ORGANISATON NORD AMERICAINE POUR LA PROTECTION DES PLANTES
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CANADA UNITED STATES MEXICO

NAPPO Regional Standards for Phytosanitary Measures (RSPM)

RSPM No. 35
Guidelines for the Movement of Stone and Pome Fruit Trees and Grapevines into a NAPPO Member Country

The Secretariat of the North American Plant Protection Organization
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Review

NAPPO Regional Standards for Phytosanitary Measures are subject to periodic review and amendment. The next review date for this NAPPO standard is 2014. A review of any NAPPO Standard may be initiated at any time upon the request of a NAPPO member country.

Approval

This Standard was approved by the North American Plant Protection Organization (NAPPO) Executive Committee on October 19, 2009 and is effective from this date.

Approved by:

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Implementation

See the attached Implementation Plans for implementation dates in each NAPPO country.

Amendment Record

Amendments to this Standard will be dated and filed with the NAPPO Secretariat.

Distribution

This standard is distributed by the NAPPO Secretariat to the Industry Advisory Group and Sustaining Associate Members, the International Plant Protection Convention (IPPC) Secretariat, and to other Regional Plant Protection Organizations (RPPOs).

Introduction

Scope

This Standard describes guidelines for the importation of stone and pome fruit trees and grapevines by the member countries, and the movement of these plants among the member countries of NAPPO. Pests specifically dealt with in this Standard are arthropods, bacteria, fungi, nematodes, phytoplasmas, viroids, viruses and virus-like agents. The Annexes in the Standard also include pest vectors that may not be considered as direct pests themselves, but that promote the spread, entry, and establishment of stone and pome fruit and grapevine pests. This Standard does not address abiotic disorders, varietal trueness-to-type, and quality grades and standards.

References

Determination of pest status in an area, 1998. ISPM No. 8, FAO, Rome.
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Good plant protection practice – Pome fruits , 1999 EPPO PP 2/18(1)
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Pest risk analysis for quarantine pests including analysis of environmental risks and living modified organisms, 2004. ISPM No. 11, FAO, Rome.
Recognition of pest free areas and areas of low pest prevalence, 2007. ISPM No. 29, FAO, Rome
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Requirements for the establishment of pest free areas, 1995. ISPM No. 4, FAO, Rome.
Requirements for the establishment of pest free places of production and pest free production sites, 1999. ISPM No. 10, FAO, Rome.
Authorization of laboratories for phytosanitary testing, 2009. RSPM No. 9, NAPPO, Ottawa.
The use of integrated measures in a systems approach for pest risk management, 2002. ISPM No. 14, FAO, Rome.

Definitions

Definitions of phytosanitary terms used in this standard can be found in NAPPO RSPM No. 5 (*Glossary of phytosanitary terms)* and in ISPM No. 5 (*Glossary of phytosanitary terms).*

Outline of Requirements

This standard outlines a systems approach for mitigating the risk of regulated pest introductions associated with the international movement of stone and pome fruit trees and grapevines, without undue restriction of trade. This is achieved through a combination of phytosanitary measures to prevent the spread, entry and establishment of associated pests including arthropods, bacteria, fungi, nematodes, phytoplasmas, viroids, viruses and virus-like agents. The General Requirements of the standard address the pest risk assessment and phytosanitary measures for pest risk management. Specific requirements identify and describe the components of a stone and pome fruit and grapevine certification program primarily designed to control phytoplasmas, viruses and virus-like agents spread by infected propagative material. Certification programs may also be applicable to other types of pests.

Background

This Standard deals specifically with arthropods, bacteria, fungi, nematodes, phytoplasmas, viroids, viruses and virus-like agents of stone and pome fruit trees and grapevines. Economic impacts of these pests on these crops include delayed maturity, increased agricultural inputs, reduced growth, yield and fruit quality, graft incompatibility, and plant mortality. The pests addressed in this standard may also affect other crops or natural ecosystems, with varying economic impacts. In addition to direct effects on the plants, certain nematodes and arthropods are vectors of stone and pome fruit and grapevine diseases. The same pests may also cause diseases in other crops with varying economic impacts. Stone and pome fruit and grapevine plants including cuttings, rootstock, and tissue cultures pose a high risk for introducing plant pests. Traditional phytosanitary measures used to reduce pest risk include prohibition, quarantine restrictions, entry point inspections, and post-entry quarantines. A greater volume of trade between and within countries has increased the risk of pest introduction.

The use of integrated measures in a system approach for pest risk management offers a wide range of independent measures that are used in combination with each other to meet an appropriate level of phytosanitary protection in accordance with *The use of integrated measures in a systems approach for pest risk management*, ISPM No. 14 and *Integrated pest risk management measures for the importation of plants for planting into NAPPO member countries,* RSPM No. 24.

A systems approach integrates pest risk management measures to meet the appropriate level of phytosanitary protection of the importing country.

Systems approaches provide, where appropriate, an equivalent alternative to procedures such as disinfestation treatments or replace more restrictive measures like prohibition. This is achieved by considering the combined effect of different conditions and procedures. Systems approaches provide the opportunity to consider both pre and post harvest procedures that may contribute to the effective management of pest risk.

A systems approach requires two or more measures that are independent of each other, and may include any number of measures that are dependent on each other. An advantage of the systems approach is the ability to address variability and uncertainty by modifying the number and strength of measures to meet the appropriate level of phytosanitary protection and confidence.

Certification programs used to control virus diseases are good examples of a systems approach at work. Various independent components such as virus-testing, field inspection, isolation distances, and vector control, all work together to minimize the spread, entry, and establishment of pests.

The objectives of this Standard are to:

- Prevent the spread, entry and establishment of quarantine pests into NAPPO member countries.
- Manage regulated non-quarantine pests within NAPPO member countries
- Facilitate equitable and orderly trade into and within the NAPPO region.
- Promote the use of integrated systems approaches and good plant protection practices as the basis for international exchange of stone and pome fruit and grapevine plants for planting.

1. General Requirements

1.1 Stone and Pome Fruit and Grapevine Pests

The status of stone and pome fruit and grapevine pests within NAPPO member countries have been identified in the annexes.

1.2 Pest Risk Analysis

All Pest Risk Analyses (PRAs) for stone and pome fruit and grapevine pests should be performed in accordance with *Guidelines for pest risk analysis,* ISPM No. 2 and *Pest risk analysis for quarantine pests including analysis of environmental risks and living modified organisms,* ISPM No. 11. Application of phytosanitary measures should be based on the results of Pest Risk Analyses. The pests in the annexes may be classified as regulated pests, depending on their presence or absence in a country and the official control measures applied.

1.3 Phytosanitary Measures for Pest Risk Management

Phytosanitary measures for pest risk management should be used to prevent the spread, entry and establishment of regulated pests.

The importation and movement of stone and pome fruit trees and grapevines is subject to the application of integrated phytosanitary measures for pest risk management in a systems approach in accordance with *The use of integrated measures in a systems approach for pest risk management,* ISPM No. 14.

Following a pest risk analysis, a number of phytosanitary measures to mitigate risk exist for importing plants into a NAPPO member country. The phytosanitary measures described below may be combined to obtain an appropriate level of phytosanitary protection. Other phytosanitary measures and procedures such as inspection, fumigation, chemical sprays, hot water dips, biological control, and cold treatment may also be applied to plant material, growing media, or packaging for any of the options. Section 3.0 "Post-entry Quarantine of Stone and Pome Fruit Trees and Grapevines" identifies the criteria appropriate for the post-entry quarantine of these plants.

1.3.1 Stone and Pome Fruit Trees and Grapevines for Research Purposes and Subsequent Destruction

This option could be applied to stone and pome fruit trees and grapevines that do not come from an official certification program or that may be infested with pests. Plants are maintained under official quarantine conditions to prevent the spread, entry and establishment of regulated pests. Plant material may be inspected, tested or treated for naturally transmissible pests before importation or after entry. Plant material, growing media, or packaging must be disposed of as instructed by the NPPO. This option is only suitable for small quantities of plant material.

1.3.2 Stone and Pome Fruit Trees and Grapevines for Quarantine, Testing and Treatment at NPPO-authorized Facilities and Subsequent Distribution

This option could be applied to stone and pome fruit trees and grapevines that do not come from an official certification program or that may be infested with pests. Plants are imported for quarantine, testing and treatment in a post-entry quarantine station approved by the importing National Plant Protection Organization (NPPO). Detected regulated pests should be eliminated before release. This option is only suitable for small quantities of plant material.

1.3.3 Stone and Pome Fruit Trees and Grapevines for Quarantine at Importers' Premises and Subsequent Distribution.

This option could be applied to stone and pome fruit trees and grapevines that do not come from an official certification program recognized by the importing NPPO. Plants are planted under quarantine conditions on the importer's premises. The NPPO should test and/or visually examine or treat, as appropriate, for regulated pests before release from the quarantine conditions. This option may apply to the importation of plants from a certification program under evaluation.

1.3.4 Stone and Pome Fruit Trees and Grapevines from an Official Certification Program.

Stone and pome fruit trees and grapevines may be imported into a NAPPO member country if produced under an official certification program that has been evaluated using this Standard and authorized by the importing NPPO. The importing NPPO should perform audit inspections either in the country of origin or on imported plants,

including testing samples for the presence of pests. The importing NPPO may require post-entry quarantine conditions.

1.3.5 Stone and Pome Fruit Trees and Grapevines from a Pest-free Area, Pest Free Place of Production, or Pest Free Production Site.

