Field-Scale Movement of *Lygus* Bugs in Arizona Cotton

Ayman M. Mostafa, Peter C. Ellsworth

University of Arizona Cooperative Extension, AZ, USA

James Hagler, Steven E. Naranjo, Scott Machtley

USDA-ARS, Arid-Land Agricultural Research Center, AZ, USA

ARIZONA COLLEGE OF AGRICULTURE AND LIFE SCIENCES COOPERATIVE EXTENSION

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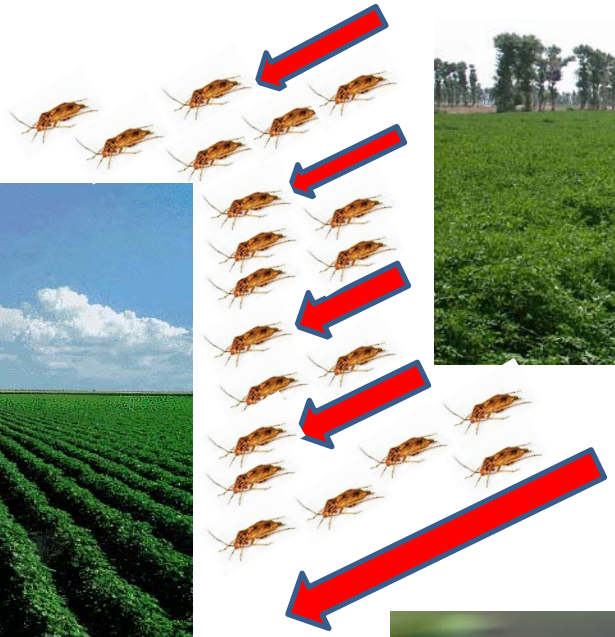
Lygus bug Movement

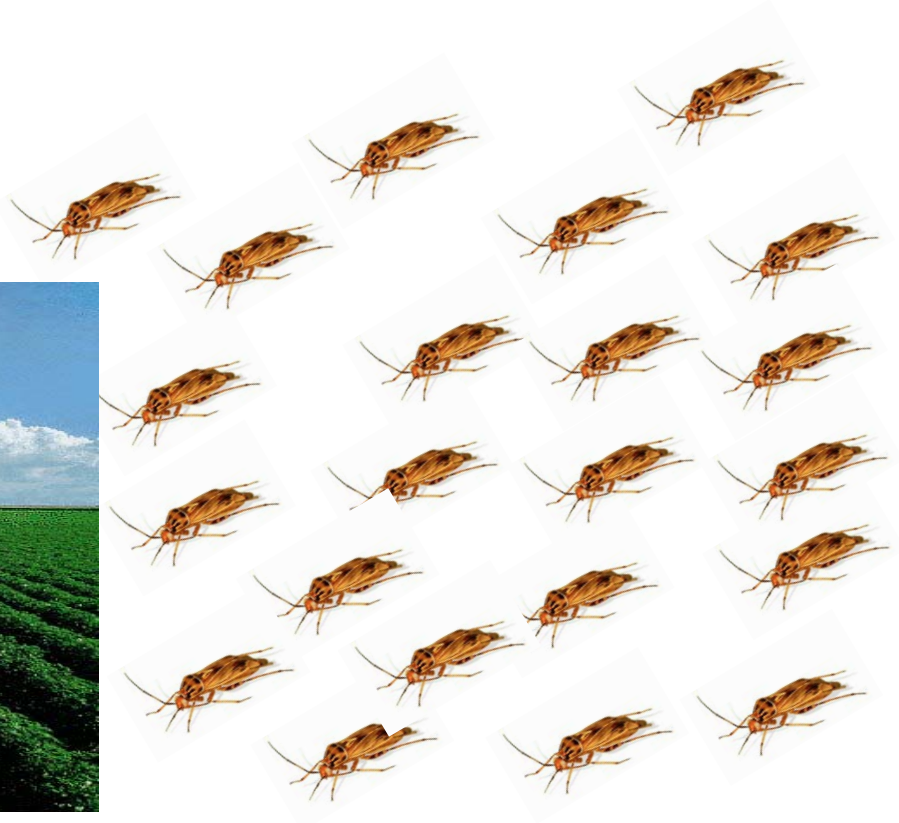
Sink



Source

Crop loss

Damage



How do *Lygus* bugs colonize and develop once arriving in individual cotton field?

