

**National Plant Diagnostic Network (NPDN)  
2007 National Meeting  
January 28-31, 2007, Orlando, Florida  
NPDN Presentations**

The following is a collection of shorthand notes taken from various presentations held on Monday, January 28<sup>th</sup>, and Tuesday, January 29<sup>th</sup>, 2007. Any of the corresponding PowerPoint presentations can be viewed in PDF format in the Presentations section.

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## OPENING SESSION

### **Welcome Address and Introductions**

*Jim Stack, GPDN Director, Kansas State University, NPDN Operations Committee Executive Director*

- Welcome
- Attendees: appx. 215 people from all over US, PR, USVI, Samoa & Guam
- Importance of plants- healthy plants important
- 1918 USDA established to protect plants
- 2002 USDA with Land-Grants established NPDN with 5 regions
- Much accomplished but still much to get done

### **Keynote Address I: Agricultural Security as a USDA Priority, Part 1**

*Kitty Cardwell, CSREES, National Program Leader*

- Purpose: To take stock for the first 5 yrs
- Embedded review panel- introductions of panel members
- NPDN needs to be responsive & dynamic, because we are an emergency response system
- NPDN formed in response to 9/11- are our plants vulnerable
- Patriot Act, Oct 2001 to strengthen America prohibited transfer of restricted agents (select agents)
- HSP9 surveillance & monitoring of plant systems
- Cooperative agreements between universities & CREES, USDA
- 5 core animal & plant labs established, some satellite labs
- 1<sup>st</sup> supplemental 4mil\$, every state \$30-70k
- Trend- amount going up due to success (but this year, the same due to success of NPDN)
- Vulnerable ag systems- intentional or natural
- Pathway of disaster prep
  - Detection
  - Diagnosis-NPDN
  - Mitigation -NPDN
  - Control
  - Recovery
- What infrastructure do we need-
  - 5 HUB labs in regions
  - Steering committee – we needed communication organization of programs
  - Ops Comm committee developed
    - NPDN regional dirs, CSREES
    - APHIS
    - Nat'l Plant Board

- Regional responsibilities
- Disease & pest mgmt
  - Detectors
  - Diagnosis
  - Response
  - Program areas
    - Detection-First detector trainings
- Detection-first detector trainings
- Diagnosis-
  - Shared
  - Distance
  - Molecular
- Surge samples- Clear the negatives so labs don't get bogged down
- Communications strategy
  - PDIS
  - Secure Comm
  - Scenario exercise training
  - Syndrome analysis-GIS reporting to see trends in diseases & predict outbreaks
- NPDN Partners- many
- Let's see what we can do next & make it better

### **Keynote Address I: Agricultural Security as a USDA Priority, Part 2**

*Mark R. Wilson, Program Manager, Chemical Biological Sciences Unit, Federal Bureau of Investigation*

- Forensics- Latin for open debate (forum)
  - Specific science used as witness to both criminal & civil matters
- Bacterial is clonal, so deal with it differently than humans etc.
- Adversary System
  - Judge, Lawyer, Witness
- Standards of testing
- 1923 Frye test- Frye standard– left up to the judge if the evidence testing was accepted – more subjective
  - SOP's used
  - Peer-reviewed publications science
  - Presentations
  - General use
  - Proficiency testing
- 1996 Daubert test – corrected the deficiency Dow Pharm.
  - Testability
  - Peer Review
  - Error Rate
  - General Acceptance (Frye method)

- QA & Validation
  - Appropriate Facilities
  - Personnel Trained
  - Knowledge
  - Blind proficiency testing
- QA Guidelines for performing microbial forensic work @ website [http://www.fbi.gov/hq/lab/fsc/backissu/oct2003/2003\\_10\\_guide01.htm](http://www.fbi.gov/hq/lab/fsc/backissu/oct2003/2003_10_guide01.htm)
- Counterterrorism investigations handled differently
- Traditional Forensic Typing
  - Reference samples- Q & K
  - Each discipline has distinct “match criteria”
  - Source of origin wanted but not always available- i.e. Anthrax
  - Need to develop a profile then find the source, add to the database to build it up for next attack
- Need to know
  - What is the agent/where are they located strains etc
  - Was it intentional – Food borne illness hard to know
  - Was pathogen engineered
  - Ultimately-who did it
- Magnitude of challenge
  - Infectious agent numbers are staggering
  - Human, plant & animals
- Need strong partnerships in order to address the problem with a wide variety of disciplines
- DHS Main hub with various spokes to respond to events
- How USDA/NPDN plays a roll like the CDC- reagents prepped there for QA/reproducibility of results & testing
- NBFAC objectives
- Need more with ag plants
  - Need signature database
  - Better understanding of environment
  - Dedicated facilities
  - Need to rapidly develop techniques & out into field
  - Knowledge mgmt system collate existing knowledge
  - Methods to perform traditional forensic exams of contaminated evidence
  - Define analytical plans (SOPs)
  - New techs to address needs (microarray analysis)
- Outreach more for vets/humans
- Summarize
- QA necessary
- Magnitude of problem
- Risk to ag needs new tech
- Assess techs thoroughly

## **Keynote Address II: Agricultural Security as a State Priority, Part 1**

*Honorable Charles Bronson, Florida Commissioner of Agriculture and Consumer Services*