This option is usually not appropriate for pests such as viruses where inspection is inadequate and comprehensive surveys are impractical for determining pest free status. Stone and pome fruit trees and grapevines may be certified free from specific pests for entry into NAPPO member countries based on absence of these pests in the exporting site or area performed in accordance with *Requirements for the establishment of pest free areas*, ISPM No. 4, *Requirements for establishment of pest free places of production and pest free production sites,* ISPM No. 10 and *Recognition of pest free areas and areas of low pest prevalence,* ISPM No. 29. The importing NPPO should perform audit inspections and may take samples to test for the presence of pests. The importing NPPO may require post-entry quarantine conditions.

1.3.6 Prohibition

If no satisfactory measure to reduce risk to an acceptable level can be found, the final option may be to prohibit importation of the stone and pome fruit and grapevine material.

1.4 Documentation Requirements

A phytosanitary certificate or an equivalent official document should be issued by the exporting country according to the requirements of the NPPO of the importing country. A permit to import must be obtained by the importer, if required by the importing NPPO.

2. Specific Requirements

2.1 Stone and Pome Fruit and Grapevine Certification Programs

This Standard deals specifically with the essential elements of a certification program to mitigate the risk of stone and pome fruit and grapevine pests listed in the annexes.

The certification program should be carried out by or under the authority of the NPPO. A separate certifying agency may be charged with the administration of the certification program. The certification program should clearly define requirements such as terminology, testing, eligibility, the nomenclature of certification levels, horticultural management, isolation and sanitation requirements, inspection and re-testing, documentation, identification and labeling, quality assurance, non-compliance and remedial measures, and criteria for post entry quarantine.

2.1.1 Program Administration

The certification program should be administered by a NPPO or a certifying agency authorized by a NPPO that employs administration, inspection and laboratory diagnostic personnel that have the education, training, and experience required to implement the certification program.

This program should specify the roles and responsibilities of the participants in the program, the certifying agency, its personnel, laboratories involved in testing, non-agency organizations accredited to perform certification and testing activities, and participants in the program.

The certifying agency should ensure that diagnostic, certification and inspection staff employed by the certifying agency or accredited non-agency organizations meet appropriate training, experience, educational and proficiency requirements. The agency should be prepared to supply, upon request, this information to its country's NPPO.

Certifying agencies authorized by the exporting country's NPPO must notify and obtain approval from the exporting NPPO before making changes to the certification program or deviations from program requirements before plants produced under the changes or deviations are exported.

The exporting country's NPPO must inform the importing country's NPPO of changes to the certification program or diagnostics before plants produced under the modified program are exported.

2.1.2 Terminology

The certification program should define all terminology specific to the certification program using sufficient detail to ensure clear understanding of the certification requirements. The terminology used by the NAPPO countries for similar purposes should be harmonized to the greatest extent possible.

2.1.3 Diagnostics

Diagnostics include but are not limited to: 1) sample processing for the recovery or isolation and identification of pathogens, insects, nematodes and other pests; 2) pest identification utilizing morphological characters such as for insects, mites, and other arthropods and nematodes; 3) disease determinations utilizing indicator plants; 4) serological tests such as Enzyme Linked Immuno-Sorbent Assays (ELISA); and 5) assays based on nucleic acid amplification by various Polymerase Chain Reaction (PCR) methodologies.

Diagnostics will be done by the certifying agency or laboratories authorized by the NPPO. If private laboratories are used, they should be accredited by the NPPO in accordance with *Authorization of laboratories for phytosanitary testing,* RSPM No. 9. The approved diagnostic methods for fruit tree virus pests are listed in the proceedings of the International Symposium on Virus and Virus-like Diseases of Temperate Fruit Crops which meets every three years (Jelkmann, W. 2004).

Upon request, the exporting NPPO must provide the importing NPPO with the diagnostic results, methodology and a list of pests regulated in the certification program in the exporting country.

The NPPO of the exporting country must notify the NPPO of the importing country of proposed changes to diagnostics being used by the certifying agency or NPPO in the exporting country. The importing country may refuse the plants if a new test or modifications have not been authorized.

2.1.4 Eligibility

Potential program participants should file an application with the certifying agency or NPPO. Eligibility is conferred by the certifying agency if the conditions of the certification program have been met.

The certification program should specify eligibility for plant material used in the program. Eligibility requirements also must be met when plants are purchased for export. Plant brokers must ensure the traceability of export consignments to approved places of production.

2.1.5 Certification Levels

Certification levels represent successive generations of propagation from the original tested material, and may have additional phytosanitary measures applied depending on the generation. Certification levels are a categorical measure of the health status of certified plants. The certification program should clearly define certification levels. Eligibility criteria should be established at each level, including nomenclature, propagation and pest management measures, and the number of generations removed from the original tested material. It is strongly recommended that the certification levels be identified as Generation 1, 2, 3, 4, etc.

2.1.6 Horticultural Management

The certification program should define horticultural management requirements for hosts of pests or pest vectors within the field and buffer zones.

All stone and pome fruit trees and grapevines in the certification program should be kept in good horticultural condition by following good agricultural practices for their region. Good agricultural practices are explained at the FAO website at http://www.fao.org/prods/gap/index_en.htm).

Where they exist, best management practices for pest control should be employed, for example:
Good plant protection practice – EPPO PP 2/1(2), 2003
Good plant protection practice – Grapevine EPPO PP 2/23(1), 2002
Good plant protection practice – Pome fruits EPPO PP 2/18(1), 1999
Good plant protection practice – Stone fruits EPPO PP 2/33(1), 2004

2.1.7 Isolation, Pest Management and Sanitation

The isolation requirements of the certification program will vary according to the certification level and should be based on the biology of the pests and their vectors present in the certification area. The certification program should specify the minimum distance from non-certified hosts, and acceptable cover crops and weed control measures required to reduce alternate pest hosts to acceptable levels.

The certification program should specify pest management measures including vector suppression and the control of pollen-borne viruses required to adequately protect plants produced under the program from exposure to pests.

The certification program should specify phytosanitary measures by which the risks associated with the movement of soil or water, other growing media or plant products potentially infested with vectors or pests are mitigated to acceptable levels.

The certification program should specify crop rotation and fallow requirements between pest host crops, and chemical control requirements for a site being used for the production of plants under the certification program.

2.1.8 Inspection and Diagnostics

The certification program should specify the inspection and diagnostics requirements throughout all levels of the certification program.

Plants in the certification program should be inspected during the growing season at times appropriate for the detection of disease symptoms and determining the presence of insects or other pest vectors according to appropriate methods for each pest.

The certification program should specify:

- the process to be undertaken upon suspicion of pest infestation.
- the process to be undertaken upon confirmation of pest infestation.
- notification and inspection requirements when selling or purchasing certified material.
- frequency of sampling and diagnostics for pests at each certification level
- inspection requirements including reviews of maps of places of production and production sites, variety labelling practices, new places of production and production sites and any deviations between inventory, sales and purchases.

2.1.9 Documentation and Identification

The certifying agency responsible for the certification program must document inspection, certification and diagnostic activities to ensure the eligibility and status of the places of production and production sites, participants and all certification levels of the stone and pome fruit trees and grapevines. These documents must be available, upon request, to the exporting and importing country NPPOs for audit, traceback, trace forward and other regulatory purposes.

The certification program should include a system approved by the certifying agency to document and identify plants during growth, post harvest, and at sale to ensure tracebility. The system should at least record the certification level, the year of propagation, the participant, geographic location of the field of production, location of certified trees within the field of production, the variety and rootstock, and the purchaser’s identity.

Purchases and sales of plants produced under the certification program, previous cropping history for production sites, and production site maps should be retained by the participants for a period of time specified by the certifying agency.

2.1.10 Quality Systems and Audit Review

The importing and exporting country NPPOs should ensure the validity and reliability of the certification program through periodic audit and reviews of the program. In addition, the place of production must perform internal audits to verify compliance with the program rules.

The importing NPPO should periodically audit/review the exporting NPPO certification program to ensure it continues to meet the certification standards and their import requirements. It should include testing of imported plant material, site visits and review of the exporting NPPO certification program and internal audit process. Detection of pests or vectors controlled under the certification program or deficiencies of documentation, etc. may indicate that the integrity of the exporting NPPO certification system is compromised.

2.1.11 Non-compliance and Corrective Measures

The certification program should specify the consequences of non-compliance. In addition, the corrective measures should be specified to enable a suspended or de-certified participant, production area or variety to become eligible for re-certification or reinstatement.

3. Post-entry Quarantine of Stone and Pome Fruit trees and Grapevines

The importing NPPO may require post-entry quarantine conditions for imported stone and pome fruit and grapevine plants. The post-entry quarantine may occur at a NPPO approved private or public facility. The post-entry requirements should be based on the level of risk determined by the biology of the pests of concern, including their host range, their means of natural spread, and the likelihood of transmission by local vectors.

Post-entry quarantine criteria should specify:

- The roles and responsibilities of the NPPO of the importing country, duly authorized officials and the importer.
- Horticultural management requirements to promote plant growth and the detection of pests.
- Isolation and suppression measures to control pest vectors and prevent the movement of pests within and outside the post-entry quarantine area.
- Plant and weed control measures within the post-entry quarantine area to reduce alternate hosts of pests and pest vectors.
- Soil and plant treatment, vector surveillance and suppression, facility design and other criteria to be met before a facility, production site, or production area becomes suitable for post-entry quarantine.
- The requirements for movement of horticultural equipment and personnel into and from the post-entry quarantine area.
- Containment, security and access restrictions to the imported plants.
- Disposition of pruning waste and all other articles capable of transmitting or

harbouring pests.

- Inspection, sampling and diagnostics to determine the presence pests in the imported plants.
- Conditions under which the imported plants would be removed from post-entry quarantine.
- Final disposition of plants from the post-entry quarantine area.
- De-contamination and subsequent use restrictions of a post-entry quarantine area.