Marking technique for insect dispersal

Insects can be marked in the field using protein-rich food products

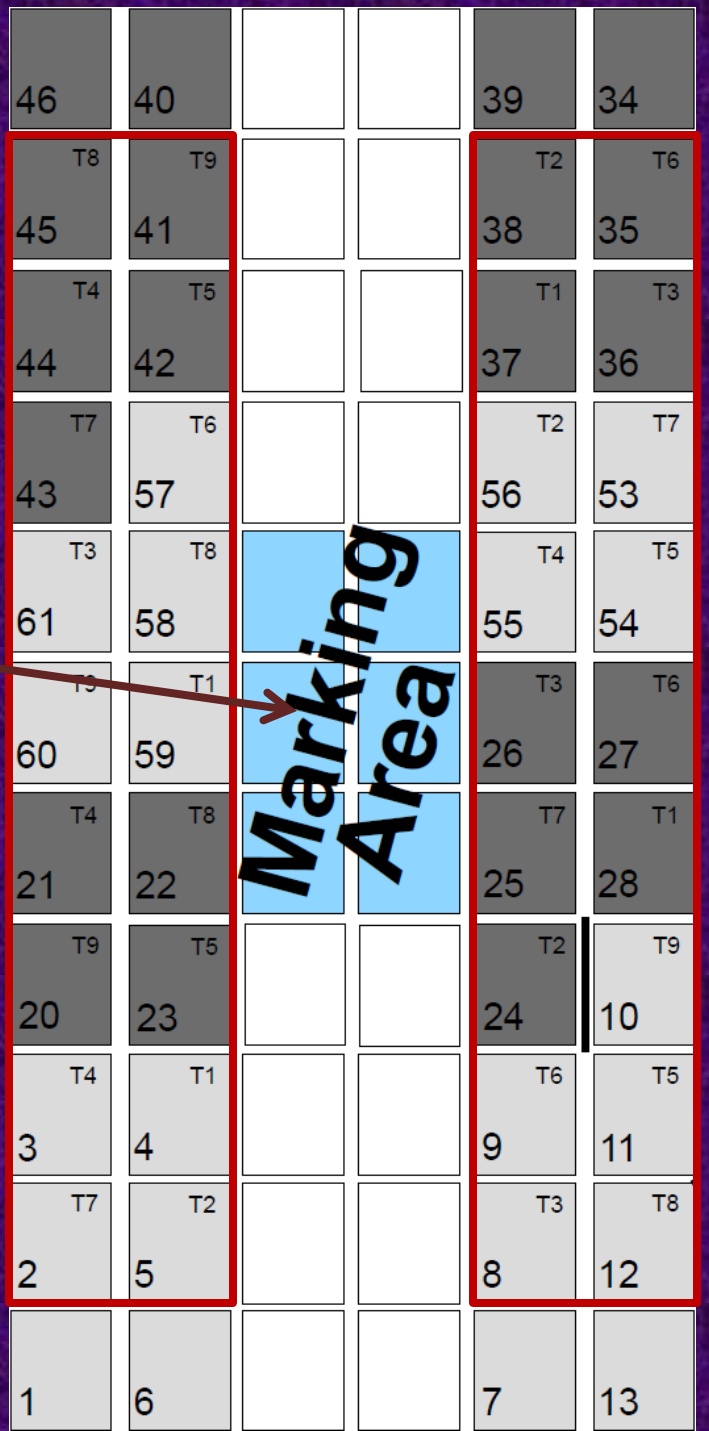
- Egg white (the mark is egg albumin protein)
- Milk (the mark is milk casein protein)