- Commissioners Meet 2 times a yr with other states re what states are facing
- FL International travel & Deep ports means we are at risk for incoming diseases
- Who should be trained
- Lack of money & personnel make it hard to inspect (appx 10% gets inspected)
- 15mil trees lost to canker Citrus now # 2 Nurseries are #1
- With free trade comes free pest & disease
- Now we are in a 50/50 pay out for inspections with state/Feds
- Don't allow plants & animals in from problem areas- law enforcement needs to be trained to know not to let these things in but it is hard
- Terrorists have more plans to bring stuff in to hurt the economy more than to hurt people- why ag industries are important from an economic standpoint "economic disaster"
- Polled what people thought about their food supply- # 1 issue to the people of FL
- When CA had spinach problem- Eastern growers also lost crops to the scare- economy hit hard with this
- E.coli also in other areas, county fairs
- Made the industry clean up the process- ie hand picking (FL has lots of this) and the way food is processed cleanly
- FL inspectors also have gamma ray trucks to try to minimize the spread of disease
- Everything in the islands we are waiting to see when it reaches FL
  - Pink hibiscus mealybug
  - Med fruit fly
- While we are looking at disease, remember it is all connected to the economy. We can't count on other countries to supply us with food like we depend on oil
- FL ethanol production- not corn, but UF trying the non-native invasive species to make the EtOH
- 2mil less acres for farming in FL, but pulling in more money because of marketing

## **Keynote Address II: Agricultural Security as a State Priority, Part 2**

*Mike Seyfert, Legislative Director for Senator Pat Roberts*

- Senator was Chairman of Intelligence committee for 4 yrs
- Armed services Committee
- Agriculture Committee
- Now on Finance Committee
- Threat to our Ag
- Traveled to Russia to see diseases there that were developed as weapons- not well guarded & would be easy to get into the US
- Introspective look that 9/11 gave us & the money for NPDN
- Trying to get funding increased
- Visit & speak with your congressional members
- University administrators also
- He asks senate & House to get funding but you know how that goes
- Will take questions

## **NPDN REPORT OF PROGRESS AND COLLABORATION**

### **NPDN: A Record of Accomplishments**

*Rick Bostock, WPDN Director, University of California-Davis*

- Many accomplishments- will go over key ones
- Network mission
- Educate (to detect)
- First detector training
- Increased awareness
- Diagnose
- Training & support
- Nat'l stds
- Surge
- Communicate
- Exercise scenarios
- Coordination & coop w/ regulatory agencies
- Get diagnostics data in a secure way
- Outreach
- Committees: 8 of them
- Chairs doing great jobs
- Interagency partnerships
- At beginning, didn't know how things would develop but came together quickly
- Forming interactions between land grants, Fed agencies & State Depts of AG

- IPM
- EDEN
- APS
- Nat'l Plant Board
- Tremendous progress made in cooperation bw everyone
- Education & training
  - 13k basic
  - First detectors trained diverse group
  - NRI Program- convert NPDN using LYRA in beta testing mode
  - Regional pest alerts distributed
    - Entomology & insect vector training
    - SOD online training Oct 2004 (demo of good coop)
  - Specialized training in diagnostics SOD/greening in lab training PCR
- Provided resources that helped some labs stay open
- Web-enabled microscopy
- Real-time PCR
- Collaboration
- Distance diagnostics
  - EDEN
  - PDIS
  - DDI
- SOP's for significant agents, 8 of them
- Permits for PPQ
- Success stories
  - RS32
    - Came in on geraniums
    - Threat to other crops
  - SBR
    - Great example of network
    - LSU person detected it right after training & knew who to call
    - Was confirmed w/in days
    - Showed we were ready
    - Many on ASR team from NPDN
  - SOD
    - 12yrs ago showed up in western region
    - Very broad host range
    - 2004 was shipped all over the US
    - Nurseries went out of business
    - NPDN processed thousands of samples- when provisional labs were set up
- Recent pests of note
- Communication
  - Exercise program
    - "Who you gonna call"

- Screen for presumptive pos
  - Focused on SBR tailored to local needs
  - Also showed coop b/w agencies with FBI, Mexico border patrol etc.
- IT natl & regional efforts
  - Tries to accommodate local & state practices
  - Tries to coordinate what needs to go into database (committee)
  - CERIS DDI
  - Secure communication modules put together
  - NPDN Acronym Translator in beta testing
- Epidemiology committee
  - Design, develop & implement analyses using NPDN to detect outbreaks in real-time
  - GIS platforms
  - Get databases to talk with each other
  - SBR reports
- Public relations websites, newsletter
- Continuing goals
  - Coordinate w/ governance
  - Educate
  - Data
  - Diagnostics
  - Response
  - Sustainable funding- buy shirts

## **NPDN: Partnering for Success**

### **Part 1: National Animal Health Laboratory Network (NAHLN)**

*Mark Robinson, CREES Animal Program Leader (NAHLN)*

- Basic info on Animal Network & how it fits in
- Partnership b/w APHIS etc & extension
- AAVLD is at the state level & was recommended to get a partnership for natl
- Objectives
- Capability & capacity
- R&D, education of routine diagnostics
- 2002 12 labs identified
- 2005 16 labs added
- 2007 59 labs in 47 states-Some labs are specialized for local threats
- Activities
- Surveillance & testing
  - Development & validation of testing
  - Getting real-time for high-throughput
  - Train the trainer
  - Harmonize the LIMS

- NPDN ahead in the exercises conducted
- Dealing with the same problems NPDN have
- Secure comms very important
  - Need to account for time lag b/w detection & confirmation
- Working on disease detection, but also need to integrate toxicology & zoonotic
- Expand roles of labs b/w fed, state & local
- Need Integration
  - Internal -AAVLD, USDA etc.
  - External- what industries need vs, regulatory
  - Interagency Consortium of Laboratory Networks
- HHS< DHS< DOD< NPDN etc...

