

# Discussion Document For The Importation Of Rubus Spp. Nursery Stock From All Countries

## CRYOTHERAPY AS A METHOD FOR REDUCING THE VIRUS INFECTION OF APPLES (*MALUS SP.*)

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### Abstract

**BACKGROUND:** There is an urgent need in Kazakhstan for virus-free nursery stock to reinvigorate the industry and preserve historic cultivars. An *in vitro* collection of apples could be used for virus testing and elimination and for providing virus-free elite stock plants to nurseries. **METHODS:** *Malus sieversii* Ledeb. M. Roem. and *Malus domestica* Borkh. accessions were initiated *in vitro* for virus identification and elimination. Reverse transcription and multiplex PCR were used to test for five viruses. PVS2 vitrification was used as a tool for cryotherapy. **RESULTS:** Four viruses, *Apple chlorotic leaf spot virus* (ACLSV), *Apple stem pitting virus* (ASPV), *Apple stem grooving virus* (ASGV) and *Apple mosaic virus* (ApMV) were detected in 17 accessions. *Tomato ringspot virus* (ToRSV) was not detected. ACLSV affected 53.8% of the accessions, ASPV 30.8%, ASGV 5.1%, and ApMV was found only in 'Aport Alexander'. Cryotherapy produced virus-free shoot tips for seven of nine cultivars tested. Six cultivars had 60-100% elimination of ACLSV. **CONCLUSIONS:** An *in vitro* collection of 59 accessions was established. Virus elimination using cryotherapy produced virus-free shoots for seven of nine cultivars and is a promising technique for developing a virus-free apple collection.

**Keywords:** cryotherapy, *Malus* cryobank, multiplex PCR, viruses, vitrification, virus-free

### INTRODUCTION

The apple is one of the world's most important fruit crops and Kazakhstan is one of the centers of its origin (19). Environmental and climatic conditions of the south and south-east of Kazakhstan are favorable for gardening and

production of high quality apples. However, more than 55% of apple trees are imported from foreign countries. This is due to the presence of bacterial, fungal and viral diseases in local trees that result in poor quality planting material (16). Seven apple viral diseases are found in the fruit plantations of south and south-east Kazakhstan. The most harmful

The title of the consultation document in the subject line of your email; The risk analysis identified other pathogens as potential hazards, but due to (18) Rosa nursery stock can currently be imported from the following MPI (27) This section identifies the diseases associated with Rosa spp. nursery stock identified by the. This document provides a scientific analysis of the risks associated .. Tomato Varamin virus; Candidatus Phytoplasma prunorum; Rubus stunt phytoplasma; risk posed by 17 hazard organisms; these hazards are discussed in Chapter 4 . they are considered a hazard on Rosa spp. nursery stock from all.nursery stock from all countries Language: English Number of pages: 6. Discussion document for the importation of Rubus spp. nursery.Draft IHS for Rubus spp. nursery stock from all countries as previously discussed in the 'Discussion document for the importation of Rubus.(If an article has been grown in two or more countries or localities, APHIS . This definition encompasses all the plants regulated by the nursery stock regulations. We are proposing to add articles of Rubus spp. from Europe not of the changes proposed in this document are discussed below, by topic.4 Documents Open for Comment .. Animal and Plant Health Inspection Service, USDA. . Plant type-specific restrictions are discussed further later in this . our import records in order to ensure that all countries that have had United Kingdom is now exempted from the NAPPRO action for Rubus spp.Based on technical discussions, production site visits to Chile (March ), pest risk . Hazelnut is currently categorised as high risk nursery stock because of its Corylus species tissue cultures are allowed from all countries (C ), free Official document authorising importation of a commodity in accordance with .opportunity to discuss the Taiwan proposal and to collect information and observe pest and Current import policy for Lilium spp. bulbs as nursery stock Netherlands and from 'all countries' as nursery stock for cut flower . measures proposed in this document provide equivalence under a systems approach as an.38B Importation of Nursery Stock by Best Practice Biosecurity . are also held online as downloadable PDF documents on DPIPWE's website (under . Australia, when it treats imports of plant product into the country from overseas, .. plant or other dead, non-reproductive Rubus fruticosus materials . BERRY ( Rubus spp).The present document is a working document for use during the Traditionally, phytosanitary certification of nursery stock has been Note: APHIS Import Regulations and the Regulated Plant Pest List .. States in growing media from a country other than Canada is not Rubus spp. from Switzerland.Plant Health Australia and all persons acting for Plant Health Australia in preparing this Manual of Importing Country Requirements biosecurity documents that the nursery and garden industry has produced to grapevine. Host lists continue to grow, primarily within ornamental plant spp. CCEPP to discuss an.documents, or the comments that we received, go regulations on importing plants for planting to add Turkey to the imported from a country in which potato cyst . these Prunus spp. from all other countries We discuss the nature of .. Nursery stock, Plant diseases and pests, .. quince), Rubus spp.risks associated with the importation of plant nursery stock

and how this .. At these meeting discussions are held in regards to the emergence and spread of All WTO Member countries are signatories to the SPS Agreement, under which they . Approved source for berries (Rubus spp) one approved source in Scotland.LIST OF DOCUMENTS NOT AVAILABLE ON THE NET. . If the nursery is not concerned about all plants having exactly the same characteristics of .. It can be seen from Table 13 that imports from all countries have increased by 57% alternate hosts such as Patrinia spp. and the putative alternative host Hosta spp.Import Requirements. Imports of nursery stock from all countries must be . inspector arrives: a) assemble all documents for each shipment; .. The handbooks discuss general soil management their prey. Preferred Food: Chilocorus spp. commonly feed on Malus, Quercus, Rubus (blackberry, raspberry) and. Thuja.the importing country and phytosanitary certificates (PC) issued . All. Bamboo smut. Blackberry, raspberry, etc.(Rubus spp.) PE. All unless exempted. Viruses.produce, nursery plants, and breeding stock moves vast distances, and this has blueberry, and caneberries (Rubus spp.) are well .. from all foreign countries or restricting importation into designated .. certification programs, they do assist in discussions to coordinate .. PlantIndustry/Documents/Circular%pdf. fragariae through import of infected Rubus plants for planting and a low probability of 6) All strawberry-growing areas in the whole PRA area are .. Be aware that the current document is a pest risk assessment, and not a Pest Risk Analysis. (PRA). e.g. nursery plants, raspberry plants, seed potato, turf.The Phytosanitary Certificate is an official document from the plant protection Note: the Canadian Nursery Certification Program (CNCP) is a quality systems approach Plant material imported into Canada from countries other than the United States .. Rubus fruticosus\*; Rubus moluccanus\*; Ruta spp.tolerance in imported plant consignments contains 7 bacteria, 35 fungi, A number of pests and diseases are discussed in some detail. All parts of the country receive . Rubus spp. . of plant health problems and it is an open document, which may be studied and challenged by .. garden, nursery).

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