

Importation of Leaves and Stems of Parsley, *Petroselinum crispum*, from Israel into the United States

Qualitative, Pathway-Initiated Pest Risk Assessment

September 1997

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Table of Contents

A. Introduction	1
B. Risk Assessment Methods	1
1. Initiating Event: Proposed Action	1
2. Assessment of Weediness Potential of Parsley	2
3. Previous Risk Assessments, Current Status, and Pest Interceptions	2
4. Pest List: Pests Associated with Parsley from Israel	3
5. List of Quarantine Pests	6
6. Quarantine Pests Likely to Follow Pathway (Quarantine Pests Selected for Further Analysis)	6
7. Economic Importance: Consequences of Introduction	7
8. Likelihood of Introduction	8
9. Conclusion: Pest Risk Potential and Phytosanitary Measures .	9
C. References	9

A. Introduction

This pest risk assessment was prepared by the Animal and Plant Health Inspection Service (APHIS) of the U.S. Department of Agriculture (USDA) to examine plant pest risks associated with the importation into the United States of **fresh leaves and stems of parsley (*Petroselinum crispum*) grown in Israel**. This is a qualitative pest risk assessment, that is, estimates of risk are expressed in qualitative terms such as high or low rather than numerical terms such as probabilities or frequencies. The details of methodology and rating criteria can be found in: *Pathway-Initiated Pest Risk Assessment: Guidelines for Qualitative Assessments, version 4.0* (USDA, 1995); available from the individual named in the proposed regulations, or on our web site at www.aphis.usda.gov/ppq/bats/bant.

International plant protection organizations, e.g., North American Plant Protection Organization (NAPPO) and International Plant Protection Convention (IPPC) of the United Nations Food and Agriculture Organization (FAO), provide guidance for conducting pest risk analyses. The methods used to initiate, conduct, and report this plant pest risk assessment are consistent with guidelines provided by NAPPO, IPPC and FAO. Our use of biological and phytosanitary terms, e.g., introduction, quarantine pest, conforms with the *NAPPO Compendium of Phytosanitary Terms* (Hopper, 1996) and the *Definitions and Abbreviations (Introduction Section) in International Standards for Phytosanitary Measures, Section 1—Import Regulations: Guidelines for Pest Risk Analysis* (FAO 1996).

B. Risk Assessment

1. Initiating Event: Proposed Action

This pest risk assessment is commodity-based, and therefore "pathway-initiated"; the assessment is in response to a request for USDA authorization to allow importation of a particular commodity presenting a potential plant pest risk. In this case, the importation of **fresh leaves and stems of parsley (*Petroselinum crispum*) grown in Israel** is a potential pathway for introduction of plant pests. Regulatory authority for the importation of fruits and vegetables from foreign sources into the U.S. is found in 7 CFR §319.56 .

2. Assessment of Weediness Potential of parsley, *Petroselinum crispum*

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

Table 1: Process for Determining Weediness Potential of Commodity

Commodity: Apiaceae, *Petroselinum*, contains three species, native to the Old World. One species, *Petroselinum crispum* (Miller) A.W. Hill, is cultivated as a garnish and for salads.

Phase 1: *Petroselinum crispum* is native to north and central Europe and has escaped in North America. Parsley is widely cultivated in the United States. No other species of *Petroselinum* is known to occur in the United States.

Phase 2: Is the species listed in:

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

Phase 3: Conclusion: *Petroselinum segetum* (L.) Koch is listed in *Geographical Atlas of World Weeds* as a common weed of Portugal. *Petroselinum crispum* is grown commercially and in home gardens within the U.S.

3. Previous Risk Assessments, Current Status and Pest Interceptions

3a. Decision history for *Petroselinum crispum*

1969 - Egypt: Denied entry, possible carrier of various quarantine-significant plant pest. Parsley does not readily lend itself to inspection, neither will it take an effective treatment which might be used as a condition of entry.

1972 - France: Denied entry, no approved treatment for complex of pests.