## **NPDN: Partnering for Success**

### **Part 2: National Plant Board**

*Mike Brown, National Plant Board*

- Increase our knowledge of NPB
- Website
- Help with communications b/w disciplines & labs
- Formed in 1925
  - SPROs
  - Represent all states & PR now- 2 members from each region
  - Cover all disciplines dealing with plant protection
- Nat'l clearinghouse for info in quarantine & inspection policies & procedures
- Interaction w/ NPDN, USDA, APHIS, PPQ, NASDA
- [www.nationalplantboard.org](http://www.nationalplantboard.org)
- Overview of each state- movement of plants etc.
- Find specialists in states for weeds, seeds, etc.
- Get to know your SPRO- so first detectors know where info needs to go
- NPB annual meeting in August in Hawaii...

## **NPDN: Partnering for Success**

### **Part 3: Integrated Pest Management (IPM)**

*John Ayers, IPM co-director NEPDN*

- 4 regions
- All centers funded equally, but their funding is going down
- Center leadership
- Southern
  - SBR preparations in Sp 2004 organized by Carrie SPDN
  - SBR Tour of Brazil

- Carrie Harmon & Amanda Hodges key leaders
  - Soybean Aphid - PIPE
  - Pink Hibiscus Mealybug
- WPDN
- Rick Melnicoe
- NC IPM
  - Sue Radcliffe- leader for pest alerts
  - Soybean aphid & legume components of IPM PIPE
  - ESA nat'l meeting
  - Pest mgmt issues
- NE IPM
  - George Hurdler
  - SBR workshop in Sp 2004
  - NPDN Ops Comm. member
- Pest Alerts – Pests & Pathogens
  - Funded & sponsored by the IPM centers
  - Roles are different, but some overlap with NPDN- we work well together
- [www.ipmcenters.org](http://www.ipmcenters.org)

## **NPDN: Partnering for Success**

### **Part 4: Extension Disaster Education Network (EDEN)**

*Steve Cain, EDEN*

- Reduces the impact of disasters though education
- Find contact in your state
- How people act on information – immediate response important
- Provides resources on various disaster topics
- Working with already developed partnerships before & during a disaster
- Established several partnerships
- Various disciplines in network
- State example
  - Louisiana & Katrina
  - N Dakota- how to properly sandbag
  - IN Tornadoes in 2006
  - VA Disaster preparedness
- Mostly focus on train the trainer
- Survey on what top HS issues in 2002 were, then went and wrote plans for these i.e. water quality & food security were top concerns
- Appropriate audiences determined
- Asked farmers who they would turn to if new crop diseases – extension agents
- Current curriculums
- Difference b/w NPDN & EDEN

- On guard for protecting America's food system
- Nat'l response plan w USDA
- Ready business with DHS
- Pandemic prep w CDC., DHS, USDA
- Animal biosecurity mgmt course
  - UK will probably develop
  - Conference w 6 regional locations to collaborate efforts & planning across state lines

## **NPDN: Partnering for Success**

### **Part 5: Certified Crop Consultants**

*Harold Waters, CCA, Certified Crop Advisors*

- Part of the American Society of Agronomy
  - Through advisors
  - University specialists
  - Extension
- 37 local boards
- Work in landscape, citrus etc not just soybeans
- To be a CCA
  - Take exam for CCA
  - Continued education updates
  - 2 yr minimum experience
  - All needs to be documented
- Description
  - Out in field- scouting work
  - Work across 65% acres
  - University trained- first detector training etc.
  - Service crop producers is their job
- Technical Service Providers
- Soybean Rust
- NPDN partnership assisted in
  - First detector training
  - Communication across state lines
  - Event training (SBR)
- Education activities
  - Manual development
  - Review changes
  - Discussion sessions FL & CA
  - Conference calls on education & training
- Future Needs
  - Communication @ state level
  - Value further training
  - Incorporate material into continuing ed
  - Specific to business issues

- Get more involved in diagnosis
- Technology & value to grower
- Communication

### **Vision for the National Plant Diagnostic Network**

*Ray Hammerschmidt, NCPDN Director, Michigan State University*

- Things we are working towards & how we will get there
- NPDN mission statement
- How we accomplish this
- Enhance our ability to diagnose
- Improve communications b/w agencies & partners
- Deliver educational programs on threats posed
- Vision:
  - Become an integral part in plant protection thru enhanced diagnostics, education, & comm.
  - Why: better protection
  - How: develop capacity that facilitates rapid detection of high consequence plant pests & pathogens
  - Why: must be prepared for intros & outbreaks
  - Continue to establish & refine protocols so can immediately report & stay on cutting edge
- Continue to Educate
  - Faculty & diagnosticians & administrations
  - State regulatory personnel
  - First detectors
- Continued communication important
- Ensure LGU clinics have what they need
- Continue exercises to build partnerships & improve where it needs to
- Continue first detectors for new diseases
- Develop new partnerships with all stakeholders
- Continue excellence with the diagnostics & their activities

## **HIGH CONSEQUENCE PLANT PATHOGENS, INSECT PESTS, AND INVASIVE WEEDS**

### **How Real is the Threat?**

*Jim Stack, GPDN Director, Kansas State University, NPND Operations Committee Executive Director*

- Not just a list of exotic agents
- More pressing when clear vulnerabilities
- Inherent complexity of plant systems
  - Hundreds of hosts

