

Spotted Lanternfly Management in Orchards: Current Status of our Knowledge on the Biology, Impacts, and Control of this New Invasive Pest

Julie M. Urban
Penn State University



Photo : Pennsylvania
Dept. of Agriculture

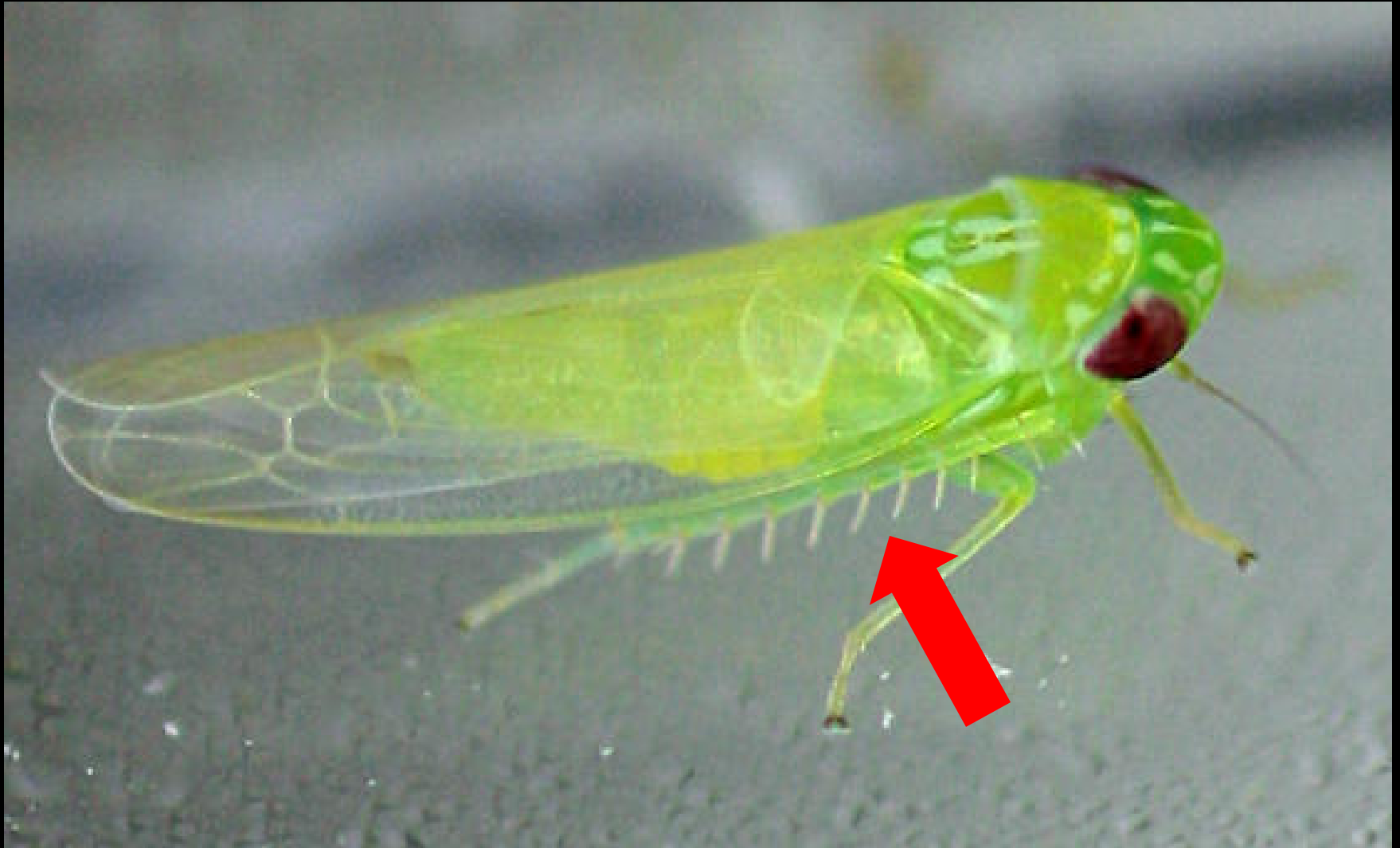
INVASIVE SPOTTED LANTERNFLY
HEMIPTERA: FULGORIDAE: *Lycorma delicatula* (WHITE)



