

**Importation of Chinese Penjing
into the United States**

With Particular Reference to *Ehretia microphylla*

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Table of Contents

A.	Introduction.....	1
B.	Risk Assessment	
1.	Initiating Event: Proposed Action.....	1
2.	Assessment of Weediness Potential (Table 1).....	2
3.	Previous Risk Assessments, Current Status and Pest Interceptions.....	3
4.	Pest List: Pests Associated with <i>Ehretia</i> in China (Table 2).....	3
5.	List of Quarantine Pests (Table 3).....	10
6.	Quarantine Pests Likely to Follow Pathway (Quarantine Pests Selected for Further Analysis) (Table 4).....	11
7.	Economic Importance: Consequences of Introduction (Table 5).....	12
8.	Likelihood of Introduction (Tables 6 and 7).....	14
9.	Pest Risk Potential (Table 8) and Phytosanitary Measures.....	16
C.	Literature Cited.....	17
D.	Acknowledgments	22

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 *Ehretia (Carmona) microphylla* 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 *Ehretia* spp.

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: *Ehretia* spp. (Boraginaceae)

- Phase 1: The genus *Ehretia* consists of about 50 species of evergreen or deciduous shrubs and trees native to tropical and subtropical Old and New World. *Ehretia* is sometimes planted as an ornamental in the extreme southern United States. Some species provide timber (*E. acuminata*) R. BR.; some are used medicinally (*E. philippensis* A. DC).
- 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 *Ehretia* spp. from China

Currently enterable as bare root plants

Pest Interceptions on bare root *Ehretia* spp. from China - FY85-95

Bradybaena ravidula(Benson) (Mollusca: Bradybaenidae)

Coccidae sp. (Homoptera)

Pseudaulacaspis sp. (Homoptera: Diaspididae)

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

Table 2. Pests of <i>Ehretia</i>				
Scientific Name	Dist ¹	Host Genera ²	Codes ³	References
ARTHROPODA AND MOLLUSCA				
<i>Adoretus sinicus</i> Burmeister (Coleoptera: Scarabaeidae)	CN, HI	Poly. Camellia, Rosa, Diospyros, Frimiana, Theobroma, Morus, Abelmoschus, Vitis, Gossypium, Phaseolus, Populus	Z(soil), h, n	China, 1995, INKTO No. 89; CFR 318.13
<i>Agrotis segetum</i> (D. & S.) (Lepidoptera: Noctuidae)	CN	Poly. Citrus, Malus, Olea, Vitis, Zea	n, z(soil)	China, 1995; Carter, 1984; INKTO No. 25.
<i>Aleurocanthus spiniferus</i> Quaintance (Homoptera: Aleyrodidae)	CN, HI	Poly. Ehretia, Citrus, Vitis, Pyrus, Rosa, Diospyros, Camellia, Gardenia, Paeonia, Cinnamomum, Salix,	n, z _e	China, 1994, 1995; CIE, 1976; INKTO No. 14; CFR 318.13
<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, Juglans, Cunninghamia, Juniperus, Pinus, Malus, Prunus, Sabina, Salix, Ulmus, Vericia	Z(soil)	China, 1994, 1995
<i>Anomala cupripes</i> Hope (Coleoptera: Scarabaeidae)	CN	Poly. Buxus, Ficus, Camellia, Delonix, Hevea, Dimocarpus,	Z (soil)	China, 1994, 1995 Gordon, 1994

