

Soybean Aphid – Thinking Outside the Crop

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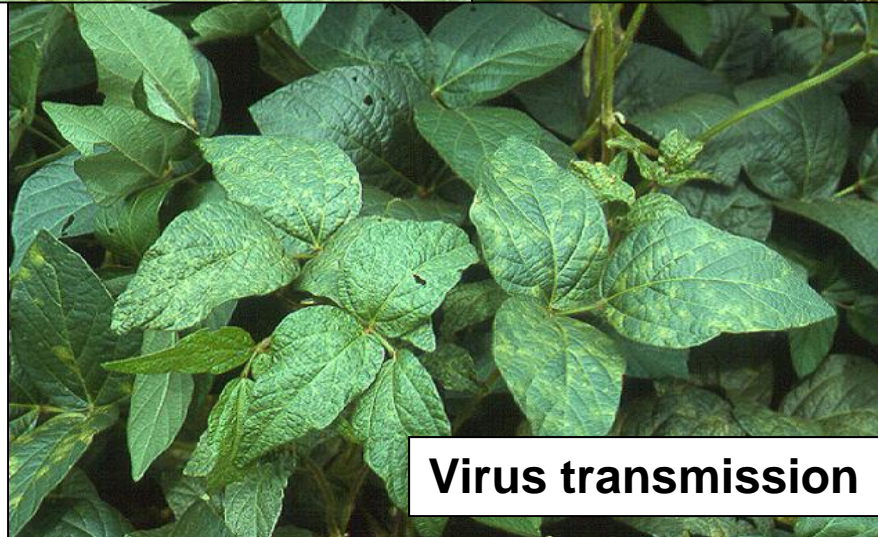
2000: A New Pest Arrives



Closeup view...



Numbers!



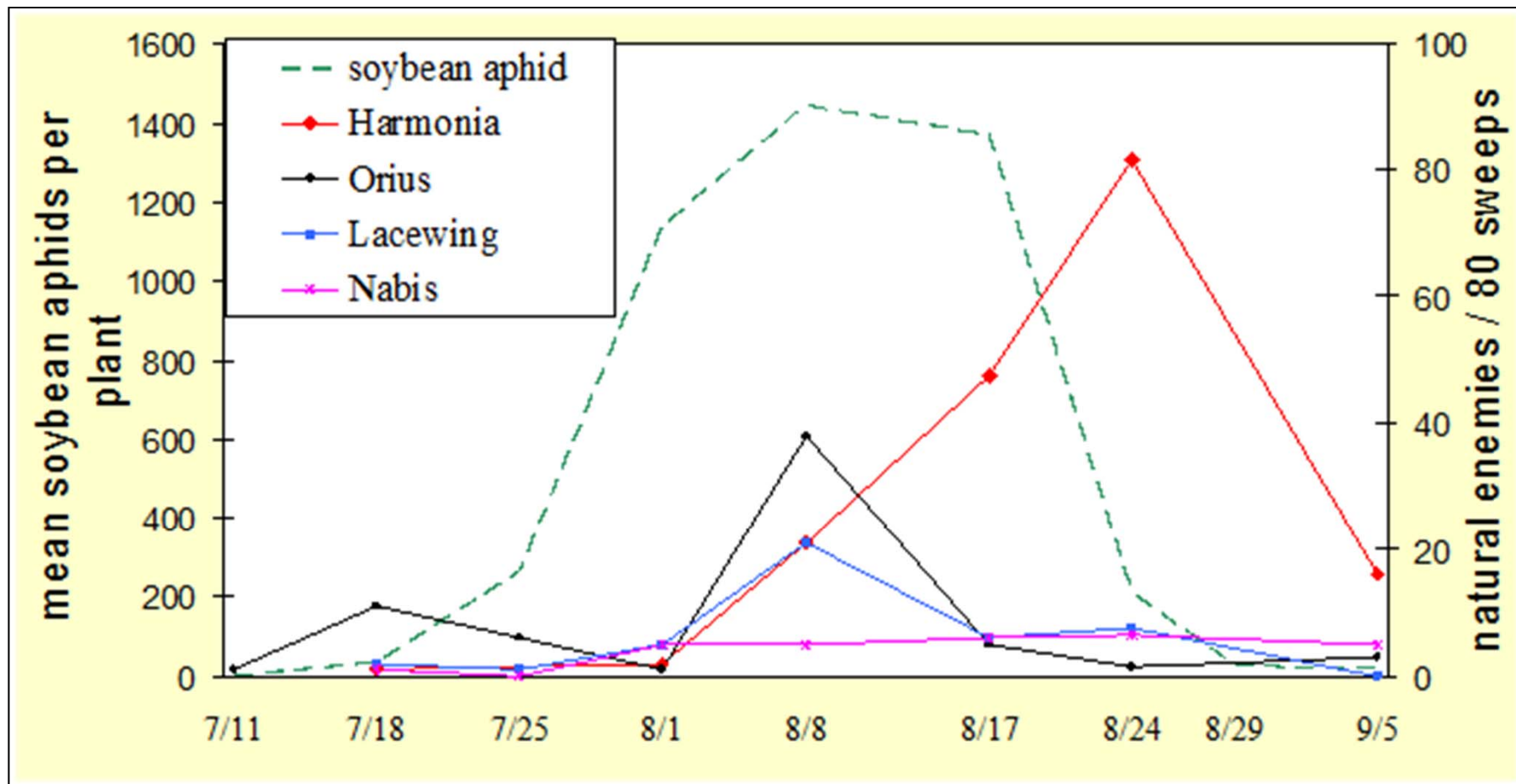
Virus transmission

Grant County – August, 2000



(photo by John Wedberg)

Soybean Aphid and Natural Enemies 2001 - Arlington, WI



Bob Ellingson (fig. courtesy E. Cullen)