Marking technique for insect dispersal

Protein can be applied using conventional spraying equipment

Experimental Design

- 66 plots, 40x40 ft, 7 ft alley
- 6 marked plots in the middle



Materials and Methods

Dates of marker applications and sampling after each spray

Protein	Spray Date	Sampling Date	Days after spray
	7/26/12	7/27/12	1
		8/1/12	6
Milk 	8/2/12	8/3/12	1
		8/7/12	5
		8/13/12	11
	8/14/12	8/20/12	6
Milk	8/26/12	8/31/12	5
		9/6/12	11

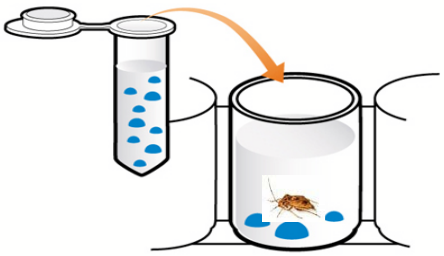
Materials and Methods

- 10 leaf discs from each marked plot
- 25 Sweeps from each plot
- Different nets for marked plots
- Sample bags rapidly put on dry ice to minimize movement and contamination

Materials and Methods

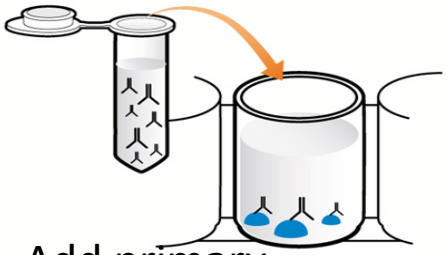
- Samples sorted out the same day
- Each individual insect put in tube
- A lot of toothpicks!

Summary of ELISA



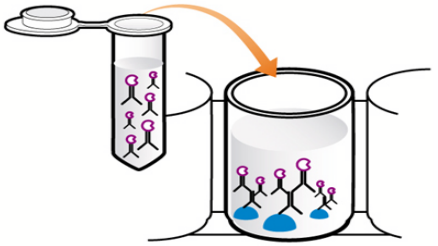
1. Add insect sample

2. Wash with PBST



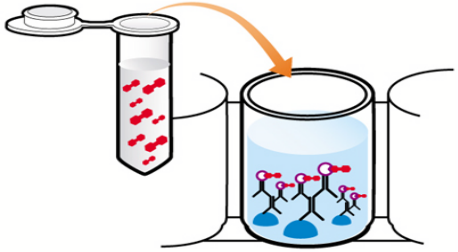
3. Add primary antibody **(e.g., egg albumin antibody)**

4. Wash with PBST



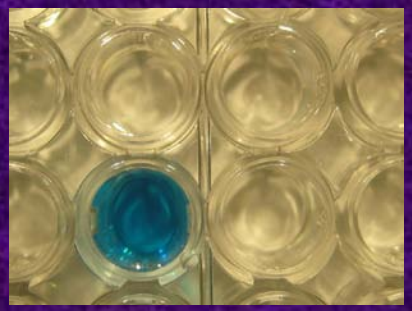
5. Add secondary antibody with enzyme attached