3b. Interceptions from area for FY 1985-97

ORIGIN	PEST	HOST	TOTAL
CYPRUS	APHIDIDAE, SPECIES OF	PETROSELINUM CRISPUM (LEAF)	1
CYPRUS	MOLLUSCA, SPECIES OF	PETROSELINUM CRISPUM (LEAF)	1
FRANCE	NOCTUIDAE, SPECIES OF	PETROSELINUM CRISPUM (LEAF)	1
FRANCE	PYRALIDAE, SPECIES OF	PETROSELINUM CRISPUM	1
FRANCE	THEBA PISANA	PETROSELINUM CRISPUM (LEAF)	1
GIBRALTAR(?)	AUTOGRAPHA SP.	PETROSELINUM CRISPUM (LEAF)	1
GIBRALTAR(?)	COCHLICELLA SP.	PETROSELINUM CRISPUM (LEAF)	1
GIBRALTAR(?)	MONACHA CARTUSIANA	PETROSELINUM CRISPUM (LEAF)	1
GREECE	AGROMYZIDAE, SPECIES OF	PETROSELINUM CRISPUM	1
GREECE	APIDAE, SPECIES OF	PETROSELINUM CRISPUM (LEAF)	1
GREECE	CERNUELLA SP.	PETROSELINUM CRISPUM (LEAF)	1
GREECE	HELICELLA CRETICA	PETROSELINUM CRISPUM (LEAF)	1
GREECE	MAMESTRA SP.	PETROSELINUM CRISPUM (LEAF)	1
GREECE	TEPHRITIDAE, SPECIES OF	PETROSELINUM CRISPUM (LEAF)	1
ISRAEL(?)	APHIDIDAE, SPECIES OF	PETROSELINUM CRISPUM (LEAF)	1
ISRAEL	APHIDIDAE, SPECIES OF	PETROSELINUM CRISPUM (LEAF)	1
ISRAEL	NYSIUS SP.	PETROSELINUM CRISPUM (LEAF)	1
ITALY(?)	APHIDIDAE, SPECIES OF	PETROSELINUM CRISPUM	1
ITALY	AGROMYZIDAE, SPECIES OF	PETROSELINUM CRISPUM (LEAF)	1
ITALY	CEUTORHYNCHUS SP.	PETROSELINUM CRISPUM (LEAF)	1

ITALY	HELICELLA SP.	PETROSELINUM CRISPUM (LEAF)	1
SPAIN(?)	THEBA PISANA	PETROSELINUM CRISPUM (LEAF)	1
SPAIN	COCHLICELLA BARBARA	PETROSELINUM CRISPUM (LEAF)	1
SPAIN	HELICELLA SP.	PETROSELINUM CRISPUM (LEAF)	1
SPAIN	NOCTUIDAE, SPECIES OF	PETROSELINUM CRISPUM (LEAF)	1
SPAIN	THEBA PISANA	PETROSELINUM CRISPUM (LEAF)	1
SPAIN	THEBA PISANA	PETROSELINUM CRISPUM (STEM)	1
SPAIN	THEBA PISANA	PETROSELINUM SP.	1
SYRIA	ACYRTHOSIPHON SP.	PETROSELINUM CRISPUM (LEAF)	1
TUNISIA	AGROMYZIDAE, SPECIES OF	PETROSELINUM CRISPUM	1
TUNISIA	APHIDIDAE, SPECIES OF	PETROSELINUM CRISPUM	1

4. Pest List: Pests Associated with *Petroselinum spp.*

The pest list in Table 2 was developed after a review of some of the information sources listed in USDA (1995). The list summarizes information on the distribution of each pest, pest-commodity association, and regulatory history.

