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

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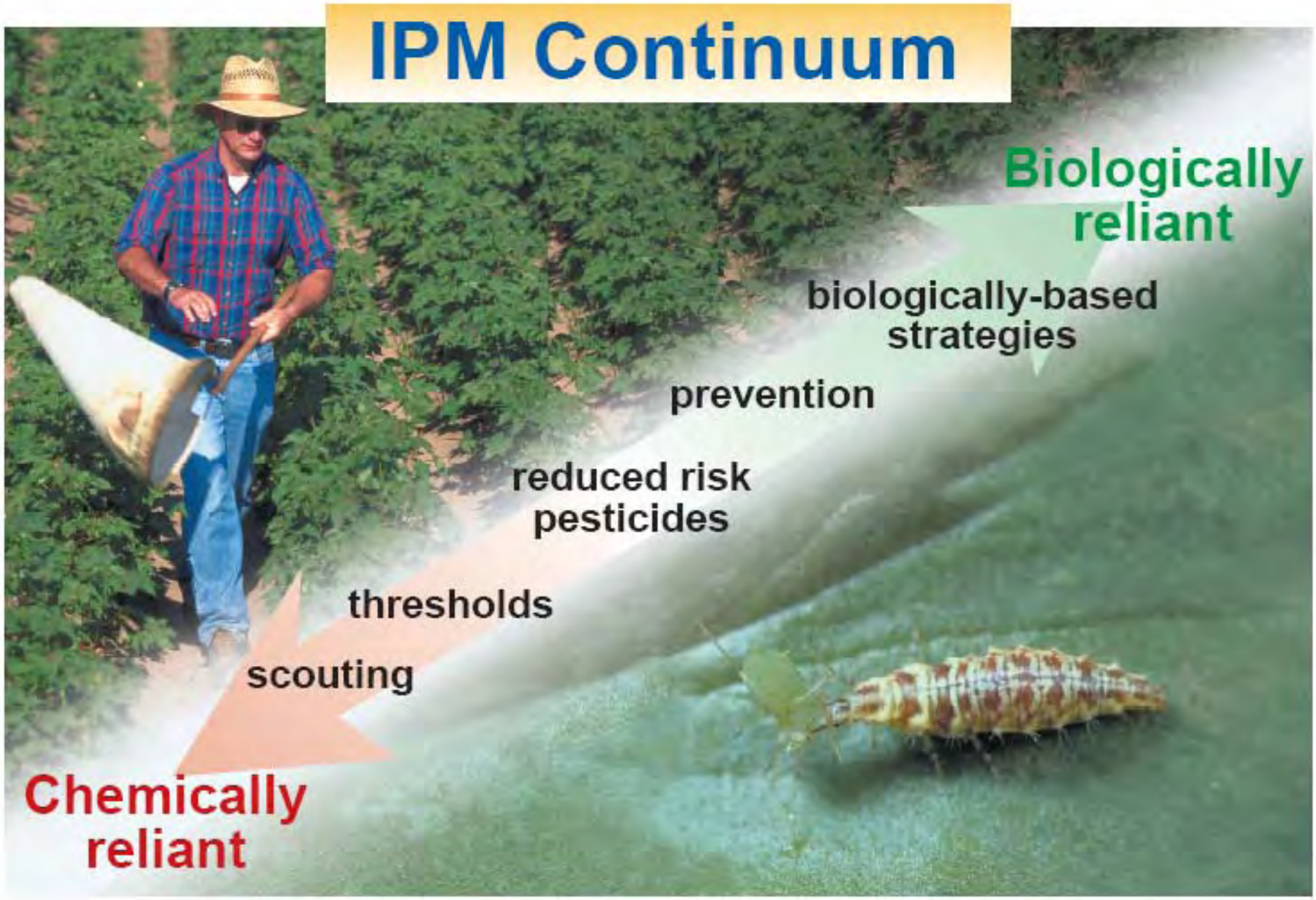
Overview

- ✓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


IPM Continuum
Biologically reliant
biologically-based strategies
prevention
reduced risk pesticides
thresholds
scouting
Chemically reliant

Voices from our past

"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"

