

Importation of *Mentha* spp. (Mint)
as Fresh Leaves and Stems
From El Salvador and Honduras
into the Continental United States

A Qualitative, Pathway-Initiated Risk Assessment

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A. Introduction

This risk assessment (RA) was prepared for the Animal and Plant Health Inspection Service (APHIS), U.S. Department of Agriculture (USDA) under Purchase Order Number 43–6395–0–2185 (dated June 27, 2000). The project was supported by the U.S. Agency for International Development under Project Hurricane Mitch Economic Initiative.

The purpose of this RA is to examine pest risks associated with the importation into the United States of *Mentha* spp. (mint) as leaves and stems from El Salvador and Honduras. The RA is a qualitative one in which risk is expressed in terms such as high and low rather than in numerical terms such as probabilities or frequencies. The details of the methodology and rating criteria can be found in *Pathway-Initiated Pest Risk Assessments: Guidelines for Qualitative Assessments, Version 5.0* (USDA, 2000a).

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

The FAO guidelines describe three stages of pest risk analysis: Stage 1 (initiation), Stage 2 (risk assessment), and Stage 3 (risk management). This document satisfies the requirements of FAO Stages 1 and 2.

B. Risk Assessment

1. Initiating Event: Proposed Action

This RA is commodity based and therefore “pathway-initiated.” It was conducted in response to a request for the USDA to authorize the importation of a particular commodity presenting a potential plant pest risk. The importation into the United States of fresh mint (*Mentha* spp.) leaves and stems as a commodity from El Salvador and Honduras is a potential pathway for the introduction of plant pests. The regulatory authority for the importation of fruits and vegetables from foreign sources into the United States may be found in the Code of Federal Regulations (7CFR§319.56).

2. Assessment of Weediness Potential

The results of the weediness screening for *Mentha* spp. from El Salvador and Honduras (Table 1) did not prompt a pest-initiated risk assessment.

Table 1. Process for Determining Weediness Potential of the Commodity

Commodity: Fresh leaves and stems of <i>Mentha</i> spp. (Lamiaceae) for consumption.	
Phase 1: Mints are grown commercially in the United States, principally in Oregon and Michigan, but are also widely grown throughout the United States.	
Phase 2: Is the species listed in:	
<u>YES</u>	<i>Geographical Atlas of World Weeds</i> (Holm, et al., 1979). Twelve species of mint are listed as weeds that are common, present, or part of the flora of one to eleven countries, but no species are listed as a serious or principal weed. Of these weed species, <i>M. arvensis</i> , <i>M. gentilis</i> , and <i>M. piperita</i> are listed as present but of unknown importance in the United States. None of these species are listed in any category for El Salvador or Honduras. Some of the commercial varieties are hybrids that may have one of the twelve species as a parent (Wiersema and León, 1999).
<u>NO</u>	<i>World's Worst Weeds</i> (Holm, et al., 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>YES</u>	<i>Economically Important Foreign Weeds</i> (Reed, 1977). <i>Mentha satureiodes</i> R. Br. is listed but the species is not associated with mint used as a commodity (e.g., essential oils, flavors) (Wiersema and León, 1999).
<u>YES</u>	<i>Composite List of Weeds</i> (Weed Science Society of America, 1989). The following species of <i>Mentha</i> are listed: <i>M. arvensis</i> L., <i>M. longifolia</i> (L.) Hudson, <i>M. piperita</i> L., <i>M. rotundifolia</i> (L.) Huds., <i>M. spicata</i> L., <i>M. suaveolens</i> J. F. Ehrh.
<u>NO</u>	<i>World Weeds</i> (Holm, et al., 1997).
<u>YES</u>	Is there any literature reference indicating weediness (e.g., <i>AGRICOLA</i> , <i>CAB</i> , <i>Biological Abstracts</i> , and <i>AGRIS</i> search on “species name” combined with “weed”)? As indicated above several species are weedy.
Comments: <i>M. rotundifolia</i> is a synonym of <i>M. suaveolens</i> (apple mint), which occurs in at least 21 States. <i>M. gentilis</i> is a synonym of <i>M. arvensis</i> , which occurs in 43 States. <i>Mentha</i> spp. occur in all States (USDA, 2000b).	
Phase 3: Conclusion: The genus <i>Mentha</i> contains some species that are weedy and others that are of economic importance. The species of economic importance have not been classified as weeds in a search of the scientific literature. Similarly, in El Salvador and Honduras, species of <i>Mentha</i> have not been classified as weedy in the literature. The commodity consists of one or more species that are not considered as economic weeds although they may become weedy in home gardens. Since the commodity consists of leaves with stems, it is not likely that the commodity would be contaminated with <i>Mentha</i> spp. seeds. Although seeds can be used for new plants, mints are so easily increased by division or cuttings that these methods are used almost exclusively. The weediness of the commodity is considered as negligible.	

