

Importation of Chinese Penjing

into the United States

With Particular Reference to *Podocarpus macrophyllus*

Gary L. Cave, Ph.D., Entomologist
Scott C. Redlin, Ph.D., Plant Pathologist

United States Department of Agriculture
Animal and Plant Health Inspection Service
Plant Protection and Quarantine
Biological Assessment and Taxonomic Support Staff
Pest Risk Analysis Branch
4700 River Road, Unit 133
Riverdale, MD 20737-1236

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A. Introduction

This pest risk assessment (PRA) was conducted by the United States Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine, Biological Assessment and Taxonomic Support Staff (USDA, APHIS, PPQ, BATS) on *Podocarpus macrophyllus* penjing, established in a growing medium, from China. The results are expressed qualitatively ("high" or "low"), rather than quantitatively (probabilities or frequencies). The risk assessment methodology and rating criteria can be found in the document: *Pathway-Initiated Pest Risk Assessment: Guidelines for Qualitative Assessments* (USDA, 1995) (available from the authors of this risk assessment).

Authority for APHIS to regulate plant pests/plant products is derived from the Plant Quarantine Act of 1912, the Plant Pest Act of 1957, the Noxious Weed Act of 1974 and the Code of Federal Regulations, Title 7, Part 319, Subpart 37 (7 CFR 319.37 - Nursery Stock, Plants, Roots, Bulbs, Seeds and Other Plant Products). The methods and terminology used to initiate, conduct, and report this PRA are consistent with guidelines provided by FAO (1995) and NAPPO (1995).

B. Risk Assessment

1. Initiating Event: Proposed Action

China has been exporting significant volumes of bare root bonsai plants into the United States for a number of years. In August, 1992 representatives of the China Animal and Plant Quarantine Service (CAPQ), requested permission to export penjing (landscape bonsai) established in growing media. A list of 112 plant species was submitted. From these plants; categorized, by PPQ, as prohibited, postentry, and restricted; CAPQ was asked in January, 1994, to select five restricted species. Subsequently, CAPQ submitted a list of eight species, along with a list of pests or potential pests of each species. In April 1994, the BATS Staff identified five species as candidates for pest risk assessments: *Buxus sinica* (Buxaceae), *Ehretia (Carmona) microphylla* (Boraginaceae), *Podocarpus macrophyllus* (Podocarpaceae), *Sageretia thea (theazans)* (Rhamnaceae), and *Serissa foetida* (Rubiaceae).

There are special concerns associated with propagative material in growing media: the presence of biological contaminants may not be discernible by visual inspection (this includes both pre-shipment and Port of Entry inspections); the infeasibility of complete inspection greatly increases the potential of the introduction of exotic organisms; the treatment(s) of the growing media may not be entirely efficacious; the continual hazard of pest infestation/reinfestation of "clean" plants.

2. Assessment of Weediness Potential of *Podocarpus macrophyllus*.

The results of the weediness screening for *Ehretia* (Table 1) did not prompt a pest-initiated risk assessment.

Table 1: Process for Determining Weediness Potential of Commodity

Commodity: *Podocarpus spp.* (Podocarpaceae)

Phase 1: The genus *Podocarpus* consists of about 73 to 100 species of coniferous shrubs and trees, native to the temperate Southern Hemisphere and mountains and highlands of the tropics, north to the West Indies and Japan. Most species may be grown outdoors in Zone 9 of the United States, or under glass as tub plants. Species grown in California include *P. gracilior* and *P. salignus*.

Phase 2: Is the genus listed in:

- NO *Geographical Atlas of World Weeds* (Holm *et al.*, 1979)
- NO *World's Worst Weeds* (Holm *et al.*, 1977)
- NO *Report of the Technical Committee to Evaluate Noxious Weeds; Exotic Weeds for Federal Noxious Weed Act* (Gunn & Ritchie, 1982)
- NO *Economically Important Foreign Weeds* (Reed, 1977)
- NO Weed Science Society of America list (WSSA, 1989)
- NO Is there any literature reference indicating weediness, e.g., *AGRICOLA*, *CAB, Biological Abstracts*, *AGRIS*; search on "species name" combined with "weed".

Phase 3: Conclusion:

IF: 1. The species is widely prevalent in the United States and the answer to all of the questions is **no**...

Proceed with the pest risk assessment.

2. The species is widely prevalent in the United States and the answer to **one** or more of the questions is **yes**...

Proceed with the pest risk assessment, provide comments on findings in text, and incorporate findings regarding weediness into the Risk Elements described below.

3. The species is new to or not widely prevalent in the United States and the answer to all of the questions is **no**...

Proceed with the pest risk assessment.

4. The species is new to or not widely prevalent in the United States and the answer to **one or more** of the questions is **yes**...

Consult authority under the Federal Noxious Weed Act for listing plant species as a noxious weed and consider the advisability of performing a pest-initiated pest risk assessment on the plant species. Provide explanations of findings in text.

3. Previous Risk Assessments, Current Status and Pest Interceptions

Decision History for *Podocarpus* spp. from China

None

Pest Interceptions on *Podocarpus* from China - FY85-95

Pestalotiopsis sp.