- Thousands of paths
- Globalization & mixing populations
  - Population growth
  - Climate changes
- Technology
- Biggest threat is to our economy
  - Commodities
  - Food products
  - Jobs
  - Exports
  - Income spent on food/quality of supply
- Our system is vulnerable
- Challenges
- Demographics have been changing from Ag to metro
  - Walmart #1 mover of food
- Many commodity groups are aggregated, make them vulnerable
- Move more products farther & in shorter time
- 69K pest & path intercepted with only 10% inspections
- ASR came from Hurricane Ivan- what else came with it?
- What about intentional intros?
- Doesn't matter how they get introduced- it's about the consequences
- Recent intros
  - CK 900m\$
  - Karnal Bunt 350m- & not in major prod area yet
  - SBR
  - Soybean aphid
  - Long-horned beetle; emerald ash borer
- Identified a # of pests that need to be kept out of US
- Characteristics of invasive sp- vary widely
- Could we have predicted introduction/cost
- We have limited ability in predicting future- but we can prepare for it
- Go back to a model from a previous outbreak
- APS Has a workshop in forensic plant path- Jackie Fletcher
- Incentives for reporting
- Strength- vulnerability interaction
  - Expectation is that situation will get better, but reality in plant system is it usually gets worse
  - Monoculture of hosts makes it worse
  - Our success makes us weak- complacency in food safety
  - Need to educate people about the purpose of safety in ag
- APS war emergency Board1918 / NPDN map very similar

## Potato Cyst Nematode

*Phil Berger, USDA, APHIS, PPQ, National Science Program Leader*

### What Happened

- April 2006 detected in a routine CAPS survey sample
- Also Quebec heavy infestation of another strain
- 7 fields in eastern Idaho w/in 1 mile radius of each other & detected early
- Activated response through many agencies
- Had impact on trade- shut off some exports
- Over 50k samples processed
- Technical working group with different types of expertise & international
- How survey works
  - Hand sampling 5lb samples – composite 3-5lb samples per acre
  - Make sure good record keeping with where samples were taken etc.
  - Went over diagnostic processing of sample
  - Morphological & molecular confirmation- eventually by Beltsville lab now being transferred to APHIS
- Next Steps
  - Survey cross country and as much as they can handle
  - All fields in regulated area 25% in each field
  - Capacity is limited in some states as to amount of sampling they can handle
  - Some cases NPDN labs will be asked to process samples as well as others
- Risk- Emergency funding supplied- think it was restricted to area where found
  - High risk for unintentional movement
- UK & EU experience
- NZ experience
- Conclusions
- Huge problem in EU, Australia, & NZ

## Citrus Greening

*Ron Brlansky, University of Florida*

- 9.1 billion dollar industry
- Already here & we weren't ready
- Introduced in 2005 near FL city
- Asian citrus psyllid was here already and knew it would spread
- Distribution in FL 598 confirmed trees in residential & commercial areas
- 12 counties infected
- No detections yet in northern counties yet
- Causal agents 3 strains of *Candidatus liberibacter* sp.

- Pleiomorphic
- Non-culturable
- Very difficult to find
- Vectors
- All citrus sp affected- severity varies with strain
- Economic losses
- W/o control; measures life of infected groves shortens to 7-10 yrs with reduced fruit yield
- Looking at systemic controls
- Brazil first report in 2004- probably there for 6 yrs
- Fruit smaller with less yield, less juice higher acid
- ID of disease
  - Symptoms like nutrient deficiency
  - PCR our only detection option
  - Yellow shoot on trees
  - Blotchy mottle
  - Fruit drop
  - Diebacks
  - Fruit lopsided- green color aborted seed & bitter
  - Silver coloring when push thumb into fruit rind
- Movement citrus, orange jasmine, severina
  - Wind dispersal of psyllid
  - Infected psyllids on non-host
- How fast can it spread
- May stay hidden for yrs
- Manage by disease free stock, get rid of diseased trees, insecticides for psyllid ctrl

### **UG-99 Wheat Rust in Africa**

*Marty Carson, University of Minnesota*

- Last epidemic in 1950s
- Pathogen pops have been pretty stable
- Resistant host cultivars
- Reduce over-wintering alt host
- 1st known strain to be virulent on Sr31
- Established in a few areas in Africa
- Wheat present all year so no over-wintering & can persist
- Why concerned
- Rely on the gene for resistance-very low #s of resistant host strains planted in a wide region.
- Wind patterns may spread the disease into bread basket in India
- Crossed the Red Sea & in Yemen
- SR36 has resistance to this TTKS strain

- How vulnerable is the US to this disease? Varies with the cultivar of wheat- but high degree of susceptibility in Europe & US
- New developments
  - Virulence has risen (Sr24 was highly effective against TTKS but it has adapted)
  - Variant strains
- International Stem Rust Monitoring put out monitoring plots with different varieties of wheat
- US is doing annual surveys in wheat areas when the early stage of the rust develops
- Stem rust is relatively uncommon
- [www.ars.usda.gov/](http://www.ars.usda.gov/)
- Cereal Rust Bulletin
- Can sign up for a listserve

### ***Ralstonia solanacearum* R3B2**

*Karen Snover-Clift, NEPDN Associate Director, Cornell University*

- Disease & host
- Southern wilt (geranium) or brown rot (potato)
- Why select agent?
- Due to its ability to survive in temperate climate & host range
- Known to be worldwide, but not established in US or Canada
- Symptoms similar to *Xanthomonas*, foliar wilting, bacterial ooze, stem necrosis, warmer temps cause symptoms to appear
- Development
  - Soil-borne or through wounds
  - Contaminated media or water
- Detection
  - Semi-selective media to sp
  - ELISA
  - Carbon utilization tests
  - PCR
- History
  - 1999 & 2000 saw introductions on Geranium cuttings
  - 2003 on cutting from Kenya
  - 2004 Guatemala
- Regulatory Response
  - Eradication –expensive
  - Training for sanitary production
  - Better record keeping of shipments-barcoding
- NPDPN response
- Confidentiality was of high importance
- USDA & NPDPN got together for diagnostics training