Table 2: Pest List			
ORGANISM	DISTRIBUTION¹	COMMENTS²	REFERENCES
INSECTA			
<i>Agriotes lineatus</i> L. (Coleoptera: Elateridae)	IL	a,k	Avidov and Harpaz, 1969
<i>Agrotis segetum</i> Denis & Schiff. (Lepidoptera: Noctuidae)	IL	a,k	Avidov and Harpaz, 1969; Carter, 1984
<i>Autographa gamma</i> L. (Lepidoptera: Noctuidae)	IL	z	Whittle, 1986, Zhang, 1994
<i>Chromatomyia horticola</i> (Goureau) (Diptera: Agromyzidae)	IL	z	CIE, 1987; Spencer, 1973; Spencer, 1990
<i>Frankliniella occidentalis</i> (Pertgande) (Thysanoptera: Thripidae)	IL,US	k,o	Eppo, 1995
<i>Hyadaphis foeniculi</i> (Passerini) (Homoptera: Aphididae)	IL,US	o	Blackburn and Eastop, 1984; Swirski, E. 1962
<i>Liriomyza bryoniae</i> (Kaltenbach) (Diptera: Agromyzidae)	IL	z	EPPO, 1995; Spencer, 1973; Spencer, 1990
<i>Myzus persicae</i> (Sulzer) (Homoptera: Aphididae)	IL,US	o,y(CeMV)	Blackburn and Eastop, 1984; Swirski, 1962
<i>Papilio machaon sphyrus</i> Hbn. (Lepidoptera: Papilionidae)	IL	k	Avidov and Harpaz, 1969
<i>Philophylla (=Euleia) heraclei</i> L. (Diptera: Tephritidae)	IL	z	INKTO, 1958; White <i>et al.</i> , 1992
<i>Spodoptera frugiperda</i> J.E. Smith (Lepidoptera: Noctuidae)	IL,US	c,o,z	Zhang, 1994

<i>Spodoptera littoralis</i> (Boisd.) (Lepidoptera: Noctuidae)	IL	k	Avidov and Harpaz, 1969
<i>Thrips angusticeps</i> Uzel (Thysanoptera: Thripidae)	IL	z	FAO, 1993; Nakahara, 1984
Nematoda			
<i>Ditylenchus dipsaci</i> (Kuhn) Pilipjev	IL,US	a,g	EPPO, 1995; FAO, 1993
<i>Meloidogyne hapla</i> Chitwood	IL,US	m,o	Goodey <i>et al.</i> , 1965; Ritter, 1971
<i>Meloidogyne incognita</i> (Kofoid & White) Chitwood	IL,US	m,o	Anon., 1980; Orion <i>et al.</i> , 1982;
<i>Meloidogyne javanica</i> (Treub) Chitwood	IL,US	m,o	Glaser <i>et al.</i> , 1986; Goodey <i>et al.</i> , 1965
Mollusca			
<i>Theba pisana</i> (Muller)	IL,US(CA)	z	Cheney, 1988; EPPO, 1995; Haas, 1997
Other genera, <i>Cochlicella</i> , <i>Monacha</i> and <i>Helicella</i> occur in Israel and may be intercepted as hitchhikers.			
Pathogens			
<i>Alternaria dauci</i> (Kuhn) Groves & Skolko (Fungi Imperfecti: Hyphomycetes)	IL,US	o	CMI, 1979; Farr <i>et al.</i> , 1989
<i>Alternaria radicina</i> Meier, Drechs., & E.D. Eddy (Fungi Imperfecti: Hyphomycetes)	IL,US	o	CMI, 1972; Farr <i>et al.</i> , 1989
<i>Botrytis cinerea</i> Pers.:Fr. (Fungi Imperfecti: Hyphomycetes) Teleomorph: <i>Botryotinia fuckeliana</i> (de Barry)Whetzel	IL,US	k,o	Barkai-Golan, 1981; Farr <i>et al.</i> , 1989
<i>Erysiphe heraclei</i> DC (Pyrenomycetes: Erysiphales)	IL,US	o	CMI, 1967; Farr <i>et al.</i> , 1989
<i>Macrophomina phaseolina</i> (Tassi) Goidanich (Fungi Imperfecti: Coelomycetes)	IL,US	a,o	Barkai-Golan,1981; Farr <i>et al.</i> , 1989