4. Pests associated with *Podocarpus* spp. in China

Table 2. Pests of *Podocarpus*

ARTHROPODA and MOLLUSCA				
Scientific name	Dist.	Host Genera	Codes	References
<i>Adoretus sinicus</i> Burmeister (Coleoptera: Scarabaeidae)	CN, HI	Poly. Camellia, Diospyros, Rosa Frimiana, Vitis, Morus, Theobroma, Abelmoschus, Gossypium, Phaseolus, Asparagus, Populus	h, n, z(soil)	China, 1995; CFR 318.13; INKTO , No. 89
<i>Agrotis segetum</i> (D. & S.) (Lepidoptera: Noctuidae)	CN	Poly., Citrus, Malus, Olea, Vitis, Zea	n, z(soil)	Carter, 1984; China, 1995; INKTO, No. 25
<i>Amphimallon solstitialis</i> (L.) (Coleoptera: Scarabaeidae)	CN	Poly., Pinus, Beta, Solanum	n, z(soil)	Browne, 1968; China, 1995; CIE, 1979; INKTO No. 99
<i>Anomala corpulenta</i> Motschulsky (Coleoptera: Scarabaeidae)	CN	Poly. Buxus, Cunninghamia, Julans, Pinus, Malus, Juniperus, Prunus, Sabina, Salix, Ulmus, Vericia	z (soil)	China, 1994, 1995
<i>Anomala cupripes</i> Hope (Coleoptera: Scarabaeidae)	CN	Poly., Buxus, Camellia, Delonix, Ficus, Dimocarpus, Hevea, Litchi, Mangifera	z (soil)	China, 1994, 1995 Gordon, 1994
<i>Aonidiella aurantii</i> (Maskell) (Homoptera: Diaspididae)	CN, US	Poly., Buxus, Podocarpus, Citrus, Persea	c, z	China, 1994; CIE, 1968a; Dekle, 1965; Li and Liao, 1990; Nakahara, 1982
<i>Aonidiella taxus</i> Leonardi (Homoptera: Coccidae)	CN, US	Cephalotaxus, Podocarpus, Taxus	c, z	China, 1994; Dekle, 1965; Nakahara, 1982
<i>Aphis gossypii</i> Glover (Homoptera: Aphididae)	CN, US	Polyphagous	c	China, 1995; CIE, 1968b
<i>Aporia crataegi</i> L. (Lepidoptera: Pieridae)	CN	Poly., Crataegus, Malus, Prunus, Pyrus, Salix, Ulmus	n	Anonymous, 1972, 1986 China, 1995; INKTO, No. 149
<i>Archips oporana</i> (L.) (Lepidoptera: Tortricidae)	CN	Pinus, Abies, Podocarpus, Juniperus	z	China, 1994, 1995; Bradley <i>et al.</i> , 1973

<i>Bradybaena ravidula</i> (Benson) (Mollusca: Bradybaenidae)	CN	Poly. Ehretia, Iris, Rosa, Chrysanthemum, Prunus, Gardenia, Cymbidium, Iris	n, z(soil), z	China, 1995; PPQ interception; Likhachev and Rammel'meier, 1962
<i>Bradybaena similaris</i> (Ferussac) (Mollusca: Bradybaenidae)	CN, US	Poly., Sageretia, Serissa	c, z, z(soil)	Chang and Chen, 1989; China, 1994; Dundee, 1970; Yen 1943
<i>Brevipalpus obovatus</i> Donnadeieu (Acarina: Tenuipalpidae)	CN, US	Poly., Podocarpus	c, z	China, 1994; Jeppson, <i>et al.</i> , 1975
<i>Ceroplastes japonicus</i> Green (Homoptera: Coccidae)	CN	Poly. Buxus, Camellia, Malus, Gardenia, Prunus, Morus, Podocarpus, Magnolia, Citrus, Pyrus, Michelia	n, z	China, 1994, 1995; Gimpel, 1974; Kozar, <i>et al.</i> , 1984
<i>Ceroplastes pseudoceriferus</i> Green (Homoptera: Coccidae)	CN	Poly. Podocarpus, Camellia, Diospyros, Ulmus, Salix, Punica, Buxus, Gardenia, Rosa, Ilex, Nandina, Cedrus, Chaenomeles,, Morus, Citrus, Magnolia, Cycas, Litchi, Mangifera, Rosaceae	z	China, 1994, 1995; Park <i>et al.</i> , 1990
<i>Ceroplastes rubens</i> Maskell (Homoptera: Coccidae)	CN, FL, HII	Poly. Podocarpus, Citrus, Persea, Gardenia, Pinus, Aglaonema, Viburnum, Brassaia, Aralia	g, z	China, 1994, 1995; Hamon and Williams, 1984
<i>Chrysomphalus dictyospermi</i> (Morgan) (Homoptera: Diaspididae)	CN, US	Poly. Buxus, Podocarpus	c	China, 1994; CIE, 1969; Dekle, 1965; Garonna and Viggiani, 1989; Johnson and Lyon, 1982; Nakahara, 1982
<i>Chrysomphalus aonidum</i> L. (Homoptera: Diaspididae)	CN, US	Poly. Podocarpus	c, m	CIE, 1988a; Dekle, 1965
<i>Clania minuscula</i> Butler (Lepidoptera: Psychidae)	CN	Poly. Buxus, Acer, Bischofia, Camellia, Cupressus, Pinus, Lagerstroemia, Platanus, Punica, Salix, Sapium, Rosa, Ulmus, Pyrus, Prunus, Salix, Podocarpus, Vitis, Malus, Morus, Citrus, Thea, Pyrus, Ribes, Rubus, Castanea, Quercus, Populus, Fraxinus, Magnolia	z	China, 1994, 1995; Kozhanchikov 1956; Shiraki, 1952
<i>Coccus hesperidum</i> L. (Homoptera: Coccidae)	CN, US	Poly. Podocarpus, Pinus, Acacia, Citrus, Carica, etc.	c, z	Browne, 1968; CIE, 1972; Hamon and Williams, 1984