- NPDN reduced the # of samples sent to USDA by weeding out negatives
- Industry learned about quarantine process
- Threat successfully eradicated
- For more info, see poster

### **High-Consequence Insect Pests**

*Dan Gilrein, Entomologist, Cornell University*

- Sampling of “new” species – more people looking, greater diversity of areas being searched (hundreds of plant species, many settings) – Q whitefly, longhorned beetles, columbine sawfly
- Asian longhorned beetle: Quarantine areas on Long Island, NY to protect horticultural areas in NY, NJ, rather than a state-wide quarantine
  - Trees found infested, trees treated, mostly trunk injections or soil drenches of imidicloprid
  - \$268.9 M state, federal, local funds dedicated to this pest
  - Help at the ground floor: Early detection, training, alerts, ID support to departments of ag, educational materials and programs, engage and preserve the local industry
- Glassywinged sharpshooter
  - Distributed throughout some areas of California spreading Pierce’s disease
- Emerald ash borer
  - 20 million trees destroyed, could be 20-60B in losses
- Winter moth
  - Important in eastern MA, Boston and Cape Cod. Trees dying after several years of natural defoliation. Trying to release biological controls
- European wood wasp
  - NY, attacking and killing pine trees
  - Assessing areas of vulnerability being assessed
- Soybean aphid
- Asian ambrosia beetle
- European crane fly – has potential to affect sod production and other turf

### **High Consequence Weeds and Invasive Species Coordination**

*Bob Nowierski, CSREES*

- \$137 B per year losses to invasive species
- Invasive plants threaten endangered species, cost billions to control, create fire hazards, reduce habitat, and can be toxic
- Some of the worst:
  - Old world climbing fern, smothers native habitat, can topple trees
  - Kudzu, same effects as above
  - Purple loosestrife, good control with *Galerucelia* beetles

- Leafy spurge, cattle won't eat it, has a blinding sap for humans, some control with copper flea beetle
- Spotted knapweed, some biocontrol; several other knapweeds
- Giant salvinia, aquatic weed, can form dense mats that choke lakes, good control with bud-feeding weevil at Lake Moondara
- Water hyacinth, also aquatic
- Alligator weed, aquatic
- Eurasian water millifol, often new infestations can come from aquariums
- Several thistles, some can cause horse problems
- Gorse – terrible spines
- Giant hogweed, northwest and northeast distribution, causes severe rash and blistering
- Encourage adoption and implementation of IPM weed management
  - Weigh risks and benefits, utilize all possible options
- Need good coordination of efforts between agencies at all levels, such as the Invasive Species Council and Invasive Species Management Plan.
- Invasive species website: <http://www.invasivespeciesinfo.gov/>
- Several federal coordinating committees through USDA-CSREES
- APHIS-PPQ Permitting Board of Advisors, CSREES invasive species working group, Technical Advisory Group for the Biological Control of Weeds
- Top priorities: Identify who you call when identifying a new IS, coordination of efforts

### **Off-shore Pest Information Program and Preparedness Planning**

*Joel Floyd, USDA, APHIS, PPQ*

- APHIS program: international services, veterinary services, PPQ
- OPIP genesis from stakeholder reviews
- Framework of national response plan: Prevention and preparedness (Response and recovery are in other programs)
- Systematically collect, report, assess, and communicate information on pests
- Offshore Pest Information System: systematic web-based process
- Several regions covered by international personnel
- OPIS users: USDA-APHIS, ports, PPQ, trade, pest risk analysts, etc.
- Outcomes: notifying ports, regulation modifications to prevent movement, develop response guidelines, promote collaboration with domestic and international programs
- New fruit fly, eucalyptus pests and diseases, new weeds, lime swallowtail, red palm mite
- Preparedness planning: prioritization of pests (i.e. Select agent list), development of response plans, response guidelines, evaluating research needs, strengthening identification/diagnostic networks, training for response with ICS, exercises, etc

## **Early Detection Strategies**

*Matt Royer, USDA, APHIS, PPQ, Emergency and Domestic Programs*

- Plant protection and quarantine: Safeguards agriculture and natural resources via the Plant Protection Act to minimize the impact of introductions
- New Pest Advisory Group: 802 new pests evaluated since 1982, 16 now under review
- Quarantine and eradication
- Begins with offshore information, identify risks, continues with inspections at ports, look at pathways for introduction, undertake domestic surveys for pests that pose the greatest threat (CAPS) – 12 pests were of national survey priority in 2006 (pests of regulatory significance).
- National Plant Board Advisory Group met with APHIS to identify areas for improvement. New CAPS mission statement developed.
- NAPIS (National Agricultural Pest Information System) – records from surveys
- How to add value to the raw data? Soybean rust is a success story. Engage industry.