4. Evaluation and Approval of a Certification Program

Prior to allowing importation of stone and pome fruit trees and grapevines, the importing NPPO should evaluate the certification program of the exporting NPPO including a documentation review, a site visit, and testing of plants by the importing NPPO to ensure they meet the standard of the certification program.

Following approval of the certification program additional temporary restrictions such as pre-clearance testing and post-entry quarantine may be used.

5. Bilateral Workplans

Exporting and importing country NPPOs may decide that a bilateral workplan is necessary to elaborate on these guidelines. Guidelines for the development of bilateral workplans are provided in *Guidelines for Bilateral Workplans,* RSPM No. 19. Modifications to these guidelines should be technically justified.

Annex 1: Fruit Tree Pests

Note: Synomyms for virus names in Tables 1 and 2 can be found in Appendix 2 of RSPM No. 25 on the NAPPO website.

LEGEND FOR SYMBOLS USED IN TABLES

Presence or absence unless otherwise noted conform to the categories listed in *Determination of Pest Status in an Area*, ISPM No. 8. For ease of reference alphanumeric designations have been added here.

Ab1: Absent: no pest records
Ab2: Absent: pest eradicated
Ab3: Absent: pest no longer present
Ab4: Absent: pest records invalid
Ab5: Absent: pest records unreliable
Ab6: Absent: intercepted only
Ab7: Absence: confirmed by survey
Ab8: Absence: pest free area declared
P1: Present: in all parts of the area
P2: Present: only in some areas
P3: Present: except in specified pest free areas
P4: Present: in all parts of the area where host crop(s) are grown
P5: Present: only in some areas where host crop(s) are grown
P6: Present: only in protected cultivation
P7: Present: seasonally
P8 Present: but managed
P9 Present: subject to official control
P10: Present: under eradication
P11: Present: at low prevalence.
P12: Present: not associated with host crop (NAPPO category)

Table 1: Virus pests of stone fruit – Status in NAPPO Region

PEST	HOSTS	REFERENCES	PRESENCE/ABSENCE		
			CAN	USA	MEX
Apple chlorotic leafspot trichovirus (ACLSV)	Prunus	Nemeth, 1986	P11	P11	P12
Apple mosaic ilarvirus (APMV)	Pnus	Nemeth, 1986	P11	P11	P12
Apricot bare twig and unfruitfulness Caused by mixed infection of Cucumber green mottle mosaic tobamovirus and Strawberry latent ringspot sadwavirus	Apricot, Peach	Nemeth, 1986	Ab1	Ab1	Ab1
Apricot chlorotic leaf mottle agent	Apricot, Peach	Wood, 1979	Ab1	Ab1	Ab1
Apricot deformation mosaic agent	Prunus	Nemeth, 1986	Ab1	Ab1	Ab1
Apricot latent foveavirus	Apricot, Peach, Plum	Nemchinov et al., 2000	Ab1	P5	P5
Apricot latent ringspot nepovirus	Apricot, Cherry, Peach	Gentit et al., 2001	Ab1	Ab1	Ab1
Apricot Moorpark mottle agent	Apricot, Peach, Plum	Nemeth, 1986	Ab1	Ab1	Ab1
Apricot pseudo-chlorotic leaf spot trichovirus	Apricot, Peach, Plum	Liberti et al., 2005	Ab1	Ab1	Ab1
Apricot pucker leaf agent	Apricot, Peach, Plum	Nemeth, 1986	Ab1	Ab3	Ab1
Apricot ring pox agent	Prunus	Nemeth, 1986	P5	P5	Ab1
Apricot stone pitting agent	Apricot, Peach	Wood, 1979	Ab1	Ab1	Ab1
Apricot witches' broom agent	Apricot	Nemeth, 1986	Ab1	Ab1	Ab1
Arabis mosaic nepovirus (ARMV)	Cherry, Peach	Nemeth, 1986	P12	P12	P12
Asian Prunus foveavirus	Apricot, Peach, Plum	Marais et al., 2004	P5	P5	P5
Cherry Amasya disease agent	Cherry	Citir, 1987	Ab1	Ab1	Ab1

PEST	HOSTS	REFERENCES	PRESENCE/ABSENCE		
			CAN	USA	MEX
Cherry black canker agent	Cherry	Nemeth, 1986	P5	P5	Ab1
Cherry chlorotic rusty spot virus	Cherry	Di Serio et al., 1996	Ab1	Ab1	Ab1
Cherry freckle fruit agent	Cherry	Nemeth, 1986	Ab1	Ab3	Ab1
Cherry green ring mottle virus (CGRMV)	Cherry, Peach, Apricot	Nemeth, 1986	P4	P4	Ab1
Cherry Hungarian raspleaf virus	Cherry	Nemeth, 1986	Ab1	Ab1	Ab1
Cherry leafroll nepovirus (CLRV)	Cherry, Peach, Plum	Nemeth, 1986	P12	P5	Ab1
Cherry line pattern and leaf curl agent	Prunus	Nemeth, 1986	Ab1	Ab1	Ab1
Cherry little cherry closterovirus 1and 2 (LCHV-1, LCHV-2)	Cherry	Rott and Jelkmann, 2001	P4	P4	Ab1
Cherry mottle leaf trichovirus (CMLV)	Prunus	James and Mukerji, 1993	P5	P5	Ab1
Cherry necrotic line pattern A complex of Prunus necrotic ringspot ilarvirus and Apple chlorotic leafspot trichovirus	Cherry	Nemeth, 1986	P11	P11	Ab1
Cherry necrotic mottle leaf foveavirus?	Cherry	Gentit et al., 2002	Ab1	Ab1	Ab1
Cherry necrotic rusty mottle virus (CNRMV)	Cherry	Nemeth, 1986	P4	P4	Ab1
Cherry raspleaf (American) cheravirus (CRLV)	Cherry, Peach	Nemeth, 1986	P5	P5	Ab1

PEST	HOSTS	REFERENCES	PRESENCE/ABSENCE		
			CAN	USA	MEX
Cherry raspleaf virus (European) caused by viruses and virus complexes: -Raspberry ringspot nepovirus (RRSV) -Raspberry ringspot nepovirus and Cherry leaf roll nepovirus (CLRV) -Raspberry ringspot nepovirus plus Prune dwarf ilarvirus (PDV) -Arabis mosaic nepovirus (ARMV) -Arabis mosaic nepovirus plus Prune dwarf ilarvirus -Prune dwarf ilarvirus plus Strawberry latent ringspot sadwavirus (SLRSV)	Prunus	Nemeth, 1986	Ab1	Ab1	Ab1
Cherry rosette disease - caused by Raspberry ringspot nepovirus plus Cherry leaf roll nepovirus	Cherry	Smith, 1972	Ab1	Ab1	Ab1
Cherry rough bark agent	Cherry	Nemeth, 1986	Ab1	P5	Ab1
Cherry rough fruit agent	Cherry	Nemeth, 1986	Ab1	Ab3	Ab1
Cherry rusty mottle (American) foveavirus? Two closely related strains - mild and severe	Cherry	Nemeth, 1986	P4	P4	Ab1
Cherry rusty mottle (European) foveavirus?	Cherry	Nemeth, 1986	Ab1	Ab1	Ab1
Cherry rusty spot agent	Cherry	Nemeth, 1986	Ab1	Ab1	Ab1
Cherry short stem agent	Cherry, Peach, Apricot	Nemeth, 1986	P5	P5	Ab1
Cherry spur cherry agent	Cherry	Nemeth, 1986	Ab1	P5	Ab1
Cherry stem pitting agent	Cherry	Zhang etal., 1998	Ab1	P5	Ab1
Cherry twisted leaf foveavirus?	Prunus	Nemeth, 1986	P5	P5	Ab1
Cherry A capillovirus (CVA)	Prunus	Jelkmann, 1995	P4	P4	Ab1

PEST	HOSTS	REFERENCES	PRESENCE/ABSENCE		
			CAN	USA	MEX
Cucumber mosaic cucumovirus (CMV)	Cherry, Peach, Plum	Nemeth, 1986	P5	P12	P12
Epirus cherry ourmiavirus (EPCV)	Cherry	Avgelis et al., 1989	Ab1	Ab1	Ab1
Hop stunt hostuviroid	Peach, Plum	Ogawa et al., 1995	P5	Ab1	Ab1
Krikon stem necrosis agent	Apricot, Peach, Plum	Nemeth, 1986	Ab1	Ab1	Ab1
Montmorency bark splitting foveavirus?	Apricot, Cherry, Plum	Nemeth, 1986	Ab1	P11	Ab1
Peach bark and wood grooving agent	Peach	Nemeth, 1986	Ab1	Ab3	Ab1
Peach chlorosis agent	Peach	Nemeth, 1986	Ab1	Ab1	Ab1
Peach chlorotic mottle virus	Peach	James et al., 2007	P5	P5	P5
Peach chlorotic spot agent	Peach	Nemeth, 1986	Ab1	Ab1	Ab1
Peach enation virus	Peach	Nemeth, 1986	Ab1	Ab1	Ab1
Peach latent mosaic pelamoviroid	Prunus	Flores et al., 2006	P4	P4	P4
Peach leaf necrosis agent in plum	Peach, Plum	Ogawa et al., 1995	Ab1	Ab1	Ab1
Peach line pattern and leaf curl virus	Prunus	Nemeth, 1986	Ab1	Ab1	Ab1
Peach mosaic trichovirus (PMV)	Apricot, Peach, Plum	Janes et al., 2006	Ab1	P5	P5
Peach mottle agent	Cherry, Peach	Nemeth, 1986	Ab1	Ab3	Ab1
Peach oil blotch agent	Peach, Plum	Nemeth, 1986	Ab1	Ab1	Ab1
Peach pseudostunt agent in plum	Peach, Plum	Ogawa et al., 1995	Ab1	Ab1	Ab1
Peach purple mosaic agent	Peach	Nemeth, 1986	Ab1	Ab1	Ab1
Peach red marbling agent	Peach	Grasseau et al., 1999	Ab1	Ab1	Ab1
Peach rosette mosaic nepovirus (PRMV)	Peach, Plum	Nemeth, 1986	P5	P5	Ab1