<i>Coccus longulus</i> (Douglas) (Homoptera: Coccidae)	CN, US	Poly. Podocarpus, Leucaena, Spathiphyllum, Anthurium, Myrica, Citrus	c, z	Chang, <i>et al.</i> , 1982; Hamon and Williams, 1984
<i>Conogethes punctiferalis</i> (Guenée) (Lepidoptera: Pyralidae)	CN	Poly. Gossypium, Helianthus, Pinus, Prunus, Pyrus, Sorghum, Zea, Castanea	n	China, 1995; INKTO
<i>Cryptothlea variegata</i> Snellen (Lepidoptera: Psychidae)	CN	Pinus, Pyracantha, Rosa, Buxus, Malus, Podocarpus, Gingko, Ulmus	z	China, 1994
<i>Cryptotympana pustulata</i> (F.) (Homoptera: Cicadidae)	CN	Podocarpus, Citrus, Pyrus, Morus, Salix, Populus	z (soil) z (oviposition)	China, 1994, 1995; Shiraki, 1952
<i>Dioryctia splendidella</i> Herring-Schaeffer (Lepidoptera: Pyralidae)	CN	Pinus, Podocarpus	z	China, 1994, 1995 Hirose and Nozato, 1975; Zelenev, 1980
<i>Drosicha corpulenta</i> (Kuwana) (Homoptera: Margarodidae)	CN	Poly. Buxus, Magnolia, Paulownia, Plantanus, Salix, Melia, Sophora, Podocarpus, Ziziphus, Diospyros, Malus, Pyrus, Citrus, Prunus, Ficus, Castanea, Quercus	z (soil)	China, 1994, 1995; Shiraki, 1952
<i>Fiorinia fioriniae</i> (Targioni-Tozzetti) (Homoptera: Diaspididae)	CN, US	Poly. Podocarpus	c, m	Johnson and Lyon, 1988; Nakahara, 1982
<i>Fiorinia japonica</i> (Kuwana) (Homoptera: Diaspididae)	CN, US	Poly. Podocarpus, Abies, Cedrus, Juniperus, Picea, Pinus, Taxus, Tsuga	c, z	China, 1994; Johnson and Lyon, 1988; Nakahara, 1982;
<i>Gryllotalpa africana</i> Palisot de Beauvois (Orthoptera: Gryllotalpidae)	CN	Poly. Solanum, Saccharum, Gossypium, Vitis, Fragaria, Camellia, Dianthus, Prunus, Fortunella, Pinus, Nicotiana	n, z (soil)	China, 1995; INKTO No. 197
<i>Gypsonoma minutana</i> Hübner (Lepidoptera: Tortricidae)	CN	Podocarpus, Populus, Salix	z	China, 1994, 1995; Dogancar and Dokken 1985; Giunchi and de Giovanni, 1987
<i>Helicoverpa armigera</i> (Hübner) (Lepidoptera: Noctuidae)	CN	Poly. Glycine, Gossypium, Lycopersicon, Medicago, Nicotiana, Solanum, Tagetes, Triticum, Zea	n, z (soil)	Avidov and Harpaz, 1969; China, 1995; CIE, 1993a
<i>Helicoverpa assulta</i> (Guenée) (Lepidoptera: Noctuidae)	CN	Poly. Capsicum, Cucumis, Gossypium, Ipomoea, Nicotiana, Sorghum, Zea	n, z (soil)	China, 1995; CIE, 1994

<i>Homona coffearia</i> Nietner (Lepidoptera: Psychidae)	CN	Poly. Podocarpus, Malus, Pyrus, Prunus, Citrus, Vitis, Fragaria, Cinnamomum, Eucalyptus, Vigna, Litchi, Morus, Camellia, Averrhoa	z	Browne, 1968; China, 1994, 1995; Shiraki, 1952; Rejesus and Banasihan, 1978; Shiraki, 1952
<i>Homona magnanima</i> Diakonoff (Lepidoptera: Tortricidae)	CN	Pyrus, Podocarpus, Camellia, Rosa, Prunus, Pinus, Abies, Ligustrum, Punica	z	China, 1994, 1995; Kobayashi, <i>et al.</i> , 1988; Kanoh, <i>et al.</i> , 1983
<i>Icerya aegyptica</i> (Douglas) (Homoptera: Margarodidae)	CN	Poly. Citrus, Cinnamomum, Diospyros, Ficus, Morus, Psidium, >100 hosts	n	China, 1995; CIE, 1966; INKTO, No. 119; Willians, 1985
<i>Icerya seychellarum</i> (Westwood) (Homoptera: Margarodidae)	CN	Poly. Sapium, Camellia, Acer, Podocarpus, Psidium, Citrus, Pyrus, Prunus, Rosa, Cycas, Eriobotrya, Morus, Trachycarpus, Thea, >100 hosts	n	CIE, 1955; China, 1995; PNKTO, No. 21
<i>Lepidosaphes Gloverii</i> (Packard) (Homoptera: Diaspididae)	CN, US	Poly. Podocarpus, Citrus, Morus, Ligustrum, Magnolia, Hedera, Prunus	c, m	Dekle, 1965; Nakahara, 1982
<i>Lepidosaphes pallida</i> (Maskell) (Homoptera: Diaspididae)	CN, US	Poly. Podocarpus, Picea, Cephalotaxus, Sequoia, Chamaecyparis, Cryptomeria, Cupressus, Juniperus, Taxodium, Taxus, Thuya	c, z	China, 1994; Nakahara, 1982
<i>Lepidosaphes pini</i> (Maskell) (Homoptera: Diaspididae)	CN, MD, PA, HI	Podocarpus, Pinus, Abies	g, n, z	China 1994; Nakahara 1982
<i>Mamestrabassicae</i> (L.) (Lepidoptera: Noctuidae)	CN	Poly. Beta, Brassica, Daucus, Gossypium, Morus, Vicia, Nicotiana, Pisum, Saccharum, Solanum, Triticum	n, z(soil)	China, 1995; INKTO, No. 61
<i>Neophylaphis podicarpi</i> Takahashi (Homoptera: Aphididae)	CN, US	Podocarpus	f, z	China 1994; Shiraki, 1952; Johnson Y Lyon, 1988.
<i>Paralepidosaphes tubulorum</i> (Ferris) (Homoptera: Diaspididae)	CN	Poly. Podocarpus, Betula, Rhododendron, Ribes, Pyrus, Malus, Prunus, Votos, Ficus, Diospyruos, Salix	z	China, 1994; Shiraki, 1952
<i>Parlatoria pergandii</i> Comstock (Homoptera: Diaspididae)	CN, US	Poly. Podocarpus, Citrus, Ilex	c, z	China, 1994; Dekle, 1965; Nakahara, 1982
<i>Parlatoria proteus</i> (Curtis) (Homoptera: Diaspididae)	CN, US	Poly. Podocarpus, Brassia, Calophyllum, Vanda, Phoenix	c, z	China, 1994; Nakahara, 1982