<i>Phytophthora nicotianae</i> var. <i>parasitica</i> Breda de Haan var. <i>parasitica</i> (Dastur) G.M. Waterhouse (Oomycetes: Peronosporales)	IL,US	m,o	Farr <i>et al.</i> , 1989; Sneh and Katz, 1988
<i>Pythium aphanidermatum</i> (Edson) Fitzp. (Oomycetes: Peronosporales)	IL,US	m,o	Elad <i>et al.</i> , 1982; Farr <i>et al.</i> , 1989
<i>Rhizoctonia solani</i> Kuhn (Fungi Imperfecti: Mycelia Sterila) Teleomorph: <i>Thanatephorus cucumeris</i> (Frank) Donk	IL,US	o	CMI, 1974; Farr <i>et al.</i> , 1989
<i>Sclerotinia sclerotiorum</i> (Lib.) de Bary	IL,US	o	Barkai-Golan, 1981; Farr <i>et al.</i> , 1989
Bacteria			
<i>Agrobacterium tumefaciens</i> (Smith & Townsend)	IL,US	o	Bradbury, 1986
<i>Erwinia carotovora</i> subsp. <i>carotovora</i> (Jones) Berget <i>et al.</i>	Worldwide	o	Bradbury, 1986
Viruses			
Alfalfa mosaic virus	IL,US	k,o	Marco, 1975; Brunt <i>et al.</i> , 1996
Beet curly top virus	IL?,EG,IR,US	o,v	Brunt <i>et al.</i> , 1989
Broad bean wilt virus	IL?,US	o,v	Brunt <i>et al.</i> , 1989
Celery mosaic virus (CeMV)	IL?,Prob. Worldwide	m,o,v	Brunt <i>et al.</i> , 1996; Frowd and Tomlinson, 1972, Iwaki and Komuro, 1970
Cucumber mosaic virus	IS,US	o	Brunt <i>et al.</i> , 1989; Frowd and Tomlinson, 1972; Marco, 1975
Strawberry latent ringspot virus	IL,US(CA)	m,o,v	Bellardi and Bertaccini, 1991; Brunt <i>et al.</i> , 1996; Cohen <i>et al.</i> , 1994

¹ Distribution legend: IL = Israel; EG = Egypt; IR = Iran; US = United States; CA = California

- ² Comments:
- a = Pest mainly associated with plant part other than commodity.
 - g = Quarantine pests: pest has limited distribution in the U.S. and is under official control as follows: pest listed by name in USDA pest dictionary, official quarantine action may be taken on this pest when intercepted on this commodity.
 - k = Not specifically listed for host, but reported from other hosts in same plant genus/family.
 - m = The pest occurs in Israel 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 Israel.
 - o = Organism does not meet the geographical and regulatory definition for a quarantine pest.
 - y = Pest is a vector of plant pathogens.
 - z = External feeder: Pest is known to commonly attack or infect commodity and it would be reasonable to

- z = expect the pest may remain with the commodity during processing and shipping.
 z = 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.

5. List of Quarantine Pests

The list of quarantine pests for commercial shipments of parsley from Israel is provided in Table 3. Should any of these pests be intercepted on commercial (or any other) shipments of *Petroselinum crispum* quarantine action may be taken.

Table 3: Quarantine Pests	
Arthropods	<i>Agriotes lineatus</i> <i>Agrotis segetum</i> <i>Autographa gamma</i> <i>Chromatomyia horticola</i> <i>Liriomyza bryoniae</i> <i>Papilio machaon sphyrus</i> <i>Philophylla heraclei</i> <i>Spodoptera littoralis</i> <i>Thrips angusticeps</i>
Mollusk	<i>Theba pisana</i>
Nematode	<i>Ditylenchus dipsaci</i>

6. Quarantine Pests Likely to Follow Pathway

Only those quarantine pests that can reasonably be expected to follow the pathway, *I. e.*, be included in commercial shipments of *Petroselinum crispum* analyzed in detail (USDA, 1995). Only quarantine pests listed in Table 4 were selected for further analysis and subjected to steps 7-9 below.

Table 4: Quarantine Pest Selected for Further Analysis:	
Arthropods	<i>Autographa gamma</i> <i>Chromatomyia horticola</i> <i>Liriomyza bryoniae</i> <i>Philophylla heraclei</i> <i>Thrips angusticeps</i>
Mollusk	<i>Theba pisana</i>

Other plant pests 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. For example, they are associated mainly with plant parts other than the 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 of these commodities during inspections by Plant Protection and Quarantine Officers but would not be expected to be present with every shipment. In addition, the biological hazard of organisms identified only to the generic level are not assessed due to the lack of adequate biological/taxonomic information. This lack of biological information on any given insect or pathogen should not be equated with low risk. By necessity, pest risk assessments focus on those organisms for which biological information is available. By developing detailed assessments for

known pests that inhabit a variety of niches on the parent species, *i.e.* on the surface of or within the bark/wood, on the foliage, etc., effective mitigation measures can be developed to eliminate the known organism and any similar unknown ones that inhabit the same niches.

