

**Importation of *Fernaldia* spp. Woodson (Loroco)
as Fresh Flowers and Leaves From
El Salvador, Guatemala, Honduras, and Nicaragua
into the 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 *Fernaldia* spp. (loroco) as flowers and leaves from El Salvador, Guatemala, Honduras, and Nicaragua. 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. In this case, the importation into the United States of loroco as fresh flowers and leaves as a commodity from El Salvador, Guatemala, Honduras, and Nicaragua is a potential pathway for the introduction of plant pests. The purchase order lists the commodity as “leaves,” but the product of commerce is flowers, which may include leaves collected during harvest. Therefore, flowers were included in this assessment. 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 weediness screening for *Fernaldia* spp. from El Salvador, Guatemala, Honduras, and Nicaragua (Table 1) did not prompt a pest-initiated risk assessment.

Table 1. Process for Determining Weediness Potential of *Fernaldia* spp.

Commodity: The commodity requested is fresh flowers and leaves of *Fernaldia* spp. (Apocynaceae) for consumption. The only species listed in a world listing of economic plants (Wiersema and León, 1999) is *F. pandurata* (A. DC) Woodson.

Phase 1: *Fernaldia* spp. are grown primarily in the tropics and subtropics and are not commonly grown in the United States.

Phase 2: Is the species 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 and Ritchie, 1982).

NO Economically Important Foreign Weeds (Reed, 1977).

NO Composite List of Weeds (Weed Science Society of America, 1989).

NO World Weeds (Holm, *et al.*, 1997).

NO Is there any literature reference indicating weediness (*e.g.*, AGRICOLA, CAB, and AGRIS search on "species name" combined with "weed").

Phase 3: Conclusion: *F. pandurata* is the species of commerce. It is not native to the United States, although it may be cultivated (USDA, 2000b). Flowers may be contaminated with seeds. The *Fernaldia* spp. have not been characterized as weedy elsewhere. The weediness potential is considered as negligible even though seeds may be present in association with flowers.

3. History, Pest Interceptions, and Current Status

1989—Guatemala: Above ground parts. Allow entry with inspection and treatment is warranted by pest findings (APHIS, 2000a).

Pest Interception Records for *Fernaldia* spp., 1985–1999, from El Salvador, Guatemala, Honduras, and Nicaragua (APHIS, 2000b).

TAXA	HOST	TOTAL
Agromyzidae, species of	<i>Fernaldia</i> sp. (leaf)	3
Anthomyiidae species of	<i>Fernaldia pandurata</i> (leaf)	1
Aphididae, species of	<i>Fernaldia pandurata</i> (leaf)	7
Aphididae, species of	<i>Fernaldia pandurata</i>	9
Aphididae, species of	<i>Fernaldia</i> sp. (flower)	1
Aphididae, species of	<i>Fernaldia</i> sp. (leaf)	4
Aphididae, species of	<i>Fernaldia</i> sp.	2
<i>Aphis</i> sp. (Aphididae)	<i>Fernaldia</i> sp. (leaf)	2
Cecidomyiidae, species of	<i>Fernaldia</i> sp. (leaf)	1
Cicadellidae, species of	<i>Fernaldia</i> sp. (leaf)	1
Coccidae, species of	<i>Fernaldia</i> sp. (leaf)	3
<i>Diaphania</i> sp., <i>indica</i> complex (Crambidae)	<i>Fernaldia</i> sp.	1
<i>Frankliniella</i> sp. (Thripidae)	<i>Fernaldia pandurata</i>	1
Geometridae, species of	<i>Fernaldia pandurata</i> (leaf)	1
Noctuidae, species of	<i>Fernaldia</i> sp. (leaf)	1
<i>Piesma</i> sp. (Piesmatidae)	<i>Fernaldia</i> sp. (leaf)	1
<i>Planococcus</i> sp. (Pseudococcidae)	<i>Fernaldia</i> sp. (leaf)	1
Pseudococcidae, species of	<i>Fernaldia pandurata</i> (leaf)	1
Pseudococcidae, species of	<i>Fernaldia</i> sp. (flower)	1
Pseudococcidae, species of	<i>Fernaldia</i> sp. (leaf)	24
<i>Schizomyia</i> sp. (Cecidomyiidae)	<i>Fernaldia pandurata</i> (leaf)	1
<i>Schizomyia</i> sp. (Cecidomyiidae)	<i>Fernaldia</i> sp. (leaf)	2
<i>Sibinia</i> sp. (Curculionidae)	<i>Fernaldia</i> sp.	1
<i>Sitona crinita</i> (Herbst) (Curculionidae)	<i>Fernaldia</i> sp. (leaf)	1
Thripidae, species of	<i>Fernaldia pandurata</i> (leaf)	1

NOTE: The pest status of these interceptions can be found in Table 2 or under “Discussions” below.