## **Pest Information Platform for Extension and Education (PIPE)**

*Scott Isard, Pennsylvania State University*

- Huge, coordinated effort to get data from the field to the end-user via a real-time website based on a database
- IPM Pest Information Platforms for Extension and Education
- Collect information, analyze info, integrate, modeling, data mgmt
- 2 interphases involved, public observations of multiple pests & restricted for more data access- toolboxes & communications
- Input data – Excel, PDA,
- Interrogating the Nat'l database- can get any date's data for easy access
- Modeling- ensemble forecasting; IAMS, HYSPLIT, climate (aerobiology modeling for spore spreading maps- predicted where ASR was found 2 weeks later)
- Communication tools for specialists- agents with growers switches data from restricted to public access
- Automatic notification function- if changes to your area can have it notify you, switch organisms you are looking at also
- Guidelines for managing diseases
- Good farming practice- Documentation form comes out with the state guidelines, can be filed for insurance purposes
- State commentary can be grouped
- Economic Research Service said the coordinated framework increased soybean producers' profits from \$11-300 million at a cost of \$2.5-5 million

- \$3.5 million support in 2007 from Risk Management Agency, funneled through the Southern IPM center
- Focus for 2007 is to maintain and improve the soybean rust component, continue to develop the soybean aphid component
- Add a new component: viral diseases of legumes
- PIPE is the application of advanced IT to IPM

### **Epidemiology: Regional to Local Focus**

*Paul Jepson and Len Coop, Oregon State University*

- Sustainability for growth & development where diagnostics play a role-defense
- Attributes of a successful IPM program: validated, outcome-based programs; involves stakeholders; collaborative networks and partnerships; services on temporal and spatial scales that are relevant to decision making
- The components of IPM get local quickly: pest prevention tactics, decision support tools, IPM mitigation practices, pest avoidance tactics
- Increasing the use of online resources
- Development of models driving the use of online resources for decision making
- One example is the codling moth and the assignation of degree days for setting spray dates for fruit trees
- Western Weather Working Group. A handout distributed to outline the group's accomplishments
- NPDPN-IPM partnership – model system of diagnostics integrating with management
- Web-based delivery tools to ingrate information from multiple sources; data are merged and housed at CERIS. Incorporating spatial maps.
- Integrated GIS platforms
- New modes of data exploitation:
  - Consenting adults only (NPDPN, etc)
  - High levels of security and confidentiality
  - Superimpose data from multiple locations
  - Explore association with new reports and anomalies
  - A new approach to a real-time pest information center
  - Test thresholds and models down to the county level weather, terrain, and pest reports
- The value of a distributed multi-partner system
  - Maintain data confidentiality
  - Allow many different groups to interact with the data
  - Distributes costs
  - Specific expertise maintains specific components of the system
- IPM and NPDPN needs are complementary

- Pooled resources through partnership
- Collaborative distributed network
- Standardized, seamless interface
- Fills gaps, doesn't replace systems
- Potential for future integration with new systems and partners

## DISEASE DIAGNOSIS: TECHNOLOGY AND STRATEGY

### **Developing a Technology Strategy**

*Chet Stutula, Agdia, Inc.*

- No single technology is able to serve all of our needs
  - Dipstick tests
  - Spending too much time on ELISA delayed work on a release of Immunostrips?
- Diverse needs/goals require a variety of technologies
  - Field and onsite detection
  - Field and onsite results
  - Definitive confirmation & regulatory action
- Nucleic Acid-based dipstick assays
  - Being developed in Los Alamos
  - Simple extraction
  - Isothermal extraction
  - Then use dipstick 30 copies of DNA is adequate – in 30 min
- Handheld isothermal device
- Canary- Lincoln Labs- B cell antibody bioassay Ca<sup>++</sup> flux to see bacteria, fungi, virus takes 5 min
- Protein nucleic acid probes (SmartDNA) bind dyes to the target complex & then photobleach several minutes with no instruments except a light- no extraction involved
- Methods used to confirm should be independent & use the same sample
  - Take dipstick & extract DNA from sample pad & sample line
  - Run PCR
  - Then sequence
- The processes of confirming first detection, responding, test flow & lab mgmt
  - Are simpler if things are common test group instead of individual viruses Begomovirus, tospovirus- 1000's of individual viruses
  - Help researchers screen for a certain group
- Central science lab in the UK use real-time
- Agdia interested in this so that things work together well
- When grower gets result & confirm it if they have to – very important for the grower, and be able to be confident of results

- Want to be able to take ELISA well liquid & confirm that by PCR
  - Samples are heterogenous & all leaves may not be pos like the well & you would begin to question whether results are accurate
  - Some growers would destroy whole crops if they have a virus... need to be confident in results
- Don't marry the technology
- Diverse needs

**Advanced Diagnostics Technology: “Mind the Gap: The Role of the NRI in Supporting Plant Bio-security.”**

*John Sherwood, Program Leader, CSREES Bio-Security, University of Georgia*

- Program direction in the NRI
- Gaps in biosecurity –set priorities, what are the goals of the grants, ie SBR
- Who is the one who spread the disease
- Costs of the crops diseases, how growers move from 1 crop to another
- Crops are vulnerable because they cover a large area
- How pathogen introduced
- What is the role of a competitive program
- Should the program be limited to select agents?
- What about old paths with new tricks? Chemical rotations with chemicals that may develop a resistance
- Areas for growth- new tools, looking at global rather than local, path diversity, evolutionary predictions
- Which plant paths & ag security
- Deal with ones that kill plants then food storage problems...
- Understand disease cycle to combat the disease
- What are NRI priorities – determined by stakeholders
- How funding determined – proposed by president, acted upon by congress, USDA
- Goals & priorities
  - Protection & safety of nations ag & food
  - 5 phases of biohazards (detection, diagnosis, mitigation, ctrl & recovery)
  - Focus on critical emerging issues; i.e.
- All significant events are similar
- There are gaps
- What are NRI's big accomplishments?
- Program started in 2003- funding has increased, for longer periods of time
- Go to website on USDA funded projects/ send him email [Sherwood@uga.edu](mailto:Sherwood@uga.edu) if can't find
- What has been focus of 23 awards- mostly diagnostics, genomics, application of new technology, enhancing modeling tools, improving taxonomy & identification