PEST	HOSTS	REFERENCES	PRESENCE/ABSENCE		
			CAN	USA	MEX
Peach seedling chlorosis agent	Peach	Nemeth, 1986	Ab1	Ab1	Ab1
Peach star mosaic agent	Peach	Nemeth, 1986	Ab1	Ab1	Ab1
Peach stubby twig agent	Peach, Plum	Nemeth, 1986	Ab1	Ab3	Ab1
Peach stunt - caused by Prune dwarf ilarvirus plus Prunus necrotic ringspot ilarvirus	Prunus	Uyemoto and Scott, 1992	P4	P4	P4
Peach wart agent	Apricot, Cherry, Peach	Nemeth, 1986	Ab1	P5	Ab1
Peach yellow mottle agent	Peach	Nemeth, 1986	Ab1	Ab1	Ab1
Plum bark necrosis stem pitting closterovirus?	Prunus	Amenduni et al., 2005	Ab1	P5	Ab1
Plum fruit crinkle agent	Plum	Nemeth, 1986	Ab1	Ab1	Ab1
Plum line pattern (American) ilarvirus (APLPV)	Prunus	Nemeth, 1986	P5	P5	Ab1
Plum line pattern (European) caused by: Apple mosaic ilarvirus or Danish line pattern ilarvirus	Prunus	Nemeth, 1986	P5	P5	Ab1
Plum mottle leaf agent	Plum	Nemeth, 1986	Ab1	Ab1	Ab1
Plum ochre mosaic agent	Plum	Nemeth, 1986	Ab1	Ab1	Ab1
Plum pox potyvirus (PPV)	Prunus	Capote et al., 2006	P10	P10	Ab1
Plum white spot agent	Plum	Smith, 1972	Ab1	P5	Ab1
Prune diamond canker agent	Plum	Nemeth, 1986	Ab1	P5	Ab1
Prune dwarf ilarvirus (PDV)	Prunus	Nemeth, 1986	P4	P4	P4
Prunus necrotic ringspot ilarvirus (PNRSV)	Prunus	Nemeth, 1986	P4	P4	P4

PEST	HOSTS	REFERENCES	PRESENCE/ABSENCE		
			CAN	USA	MEX
Raspberry ring spot nepovirus (RRSV)	Cherry, Peach, Plum	Nemeth, 1986	Ab1	Ab1	Ab1
Shirofugen stunt virus	Cherry	Desvignes, 1999	Ab1	Ab1	Ab1
Sour cherry fruit necrosis Caused by a mixed infection of Apple chlorotic leafspot trichovirus and Prunus necrotic ringspot ilarvirus	Cherry	Nemeth, 1986	P5	P5	Ab1
Sour cherry gummosis agent	Cherry	Nemeth, 1986	Ab1	P5	Ab1
Sour cherry line pattern agent	Cherry, Peach, Plum	Nemeth, 1986	Ab1	Ab1	Ab1
Sour cherry pink fruit agent	Cherry	Nemeth, 1986	Ab1	P5	Ab1
Sour cherry vein yellow spot agent	Cherry	Nemeth, 1986	Ab1	Ab1	Ab1
Sowbane mosaic sobemovirus (SOMV)	Cherry, Plum	Nemeth, 1986	P12	P12	P12
Stocky prune cheravirus	Peach, Plum	Candresse et al., 2006	Ab1	Ab1	Ab1
Strawberry latent ring spot sadwavirus (SLRSV)	Prunus	Ogawa et al., 1995	P12	P12	Ab1
Tobacco mosaic tobamovirus (TMV)	Cherry, Plum	Nemeth, 1986	P12	P12	P12
Tobacco necrosis necrovirus (TNV)	Apricot, Cherry, Plum	Nemeth, 1986	P12	P5	P11
Tobacco ring spot nepovirus (TRSV)	Cherry, Peach	Nemeth, 1986	P5	P5	P12
Tomato black ring nepovirus (TBRV)	Cherry, Peach	Nemeth, 1986	Ab1	Ab1	Ab1
Tomato bushy stunt tombusvirus (TBSV)	Apricot, Cherry, Plum	Ogawa et al., 1995	P5	P5	P5
Tomato ringspot nepovirus (TORSV)	Prunus	Ogawa et al., 1995	P4	P4	P4

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Table 2: Virus Pests of Pome Fruit – Status in NAPPO Region

PEST	HOSTS	REFERENCES	PRESENCE/ABSENCE		
			CAN	USA	MEX
Apple blister bark agent	Apple	Fridlund, 1989	P5	P5	Ab1
Apple brown ringspot agent	Apple	Nemeth, 1986	Ab1	Ab1	Ab1
Apple bumpy fruit of Ben Davis agent	Apple	Nemeth, 1986	Ab1	Ab1	Ab1
Apple bunchy top agent	Apple	Sharma et al., 1979	Ab1	Ab1	Ab1
Apple chat fruit (phytoplasma?)	Apple	Jones and Aldwinkle, 1990	Ab1	P5	Ab1
Apple chlorotic leafspot trichovirus (ACLSV)	Apple, Pear, Quince	Martelli et al., 1994	P4	P4	P4
Apple dead spur agent	Apple	Fridlund, 1989	P5	P5	Ab1
Apple dimple fruit apscaviroid	Apple	Di Serio et al., 2001	Ab1	Ab1	Ab1
Apple flat limb agent	Apple	Nemeth, 1986	P4	P4	Ab1
Apple freckle scurf agent	Apple	Fridlund, 1989	Ab1	P5	Ab1
Apple fruit crinkle viroid	Apple	Ito and Yoshida, 1998	Ab1	Ab1	Ab1
Apple green crinkle agent	Apple	Fridlund, 1989	P5	P5	P5
Apple green dimple and ring blotch agent	Apple	Posnette, 1963	Ab1	Ab1	Ab1
Apple green mottle agent	Apple	Nemeth, 1986	Ab1	P5	Ab1
Apple latent spherical cheravirus	Apple	Chunjiang et al., 2000	Ab1	Ab1	Ab1

PEST	HOSTS	REFERENCES	PRESENCE/ABSENCE		
			CAN	USA	MEX
Apple leaf pucker agent and related disorders Related: -McIntosh leaf pucker -Golden Delicious russet ring -Newtown ring russeting -Stark Delicious ring russeting -Common Delicious ring russeting -Jubilee ring-and-line pattern agent -Stayman blotch -Ballarat leaf pucker -Granny Smith leaf flick, bark blister, fruit russet and distortion -Red Delicious red ring	Apple	Fridlund, 1989	P5	P5	Ab1
Apple mosaic ilarvirus (APMV)	Apple	Jones and Aldwinkle, 1990	P4	P4	P4
Apple (McIntosh) depression agent	Apple	Nemeth, 1986	Ab1	P5	Ab1
Apple necrotic spot and mottle agent	Apple	Sharma et al., 1979	Ab1	Ab1	Ab1
Apple Newton wrinkle agent	Apple	Nemeth, 1986	P5	Ab1	Ab1
Apple Platycarpa scaly bark agent (=apple stem pitting virus?)	Apple	Fridlund, 1989	P5	P5	Ab1
Apple pustule canker agent	Apple	Fridlund, 1989	Ab1	P5	Ab1
Apple red ring agent	Apple	Nemeth, 1986	Ab1	P5	Ab1
Apple ringspot agent	Apple	Nemeth, 1986	Ab1	Ab1	Ab1
Apple rosette agent	Apple	Nemeth, 1986	Ab1	Ab1	Ab1
Apple rough skin agent	Apple	Fridlund, 1989	Ab1	P5	Ab1
Apple rubbery wood agent	Apple, Pear	Jones and Aldwinkle, 1990	P4	P4	P4
Apple russet ring agent	Apple	Nemeth, 1986	P5	P5	Ab1

PEST	HOSTS	REFERENCES	PRESENCE/ABSENCE		
			CAN	USA	MEX
Apple russet wart agent	Apple	Nemeth, 1986	Ab1	Ab1	Ab1
Apple scar skin apscaviroid	Apple, Pear	Desvignes et al., 1999	P5	P5	Ab1
Apple star crack agent	Apple	Nemeth, 1986	Ab1	P5	P5
Apple stem grooving capillovirus (ASGV)	Apple, Pear	Nemeth, 1986	P4	P4	P4
Apple stem pitting foveavirus (ASPV)	Apple, Pear	Nemeth, 1986	P4	P4	P4
Apple transmissible internal bark necrosis agent	Apple	Fridlund, 1989	Ab1	P5	Ab1
Apple (Tulare) mosaic ilarvirus	Apple, Pear	Nemeth, 1986	Ab1	Ab3	Ab1
Apple (Malus robusta No. 5) decline agent	Apple	Nemeth, 1986	P5	Ab1	Ab1
Carnation ringspot dianthovirus (CRSV)	Apple, Pear	Nemeth, 1986	P12	P12	P12
Cherry rasp leaf cheravirus (CRLV)	Apple	James et al., 2001	P5	P5	Ab1
Peach latent mosaic pelamoviroid	Apple	El-Dougdoug, 1998	P12	P12	P12
Pear bark necrosis agent	Pear	Nemeth, 1986	Ab1	P5	Ab1
Pear bark split agent	Pear	Nemeth, 1986	P5	Ab1	Ab1
Pear blister canker apscaviroid	Pear	Hernàndez et al., 1992	P5	P5	Ab1
Pear bud drop agent	Pear	Nemeth, 1986	Ab1	Ab1	Ab1
Pear concentric ring pattern agent	Pear	Jones and Aldwinkle, 1990	Ab1	P5	Ab1
Pear corky pit agent (=Pear stony pit agent?)	Pear	Nemeth, 1986	P5	Ab1	Ab1
Pear freckle pit agent	Pear	Nemeth, 1986	P5	P5	Ab1
Pear mild mosaic agent	Pear	Fridlund, 1989	Ab1	Ab1	Ab1
Pear latent tombusvirus	Pear	Russo et al., 2002	Ab1	Ab1	Ab1