4. Pest Categorization

Pests reported in the scientific and regulatory literature on *Fernaldia* spp. from the four countries 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 *Fernaldia* spp. from El Salvador, Guatemala, Honduras, and Nicaragua

Pest Name (Order: Family)	Geographic Distribution ¹	Plant Part Affected ²	Quarantine Pest ³	Likely to Follow Pathway ³	References
ARTHROPODS					
Agromyzidae spp. (Diptera)	ES, GU, HO, NI	L	Y	Y	APHIS, 2000b
Anthomyiidae sp. (Diptera)	ES, GU, HO, NI	L	Y	Y	APHIS, 2000b
Aphididae spp. (Homoptera)	ES, GU, HO, NI	L, Fw	Y	Y	APHIS, 2000b
<i>Aphis</i> spp. (Homoptera: Aphididae)	ES, GU, HO, NI	L, Fw, F	Y	Y	APHIS, 2000b; Arevalo-Castillo, 2000
<i>Aulacaspis</i> sp. (Homoptera: Diaspididae)	ES	L, S, F	Y	Y	Arevalo-Castillo, 2000
<i>Bemisia tabaci</i> (Gennadius) (Homoptera: Aleyrodidae)	ES, GU, HO, NI, US	L	N	Y	Arevalo-Castillo, 2000; CABI, 2000; Metcalf and Metcalf, 1993
Cecidomyiidae sp. (Diptera)	ES, GU, HO, NI	L	Y	Y	APHIS, 2000b
Cicadellidae sp. (Homoptera)	ES, GU, HO, NI	L	Y	Y	APHIS, 2000b
Coccidae spp. (Homoptera)	ES, GU, HO, NI	L	Y	Y	APHIS, 2000b
<i>Contarinia</i> sp. (Diptera: Cecidomyiidae)	GU	Fw	Y	Y	Hill, 1994; Morton, 1997
<i>Diabrotica adelpha</i> Harold (Coleoptera: Chrysomelidae)	ES, GU, HO, NI	F, Fw, L, R, S	Y	Y	Arevalo-Castillo, 2000; Maes and Staines, 1991; McGuire and Crandall, 1967; Passoa, 1983

Pest Name (Order: Family)	Geographic Distribution ¹	Plant Part Affected ²	Quaran- tine Pest ³	Likely to Follow Pathway ³	References
<i>Diabrotica balteata</i> Leconte (Coleoptera: Chrysomelidae)	GU, HO, NI, US	F, Fw, L, R, S	N	Y	Arevalo-Castillo, 2000; CABI, 2000; Maes and Staines, 1991; McGuire and Crandall, 1967; Passoa, 1983
<i>Diaphania</i> sp., <i>indica</i> complex ⁴ (Lepidoptera: Crambidae)	ES, GU, HO, NI	L	Y	Y	APHIS, 2000b
<i>Frankliniella</i> spp. (Thysanoptera: Thripidae)	ES, GU, HO, NI	Fw, L	Y	Y	APHIS, 2000b; Morton, 1997
Geometridae sp. (Lepidoptera)	ES, GU, HO, NI	L	Y	Y	APHIS, 2000b
Gusano de alambre (unidentified wireworm) (Coleoptera: Elateridae)	ES	S, R	Y	Y	Arevalo-Castillo, 2000; Hill, 1994
Gusano hacero, unidentified cutworm (Lepidoptera: Noctuidae)	ES	S	Y	Y	Arevalo-Castillo, 2000
<i>Melittia cucurbitae</i> Harris (Lepidoptera: Sesiidae) (<i>M. satyriniformis</i> Hubner is a synonym)	ES, US	S	N	Y	Arevalo-Castillo, 2000; Becker and Eichlin, 1984; Eichlin, 1975; Heppner and Duckworth, 1981; King and Saunders, 1984
Noctuidae sp. (Lepidoptera)	ES, GU, HO, NI	L	Y	Y	APHIS, 2000b
<i>Piesma</i> sp. (Hemiptera: Piesmatidae)	ES, GU, HO, NI	L	Y	Y	APHIS, 2000b
<i>Planococcus</i> sp. (Homoptera; Pseudococcidae)	ES, GU, HO, NI	L	Y	Y	APHIS, 2000b