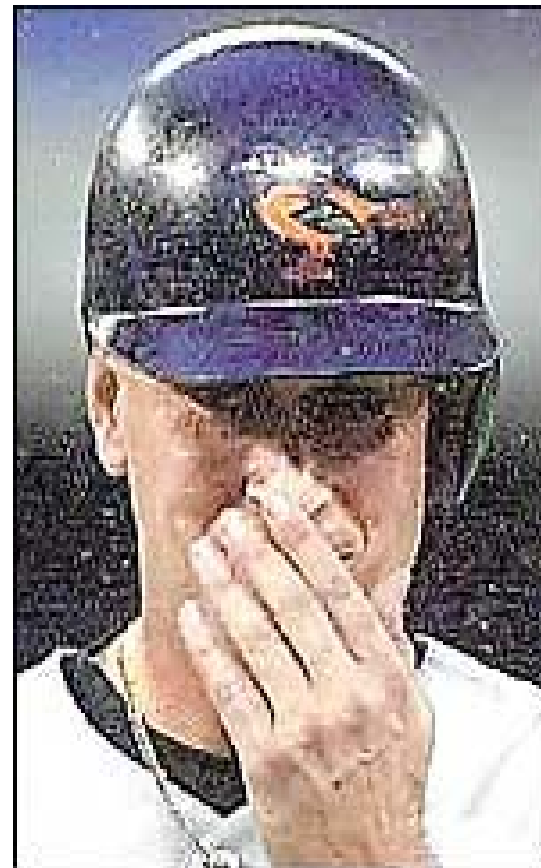
Asian Lady Beetle (*Harmonia*)



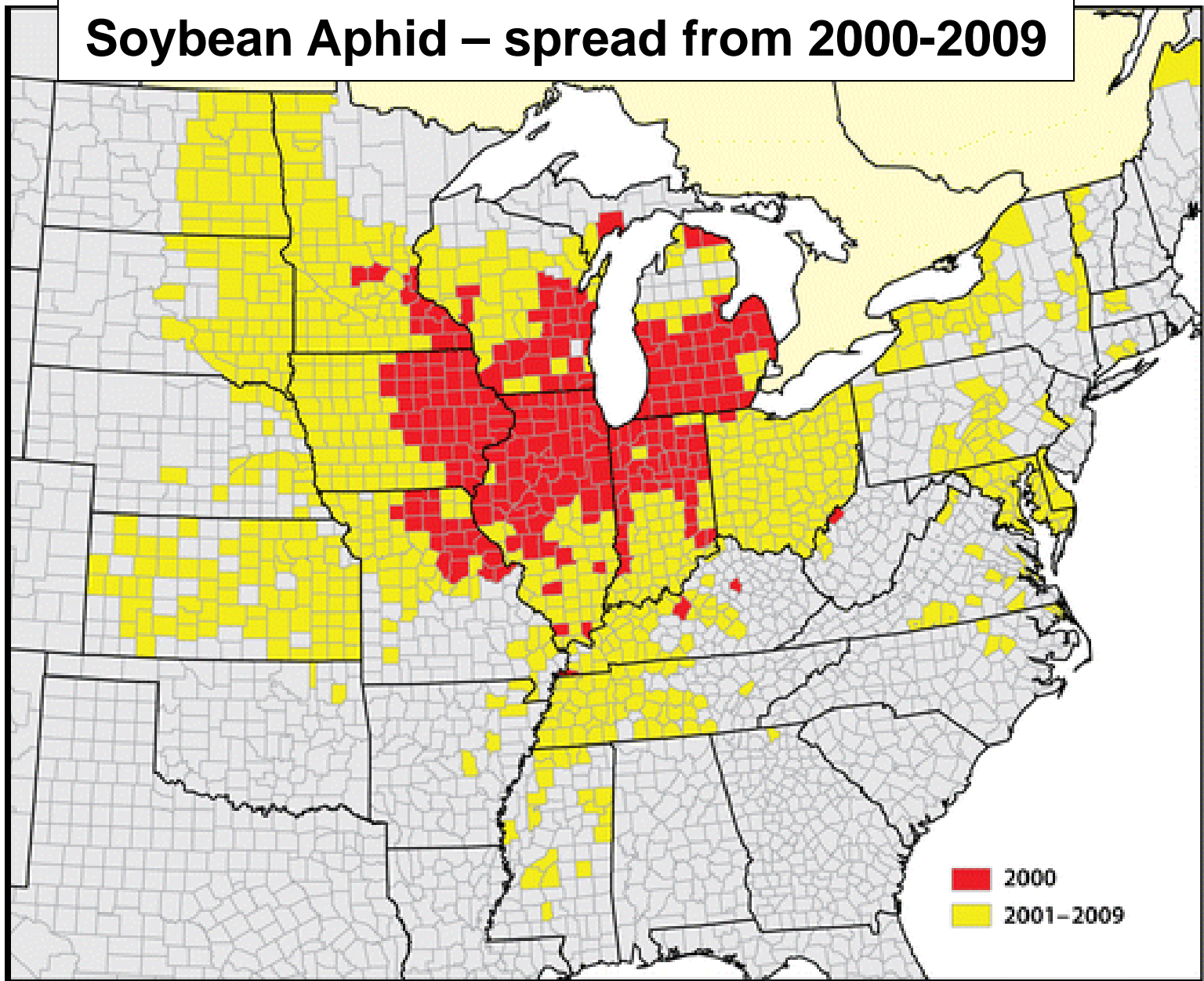
Soybean Aphids Descend on Toronto August 2-3, 2001



(photo credits Toronto Star)