<i>Phenacoccus cockerelli</i> (Cooley) (Homoptera: Diaspididae)	CN, US	Poly., Podocarpus, Magnolia, Nerium, Gardenia	c, m	Dekle, 1965; Nakahara, 1982
<i>Phyllophaga</i> sp. (Coleoptera: Scarabaeidae)	CN	Poly. Serissa	n, z(soil), z _e	China, 1995; PPQ interception
<i>Phyllophaga titanis</i> Reitter (Coleoptera: Scarabaeidae)	CN	Poly. Buxus, Rosa, Sophora, Ulmus	z (soil)	China, 1995; Gordon, 1994
<i>Quadraspidiotus perniciosus</i> (Comstock) (Homoptera: Diaspididae)	CN, US	Poly. Podocarpus, Malus, Pyrus, Prunus, Rosaceae, Citrus	c, z	China, 1994; Nakahara, 1982
<i>Spodoptera litura</i> (F.) (Lepidoptera: Noctuidae)	CN	Poly. Arachis, Beta, Brassica, Citrus, Glycine, Gossypium, Ipomoea, Morus, Nicotiana, Oryza, Solanum, Sorghum, Ulmus, Zea	n	CIE, 1993b; China, 1995; INKTO, No. 12
<i>Sympiezomias velatus</i> Chevrolet (Coleoptera: Curculionidae)	CN	Sophora, Populus, Morus, Glycine, Beta, Castanea, 70 genera, 101 species recorded.	z(soil)	China, 1995
<i>Thrips palmi</i> Karny (Thysanoptera: Thripidae)	CN, FL, HI	Polyphagous	g, n	CIE, 1992; Smith <i>et al.</i> 1992
<i>Tridactylus japonicus</i> de Hoan (Orthoptera: Trydactilidae)	CN	Buxus, Camellia, Cedrus, Fragaria, Gossypium, Oryza Nicotiana, Rosa, Sabina, Saccharinum	z (root)	China, 1994, 1995; Shiraki, 1952
<i>Unaspis yanonensis</i> (Kuwana) (Homoptera: Diaspididae)	CN	Buxus, Citrus, Camellia, Punica, Osmanthus, Prunus, Podocarpus	n, z	China, 1994, 1995; PNKTO, No. 45; CIE, 1988b; Reu <i>et al.</i> , 1990; Tanaka, 1981
“Calyptozele” sp.” (?) Unknown	CN	Podocarpus, unknown	unknown	China, 1994, 1995
“Incilaria” sp.” (?) Unknown	CN	Podocarpus, Serissa, Unknown	Unknown	China, 1994, 1995
BACTERIA				
<i>Agrobacterium tumefaciens</i> (Smith & Townsend) Conn (Rhizobiaceae)	CN, US	Podocarpus, Various genera	o, z _{ei}	Bradbury, 1986
FUNGI				
<i>Pestalosphaeria jinggangensis</i> P.L. Zhu, Ge, & T. Xu (Pyrenomycetes, Amphisphaerales)	CN	Podocarpus	z _{ei}	Farr, 1994; Zuh <i>et al.</i> , 1991a; b

<i>Pestalotia diospyri</i> Sydow (Fungi Imperfecti, Coelomycetes)	CN (not on Podocar pus)	Diospyros	z_{ei}	Anonymous, 1986; Farr <i>et al.</i> 1989; Tai, 1979
<i>Pestalotia foedans</i> Sacc. & Ellis (Fungi Imperfecti, Coelomycetes)	CN, US	Pinus, Podocarpus	o, z_{ei}	Farr, <i>et al.</i> , 1989; Tai, 1979
<i>Pestalotia zahlbruckneriana</i> Henn. (Fungi Imperfecti, Coelomycetes)	CN, US	Acer, Podocarpus	o, z_{ei}	Farr, <i>et al.</i> 1989; Tai, 1979
<i>Pestalotiopsis funerea</i> (Desmaz.) Steyaert (Fungi Imperfecti, Coelomycetes)	CN, US	Podocarpus Various genera	o, z_{ei}	China, 1992; Farr <i>et al.</i> , 1989
<i>Phellinus noxius</i> (Corner) G. Cunn. (Basidiomycetes, Aphyllophorales)	CN	Podocarpus Various genera	$z_{ei}, (soil)$	Chang, 1995; Farr, <i>et al.</i> 1989
<i>Phyllosticta nandinae</i> Tassi (Fungi Imperfecti, Coelomycetes)	CN, US	Nandina, Podocarpus	o, z_{ei}	China, 1992; Farr, <i>et al.</i> , 1989
<i>Pseudomassaria</i> <i>carolinensis</i> Barr & C. S. Hodges Anamorph: <i>Beltraniella</i> <i>portoricensis</i> (F. Stevens) Pirozynski & S. D. Patil (Pyrenomycetes, Amphisphaerales)	CN, US	Eucalyptus, Podocarpus	o, z_{ei}	Farr <i>et al.</i> , 1989; Farr, 1994; Matsushima, 1980
<i>Pythium aphanidermatum</i> (Edson) Fitzp. (Oomycetes, Peronosporales)	CN, US	Podocarpus Various genera	$o, z_{ei} (soil)$	China, 1992; Farr, <i>et</i> <i>al.</i> , 1989
<i>Sphaerella podocarpi</i> Cooke (Loculoascomycetes, Dothideales)	CN	Podocarpus	z_{ei}	Farr, <i>et al.</i> , 1989; Tai, 1979
<i>Zygosporium masonii</i> S. J. Hughes (Fungi Imperfecti, Hyphomycetes)	CN, US	Juncus, Magnolia	o, z_{ei}	Farr <i>et al.</i> , 1989; Matsushima, 1980
NEMATODA				

