Managing Cotton Insects in the Regional Landscape: Lessons Learned and Future Challenges

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Overview

✓ Problem of managing fields vs. farms
✓ Lygus and the landscape
✓ Management options
✓ Future prospects
Research and Extension Approaches

- Landscape level research is complex
- Requires close cooperation with stakeholders
- Traditional replicated experiments limited in their value
- Large scale observational
- Extension outreach is linked to participatory “research”
- Primary outcome has been getting people to understand that single field management limits IPM choices
- Desired impact is to move toward more biological reliance in IPM continuum
“The grower, faced with rising production costs at all levels must decide if he will rely completely on insecticides to fight Lygus and accept the financial burden or if he will look for another method of control....”

“In attacking the Lygus problem, chemicals are used when absolutely necessary; but first a major change must be made in farm practices to keep Lygus out of cotton”

Dr. Vern Stern, 1967
In row and field crops, most arthropod populations must re-build each year.

Populations must move into a field and it is the surrounding environment that determines the degree of pest severity.

All crops and weeds act as a source or a sink.

The landscape mosaic has both a spatial and temporal component.

Some plants are more “preferred” than others.

The landscape can be manipulated.
Landscape is a Mosaic of Crops, Weeds and Native Plants

That Changes Through the Year
A Year in the San Joaquin Valley as Viewed from Landsat
Spring
Foothills
Weedy fields
Orchards
Potential Spring Buildup

Summer
Safflower
Alfalfa
Seed
Cotton
Beans
Tomato
Sugar Beets
Crops Removed from Landscape, Concentrating Lygus

Annual Summer Buildup

Autumn
Annual Lygus Population Projection

- Ground survey
- Host abundance
- Issue a “forecast”
- Important service and outreach activity for 25 years
- Early season buildup on native vegetation is weather dependent and infrequent
- Annual infestation related to local landscape
How Can We Manage the Landscape in an Area-wide Manner?
Unknown Status
Poor Host
Fair Host
Good Host
Excellent Host
Mowing Orchard Vegetation

- Useful in managing or reducing lygus in almonds or pistachios
- Mow frequently especially where orchards border susceptible crops
- Every other orchard row may be sufficient
- Chemical “mowing” is an option
- Mowing reduces suitability of habitat and increases mortality to immature lygus
Managing Sources of Lygus

- Safflower provides habitat in May-June
- Lygus population build
- Treat safflower before lygus develop wings
- Utilized temperature based phenology predictions
- \(660_{\text{dd}>52}\) after April 1, spray the safflower
- Approach continues to be used
Alfalfa is a Key Crop

✓ Preferred host
✓ One of the few crops grown for vegetative rather reproductive part
✓ Crop is continually in pre-reproductive state, always developing vegetatively
✓ A field can absorb lygus from surrounding area, acting as sponge
✓ Lygus have no incentive to leave
Strip Cutting Alfalfa Fields

- Within a field, split harvest schedule
- $\frac{1}{2}$ of field is cut every 14 days
- Concept acceptable, execution cumbersome
- Interferes with custom harvest, irrigation management
- Not widely accepted
Leaving strips of uncut alfalfa for lygus habitat is widely used in SJV. Uncut strips are incorporated into the next cutting and another strip is left. This practice is done from June until August, 3 cuttings.
Strip Cutting in Alfalfa Forage
Interplanting Alfalfa and Cotton
Buffer Strips Help to Manage Lygus

- Cowpea/Lima Bean
- More attractive than cotton
- 30 foot strip on upwind side
- Snow fence
- Slows migration
  - provides lead time
- Concentrates population
  - creates killing zone
  - reduces area to be treated
Interplanting Alfalfa and Cotton

- First suggested in 1960's
- Strip cut to maintain attractiveness
- Alfalfa provides preferred habitat and year round refugia for natural enemies
- Not widely accepted due to crop production incompatibilities
- Reintroduced for bio-intensive IPM, e.g. BASIC program
Landscape and Areawide Management

✓ Understanding the spatial arrangements can lead to better management
✓ Lygus move from a source into a sink.
✓ Some areas have fewer sinks so cotton is where Lygus are destined
✓ Providing better habitat then cotton can provide some mitigation
✓ No formal areawide program for Lygus but individuals have developed components of area wide plans, but here is a “composite” example of practices conducted
Hypothetical Farm Before Incorporating Landscape Approaches for IPM

- Lygus Mov’t
- Cut Alfalfa
- Uncut Alfalfa

Legend:
- Safflower
- Cotton
- Alfalfa
Hypothetical Farm After Incorporating Landscape Approaches for IPM

- ✔ Rearranged cropping pattern
- ✔ Embed alfalfa fields around cotton
- ✔ Utilized strip cropping
- ✔ Introduced more alfalfa hay
- ✔ Intercrop alfalfa in cotton
Factors to Areawide Management

✓ Cooperation - Neighbor to neighbor
✓ Knowledge - The solution doesn’t come in jug
✓ Motivation - Work and risk
✓ Commitment - All year long
✓ Location - can the landscape be manipulated?
✓ Situation - How often does the problem occur?
Working with the Landscape

✓ Isn’t easy or cheap or without risk
✓ Can provide great reward by bringing a community closer together in understanding their local ecosystem
✓ Requires long term thinking over a wider area, both geographical and psychological
Working with the Landscape
It’s Not Easy, But Has its Rewards
Thank You for Your Attention