Soybean Aphid – spread from 2000-2009



R Ragsdale DW, et al. 2010.
Annu. Rev. Entomol. 56:375-99

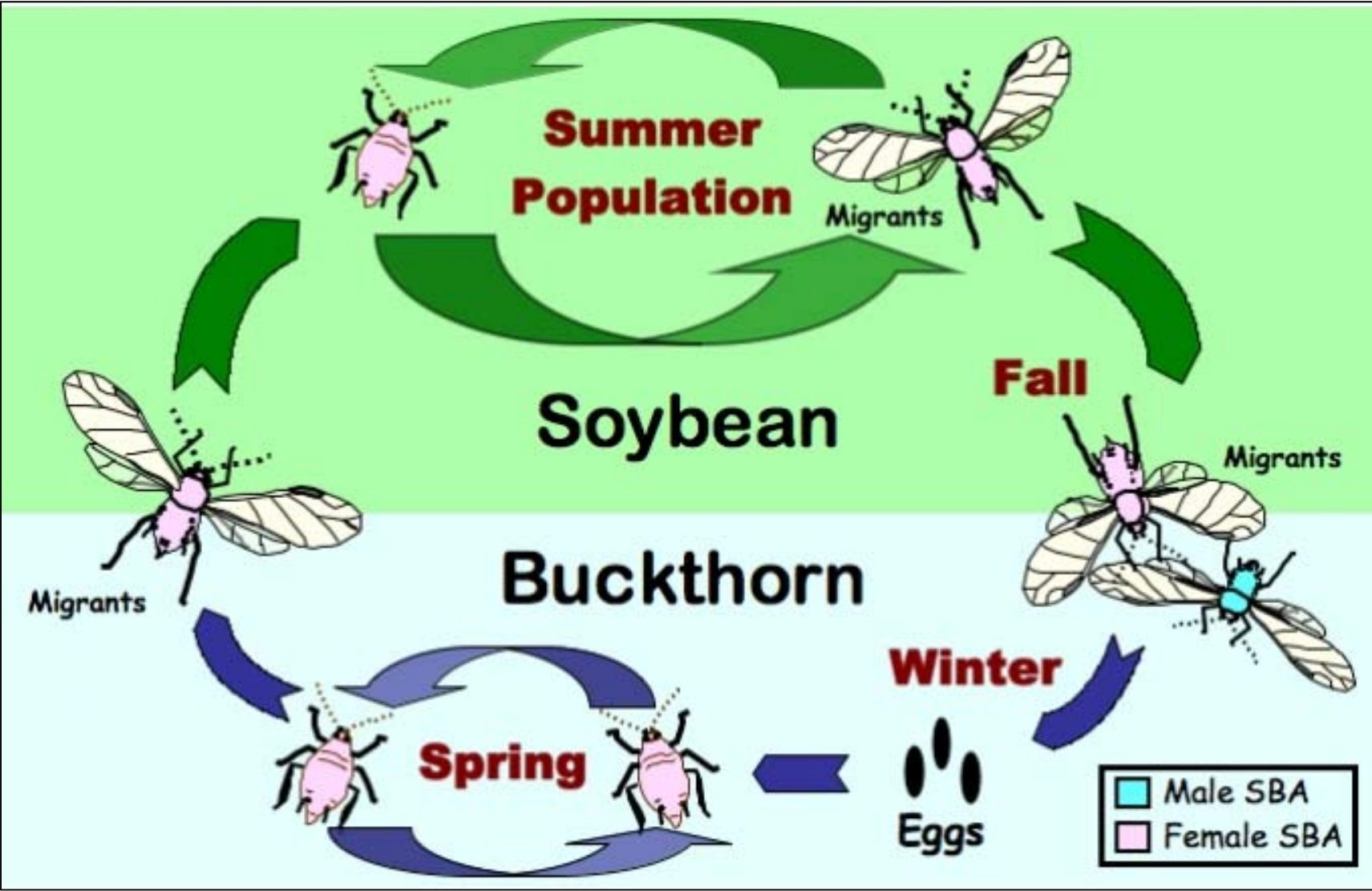
What was the response to the SBA invasion? (NC502 & NCSRP)

- Insecticide recommendations,
economic threshold (ET)
 - ET = 250 aphids/plant, V – R5
- Biological Control