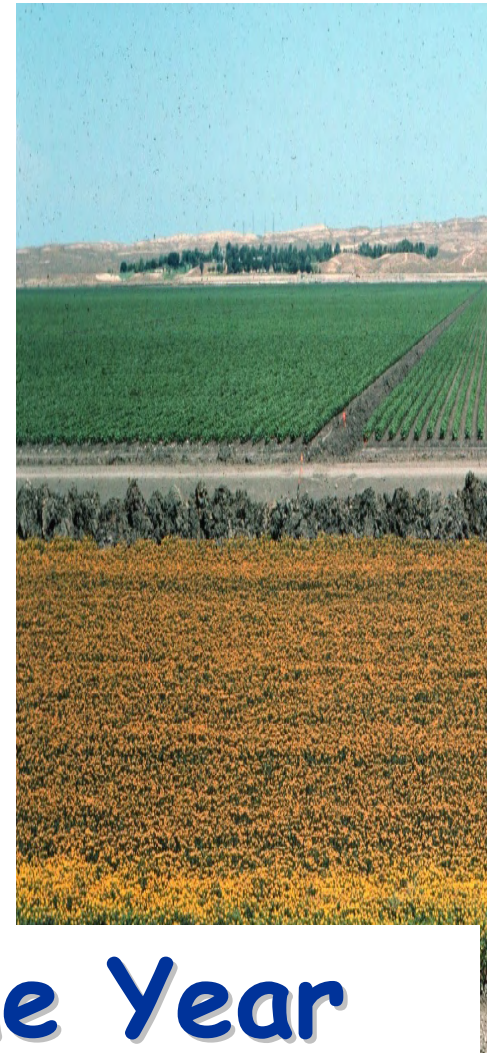
Dr. Vern Stern, 1967

Vern Stern: Landscape Ecologist

- ✓ 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

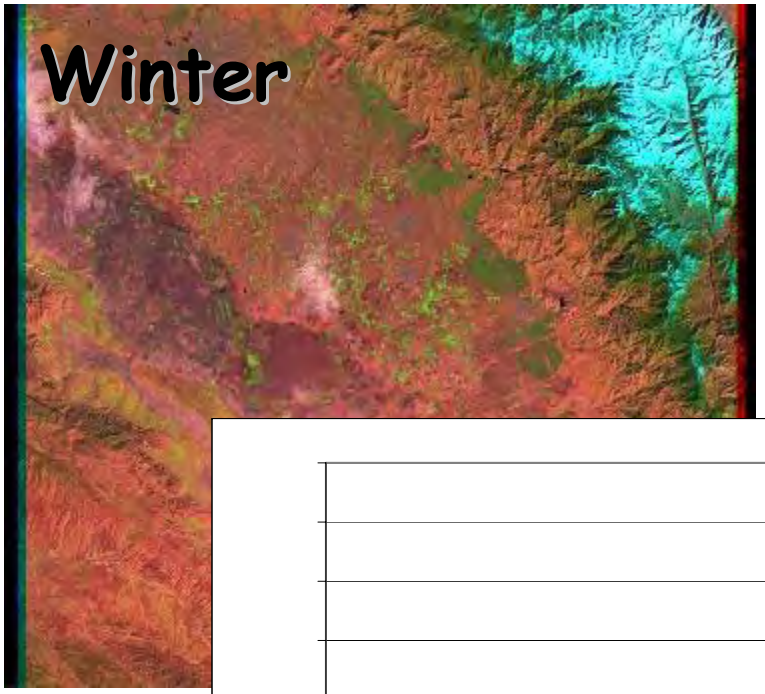
Landscape is a Mosaic of Crops, Weeds and Native Plants