<i>Aphelenchooides besseyi</i> Christie (Aphelenchoididae)	CN, US	Various genera	o,z(soil)	Anonymous, 1984; EPPO, 1996a
<i>Aphelenchus</i> sp. (Aphelenchidae)	CN	Unknown	z(soil)	EPPO, 1996a
<i>Criconemella</i> sp. (Criconematidae)	CN	Unknown	z(soil)	EPPO, 1996a
<i>Dorylaimidae</i> sp. (Dorylaimidae)	CN	Unknown	z(soil)	EPPO, 1996a
<i>Dorylaimus</i> sp. (Dorylaimidae)	CN	Unknown	z(soil)	EPPO, 1996b
<i>Helicotylenchus</i> sp. (Hoplolaimidae)	CN	Unknown	z(soil)	EPPO, 1996a; b
<i>Helicotylenchus dihystera</i> (Cobb) Sher (Hoplolaimidae)	CN, US	Various genera	o, z(soil)	Anonymous, 1984; EPPO, 1996a; b
<i>Hirschmanniella</i> sp. (Pratylenchidae)	CN	Unknown	z(soil)	EPPO, 1996a;b
<i>Meloidogyne</i> sp. (Heteroderidae)	CN	Unknown	z(soil)	EPPO, 1996b
<i>Paratrophorus</i> sp. (Belonolaimiidae)	CN	Unknown	z(soil)	EPPO, 1996a
<i>Pratylenchus brachyurus</i> (Godfrey) Filipjev & Schuurmans Stekhoven (Pratylenchidae)	CN, US	Various genera	o, z(soil)	Anonymous, 1984; EPPO, 1996b
<i>Pratylenchus</i> sp. (Pratylenchidae)	CN	Unknown	z(soil)	EPPO, 1996a; b
<i>Rotylenchus robustus</i> (deMan) Filipjev (Hoplolaimidae)	CN, US	Various genera	o, z(soil)	EPPO, 1996b
<i>Trichodorus</i> sp. (Trichodoridae)	CN	Unknown	z(soil)	EPPO, 1996a
<i>Tylenchorhynchus</i> sp. (Tylenchorhynchidae)	CN	Unknown	z(soil)	EPPO, 1996a
<i>Tylenchorhynchus</i> <i>crassicaudatus</i> Williams (Tylenchorhynchidae)	CN	Oryza	z(soil)	EPPO, 1996a; b

<i>Tylenchorhynchus leviterinalis</i> Siddiqi, Mukherjee & Dasgupta (Tylenchorhynchidae)	CN	Unknown	z(soil)	EPPO, 1996a; b
<i>Tylenchus</i> sp. (Tylenchidae)	CN	Unknown	z(soil)	EPPO, 1996a
<i>Xiphinema brasiliense</i> Lordello (Longidoridae)	CN, US (FL)	Unknown	o, z(soil)	EPPO, 1996b
<i>Xiphinema</i> sp. (Longidoridae)	CN	Unknown	z(soil)	EPPO, 1996a;b

¹Codes: c - Listed in non-reportable dictionary as non-actionable.

f - Pest occurs in the U.S. and is not subject to official restrictions and regulations (*i.e.* not listed as actionable, and no official control program)

g- Quarantine pest; pest has limited distribution in the U.S. and is under official control as follows: pest listed by name in USDA's pest dictionary, official quarantine action may be taken on this pest when intercepted on this commodity.

h- Quarantine pest; pest has limited distribution in the U.S. and is under official control as follows:(1) pest listed by name in USDA's pest dictionary, official quarantine action may be taken on this pest when intercepted on this commodity and, (2) pest is a program pest (there is an official Federal or recognized State program for control of this pest beyond its being listed in the pest dictionary as actionable.)

m- the pest occurs within the PRA area and has been reported to attack the specified host species in other geographic regions; but has not been reported to attack the specified host species in the PRA area.

n- Listed in the USDA catalogue of intercepted pests as actionable.

z_i - Internal feeder: Pest is known to attack or infect commodity and it would be reasonable to expect the pest may remain with the commodity during processing and shipping

z_e - External feeder: Pest is known to commonly attack or infect commodity and it would be reasonable to expect the pest may remain with the commodity during processing and shipping.

