Importation of Yam-Bean or Jícama Roots (*Pachyrhizus* spp. Rich. ex DC., Nom. Cons.) From El Salvador, Honduras and Nicaragua 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.

This risk assessment examines the pest risks associated with the importation into the United States of the roots of yam-bean or jícama (*Pachyrhizus* spp.) from El Salvador, 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. The importation into the United States of *Pachyrhizus* spp. (yam-bean or jícama roots) as a commodity from El Salvador, Honduras, and Nicaragua 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 *Pachyrhizus* spp. from El Salvador, Honduras, and Nicaragua (Table 1) did not prompt a pest-initiated risk assessment.

Table 1. Process for Determining Weediness Potential of the Commodity

Commodity: The commodity requested is fresh roots (free of stems, leaves, and soil) of *Pachyrhizus* spp. (yam-bean, jícama), Fabiaceae, for consumption.

Phase 1: *Pachyrhizus* species are not widely grown in the United States because the plants grow in tropical and subtropical climates. *Pachyrhizus* spp. are represented in a plant database (USDA, 2000b) as occurring in Florida, Hawaii, Puerto Rico, and the Virgin Islands. Roots are readily available in food stores within 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 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*, *Biological Abstracts*, and *AGRIS* search on "species name" combined with "weed").

Phase 3: Conclusion: Species are not reported as weedy. Even if the commodity is diverted from consumption to planting, the species could not establish in temperate climates of the United States. Roots currently available in food stores without reports of establishment demonstrate that the weediness potential of the commodity is negligible.

3. Previous Risk Assessments and Decision History

In 1990, roots of *Pachyrhizus tuberosus* (Lan.) A. Spreng. were permitted entry from Guatemala with inspection and treatment if warranted by findings of pests based on a decision sheet prepared by APHIS (APHIS, 2000a). The interception records include one species of Curculionidae and one species of Rhinotermitidae from the roots of *P. erosus* (L.) Urban from El Salvador (APHIS, 2000b). These interceptions are further discussed in the context of their pest status following Table 2 (*infra*). No interception records were provided for Honduras or Nicaragua for this commodity.

4. Pest Categorization

The pests that have been reported in the scientific and regulatory literature as infecting or infesting *Pachyrhizus* species in El Salvador, Honduras, and Nicaragua are listed in Table 2. This table 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 Pachyrhizus species in El Salvador, Honduras, and Nicaragua and presence in the United States on Any Host

Pest Name (Order: Family)	Distri-bution[1]	Plant Part Affected	Quarantine Pest Status	Likely to Follow Pathway	References
ARTHROPODS					
Etiella zinckinella (Treits.) (Lepidoptera: Pyralidae)	ES, NI, US	leaves, whole plant	No	No	CABI, 2000; Hill, 1994; IIE, 1974; McGuire & Crandall, 1967; Passoa, 1983
FUNGI					
Alternaria dauci (Kühn) Groves & Skolko (Mitosporic Fungi)	ES, HO, NI, US	leaves	No	No	ARS, 2000; CABI, 2000
Chaetoseptoria wellmanii Stev. (Mitosporic Fungi)	ES, US	leaves	No	No	ARS, 2000; CMI, 1986; Wellman, 1977
Colletotricum sp. (probably *C. gleosporiodes* Penz.) (Ascomycota: Phyllachorales)	ES, US	leaves, pod and fruit	CBD[2]	Yes	ARS, 2000; Wellman, 1977
Erysiphe communis (Wallr.) Link (Ascomycota: Erysiphales)	ES, US	leaves, stems	No	No	ARS, 2000; CABI, 2000
Erysiphe polygoni DC (Ascomycota: Erysiphales)	ES, US	leaves, stems	No	No	CABI, 2000; Crandall *et al.*, 1951
Leveillula taurica (Lév.) Arnaud (Ascomycota: Erysiphales)	HO, NI, US	leaves, stems	No	No	CABI, 2000; CMI, 1978
Erysiphe sp. [ana. = *Oidium* sp. (Mitosporic Fungi)]	ES, US	leaves	CBD[2]	No	ARS, 2000; Wellman, 1977