PEST	HOSTS	REFERENCES	PRESENCE/ABSENCE		
			CAN	USA	MEX
Pear rough bark agent	Pear	Nemeth, 1986	Ab1	Ab1	Ab1
Pear stony pit agent	Pear	Fridlund, 1989	P4	P4	Ab1
Quince deformation agent (=Apple stem pitting virus?)	Quince	Nemeth, 1986	Ab1	Ab1	Ab1
Quince stunt virus complex A mixed infection of Apple stem pitting foveavirus and Apple chlorotic leafspot trichovirus	Apple, Pear, Quince	Nemeth, 1986	P4	P4	P4
Quince wood pitting agent	Quince	Fridlund, 1989	Ab1	P5	Ab1
Quince yellow blotch agent (=Apple rubbery wood?)	Apple, Pear, Quince	Nemeth, 1986	Ab1	Ab1	Ab1
Quince yellow mosaic agent	Quince	Fridlund, 1989	Ab1	Ab1	Ab1
Sowbane mosaic sobemovirus (SOMV)	Apple	Nemeth, 1986	P12	P12	P12
Tobacco mosaic tobamovirus (TMV)	Apple, Pear	Nemeth, 1986	P5	P5	P12
Tobacco necrosis necrovirus (TNV)	Apple, Pear	Nemeth, 1986	P12	P5	P12
Tobacco ringspot nepovirus (TRSV)	Apple	Nemeth, 1986	P5	P12	P12
Tomato ringspot nepovirus (TORSV)	Apple	Jones and Aldwinkle, 1990	P5	P5	P5

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Table 3: Fungal pathogens (incl. Chromista) of stone and pome fruit trees – Status in NAPPO Region

PEST	HOST	DISEASE	REFERENCE	PRESENCE/ABSENCE		
				CAN	USA	MEX
Alternaria gaisen Nagano Synonym: Alternaria kikuchiana Tanaka	Pyrus	Japanese pear black spot	Jones & Aldwinckle, 1990	Ab1	Ab1	Ab1
Alternaria mali Roberts	Malus	Alternaria blotch	Jones & Aldwinckle, 1990	P5	P5	Ab1
Alternaria yaliinficiens R G. Roberts	Pyrus	Chocolate spot	Roberts, 2005	Ab1	Ab1	Ab1
Apiognomonia erythrostoma (Pers.) V. Hohnel. Anamorph: Phomopsis stipata (Lib.) Sutton	Prunus	Red spot, leaf scorch, gnomoniosis	Ogawa et al., 1995	Ab1	Ab1	Ab1
Apiosporina morbosa (Schwein.:Fr.) V. Arx	Prunus	Black knot	Ogawa et al., 1995	P1	P1	P2
Armillaria heimii Pegler	Prunus	Armillaria root rot	Mwenje & Ride, 1997	Ab1	Ab1	Ab1
Armillaria mellea (Vahl.:Fr.) P. Kumm.	Prunus	Armillaria root rot	Jones & Aldwinckle, 1990; Ogawa et al., 1995	P1	P1	P1
Blumeriella jaapii (Rehm) Arx	Prunus	Leaf spot, shot-hole	Ogawa et al., 1995	P1	P1	Ab1
Botryosphaeria dothidea (Moug.:Fr.) Ces. & De Not. Anamorph: Fusicoccum aesculi Corda	Prunus, Malus	Fungal gummosis (Prunus), white rot (Malus)	Jones & Aldwinckle, 1990; Ogawa et al., 1995	P5	P5	P12
Botryosphaeria obtusa (Schwein.) Shoemaker Anamorph: Sphaeropsis malorum Berk.	Prunus, Malus	Fungal gummosis (Prunus), black rot (Malus)	Jones & Aldwinckle, 1990; Ogawa et al., 1995	P1	P1	P2
Botryosphaeria ribis Gross. & Duggar	Malus, Prunus	Fruit rot, gummosis	Pusey, 1993	P12	P12	P12
Botryosphaeria stevensii Shoemaker Synonym: Physalospora malorum Shear, N. Stevens, & M.S. Wilcox Anamorph: Diplodia mutila (Fr. :Fr.) Mont.	Malus, Pyrus	Black rot	Jones & Aldwinckle, 1990	P1	P1	Ab1

PEST	HOST	DISEASE	REFERENCE	PRESENCE/ABSENCE		
				CAN	USA	MEX
Botryotinia fuckeliana (de Bary) Whetzel [teleomorph] Anamorph: Botrytis cinerea Pers.: Fr.	Malus, Prunus	Gray mold, dry eye rot, blossom end rot, green fruit rot	Jones & Aldwinckle, 1990; Ogawa et al., 1995	P2	P1	P12
Chrondrostereum purpurem (Pers.:Fr.) Pouzar	Malus, Prunus	Silver blight	Jones & Aldwinckle, 1990; Ogawa et al., 1995	P1	P1	P12
Colletotrichum acutatum J.H. Simmonds	Prunus; Malus	Anthracnose, bitter rot; blackspot	Jones & Aldwinckle. 1990; Ogawa et al., 1995	P12	P12	P2
Corticium stevensii Burt	Malus, Pyrus	Thread blight	Jones & Aldwinckle, 1990	Ab1	P2	Ab1
Cristulariella moricola (Hino) Redhead Teleomorph: Grovesinia pyramidalis M. Cline, J.L. Crane, & S. Cline	Malus	Zonate leaf spot	Ogawa et al., 1995	Ab1	Ab1	Ab1
Cylindrocarpon didymum (Harting) Wollenweb.	Malus	Twig blight	Dugan & Grove, 1994	P12	P2	Ab1
Diaporthe ambigua Nitschke Anamorph: Phomopsis ambigua (Sacc.) Traverso	Malus, Pyrus, Prunus	Canker	Smit et al., 1997	P2	P2	Ab1
Diaporthe eres Nitschke	Malus, Prunus	Bark canker	Jones & Aldwinckle, 1990; Ogawa et al., 1995	P2	P2	Ab1
Diaporthe perniciosa Ém. Marchal Anamorph: Phomopsis mali Roberts, nom. Illeg.	Prunus, Malus	Bark canker	Jones & Aldwinckle, 1990; Ogawa et al., 1995	P1	P1	Ab1
Diaporthe tanakae Kobayashi & Sakuma Anamorph: Phomopsis tanakae Kobayashi & Sakuma	Malus, Pyrus	Canker	Jones & Aldwinckle, 1990	Ab1	Ab1	Ab1
Diplocarpon mali Harada & Sawamura Anamorph: Marssonina coronaria (Ellis & J.J. Davis) J.J. Davis	Malus	Marssonina blotch, apple leaf spot disease	Jones & Aldwinckle, 1990	P2	P2	Ab1

PEST	HOST	DISEASE	REFERENCE	PRESENCE/ABSENCE		
				CAN	USA	MEX
Diplocarpon mespili (Soraurer) Sutton Synonym: Fabraea maculata Atk. Anamorph: Entomosporium mespili (DC) Sacc.	Pyrus, Cydonia	Pear leaf blight, Fabraea leaf spot	Jones & Aldwinckle, 1990	P1	P1	P2
Erythricium salmonicolor (Berk. & Broome) Burdsall	Pyrus, Malus	Pink disease	Kondal & Agarwala, 1975	Ab1	P12	P12
Eutypa lata (Pers.:Fr.) Tul. & C. Tul. Anamorph: Cytosporina spp.	Prunus	Eutypa dieback, gummosis disease	Ogawa et al., 1995	P12	P12	Ab5
Gloeodes pomigena (Schwein.) Colby	Malus, Pyrus, Prunus	Sooty blotch, flyspeck	Jones & Aldwinckle, 1990	P2	P2	P2
Glomerella cingulata (Stoneman) Spauld. and H. Schrenk Anamorph: Colletotrichum gloeosporioides (Penz.) Penz. & Sacc. in Penz.	Prunus, Malus, Pyrus	Anthracnose, fruit rot, bitter rot, black spot	Jones & Aldwinckle, 1990; Ogawa et al., 1995	P1	P1	P1
Guignardia piricola (nose) W. Yanam Synonym: Physalospora piriciola Nose Anamorph: Fusicoccum sp.	Malus, Pyrus	Apple ring rot disease	Jones & Aldwinckle, 1990	Ab1	Ab1	Ab1
Gymnosporangium asiaticum Miyabe ex G. Yamada	Pyrus	Japanese pear rust	Jones & Aldwinckle, 1990	Ab1	Ab1	Ab1
Gymnosporangium clavipes (Cooke & Peck) Cooke & Peck in Peck	Malus, Pyrus	Quince rust	Jones & Aldwinckle, 1990	P1	P1	P2
Gymnosporangium fuscum R. Hedw. in DC	Pyrus	Pear trellis rust, European pear rust	Jones & Aldwinckle, 1990	P5	P5	Ab1
Gymnosporangium globosum (Farl.) Farl.	Malus, Pyrus	American hawthorn rust	Jones & Aldwinckle, 1990	P1	P1	P2
Gymnosporangium juniperi-virginianae Schwein.	Malus	Cedar-apple rust	Jones & Aldwinckle, 1990	P5	P5	Ab1
Gymnosporangium kernianum Bethel	Pyrus	Kern's pear rust	Jones & Aldwinckle, 1990	Ab1	P2	P2
Gymnosporangium libocedri (Henn.) F. Kern	Pyrus	Pacific coast pear rust	Jones & Aldwinckle, 1990	Ab1	P2	Ab1