5. List of Quarantine Pests

Table 3: Quarantine Pests - *Podocarpus*

ARTHROPODA

- Adoretus sinicus* Burmeister (Coleoptera: Scarabaeidae)
Agrotis segetum (D. & S.) (Lepidoptera: Noctuidae)
Amphimallon solstitialis (L.) (Coleoptera: Scarabaeidae)
Anomala corpulenta Motschulsky (Coleoptera: Scarabaeidae)
Anomala cupripes Hope (Coleoptera: Scarabaeidae)
Aporia crataegi L. (Lepidoptera: Pieridae)
Archips oporana (L.) (Lepidoptera: Tortricidae)
Ceroplastes japonicus Green (Homoptera: Coccidae)
Ceroplastes pseudoceriferus Green (Homoptera: Coccidae)
Ceroplastes rubens Maskell (Homoptera: Coccidae)
Clania minuscula Butler (Lepidoptera: Psychidae)
Conogethes punctiferalis (Guenée) (Lepidoptera: Pyralidae)
Cryptothlea variegata Snellen (Lepidoptera: Psychidae)
Cryptotympana pustulata (F.) (Homoptera: Cicadidae)
Dioryctria splendidella Herring-Schaeffer (Lepidoptera: Pyralidae)
Drosicha corpulenta (Kuwana) (Homoptera: Margarodidae)
Gryllotalpa africana Palisot de Beauvois (Orthoptera: Gryllotalpidae)
Gypsonoma minutana (Hubner) (Lepidoptera: Tortricidae)
Helicoverpa armigera (Hübner) (Lepidoptera: Noctuidae)
Helicoverpa assulta (Guenée) (Lepidoptera: Noctuidae)
Homona coffearia Nietner (Lepidoptera: Psychidae)
Homona magnanima Diakonoff (Lepidoptera: Psychidae)
Icerya aegyptica (Douglas) (Homoptera: Margarodidae)
Icerya seychellarum (Westwood) (Homoptera: Margarodidae)
Lepidosaphes pini (Maskell) (Homoptera: Diaspididae)
Mamestra brassicae (L.) (Lepidoptera: Noctuidae)
Paralepidosaphes tubulorum (Ferris) (Homoptera: Diaspididae)
Phyllophaga titanis Reitter (Coleoptera: Scarabaeidae)
Spodoptera litura (F.) (Lepidoptera: Noctuidae)
Sympiezomias velatus Chevrolet (Coleoptera: Curculionidae)
Thrips palmi Karny (Thysanoptera: Thripidae)
Tridactylus japonicus de Hoan (Orthoptera: Trydactylidae)
Unaspis yanonenensis (Kuwana) (Homoptera: Diaspididae)

MOLLUSCA

- Bradybaena ravida* (Benson) (Mollusca: Bradybaenidae)

UNKNOWN

- “*Calyptozele*” sp.
 “*Incilaria*” sp.

FUNGI

Pestalosphaeria jinggangensis P.L. Zhu, Ge, & T. Xu (Pyrenomycetes, Amphisphaerales)
Pestalotia diospyri Sydow (Fungi Imperfecti, Coelomycetes)
Phellinus noxius (Corner) G. Cunn. (Basidiomycetes, Aphyllophorales)
Sphaerella podocarpi Cooke (Loculoascomycetes, Dothideales)

NEMATODA

Paratrophorus sp. (Belonolaimidae)
Tylenchorhynchus crassicaudatus Williams (Tylenchorhynchidae)
Tylenchorhynchus leviterminalis Siddiqi, Mukherjee & Dasgupta (Tylenchorhynchidae)

6. Quarantine Pests Likely to Follow Pathway

Table 4: Quarantine Pests Likely to Follow Pathway

ARTHROPODA

Adoretus sinicus Burmeister (Coleoptera: Scarabaeidae)
Agrotis segetum (D. & S.) (Lepidoptera: Noctuidae)
Amphimallon solstitialis (L.) (Coleoptera: Scarabaeidae)
Anomala corpulenta Motschulsky (Coleoptera: Scarabaeidae)
Anomala cupripes Hope (Coleoptera: Scarabaeidae)
Archips oporana (L.) (Lepidoptera: Tortricidae)
Ceroplastes japonicus Green (Homoptera: Coccidae)
Ceroplastes pseudoceriferus Green (Homoptera: Coccidae)
Ceroplastes rubens Maskell (Homoptera: Coccidae)
Clania minuscula Butler (Lepidoptera: Psychidae)
Cryptothlea variegata Snellen (Lepidoptera: Psychidae)
Cryptotympana pustulata (F.) (Homoptera: Cicadidae)
Dioryctria splendidella Herring-Schaeffer (Lepidoptera: Pyralidae)
Drosicha corpulenta (Kuwana) (Homoptera: Margarodidae)
Gryllotalpa africana Palisot de Beauvois (Orthoptera: Gryllotalpidae)
Gypsonoma minutana (Hubner) (Lepidoptera: Tortricidae)
Helicoverpa armigera (Hübner) (Lepidoptera: Noctuidae)
Helicoverpa assulta (Guenée) (Lepidoptera: Noctuidae)
Homona coffearia Nietner (Lepidoptera: Psychidae)
Homona magnanima Diakonoff (Lepidoptera: Psychidae)
Icerya seychellarum (Westwood) (Homoptera: Margarodidae)
Lepidosaphes pini (Maskell) (Homoptera: Diaspididae)
Mamestra brassicae (L.) (Lepidoptera: Noctuidae)
Paralepidosaphes tubulorum (Ferris) (Homoptera: Diaspididae)
Phyllophaga titanis Reitter (Coleoptera: Scarabaeidae)
Sympiezomias velatus Chevrolet (Coleoptera: Curculionidae)
Thrips palmi Karny (Thysanoptera: Thripidae)
Tridactylus japonicus de Hoan (Orthoptera: Trydactilidae)

MOLLUSCA <i>Bradybaena ravida</i> (Benson) (Mollusca: Bradybaenidae)
UNKNOWN
“ <i>Calyptozele</i> ” sp.
“ <i>Incilaria</i> ” sp.
FUNGI
<i>Pestalosphaeria jinggangensis</i> P.L. Zhu, Ge, & T. Xu (Pyrenomycetes, Amphisphaerales)
<i>Pestalotia diospyri</i> Sydow (Fungi Imperfecti, Coelomycetes)
<i>Phellinus noxius</i> (Corner) G. Cunn. (Basidiomycetes, Aphylophorales)
<i>Sphaerella podocarpi</i> Cooke (Loculoascomycetes, Dothideales)
NEMATODA
<i>Paratrophorus</i> sp. (Belonolaimidae)
<i>Tylenchorhynchus crassicaudatus</i> Williams (Tylenchorhynchidae)
<i>Tylenchorhynchus leviterinalis</i> Siddiqi, Mukherjee & Dasgupta (Tylenchorhynchidae)

Other organisms in this Assessment, not chosen for further scrutiny, may be potentially detrimental to the agricultural production systems of the United States. However, there were a variety of reasons for not subjecting them to further analysis: they are associated mainly with plant parts other than commodity; they may be associated with the commodity (however, it was not considered reasonable to expect these pests to remain with the commodity during processing); they have been intercepted, as biological contaminants, by PPQ Officers during inspections of these commodities and would not be expected to be found with every shipment.