3. Previous Risk Assessments and Decision History

Decision History: None for El Salvador and Honduras.

The following decision history relates to adjacent countries (APHIS, 2000a):

- 1988 - Guatemala: Permit entry subject to inspection.
- 1988 - Panama: Permit entry subject to inspection.
- 1993 - Belize: Permit entry subject to inspection.
- 1997 - Guatemala: Permit entry subject to inspection.
- 1998 - Nicaragua: Permit entry subject to inspection.

Plant Protection and Quarantine interceptions from El Salvador and Honduras for FY 1985-99 with *Mentha* spp. (APHIS, 2000b).

The interceptions listed below were from ship's stores or passenger baggage but not from cargo because commercial shipments have not been approved from El Salvador and Honduras. One cannot be certain of the real geographic origin of these interceptions since some other country may have been visited prior to El Salvador or Honduras.

Origin	Pest	Number of Interceptions
El Salvador	Aphididae, species of	1 (leaf)
	Aphididae, species of	1 (?)
	Coccidae, species of	1 (?)
	Geometridae, species of	1 (?)
	Geometridae, species of	1 (soil)
	<i>Niesthrea</i> sp.	1 (leaf)
	<i>Orthezia</i> sp.	1 (leaf)
	Pentatomidae, species of	1 (leaf)
	Pseudococcidae, species of	1 (?)
	<i>Puto</i> sp.	1 (leaf)
	Pyraustinae, species of	1 (?)
	<i>Spissistilus</i> sp.	1 (leaf)
	Thripidae, species of	2 (leaf)
	Thripidae, species of	1 (?)
Honduras	<i>Aleuroparadoxus</i> , species of	2 (leaf)
	Aphididae, species of	1 (leaf)
	Cicadellidae, species of	1 (leaf)
	Miridae, species of	1 (leaf)
	Noctuidae, species of	1 (leaf)

Note: The risk status of these interceptions is discussed on pages 7 and 8, under "Discussions."

4. Pest Categorization

The pests that have been reported in the scientific and regulatory literature on *Mentha* spp. (mint) in El Salvador and Honduras are recorded in Table 2. Table 2 also presents information about geographic distribution, host associations and regulatory data. Table 2 represents a "master list" of these organisms and serves as a basis for selecting pests for more detailed biological analysis.

Table 2. Pests Associated with <i>Mentha</i> spp. from El Salvador and Honduras					
Pest Name (Order: Family)	Geographic Distribution ¹	Plant Part Affected ²	Quarantine Pest ³	Likely to Follow Pathway ³	References
ARTHROPODS					
<i>Agrotis ipsilon</i> (Hufnagel) (Lepidoptera: Noctuidae)	ES, HO, US	L, S	N	Y	Caballero, <i>et al.</i> , 1994; CABI, 2000; Hill, 1994; IIE, 1969; Salgado-Cambar, 2000
<i>Agrotis segetum</i> Denis & Schiffermüller (Lepidoptera: Noctuidae)	HO	L, S, R	Y	Y	CABI, 2000; Hill, 1994; IIE, 1987; Salgado-Cambar, 2000
<i>Bemisia argentifolii</i> Bellows, Perring, Gill & Hendrick (Homoptera: Aleyrodidae)	HO, ES US	L	N	Y	Bellows, <i>et al.</i> , 1994; CABI, 2000
<i>Bemisia tabaci</i> (Gannets) (Homoptera: Aleyrodidae)	ES, HO, US	L	N	Y	CABI, 2000; Maes and Mound, 1993; Metcalf and Metcalf, 1993
<i>Brevipalpus obovatus</i> Donnadieu (Acari: Tenuipalpidae)	ES, HO, US	L	N	Y	CABI, 2000; IIE, 1988; Ochoa, <i>et</i> <i>al.</i> , 1994
<i>Diabrotica balteata</i> Leconte (Coleoptera: Chrysomelidae)	ES, HO, US	L	N	Y	Maes and Staines, 1991; McGuire and Crandall, 1967; Metcalf and Metcalf, 1993
<i>Listronotus dietrichi</i> (Stockton) ⁴ (Coleoptera: Curculionidae)	HO, ES, US	L, S, Sd, R	Y	Y	King and Saunders, 1984; Maes and O'Brien, 1990