6. Wash with PBST



7. Add substrate for enzyme

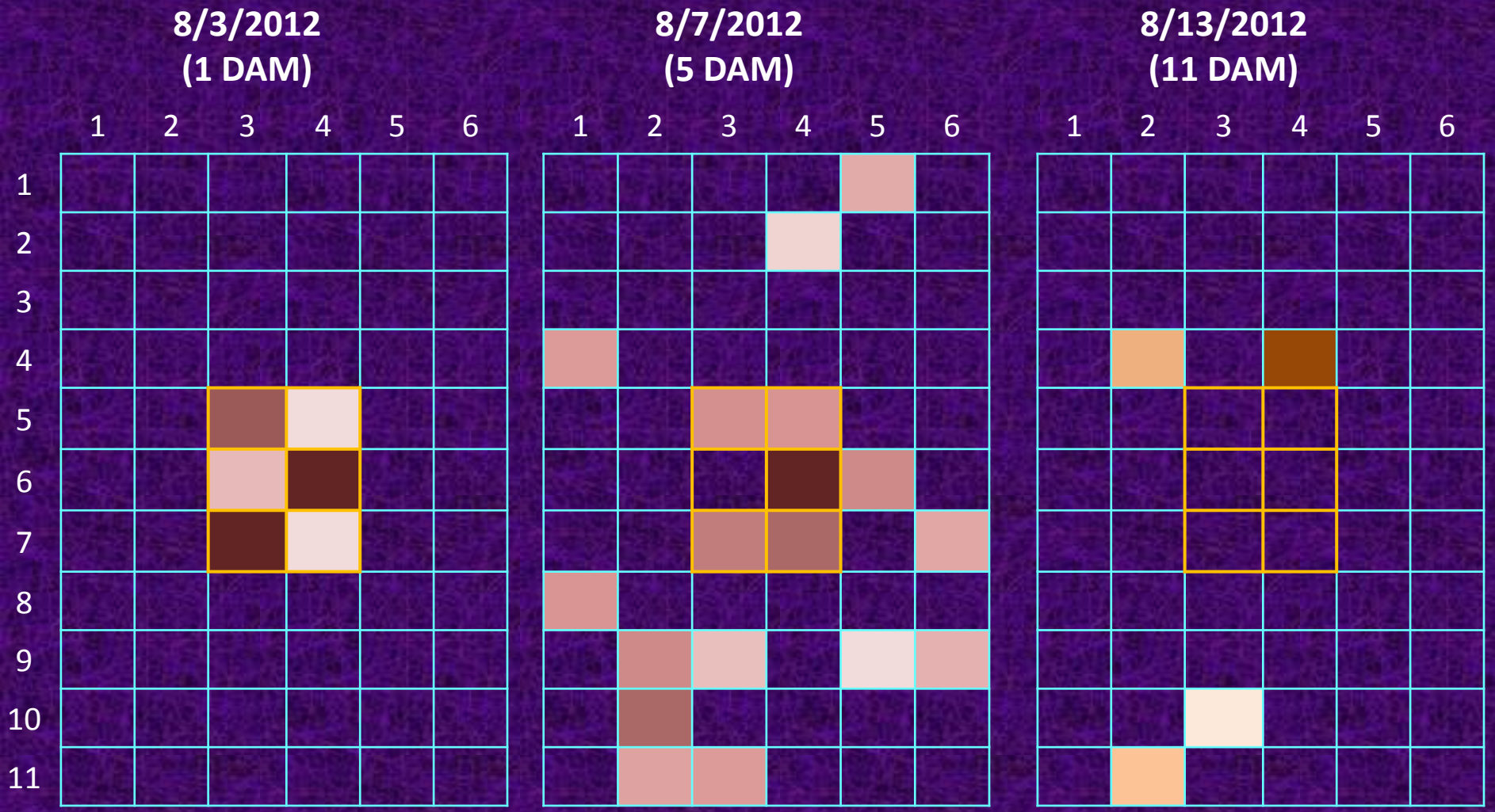
8. Observe color development



