

PURDUE
EXTENSION



**PLANT AND PEST
DIAGNOSTIC
LABORATORY**

2015 Summary Report

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Introduction

The Plant and Pest Diagnostic Laboratory (PPDL) in the Department of Botany and Plant Pathology at Purdue University is an interdisciplinary laboratory dedicated to providing accurate and rapid identification of plant diseases, insects, weeds and cultural problems. We serve as a source of unbiased information regarding pest management strategies, provide training for plant and pest related problems and participate in the National Plant Diagnostic Network (NPDN), a consortium of networked Land Grant University Diagnostic Laboratories established to protect our nation's plant biosecurity infrastructure.

Sample Overview

The Purdue University Plant and Pest Diagnostic Lab provided 2906 diagnoses on 2120 samples submitted in 2015 (Tables 1 and 2), with 16% of our samples originating from outside Indiana (Fig. 1). We greatly appreciate the generous diagnostic assistance of faculty and staff from the Departments of Botany & Plant Pathology, Agronomy, Entomology, Horticulture & Landscape Architecture, and Forestry & Natural Resources as well as assistance from select diagnostic specialists at other institutions across the country (Table 1). Ornamental plants were again the biggest category of non-regulatory samples received in 2015 (43%) followed by Agronomic crops at 22%

(Fig. 5). Also following the pattern in previous years disease identification accounted for most (59%) of the problems diagnosed (Fig. 3). The lab received more than 500 samples during the peak activity period in June last year (Fig. 6). More than 40% of our samples received a diagnosis within 3 days of submission and almost 70% within 6 days (Fig. 7).

About a third of our samples are submitted by commercial businesses, including professionals from agribusiness, the green industry and pest control companies. Another third come from non-commercial sources such as Extension Educators, homeowners and campus faculty. The remaining samples submitted by the Indiana Dept. of Natural Resources (IDNR), Indiana Crop Improvement Association (ICIA) and the Office of the Indiana State Chemist (OISC) are related to regulatory/survey activities (Table 3).

Diagnostic Highlights

The growing season began with unusually high rainfall levels in many areas of the state. This delayed planting of corn and soybeans and caused an increase in problems associated with excess water, such as damping off, root diseases and injury from pre-plant herbicides. The wet weather also influenced a number of insect populations and especially those that harbor near buildings and homes. Moisture loving pests such as millipedes, springtails, fungus gnats and foreign grain beetles became problematic and a large part of the insect questions we received from the public during 2015. Tar spot of corn, caused by the fungus *Phyllachora maydis*, a disease not previously reported in the United States was diagnosed by the PPDL in September on corn samples from Indiana and Illinois, with confirmation provided by USDA National Plant Pathologist Megan Romberg. The lab worked together with Kiersten Wise, Purdue Extension Crop Disease Specialist, the plant diagnostic clinic at the University of IL, our Indiana SPRO, SPHD and IDNR inspectors, a team from USDA-APHIS-PPQ and industry partners to quickly inform our stakeholders of this new find and to determine the extent of the infestation in Indiana and Illinois. While yields were not impacted in 2015, surveys are planned for the 2016 growing season to monitor this newly introduced plant disease.

- Media coverage:
<https://www.youtube.com/watch?v=zLH2vIJLRBE>
- <http://www.purdue.edu/newsroom/releases/2015/Q3/new-corn-disease-confirmed-in-indiana.html>

A number of other diseases not previously reported in Indiana were diagnosed by the PPDL and documented with expert assistance of

several colleagues. Along with Tar Spot, these First Reports resulted in five journal publications (listed below). New diseases include: Eyespot (Strawbreaker Foot Rot) of wheat, false mildew leaf blight disease of switchgrass, smut fungus on purple sandgrass, bacterial leaf spot of basil, downy mildews on Agastache and Rudbeckia, virus diseases on Hydrangea, Spirea and evening primrose, rusts on Amsonia and ornamental pear trees and powdery mildew and Diaporthe (fungal) dieback of hops (an emerging specialty crop in the state).