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Pest Name (Order: Family)	Geographic Distribution ¹	Plant Part Affected ²	Quarantine Pest ³	Likely to Follow Pathway ³	References
<i>Lygus desertinus</i> Knight (Heteroptera: Miridae)	HO, US	L	N	Y	CABI, 2000; Salgado-Cambar, 2000
<i>Myzus persicae</i> (Sulzer) (Homoptera: Aphididae)	ES, HO, US	L, S	N	Y	CABI, 2000; IIE, 1979a; Hill, 1994; Metcalf and Metcalf, 1993
<i>Octotoma championi</i> Baly ⁵ (Coleoptera: Chrysomelidae)	HO, US (Texas)	L	Y	Y	Arnett, 1985; Blackwelder, 1946; CABI, 2000; Hill, 1994; Maes and Staines, 1991; Riley and Balsbaugh, 1988; Staines, 1989
<i>Octotoma scabripennis</i> Guerin (Coleoptera: Chrysomelidae)	ES, HO, US (Hawaii)	L	Y	Y	Arnett, 1985; Blackwelder, 1946; CABI, 2000; Habeck, 1976; Hill, 1994; Maes and Staines, 1991; McFadyen, 1988; Staines, 1989
<i>Orthezia insignis</i> Browne Homoptera: Ortheziidae	ES, HO, US	L, S, Fw	N	Y	CABI, 2000; Scalenet, 2001
<i>Peridroma saucia</i> (Hubner) (Lepidoptera: Noctuidae)	HO, US	L, S, Fw	N	Y	Caballero, <i>et al.</i> , 1994; CABI, 2000; Metcalf and Metcalf, 1993; Salgado- Cambar, 2000
<i>Planococcus citri</i> (Risso) (Homoptera: Pseudococcidae)	ES, HO, US	L, S	N	Y	Ben-Dov, 1994; McGuire and Crandall, 1967; Metcalf and Metcalf, 1993

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Pest Name (Order: Family)	Geographic Distribution ¹	Plant Part Affected ²	Quarantine Pest ³	Likely to Follow Pathway ³	References
<i>Pseudococcus jackbeardsleyi</i> Gimpel and Miller (Homoptera: Pseudococcidae)	ES, HO, US	L, S	N	Y	CABI, 2000
<i>Trichoplusia ni</i> (Hubner) (Lepidoptera: Noctuidae)	HO, US	L, W	N	Y	Caballero, <i>et al.</i> , 1994; CABI, 2000; Metcalf and Metcalf, 1993; Salgado- Cambar, 2000
<i>Xestia c-nigrum</i> (Linnaeus) (Lepidoptera: Noctuidae)	ES, US	L, S	N	Y	CABI, 2000; IIE, 1979b; Hill, 1979
BACTERIA					
<i>Pseudomonas cichorii</i> (Swingle) Stapp (Pseudomonadales: Pseudomonaceae)	HO, US	W	N	Y	CABI, 2000; Davis, <i>et al.</i> , 1997; Salgado-Cambar, 2000
FUNGI					
<i>Alternaria alternata</i> (Fr.:Fr.) Keissl. f. sp. <i>lycopersici</i> (Deuteromycotina: Hyphomycetes)	HO, US	L	N	Y	Appendix; ARS, 2000; CABI, 2000; Salgado-Cambar, 2000
<i>Erysiphe cichor-acearum</i> DC (Pyrenomycetes: Erysiphales)	HO	L	N	Y	ARS, 2000; Salgado-Cambar, 2000
<i>Puccinia</i> sp. Pers.: Pers. (Basidiomycetes: Uredinales)	HO	L	Y	Y	Agrios, 1997a; Appendix; ARS, 2000; Horner, 1952
<i>Pythium</i> sp. Pringsh. nom. cons. (Oomycetes: Peronosporales)	HO	W	Y	N	Agrios, 1997b; ARS, 2000; Appendix
<i>Sclerotinia sclerotiorum</i> (Lib.) De Bary (Discomycetes: Helotiales)	HO, US	W	N	Y	ARS, 2000; Salgado-Cambar, 2000