PEST	HOST	DISEASE	REFERENCE	PRESENCE/ABSENCE		
				CAN	USA	MEX
Gymnosporangium nelsonii Arth.	Pyrus	Rocky mountain pear rust	Jones & Aldwinckle, 1990	P5	P5	P2
Gymnosporangium yamadae Miyabe ex G. Yamada	Malus	Japanese apple rust	Jones & Aldwinckle, 1990	Ab1	Ab1	Ab1
Helicobasidium mompa Tanaka	Prunus, Pyrus, Malus	Violet root rot	Jones & Aldwinckle 1990; Ogawa et al.,1995	Ab1	Ab1	Ab1
Helminthosporium papulosum A. Berg.	Malus, Pyrus	Black pox of apple, blister canker of pear	Jones & Aldwinckle, 1990	Ab1	Ab1	Ab1
Hinomyces pruni (I. Hino) Narumi-salito & Y. Harada. Synonym: Cristulariella pruni Y. Harada & Noro	Prunus	Zonate leaf spot	Ogawa et al., 1995	Ab1	Ab1	Ab1
Leucostoma cincta (Fr.:Fr.) Höhn. Anamorph: Cytospora cincta Sacc.	Prunus	Dieback, perennial canker	Ogawa et al., 1995	P5	P5	Ab1
Leucostoma persoonii Hohn.	Prunus	Dieback, canker	Ogawa et al., 1995	P1	P1	P2
Leucotelium pruni-persciae (Hori) Tranzschel	Prunus	Leucotelium white rust	Ogawa et al., 1995	Ab1	Ab1	Ab1
Macrophoma kawatsakai Hara	Prunus	Plum wilt	Qong et al., 2005	Ab1	Ab1	Ab1
Monilinia fructicola (G. Wint.) Honey	Prunus, Malus	Brown rot of fruit	Jones & Aldwinckle 1990; Ogawa et al., 1995	P1	P1	P2
Monilinia fructigena Honey in Whetzel	Prunus, Malus, Pyrus,	Brown rot	Jones & Aldwinckle 1990; Ogawa et al., 1995	Ab1	Ab2	Ab1
Monilinia kusanoi (Takah.) W. Yamamoto Anamorph: Monilia kusanoi P. Henn.	Prunus	Leaf blight, green fruit rot	Ogawa et al., 1995	Ab1	Ab1	Ab1
Monilinia laxa (Aderhhold & Ruhland) Honey	Prunus, Malus	Brown rot	Jones & Aldwinckle 1990; Ogawa et al., 1995	P2	P2	Ab1

PEST	HOST	DISEASE	REFERENCE	PRESENCE/ABSENCE		
				CAN	USA	MEX
Monilinia mali (Takah.) Whetzel	Malus	Blossom blight, leaf blight	Jones & Aldwinckle, 1990	Ab1	Ab1	Ab1
Monilia polystroma G. van Leeuwen et al.	Malus, Prunus	Brown rot	van Leeuwen et al., 2002	Ab1	Ab1	Ab1
Nectria cinnabarina (Tode:Fr.) Fr. Anamorph: Tubercularia vulgaris Tode: Fr.	Malus, Prunus	Twig blight, dieback, coral spot	Jones & Aldwinckle, 1990	P1	P1	P2
Nectria galligena Bress. in Strass. Anamorph: Cylindrocarpon heteronemum (Berk. & Broome) Wollenweb.	Malus, Pyrus	Canker, eye rot; zonate leaf spot	Jones & Aldwinckle, 1990	P1	P1	P2
Neofabrae perennans (Kienholz) Dugan, R.G. Roberts & G.G. Grove Synonym: Neofabrae perennans Kienholz Anamorph: Cryptosporiopsis perennans (Zeller & Childs) Wollenweb.	Malus	Perennial canker	Jones & Aldwinckle, 1990	P5	P5	Ab1
Peniophora sacrata G. Cunn.	Prunus, Malus, Pyrus	Root canker	Jones & Aldwinckle, 1990	Ab1	Ab1	Ab1
Pezicula malicorticis (H . Jacks.) Nannf. Synonym: Neofabraea malicortis H. Jacks. Anamorph: Cryptosporiopsis curvispora (Peck) Gremmen	Malus, Pyrus	Bull's-eye rot, anthracnose, and perennial canker	Jones & Aldwinckle, 1990	P2	P2	Ab1
Phacidiopycnis piri (Fuckel) J. Weindlymayr Teleomorph: Potebniamyces pyri (Berk. & Broome) Dennis	Pyrus, Malus	Canker, stem end rot	Xiao & Boal, 2005	P5	P5	Ab1
Phacidiopycnis washingtonensis Xiao and J. D. Rodgers	Malus, Pyrus	Phacidiopycnis rot, canker, twig dieback	Xiao et al. 2005	Ab1	P5	Ab1
Phialophora malorum (M.N. Kidd & A. Beamont) McColloch	Malus, Pyrus	Side rot	Jones & Aldwinckle, 1990	P2	P2	P12
Phialophora parasitica Ajello, L.K. Georg. & Wang	Prunus	Dieback	Ogawa et al., 1995	Ab1	P12	Ab1

PEST	HOST	DISEASE	REFERENCE	PRESENCE/ABSENCE		
				CAN	USA	MEX
Phomopsis amygdali (Del.) Tuset & Portilla	Prunus	Constriction canker	Ogawa et al., 1995	P2	P2	Ab1
Phomopsis fukushii S. Endo & Tanaka	Pyrus, Malus	Canker	Uecker, 1988	Ab1	Ab1	Ab1
Phyllosticta solitaria Ellis & Everh.	Malus	Blotch	Jones & Aldwinckle, 1990	P2	P2	Ab1
Phymatotrichopsis omnivora (Duggar) Hennebert	Malus, Prunus, Pyrus, Cydonia	Texas root rot	Jones & Aldwinckle 1990; Ogawa et al., 1995	Ab1	P2	P2
Phytophthora cambivora (Petri) Buisman	Malus, Prunus	Ink disease	Jones & Aldwinckle, 1990; Ogawa et al., 1995	P5	P5	Ab1
Phytophthora cryptogea Pethybr. & Lafferty	Prunus, Malus	Collar rot	Jones & Aldwinckle, 1990; Ogawa et al., 1995	P5	P5	P2
Phytophthora drechsleri Tucker	Malus	Fruit rot	Jones & Aldwinckle, 1990	P12	P12	P2
Phytophthora megasperma Dreschsler	Malus, Prunus	Collar rot, crown rot	Jones & Aldwinckle, 1990; Ogawa et al., 1995	P12	P12	Ab1
Phytophthora syringae (Kleb.) Kleb.	Malus, Prunus	Fruit rot	Jones & Aldwinckle, 1990; Ogawa et al., 1995	P5	P5	Ab1
Podosphaera clandestina (Wallr.:Fr.) Lév.	Prunus	Powdery mildew	Ogawa et al., 1995	P1	P1	Ab1
Podosphaera leucotricha (Ellis & Everh.) E.S. Salmon Anamorph: Oidium farinosum Cooke	Prunus, Malus	Rusty spot, powdery mildew	Jones & Aldwinckle, 1990; Ogawa et al., 1995	P1	P1	P1
Podosphaera tridactyla (Wallr.) de Bary	Prunus	Powdery mildew	Ogawa et al., 1995	P5	P5	Ab1
Polystigma rubrum (Pers.) DC.	Prunus	Plum red leaf spot	Ogawa et al., 1995	Ab1	Ab1	Ab1

PEST	HOST	DISEASE	REFERENCE	PRESENCE/ABSENCE		
				CAN	USA	MEX
Polystigma ussuriense (Jacz. & Natalyina) Prots.	Prunus	Plum red leaf spot	Ogawa et al., 1995	Ab1	Ab1	Ab1
Pythium irregulare Buisman	Malus	Replant disease	Braun, 1991	P1	P1	P12
Pythium vexans de Bary	Prunus, Pyrus	Water rot	Hendrix et al., 1966	P12	P12	Ab1
Rosellinia necatrix Prill. [Anamorph: Dematophora necatrix R. Hartig]	Prunus, Malus	Root rot	Jones & Aldwinckle 1990; Ogawa et al., 1995	Ab1	P2	P2
Schizothyrium pomi (Mont.:Fr.) Arx [Anamorph: Zygophiala jamaicensis E. Mason]	Malus	Flyspeck	Jones & Aldwinckle 1990	P2	P2	Ab1
Sclerotium rolfsii Sacc. [Teleomorph: Athelia rolfsii (Curzi) Tu & Kimbrough]	Malus, Pyrus, Prunus	Southern blight, stem rot	Jones & Aldwinckle 1990; Ogawa et al., 1995	P12	P12	P12
Sphaerotheca pannosa (Wallr. :Fr.) Lév.	Prunus	Powdery mildew	Ogawa et al., 1995	P1	P1	P2
Stemphyllium vesicarium (Wallr.) E. Simmons Teleomorph: Pleospora allii (Rabenh.) Ces. & De Not.	Pyrus	Brown spot	Llorente et al. 2006.	P12	P12	Ab1
Taphrina deformans (Berk.) Tul.	Prunus	Peach leaf curl	Ogawa et al., 1995	P1	P1	P2
Thielaviopsis basicola (Berk. & Broome) Ferraris Synanamorph: Chalara elegans Nag Raj & Kendrick	Prunus	Black root rot	Sewell & Wilson, 1975	P1	P1	Ab1
Tranzschelia discolor (Fuckel) Tranzschel & Litv. Synonym: Tranzschelia pruni-spinosae (Pers. :Pers.) Dietel var. discolor (Fuckel) Dunegan	Prunus	Rust	Ogawa et al., 1995	P5	P5	P2
Tranzschelia pruni-spinosae (Pers. :Pers.) Dietel	Prunus	Rust	Ogawa et al., 1995	P1	P1	Ab1
Valsa ceratosperma (Tode: Fr.) Maire [Anamorph: Cytospora sacculus (Schwein.) Gvritischvili]	Malus	Valsa canker	Jones & Aldwinckle, 1990	P12	P12	Ab1