Pest Name (Order: Family)	Geographic Distribution ¹	Plant Part Affected ²	Quaran- tine Pest ³	Likely to Follow Pathway ³	References
<i>Polyphagotarsonemus latus</i> Banks (Acari: Tarsonemidae)	ES, NI, US	W	N	Y	Arevalo-Castillo, 2000; CABI, 2000; Hill, 1994
<i>Prairiana bifurcata</i> DeLong (Homoptera: Cicadellidae) ⁵	GU	L, S	Y	Y	Morton, 1997
Pseudococcidae spp. (Homoptera)	ES, GU, HO, NI	L, Fw	Y	Y	APHIS, 2000b
<i>Schizomyia</i> spp. (Diptera: Cecidomyiidae)	ES, GU, HO, NI	L	Y	Y	APHIS, 2000b; Morton, 1997
<i>Sibinia</i> sp. (Coleoptera: Curculionidae)	ES, GU, HO, NI	L	Y	Y	APHIS, 2000b
<i>Sitona crinita</i> (Herbst) ⁶ (Coleoptera: Curculionidae)	ES, GU, HO, NI	L	Y	Y	APHIS, 2000b
Thripidae sp. (Thysanoptera)	ES, GU, HO, NI	L	Y	Y	APHIS, 2000b
FUNGI					
<i>Cercospora</i> sp. Fresen. (Deuteromycotina: Hyphomycetes)	ES	L	Y	Y	Arevalo-Castillo, 2000
<i>Fusarium</i> sp. Link:Fr. (Deuteromycotina: Hyphomycetes)	ES	W	Y	Y	Arevalo-Castillo, 2000
<i>Rhizoctonia solani</i> Kühn (Deuteromycotina: Agromycetes) Teleomorph = <i>Thanate-phorus</i> <i>cucumeris</i> (A. B. Frank) Donk	ES, US	W	N	Y	Arevalo-Castillo 2000; ARS, 2000

¹ ES = El Salvador, GU = Guatemala, HO = Honduras, NI = Nicaragua, US = United States

² L = Leaves, S = Stems, W = Whole plant, F = Fruit, Fw = Flowers, R = Roots

³ Y = Yes, N = No

⁴ The interception is not analyzed further because (1) there is no scientific literature record available associating *Diaphania* sp. *indica* complex with *Fernaldia* spp. in Central America; (2) the interception record, upon which the listing of this name in Table 2 was based, is a single

noncargo interception whose geographic origin is necessarily uncertain and, (3) the interception was named based on an immature stage that could not be identified to species and therefore was assigned by the identifier to the complex. Dr. Alma Solis (2001) reports that the complex refers to the immatures of approximately 31 *Diaphania* spp. found in the western hemisphere that cannot be identified to species, except for the pickleworm, *D. nitidalis*. The *Diaphania* sp. *indica* complex includes the melonworm (*D. hyalinata*), the pickleworm, *D. nitidalis*, and the pumpkin caterpillar (*D. indica*) found in the United States and in Central America. In addition, there is no scientific literature record available associating *Diaphania* sp. *indica* complex with *Fernaldia* spp. in Central America. Since *D. indica* is of limited distribution in the United States (Florida), quarantine action will be taken whenever an unidentifiable member of this complex is intercepted.

⁵ *Prairiana bifurcata* DeLong is not analyzed further because not only was no biological or damage information found in the scientific literature searched, there is an uncertainty about the validity of a single report (Morton, 1997) for Guatemala. This report was based in turn on another report by Fischer (1993) that listed APHIS interception records for products from Guatemala for 1985–1991. However, we do not have an APHIS interception record of this species to confirm this report, which was apparently not based on cargo and therefore is of uncertain origin. Apparently, the distribution of this species is limited to Mexico. One specimen, which is recorded from Vera Cruz, Mexico, is deposited in the Ohio State University Museum (telecon: Dr. S. McKamey of the USDA, ARS, Systematic Entomology Laboratory).