Publications

Ruhl G., Romberg, M., Bissonnette, S., Plewa D., Creswell, T. and Wise, K. (2016). First Report of Tar Spot on Corn caused by *Phyllachora maydis* in the United States. Plant Disease (in press)

Webb, C., Speers, C., Ruhl, G., Creswell, T., (2016). First Report of Bacterial Leaf Spot Caused by *Pseudomonas cichorii* on Sweet Basil (*Ocimum basilicum*) in Indiana. Plant Disease (in press)

Abbasi, M., Aime, M.C., Ruhl, G., Creswell, T. (2015) First Report of the Smut Fungus *Ustilago sieglingiae* on Purple Sandgrass (*Triplasis purpurea*) from Indiana. Plant Disease (in press)

Creswell, T., Ruhl, G., Aime, M.C., Beckerman, J., Abbasi, M. (2015) First report of rust disease of Bradford Pear caused by *Gymnosporangium clavipes*. Plant Disease (in press).

Rivera, Y., Salgado-Salazar, C., Creswell, T., Ruhl., G., Crouch, JA. (2015). First report of downy mildew caused by *Peronospora sp.* on *Agastache* in the United States. Plant Disease (in press)

Extension Specialist Collaboration

The PPDL benefits greatly from the diagnostic expertise provided by specialists in other departments (Table 1) and they in turn gain valuable information to share with their stakeholders. Some comments are given below.

Cliff Sadof, Ornamental Extension Entomology Specialist

"I have used specimens received by the PPDL to help me confirm my general impressions of the incidence of insect problems in the state. Specifically, I used clinic reports of Eastern tent caterpillar, and oak galls to inform my presentations this year to the green industry. This was particularly useful in talks I gave to the MRTF, IAA, and INLA."

John Obermeyer, IPM Specialist, Department of Entomology

"Syrphid fly maggots were identified in PPDL corn samples late in the season which supplemented other reports I had gotten directly. The lab samples helped me confirm large numbers of beneficial syrphid flies in and around corn fields, indicating that aphid populations were present and feeding in corn. This led me to write and post an article for the Pest & Crop newsletter. The email notification of this finding went to over 3,000 field crop agribusiness personnel."

Travis Legleiter; Weed Science Program Specialist

"The weed identification samples diagnosed in the PPDL aided in further confirmation of the prevalence of two troublesome Amaranthus species in the state of Indiana. In particular samples from the 2015 growing season further confirmed an increasing prevalence of common waterhemp, which we had suspected would become a larger issue for Indiana farmers."

Larry Bledsoe, Coordinator - Indiana Cooperative Agricultural Pest Survey

"The PPDL continues a successful collaboration with the Indiana Cooperative Agricultural Pest Survey by providing valuable diagnostic data for several important endemic and exotic invasive species."

Tim Gibb, Insect Diagnostician/Turfgrass Extension Specialist

"The bed bug resurgence continues in Indiana - much as it does nationally. Samples submitted for confirmation as well as requests for biology and management were high during 2015. The introduction and spread of Brown Marmorated Stink bugs (BMSB) also continues. Pest status of BMSB has risen from simply a nuisance pest to one of serious concern both in Indiana agriculture and in Indiana residences as an unwelcome invader. The number of samples submitted to the PPDL by those with suspected delusory parasitosis continued to rise during 2015. Although these problems lies are referred to health care professionals, the number of cases submitted to our lab is alarming."

Kyle Daniel, Nursery and Landscape Outreach Specialist

"Working with the PPDL on sample diagnoses helped me to monitor trends of abiotic stresses in 2016. Specifically, it allowed me to determine the effects of the record spring/early summer rainfall on ornamental plants, especially on conifers."