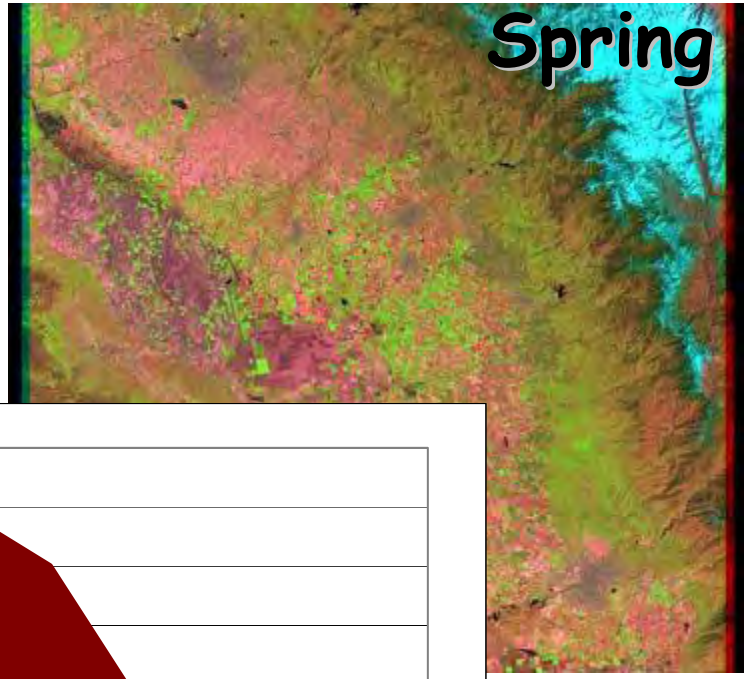


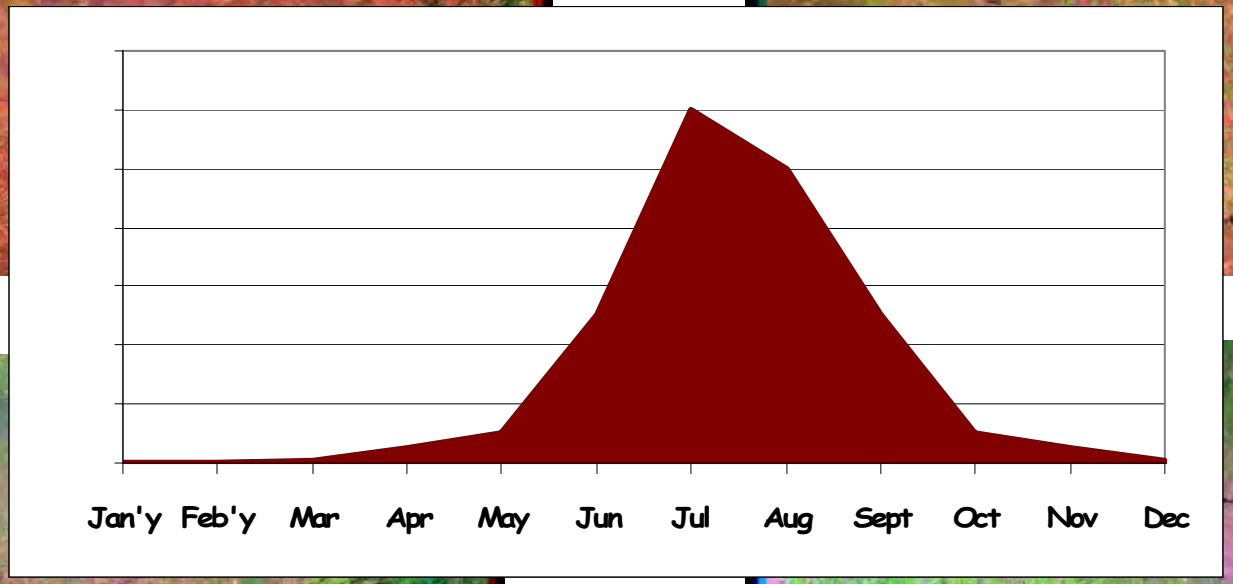



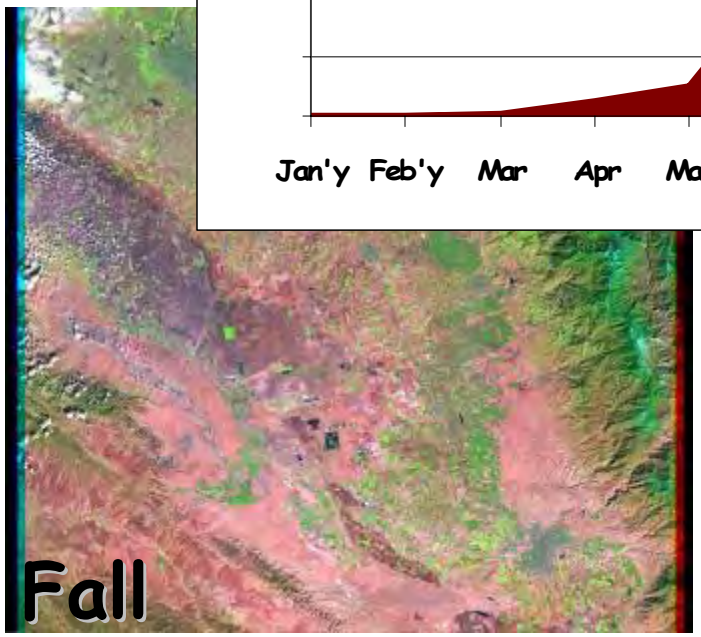
That Changes Through the Year

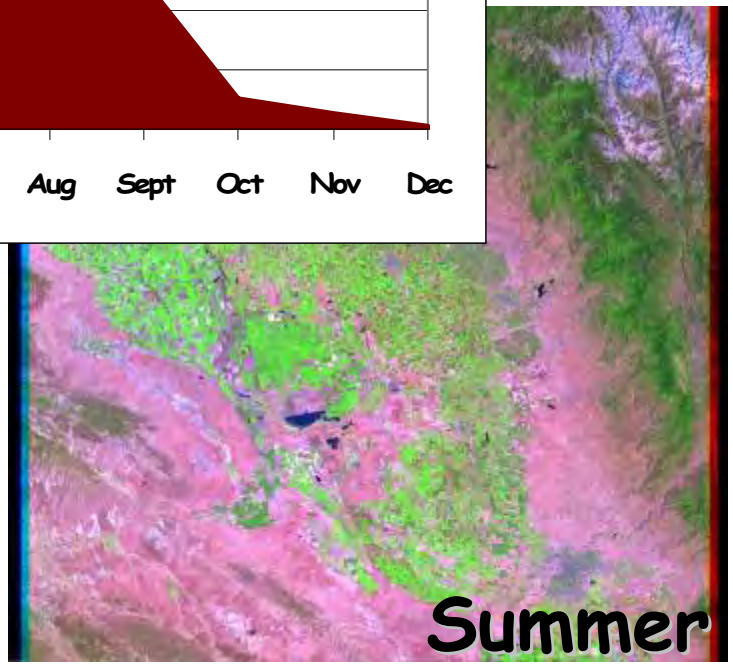
A Year in the San Joaquin Valley as Viewed from Landsat