		Litchi, Mangifera		
<i>Aphis gossypii</i> Glover (Homoptera: Aphididae)	CN, US	Poly. <i>Ehretia</i> , <i>Sageretia</i> , <i>Serissa</i>	c, z _e	China, 1994; CIE, 1968; Wilson & Vickery, 1981; Patch, 1938; Smith & Parron, 1978
<i>Aphis</i> sp. (Homoptera: Aphididae)	CN	<i>Ehretia</i>	z _e	PPQ interception; China, 1995
<i>Aporia crataegi</i> L. (Lepidoptera: Pieridae)	CN	Poly. <i>Crataegus</i> , <i>Malus</i> , <i>Prunus</i> , <i>Pyrus</i> , <i>Salix</i> , <i>Ulmus</i>	n	INKTO No. 149; China, 1995; Anon., 1986
<i>Bradybaena ravida</i> (Benson) (Mollusca: Bradybaenidae)	CN	Poly. <i>Ehretia</i> , <i>Iris</i> , <i>Gardenia</i> , <i>Rosa</i> , <i>Cymbidium</i> , <i>Prunus</i> , <i>Chrysanthemum</i>	n, z(soil), z _e	PPQ interception; China, 1995; Likhachev & Rammelmeier, 1962
<i>Bradybaena similaris</i> (Ferussac) (Mollusca: Bradybaenidae)	CN, US	Poly. <i>Sageretia</i> , <i>Serissa</i>	c, z _e , z(soil)	China, 1994; Chang & Chen, 1989; Dundee, 1970; Yen 1943
<i>Chrysodeixis chalcites</i> (Esper) (Lepidoptera: Noctuidae)	CN	Poly. <i>Ficus</i> , <i>Coffea</i> , <i>Brassica</i> , <i>Cucumis</i> , <i>Cynara</i> , <i>Cucurbita</i> , <i>Echium</i> , <i>Utica</i> , <i>Glycine</i> , <i>Gossypium</i> , <i>Medicago</i> , <i>Trifolium</i> , <i>Lycopersicon</i> , <i>Salvia</i> , <i>Marrubium</i> , <i>Nicotiana</i> , <i>Phaseolus</i> , <i>Solanum</i> , <i>Zea</i>	n	CIE, 1977; China, 1995; Goodey, 1991; Taylor, 1980
<i>Conogethes punctiferalis</i> (Guenée) (Lepidoptera: Pyralidae)	CN	Poly. <i>Gossypium</i> , <i>Pinus</i> , <i>Helianthus</i> , <i>Prunus</i> , <i>Pyrus</i> , <i>Zea</i> , <i>Sorghum</i> , <i>Castanea</i>	n	INKTO; China, 1995
<i>Drosicha corpulenta</i> (Kuwana) (Homoptera: Margarodidae)	CN	Poly. <i>Buxus</i> , <i>Citrus</i> , <i>Ficus</i> , <i>Magnolia</i> , <i>Paulownia</i> , <i>Plantanus</i> , <i>Salix</i> , <i>Melia</i> , <i>Pyrus</i> , <i>Sophora</i> , <i>Quercus</i> , <i>Podocarpus</i> , <i>Prunus</i> , <i>Ziziphus</i> , <i>Diospyros</i> , <i>Malus</i> , <i>Castanea</i>	z (soil), z _e	China, 1994, 1995; Shiraki, 1952

<i>Gryllotalpa africana</i> Palisot de Beauvois (Orthoptera: Gryllotalpidae)	CN	Poly. Solanum, Pinus, Camellia, Saccharum, Gossypium, Fragaria, Dianthus, Prunus, Vitis, Fortunella, Nictotiana	n, z(soil)	INKTO No. 197; China, 1995
<i>Helicoverpa armigera</i> (Hübner) (Lepidoptera: Noctuidae)	CN	Poly. Glycine, Tagetes, Medicago, Gossypium, Solanum, Lycopersicon, Zea, Triticum, Nicotiana	n, z(soil)	CIE, 1993; China, 1995; Avidov & Harpaz, 1969
<i>Helicoverpa assulta</i> (Guenée) (Lepidoptera: Noctuidae)	CN	Poly. Capsicum, Cucumis, Gossypium, Ipomoea, Nicotiana, Sorghum, Zea	n, z(soil)	CIE, 1994; China, 1995
<i>Icerya aegyptica</i> (Douglas) (Homoptera: Margarodidae)	CN	Poly. Citrus, Ficus, Cinnamomum, Morus, Diospyros, Psidium, >100 hosts	n	INKTO No. 119; China, 1995; CIE, 1966; Williams, 1985
<i>Icerya purchasi</i> Maskell (Homoptera: Margarodidae)	CN, US	Poly. Buxus, Ehretia,	c, o, z _e	China, 1994, CIE, 1971; Myer, 1978; Salama, <i>et.al</i> , 1985
<i>Icerya seychellarum</i> (Westwood) (Homoptera: Margarodidae)	CN	Poly. Sapum, Acer, Camellia, Citrus, Podocarpus, Psidium, Citrus, Pyrus, Prunus, Rosa, Cycas, Thea, Eriobotrya, Morus, Trachycarpus, >100 hosts	n	CIE, 1955; PNKTO No. 21; China, 1995
<i>Mamestra brassicae</i> (L.) (Lepidoptera: Noctuidae)	CN	Poly. Beta, Brassica, Daucus, Gossypium, Morus, Nicotiana, Pisum, Saccharum, Solanum, Triticum, Vicia	n, z(soil)	INKTO No. 61; China, 1995
<i>Myzus persicae</i> (Sulzer) (Homoptera: Aphididae)	CN, US	Poly. Buxus, Ehretia, Serissa	c, o, z _e	China, 1994; Blackman & Eastop, 1985; Zhang & Zhong, 1983
<i>Phyllophaga</i> sp. (Coleoptera: Scarabaeidae)	CN	Poly. Serissa	n,z(soil), z _e	PPQ interception; China, 1995
<i>Phyllophaga titanis</i> Reitter	CN	Poly. Buxus, Rosa,	z (soil)	China, 1995; Gordon,