7. Economic Importance: Consequences of Introduction

Pests rated for potential economic importance are evaluated against five biological factors. The cumulative score for these elements is the Risk Rating (USDA, 1995).

Table 5: Risk Rating - Consequences of Introduction						
Pest	Climate/ Host	Host Range	Dispersal	Economic	Environ- mental	Risk Rating
<i>Adoretus sinicus</i>	H	H	H	M	M	H
<i>Agrotis segetum</i>	H	H	H	M	M	H
<i>Amphimallon solstitialis</i>	H	H	H	M	M	H
<i>Anomala corpulenta</i>	H	H	H	M	M	H
<i>Anomala cupripes</i>	H	H	H	M	M	H
<i>Archips oporana</i>	H	H	H	M	M	H

<i>Ceroplastes japonicus</i>	H	H	H	M	M	H
<i>Ceroplastes pseudoceriferus</i>	H	H	H	M	M	H
<i>Ceroplastes rubens</i>	H	H	H	M	M	H
<i>Clania minuscula</i>	H	H	H	M	M	H
<i>Cryptothlea variegata</i>	H	H	H	M	M	H
<i>Cryptptympana pustulata</i>	H	H	H	M	M	H
<i>Diroyctia splendidella</i>	H	H	H	M	M	H
<i>Drosicha corpulenta</i>	H	H	H	M	M	H
<i>Gryllotalpa africana</i>	H	H	H	M	M	H
<i>Gypsonoma minutana</i>	H	H	H	M	M	H
<i>Helicoverpa armigera</i>	H	H	H	M	M	H
<i>Helicoverpa assulta</i>	H	H	H	M	M	H
<i>Homona coffearia</i>	H	H	H	M	M	H
<i>Homona magnanima</i>	H	H	H	M	M	H
<i>Icerya seychellarum</i>	H	H	H	M	M	H
<i>Lepidosaphes pini</i>	H	H	H	M	M	H
<i>Mamestra brassicae</i>	H	H	H	M	M	H

<i>Paralepidosaphes tubulorum</i>	H	H	H	M	M	H
<i>Phyllophaga titanis</i>	H	H	H	M	M	H
<i>Sympiezomias velatus</i>	H	H	H	M	M	H
<i>Thrips palmi</i>	H	H	H	M	M	H
<i>Tridactylus japonicus</i>	H	H	H	M	M	H
<i>Bradybaena ravida</i>	H	H	H	M	M	H
<i>Calyptozele</i> sp.	H	H	H	M	M	H
<i>Incilaria</i> sp.	H	H	H	M	M	H
<i>Pestalosphaeria jinggangensis</i>	H	L	H	M	M	M
<i>Pestalotia diospyri</i>	H	M	H	M	M	H
<i>Phellinus noxius</i>	H	H	H	M	M	H
<i>Sphaerella podocarpi</i>	H	L	H	M	M	M
<i>Paratrophorus</i> sp.	H	M	H	M	M	H
<i>Tylenchorhynchus crassicaudatus</i>	H	M	H	M	M	H
<i>Tylenchorhynchus leviterinalis</i>	H	M	H	M	M	H

8. Likelihood of Introduction

The likelihood of introduction for a pest is rated relative to six factors (Tables 6 and 7) (USDA, 1995).

Table 6: Amount of Commodity Shipped

Number of 40' Containers Annually	Rating
10 - 100	M

Table 7: Risk Rating - Likelihood of Introduction

Pest	Likelihood of surviving postharvest treatment	Likelihood of surviving shipment	Likelihood of not being detected at port of entry	Likelihood of moving to suitable habitat	Likelihood of finding suitable hosts	Risk Rating
<i>Adoretus sinicus</i>	H	H	H	H	H	H
<i>Agrotis segetum</i>	H	H	H	H	H	H
<i>Amphimallon solstitialis</i>	H	H	H	H	H	H
<i>Anomala corpulenta</i>	H	H	H	H	H	H
<i>Anomala cupripes</i>	H	H	H	H	H	H
<i>Archips oporana</i>	H	H	M	H	H	H
<i>Ceroplastes japonicus</i>	H	H	M	H	H	H
<i>Ceroplastes pseudoceriferus</i>	H	H	M	H	H	H
<i>Pseudoplastes rubens</i>	H	H	M	H	H	H
<i>Clania minuscula</i>	H	H	M	H	H	H
<i>Cryptothlelea variegata</i>	H	H	M	H	H	H
<i>Cryptotympana pustulata</i>	H	H	H	H	H	H
<i>Drosicha corpulenta</i>	H	H	H	H	H	H
<i>Gryllotalpa africana</i>	H	H	H	H	H	H
<i>Gypsonoma minutana</i>	H	H	M	H	H	H