7. Economic Importance: Consequences of Introduction

The consequences of introduction were considered for each quarantine pest selected for further analysis. For qualitative, pathway-initiated pest risk assessments, these risks are estimated by rating each pest with respect to five risk elements (USDA, 1995). Table 5 shows the risk ratings for these risk elements.

Pest	Climate/ Host	Host Range	Dispersal	Economic	Environ- mental	Risk Rating
<i>Autographa gamma</i>	high	high	medium	medium	high*	high
<i>Chromatomyia horticola</i>	high	high	low	medium	high**	high
<i>Liriomyza bryoniae</i>	high	high	low	medium	high***	high
<i>Philophylla heraclei</i>	medium	high	low	medium	medium	medium
<i>Thrips angusticeps</i>	high	high	low	medium	high****	high
<i>Theba pisana</i>	high	high	low	medium	medium	medium

*This pest is known to attack members of the plant genera, *Amaranthus*, *Helianthus*, *Rhododendron*, *Solanum*, *Trifolium*, and *Vigna*. In the United States, *Amaranthus pumilus*, *Helianthus schweinitzii*, *Rhododendron chapmanii*, *Solanum drymophilum*, *S. incompletum*, *S. sandwicense*, *Trifolium stoloniferum*, and *Vigna o-wahuensis* are Federally listed endangered species.

**This pest is known to attack members of the plant genera *Arabis*, *Alstragalus*, *Bidens*, *Cardamine*, *Cirsium*, *Cucurbita*, *Erigeron*, *Eryngium*, *Erysimum*, *Euphorbia*, *Hibiscus*, *Lepidium*, *Lotus*, *Lupinus*, *Mimulus*, *Oenothera*, *Oxytropis*, *Peucedanum*, *Phacelia*, *Phlox*, *Rhus*, *Rorippa*, *Senecio*, *Solanum*, *Trifolium*, *Vicia*, *Vigna* and *Viola*. In the United States, *Arabis mcdonaldiana*, *A. perstellata*, *A. serotina*, *Astragalus albens*, *A. applegatei*, *A. bibulatus*, *A. cremnophytax* var. *cremnophytax*, *A. humillimus*, *A. montii*, *A. osterhoutii*, *A. phoenix*, *A. robbinsii* var. *jesupi*, *Bidens cuneata*, *B. micrantha* ssp. *kalealaha*, *B. wiebkei*, *Cardamine micranthera*, *C. palmatus*, *C. tenuis* ssp. *capilaris*, *Cirsium fontinale* var. *fontinale*, *Cucurbita okeechobeensis* ssp. *okeechobeensis*, *Erigeron maguirei* var. *maguirei*, *E. parishii*, *E. rhizomatus*, *Eryngium aristulatum* var. *parishii*, *E. constancei*, *E. cuneifolium*, *Erysimum capitatum* var. *angustatum*, *E. menziesii*, *E. teretifolium*, *Euphorbia telephioides*, *Hibiscus amottianus* ssp. *immaculatus*, *H. brackenridgei*, *H. clayi*, *Lepidium barnebyanum*, *Lotus dendroideus* spp. *traskiae*, *Lupinus aridorum*, *L. tidestromii*, *Mimulus glabratus* var. *michiganensis*, *Oenothera avita* ssp. *eurekaensis*, *O. deltoides* ssp. *howellii*, *Oxytropis campestris* var. *chartacea*, *Peucedanum sandwicense*, *Phacelia argillacea*, *P. formosula*, *Phlox nivalis* ssp. *texensis*, *Rorippa gambeli*, *Rhus michauxi*, *Senecio franciscanus*, *Solanum drymophilum*, *S. incompletum*, *S. sandwicense*, *Trifolium stoloniferum*, *Vicia menziesii*, *Vigna o-wahuensis* and *Viola chamissoniana* spp. *chamissoniana* are Federally listed endangered species.

