



Incursion of the Gold Dust Day Gecko, *Phelsuma laticauda* (Boettger 1880), in Puerto Rico through the Ornamental Plant Trade

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The ornamental and horticultural plant trade is considered a major source of intentional and unintentional introductions of non-native species (Dehnen-Schmutz et al. 2007; Hulme et al. 2018; Montagnani et al. 2022), making plant nurseries both important sources of introduced species and critical infrastructure for conservation. For example, U.S. government-run nurseries reportedly deliver 28 million tree and native plants seedlings annually (U.S. Department of the Interior and U.S. Department of Agriculture 2023). Although these facilities play important roles in conservation, they can inadvertently become pathways for the introduction of species (Kraus et al. 1999). As non-native invasive species are among the five major causes of the current mass extinc-

tion, addressing these potential invasion pathways remains important (IPBES 2023).

The International Plant Protection Convention, a treaty to protect plants from the spread of pests, laid the foundation for international cooperative measures to reduce the spread of invasive species (FAO 1997). Each of the 180 signatory states implements protections individually and to varying degrees of strictness (Eschen et al. 2015). That variation likely explains why invasive species continue to spread through the plant trade (Montagnani et al. 2022). To supplement governmental efforts, monitoring for introduced species can be aided by citizen-science. iNaturalist, the online platform for species inventory, provides a powerful tool and opportunity



Figure 1. A Gold Dust Day Gecko (*Phelsuma laticauda*) encountered at 1346 h on 18 July 2024 in a commercial plant nursery in Puerto Rico. Photographs by Christina N. De Jesús Villanueva and Steven Van Belleghem.

to expand invasive species detection. This platform has supported the detection of invasive species in Hawai'i, Italy, Thailand, Singapore, and, as we report herein, Puerto Rico (Dimson et al. 2023; Lo Parrino and Tomasi 2021; van den Burg et al. 2020).

The Gold Dust Day Gecko, *Phelsuma laticauda* (Boettger 1880), a diurnal gecko native to northern Madagascar (Gerlach et al. 2011), has numerous established non-native populations in Florida (Krysko and Borgia 2012), French Polynesia (Ota and Ineich 2006; Lund 2015), Comoros and Seychelles (Rocha et al. 2009), Mascarenes (Cole 2007), Hawai'i (multiple populations on at least three islands) (McKeown 1996), and within Madagascar (Dubos et al. 2014). *Phelsuma laticauda* is an aggressive competitor, both in its native and non-native ranges (Gehring et al. 2010; Lund 2015; Deso et al. 2023). Points of incursion can serve as early indicators of preventable spread into vulnerable regions. In the Caribbean, the greater Antilles were identified by Dubos et al. (2023) among those with the highest risk of invasion in the next 45 years.

On 19 April 2024, Santos (2024) reported an observation of a single *Phelsuma laticauda* in Puerto Rico. I. Santos (pers. comm.) informed us of a single specimen at the site, a commercial ornamental nursery located in an urban area. We visited the nursery on 26 April and 18 July 2024 to confirm the observation and speak with the nursery staff. The staff indicated that the first-known introduction occurred sometime during 2021 via an orchid shipment originating from Hawai'i. A second known introduction occurred more recently in 2024. Both individuals (sexes unknown) continue to roam freely in the open-air nursery, which is surrounded by other businesses. Both shipments responsible for incursions came from the same orchid nursery in Hilo, on the Big Island of Hawai'i. This nursery is located in an area of Hilo where *P. laticauda* has been documented (Stevens 2021). The staff at the nursery in Puerto Rico also informed us of at least two other plant nurseries on the island that import orchids directly from Hawai'i through the same exporter, although we have no means of verifying that information.

Phelsuma laticauda is established on multiple islands (see above), indicating an ability to survive in shipments, although survival of the individuals in Puerto Rico was assisted by nursery staff. The first individual to arrive was reportedly found stuck to a piece of shipping tape, and the staff carefully removed it, nursed it back to health, watched it grow, and now consider it a free-roaming pet in the nursery.

Historically, responses to introductions of amphibians and reptiles has been limited (Kraus and Campbell 2002). Even with early notice, identified populations were allowed to persist. This was, for example, the case with the Common Coquí (*Eleutherodactylus coqui*) in Hawai'i (Kraus and Campbell 2002), where it is now widespread. In the

Caribbean, *P. laticauda* has been identified as a potential threat to endangered species like *Anolis koopmani* and *Anolis juangundlachi* (Dubos et al. 2023). We now know that *P. laticauda* has arrived as a stowaway to Puerto Rico and could pose a risk of further expansion in the Greater Caribbean, like that of other non-native reptiles that rapidly spread within the region, including Smooth-scaled Tegulets (*Gymnophthalmus underwoodi*), Green Iguanas (*Iguana iguana*), and Common House Geckos (*Hemidactylus frenatus*) (De Jesús Villanueva et al. 2022; Lindsay et al. 2023; van den Burg et al. 2023; Rivera et al. 2024).

The repeated introductions of *P. laticauda* via ornamental plant shipments from Hawai'i to Puerto Rico is an important reminder of the risks posed by the global plant trade. As with other invasive species in the Caribbean and elsewhere, early detection and rapid responses are essential to prevent further establishment and spread. This report brings awareness of *P. laticauda* incursions and the possibility of future within-region spread. Education campaigns on biosecurity for key stakeholders (i.e., horticulturalists, exporters, harbor personnel) that highlight the invasion risk associated with *P. laticauda* will likely remain the most important tool to prevent further spread, and citizen-science platforms like iNaturalist can serve an important supporting role in early detection and reporting.

Acknowledgements

We thank iNaturalist users Ivan Santos and Steve Stevens. We also thank Dr. Steven Van Belleghem for his support during our nursery visits, and the staff of the commercial nursery in Puerto Rico for their observations that led to the documentation of this species on Puerto Rico.

Disclaimer: The findings and conclusions in this publication are those of the authors and should not be construed to represent any official USDA-Forest Service or U.S. Government determination or policy.

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