⁶ *Sitona crinita* (Herbst) is the only interception that was identified to the species level (APHIS, 2000b). This interception was not analyzed further because a comprehensive search of the scientific literature was negative for biological information and host preferences. The species has not been reported in the western hemisphere. It is known only from Europe and the Near East (Danielsson, 2000).

Discussion. The absence of taxonomic information at the species level makes biological evaluation difficult. Consequently, the taxa found in the El Salvador letter response (Arevalo-Castillo, 2000), and from the scientific literature (*Aphis* sp., *Aulacaspis* sp., *Cercospora* sp., *Contarina* sp., Elateridae sp. [Gusano de alambre], *Frankliniella* sp., *Fusarium* sp., Noctuidae sp. [Gusano hacero], and *Schizomyia* sp.) were not analyzed further, and their analysis stops at this point. Members of these taxa occur in the United States. Similarly, members of the family and/or genera listed in the interception records (APHIS, 2000b) occur in the United States and were not analyzed further. These are Agromyzidae, Anthomyiidae, Aphididae, Cecidomyiidae, Cicadellidae, Coccidae, Geometridae, Noctuidae, *Piesma*, *Planococcus*, Pseudococcidae, *Sibinia*, and Thripidae. 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 *Fernaldia* spp. from El Salvador, Guatemala, Honduras, or Nicaragua. If such a pest is found on commercial or other shipments quarantine action will be taken. A pest listed as “N” in the “Quarantine Pest” column is not a quarantine pest.

The correspondence from El Salvador (Arevalo-Castillo, 2000) listed the name of “virus del mosaico” in association with *Fernaldia* in El Salvador. The name, as such, has little useful taxonomic significance and is not found associated with *Fernaldia* spp. in the scientific literature. Mosaic symptoms may be caused by virus infection as well as abiotic agents.

Pests that are listed as “Y” in the “Likely to Follow Pathway” column and a “Y” in the “Quarantine Pest” column are candidates for further analysis in Tables 3, 4, and 5 (USDA, 2000a). For this commodity, only one pest, *Diabrotica adelpha*, is further analyzed.

5. Consequences of Introduction

The ratings for *Diabrotica adelpha* for the five risk elements (REs) for “Consequences of Introduction” are shown in Table 3.

Table 3. Risk Rating for Consequences of Introduction

Pest Species	RE #1 Climate Host Interaction	RE #2 Host Range	RE #3 Dispersal Potential	RE #4 Economic Impact	RE #5 Environmental Impact	Cumulative Risk Rating
<i>Diabrotica adelpha</i>	Medium 2	High 3	Medium 2	Medium 2	Medium 2	Medium 11

6. Likelihood of Introduction

The ratings for six subelements (SEs) concerning the “Likelihood for Introduction” are shown in Table 4 for *Diabrotica adelpha*.

Table 4. Risk Rating for Likelihood of Introduction

Pest Species	SE #1 Quantity imported annually	SE #2 Survive postharvest 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	Cumulative Risk Rating
<i>Diabrotica adelpha</i>	Medium 2	Medium 2	High 3	Medium 2	Medium 2	High 3	Medium 14

7. Conclusion: Pest Risk Potential and Suggested Phytosanitary Measures

The pest risk potential rating for the pest listed in Tables 3 and 4 is shown in Table 5.

Table 5. Pest Risk Potential

Pest Species	Consequences of Introduction (Cumulative Risk Rating)	Likelihood of Introduction (Cumulative Risk Rating)	Pest Risk Potential ¹
<i>Diabrotica adelpha</i>	Medium 11	Medium 14	Medium 25

¹ Risk Potential (USDA, 2000a).

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. The port-of-entry inspection is not considered sufficient to provide phytosanitary security.

As stated in the Guidelines (USDA, 2000a), a detailed examination and choice of appropriate sanitary and phytosanitary measures to mitigate risk for commodities 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 that pest.

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