Planthoppers: close relatives to Leafhoppers



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Honeydew



Honeydew → Sooty Mold









from Dara, Barringer & Arthurs, 2015

Photo: Greg Hoover,
Penn State University



Host Plants

FAMILY	HOST COMMON NAME	FAMILY	HOST COMMON NAME
<i>Aceraceae</i>	Japanese maple, sugar maple, red maple	<i>Malvaceae</i>	Rose of sharon
<i>Asclepiadaceae</i>	Rough potato	<i>Moraceae</i>	Mulberry
<i>Betulaceae</i>	Birch	<i>Oleaceae</i>	Lilac, autumn olive
<i>Compositae</i>	Burdock	<i>Pinaceae</i>	Pine
<i>Cornaceae</i>	Dogwood	<i>Rosaceae</i>	Cherry, plum, apple, pear, rose, apricot, peach
<i>Fabaceae</i>	Black locust	<i>Rutaceae</i>	Corktree
<i>Fagaceae</i>	American beech, chestnut oak	<i>Saliaceae</i>	Poplar, willow
<i>Juglandaceae</i>	Walnut, wingnut	<i>Simaroubaceae</i>	Tree of heaven
<i>Magnoliaceae</i>	Magnolia, tuliptree	<i>Vitaceae</i>	Wild vitis, virginia creeper, amur grape, wine grape

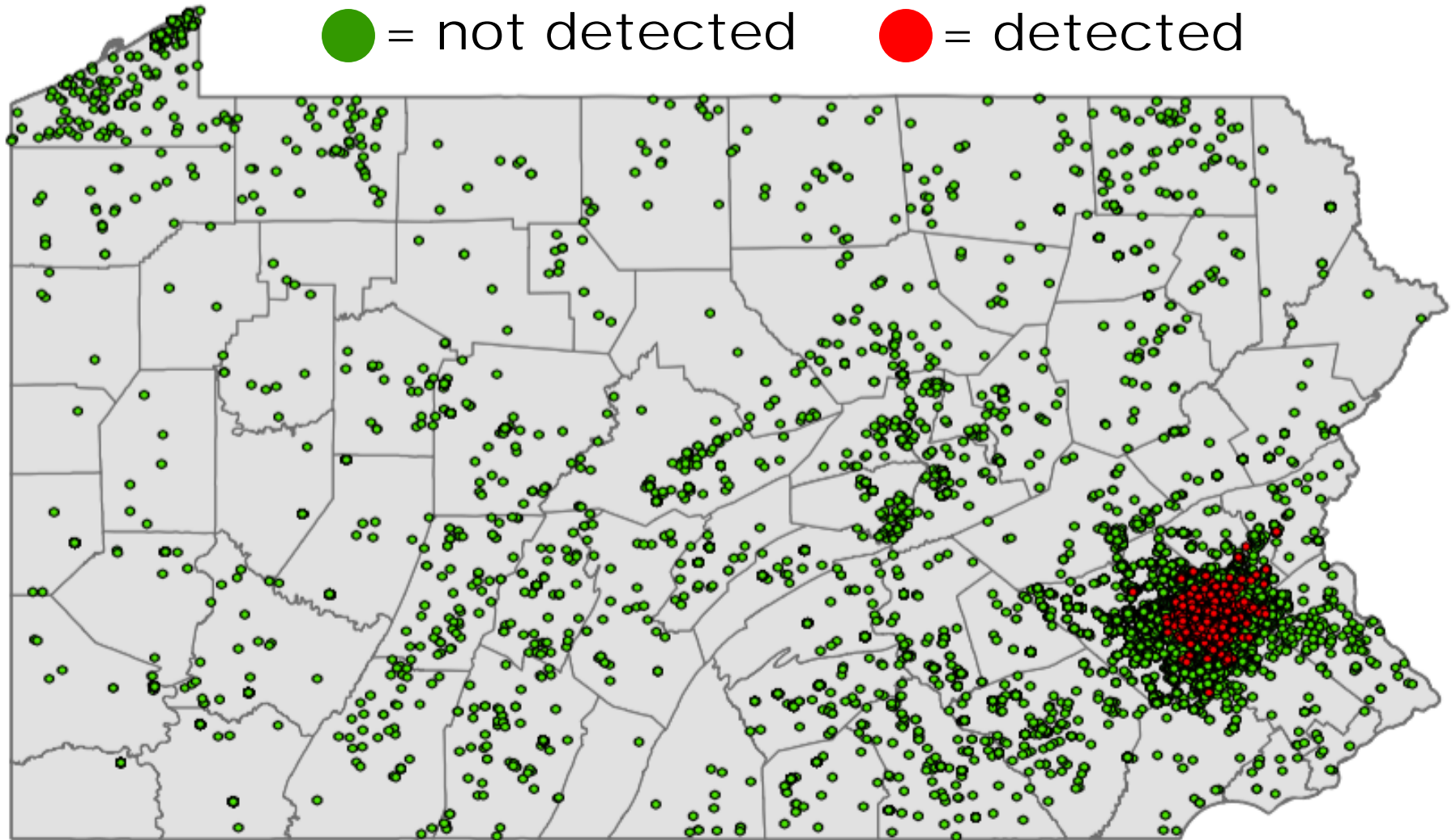
Host list (edited) from
Dara et al. 2015