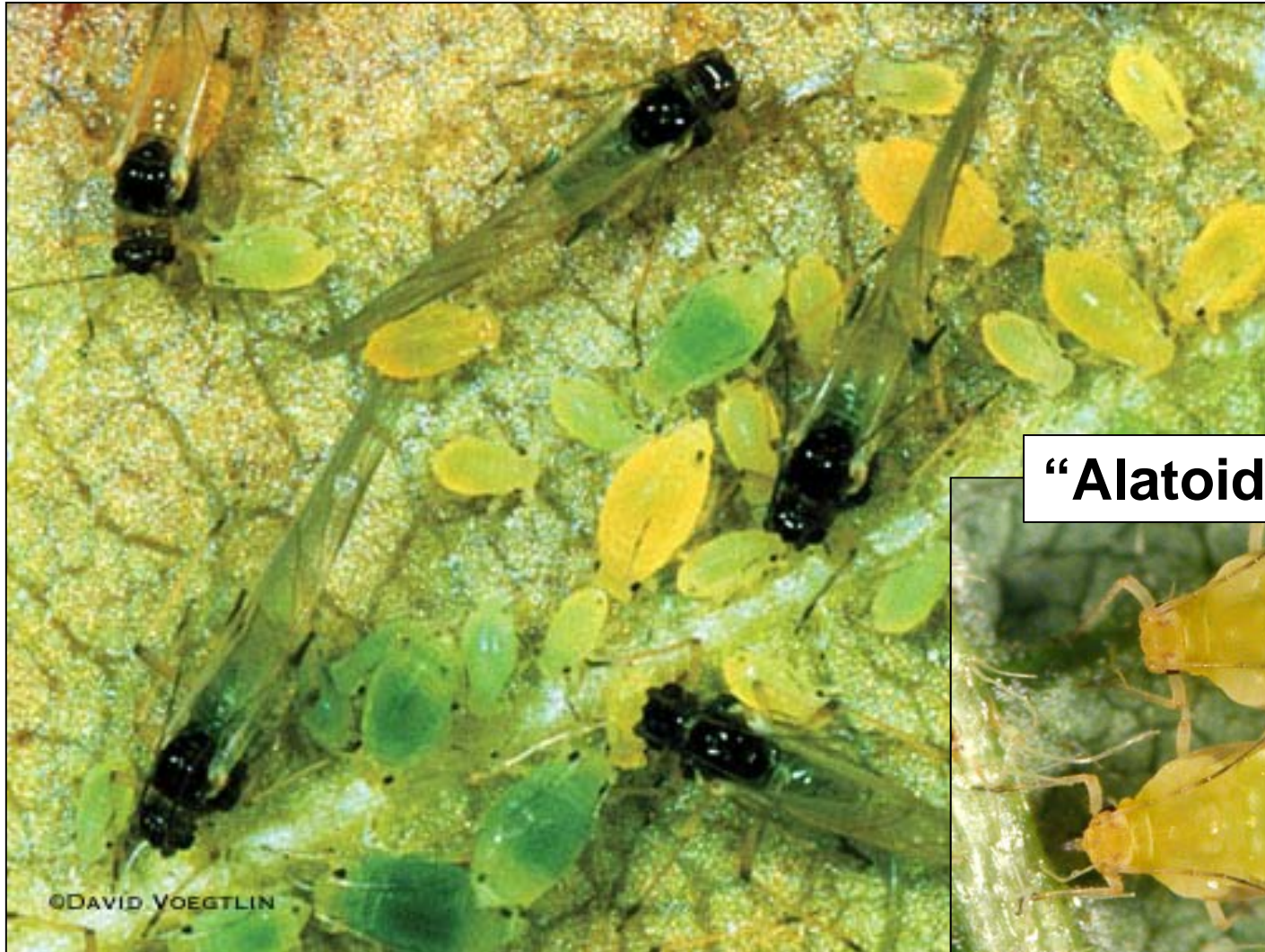


- Host Plant Resistance (*Rag* genes)

Soybean Aphid Seasonal History



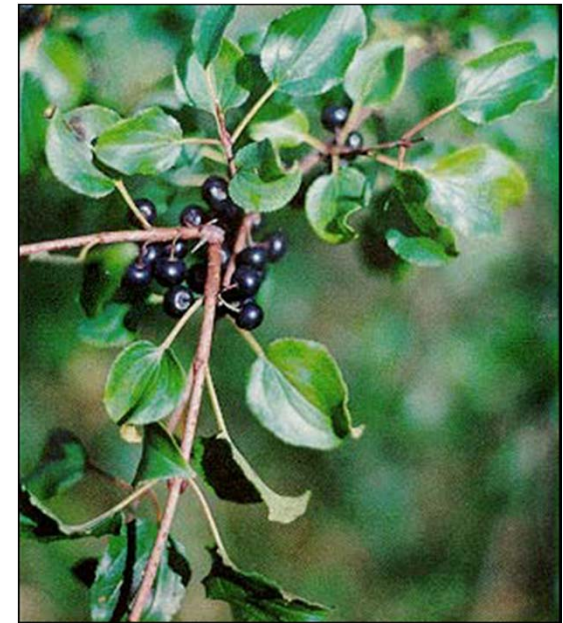
Soybean Aphid - migratory (winged alatae) & stationary (wingless apterae) forms



