Spotted Lanternfly USDA-NIFA SCRI CAP Project: Stakeholder Advisory Panel Meeting
"Pre-Season Preview" of Work Planned for 2021 Field Season
## April 28, 2021

Purpose of Meeting: To engage in informal, meaningful dialogue between SAP members and project personnel to get input on project plans and priorities.

Agenda:

- New Distribution Map and Announcements
- Brief summary of plans for each of 3 project objectives:

  Objective 1. Quantify SLF impact on at-risk specialty crops and immediately develop management tactics to reduce the damage in areas where SLF is established. (5 sub-objectives)

  Objective 2. Perform essential fundamental research on SLF basic biology, ecology, behavior and biological control tactics contributing to long-term sustainable solutions. (8 sub-objectives)

  Objective 3: Deliver immediate SLF management solutions to specialty crop stakeholders and the general public via the Extension networks of the partnering land grant universities, USDA agencies, and NEIPMC. (4 sub-objectives)

- Discussion: hearing and responding to input, questions, prioritization of SAP

- Meeting will be recorded and link and written summary will be shared with all SAP members

- On-line survey of SAP will follow in next 1-2 weeks to assess priorities, needs, etc.

Spotted Lanternfly Reported Distribution
Updated April 6, 2021

New York State
Integrated Pest Management Program
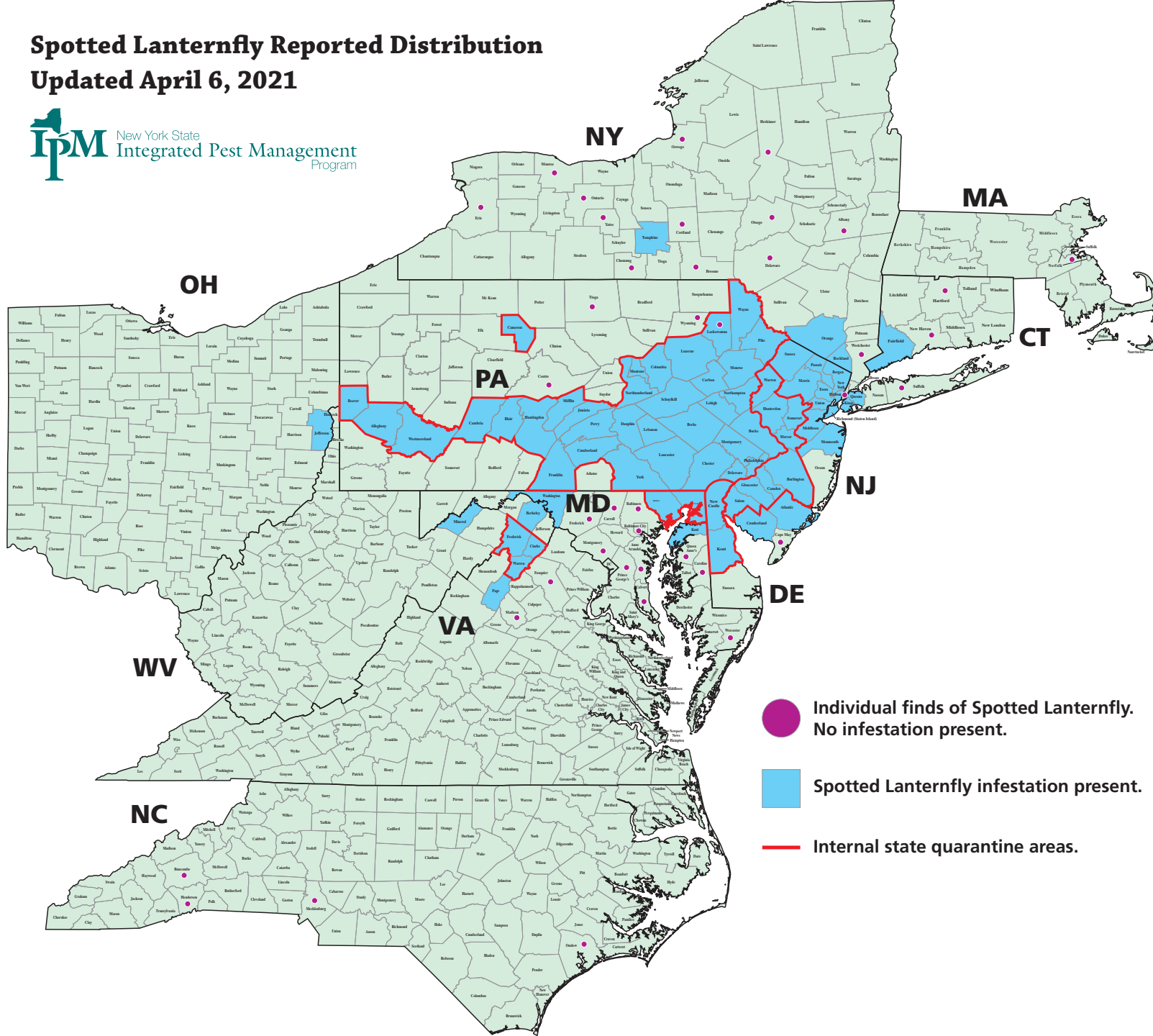
Individual finds of Spotted Lanternfly.
No infestation present.