PEST	HOST	DISEASE	REFERENCE	PRESENCE/ABSENCE		
				CAN	USA	MEX
Venturia carpophila E.E. Fisher [Anamorph: Cladosporium carpophilium Thuem.]	Prunus	Scab, black spot, freckle spot	Ogawa et al., 1995;	P1	P1	Ab1
Venturia inaequalis (Cooke) G. Wint. [Anamorph: Cladosporium carpophilum Thuem]	Malus	Anthracnose, scab, black spot	Jones & Aldwinckle, 1990	P1	P1	P2
Venturia nashicola S. Tanaka & S. Yamamoto Anamorph: Fusicladium nashicola K. Schub. & U. Braun	Pyrus	Pear scab	Jones & Aldwinckle, 1990	Ab1	Ab1	Ab1
Venturia pyrina Aderhold Anamorph: Fusicladium pyrorum (Lib.) Fuckel	Pyrus	Pear scab	Jones & Aldwinckle, 1990	P1	P1	P2
Verticillium albo-atrum Reinke & Berthier	Prunus	Verticllium wilt	Ogawa et al., 1995	P1	P1	P2
Verticillium dahliae Kleb	Prunus	Verticillium wilt	Ogawa et al., 1995	P1	P1	P2
Wilsonomyces carpophilus (Lév.) Adaskaveg Ogawa, & Butler Anamorph: Stigmina carpophila (Lév.) M.B. Ellis	Prunus	Shot hole	Ogawa et al., 1995	P1	P1	P2

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Table 4: Bacterial and phytoplasmal pathogens of stone and pome fruit trees – Status in NAPPO Region

PEST	HOSTS	DISEASE	REFERENCE	PRESENCE/ABSENCE		
				CAN	USA	MEX
Bacteria						
Agrobacterium tumefaciens (Smith & Townsend) Conn Synonym: Rhizobium radiobacter (Smith & Townsend) Young et al.	Prunus, Malus	Crown gall	Rhouma et al., 2005	P1	P1	P2
Agrobacterium rhizogenes (Riker et al. Conn. Synonym: Rhizobium rhizogenes (Riker et al.) Young et al.	Malus	Hairy root	Young, 1996	P1	P1	P2
Erwinia amylovora (Burrill) Winslow et al. (includes antibiotic resistant strains)	Malus, Pyrus	Fire blight	Van der Zwet and Keil, 1979	P1	P1	P2
Erwinia pyrifoliae Kim et al.	Pyrus pyrifolia	Asian pear blight	Kim et al., 1999	Ab1	Ab1	Ab1
Pseudomonas amygdale Psallidas & Panagopoulos	Prunus	Almond bacteriosis	Psallidas & Panagopoulos, 1975	Ab1	Ab1	Ab1
Pseudomonas syringae pv. morsprunorum (Wormald) Young et al.	Prunus	Bacterial canker of stone fruits; dieback	Lattore and Jones, 1979	P1	P1	Ab1
Pseudomonas syringae pv. papulans (Rose) Dhanvantari	Malus	Blister spot	Kerkoud et al., 2002	P5	P5	Ab1
Pseudomonas syringae pv. persicae (Prunier et al.) Young et al.	Prunus	Bacterial shoot dieback; canker; leaf spot; fruit lesions	Vigouroux, 1999	Ab1	Ab1	Ab1

PEST	HOSTS	DISEASE	REFERENCE	PRESENCE/ABSENCE		
				CAN	USA	MEX
Pseudomonas syringae pv. syringae van Hall	Prunus, Malus, Pyrus	Bacterial canker & fruit spot; blossom blast of pear; blister bark of apple	Jones & Aldwinckle,1990; Ogawa et al., 1995.	P1	P1	Ab1
Xanthomonas arboricola pv. pruni (Smith) Vauterin et al.	Prunus	Leaf and fruit spot and stem canker	Jones & Aldwinckle,1990	P5	P5	P2
Xylella fastidiosa Wells et al.	Prunus	Phony peach disease; plum leaf scald	Jones & Aldwinckle,1990	P12	P5	Ab1
Phytoplasma						
Candidatus Phytoplasma asteris Lee et al	Malus, Prunus, Pyrus	Aster yellows, apple sessile leaf	Firrao et al., 2005; Jomantienne & Davis, 2005	Ab1	Ab1	Ab1
Candidatus Phytoplasma australiense Davis et al.	Prunus	Peach yellow leaf roll (Bolivia)	Jones et al., 2005	Ab1	Ab1	Ab1
Candidatus Phytoplasma mali Seemuller & Schneider	Malus, Prunus	Apple proliferation	Jones & Aldwinckle,1990; Mehle et al., 2006	Ab1	Ab1	Ab1
Candidatus Phytoplasma phoenicium Verdin et al.	Prunus	Almond witches'-broom	Abou-Jawdah et al., 2003; Verdin et al., 2003	Ab1	Ab1	Ab1
Candidatus Phytoplasma pruni Firrao	Prunus	X-disease, peach red suture, peach rosette	Firrao, 2004; Ogawa et al., 1995; Scott & Zimmerman, 2001	P5	P5	Ab1

PEST	HOSTS	DISEASE	REFERENCE	PRESENCE/ABSENCE		
				CAN	USA	MEX
Candidatus Phytoplasma prunorum Seemuller & Schneider	Prunus	European stone fruit yellows; apricot chlorotic leafroll; Molières disease; Japanese plum leptonecrosis; peach rosette (Europe); peach rosette decline; peach vein clearing; decline of almond and flowering cherry	Berhard et al., 1977; Lorenz et al., 1994; Firrao et al., 2005; Morvan, 1977; Ogawa et al., 1995	Ab1	Ab1	Ab1
Candidatus Phytoplasma pyri Seemuller & Schneider	Pyrus, Prunus	Pear decline, moria, peach yellow leaf roll	Blomquist & Kirkpatrick, 2002; Firrao et al., 2005; Seemuller & Schneider, 2004	P5	P5	Ab1
Candidatus Phytoplasma ulmi Lee et al.	Prunus cerasus	Cherry lethal yellows	Firrao et al., 2005; Zhu et al., 1998	Ab1	Ab1	Ab1
Cherry albino phytoplasma	Prunus	Cherry albino	Ogawa et al., 1995	Ab1	Ab3	Ab1
Cherry blossom anomaly phytoplasma	Prunus	Cherry blossom anomaly	Ogawa et al., 1995	Ab1	P5	Ab1

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Annex 2: Grapevines Pests

LEGEND FOR SYMBOLS USED IN TABLES

Presence or absence unless otherwise noted conform to the categories listed in the *Determination of Pest Status in an Area*, ISPM No. 8. For ease of reference alphanumeric designations have been added here.

Ab1: Absent: no pest records
Ab2: Absent: pest eradicated
Ab3: Absent: pest no longer present
Ab4: Absent: pest records invalid
Ab5: Absent: pest records unreliable
Ab6: Absent: intercepted only
Ab7: Absence: confirmed by survey
Ab8: Absence: pest free area declared

P1: Present: in all parts of the area
P2: Present: only in some areas
P3: Present: except in specified pest free areas
P4: Present: in all parts of the area where host crop(s) are grown
P5: Present: only in some areas where host crop(s) are grown
P6: Present: only in protected cultivation
P7: Present: seasonally
P8 Present: but managed
P9 Present: subject to official control
P10: Present: under eradication
P11: Present: at low prevalence.
P12: Present: not associated with host crop (NAPPO category)

Table 1: Viruses and Virus-like diseases of grapevines – Status in NAPPO Region

PEST	REFERENCE	PRESENCE/ABSENCE		
		CAN	USA	MEX
Arabis mosaic virus (ArMV)	Martelli and Boudon-Padieu, 2006	P5	P5	Ab1
Blueberry leaf mottle virus (BBLMV)	Martelli and Boudon-Padieu, 2006	Ab1	P12	Ab1
Grapevine Ajinashika virus (GAV)	Namba et al, 1991	Ab1	Ab1	Ab1
Grapevine Algerian latent virus (GALV)	Gallitelli et al, 1989	Ab1	Ab1	Ab1
Grapevine berry inner necrosis disease	Martelli and Boudon-Padieu, 2006	Ab1	Ab1	Ab1
Grapevine Bulgarian latent virus (GBLV)	Martelli and Boudon-Padieu, 2006	Ab1	Ab1	Ab1
Grapevine chrome mosaic virus (GCMV)	Martelli and Boudon-Padieu, 2006	Ab1	Ab1	Ab1
Grapevine corky bark disease	Martelli and Boudon-Padieu, 2006	Ab1	P5	P5
Grapevine fanleaf virus (GFLV)	Martelli and Boudon-Padieu, 2006	P5	P5	P5
Grapevine leafroll-associated virus 1 (GLRaV-1)	Martelli and Boudon-Padieu, 2006	P5	P5	Ab1
Grapevine leafroll-associated virus 2 (GLRaV-2)	Martelli and Boudon-Padieu, 2006	P5	P5	Ab1
Grapevine leafroll-associated virus 3 (GLRaV-3)	Martelli and Boudon-Padieu, 2006	P5	P5	P5
Grapevine leafroll-associated virus 4 (GLRaV-4)	Martelli and Boudon-Padieu, 2006	Ab1	P5	Ab1
Grapevine leafroll-associated virus 5 (GLRaV-5)	Martelli and Boudon-Padieu, 2006	Ab1	Ab1	Ab1
Grapevine leafroll-associated virus 6 (GLRaV-6)	Martelli and Boudon-Padieu, 2006	Ab1	Ab1	Ab1
Grapevine leafroll-associated virus 7 (GLRaV-7)	Martelli and Boudon-Padieu, 2006	Ab1	Ab1	Ab1
Grapevine leafroll disease	Martelli and Boudon-Padieu, 2006	P1	P1	P1
Grapevine line pattern virus (GLPV)	Martelli and Boudon-Padieu, 2006	Ab1	Ab1	Ab1
Grapevine rupestris stem pitting associated virus (RSPaV)	Martelli and Boudon-Padieu, 2006	P4	P4	P4
Grapevine rupestris stem pitting disease (RSP)	Martelli and Boudon-Padieu, 2006	P4	P4	P4