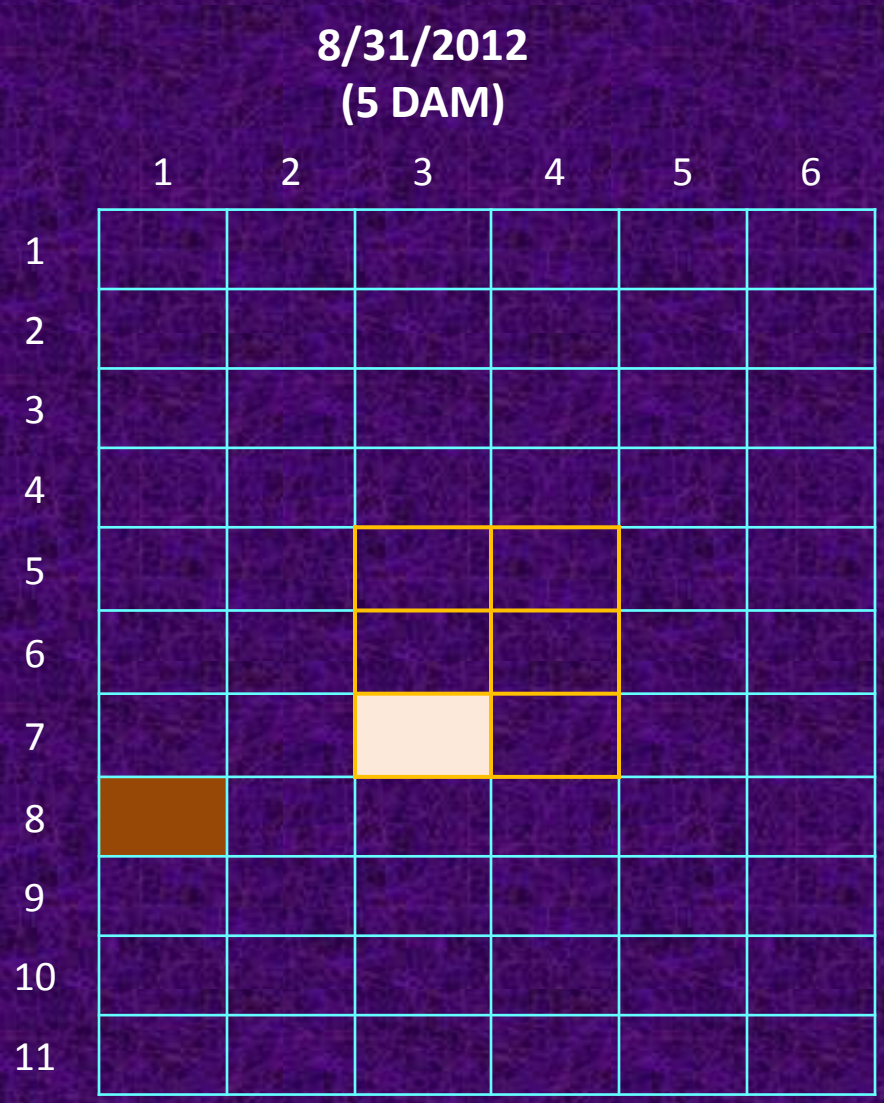
Means of assayed and positively marked and % of positively marked for three milk protein sprays.