Spotted Lanternfly infestation present.

Internal state quarantine areas.

Objective 1. Quantify SLF impact on at-risk specialty crops and immediately develop management tactics to reduce the damage in areas where SLF is established. (5 sub-objectives)

1.1. Assess damage from SLF feeding damage to fruit trees, vines, common border trees, and woody ornamentals in the field and laboratory (VA Tech, Cornell, Penn State)

- Continue work on tree ring analysis, and initiate work on impacts on grapevines in Virginia
- Continue research, using injection technologies; surveying for SLF in the Hudson Valley
- Complete data analyses for two experiments investigating effects of SLF feeding on physiology of grapes
- Conduct carbon partitioning experiment on grapes originally planned for 2020
- Repeat 2020 common garden study on tree physiology using red maple and silver maple with 4 different densities of adult SLF. Photosynthesis, gas exchange, water use, and carbohydrate concentrations will be evaluated.
- Evaluate fertilization treatment sold by a major landscape company in SE PA on attractiveness of trees to SLF at the common garden using red and silver maples
- Evaluate 4 species of potted trees (red maple, river birch, *Ailanthus*, and *Styrax japonica*) for diameter growth and carbohydrate production at 4 different densities of adult SLF

1.2. Conduct lab-based insecticide bioassays against SLF adults, nymphs, and eggs (VA Tech, Cornell, Penn State)
- Evaluate factors that influence efficacy of ovicides, including egg age, diapause state and penetrants
- Examine the role of *Beauveria bassiana* in SLF management

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1.3. Conduct experimental pesticide trials in greenhouses, vineyards, and orchards against SLF adults, nymphs, and eggs (USDA, Rutgers, VA Tech, Penn State)

- Evaluate pesticide efficacy in infestation zone
- Repeat and revise management trials as needed
- Conduct efficacy trials of physical barriers in combination with insecticides in vineyards
- Determine the most effective organic *Beauveria* and essential oil treatments for SLF for home owners and organic growers
- Compare insecticide treatments of bifenthrin and dinotefuran in large plot treatments

1.4. Implement, test, and refine existing tools for biosurveillance and monitoring (USDA, Rutgers, VA Tech, Penn State)

- Develop and refine behaviorally compatible trap designs
- Continue work on plant-based semiochemicals to Identify attractive olfactory stimuli and develop lures for trapping systems
- Implement, test, and refine existing tools for biosurveillance and monitoring; complete all eDNA methodological field trials, data analysis, publication; continue monitoring using circle trap

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1.5. Examine the potential for SLF insecticide management to affect pollinators and biological control agents of other pests (USDA, Penn State)

- Determine the carryover of fall trunk, bark, and drench sprays of neonicotinoids used to control SLF on bees coming to the flowers of treated trees the following season
- Publish the results of the non-target impacts on ground and aerial arthropod communities in the large plot trials with various treatments of *Beauveria* and dinotefuran
- Evaluate non-target impacts of large plot treatments of bifenthrin and dinotefuran on pollinators and other arthropods

Objective 2. Perform essential fundamental research on SLF basic biology, ecology, behavior and biological control tactics contributing to long-term sustainable solutions. (8 sub-objectives)

2.1. Assess host plant suitability and SLF movement among various hosts under field conditions (Rutgers, VA Tech)

- Repeat study on the influence of host plant on cohort development and survivorship in NJ
- Assess host plant suitability and SLF movement among them under field conditions. Changes in host range have already been followed in Virginia; we will evaluate the effect of vineyard surroundings on SLF invasion

2.2. Develop sustained SLF colonies in the laboratory and under semi-field conditions (USDA)

2.3. Examine SLF feeding behavior (VA Tech, USDA, Penn State)

- Continue work on assessing the effects of different repellents on SLF nymphs and adults in olfactometer experiments, feeding choice assays, and semi-field trials
- Continue work assessing mixed host diets on SLF development and survivorship
- Continue work assessing SLF survivorship and impacts on other plants of agricultural importance
- Using EPG, record all life stages on Tree of Heaven; initiate recording all life stages on grapes; perform correlation of EPG feeding patterns with histological studies to verify the physical location of the stylet and/or salivary sheath in the host plant tissue