PEST	REFERENCE	PRESENCE/ABSENCE		
		CAN	USA	MEX
Grapevine Tunisian ringspot virus (GTRV)	Martelli and Boudon-Padieu, 2006	Ab1	Ab1	Ab1
Grapevine virus A (GVA)	Martelli and Boudon-Padieu, 2006	Ab1	P5	Ab1
Grapevine virus B (GVB)	Martelli and Boudon-Padieu, 2006	Ab1	P5	Ab1
Grapevine virus D (GVD)	Martelli and Boudon-Padieu, 2006	Ab1	Ab1	Ab1
Kober stem grooving disease (KSG)	Martelli and Boudon-Padieu, 2006	Ab1	P5	Ab1
Tomato bushy stunt virus (TBSV)	Martelli and Boudon-Padieu, 2006	P12	P12	P12
Tomato ringspot virus (ToRSV)	Martelli and Boudon-Padieu, 2006	P5	P5	Ab1

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Table 2: Nematode pests of grapevines – Status in NAPPO Region

PEST	MODE OF PARASITISM ON GRAPEVINES	REFERENCE	PRESENCE/ABSENCE		
			CAN	USA	MEX
Hoplolaimus pararobustus	Migratory endo and ectoparasite	Cohn, E.1970; Lambert *et al*, 1997; Kleynhans *et al*, 1966.	Ab1	Ab1	Ab1
Hoplolaimus seinhorsti	Migratory endo and ectoparasite	Catalano *et al*., 1992.; Brown, *et al*, 1993.	Ab1	P2	Ab1
Longidorus africanus	Root tip ectoparasite	Andres *et al*., 1991; Raski, D.J., 1988.	Ab1	P1	Ab1
Longidorus apulus	Root tip ectoparasite	Tzortzakakis *et al,.* 2001.	Ab1	Ab1	Ab1
Longidorus attenuatus	Root tip ectoparasite	Griffiths and Robertson.1984; Raski, D.J.,1988; CPC 2006 edition.	Ab1	Ab1	Ab1
Longidorus cretensis	Root tip ectoparasite	Tzortzakakis *et al,.* 2001.	Ab1	Ab1	Ab1
Longidorus elongatus	Root tip ectoparasite	Griffiths and Robertson.1984; Raski, D.J.,1988; CPC 2006 edition.	P2	P1	Ab1
Longidorus euonymus	Root tip ectoparasite	Barsi, L. 1994; Choleva-Abadzhieva, B.1975.	Ab1	Ab1	Ab1
Longidorus fasciatus	Root tip ectoparasite	Brown et al,1993, Brown *et al*., 1997.	Ab1	Ab1	Ab1
Longidorus juvenilis	Root tip ectoparasite	Coiro *et al*., 1992; Kleynhans *et al*, 1966.	Ab1	Ab1	Ab1
Longidorus macrosoma	Root tip ectoparasite	Andres *et al.*,1991; Raski, D.J., 1988.	Ab1	Ab1	Ab1
Longidorus magnus	Root tip ectoparasite	Lamberti *et al*., 1982.	Ab1	Ab1	Ab1
Meloidogyne arenaria	Sedentary Endoparasite	Powers *et al*., 2005; Raski, D.J., 1988; CPC 2006 edition.	P6	P1	P1
Meloidogyne incognita	Sedentary Endoparasite	Powers *et al*., 2005; Raski, D.J.,1988.	P6	P1	P1
Meloidogyne hapla	Sedentary Endoparasite	Powers *et al.*, 2005; Raski, D.J.,1988; CPC 2006 edition.	P1	P1	P1
Meloidogyne javanica	Sedentary Endoparasite	Powers *et al*., 2005; Raski, D.J.,1988.	P6	P1	P2
Meloidogyne mali	Sedentary Endoparasite	Itoh *et al*., 1969.	Ab1	Ab1	Ab1
Meloidogyne nataliei	Sedentary Endoparasite	Bird *et al*.,1994; Raski, D.J.,1988.	Ab1	P2	Ab1

PEST	MODE OF PARASITISM ON GRAPEVINES	REFERENCE	PRESENCE/ABSENCE		
			CAN	USA	MEX
Mesocriconema xenoplax	Ectoparasite	Ferris *et al*., 2004.	P1	P1	P5
Paralongidorus maximus	Root tip ectoparasite	Mc Elroy *et al*., 1977.	Ab1	Ab1	Ab1
Pratylenchus brachyurus	Migratory endo and ectoparasite	Oliveira *et al*., 1999.	P2	P1	P5
Pratylenchus coffeae	Migratory endo and ectoparasite	Silva and Inomoto, 2002.	Ab1	P1	P5
Pratylenchus crenatus	Migratory endo and ectoparasite	Brown *et al*., 1980.	P2	P1	P5
Pratylenchus hexincisus	Migratory endo and ectoparasite	Carta *et al*., 2001.	P2	P1	P5
Pratylenchus neglectus	Migratory endo and ectoparasite	Carta *et al*., 2001.	P2	P1	P5
Pratylenchus penetrans	Migratory endo and ectoparasite	Carta *et al*., 2001.	P2	P1	P1
Pratylenchus pratensis	Migratory endo and ectoparasite	Handoo and Morgan, 1989.	Ab1	P2	P2
Pratylenchus scribneri	Migratory endo and ectoparasite	Handoo and Morgan, 1989.	Ab1	P1	P5
Pratylenchus thornei	Migratory endo and ectoparasite	Handoo and Morgan, 1989.	P2	P1	P5
Pratylenchus vulnus	Migratory endo and ectoparasite	Handoo and Morgan, 1989; Chitambar and Raski, 1984.	P2	P1	P5
Tylenchulus semipenetrans	Semiendoparasite	Edwards, M. 1988.	Ab1	P1	P1
Xiphinema americanum	Root tip ectoparasite	Weimin *et al*., 2004.	P2	P1	P1
Xiphinema australiae	Root tip ectoparasite	Luc. M. 1981.	Ab1	Ab1	Ab1
Xiphinema brevicolle	Root tip ectoparasite	Olivera *et al*., 2004.	Ab1	P12	Ab1
Xiphinema bricolensis	Root tip ectoparasite	Vrain, T. C. 1993.	P2	P12	Ab1
Xiphinema californicum	Root tip ectoparasite	Georgi, L. L. 1988.	Ab1	P1	Ab1

PEST	MODE OF PARASITISM ON GRAPEVINES	REFERENCE	PRESENCE/ABSENCE		
			CAN	USA	MEX
Xiphinema diversicaudatum	Root tip ectoparasite	Weimin *et al*., 2004.	P2	Ab1	P1
Xiphinema index	Root tip ectoparasite	Weimin *et al*., 2004.	Ab1	P1	Ab1
Xiphinema insigne	Root tip ectoparasite	Lambert *et al*., 1997.	Ab1	Ab1	Ab1
Xiphinema italiae	Root tip ectoparasite	Weimin *et al*., 2004.	Ab1	Ab1	Ab1
Xiphinema mediterraneum	Root tip ectoparasite	Roca *et al*., 1991.	Ab1	Ab1	Ab1
Xiphinema melitense	Root tip ectoparasite	Roca *et al*., 1991.	Ab1	Ab1	Ab1
Xiphinema monohysterum	Root tip ectoparasite	McLeod and Khair, 1971.	Ab1	Ab1	Ab1
Xiphinema pachtaicum	Root tip ectoparasite	Roca *et al*., 1991.	Ab1	Ab1	Ab1
Xiphinema pacificum	Root tip ectoparasite	Vrain, T. C. 1993.	P2	Ab1	Ab1
Xiphinema rivesi	Root tip ectoparasite	Georgi, L. L. 1988.	P2	P2	Ab1
Xiphinema simile	Root tip ectoparasite	Barsi, L. 1994.	Ab1	Ab1	Ab1
Xiphinema taylori	Root tip ectoparasite	Weimin *et al*., 2004.	Ab1	Ab1	Ab1
Xiphinema vuittenezi	Root tip ectoparasite	Weimin *et al*., 2004.	Ab1	P2	Ab1
Zygotylenchus guevarai	Migratory endo and ectoparasite	Siddiqi, 1975.	Ab1	Ab1	Ab1
Longidorus other *spp*.	Root tip ectoparasite	Koenning *et al*., 1999.			
Meloidogyne other *spp*.	Sedentary Endoparasite	Powers *et al*., 2005.			
Xiphinema other *spp*.	Root tip ectoparasite	Roca *et al*., 1991.			

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