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INTERNATIONAL MAIL AS A PATHWAY FOR THE MOVEMENT OF EXOTIC PLANT PESTS INTO AND WITHIN THE GREATER CARIBBEAN REGION

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ABSTRACT: The objective of this study was to evaluate the risk of pest movement associated with the international mail pathway in the Greater Caribbean Region (GCR[6]). We examined data on materials of phytosanitary significance (MPS) intercepted in mail, and developed suggestions for improved safeguarding. Of packages sent to the United States from worldwide origins, 2.7% of public and 5.6% of private mail packages contained MPS. Of packages sent from GCR origins by public and private mail, 3.3% and 1.6%, respectively, contained MPS. The United States receives more public than private mail. In other GCR countries, however, private postal services dominate the parcel market. High-risk items found in mail included propagative materials (1/3 of intercepted materials) and live insects. Fresh fruits, vegetables, soil, and wood items were also intercepted. We estimated that the GCR (excluding the United States) may annually receive over 14,000 mail packages containing MPS, with up to 4,000 of these being propagative materials. International mail may be the pathway of choice for intentional smuggling of high-risk items. This work was carried out in the framework of the CISWG Caribbean Pathway Analysis. The complete report can be accessed at: http://carribean-doc.ncsu.edu/index.htm.

Keywords: Mail, Propagative, Exotic pest, Quarantine

INTRODUCTION

Public and private postal services are an often overlooked pathway for the movement of plant pests. Almost any item can be sent by mail, either legally or illegally. Controlling mail contents presents an immense challenge to any country. Various studies in the United States have shown that live plants and plant pests are being shipped by mail, often in connection with mail-order purchases (Keller and Lodge, 2007; Zhuikov, 2008). On-line shopping is on the rise, spurring an increase in postal activity. Our goal was to evaluate the risk of pest movement associated with the international mail pathway in the GCR, to assess the most important parts of the pathway (public vs. private) and to evaluate the types of MPS moving through mail.

MATERIALS AND METHODS

We used data collected from U.S. ports of entry (WADS-USDA, 2008) to estimate approach rates of materials of phytosanitary significance (MPS) arriving in mail in the United States. Port-of-entry data were collected through a detailed inspection of randomly selected sampling units; *i.e.*, they are unbiased and thus suitable for risk quantification. These data were collected at 11 U.S. ports of entry from 2005 through 2007. MPS are defined as any plants, plant parts, or plant pests (arthropods, nematodes, mollusks, weeds, pathogens). The MPS approach rate is the percentage of sampling units in which MPS are found. Estimates are presented as 95% binomial confidence intervals, *i.e.*, the limits within which the actual approach rates lie with 95 percent certainty (Steel et al., 1997).

[6] The Greater Caribbean Region (GCR) is defined as all countries bordering the Caribbean Sea, plus the Bahamas, Turks and Caicos, El Salvador, Suriname, Guyana, and the U.S. Gulf States (Florida, Alabama, Mississippi, Louisiana, and Texas).

RESULTS

A large variety of plant materials and some insects were intercepted in both public and private international mail entering the United States (Table 1). When considering mail of worldwide origin, private mail had almost double the MPS approach rate of public mail (Table 2). The same tendency was seen with mail of Caribbean origin, though the difference was not statistically significant. The degree to which mail is inspected varies widely within the GCR, from 100% in some countries to minimal inspection in others. We estimated that the GCR (excluding the United States) may annually receive over 14,000 public mail packages containing MPS, with up to 4,000 of these being propagative materials (Table 3). We do not have statistics on private mail volumes, but market studies suggest that 10 percent of packages are moved by public mail in the GCR, while 90 percent are moved by private mail (*e.g.*, FedEx, UPS, and DHL) [7] (UPU, 2007). Whether the intercepted MPS constitute a threat would vary from case to case, depending on the MPS and the country of destination.

CONCLUSIONS

The data available for the evaluation of pest risk associated with mail is very limited. However, our analysis indicates that the pest risk posed by international mail may be significant for at least some countries of the GCR. More research should be carried out on this pathway. In the meantime, we offer the following suggestions for improved safeguarding of mail:

- Establish mail inspection systems in countries where they do not yet exist.
- Post educational information at mail facilities to increase public awareness of phytosanitary regulations for mail.
- Conduct periodic data collection efforts at mail facilities for the purpose of risk quantification.
- Record data on pest interceptions in mail. Collect and archive data on pest and quarantine material interceptions in mail. Ideally, the database, or at least the format of the database, should be region-wide.
- Implement package tracking and tracing technology at mail facilities.
- Use appropriate inspection technology (*e.g.*, x-ray systems) at mail facilities.
- Use detector dogs at mail facilities.