Table 2. Pests Associated with <i>Mentha</i> spp. from El Salvador and Honduras					
Pest Name (Order: Family)	Geographic Distribution ¹	Plant Part Affected ²	Quarantine Pest ³	Likely to Follow Pathway ³	References
NEMATODES					
<i>Rotylenchulus reniformis</i> Linf. and Oliveira) Tylenchidae	HO, US	R	N	N	CABI, 2000

¹ ES = El Salvador, HO = Honduras, US = United States

² Fw = Flowers, L = Leaves, S = Stems, Sd = Seeds, R = Roots, W = whole plant,

³ Y = Yes, N = No

⁴ One brief report on the biology of this species was found as a pest of corn and rice (King and Saunders, 1984). Information about the genus *Listronotus* was used as a guide. *L. oregonensis* is a pest of carrots in the United States, and *L. bonariensis* is a serious pests of grasses in South America, New Zealand, and Australia (CABI, 2000).

⁵ *O. championi* Baly was considered a quarantine pest for this study because of the limited distribution and uncertainty of establishment in the United States.

Discussions. Pathogens. The fungal genus, *Puccinia*, has been carried over for analysis in Tables 3, 4, and 5. In Honduras, unidentified *Puccinia* spp were mentioned in correspondence (Appendix) to occur on *Mentha* spp. Based on the references cited (Alfieri Jr., *et al.*, 1994; ARS, 2000), *Puccinia* spp. reported in the United States on *Mentha* spp. include *P. angustata*, *P. menthae*, *P. methae* var. *menthae*, *P. menthae* var. *pseudomenthae*, and *P. pseudomenthae*.

The biological information necessary to render ratings for Tables 3, 4, and 5 is most often found in data reported at the species level. More than 4,000 species of *Puccinia* occur on hosts throughout the world (Hawksworth, *et al.*, 1995). The available data do not indicate what species of *Puccinia* occur in Honduras on mint. Therefore, it was necessary to extrapolate in these tables.

Arthropods. The absence of taxonomic information at the species level, makes biological evaluations difficult. Consequently, undetermined species in the following families and genera, which are recorded on the PPQ list of interceptions (non-cargo) for El Salvador and Honduras (APHIS, 2000b), were not analyzed further: *Aleuroparadoxus*, Aphididae, Cicadellidae, Coccidae, Geometridae, Miridae, *Niesthrea*, Noctuidae, *Orthezia*, Pentatomidae, Pseudococcidae, *Puto*, Pyraustinae, *Spissistilus*, and Thripidae. Intercepted members in these taxa are found in the United States and their analysis stops at this point.

Octotoma spp. are primarily leaf miners that form a group within the Chrysomelidae (Hispiniae). The economic significance of *Octotoma championi* Baly was not described in the literature searched. The little information that is reported points to a limited host range, primarily, as a pest of *Lantana* spp., *Origanum* spp., *Mentha* spp., and *Sesamum* spp., (Maes and Staines, 1991 and Staines, 1989). Although reported to be in Texas, *O. championi* appears to be restricted to Mexico and Central America in tropical and subtropical climatic zones. *O. championi* is a potential candidate for biological control of lantana in tropical areas where the plant is considered weedy and has been released in Australia for that purpose (Riley and Balsbaugh, 1988).

In addition, *O. scabripennis* has been released in Australia and in other countries for biological control of lantana (CABI, 2000 and Staines, 1989). In addition to *Lantana* spp., *O. scabripennis* is reported to feed on *Tectona grandis*, *Lippia umbellata*, *Origanum* spp., *Mentha spicata*, *Salvia occidentalis*, *Sesamum indicum*, *Vigna unguiculata*, *Phaseolus vulgaris*, and *Stizolobium aterrimum* (Staines, 1989).

Agrotis segetum was listed in correspondence (Salgado-Cambar, 2000 and the Appendix) as occurring in Honduras. However, according to the other references cited in Table 2, this pest has not been reported in the Western hemisphere except for St. Martin. It is a cutworm pest of many plant species and recorded in the Europe, Asia, and Africa. The assessors of this document list this pest on the basis of its listing by Salgado-Cambar (Salgado-Cambar, 2000) even though there do not appear to be any reports of the pest occurrence in Honduras.