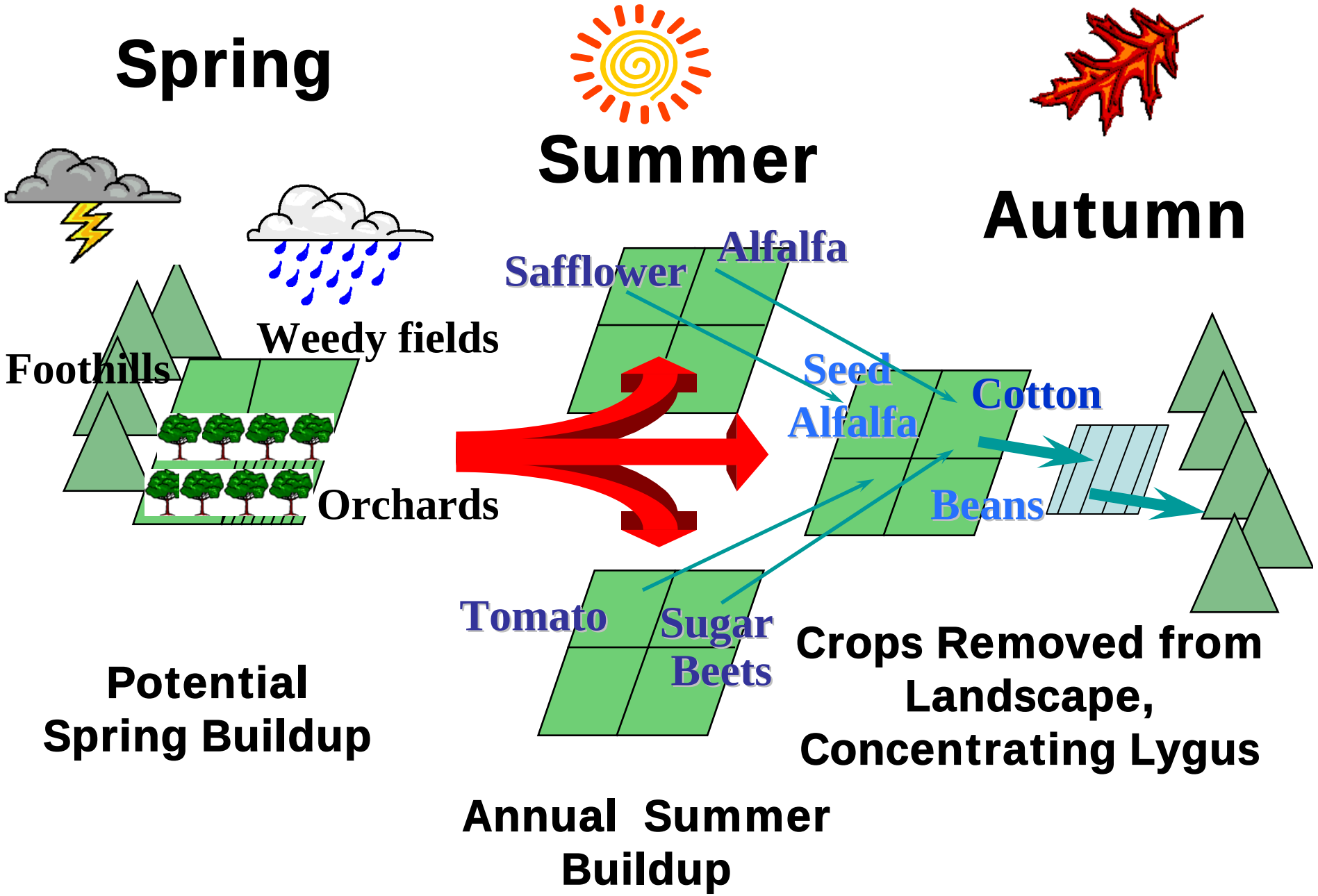

Winter


Spring


Jan'y
Feb'y
Mar
Apr
May
Jun
Jul
Aug
Sept
Oct
Nov
Dec


Fall


Summer

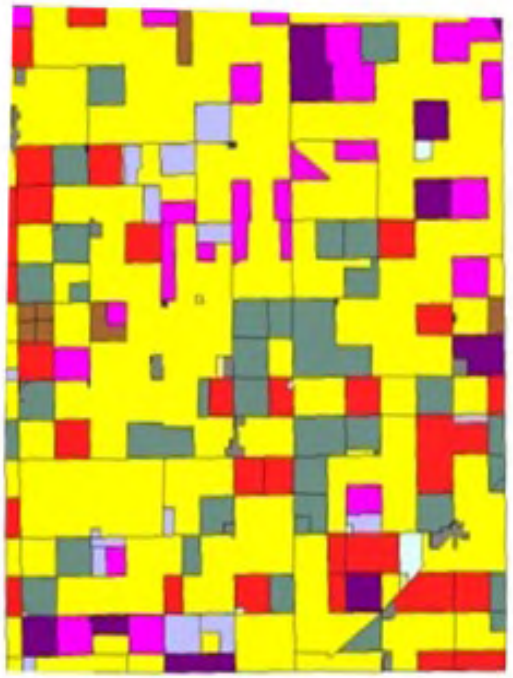

Spring
Summer
Autumn
Weedy fields
Foothills
Orchards
Safflower
Alfalfa
Seed Alfalfa
Cotton
Beans
Tomato
Sugar Beets
Potential Spring Buildup
Annual Summer Buildup
Crops Removed from Landscape, Concentrating Lygus

Annual Lygus Population Projection

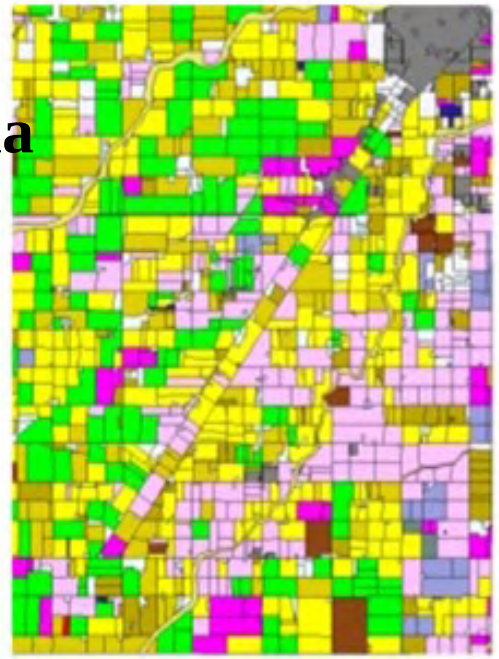
- ✓ Ground survey
- ✓ Host abundance
- ✓ Issue a "forecast"
- ✓ Important service and outreach activity for 25 years
- ✓ Early season buildup on native vegetation is weather dependent and infrequent
- ✓ Annual infestation related to local landscape

How Can We Manage the Landscape in an Area-wide Manner?