2.4. Determine baseline dispersal capacity of SLF adults and nymphs in laboratory and field (USDA, Penn State)

- Conduct movement frequency and patterns of SLF surrounding vineyards according to the landscape classification; evaluate high-risk pathways that SLF enter vineyards and other agricultural commodities

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2.5. Identify dispersal pathways and predict expected range of SLF using multiple modeling approaches (Temple, Cornell, VA Tech)

- Continue simulations-based work by incorporating findings from empirical studies of SLF biology
- Complete preliminary snapshot of spotted lanternfly degree day requirements; complete degree day modeling and development of a spotted lanternfly predictive model
- Documentation of spread of SLF along railroad lines has begun in Virginia, and this approach will be used to select areas for sampling near vineyards

2.6. Examine SLF capacity for transmission of microorganisms via feeding (Penn State, VA Tech)

- Confirm preliminary results testing if adult SLF can transmit grapevine yellows phytoplasmas to healthy grapevines
- Complete transmission experiments for Pierce's disease on grapevines in quarantine greenhouse studies
- Test whether SLF can transmit red blotch virus on grapevines in quarantine greenhouse studies
- Set up transcriptomics experiment to test grapevine responses to pathogens+SLF stress.

2.7. Characterize SLF reproduction and endosymbiont transmission and establish potential for control via interruption (Penn State)

- Continue dissections of SLF females to identify key transitions in reproductive development and endosymbiont transmission.
- Develop key stages in female reproductive development into a degree day model to improve timing of management

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2.8. Examine potential SLF management with biological control (Penn State, VA Tech, Cornell, USDA, Delaware, Rhode Island)

- Determine the carryover of fall trunk, bark, and drench sprays of neonicotinoids used to control SLF on bees coming to the flowers of treated trees the following season
- Determine the importance and pollinator fauna that rely on red maple and tree of heaven to understand implications of treating these trees for SLF
- Develop and bloom phenology model to compare against SLF development to better target insecticide treatment for SLF nymphs while avoiding flowering plant bloom to minimize non- target impacts
- Examine *Beauveria* as a control agent in collaboration with other states
- Assess sequestration of alkaloids from TOH, which could affect SLF palatability by natural predators
- Complete a peer-reviewed publication reporting results from challenging all SLF instars with 5 biopesticides based on entomopathogenic fungi
- Complete studies of the genetic diversity of native entomopathogenic fungi isolated from SLF; compare the pathogenicity and virulence of native isolates of entomopathogenic fungi with the top biopesticides;
- Assess and publish impacts of *Batkoa major* on SLF
- Determine the presence of impact of indigenous parasitoids that may contribute to biocontrol in VA. Wintering eggs have been collected for other studies, and emergence of parasitoids will be determined. Identify mites that have been associated with collected oothecae; identification is pending.

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2.8. Examine potential SLF management with biological control (Penn State, VA Tech, Cornell, USDA, Delaware, Rhode Island) (cont'd)

- Work with USDA biocontrol researchers to start developing rearing capabilities for non-target native host species to provide them with for host specificity testing of the dryinid parasitoid of SLF
- Expand field surveys for resident natural enemies that may attack SLF, and continue host range evaluations and related behavioral research to support eventual petitions for field release of Asian parasitoids
- Continue rearing non-target species to provide egg masses and nymphs as required by USDA labs for host range testing of potential SLF parasitoids
- Provide USDA-APHIS with eggs for host suitability studies for the remaining non-target colonies
- Pursue molecular work on *Anastatus* species, including training in the molecular lab of USDA APHIS cooperator Yunke Wu
- As Covid restrictions lift, conduct additional research in China and Korea to examine the impact on SLF due to natural enemies and determine the specificity of the key parasitoid natural enemies on potential Asian non target species
- As Covid restrictions lift, conduct field work in China with USDA cooperators in foreign exploration to investigate and collect possible biocontrol agents

Objective 3: Deliver immediate SLF management solutions to specialty crop stakeholders and the general public via the Extension networks of the partnering land grant universities, USDA agencies, and NEIPMC. (4 sub-objectives)

3.1 Deliver management strategies and new knowledge to specialty crop stakeholders and the general public via synergized and innovative Extension programming produced by partnering universities, USDA, and NEIPMC (All Institutions)

- Contact state regulatory officials in affected states in the coming months to capture new infestations and quarantine zones for the regional Spotted Lanternfly distribution map
- Disseminate information to stakeholders, including through Extension programming
- Continue Rutgers Fruit IPM program scouting efforts; continue scouting/surveys in other states
- Develop training for the agricultural community in the lower Hudson Valley

3.2 Provide SLF education and outreach opportunities using traditional (e.g. regional meetings, on-farm demonstrations) and web-based (e.g. webinars) platforms (All Institutions)