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[7] These companies are not the only private mail carriers, but are among the most prominent worldwide. Full company names are: FedEx = FedEx Corporation, UPS = United Parcel Service of America, Inc., DHL = DHL International, Ltd.

Table 1. Relative frequency of packages found to contain MPS during data collection at 11 U.S. ports of entry, 2005-2007 (USDA, 2008).

	Origin: Worldwide		Origin: GCR (Except United States)	
Item	Public mail Sample size: 2,042	Private mail Sample size: 1,042	Public mail Sample size: 77	Private mail Sample size: 386
Seeds, pods	20%	24%	12%	5%
Propagative plant materials	9%	3%	6%	4%
Soil	1%	7%	1%	9%
Fruits, fresh	11%	7%	16%	5%
Fresh plant material	8%	7%	9%	2%
Grains, grain products	3%	2%	9%	0%
Vegetables, fresh	3%	4%	8%	3%
Wood, wood items	2%	20%	4%	23%
Straw, hay	1%	0%	0%	0%
Honey, honey combs	0%	2%	0%	1%
Coffee, tea	6%	13%	9%	30%
Vegetables, dried or preserved	2%	1%	0%	0%
Herbs, spices, & flowers, dried or processed	16%	3%	8%	4%
Fruits, dried, preserved, processed	10%	4%	16%	3%
Miscellaneous	3%	1%	1%	1%
Mushrooms	3%	0%	0%	0%
Nuts	3%	3%	1%	6%
Insects	0%	1%	0%	3%

Table 2. Inspection results for mail packages arriving in the United States (2005-2007) (USDA, 2008).

	Origin: Worldwide		Origin: GCR (Except United States)	
	Public mail	Private mail	Public mail	Private mail
Packages inspected	76,132	18,455	2,414	374
Packages with MPS	2,042	1,042	18	6
MPS approach rates [8] (95% binomial confidence interval)	2.7% (2.6-2.8%)	5.6% (5.3-6.0%)	0.8% (0.4-1.2%)	1.6% (0.6-3.6%)

Table 3. Number of public mail packages of worldwide origin received in GCR countries (UPU, 2008) and estimated number of packages arriving with plant materials or plant pests (based on approach rate of 2.6 to 2.8%).

Country [9]	Packages received	Estimated packages with plant materials/plant pests (95 percent binomial confidence interval)	Year of data
Anguilla	1,895	49-53	2003
Antigua and Barbuda	14,042	365-393	2005
Aruba	7,067	184-198	2003
Bahamas	35,641	927-998	2005
Barbados	46,717	1,215-1,308	2005
Belize	33,447	870-937	2006
Cayman Islands	29,481	766-825	2005
Costa Rica	29,889	777-837	2006
Cuba	4,748	123-133	2001
Dominica	8,361	217-234	2005
Dominican Republic	15,469	402-433	2006
El Salvador	29,853	776-836	2006
Grenada	8,193	213-229	2006
Guatemala	21,397	556-599	2006
Guyana	12,058	313-338	2005
Haiti	3,978	103-111	2004
Jamaica	83,432	2,169-2,336	2005

[8] The approach rate is the percentage of randomly inspected packages that contained plant materials. Worldwide approach rates were calculated using interceptions of any plant material/pest, and approach rates for the GCR were based on interceptions of plant materials/pests of U.S. quarantine significance. The approach rate is usually given with a 95% binomial confidence limit (the limit within which the true approach rate falls with a 95% likelihood).

[9] No data for Guadeloupe, Honduras, Martinique, Saint-Barthélemy, St. Martin, and St. Vincent and the Grenadines.

Country [9]	Packages received	Estimated packages with plant materials/plant pests (95 percent binomial confidence interval)	Year of data
Montserrat	1,567	41-44	2005
Netherland Antilles	29,328	762-821	2006
Nicaragua	4,978	129-139	2002
Panama (Rep.)	28,056	729-786	2006
St. Kitts and Nevis	11,480	298-321	2005
Saint Lucia	12,299	320-344	2006
Suriname	4,150	107-116	2006
Trinidad and Tobago	48,900	1,271-1,369	2005
Turks and Caicos Islands	1,000	26-28	2004
Virgin Islands	6,254	163-175	2006
GCR Total (excluding U.S.)	533,680	13,876-14,943	