(Coleoptera: Scarabaeidae)		Sophora, Ulmus		1994
<i>Rhizoecus hibisci</i> Kawai & Takagi (Homoptera:Pseudococcidae)	CN, HI,	Serissa, Cryptanthus, Rhaphis, Zelkova, Carex, Crinum, Cuphea, Sabal, Dieffenbachia, Nerium, Hakonechloa, Phoenix, Pelargonium, Hibiscus	z (soil)	EPPO, 1996a
<i>Saissetia</i> sp. (Homoptera: Coccoidea)	CN	Ehretia	z _e	PPQ interception; China, 1995
<i>Spodoptera litura</i> (F.) (Lepidoptera: Noctuidae)	CN	Poly. Arachis, Beta, Brassica, Citrus, Glycine, Gossypium, Ipomoea, Morus, Nicotiana, Oryza, Solanum, Sorghum, Ulmus, Zea	n	INKTO No. 12; CIE, 1967; China, 1995
<i>Succinea</i> sp. (Mollusca: Succinidae)	CN	Ehretia, unknown	n, z _e	China, 1994, 1995
<i>Sympiezomias velatus</i> Chevrolet (Coleoptera: Curculionidae)	CN	Sophora, Populus, Morus, Glycine, Beta, Castanea, 70 genera, 101 species recorded.	z(soil), z _e	China, 1995
<i>Tetranychus kanzawai</i> Kishida (Acari: Tetranychidae)	CN	Poly. Ehretia, Prunus, Morus, Sophora, Salix, Lycium, Gardenia, Medicago, Cordyline, Cyathea, Manihot, Perilla, Vitis, Murraya, Phaseolus, Solanum, Tecton, Rosa, Camellia, Terminalia, Fragaria, Capsicum, Zea	z _e	Tseng, 1990; China, 1995; Kondo, <i>et al.</i> , 1987; Osakabe, 1967.
<i>Thrips palmi</i> Karny (Thysanoptera: Thripidae)	CN,FL,H I	Polyphagous	g, n	CIE, 1992; Smith, <i>et al.</i> , 1992.
<i>Tridactylus japonicus</i> de Hoan (Orthoptera: Trydactilidae)	CN	Buxus, Camellia, Rosa, Cedrus, Fragaria, Oryza, Gossypium, Nicotiana, Sabina, Saccharinum	z (soil), z _e	China, 1994, 1995; Shiraki, 1952
A <i>Austropelea allulua</i> @(?) (Lymnaeidae)	CN	Ehretia, unknown	unknown	China, 1994, 1995
A <i>Incilaria</i> sp.@(?)	CN	Podocarpus, Serissa,	unknown	China, 1994, 1995