Lindsey Purcell; Urban Forestry Specialist

"I received a fair number of inquiries regarding decline in both deciduous and evergreen species that were planted less than 10-15

years. It is my belief that much of the decline was the result of the drought stress from previous years still presenting symptoms currently. Additionally, I have seen way too many trees in decline or complete failure due to excessive planting depth. The saga continues and it is critical to get the landscape industry current with ANSI planting standards and current best management practices.”

Surveys

The PPDL continued a long-term, multi-year partnership (2004-2016) with IDNR in the annual Cooperative Agriculture Pest Survey (CAPS) to test nursery samples for *Phytophthora ramorum*, causal agent of Ramorum Blight and Sudden Oak Death, a potentially devastating disease of our nursery trade and timber industry (Table 2). All 395 samples from the survey tested negative for *P. ramorum*.

Thousand Cankers Disease (TCD) update: The IDNR is monitoring for the presence of TCD in Indiana. The TCD disease complex of black walnut is caused by a fungus (*Geosmithia morbida*)(Gm) that is vectored by a bark beetle, the walnut twig beetle (WTB), *Pityophthorus juglandis*. In June 2014, Gm was detected on three individual *Stenomimus pallidus* weevils that emerged from a girdled study tree in Brown County, IN. In 2015, *Geosmithia* was detected on WTB captured in traps and reared from the bark of logs from a sawmill in SE Franklin County, IN. **TCD has NOT been detected in any standing walnut trees in Indiana and no symptomatic, cankered, trees have been identified during surveys in the state.** The PPDL will continue to work with the IDNR as they survey black walnut trees for the insects and fungus involved in this disease complex in 2016.

The PPDL participated for the 3rd year (2013-2015) with the IDNR in an IN CAPS survey for Exotic Corn Pathogens. All 118 corn samples examined by the PPDL were diagnosed as 'not detected' visual/microscopic for the presence of *Peronosclerospora maydis* (Java Downy Mildew) *P. Philippinensis* (Philippine Downy Mildew) and *Sclerophthora rayssiae* (Brown Stripe Downy Mildew).

Data gathered from surveys are uploaded to the National Agricultural Pest Information System (NAPIS) database system and the NPDR national data repository. This effort in gathering information helps researchers and regulatory agencies guide future research and monitoring efforts.

Extension and Teaching Activities

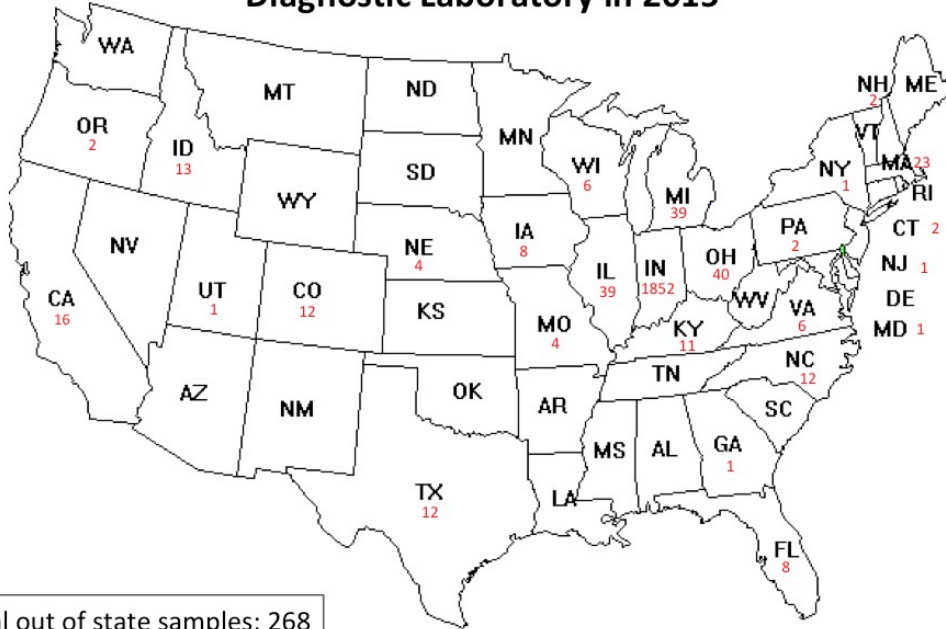
PPDL staff members participate in a variety of educational events and programs each year. Some of these programs in 2015 included:

- Indiana Arborist Association annual meeting
- Indiana Professional Lawn and Landscape Association annual training events
- Green Expo in Indianapolis
- Master Gardner training on disease diagnostics.
- Training events for employees of garden centers across the state
- Webinars for Extension Educators
- PK-12 Outreach (4-H Career Round-up; SpringFest; Wea Ridge Kindergarten Classes, Happy Hollow 4th grade, HASTI)
- Horticultural Inspection Society – 2015 Multi-state Inspection Training
- Turf and Landscape Field Day (Daniel Turf Center)
- The Indiana State Fair: Purdue Extension Ag Hort Building
- Diagnostics Training Workshop supported by USAID in Villavicencio, Columbia
- Guest lectures and lab exercises for HORT 420, AGR 290 and BTNY 301
- Diagnostics training for visiting scientists from Herat University, Afghanistan

New Staff

This year we welcomed Todd Abrahamson as our new PPDL secretary and lab assistant.

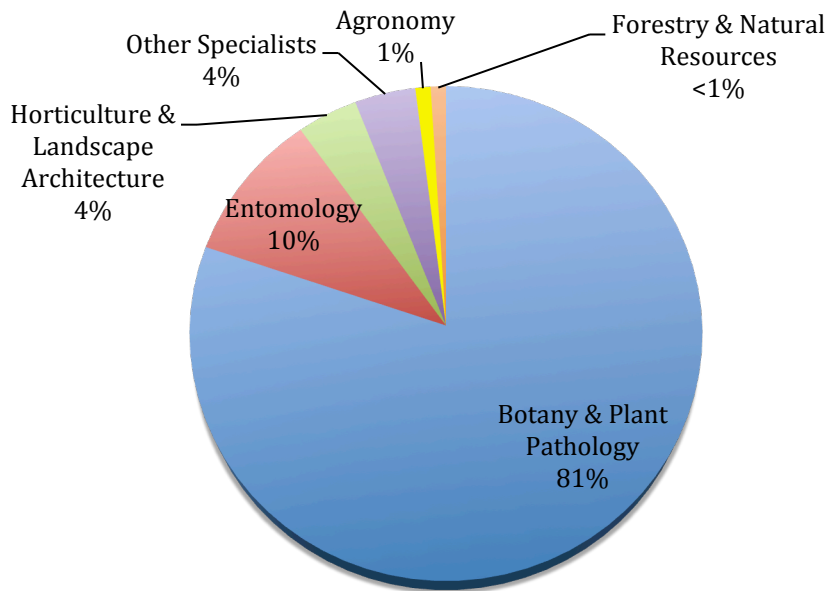
Fig. 1 Origin of samples received by the Plant and Pest Diagnostic Laboratory in 2015



Total out of state samples: 268
(16% of total routine samples)

2 Photo only samples came from Afghanistan

Fig. 2 - Departments Assisting with Sample Diagnosis - 2015



See Table 1 for detailed information.