- Evolution of program priorities –evolved to be more specific over time
  - Grants for this year they are looking at how are detections developed help with the epidemiology
- Remember- this is an integrated program so talk with each other to get grants together & how national labs are involved
- What pathogens needs to be priorities & how much needs to get done to solve the problem

## **Collaborative Diagnostics: Distributed Laboratory Systems Integrated Consortium of Laboratory Networks**

*Randolph Long, Department of Homeland Security*

- History
- Nov 2004 DHS security council involvement began
- Was established by MOA
- 12 agencies involved
- Improving coordination- spinach incident is an example
  - Promote common standards of performance
  - Fill in gaps in coverage
  - Rationalize/enhance budgets
  - Recognize who is responsible for the response
- Joint Leadership Council-DHS Chair leadership flowchart outlines organizational structure
- Roles & responsibilities outlined for all the members of the organization
- JLC, NCG, NCG subgroups, RFA (responsible federal agencies)
- Major accomplishments
  - Identified RFAs by examining network roles
  - Conducted lab capabilities assessments
  - NCG subgroups established to ID common technical objectives
  - Interagency working groups- collaborative effort
- Gaps in response- chemical & warfare attacks (bombs)
- Nat'l planning scenarios chosen to challenge all ICLN members
- NCG subgroups established and laboratory response
  - Scenarios/threat prioritization, Methods, Accreditation & QC, Proficiency testing,
- Target Key outcomes for near-term
  - List prioritized analysis gaps
  - Interoperability in key areas
  - Interagency agreed strategies toward validated sampling
  - Development of 5yr strategic plan
- Response Matrix- NPDN involved with the USDA- plant boxes

## **APHIS, National Diagnostics**

*Phil Berger, USDA, APHIS, PPQ, National Science Program Leader*

- Organizational chart of PPQ- Will go over plant health & ctr for plant health science & technology
- CPHIST
  - 3 diagnostics labs- Otis, MA works with gypsy moth; TX works on fruit flies, thrips etc; Beltsville, MD plant pathogen lab
  - Main functions- methods development & training & validation; emergency support, proficiency testing, molecular diagnostics
- Plant health programs- permits
  - Nat'l ID service (NIS)
  - Cooperators involved- Identifiers for entomology, weeds, tick, bees, snails etc.
  - Functions: nat'l id authority, coordinate all ppq id activity, molecular diagnostics lab, support CAPS, Training
- PPQ Beltsville Lab: Mary Palm, Director, 2 scientists & 2 support scientists
- Future directions (CPHST & NIS)
  - Rapid & accurate diagnosis
  - Readily available data
  - Conducted with transparency & responsiveness to PPQ stakeholders & clients

## **CURRENT ISSUES**

### **Review of the Data Sharing Policy Document**

*Rick Bostock, WPDN Director, University of California-Davis*

- All diagnostic records for the nat'l repository
- Database not worth anything unless people can use it
- Committee put together across the diverse group of NPDN- put together a draft doc
- Establish rules & processes
- Designation of NPDN analysts & process for authorizing access
- Access to partners
- Terms & definitions
  - Integrated research- closely linked w/ ext & other outreach
  - NPDN analyst
  - NPDN IRDR- housed at CERIS
  - Nat'l repository...
- Data for long- & short-term data mining
- Confidentiality important
  - What data is/What data is not- working on phase 2 data- more fields

- What is CERIS, its role
  - General policies on data sharing- states have access to their records
  - NPDN staff roles & responsibilities
- Because of sensitivity of data, it's very important to limit access & protect data
- Data needs quality control also
- Data currently in lock-down
- Individual State's records are subject to the policies in that state- will have to go thru the state to get it
- Data will not be distributed-
  - Retention
  - Data secure for the life of the NPDN
  - Submitting lab may petition to withdraw data
  - State & regional levels of data security
- Implementation of data sharing policy committee; Will review requests for access ; periodic review of policy by ops comm. & data sharing comm.
- Modifications of policy
  - A- required fields
  - B- Sample contract

### **Operations Committee Function**

*Jim Stack, GPDN Director, Kansas State University, NPDN Operations Committee Executive Director*

- How they do business, discuss issues
- CSREES APHIS, state dept ags, IPM EDEN, Industry, NPDN regional chairs
- What is our charge development, important maintenance...
- What do- prioritizes objectives; allocation of funding; progress towards nat'l & regional goals (doc what you do so can get funding) ; annual plans of work developed; detailed project planning
- Go thru each objective for each region to see if goals are being met & how the funds will be allocated & to see if there is insufficient funding for the goal
- Reports coordinated
- Facilitate communications b/w regions; compare effectiveness, coordinate resource sharing
- Committee activity discussions
- Special issues arise: formalize governance
- Now have governance document; who should be on committees, what they do, how often they meet....
- What we get done
  - Regular conference calls- biweekly to monthly
  - Conference calls as needed when issues arise, ie funding

- APS meetings
- Face-to-face 2 times a year
- How make decisions
  - Deliberately & informed
  - Often issues assigned to committee
  - Ad hoc committees formed to develop a position
  - Most decisions by consensus- or by executive committee if need be