(Philomycidae)?		Ehretia, Unknown		
FUNGI				
<i>Dennisiella babingtonii</i> (Berk.) Batista & Cif. Anamorph: <i>Microxiphium fagi</i> (Pers.) S. J. Hughes Syn.: <i>Capnodium footii</i> Harvey ex Berk. & Desmaz., nom.illeg. (Loculoascomycetes, Dothideales)	CN, US	Buxus, Ehretia, Ilicium, Sageretia	o,z _{ei}	China, 1992; Farr, et al., 1989
<i>Macrophoma ehretiae</i> Cooke & Mass. (Fungi Imperfecti, Coelomycetes)	CN	Buxus, Ehretia	z _{ei}	Anonymous, 1970; China 1995, Farr, 1989; Tai, 1979
<i>Pestalotia guepinii</i> (Desm.) Stey. (Fungi Imperfecti, Coelomycetes)	CN, US	Ehretia, Various genera	o,z _{ei}	China, 1992
<i>Phakopsora ehretiae</i> Hirats. (Basidiomycetes, Uredinales)	CN	Ehretia	z _{ei}	Farr, 1994; Spaulding, 1961; Tai, 1979
<i>Pseudocercosporella ehretiae</i> (Sawada ex) Goh & Hsieh (Fungi Imperfecti, Hyphomycetes)	CN	Ehretia	z _{ei}	Anonymous, 1970; Farr, 1994; Goh & Hsieh 1989
<i>Pseudocercospora ehretiae-</i> <i>thyrsiflora</i> Goh & Hsieh (Fungi Imperfecti, Hyphomycetes)	CN	Ehretia	z _{ei}	Goh & Hsieh, 1989b; Farr, 1994
<i>Uncinula ehretiae</i> Keissl. (Ascomycetes, Erysiphales)	CN	Ehretia	z _{ei}	Farr, 1994; Tai, 1979
<i>Uredo ehretiae</i> Barclay (Basidiomycetes, Uredinales)	CN	Ehretia	z _{ei}	China, 1995; Farr, 1994; Spaulding, 1961; Tai, 1979
<i>Uredo garabiensis</i> Hirats. & Hash. (Basidiomycetes, Uredinales)	CN	Ehretia	z _{ei}	Anonymous, 1970; China 1995; Farr, 1994
NEMATODA				
<i>Aphelenchoides besseyi</i> Christie (Aphelenchoididae)	CN, US	Various genera	o,z(soil)	Anonymous, 1984; EPPO, 1996a
<i>Aphelenchus</i> sp.	CN	Unknown	z(soil)	EPPO, 1996a

(Aphelenchidae)				
<i>Criconemella</i> sp. (Criconematidae)	CN	Unknown	z(soil)	EPPO, 1996a
Dorylaimidae 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 crassicaudatus</i> Williams (Tylenchorhynchidae)	CN	Oryza	e, z(soil)	EPPO, 1996a; b
<i>Tylenchorhynchus leviterinalis</i> Siddiqi, Mukherjee & Dasgupta	CN	Unknown	z(soil)	EPPO, 1996a; b

(Tylenchorhynchidae)				
<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

¹Geographical distribution is denoted by the following abbreviations: CN-People's Republic of China, FL-Florida, HI-Hawaii, US-United States

²Host genera identified in literature and by CAPQ

³Codes: c - Listed in non-reportable dictionary as non-actionable.

e - Although pest attacks commodity, it would not be expected to remain with the commodity (plant part) during processing

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.)

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

o - Organism does not meet the geographical and regulatory definition for a quarantine pest.