2014–2016 Lycorma Detection Survey

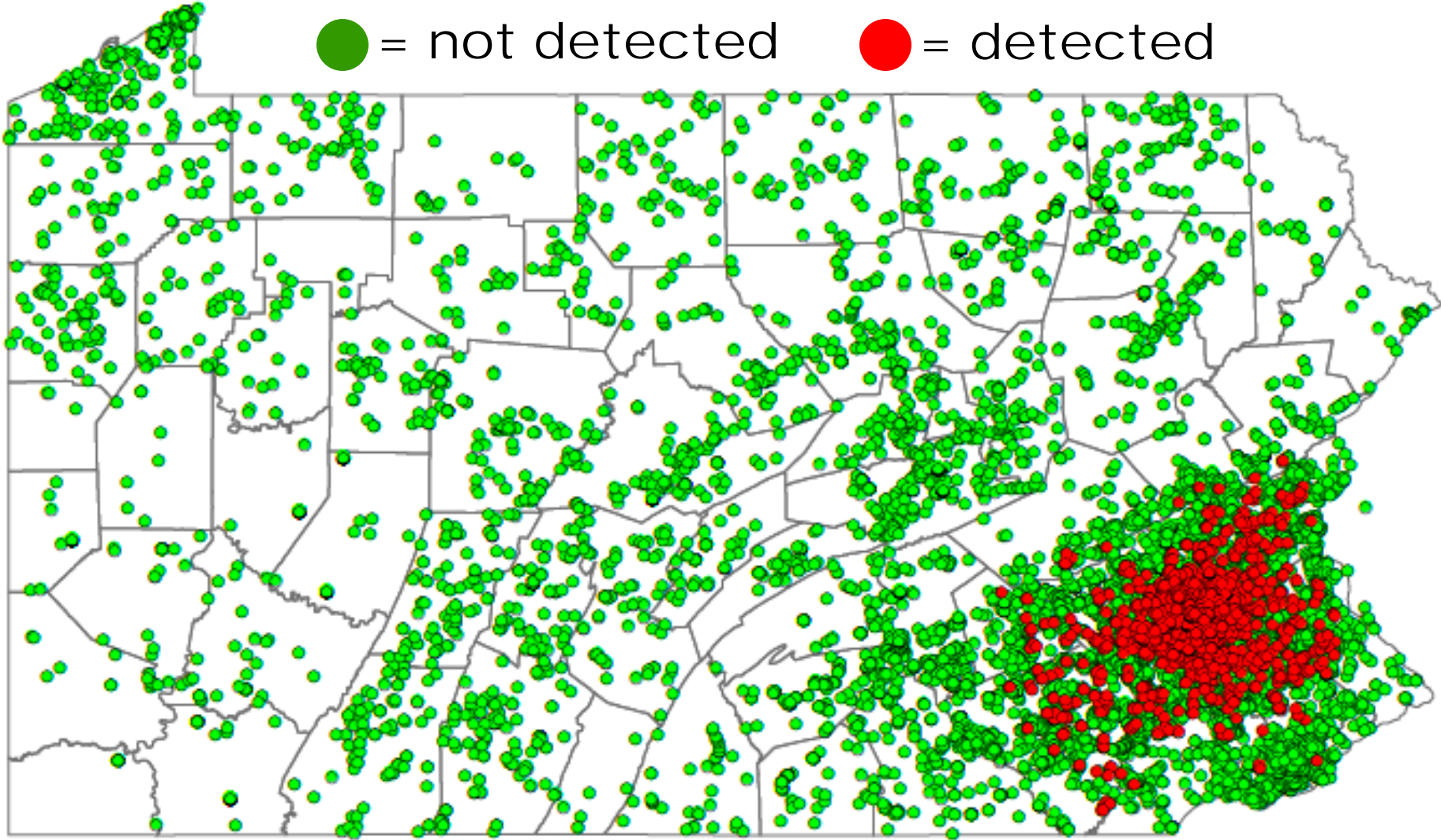
Results through 4 Oct. 2016, PDA



2014–2017 Lycorma Detection Survey

Results through 21 Nov. 2017, PDA

● = not detected ● = detected















Insecticide Bioassays: Erica Smyers



Preliminary Tree Fruit & Grape Insecticide Efficacy Ratings For SLF

Neonicotinoids	Provado Leverage Brigadier 1	Actara Voliam Flexi 1	Scorpion Venom 1	Assail 2
OPs Carbamates	Malathion 1	Imidan 1	Carbaryl 1	
Pyrethroids	Baythroid 3	Mustang Max 3	Brigade Sniper 2	

1 = Excellent 2 = Good, 3 = Fair, 4 = poor

Preliminary Insecticide Efficacy Ratings For SLF

Homeowner & Organic	Neemix 4.5 (direct contact)	M-Pede Safer Soap	Entrust
	2	1	?
Forestry Ornamentals	?	?	?

1 = Excellent 2 = Good, 3 = Fair, 4 = poor

Pesticide testing by PSU within the quarantine zone and in conjunction with Leskey USDA-ARS quarantine lab will focus on fruit crops, but this data on specific pesticides active ingredients will be useful in developing SLF control options for other crops and needs.

Feeding Damage

Spring 2018 studies: Experiment + field observations
Centinari, Timer, Smyers, Urban grape in vineyard



Insecticide Efficacy