“Alatoid” nymphs



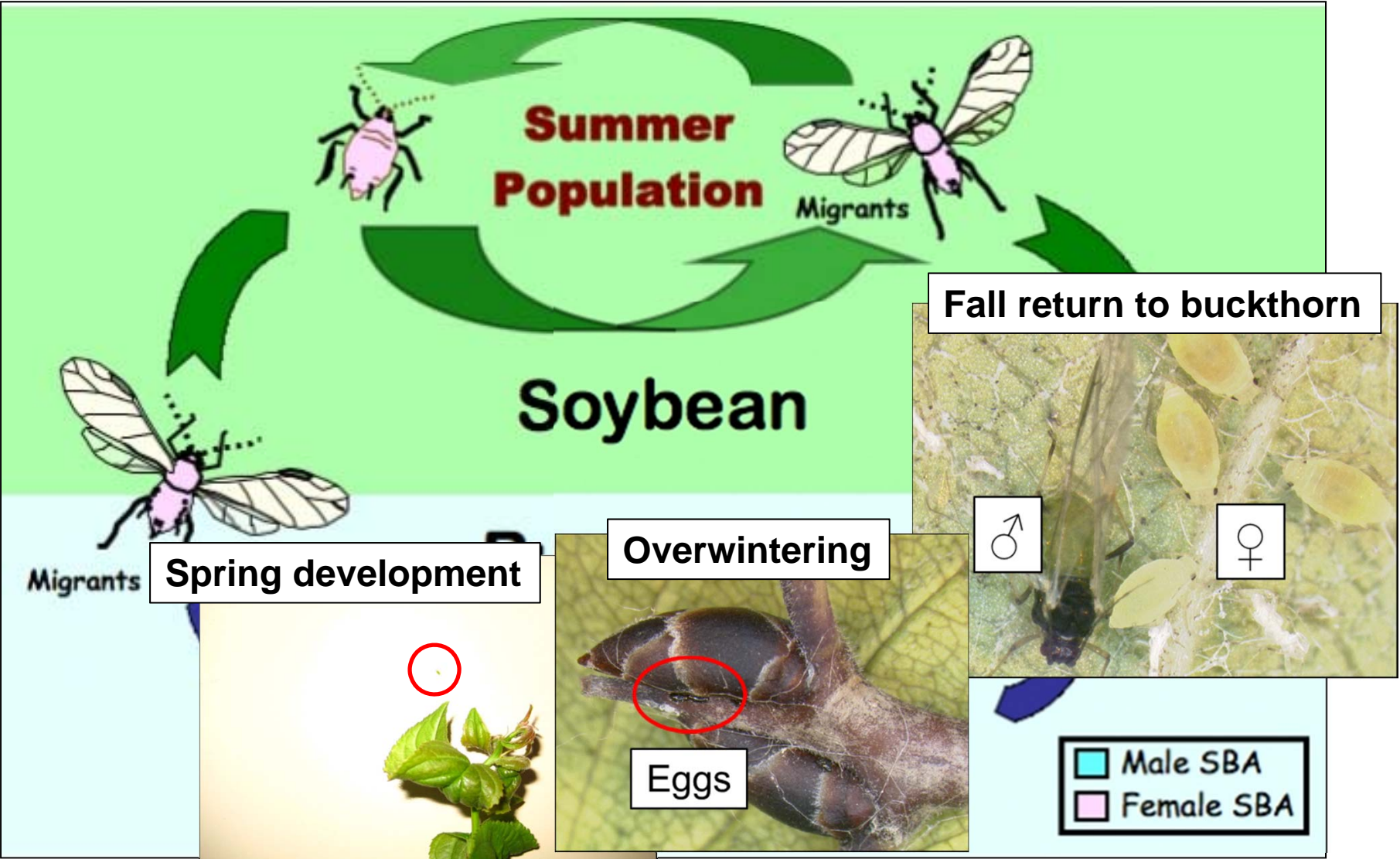
Common Buckthorn, *Rhamnus cathartica*



Buckthorn – spring bud break



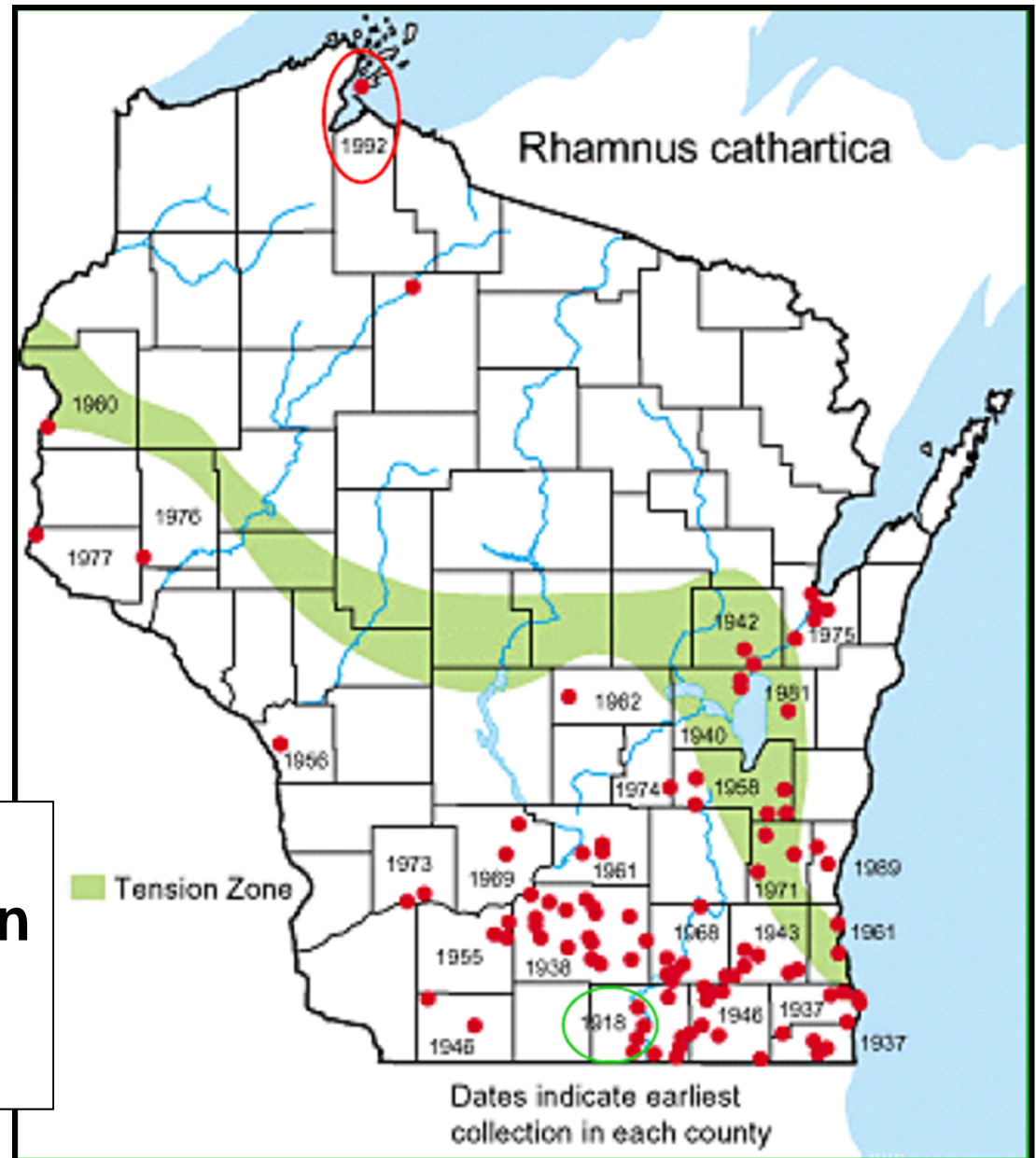
Soybean Aphid Seasonal History



Rhamnus cathartica distribution in Wisconsin

Buckthorn is locally
abundant (SC, SE)

