

Plant Biosecurity in the United States: Roles, Responsibilities, and Information Needs

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Plant biosecurity activities in the United States fall along a continuum ranging from offshore activities to the management of newly established exotic pests. For each step in the continuum, we examine the roles, responsibilities, and information needs of the Animal and Plant Health Inspection Service and other agencies involved in plant biosecurity. Both costs and information needs increase dramatically as a pest penetrates deeper into the continuum. To help meet these information needs, we propose a cyberinfrastructure for plant biosecurity to link phytosanitary agencies, researchers, and stakeholders, including industry and the public. The cyberinfrastructure should facilitate data collection, data integration, risk analysis, and reporting. We also emphasize the role of private industry in providing critical data for surveillance. We anticipate that this article will provide agricultural stakeholders, including scientists, with a better understanding of the information needs of phytosanitary organizations, and will ultimately lead to a more coordinated biosecurity effort.

Keywords: exotic pests, invasive pests, decision support systems, risk analysis, cyberinfrastructure

Plant biosecurity is the array of strategies aimed to assess and manage the risks of infectious diseases, quarantined pests, invasive alien species, living modified organisms, and biological weapons in natural and managed ecosystems (Meyerson and Reaser 2002a). (Biosecurity may also refer to preventive measures to secure biological material, but this article does not cover that aspect of biosecurity.) The two agencies in the United States in charge of developing and implementing plant biosecurity strategies are the Customs and Border Protection (CBP) agency of the US Department of Homeland Security (DHS) and the Animal and Plant Health Inspection Service's Plant Protection and Quarantine (APHIS PPQ) of the US Department of Agriculture (USDA). The activities conducted by the DHS CBP and APHIS PPQ fall within a continuum that includes off-shore detection and management of exotic pests, port-of-entry measures, and domestic eradication or management of newly introduced pests (figure 1; NPB 1999, Schwalbe 2001, Meyerson and Reaser 2002b). According to a 2003 memorandum of understanding (www.aphis.usda.gov/plant_health/moa_dhs/downloads/article1.pdf), the DHS CBP and APHIS share responsibilities at ports of entry. The DHS CBP is primarily responsible for inspection activities, whereas APHIS provides many

specialized services, including risk analysis, treatment, pest identification, certification, and training. Although malicious species introductions are always a concern, past and recent problems have generally been attributable to accidental and natural introductions of plant pests.

The growing threat of the environmental damage and economic costs caused by exotic pest invasions underlines the need to continue improving US plant biosecurity programs. Pimentel and colleagues (2000) estimated that annual losses for agricultural crops—including the cost of pest control—are \$14.1 billion for exotic arthropods and \$21.5 billion for exotic plant pathogens. In addition, the cost of arthropods' damage to lawns, gardens, and golf courses is another \$1.5 billion. International trade has been the most important pathway for the accidental or purposeful introduction of invasive species into the United States (NRC Committee 2002, Mack 2003, Taylor and Irwin 2004, Hulme 2009). Plant pests infest hundreds of hosts in natural and managed ecosystems, including urban, agricultural, and forest. Taken together, these hosts may be vulnerable to thousands of exotic pest species. Because of this diversity of hosts and ecosystems, numerous stakeholders may be involved with a particular plant biosecurity issue, such as federal and state agencies (e.g.,

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Biological invasions are the uncontrolled spread and proliferation of species including vertebrates, plants, arthropods, and plant pathogens from their native . Predicting Invasions of Nonindigenous Plants and Plant Pests. National Research Council (US) Committee on the Scientific Basis for Predicting the Invasive. Cover of Predicting Invasions of Nonindigenous Plants and Plant Pests nonindigenous species which has recently arrived or which appears to be a temporary. This Web site contains the free book Predicting Invasions of Nonindigenous Plants and Plant Pests provided by the National Academies Press. Compiled by the., English, Book edition: Predicting Invasions of Nonindigenous Plants and Plant Pests Hardcover Committee on the Scientific Basis for Predicting the. To study the issue, BANR created the Committee on the Scientific Basis of Predicting the Invasive Potential of Nonindigenous Plants and Plant Pests in the . Caton BP. A response to the ESA position paper on biological invasions. . Predicting Invasions of Nonindigenous Plants and Plant Pests. National. Predicting Invasions Of Nonindigenous Plants And Plant Pests PDF. Predicting Invasions of Nonindigenous Plants and Plant Pests. Nonindigenous plants and plant pests that find their way to the United States and become. Lehtonen, P.P. () Pest risk assessment in the United States: guidelines for Council () Predicting Invasions of Nonindigenous Plants and Plant Pests. Science 2 National Research Council () Predicting invasions of nonindigenous plants and plant pests. National Academy Press, Washington. Heather, N.W. & Hallman, G.J. () Pest management and phytosanitary trade NRC () Predicting Invasions of Nonindigenous Plants and Plant Pests. to predict the number of nonindigenous species or presence of a particular species. Predicting invasions of nonindigenous plants and plant pests. Despite the substantial impacts of nonindigenous plant pests and weeds, Application of PIN data for statistically robust predictions is limited by exotic insects exotic species exotic weeds invasion pathways nonindigenous pest arrival Port Information . Predicting Invasions of Nonindigenous Plants and Plant Pests. on the Scientific Basis for Predicting the Invasive. Potential of Nonindigenous Plants and Plant. Pests in the . has led to the expectation that such invasions. records Key words: exotic insects, exotic species, exotic weeds, invasion pathways, predictions is limited by nonrandom sampling protocols, but the data . Number of interceptions of nonindigenous plants and plant pests by taxa. A National Research Council report, Predicting Invasions of Nonindigenous Plants and Plant Pests, examines the characteristics of non-native.

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