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Pest Identification Technology Laboratory

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The Pest Identification Technology Lab (PITL, formerly Ft. Collins Lab) mission is to provide PPQ and its partners with user-friendly and up-to-date technology-based identification resources for invasive pests.

PITL produces electronic identification aids and resources as well as methods and best practices for digital identification resource development. The lab also develops and maintains interactive interfaces for creating and sharing such resources. In cooperation with taxonomic experts from around the country and the world, PITL delivers identification products (such as IDtool websites, fact sheets, screening aids, identification keys, and imageID and other searchable image galleries), ways to find and share identification aids (Search IDaids), and interfaces, such as Fact Sheet Manager, for developing digital diagnostic products in a range of formats. The lab maintains a suite of customized backend data entry interfaces to manage the data underlying these resources.

The molecular laboratory designs taxon-specific assays to detect and diagnose economically important insects. The molecular lab focuses on diagnostics for rapid and accurate identification of target pests. These assays are used to identify intercepted insects at ports of entry, as well as insects captured in Cooperative Agricultural Pest Survey (CAPS) traps during domestic surveys. The primary focus of the molecular lab is Lepidoptera (moths) and Coleoptera (beetles). Molecular assays

developed by the lab are used by PPQ and in molecular labs around the world for identifying important insect pests. The molecular lab also coordinates centralized screening of domestic traps for the Old World bollworm program and provides molecular identifications of insects for PPQ and cooperators.

Recent Accomplishments

All identification technology products and interfaces can be found at <https://idtools.org>

Digital Diagnostics

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IDtools

Identification websites, or IDtools, cover a range of plant pests and commodities. Each tool offers a cohesive package of information, including interactive keys, fact sheets, image galleries, and a variety of other customized support features, to support screening and identification of plant pests and diseases, both within and outside of PPQ. A few examples of IDtools include [Exotic Bee ID](#), [Aquarium and Pond Plants of the World](#), [Grasshoppers of the Western US](#), and [Citrus Diseases](#).

Mobile apps

Many of the Lucid keys from identification tools, along with their fact sheet and image media, are also available as Lucid mobile apps. These mobile keys are designed for use at ports of entry and in field surveys on hand-held devices with or without internet access. Aquarium and Pond Plant ID is available as a mobile app, along with many others.

CAPS Screening Aids

PITL also develops screening aids to support the CAPS community in identifying target and non-target pests during domestic surveys. [CAPS screening aids](#) are specifically designed for people screening traps from state surveys, with a simple, standardized format for ease of use.

imageID

imageID is a searchable online collection of high-quality images of plant pest taxa of concern to PPQ, with the ultimate purpose of expediting the movement of cargo. imageID is an ongoing collaboration with PPQ's National Identification Services and Field Operations, serving as the central repository where PPQ identifiers at ports of entry and Plant Inspection Stations can quickly access images and information to support efficient identification of intercepted pests.

Search IDaids

Search IDaids is a searchable collection of vetted identification resources gathered from across the Internet. The collection includes many types of identification resources, and all groups of plant pests are represented. IDaids are linked with other PPQ applications to allow users to quickly find ID support resources for pests of concern. Search IDaids also includes a section specifically for PPQ identifiers, where they can house and share their literature libraries and training resources. Search IDaids can be found at <https://idtools.net/IDaids>.

Data management and product development

PITL manages all of the data behind each of these products with customized data entry applications. Clients and cooperators help to maintain the data, and use the lab's product development interfaces to leverage data to create and share identification resources.

Molecular Laboratory

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Old World bollworm

The lab has managed the Old World bollworm (OWB) molecular program since this invasive pest was first detected in Brazil in 2013. Although this species has not established in the US, larvae are routinely intercepted on commodities from various locations in the New World. The lab develops molecular assays to identify larvae intercepted at ports of entry and adults found while screening OWB traps for the CAPS program.

- [Real-time PCR assay to identify Old World bollworm](#)
- [Phylogeography of Old World bollworm in South America and the Caribbean](#)
- [Identification of Old World bollworm and related larvae](#)

Lepidoptera diagnostics and research

PITL performs molecular research on a variety of other moth pests in addition to OWB. These include other species closely related to OWB, a variety of important pests in the same family (Noctuidae), and pest species in other families (Tortricidae, Gelechiidae). The lab develops rapid assays to identify both adults and larvae of invasive pests using DNA, uses molecular methods to improve morphological identifications, and conducts taxonomic work including full systematic revisions that allow for the correct identification of pests and related species.

- [Real-time PCR assay to identify *Autographa gamma*](#)
- [Resolving the taxonomy of some tortricid moths in the genus *Ancylis*](#)
- [Real-time PCR assay to identify *Tuta absoluta*](#)

Digital PCR

Droplet digital PCR is a method that allows for detection of target DNA sequences at levels much lower than is possible with other methods. Using this technology, PITL has produced molecular assays that are capable of detecting a single target individual in a trap full of up to 1,000 non-targets. These methods have been applied to screening OWB traps for the CAPS program, and similar methods have been developed for other species of moths and bark beetles.

- [Digital PCR assay to detect Old World bollworm in trap samples](#)
- [Digital PCR assay to detect Autographa gamma in trap samples](#)
- [Digital PCR assay to detect Ips bark beetles in trap samples](#)

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