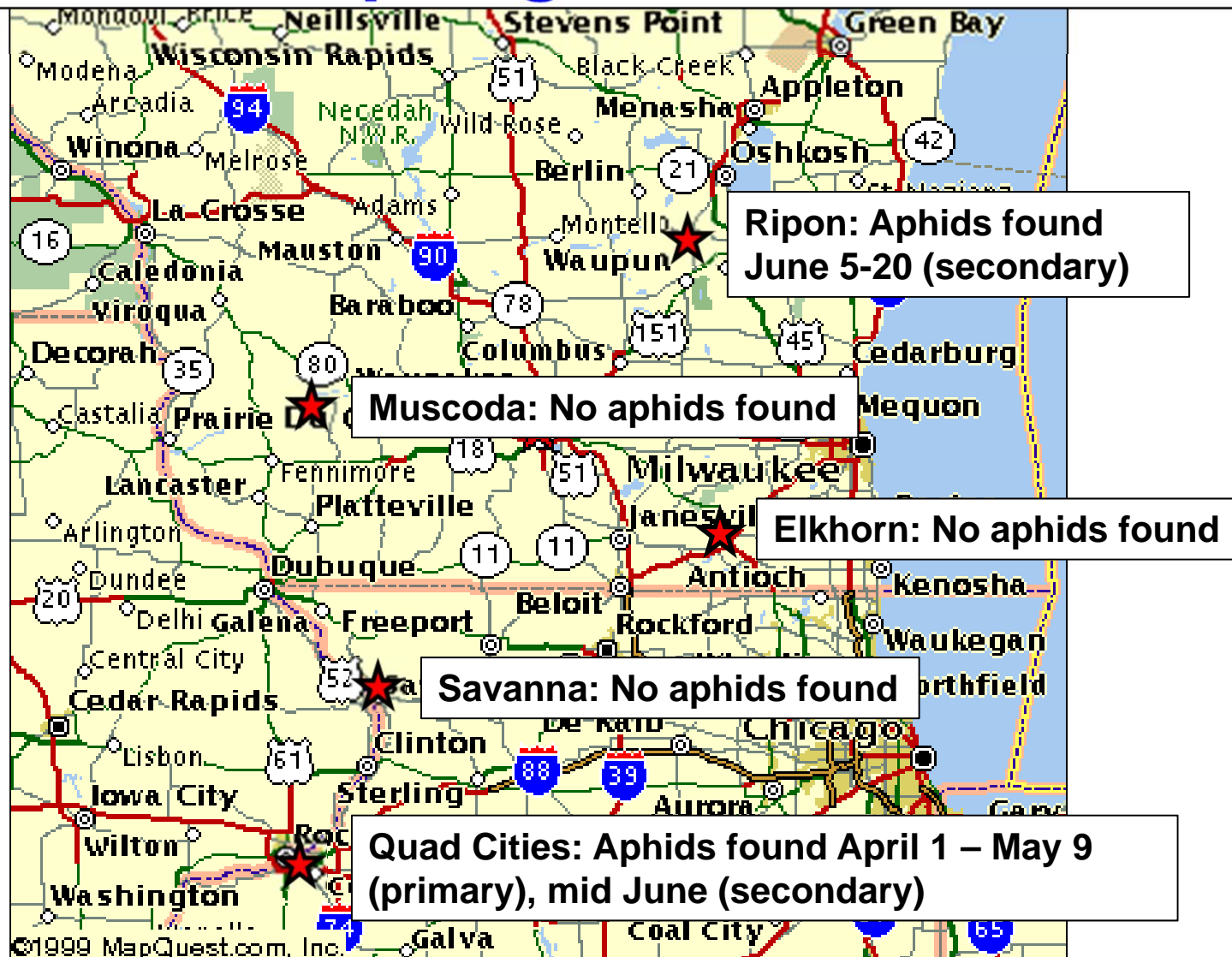
BUT – spring surveys
of buckthorn for SBA in
2001 & 2009 came up
empty!!



Soybean Aphid 2012 Spring Survey (May 9-11, with David Voegtlin)

