Potential Applications – How Can the Model Be Put Into Practice?

Carla Thomas- UC Davis, NPDN
Ray Martyn, Purdue University
Neil McRoberts, UC Davis
Jim Stack, Kansas State University
Judy Brown, U of Arizona
Forrest Nutter, U of Iowa

National Plant Disease Recovery System
April 16, 2013 Tyson Corners, VA

Biology

Existing Method

- Races and resistance
  - Hosts
  - Pathogen races/strains
- Disease cycle

Martyn Method

- Host range: narrow or wide- single or multiple species/genera /families
- No overseasoning
- Overseasoning: soil
- Overseasoning: in vector
- Pathogen reproductive potential: Low or High
- Latency: long or short

(Red text indicates unanimous vote)

Spread

Current System

- Favorable Environmental Conditions
- Spread- Potential for movement
  - Wind
  - Rain
  - Vector
  - Soil
  - Fomite-Accidental Introduction
  - Invasiveness
- Risk Mapping

Martyn System

- Dissemination: Wind
- Dissemination: Rain
- Dissemination: Seed/plant parts
- Dissemination: Vectored
  - Transmission: trans-ovarial
- Dissemination: Soil
- Disease cycle: polycyclic
- Disease cycle: monocyclic
- Dissemination: fomite (human)

Geography

Existing System

- Geographic Distribution
- Risk Mapping
- Survey, Monitoring and Detection

Martyn System

- Geospatial pattern of host: contiguous- yes or no
- Area at risk: agricultural field
- Area at risk: orchard/vineyard
- Area at risk: natural landscape
- Area at risk: forest
- Area at risk: residential
- Area at risk: greenhouse production

Economic Impact and Compensation

Existing System

- RMA- wheat example
- Potential Economic impacts-Laurel Wilt Forests
- Potential Ecological Impacts-Laurel Wilt Forests

Martyn System

- Is there a probable trade impact (yes)
- Is there a probable food safety impact (yes)

Mitigation/Control

Existing System

- Exclusion/Quarantine
- Pesticides
- Sanitation
- Germplasm/Host resistance/ avoiding monoculture/germplasm conservation
- Biocontrol
- Phytosanitation
- Eradication
- Cultural control
  - Escape
  - Nutrition management
  - Do nothing-laurel wilt
  - Trap out/attract and kill
  - IPM-laurel wilt, CVC
  - BMP's /Certification programs
  - Water management
  - Alternate host management
  - Education
  - Limit transport-laurel wilt forests

Martyn System

- Exclusion: quarantine
- Protection: known efficacious treatment exists
- Exclusion: testing/certification
- Exclusion: sanitation
- Exclusion: vector management
- Eradication: host destruction
- Eradication: Fumigation
- Eradication: seed/plant part treatment
- Resistance: resistance exists
- Avoidance: is avoidance practical (yes)

Spread May Determine Mitigation

Spread

- Dissemination: Wind
- Dissemination: Rain
- Dissemination: Seed/plant parts
- Dissemination: Soil
- Dissemination: Vectored
  - Transmission: trans-ovarial
- Disease cycle: polycyclic
- Disease cycle: monocyclic
- Dissemination: fomite (human)
- Host range: broad - multiple plant families

Mitigation/Control

- Protection: known efficacious treatment exists
- Exclusion: quarantine
- Exclusion: testing/certification
- Exclusion: sanitation
- Eradication: Fumigation
- Eradication: seed/plant part treatment
- Exclusion: vector management
- Eradication: host destruction
- Resistance: resistance exists
- Avoidance: is avoidance practical (yes)

Spread May Determine Mitigation For Seed/Plant/Soil/Fomite

Spread

- Dissemination: Seed/plant parts
- Dissemination: Soil
- Dissemination: fomite (human)
- Disease cycle: monocyclic
- Host range: narrow

Mitigation/Control

- Protection: known efficacious treatment exists
- Exclusion: quarantine
- Exclusion: testing/certification
- Exclusion: sanitation
- Eradication: Fumigation
- Eradication: seed/plant part treatment
- Eradication: host destruction
- Host Resistance: resistance exists
- Avoidance: is avoidance practical (yes)

Spread May Determine Mitigation For Wind

Spread

- Dissemination: Wind
- Disease cycle: polycyclic
- Host range: broad - multiple plant families

Mitigation/Control

- Protection: known efficacious treatment exists
- Eradication: host destruction
- Host Resistance: resistance exists
- Avoidance: is avoidance practical (yes)

So What's the Next Step?

- Don't change anything
- Incorporate Martyn Factors into existing outline
- Analyze further to develop several templates
- Other ideas?

Discussion