Pest Name (Order: Family)	Distri-bution[1]	Plant Part Affected	Quarantine Pest Status	Likely to Follow Pathway	References
ARTHROPODS					
Phaeoisariopsis griseola (Sacc.) Ferraris [= *Isariopsis griseola* Sacc.] (Mitosporic Fungi)	ES, GU, NI, US	leaves, stems	No	No	ARS, 2000; CABI, 2000; CMI, 1996; Crandall *et al.*, 1951
Phytophthora sp (Oomycota: Pythiales)	ES, US	root	CBD[2]	Yes	ARS, 2000; Wellman, 1977
Rhizopus (*niger*?) (Zygomycetes: Mucorales)	ES	root	CBD[2]	Yes	Wellman, 1977

[1]ES = E Salvador, HO = Honduras, NI = Nicaragua, US = United States
[2]These organisms are identified as presented in Wellman, 1977. Members of this genus are reported in the United States, but because the organism was not identified to the species level, the status as a quarantine pest cannot be determined (CBD).

5. Discussion. Quarantine pests found in commercial shipments of Jícama from El Salvador require quarantine action when they are intercepted. This risk assessment did not identify for further analysis any quarantine pests that are likely to follow the pathway. Other organisms listed in Table 2 could be detrimental to United States agriculture but are not further analyzed. There are a variety of reasons for not subjecting these pests to further analysis. First, they may be generally associated with plant parts other than the commodity. Secondly, although they may be associated with the commodity, these pests are not reasonably expected to remain with the commodity during harvesting and packing processes. Thirdly, they may occur as biological contaminants found during inspections of these commodities and rarely are expected to be found with commercial shipments. For these reasons, pests such as *Etiella zinckinella* are not anticipated to follow the pathway.

Further, the biological hazard of organisms identified only to the genus level is not assessed. In this risk assessment, this situation applies to *Colletotrichum*, *Erysiphe*, *Phytophthora,* and *Rhizopus* species. Lack of species identification may indicate the limits of the current taxonomic knowledge, the life stage, or the quality of the specimen submitted for identification. By necessity, pest risk assessments focus on the organisms for which biological information is available. The lack of biological information on any given insect or pathogen of a major crop where a large volume of information generally is available suggests that this pest does not present a high pest risk, but lack of information cannot be taken as proof of this supposition. The lack of identification at the specific level does not rule out the possibility that a highly dangerous pest or virulent pathogen was intercepted or that it was not a quarantine pest. Development of detailed assessments for known pests that inhabit a variety of ecological niches on the crop—such as the surfaces or interiors of bark, wood, or foliage—allow effective mitigation measures to eliminate the known organisms as well as similar but incompletely identified organisms that inhabit the same niche. The interceptions of Curculionidae and Rhinotermitidae species from El Salvador (APHIS, 2000b) also are not analyzed further because of these reasons.

The two quarantine pests, *Phytophthora* sp. and *Rhizopus* (? *niger*) (species name uncertain), were reported on *Pachyrhizus* roots in El Salvador (Wellman, 1977). Generally, *Phytophthora* root rots are detected during quality control in the country of origin and during inspection at the port of entry. A chlorine treatment may be used to disinfest the roots (Appendix). *Phytophthora* root rots occur in

nearly every part of the world (Agrios, 1997). Diseases caused by *Rhizopus* spp. characteristically are post-harvest storage rots. These organisms usually are saprobes or weak parasites of stored plant organs (Agrios, 1997).

The fungus *Phakospora meiobomiae* was reported on several legume hosts in Central America and on *Pachyrhizus erosus* in Mexico (ARS, 2000; Ono, *et al*., 1992). This risk assessment was unable to confirm the presence of this rust fungus on *Pachyrhizus* spp. in El Salvador, Honduras, and Nicaragua. Roots after post-harvest washing are not likely to be contaminated with spores of a rust fungus should any be present.

This data indicates that there are no quarantine pests that are likely to follow the pathway if species of *Pachyrhizus* are imported from El Salvador, Honduras, or Nicaragua into the United States. This importation is unlikely to pose plant pest risks if permitted.

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