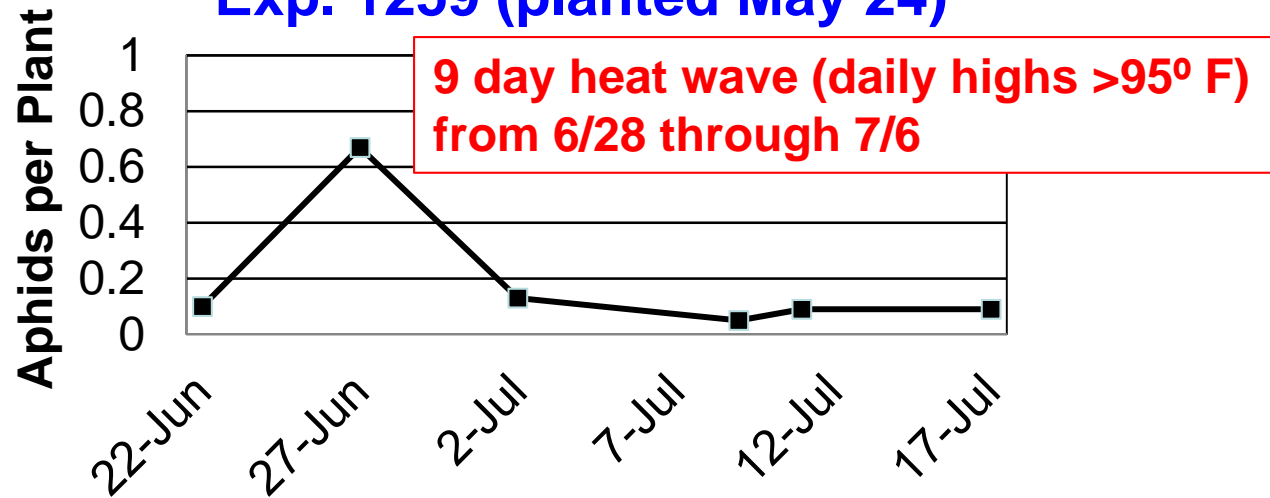


Tracking SBA on Buckthorn Spring 2012

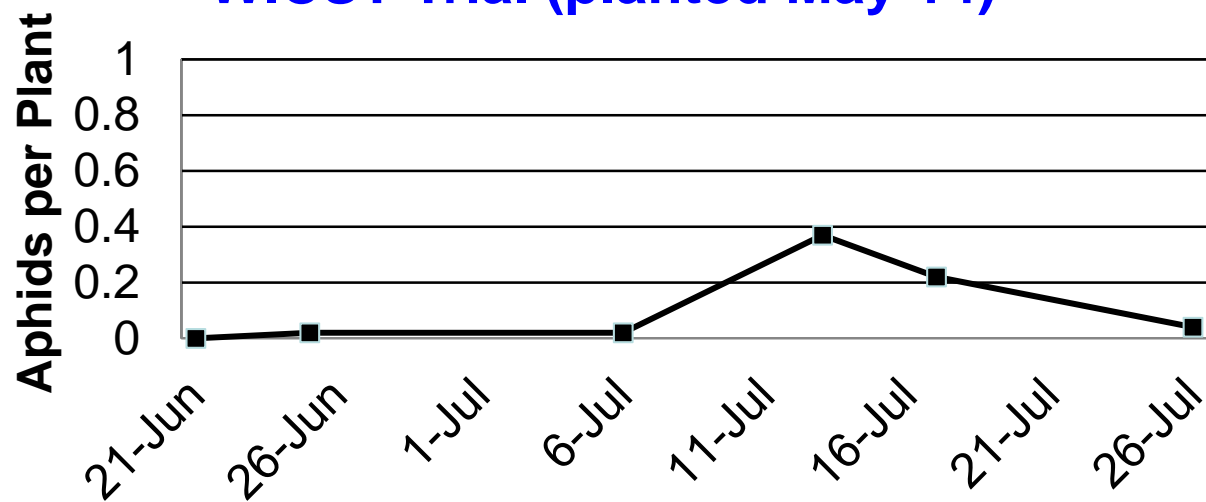


SBA Colonization & Dynamics in Soybean 2012, Arlington WI

Exp. 1259 (planted May 24)

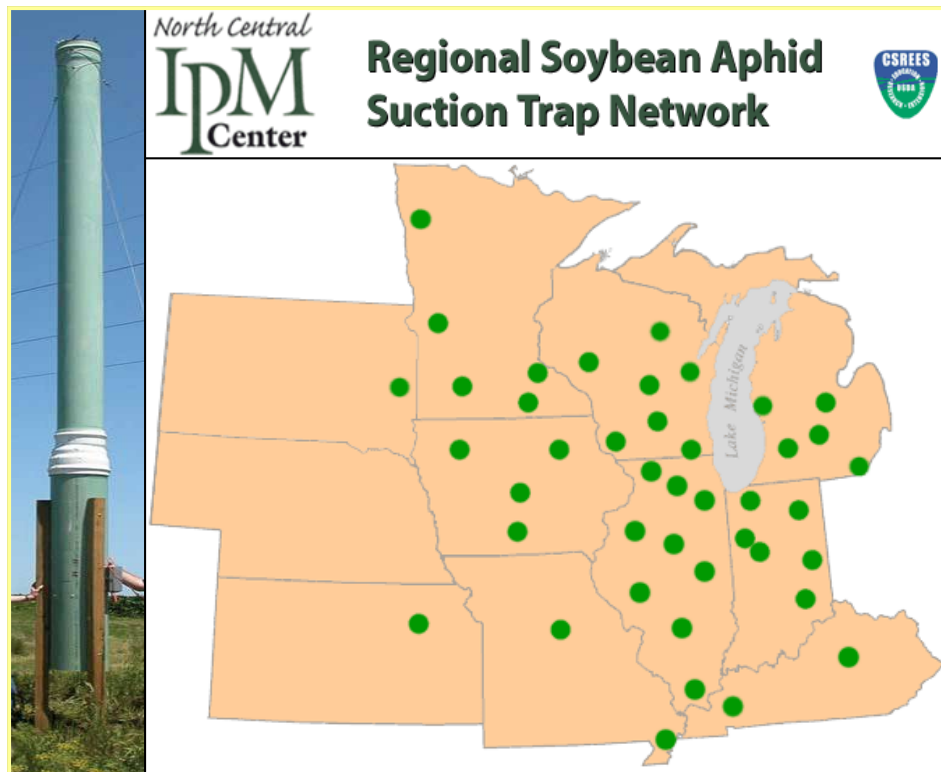


WICST Trial (planted May 14)



Seasonal Aphid Dispersal – Suction Trap Network

- Weekly captures of migrating aphid species
- Dr. David Voegtlin, Illinois Natural History Survey