Five Points

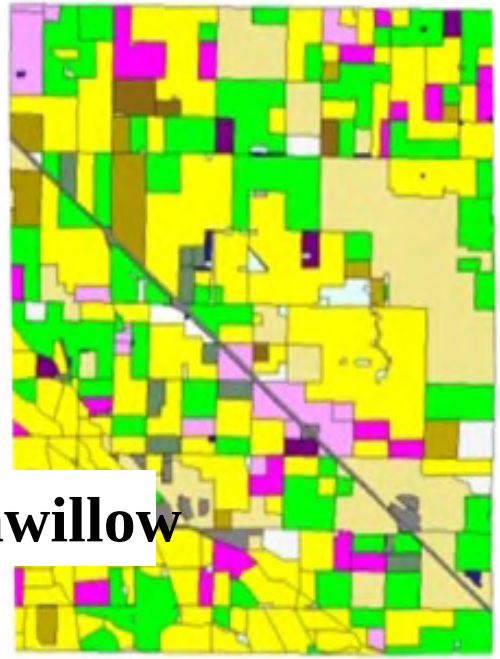


Chowchilla



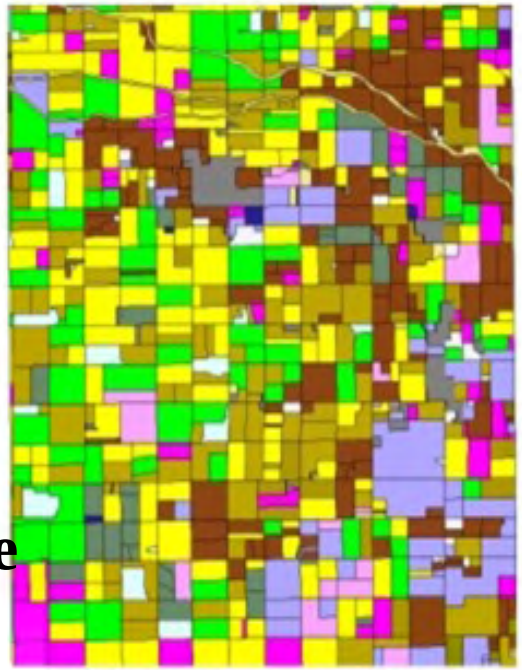
Crop Type

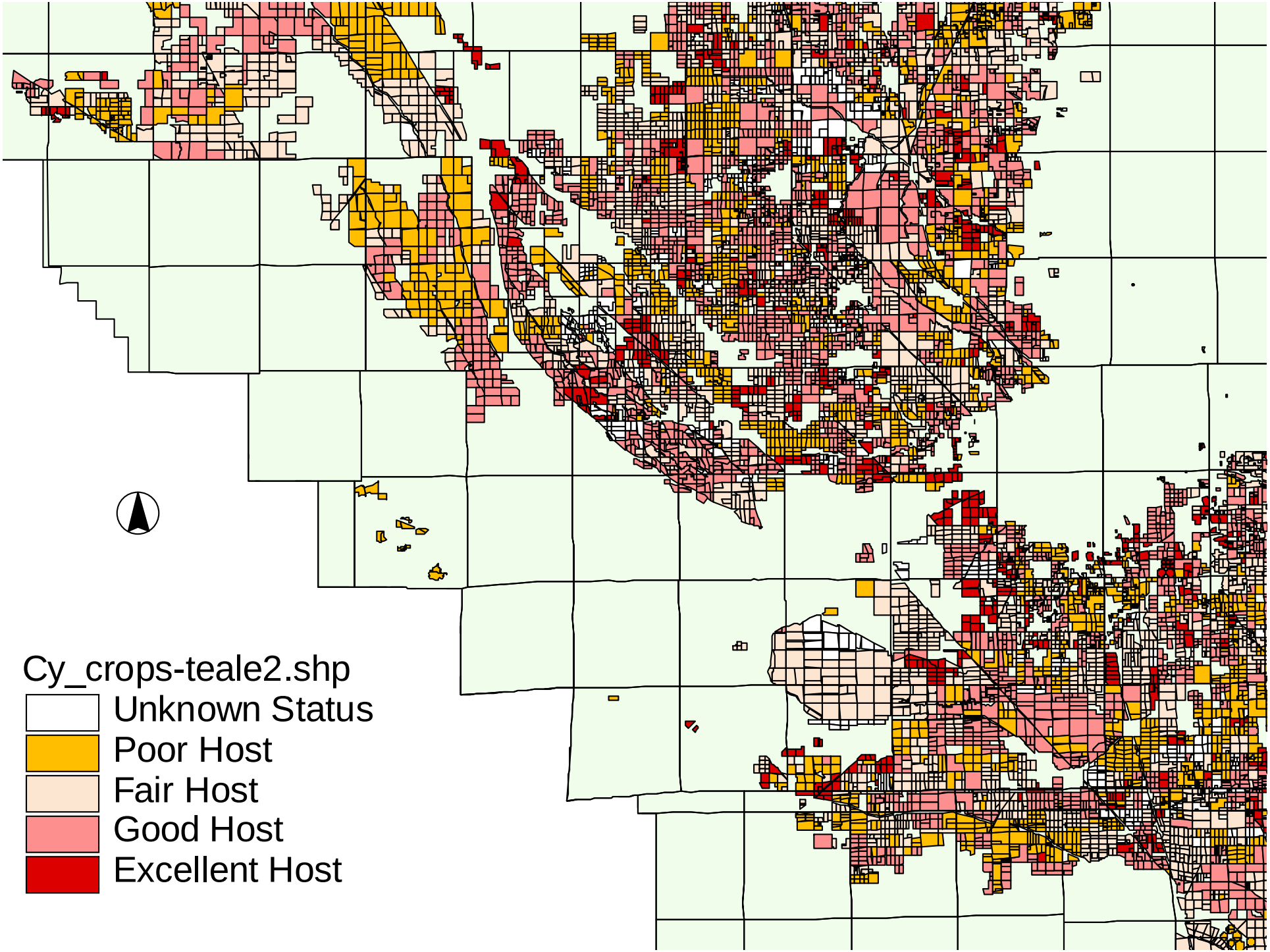
- Alfalfa
- Almond and Pistachio
- Corn
- Cotton
- Fallow and idle
- Grain
- Grapes
- Native Classes
- Non-irrigated agricultural land
- Other Decidious
- Other Truck
- Pasture
- Subtropical
- Tomatoes
- Urban
- Water