- Continue grower meetings on SLF biology and management
- Continue in-service training for VCE agents in Virginia
- Update project website: StopSLF.org
- Continue to host e-lists, and respond to social media; publish newsletter Insights focused on project accomplishments; seek SLF-focused topics for NEIPMC webinar series each year

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3.3. Develop and implement evaluation plans to direct research plans and assess efficacy, including economic evaluation, of project outputs and management recommendations (All Institutions)
- Survey affected stakeholders to evaluate and understand the impact of SLF and the priorities for research and extension
- Seek sources of data on IPM practices within the affected area, looking for indications of pesticide use trends versus trends of IPM adoption in general

3.4. Train the next generation of scientists and Extension educators to be better prepared for invasive insects using cross- training and lab rotations to promote cross-institutional collaborations and enhance coordination of Extension and research activities (All Institutions)
- Continue training of students and researchers: as of Dec. 2020, training across all institutions included: 8 undergraduates, 12 graduate students, 8 post-doctoral scientists
- Continue training in invasive pest biology and management
- In Virginia, continue training of extension agents and students in SLF appearance and biology in quarantine zone
- When Covid restrictions are lifted, conduct a field-day demonstration for all students, post-docs, and other professionals involved in our SCRI project to see SLF invasion in vineyards and ornamental nurseries, meet with growers, and see projects in operation

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3.5. Hold Stakeholder Advisory Panel meetings to evaluate accomplishments, direct and prioritize future research plans, and guide execution of objectives (All Institutions)

- Conduct a SAP pre-season preview of planned work for 2021 field season via Zoom, with recording and notes available to all SAP members afterwards
- Following pre-season preview meeting, administer on-line survey to SAP members to symposium to identify their priorities moving forward
- Provide SAP with Annual Report in early November
- Hold Annual Stakeholder Advisory Panel Meeting adjacent to the Mid-Atlantic Fruit and Vegetable Convention in Hershey, PA; Convention scheduled to be held Tues. Feb. 1 - Thurs. Feb. 3 – propose SLF SAP Meeting Friday Feb. 4?

SLF SAP meeting Notes

Attendees: Nadege Belouard, David Biddinger, Nancy Cusumano, Sebastiano De Bona, Deb Grantham, Tyler Hagerty, Kelli Hoover, Kevin Judd, Diane Kearns, Danielle Kirkpatrick, David Lane, Tracy Leskey, Stephanie Lewkiewicz, Joshua Milnes, Clayton Myers, Anne Nielsen, Greg Parra, Doug Pfeiffer, Ben Seibold, Sven Spichiger, Lisa Tewksbury, Julie Urban, Mike Webb, Robert ?

Survey for SAP for their needs and desires
Heather has moved on to her new position in MI. No funds for refilling the position ☹
Julie is working with the head of hort extension at Penn state to try and cover some of Heather's responsibility, and working on other support for some of the other things Heather was doing such as vineyard surveys.

Current map –
Additional counties have been put under PA QT. Altoona population is huge. Pittsburgh is similarly bad.
Revised VA map – Shenandoah county, Augusta county, QT includes Clarke and Warren counties
Prince William county – thousands of egg masses. Tina MacIntyre VDAG. Email Doug Pfeiffer and Brian Eschenauer to add 2 counties. Augusta and Prince William added.
Anne NJ – SLF in 30% of Vineyards, well above thresholds 253 SLF p/vine. Weekly spraying at vineyards.
NY hope to eradicate Ithaca population. Lower Hudson and SE CT populations. Staten Island infested.

Plans:
Research update – Doug Pfeiffer on tree growth under SLF pressure
Landscape companies – selling nonsense – fertilize your trees to stop SLF, studies are showing that fertilized trees are an attractant. Be aware.
Botega getting 30% mortality of SLF. Oil in Aprehend kills them as fast as the insecticide does. Bifenthrin -3-4 weeks residual, dinetofuran also 3-4 weeks. Still assessing different mixes and essential oils. They are working on getting a 24c state approval for use of oils. Having trouble getting reps to respond to their request.
Tracey's tests show nowhere near 3-4 weeks, more like 1 week. Her lab is working on testing lures. Develop a better circle trap – where on the tree, how often emptied etc etc.
eDNA Rutgers testing
Pest fact sheet available on the Penn State page-

Outreach and Extension – StopSLF.org page content constantly added. Summit and SLF 101 recordings are up. IPM webinar series- If you want to highlight your research we can schedule you for a webinar.
Evaluation – survey to SAP
Egg hatch prediction model is on StopSLF.org > Resources

Survey for base line data to manage SLF.

Meet Friday Feb 5 as a mid Atlantic fruit and Veg growers meeting tag along