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

ARTHROPODA

- Adoretus sinicus* Burmeister (Coleoptera: Scarabaeidae)
Agrotis segetum (D. & S.) (Lepidoptera: Noctuidae)
Aleurocanthus spiniferus Quaintance (Homoptera: Aleyrodidae)
Amphimallon solstitialis (L.) (Coleoptera: Scarabaeidae)
Anomala corpulenta Motschulsky (Coleoptera: Scarabaeidae)
Anomala cupripes Hope (Coleoptera: Scarabaeidae)
Aporia crataegi L. (Lepidoptera: Pieridae)
Chrysodeixis chalcites (Esper) (Lepidoptera: Noctuidae)
Conogethes punctiferalis (Guenée) (Lepidoptera: Pyralidae)
Drosicha corpulenta (Kuwana) (Homoptera: Margarodidae)
Gryllotalpa africana Palisot de Beauvois (Orthoptera: Gryllotalpidae)
Helicoverpa armigera (Hübner) (Lepidoptera: Noctuidae)
Helicoverpa assulta (Guenée) (Lepidoptera: Noctuidae)
Icerya aegyptica (Douglas) (Homoptera: Margarodidae)
Icerya seychellarum (Westwood) (Homoptera: Margarodidae)
Mamestra brassicae (L.) (Lepidoptera: Noctuidae)
Phyllophaga titanis Reitter (Coleoptera: Scarabaeidae)
Rhizoecus hibisci Kawai & Takagi (Homoptera: Pseudococcidae)
Spodoptera litura (F.) (Lepidoptera: Noctuidae)
Sympiezomias velatus Chevrolet (Coleoptera: Curculionidae)
Tetranychus kanzawai Kishida (Acari: Tetranychidae)
Thrips palmi Karny (Thysanoptera: Thripidae)
Tridactylus japonicus de Hoan (Orthoptera: Trydactilidae)

MOLLUSCA

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

UNKNOWN ORGANISMS

- AAustropelea allulua@
 AIncilaria@sp.

FUNGI

- Macrophoma ehretiae* Cooke & Mass. (Fungi Imperfecti, Coelomycetes)
Phakopsora ehretiae Hirats. (Basidiomycetes, Uredinales)
Pseudocercospora ehretiae (Sawada ex) Goh & Hsieh (Fungi Imperfecti, Hyphomycetes)
Pseudocercospora ehretiae-thrysiflora Goh & Hsieh (Fungi Imperfecti, Hyphomycetes)
Uncinula ehretiae Keissl. (Ascomycetes, Erysiphales)
Uredo ehretiae Barclay (Basidiomycetes, Uredinales)
Uredo garambiensis Hirats. & Hash. (Basidiomycetes, Uredinales)

NEMATODA

- Paratrophorus* sp. (Belonolaimidae)
Tylenchorhynchus crassicaudatus Williams (Tylenchorhynchidae)
Tylenchorhynchus leviterinalis 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)
Aleurocanthus spiniferus Quaintance (Homoptera: Aleyrodidae)
Amphimallon solstitialis (L.) (Coleoptera: Scarabaeidae)
Anomala corpulenta Motschulsky (Coleoptera: Scarabaeidae)
Anomala cupripes Hope (Coleoptera: Scarabaeidae)
Drosicha corpulenta (Kuwana) (Homoptera: Margarodidae)
Gryllotalpa africana Palisot de Beauvois (Orthoptera: Gryllotalpidae)
Helicoverpa armigera (Hübner) (Lepidoptera: Noctuidae)
Helicoverpa assulta (Guenée) (Lepidoptera: Noctuidae)
Mamestra brassicae (L.) (Lepidoptera: Noctuidae)
Phyllophaga titanis Reitter (Coleoptera: Scarabaeidae)
Rhizoecus hibisci Kawai & Takagi (Homoptera: Pseudococcidae)
Sympiezomias velatus Chevrolet (Coleoptera: Curculionidae)
Tetranychus kanzawai Kishida (Acari: Tetranychidae)
Tridactylus japonicus de Hoan (Orthoptera: Trydactilidae)

MOLLUSCA

Bradybaena ravidula (Benson) (Mollusca: Bradybaenidae)

UNKNOWN ORGANISMS

AAustropelea allulua@

AIncilaria@sp.