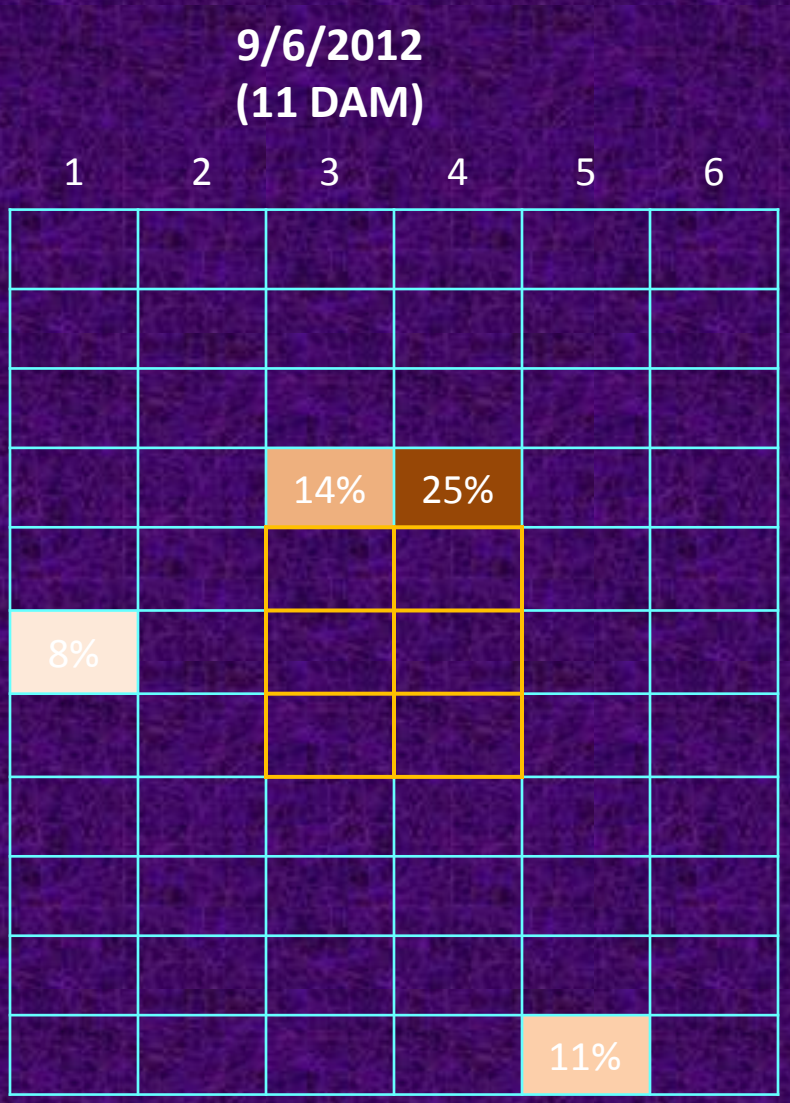
		First Spray (7/26/12)	Second spray (8/2/12)	Third Spray (8/26/12)	Total No. & % Average
Cotton leaves	Assayed	60	180	111	351
	Positive	30	105	90	225
	% Positive	50	58	81	64.1%
Adult Lygus	Assayed	133	1013	388	1534
	Positive	17	44	6	67
	% Positive	13	4	2	4.4%
Large nymphs	Assayed	45	377	113	535
	Positive	4	23	0	27
	% Positive	9	6	0	5.0%
Small nymphs	Assayed	34	211	66	311
	Positive	5	7	0	12
	% Positive	15	3	0	3.9%