## **Laboratory Accreditation and Method Standardization in the NPDN**

*Phil Berger, USDA, APHIS, PPQ, National Science Program Leader  
and Dennis McGee, Consultant, Iowa State University*

### **Phil Berger, Part 1**

- Laboratory reliability triangle: accreditation, validation methods; proficiency testing certification –
- Using ISO terms accreditation-lab certification-person
- Why an accreditation program
  - Enhanced consistency
  - Chain of custody
  - Define STDS
  - Staff competence
  - Define training requirements
  - Regulatory acceptance of results
- Benefits- Improvement
- Goals- ensure highest quality using validated methods; increase natl lab capacity; easy to use, expand- facilitate rapid, accurate detection & diagnosis for earlier mitigation
- Accreditation Process (*P ramorum* example)
  - Lab asks for approval
  - Application submitted- lab survey performed as far as equipment on-site, personnel etc.
  - Document review
  - Site visit to see if lab up to snuff (team of 3 with extensive checklist)  
Sample flow , record keeping, ways of contamination that would be unintentional & how would fix
  - Response to lab where deficiencies may be
  - Certified to perform a proficiency panel (blind) for certain assays
- This is Certification- Assure that personnel meets the standards
- Challenges of accreditation
  - Moving regulatory samples –permits issue
  - ID exotics
  - Don't have validated methods for everything- these assure that they will perform properly in every lab

- Proficiency of samples- plant pathogens are not homogeneous like blood, etc
- Validated methods are key for reliability of testing samples- data consistency
  - ID scope
  - Develop procedure
  - Establish criteria
- Phase I- Method development
- Phase II Single-lab validation (HLB)
- Phase III Multi-lab validation (SOD)
- After method validation- do a dossier review after a year or so- review data for characteristics
- Proficiency testing
  - Allows lab to monitor analyst performance
  - Provides feedback
  - Serves as system audit
- Ramorum Testing Conventional & Real-Time
  - 40 analysts received panels
  - Failures- main reason was false positives- contamination or interpretation wrong
  - Diagnostic sensitivity- rate of false pos
  - Diagnostic – rate of false negatives
  - Real-time 28 panels
  - Most failures false pos
  - Dilutions were very accurate across the labs
  - 1 analyst consistently had higher cycle times- found they were using a different instrument, but still were accurate
- Does it work/help us?
- Clear trend in improvement over time with environmental samples
- Accredited labs always had a lower failure rate than non-accredited labs
- Summary- Inter-lab variability low; assay was good; panel was stable over testing
- Next Gen in development
  - Less samples- but will have to do extractions also
  - For different pathogens, CVC, HLB, Canker, PPV
  - Better reports for feedback to the labs (compared to other people)
- Conclusions-
- We are in this together- for high quality, learn from our experiences, improve internal process assist labs in processes

## Dennis McGee, Part 2

- Accredite public & private organizations to carry out tests for phytosanitary certification of seed crops
- Develop & standardize seed health tests methods
- Why have accreditation
  - Quickly & accurately detect pathogens
  - Communicating info to agencies that can address the problem
- 3 phases to go thru- still in 1<sup>st</sup> phase, development
- Formation of system; linkage to USDA
- Form development committee
  - From NPDN, NPB Industry, APHIS CREES
  - ID who will be accredited- LGU, Dept of ag, diagnostic network & others
  - Assess regional needs w/in NPDN to get feel for their needs & to make sure they are being met
- Define accreditation
  - Quality: lab mgmt, facilities, equip, personnel, methods
  - Panels- sources APHIS requirements (regulatory) & ISO standards
- Standardized methods needed
- For regulatory pests
  - APHIS approved methods
  - NPDN accepted methods
- Non regulatory- what clinics deal with every day-
  - need to compile methods
  - prioritize methods, ie Dutch Elm
  - form technical panels- experts who will evaluate methods
  - proficiency panels are not feasible- but should have peer review to
  - establish approval-
- Auditing of the labs that want to come into the system
- Establish accredited auditors & come up with a checklist to check on the labs

## Information Security

*Keith Watson, Research Engineer, CERIAS*

- NPDN built on sharing info- needs to be protected
- CERIAS- cross disciplinary; 8 diverse areas of research
  - Supported through corporate & government sponsors
  - Serves as an unbiased resource
- Info security is the process of protecting the data
- Risk mgmt process
  - ID risk
  - Determine risk
  - Evaluate current controls

- Implement new controls/adjust existing
  - Repeat- IT changes all the time need to keep up
- Think about security
  - Confidentiality- what would happen if our info leaked out
  - Integrity- how reliable would it be if someone could modify our data- how would it be used
  - Availability- how would you get any work done if your black berry didn't work, your mouse was gone...
- 2006 stats
  - CERT/CC vulnerabilities in software is up
  - Natl Cyber Alert System Up
  - Natl vulnerability database up
  - Symantec vulnerability database up
  - Microsoft –favorite target; IE; Office 41 vulnerabilities; MS products had 104 official vulnerabilities
  - Mozilla 9 days vulnerability
  - Apple 2007 Mac Quicktime
  - Cisco released 8 vulnerabilities so far for 2007
  - Survival time for unpatched windows- 45 minutes
- New Trend
  - Month of Bugs
  - Bug Brokers- offering money for exploits corporate & private buyers
  - Search Engines for source code- programming language- Google can look for common vulnerabilities
- NPDN Challenges
- threats are evolving
- Valuable for evil-doers-
- Systems are always vulnerable- secure today not tomorrow
- NPDN id distributed & Federated- rolling out top-down security mgmt
- We are 1<sup>st</sup> line of defense- look for computer slow-downs & know who to report it to