FUNGI

Macrophoma ehretiae Cooke & Mass. (Fungi Imperfecti, Coelomycetes)
Phakopsora ehretiae Hirats. (Basidiomycetes, Uredinales)
Pseudocercospora ehretiae (Sawada ex) Goh & Hsieh (Fungi Imperfecti, Hyphomycetes)
Pseudocercospora ehretiae-thrysiflora Goh & Hsieh (Fungi Imperfecti, Hyphomycetes)
Uncinula ehretiae Keissl. (Ascomycetes, Erysiphales)
Uredo ehretiae Barclay (Basidiomycetes, Uredinales)

NEMATODA

Paratrophororus sp. (Belonolaimidae)

Tylenchorhynchus crassicaudatus Williams (Tylenchorhynchidae)

Tylenchorhynchus leviterinalis 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. There were a variety of reasons for not subjecting them to further analysis: 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 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>Aleurocanthus spiniferus</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>Drosicha corpulenta</i>	H	H	H	M	M	H
<i>Gryllotalpa africana</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>Mamestra brassicae</i>	H	H	H	M	M	H
<i>Phyllophaga</i>	H	H	H	M	M	H

<i>titanis</i>						
<i>Rhizoecus hibisci</i>	H	H	H	M	M	H
<i>Sympiezomias velatus</i>	H	H	H	M	M	H
<i>Tetranychus kanzawai</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>Austropelea allulua</i>	H	H	H	M	M	H
<i>Incilaria</i> sp.	H	H	H	M	M	H
<i>Macrophoma ehretiae</i>	H	H	H	M	M	H
<i>Phakopsora ehretiae</i>	H	L	H	M	M	M
<i>Pseudocercosporaella ehretiae</i>	H	L	H	M	M	M
<i>Pseudocercospora ehretiae-thrysiflora</i>	H	L	H	M	M	M
<i>Uncinula ehretiae</i>	H	L	H	M	M	M
<i>Uredo ehretiae</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>Aleurocanthus spiniferus</i>	H	H	M	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>Drosicha corpulenta</i>	H	H	H	H	H	H
<i>Gryllotalpa africana</i>	H	H	H	H	H	H
<i>Helicoverpa armigera</i>	H	H	M	H	H	H
<i>Helicoverpa assulta</i>	H	H	M	H	H	H
<i>Mamestra brassicae</i>	H	H	M	H	H	H

<i>Phyllophaga titanis</i>	H	H	H	H	H	H
<i>Rhizoecus hibisci</i>	H	H	H	H	H	H
<i>Sympiezomias velatus</i>	H	H	H	H	H	H
<i>Tetranychus kanzawai</i>	H	H	H	H	H	H
<i>Tridactylus japonicus</i>	H	H	H	H	H	H
<i>Bradybaena ravida</i>	H	H	H	H	H	H
<i>Austropelea allulua</i>	H	H	H	H	H	H
<i>Incilaria</i> sp.	H	H	H	H	H	H
<i>Macrophoma ehretiae</i>	H	H	M	H	H	H
<i>Phakopsora ehretiae</i>	H	H	M	H	H	H
<i>Pseudocercospora ehretiae</i>	H	H	M	H	H	H
<i>Pseudocercospora ehretiae-thrysiflora</i>	H	H	M	H	H	H
<i>Uncinula ehretiae</i>	H	H	M	H	H	H
<i>Uredo ehretiae</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, 6 and 7) (USDA, 1995).

Table 8: Pest Risk Potential

Pest	Pest Risk Potential
<i>Adoretus sinicus</i>	H
<i>Agrotis segetum</i>	H
<i>Aleurocanthus spiniferus</i>	H
<i>Amphimallon solstitialis</i>	H
<i>Anomala corpulenta</i>	H
<i>Anomala cupripes</i>	H
<i>Austropelea allulua</i>	H
<i>Bradybaena ravida</i>	H
<i>Drosicha corpulenta</i>	H
<i>Gryllotalpa africana</i>	H
<i>Helicoverpa armigera</i>	H
<i>Helicoverpa assulta</i>	H
<i>Mamestra brassicae</i>	H
<i>Phyllophaga titanis</i>	H
<i>Rhizoecus hibisci</i>	H
<i>Sympiezomias velatus</i>	H
<i>Tetranychus kanzawai</i>	H
<i>Tridactylus japonicus</i>	H
<i>Macrophoma ehretiae</i>	H
<i>Phakopsora ehretiae</i>	H
<i>Pseudocercospora ehretiae</i>	H

<i>Pseudocercospora ehretiaeethrysiflora</i>	H
<i>Uncinula ehretiae</i>	H
<i>Uredo ehretiae</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 will 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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