Percentage of marked *Lygus* in plots after 2nd marker spray

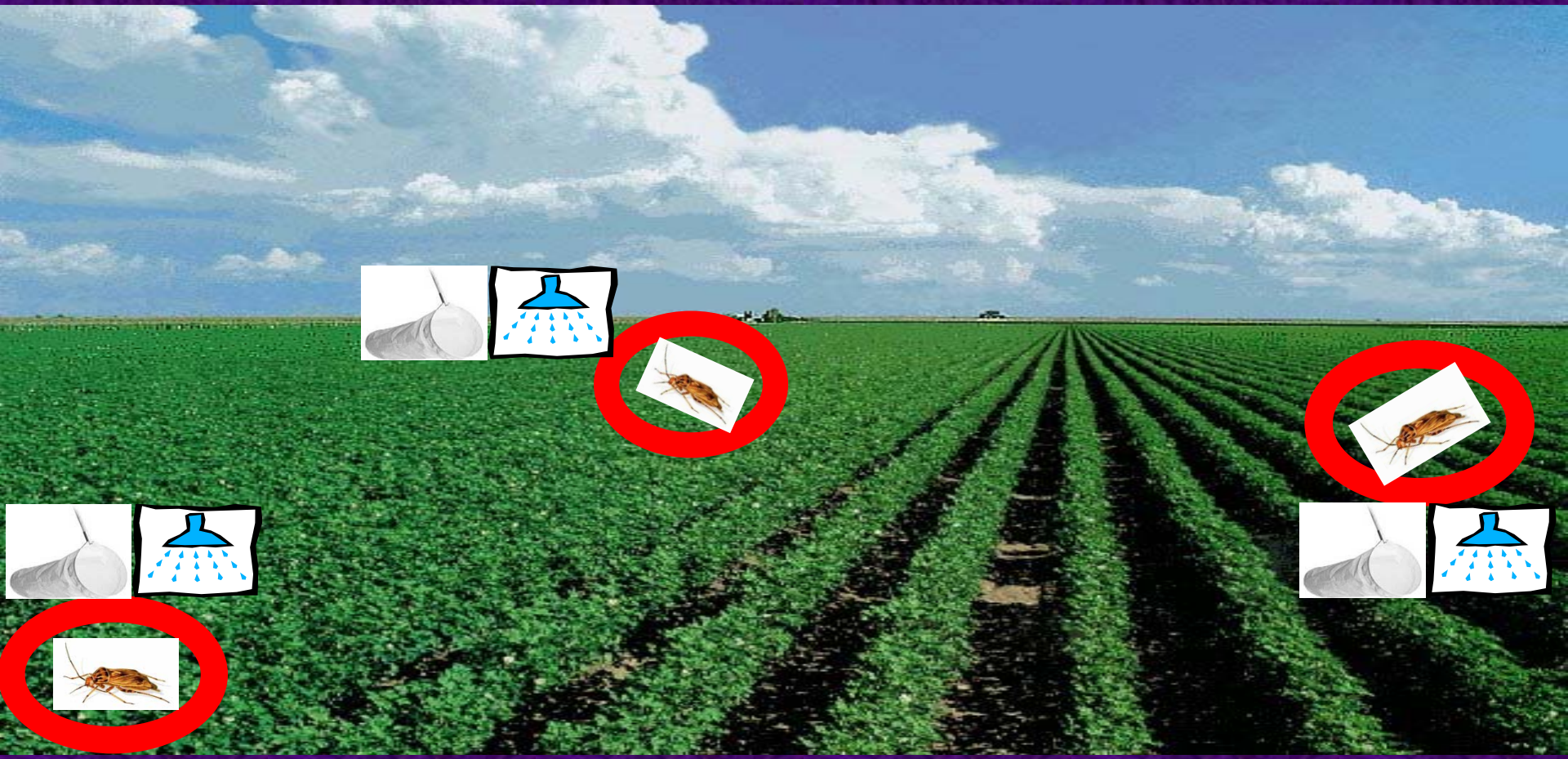


Percentage of marked *Lygus* in plots after 3rd marker spray





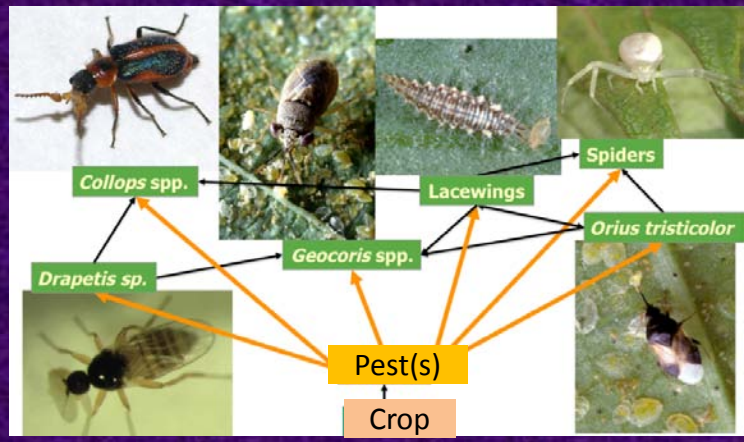
Ultimate outcome

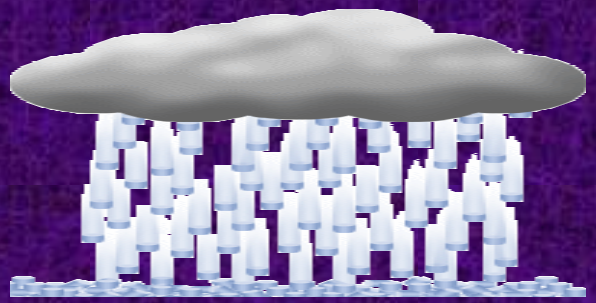


- Help determining “hot spot” areas in the field
- More precise sampling plans
- On-the-spot sprays
- **Saving time, money, and the environment**

Future Work

- Experiment design refining
- Marking application
- Sampling and handling
- Movement of natural enemies
- Field mapping
- Avoid rain!!





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