Buttonwillow

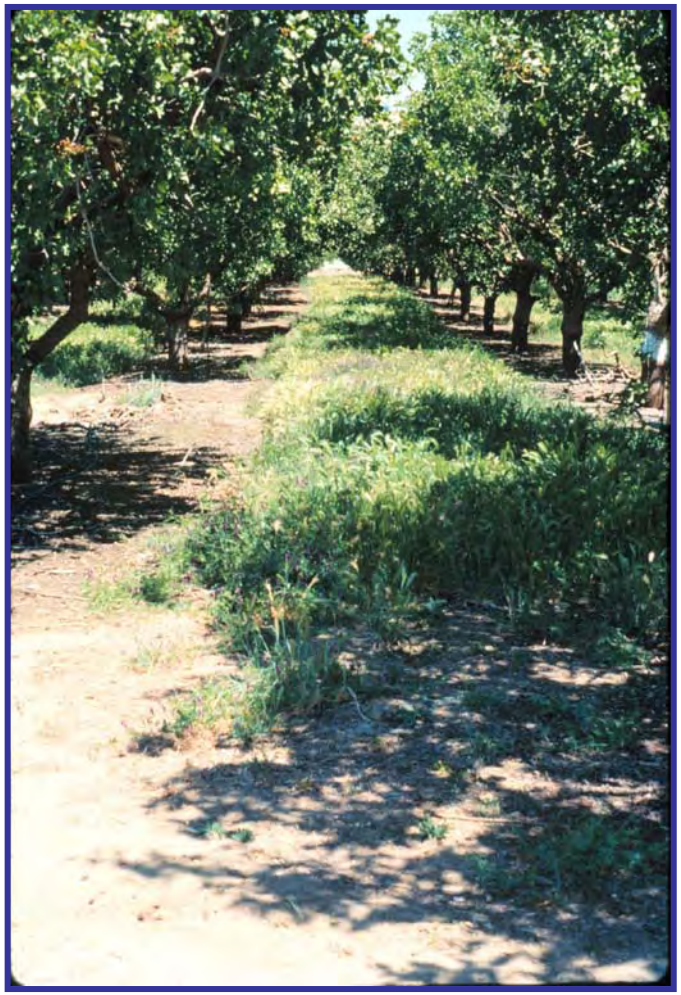
Woodville



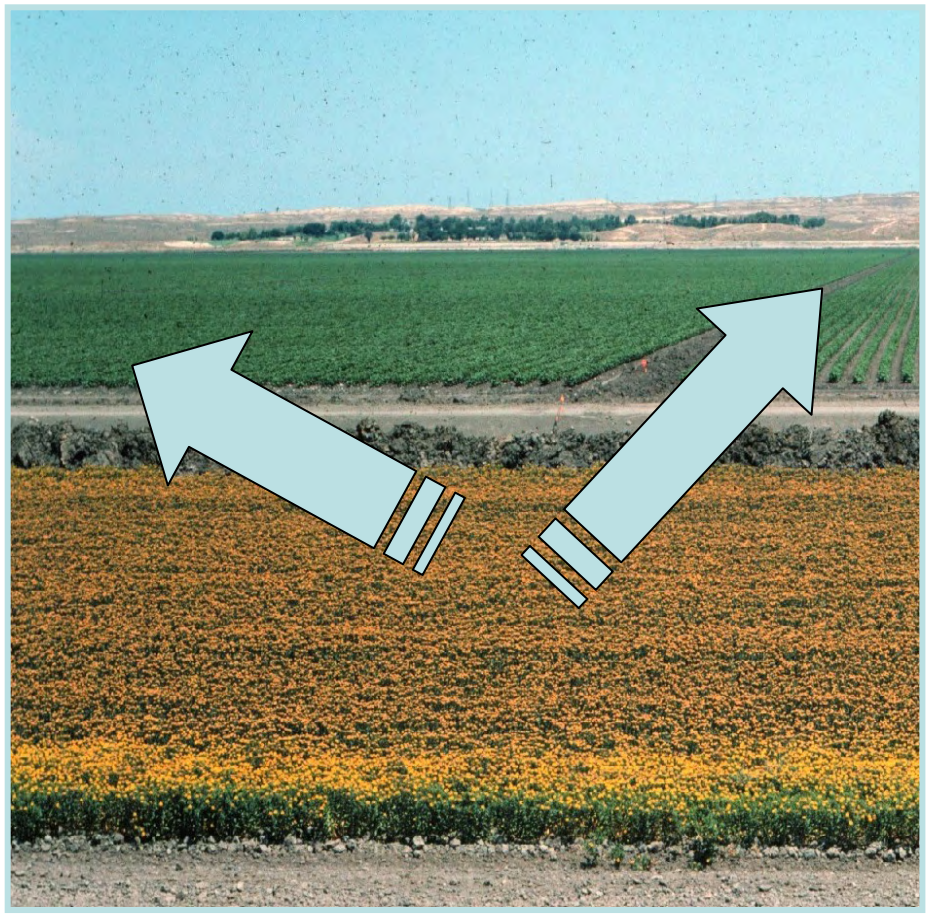

Cy_crops-teale2.shp
Unknown Status
Poor Host
Fair Host
Good Host
Excellent Host

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



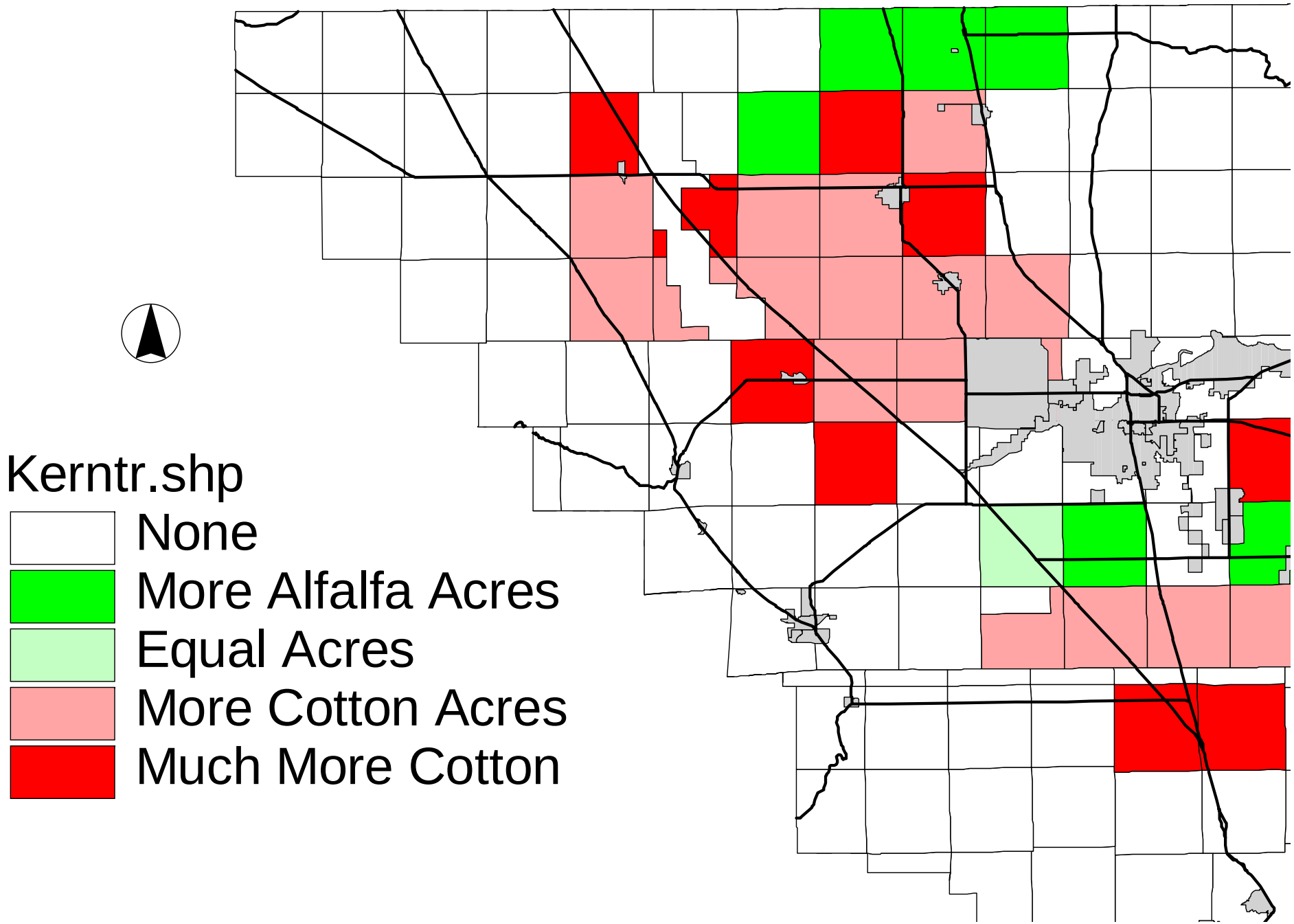
Managing Sources of Lygus



- ✓ Safflower provides habitat in May-June
- ✓ Lygus population build
- ✓ Treat safflower before lygus develop wings
- ✓ Utilized temperature based phenology predictions
- ✓ 660 $_{dd>52}$ 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


Kerntr.shp