<i>Acyrtosiphon pisum</i>	"Pea aphid"
<i>Aphis craccivora</i>	"Black legume aphid"
<i>Aphis glycines</i>	"Soybean aphid"
<i>Aphis gossypii</i>	"Cotton- melon aphid"
<i>Aphis helianthi</i>	"Sunflower or dogwood aphid"
<i>Aphis nasturtii</i>	"Buckthorn - potato aphid"
<i>Aphis spiraecola</i>	"Spiraea aphid"
<i>Brachycaudus helichrysi</i>	"Leaf curling plum aphid"
<i>Lipaphis pseudobrassicae</i>	"Turnip aphid"
<i>Macrosiphum euphorbiae</i>	"Potato aphid"
<i>Myzus persicae</i>	"Peach potato aphid"
<i>Rhopalosiphum insertum</i>	"Apple grass aphid"
<i>Rhopalosiphum maidis</i>	"Corn leaf aphid"
<i>Rhopalosiphum padi</i>	"Bird cherry-oat aphid"
<i>Schizaphis graminum</i>	"Greenbug"
<i>Sitobion avenae</i>	"English grain aphid"
<i>Therioaphis trifolii</i>	"Spotted Alfalfa aphid"

Detection of seasonal trends in aphid movement

Methods modified from Frost et. al. (2012)

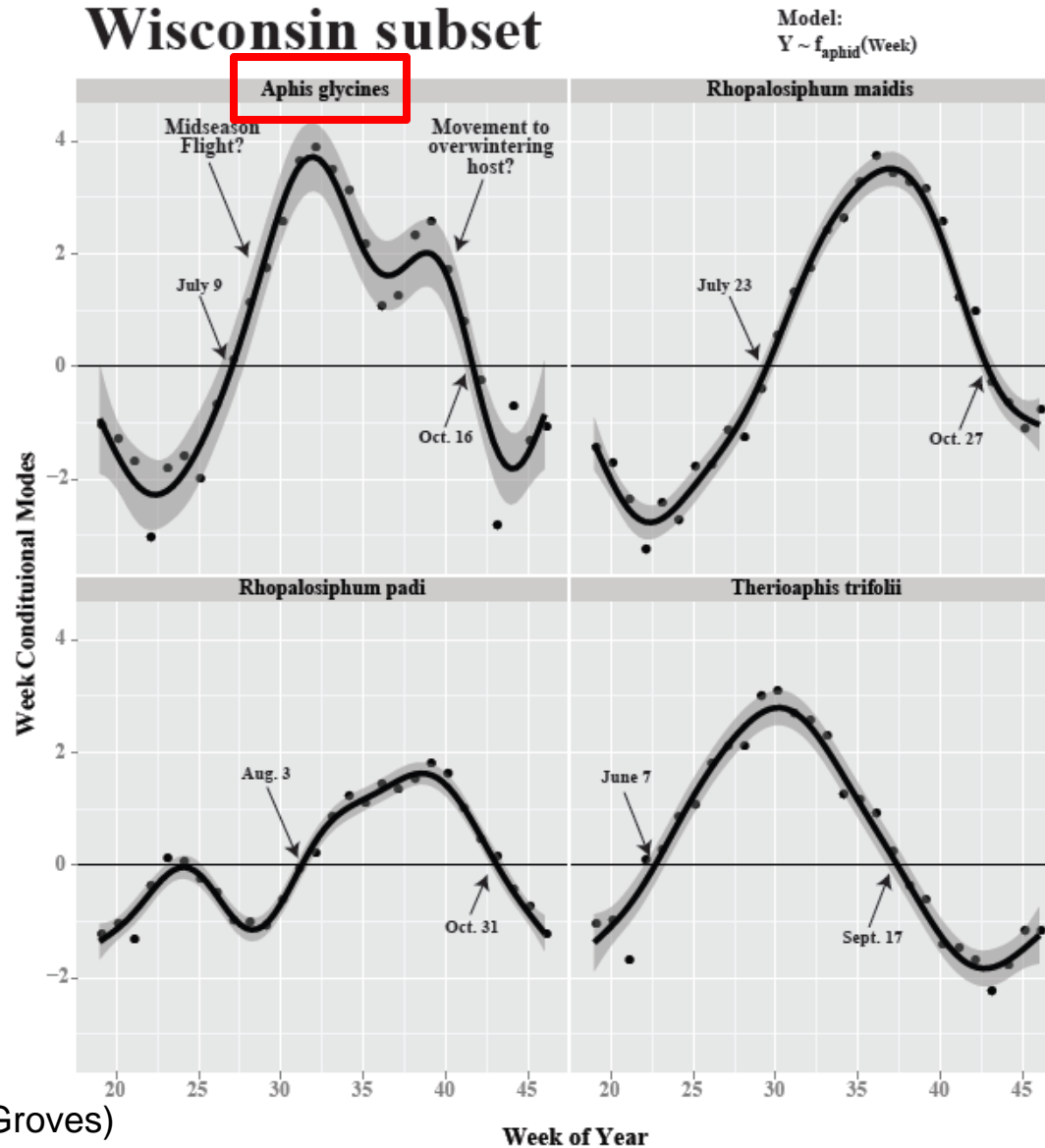
- Suction trap data were averaged for each year, location, and week combination
- Data were standardized using both a random effects models together with regression splines
- Cubic polynomials were fit to the resulting “conditional” or “deseasonalized” data (linear model) with generalized additive mixed models (GAMM's)

(slide courtesy of Russ Groves)

Modeling Aphid Phenology: Wisconsin 2005-2011



Wisconsin subset



(slide courtesy of Russ Groves)

Implications...

- Soybean aphid leads a “double life”, what happens on buckthorn is largely unknown but may be important
 - genetic recombination
 - sets the stage for the next growing season

- Some unresolved questions:
 - Why does soybean aphid apparently ignore Wisconsin buckthorn?
 - What is the spring migration pattern of soybean aphid from buckthorn to soybean?

Acknowledgements

❑ North Central Soybean Research Program



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