Fig. 3 - Diagnoses by Pest Category -2015

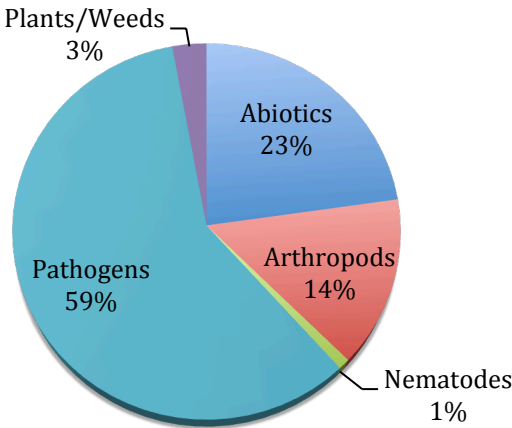


Fig. 4 - Five Year Sample Trend 2011-2015

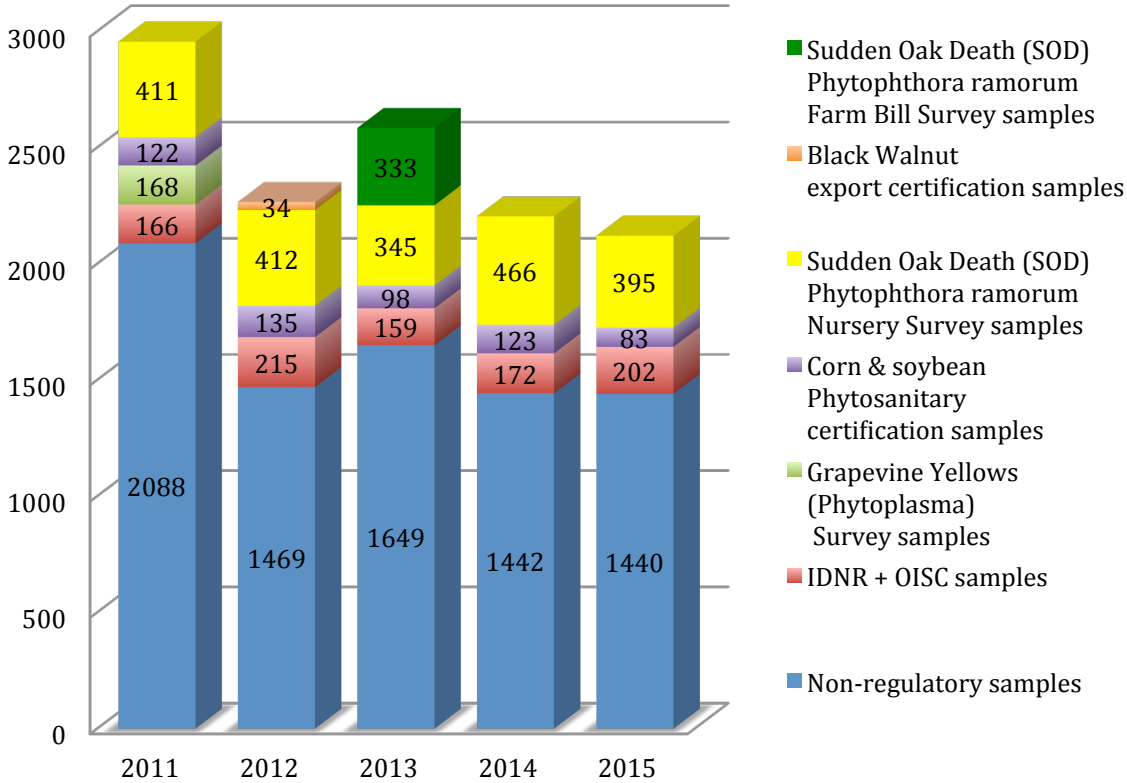


Table 1. Departmental faculty and staff that assisted with diagnoses of samples submitted to the Plant and Pest Diagnostic Laboratory during 2015. [1]

Faculty/Staff	Number of Samples	Faculty/Staff	Number of Samples
Agronomy	24 (1%)	Entomology	295 (10%)
J. Camberato	14	L. Bledsoe	12
S. Casteel	2	B. Brown	12
K. Johnson	8	J. Faghihi	7
		R. Foster	15
		T. Gibb	119
Botany & Plant Pathology	2348 (81%)	M. Ginzal	2
		J. Obermeyer	20
M. Abbasi	5	C. Sadof	108
C. Aime	2		
J. Beckerman	16	Horticulture & Landscape Architecture	113 (4%)
T. Creswell	850	B. Bordelon	8
D. Egel	10	K. Daniel	48
B. Johnson	1	M. Dana	2
R. Latin	5	R. Lerner	30
D. Lubelski	3	R. Lopez	6
T. Legleiter	137	L. Maynard	8
G. Ruhl	1304 [2,3]	S. Weller	2
I. Thompson	5	A. Patton	9
K. Wise	10		
		Other Specialist	122 (4%)
Forestry & Natural Resources	4 (<1%)	J. Byrne, MSU	75
		M. Romberg, USDA-APHIS	22
L. Purcell	3	B. Lockhart, U of MN	15
T. Stewart	1	Other	10
Total Diagnoses:			2906