None
More Alfalfa Acres
Equal Acres
More Cotton Acres
Much More Cotton

Strip Cutting Alfalfa Fields

- ✓ Within a field, split harvest schedule
- ✓ ½ of field is cut every 14 days
- ✓ Concept acceptable, execution cumbersome
- ✓ Interferes with custom harvest, irrigation management
- ✓ Not widely accepted

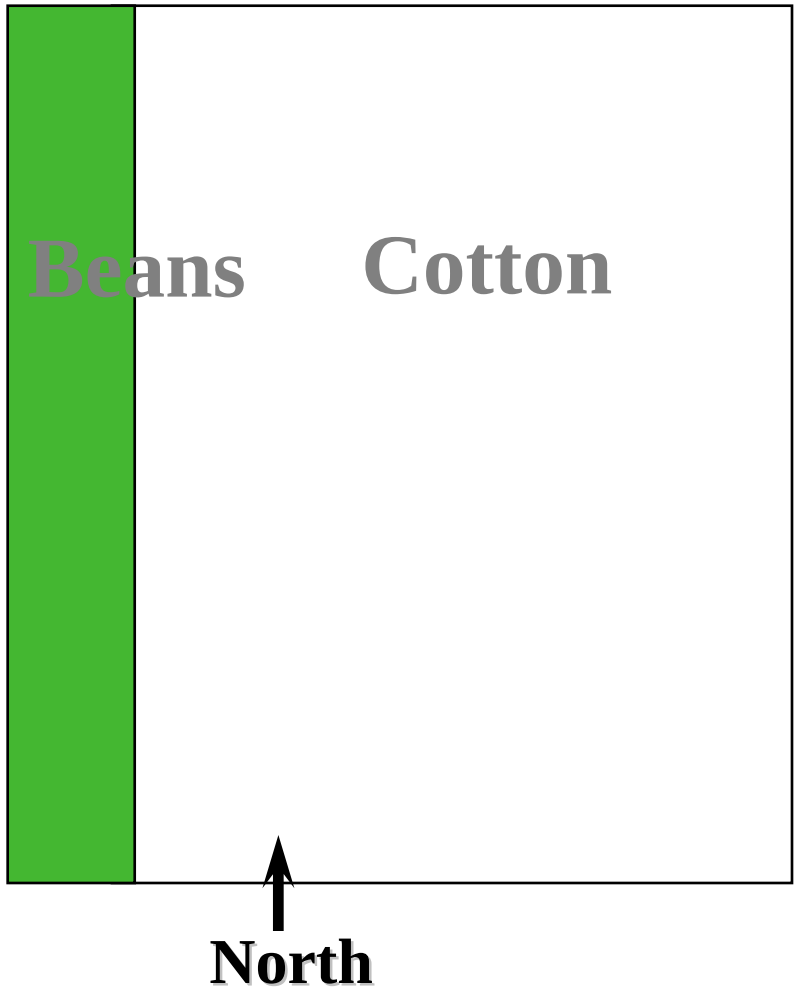
- ✓ Leaving strips of uncut alfalfa for lygus habitat is widely used in SJV
- ✓ Uncut strips are incorporated into the next cutting and another strip is left
- ✓ This practice is done from June until August, 3 cuttings

