrus limon*; *Gossypium*; *Macadamia ternifolia*; *Persea americana*; *Prunus persica*; *Ricinus communis*; *Zea mays*; *Abelmoschus esculentus*; *Abutilon* x *hybridum*; *Ananas comosus*; *Annona muricata*; *Averrhoa carambola*; *Camellia japonica*; *Camellia sinensis*; *Ceiba pentandra*; *Coffea arabica*; *Diospyros kaki*; *Eriobotrya japonica*; *Juglans regia*; *Litchi chinensis*; *Mangifera indica*; *Musa x paradisiaca*; *Olea europaea*; *Phaseolus*; *Psidium guajava*; *Punica granatum*; *Quercus*; *Sorghum*; *Theobroma cacao*; *Vigna unguiculata*; *Rosa* (EPPO 2013)

Distribution: indigenous to southern Africa (Rentel 2013): Angola, Benin, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Congo Democratic Republic, Côte d'Ivoire, Eritrea, Ethiopia, Gambia, Ghana, Kenya, Madagascar, Malawi, Mali, Mauritius, Mozambique, Niger, Nigeria, Rwanda, Réunion, Saint Helena, Senegal, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia, Zimbabwe (Stibick 2006); Pest eradicated: Netherlands. Absent, intercepted only: Denmark, Finland, Spain, Sweden, UK (EPPO GD; Stibick 2006).

Damage: Mentioned as a key pest of Citrus in Southern Africa. Damage is caused by larvae feeding on fruit. This can cause premature ripening and fruit drop (Guerrero *et al*. 2012). On citrus, fruit losses as a result of *T. leucotreta* attacks range from below 2% to as high as 90% (1998 reference); on peach, in the early 1970s, it became a serious pest in the Transvaal (South Africa), where peaches were grown near citrus; percentages of infested fruit was in average of 29%, with a maximum of 55%. Significant yield losses (≥30%) have also been reported in macadamia crops (1986 reference); in Uganda on cotton, *T. leucotreta* caused 20% loss of early sown varieties and 42-90% loss of late varieties. It is known as a pest of cotton, macadamia nuts, avocado, stone fruit and maize in Africa (EPPO 2013). Larval feeding and development can affect fruit development at any stage, causing premature ripening, fruit drop (EPPO 2013) and infections with fungi (CAPS 2007).

Other information: The generalist feeding strategy enables survival in marginal conditions as is necessary due to lack of diapauses (CAPS 2007). Outbreak in the Netherlands on *Capsicum annuum* (origin unknown). Intercepted on *Citrus paradisi* fruits. Cut flowers of roses, and numerous interceptions in cargo and passenger baggage in the USA (EPPO Alert List 2011). Quarantine Pest of Israel, Jordan, New Zealand and the United States (EPPO GD). USDA estimate the potential economic losses if False codling moth establishes of billions of dollar (Stibick 2006). Proposed in answer to the EPPO questionnaire on pests of concern for *Citrus*. At December 2015, *T. leucotreta* was under consideration for regulation in the EU (EU Standing Committee, December 2015). *T. leucotreta* is on EPPO A2 List of pests recommended for regulation.

Impact: High (on another crop)	**Intercepted:** Yes	**Spreading/invasive:** Yes

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