Spring 2018 studies: Experiments on fruit trees
Biddinger, Krawczyk (in Berks); Leskey (SLF colony)



Tree Physiology

Spring 2018 studies: Experiments on ornamentals

Mason, Felton characterize SLF saliva and impacts



Photo: Brian Walsh, 2017



Photo: Brian Walsh, 2017

Sooty Mold

Spring 2018: Analysis of 2017 experiment

Urban, Taleb – sooty mold development (DNA-based)



Chemical Ecology

Lures, attractants:

Cooperband (USDA OTIS)

Testing in Spring 2018

Behavior of Adult SLF:

Baker Lab (Penn State)

Sex Pheromone Attractant Research

Non-Pheromonal Communication

Seasonal Changes in Behavior of Adult SLF

feeding to mating trends

dispersal behavior of flying adult SLF





Photo : Pennsylvania Dept.
of Agriculture

Host Requirements/Preferences

Field studies:

Cooperband (USDA OTIS)

Setliff (Kutztown Univ.)

Controlled experiments in quarantine facility:

Leskey Lab

NEED TO ANSWER:
"The Ailanthus Question"



Search for Biological Control Agents

Foreign exploration to identify important Asian predators of SLF

Hoelmer (ARS Newark, DE)

Juli Gould (USDA APHIS)

Impact of biocontrol on non-targets

Charles Bartlett (Univ. of Delaware)

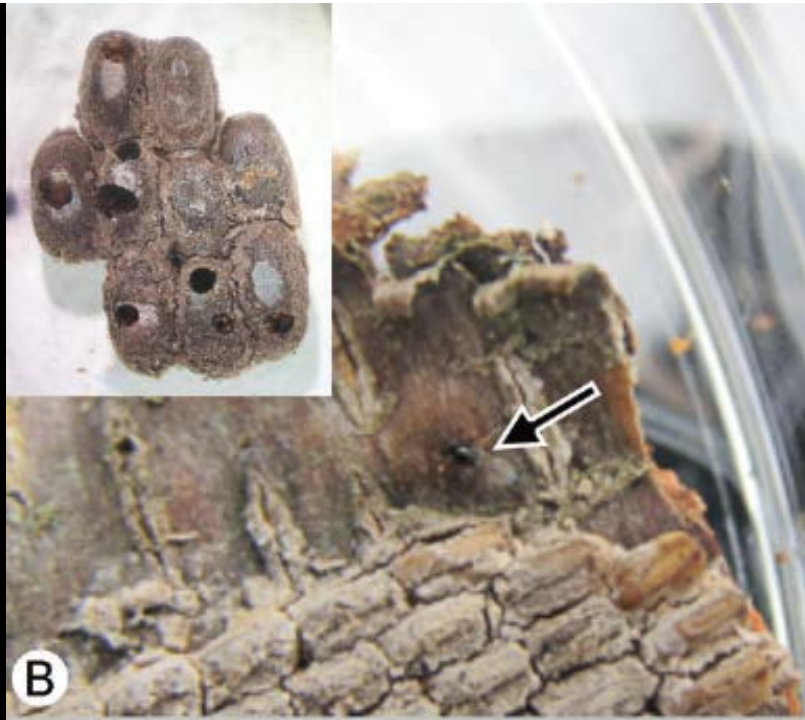
Urban Lab (Penn State)