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



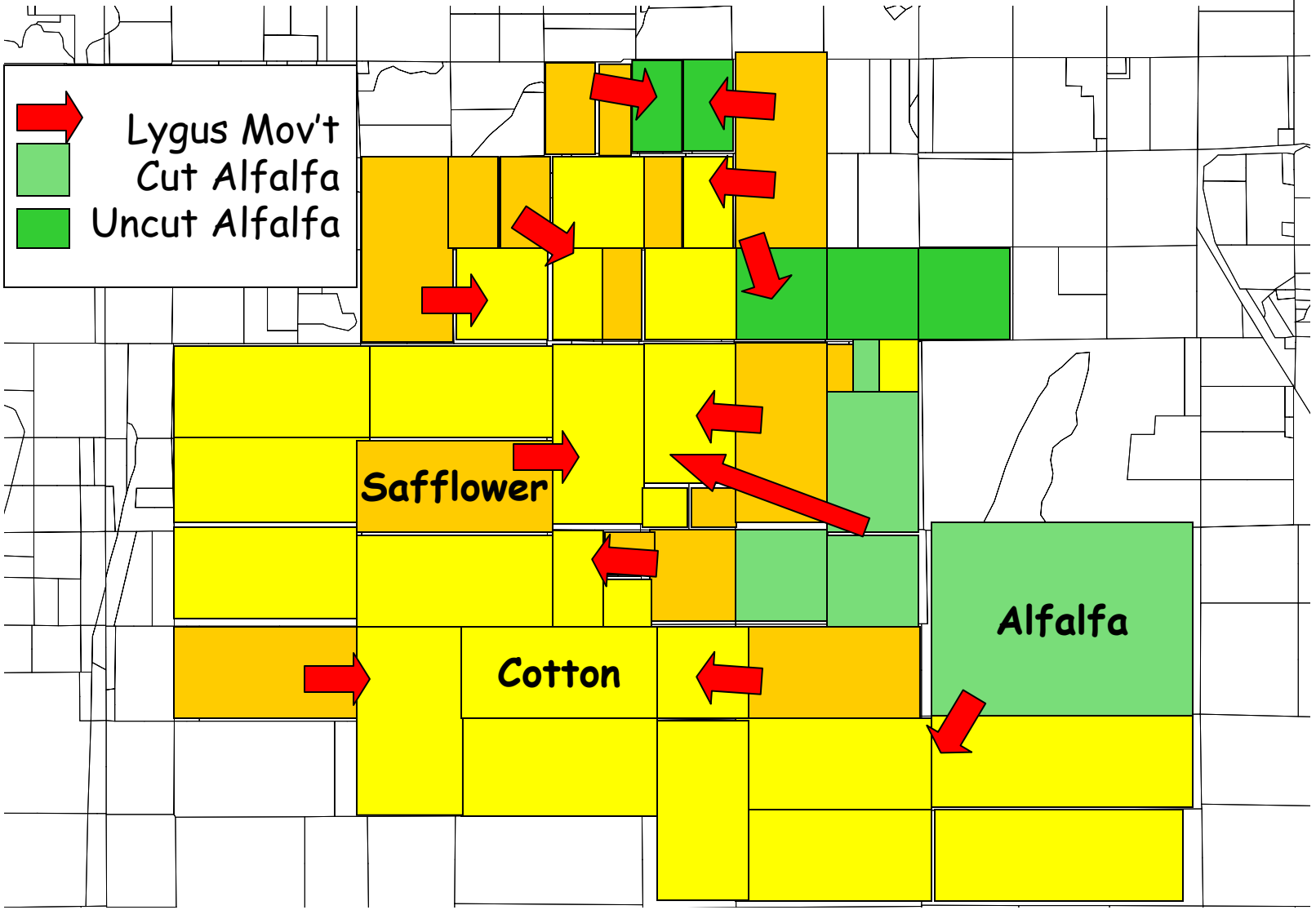
Interplanting Alfalfa and Cotton

- ✓ 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



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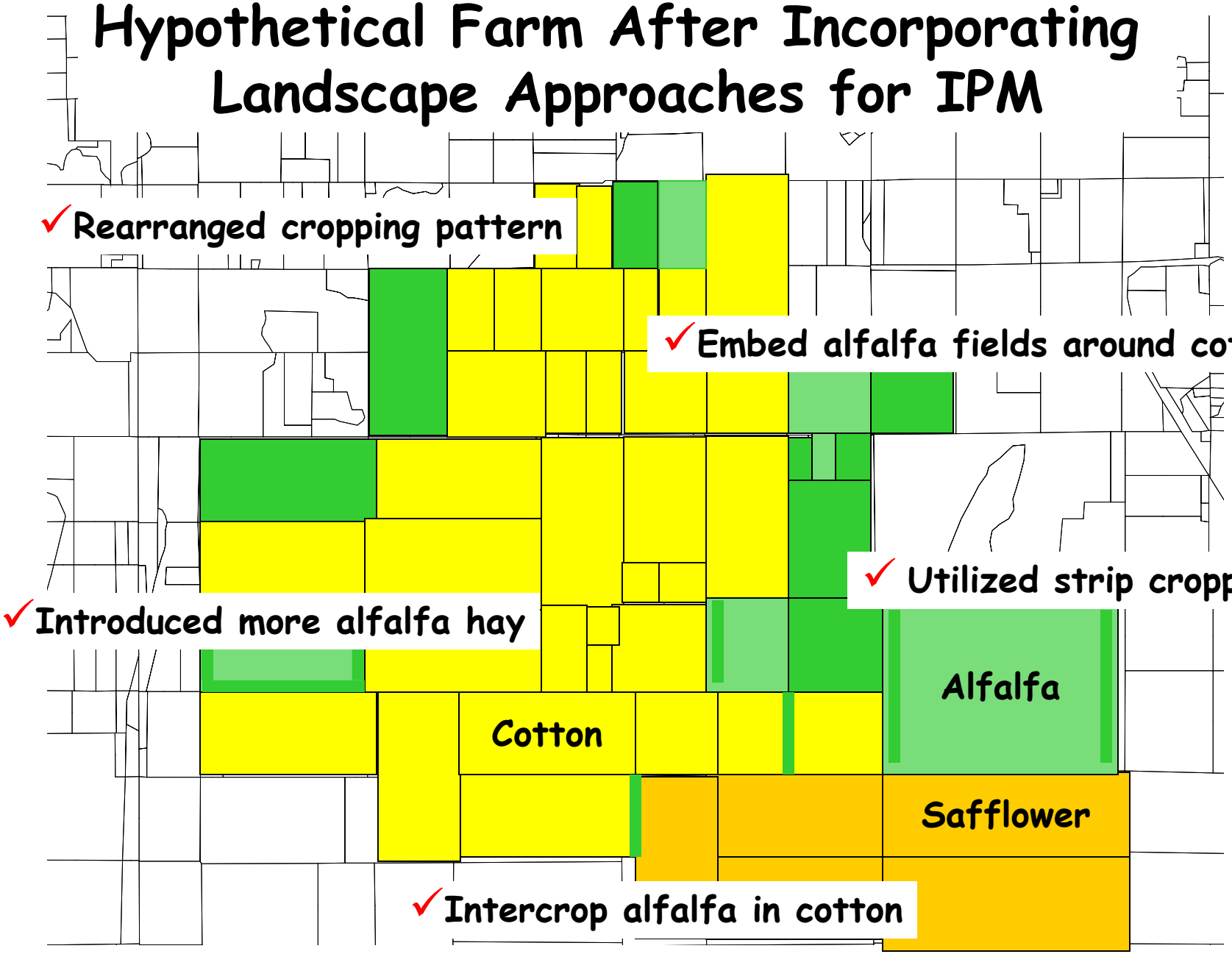

Factors to Areawide Management

- ✓ 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