[1] The total number of diagnoses exceeds the total number of samples due to multiple people assisting with a diagnosis. Names in **BOLD** are Department Diagnostic Liaisons.

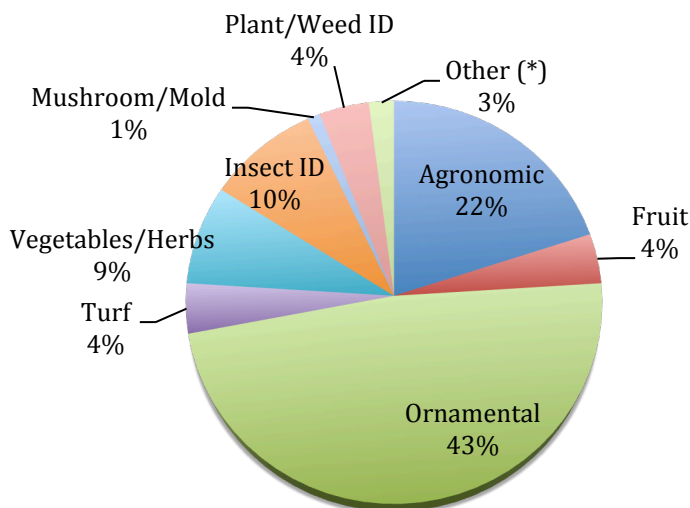
[2] 395 diagnoses were provided for *Phytophthora ramorum* nursery survey samples.

[3] 83 diagnoses were provided for corn phytosanitary survey samples.

Sample Type	Number of Samples	% of Total
Non-regulatory samples	1440	68%
Regulatory/survey samples	680	32%
Total number of samples	2120	100%

Affiliation	Number of samples	% of Total
Commercial	771	36%
Agribusiness	95	4%
Arborist	43	2%
Consultant	85	4%
Garden Center/Greenhouse/Lawn & Tree Care	233	11%
Golf Course	28	1%
Grower/Farmer	77	4%
Landscaper/Groundskeeper/Lawn & Tree Care	155	7%
Pest Control	28	1%
Other	27	1%
Non-Commercial	669	32%
Extension Educator	263	12%
Homeowner	245	12%
Researcher/Specialist	161	8%
Regulatory/Survey	680	32%
IDNR (Nursery inspection)	134	6%
IDNR/ICIA (Phytosanitary certification field inspection)	83	4%
IDNR (SOD <i>P.ramorum</i> Survey)	395	19%
Office of the Indiana State Chemist	68	3%
Totals	2120	100%

Fig. 5 - Non-Regulatory Sample Categories - 2015



See also Table 4

Table 4. Routine samples sorted by sample category-2015

Category	Number of Samples	% of Total
Agronomic	311	22%
Field crops	270	19%
Small grains	41	3%
All Fruit	59	4%
Fruit	35	2%
Small Fruit	24	2%
Ornamentals	619	43%
Annual	88	6%
Deciduous	258	18%
Evergreen	167	12%
Perennial	106	7%
Turf	61	4%
Vegetables/Herbs	132	9%
Miscellaneous	258	18%
Insect ID	143	10%
Mushroom/Mold	12	1%
Plant/Weed ID	62	4%
Other (Multiple Host, Aquatics)	41	3%
Total Samples	1440	100%

