

**Report on the:
ISF/APS Working Group to Standardize the Identification of Pathogen Races and Strains using
Differential Hosts:**

**A Consolidated Toolbox
Differential Host Sets and Reference Pathogen Strains
A Documented System for Industry and Research**

Pilot System and Next Steps

Vegetable and Ornamental Crop Section Meeting, Scottsdale, AZ – January 2013



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What is this Initiative?

- **Project Developed by ISF and the American Phytopathological Society (APS)**
 - ISF committee work led to APS chartering a committee with the goals of: looking at the issues of disease naming and lack of consistency, piloting a system to address this issue and to finding a supporting organization and funding
 - Other National Organizations needed a US counter-part
 - Members drawn from Industry, Academia, Government and like Minded Organizations
 - The group identified a need for a basic science tools to address the issue of naming thus birthing this fundamental approach:
 - A science-based “**Tool Box**” to be used to confirm pathogen and plant disease reaction and identification
 - This Serves to support resistance breeding goals, product quality claims and new pathogen identification

What is this Initiative?

- **Project Piloted these Deliverables:**
 - Documents Hosts Sets (DHS) and Reference Pathogen Strains (RPS) in “white papers” based on the existing literature
 - Sourcing, production and distribution of DHS and RPS in compliance with US regulatory requirements and industry practice
 - Links to similar Systems worldwide to complement and coordinate activities forming –
 - A Virtual Organization to Address and Manage this System
 - See Attachment 1

What do Breeders and the Scientific Community Need?

- Baseline Methodology for Consistent identification of pathogen strains allowing accurate identification and communication
- Consolidated guidelines for “use” based on peer-reviewed Literature
- Methods to calibrate local strains with RPS and resistance genes
 - The basis for Marker identification
 - Basic check in classical breeding
- **The Tools** - a Source For:
 - DHS with verified disease resistance reactions
 - RPS – known, consistent and true
 - “White papers” on use consolidating the Science

Why? Value for the Seed Industry

- A science-based Breeding/Research Tool Box to confirm resistance breeding goals and answer other disease identification questions
 - Disease Resistant varieties are a Key Goal for Breeders
- Consolidates guidelines for consistent identification of pathogen strains and races (Reference Pathogen Strains - RPS) using DHS as a tool
 - Saves Time and puts the Science behind the Claims
- US Source of Pathogen Strains and Differential Host Sets:
 - Provides a resource to simplify regulatory permitting
 - Address “Local” Conditions – Appropriate Races and Varieties available
 - Local access may increase Confidence of Regulators
- Increases speed and accuracy of identification of resistance
 - Accurate information increases customer confidence and may reduce Liability

Why? Value for the Seed Industry

- New pathogen strains emerge that overcome resistance
 - Potential for Confusion in the Market and consequent Liability
- Provides a system that allows improved “due diligence” for Resistance claims which MAY reduce liability
- Repository for differential host and pathogen collections of retiring experts
- **A Key “spoke” for various Phytosanitary uses**

What is Currently Available?

- **International Bremia Evaluation Board (IBEB)**
 - Joint initiative of lettuce breeding companies in FR and NL, the Dutch inspection service (Naktuinbouw or NAKT) and the French National Seed Station (GEVES)
- **International WG on Peronospora farinosa (IWGP)**
 - Set up through the Dutch seed association Plantum NL by NAKT and companies trading spinach seed. Supported by the Univ. of Arkansas and the Univ. of California Cooperative Extension
- **MATREF (GEVES)**
 - French national network for the production and distribution of reference material (varieties and strains) for testing vegetable varieties for disease resistance
- **The NAKT-Plantum Isolate Collection**
 - Initiative of NAKT and 10 companies members of Plantum. The collection covers viruses, bacteria, fungi, and nematodes and is used for resistance testing for vegetable variety registration trials
- **Disease resistance testing at Naktuinbouw**
 - Provides information on disease resistance tests, and collaborates with breeders and registration authorities on harmonisation of test procedures, isolates and standard varieties

Committee Achievements 2009 - 2012

- Consolidation of protocols (white papers) to screen for resistance and descriptions of the reaction of differential hosts to known strains or races of pathogens causing
 - Bacterial spot in pepper, downy mildew in spinach and Fusarium wilt in melon
 - Protocol on Tomato Tobamoviruses almost ready
- System for accessing DHS set up in GRIN
 - Multiplication (by industry), phytosanitation and functional testing of spinach, pepper and melon seed
 - Seed deposited at the USDA germplasm center in Griffith, GA and listed in GRIN
- Reference pathogen sources secured via partnerships with University scientists and ARS GRIN system
 - APHIS and state regulatory requirements met
- ISF supported web site developed and implemented
 - Services seed and pathogen requests received regularly since 2011
- Business Plan development