***This pest is known to attack members of the plant genera, *Amaranthus*, *Cucurbita*, *Lupinus*, and *Solanum*. In the United States *Amaranthus pumilus*, *Cucurbita okeechobeensis* ssp. *okeechobeensis*, *Lupinus aridorum*, *L. tidestromii*, *Solanum drymophilum*, *S. incompletum*, and *S. sandwicense*, are Federally listed endangered species.

****This pest is known to attack members of the plant genera, *Cirsium*, *Euphorbia*, *Helianthus*, *Lepidium*, *Plantago*, *Ranunculus*, *Solanum*, *Trifolium*, *Vicia* and *Viola*. In the United States, *Cirsium fontinale* var. *fontinale*, *C. pitcheri*, *C. vinaceum*, *Euphorbia telephioides*, *Helianthus schweinitzii*, *Lepidium barnebyanum*, *Plantago hawaiiensis*, *P. princeps*, *Ranunculus acrifolius* var. *aestivalis*, *Solanum drymophilum*, *S. incompletum*, *S. sandwicense*, *Trifolium stoloniferum*, *Vigna o-wahuensis*, *Viola chamissoniana* spp. *chamissoniana*, *Viola helenae*, and *Viola lanalensi* are Federally listed endangered species.

We believe it would be reasonable to assume that these pests may attack these endangered plants and because of existing legislation regarding endangered plants, we automatically gave these pests a risk rating of “high” for Consequence of Introduction.

8. Likelihood of Introduction

Each pest is rated with respect to introduction potential, *i.e.*, entry and establishment. Two separate components are considered. First, the amount of commodity likely to be imported is estimated. More imports lead to greater risk; therefore, the risk rating for the quantity of commodity is the same for all quarantine pests considered. Second, five biological features, (Risk Elements) concerning the pest and its interactions with the commodity are considered. The resulting risk ratings are specific to each pest. The cumulative risk rating for introduction was considered to be an indicator of the likelihood that a particular pest would be introduced (USDA, 1995). Table 6 shows our ratings for these risk elements.

Pest	Quantity of commodity imported annually	Likelihood survive postharvest treatment	Likelihood survive shipment	Likelihood not detected at port of entry	Likelihood moved to suitable habitat	Likelihood find suitable host	Risk rating
<i>Autographa gamma</i>	low	high	high	low	high	low	medium
<i>Chromatomyia horticola</i>	low	high	high	low	high	low	medium
<i>Liriomyza bryoniae</i>	low	high	high	low	high	low	medium
<i>Philophylla heraclei</i>	low	high	high	low	high	low	medium
<i>Thrips angusticeps</i>	low	high	high	medium	high	high	high
<i>Theba pisana</i>	low	high	high	low	high	low	medium

9. Conclusion: Pest Risk Potential and Phytosanitary Measures

The measure of pest risk potential combines the risk ratings for consequences and likelihood of introduction (USDA, 1995). The estimated pest risk potential for each quarantine pest selected for further analysis for the importation of *Petroselinum crispum* is provided in Table 7.

Pest	Pest risk potential
<i>Autographa gamma</i>	high
<i>Chromatomyia horticola</i>	high
<i>Liriomyza bryoniae</i>	high
<i>Philophylla heraclei</i>	medium
<i>Thrips angusticeps</i>	high
<i>Theba pisana</i>	medium

Plant pests with a high Pest Risk Potential may require specific phytosanitary measures. The choice of appropriate sanitary and phytosanitary measures to mitigate risk is undertaken as part of Risk Management and is not addressed, *per se*, in this document.

PPQ has 140 plant pest interceptions from parsley from other areas; however, virtually all external pests listed could be detected by inspection. Some of these same pests occur in Israel in addition to other quarantine pests and have been intercepted as hitchhikers with other commodities. Should any of these pests be intercepted on commercial (or any other) shipments of *Petroselinum crispum* quarantine action may be taken.

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 Biological Assessment and Taxonomic Support
 Plant Protection and Quarantine
 September 1997

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