The NPDN
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Disease & Pest Management

**process**

- detection
- diagnosis
- response

Process must be rapid and accurate to minimize impact
Diagnostic Process: NPDN Model

parallel networked diagnostics
to increase surge capacity

No surge capacity

rapid identification of positives
& rapid clearing of negatives
Mission

– The mission of the NPDN is to protect US agricultural and natural plant systems by:
  - Facilitating early detection of pests and pathogens through outreach and education,
  - Performing rapid and accurate diagnoses,
  - Ensuring timely reporting, and
  - Supporting response through partnerships and coordinated surge capacity.
How is this Accomplished?

- Infrastructure
- Governance
- Regional coordination
- National technical committees
  - Information Technology
  - Training and Education
  - Diagnosticians and accreditation
  - Data management
  - Exercise scenarios
# National Plant Diagnostic Network

## Operations Committee

- NPDN regional directors
- CSREES
- APHIS
- National Plant Board
- EDEN
- Regional IPM Centers
Sub-committee Outputs

Diagnostics
- Training
- Support for diagnostic infrastructure
- SOP development
- Accreditation
- Interface with Research

Educate to Detect
- First detector training
- Increased awareness

Communication
- Exercise scenarios
- Secure communications
- Coordination and cooperation among agencies
- Secure national data repository
- Newsletters and public relations

Data Management System
- Central data repository
- Custom data input interfaces
- Search and report generation capability
Diagnostics

- Infrastructure upgrades
- Laboratory accreditation
- Proficiency panels and provisional authorization
- Increased capacity for surge and PIPE samples
  - Ramorum blight
  - SBR
  - Plum pox virus
NPDN Diagnostics

SOP’s – for significant agents

Diagnostic training with USDA-APHIS

Regional Training and workshops
if pathogen propagules are present
Web-based Real-time Sharing of Diagnostics

For most exotic pests there are few diagnostic experts

polyphialide

unknown at triage lab

key diagnostic feature

monophialide

type specimen at expert lab
Collaborative Diagnostics

[Image of a computer screen showing a Polycom video call with a man and a woman, and a web browser with an image of an unknown pathogen.]
Traditional Diagnostic Techniques

2 - 14 days for fungi

pathogen isolation

pathogen colonies

1 – 2 days for bacteria
Molecular and Serological Techniques

- serology
- PCR
- real time PCR

reduce diagnostic time (weeks to hours)
increase accuracy of diagnosis – can improve through-put
Diagnostic Process: NPDN Model

- **FD**
- **triage lab**
- **SPRO/SPHD**

**Parallel networked diagnostics**
to increase surge capacity

**No surge capacity**

- **FD**
- **triage lab**
- **SPRO/SPHD**

**Rapid identification of positives**
& rapid clearing of negatives
Laboratory QA/QC Accreditation and Certification System

Systems for True and Reliable Diagnostics = STAR-D
STAR-D Organization Chart

APHIS
Auditor training
Auditors (APS?)
Assay validation
Proficiency panels
Diagnostic training

National STAR-D Comm
Develop list of docs and templates
Revise, update, improve manual, docs

NPDN Diag Comm

NPDN Exec Comm
Responsible for audit prep regionally

STAR-D National Board
CSREES, NPDN Exec Comm, NCPN, APS, APHIS, others?

National System Manager (NSM)
Oversee audit program (coordinate audits, receive audit reports), possibly serve as an auditor
Work with STAR-D Committee to revise/update/improve system manual and checklist
Coordinate proficiency testing for Tier 6, application, results documentation
Yearly update of all labs, each lab goes through every 3 years
Reporting procedures and documentation
Coordinate auditor training

Auditor pool
Undergo training
Dedicate time for pre-audit session (conference call)
Perform audit (1 day min plus travel)
Write report of audit (likely one week)
Respond to questions regarding the report (Post-report interviews)
System System for True, Accurate, and Reliable Diagnostics (STAR-D) for Quality Assurance/Quality Control of Plant Diagnostic Laboratories System Manual

Diagnostic test methods

Applicant laboratories select the types of diagnostic tests (indicated below) to be included in their LQA/QC plan. Note: Serological and molecular testing for regulatory purposes will require the highest level of QA/QC.

- Tier 6 - Tiers 4 and/or 5 for regulatory diagnostic assays
- Tier 5 - Tiers 1-4: with all capabilities
- Tier 4 - Tiers 1, 1&2, 1-3, 2, or 3 plus molecular assay capability
- Tier 3 - Tier 2 plus serological and/or toxicological capability(s)
- Tier 2 - Tier 1 plus ability to index: inoculation and plant grow out
- Tier 1 - Basic biological: incubation, plating, microscopy, taxonomic diagnoses
• The National Plant Diagnostic Network – plant diagnostic data from 50 states and 3 territories

• National Pesticide Information Retrieval Systems – a collection of pesticide related databases for the EPA

• National Agricultural Pest Information System – a USDA database of the Cooperative Agricultural Pest Survey, which tracks the movements of exotic and invasive insect and plant pests throughout the United States

• The Export Certification Project – a database containing information on more than 250 countries needed for the preparation of phytosanitary certificates accompanying plants exported from the United States.
Potential for Detection of Outbreak

- syndromic analysis
- common symptoms & hosts
- geographic delineation of affected area
Web Based GIS Reporting

Rapid Outbreak Detection

syndromic analysis
Web Based GIS Reporting

- identify area of vulnerability
- pathway prediction
- target resources and mitigation efforts

favorable environmental conditions
Education and Training

First Detector and FD Educators: modules and manuals

National standards for ‘First Detector’ and ‘First Detector Educator’ training established

Multiple basic modules
Room to develop and deploy pathogen-specific modules

Online education modules: http://cbc.at.ufl.edu

• NPDN First Detectors are trained to detect and report unusual exotic pest activity.
Education and Training
Target Audiences

- County Extension Educators/Agents
- First Detectors

- Growers
- Nursery Producers
- Crop Consultants
- Ag Biologists
- Extension personnel
- Pesticide applicators
- Master Gardeners
- Commercial seed representatives
- Conservation biologists
NPDN Exercise Program

Objective

- Practice operational functions of NPDPN in a non-emergency environment
- Relationship Building with other agencies and groups
- Improvement of protocols and processes
- Main NPDPN role: rapid detection, diagnosis and appropriate notification
40 participants/scenario

Preparedness requires practice

48 hours response time
National Plant Diagnostic Network

- Establish Communications System
- Coordinate First Detector Training
- Standardize and Certify Diagnostics
- Provide Administrative Management
Funding

FY ’02-03 - $4 million distributed by Cooperative Agreement (CA)
Every state LGU diagnostic lab received $30-70k in cash and equipment
FY ‘04 allocation - $3.7 million to be distributed on same CA
FY ‘05 – ’09 budgets - $4.5 million
Emergency supplements from APHIS, Forest Service, Risk Management Agency for event response