<i>Helicoverpa armigera</i>	H	M	M	M	H	H
<i>Helicoverpa assulta</i>	H	M	M	M	H	H
<i>Homona coffearia</i>	H	H	M	H	H	H
<i>Homona magnanima</i>	H	H	M	H	H	H
<i>Icerya seychellarum</i>	H	H	M	H	H	
<i>Lepidosaphes pini</i>	H	H	H	H	H	H
<i>Mamestra brassicae</i>	H	H	M	H	H	H
<i>Paralepidosaphes tubulorum</i>	H	H	H	H	H	H
<i>Phyllophaga titanis</i>	H	H	H	H	H	H
<i>Sympiezomias velatus</i>	H	H	H	H	H	H
<i>Thrips palmi</i>	H	H	M	H	H	H
<i>Tridactylus japonicus</i>	H	H	H	H	H	H
<i>Bradybaena ravida</i>	H	H	H	H	H	H
<i>Calyptozele</i> sp.	H	H	H	H	H	H
<i>Incilaria</i> sp.	H	H	H	H	H	H
<i>Pestalosphaeria jinggangensis</i>	H	H	M	H	H	H
<i>Pestalotia diospyri</i>	H	H	M	H	H	H
<i>Phellinus noxius</i>	H	H	M	H	H	H
<i>Sphaerella podocarpi</i>	H	H	M	H	H	H
<i>Paratrophorus</i> sp.	H	H	H	H	H	H
<i>Tylenchorhynchus crassicaudatus</i>	H	H	H	H	H	H
<i>Tylenchorhynchus leviterinalis</i>	H	H	H	H	H	H

9. Pest Risk Potential

Pest Risk Potential is the combination of the consequences and likelihood of introductions (Tables 5 - 7) (USDA, 1995).

Table 8: Pest Risk Potential

Pest	Pest Risk Potential
<i>Adoretus sinicus</i>	H
<i>Agrotis segetum</i>	H
<i>Amphimallon solstitialis</i>	H
<i>Anomala cupripes</i>	H
<i>Anomala corpulenta</i>	H
<i>Archips orana</i>	H
<i>Bradybaena ravida</i>	H
<i>Ceroplastes japonicus</i>	H
<i>Ceroplastes pseudoceriferus</i>	H
<i>Ceroplastes rubens</i>	H
<i>Clania minuscula</i>	H
<i>Cryptothlelea variegata</i>	H
<i>Cryptotympana pustulata</i>	H
<i>Dioryctia splendidella</i>	H
<i>Drosicha corpulenta</i>	H
<i>Gryllotalpa africana</i>	H
<i>Gypsonoma minutana</i>	H
<i>Helicoverpa armigera</i>	H
<i>Helicoverpa assulta</i>	H
<i>Homona coffearia</i>	H
<i>Homona magnanima</i>	H
<i>Icerya seychellarum</i>	H
<i>Lepidosaphes pini</i>	H
<i>Mamestra brassicae</i>	H
<i>Paralepidosaphes tubulorum</i>	H
<i>Phyllophaga titanis</i>	H
<i>Spodoptera litura</i>	H
<i>Sympiezomias velatus</i>	H

<i>Thrips palmi</i>	H
<i>Tridactylus japonicus</i>	H
<i>Calyptozele</i> sp.	H
<i>Incilaria</i> sp.	H
<i>Pestalosphaeria jinggangensis</i>	H
<i>Pestalotia diospyri</i>	H
<i>Phellinus noxius</i>	H
<i>Sphaerella podocarpi</i>	H
<i>Paratrophorus</i> sp.	H
<i>Tylenchorhynchus crassicaudatus</i>	H
<i>Tylenchorhynchus leviterinalis</i>	H

Phytosanitary Measures

Numerous potential biological hazards are associated with the importation of propagative material in growing media. In the case of Chinese penjing, the plants are grown in the open, in proximity to the ground and in or around agricultural production areas. Other factors which exacerbate the pest risk are inadequate pest control, plants collected from the wild, the continual flow of plant material into and out of facilities and soil movement from adjacent agricultural areas. These conditions act in concert to produce a great potential for contaminants, pest organisms of plants from nature and windborne infestations to establish in the nursery stock.

From the perspective of this risk assessment, most of the organisms of concern (some arthropods, snails, nematodes and weed seeds) are soil inhabitants during at least one portion of their life histories. Other potential hazards include fungal fruiting bodies with a latent period. These organisms have a high Pest Risk Potential and will require specific measures to insure phytosanitary security.

Accordingly, mitigation measures based solely on Port of Entry inspections may be inadequate in providing this security. However, the choice of appropriate sanitary and phytosanitary measures to mitigate risks associated with these pest species is undertaken as part of Risk Management, and is not addressed, *per se*, in this document. Should additional pests, not identified in this Risk Assessment, be intercepted, appropriate quarantine action will be taken.

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- . No. 61. Cabbage moth (*Mamestra brassicae* (L.)). 2pp.
 - . No. 89. Chinese Rose Beetle (*Adoretus sinicus* Burm.). 2pp.
 - . No. 99. Summer Chafer (*Amphimallon solstitialis* L.). 2pp.
 - . No. 119. Egyptian fluted scale (*Icerya aegyptiaca* (Dougl.)). 2pp.
 - . No. 149. Black-veined white butterfly (*Aporia crataegi* Linnaeus). 3pp.
 - . No. 197. African mole cricket (*Gryllotalpa africana* Beauvois). 3pp.
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not included (saprophytes)

Scolecobasidium tricladiatum T. Matsushima
(Fungi Imperfecti, Hyphomycetes) CN
Eucalyptus
Pinus
Podocarpus z_{ei} Matsushima, 1980; Farr, 1994

Cinnamomum

Sympodiella laxa
Subramanian & Vittal
(Fungi Imperfecti, Hyphomycetes] CN Calophyllum
Cunninghamia
Daphniphyllum
Garcinia
Podocarpus z_{ei} Matsushima, 1980