However, the absence of specific biological information should not be equated with low risk. Any pest listed with a "Y" in the "Quarantine Pest" column is considered as a quarantine pest if found on imports of *Mentha* spp. from El Salvador or Honduras. If such a pest is found on commercial or other shipments quarantine action will be taken. Pests listed as "N" in the "Quarantine pest" column are not considered quarantine pests. Pests that are listed as "Y" in the "Likely to Follow the Pathway" column and a "Y" in the "Quarantine Pest" column are candidates for further analysis in Tables 3, 4, and 5.

5. Consequences of Introduction

Five quarantine pests from Table 2 are listed in Table 3 for risk assessment by ratings assigned according to the five risk elements (REs) described in the Guidelines (USDA, 2000a).

Table 3. Risk Rating for Consequences of Introduction						
Pest	(RE #1) Climate/ Host Interaction	(RE #2) Host Range	(RE #3) Dispersal Potential	(RE #4) Economic Impact	(RE #5) Environ- mental Impact	Cumulative Risk Rating
ARTHROPODS						
<i>Agrotis segetum</i>	High 3	High 3	High 3	High 3	Medium 2	High 14
<i>Listronotus dietrichi</i> ¹	Medium 2	High 3	Medium 2	Medium 2	Medium 2	Medium 11
<i>Octotoma championi</i>	Medium 2	High 3	Medium 2	Medium 2	Medium 2	Medium 11
<i>Octotoma scabripennis</i>	Medium 2	High 3	Medium 2	Medium 2	Medium 2	Medium 11
FUNGI						
<i>Puccinia</i> sp.	High 3	Low 1	High 3	High 3	Medium 2	Medium 12

¹ See footnote 4, Table 2.

6. Likelihood of Introduction

The ratings for the subelements (SEs) concerning "Likelihood for Introduction" of the pests listed in Table 3 are shown in Table 4.

Table 4. Risk Rating for Likelihood of Introduction							
Pest	(SE #1) Quantity imported annually	(SE #2) Survive post- harvest treatment	(SE #3) Survive shipment	(SE #4) Not detected at port of entry	(SE #5) Moved to a suitable habitat	(SE #6) Contact with host material	Cumula- tive Risk Rating
ARTHROPODS							
<i>Agrotis segetum</i>	Medium 2	High 3	High 3	Medium 2	High 3	Medium 2	High 15
<i>Listronotus dietrichi</i> ¹	Medium 2	Medium 2	High 3	Medium 2	High 3	Medium 2	Medium 14
<i>Octotoma championi</i>	Medium 2	High 3	High 3	Medium 2	Medium 2	Medium 2	Medium 14
<i>Octotoma scabripennis</i>	Medium 2	High 3	High 3	Medium 2	Medium 2	Medium 2	Medium 14
FUNGI							
<i>Puccinia</i> sp.	Medium 2	Medium 2	High 3	Medium 2	High 3	Medium 2	Medium 14

¹ See footnote 4, Table 2

7. Conclusion: Pest Risk Potential And Suggested Phytosanitary Measures

The risk potential ratings for the pests listed in Tables 3 and 4 are shown in Table 5.

Table 5. Pest Risk Potential			
Pest	Consequences of Introduction	Likelihood of Introduction	Pest Risk Potential ¹
ARTHROPODS			
<i>Agrotis segetum</i>	High 14	High 15	High 29
<i>Listronotus dieticchi</i> ²	Medium 11	Medium 14	Medium 25
<i>Octotoma championi</i>	Medium 11	Medium 14	Medium 25
<i>Octotoma scabripennis</i>	Medium 11	Medium 14	Medium 25
FUNGI			
<i>Puccinia</i> sp.	Medium 12	Medium 14	Medium 26

¹ Pest Risk Potential (USDA, 2000a).

² See footnote 4, Table 2.

Pest risk potential ratings have the following suggested meanings (USDA, 2000a):

“Low: Pest will typically not require specific mitigation procedures. The port-of-entry inspection to which all imported commodities are subjected can be expected to provide sufficient phytosanitary security.

Medium: Specific phytosanitary measures may be necessary.

High: Specific phytosanitary measures are strongly recommended. Port-of-entry inspection is not considered sufficient to provide phytosanitary security.”

As stated in the Guidelines (USDA, 2000a), detailed examination and choice of appropriate sanitary and phytosanitary measures to mitigate pests risk for pests with particular risk potential scores or ratings is undertaken as part of the pest risk management phase and is not discussed in this document. The appropriate risk management strategy for a particular pest depends on the risk posed by the pest.

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