Search for Biological Control Agents

An Old Remedy for a New Problem? Identification of *Ooencyrtus kuvanae* (Hymenoptera: Encyrtidae), an Egg Parasitoid of *Lycorma delicatula* (Hemiptera: Fulgoridae) in North America

Houping Liu^{1,2} and Jason Mottern³

¹Pennsylvania Department of Conservation and Natural Resources, Harrisburg, PA 17105, ²Corresponding author: e-mail: hliu@pa.gov, and ³USDA ARS Systematic Entomology Laboratory, Washington, DC 20013



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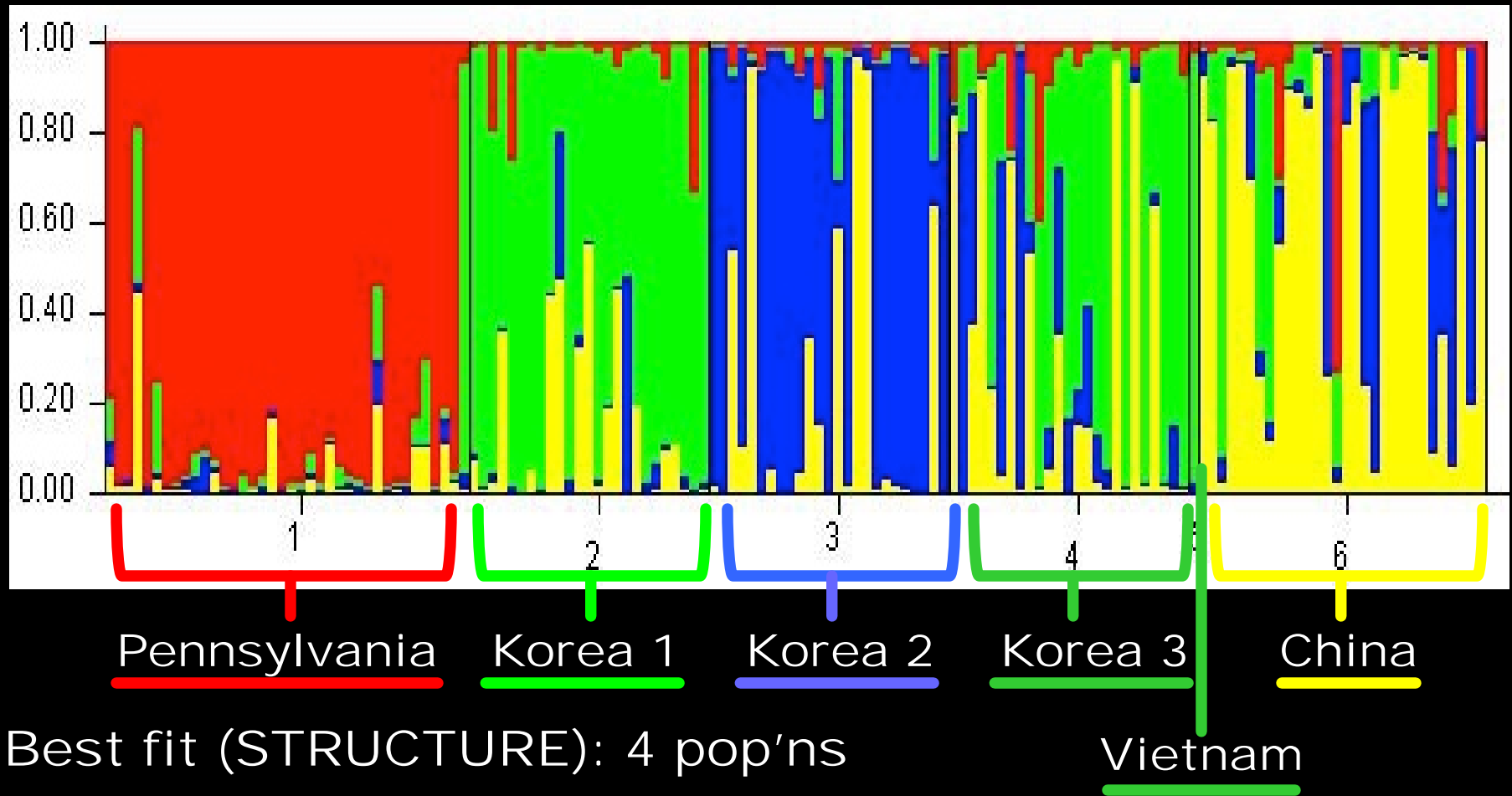
Research Objectives in Urban Lab