Fig. 6 - Monthly Totals - 2015

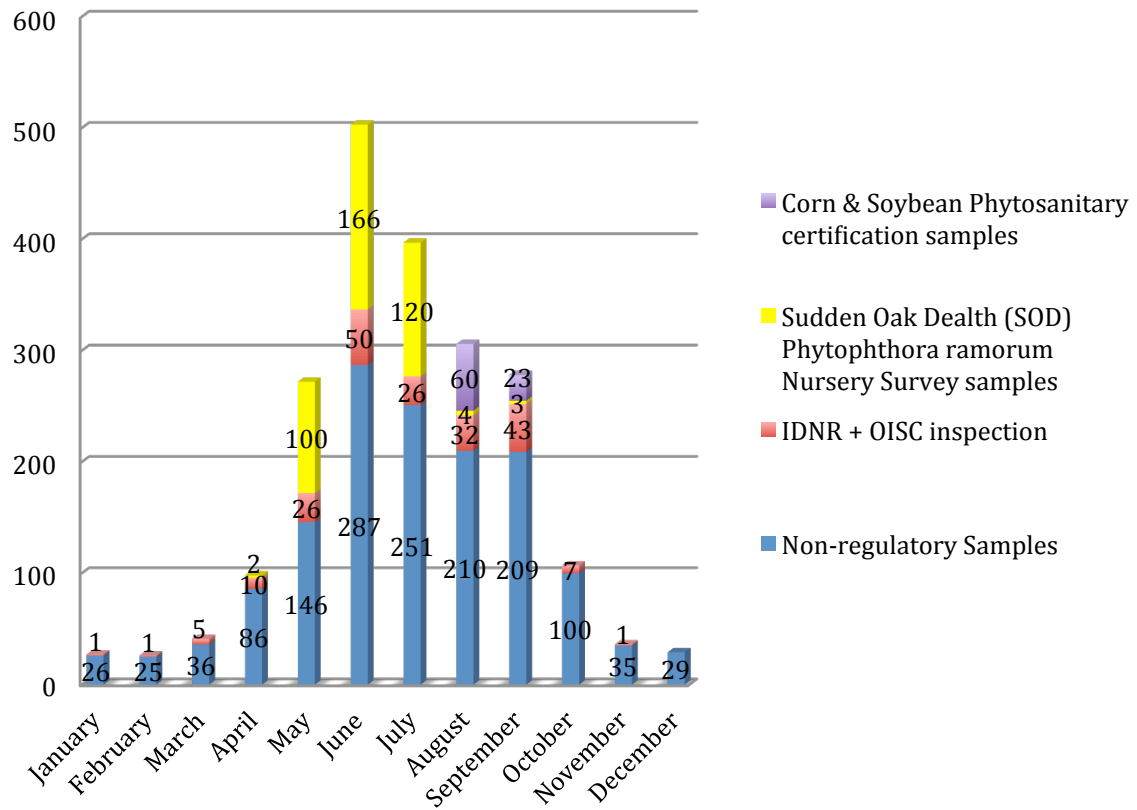
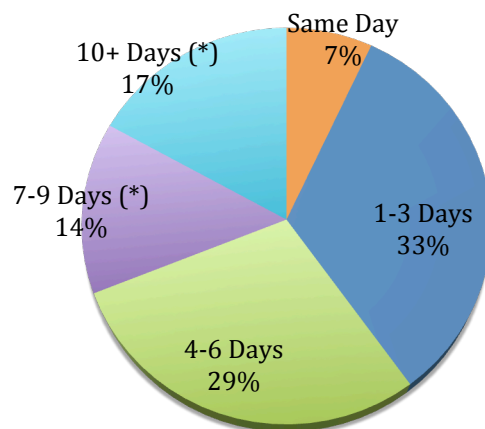


Fig. 7 - Reporting Turn-Around Time 2015



*Molecular Identification and culturing extends sample completion/turn around time for complex samples.