Other Points

- This becomes a fundamental piece of resolving pathogen naming issues or at least developing accurate translations
- MATREF, NAKT ready to help resolve or explain host and strain nomenclature gaps
- Solicit APS's continued support to tap resources and facilitate broad acceptance and use of differential hosts and reference pathogen strains by the scientific community
- Knowledge slips away as the old Guard Retires and the New Technologies take the Stage:
 - Repository for differential host sets and reference pathogens developed by retiring pathology and breeding experts

What's Next?

Work of the APS Committee is wrapping up. One Final action to meet the APS objective:

- Develop Financial support for the current work and to fund expansion of DHS, RPS and the White Papers
 - Expansion and continued activity cannot be supported by existing volunteer structure

To Include:

- A Home for Administrative Support
 - See Attachment B
- Home for Website. ISF currently supports
- Initial and on-going Financial Support
- Develop and Strengthen links with Allied Organization
 - Do not recreate the Wheel
 - Strengthen Basic Science Resources

Draft Business Plan

- **Virtual Organization** (See attach. 1)
 - Nexus for Diverse Resources. Minimize Cost, Maximize Expertise
 - But, places a Premium on Administration, Coordination, Communication, Flexibility
- **Three Part Structure**
 - Sponsors Board
 - Finances, Governance, Work Plan Approval
 - Administration or the Organization
 - Turns the crank
 - Working Committee
 - Science “Operations”

Draft Business Plan

- **Operation Principles**

- Sponsor and Supporter Driven
- “Best Science” based Output
 - Based on peer-reviewed Literature. NO original work per se
- Compliance with Laws and Regulation
- Provided as a Service with White Paper “Guidelines”
 - Disclaim Liability. Use at your own Risk
- Solicits Broad Group of like-minded Stakeholders
 - Add skills and resource when they add value
- Open to the “Public”
 - Non-members may access Materials. Solicit for Membership
 - Mixed pricing approach
- Respect Property Rights
 - MTA for varieties if required by Donor

Draft Business Plan

- **Next Steps**
 - Pilot Plan. **Completed**
 - Confirm Sponsors and Financial Commitment (Pledge)
 - Working Committee Solicits Home for Administration based on Pledges
 - WC writes “job description”
 - Proposes choices and alternatives
 - [E.g. ASTA manages \$\$ (collects/contracts?)]
 - Pledges become Commitments
 - Sponsors Convene to Formalize Commitment and Governance
 - Confirm Administration Home Choice
- **Active Operational Development**
 - WC develops Administrative Function with Institution
 - WC develops Work Plan
 - Governance Committee Approves

Members of the Committee

- Phyllis Himmel (Chair) – Marrone Bio Innovations
- Elisabetta Vivoda – HM.CLAUSE
- Radha Ranganathan – International Seed Federation
- Craig Sandlin - Syngenta
- William Dolezal – DuPont/Pioneer Hi-Bred, Inc.
- Lindsey du Toit – Washington State University
- Kimberly Webb – USDA ARS
- Narceo Bajet– Eurofins Labs, Inc.
- Kees van Ettehoven – Naktuinbouw
- Valerie Grimault – GEVES / Valerie Cadot - GEVES
- Gary Pederson – GA USDA ARS, Plant Genetic Resources Conservation Unit
- David Dierig – CO USDA ARS, Plant Genetic Resources Conservation Unit
- John Schoenecker – for American Seed Trade Association
- Ric Dunkle - American Seed Trade Association
- Staci Rosenberger– Monsanto Vegetable Seeds
- Nicki Philips – Coastal Seeds
- Phil Brown – Alf Christiansen Seeds

We're Sold, How can we Help?

- **Ask for a Motion** for the ASTA Board to adopt this as a project and assign appropriate staff and resources to refine and implemented as directed and financially supported by ASTA members.
- **Further:**
 - Make a Pledge/Contribution in Dollars and In-kind Support
 - Convince fellow seed folks to make a financial and In-kind pledges
 - Convince allied industry folks to make a Pledge
 - Provide time for member's of your company to be actively involved in governance or science operations (working committee)
 - Provide insight into the plan, it's execution, financial health and efficiency