1. Use genetics to find the origin of SLF in Pennsylvania
2. Characterize changes in microbial communities on plants/trees associated with SLF feeding and honeydew deposition
3. Characterize internal microbial associates of SLF

Using DNA to Identify Origin of SLF in PA

Not from Korea!

Urban Lab (Penn State)



Microbial Communities in "Froth"

Bacterial Communities:

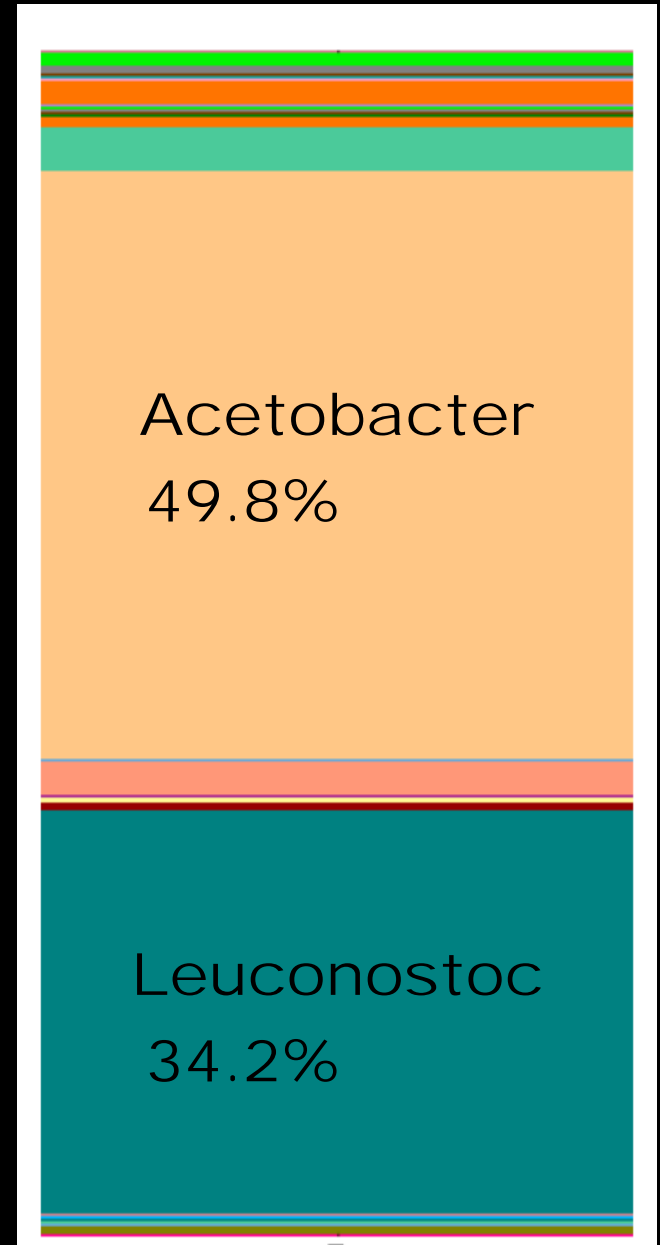
- 16S rRNA from 6 samples
- 40,710 seqs/sample

Aerobic fermenting bacteria

- convert sugars to acetic acid, lactic acid

Fungal Communities:

- most abundant species:
Geotrichum candidum
- ubiquitous yeast
- consumes lactic acid, etc.
- used in cheese making



Microbial Communities in "Froth"

Frothy flux (alcoholic flux)?

from Sinclair & Lyon (2005)

Diseases of Trees and Shrubs:

- microbes ferment sap in cracks and wounds in bark
- flux is acidic, colorless or sometimes white froth
- common on stressed trees
- seen on sweetgum, elm, willow, and *Prunus* (almond, apricot, peach), mimosa
- Don Davis (PSU plant pathologist) has never seen on *Ailanthus altissima*



Photo: Sinclair & Lyon (2005)



Damage Assessment

Currently (and ongoing)

Urban – Ailanthus froth, microbial symptoms on trees

