On Farm IPM

GROWING FARMS:
SUCCESSFUL WHOLE FARM MANAGEMENT

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What is IPM?

- Integrated Pest Management
  - *The coordinated use of pest and environmental information and available pest control methods to prevent unacceptable levels of damage by the most economical means with the least possible hazard to people, property and the environment. – EPA*
  - *Whole Farm Pest Control*

IPM

- Step #1
  - IDENTIFY THE PEST!

IPM

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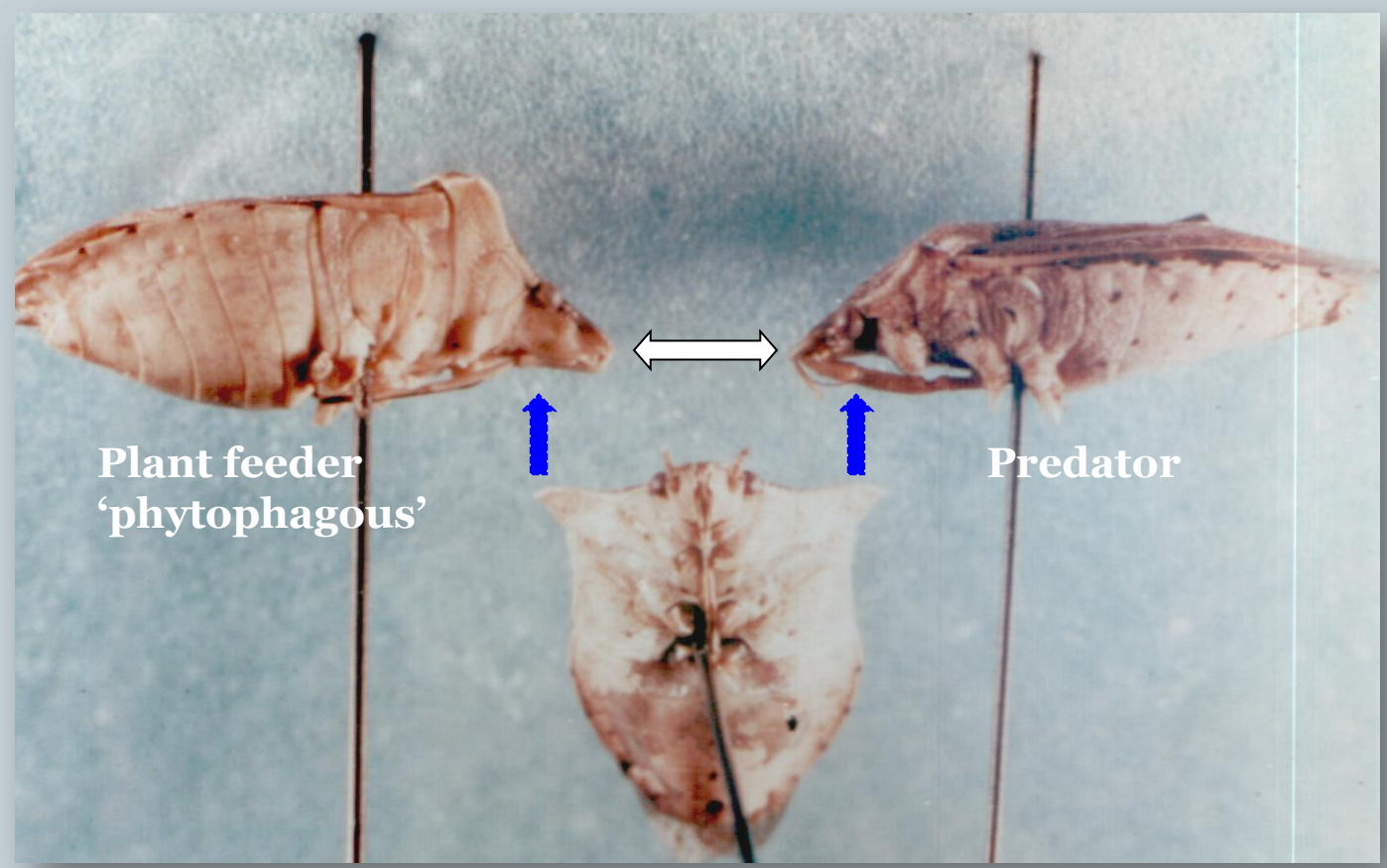
IPM

- Pest or Predator



IPM Control Strategies

- Evaluate the risks and benefits of each option:
  - Mechanical
  - Cultural
  - Biological
  - Chemical

IPM: Mechanical Control

IPM: Cultural Control

IPM: Biological Control

IPM: Chemical Control

Farmscaping

- Creating a Habitat for Wildlife and Beneficials
  - Naturally Established and Planted Fence Lines and Hedge Rows
  - Bird and Bat Houses
  - Brush Pile Construction
  - Banker Plant Establishment
  - Trap Crops
  - Cover Crops

Fence Lines/Hedge Rows

- Attraction of Wildlife
  - Essential for at least 15-20 vertebrate species
  - Preferred habitat for over 90 species
    - Quail & Hawks
    - Rat Snakes & King Snakes
    - Rabbits & Deer

Fence Lines/Hedge Rows

- Naturally Established

Fence Lines/Hedge Rows

- Planted

Plant Species	Common Name	Season of Service	Ecological Service				
			Flowers, Nectar[1], Pollen, Fruit and Seeds for:				Trapping
			Pollinators	Beneficial Insects[2]	Butterflies	Wildlife	Stink and Leaffooted Bugs
Trees							
Callistemon viminalis	Weeping bottlebrush	Wi-Sp	X	X	X	X	
Cercis canadensis	Redbud	Sp-Su	X			X	
Cornus florida	Dogwood	Sp				X	
Ilex opaca	American holly	Su-Fa	X	X		X	
Lagerstroemia indica/faurei	Crapemyrtle	Su-Fa	X	X	X		
Malus angustifolia	Crabapple	Su-Fa	X	X		X	
Osmanthus fragrans	Tea olive	Wi-Sp	X				
Prunus persica	Peach[1]	Sp	X	X	X	X	
Prunus sp.	Wild Plum, plum[1]	Sp-Su	X	X		X	
Shrubs							
Abelia sp.	Glossy abelia	Su-Fa	X		X		
Camellia spp.	Camellia	Wi-Sp	X	X			
Cliftonia monophylla	Buckwheat tree[3]	Sp	X			X	
Fatsia japonica	Japanese aralia	Fa-Wi	X	X	X		
Lonicera fragrantissima[4]	Win. honeysuckle	Wi-Sp	X			X	

Attracting Birds and Bats

- Requirements
  - Food
    - Polyculture - Intercropped fields provide for more food diversity.
    - Cover and trap crops provide a continuous food supply.
  - Water
    - Bats require a nearby water source.
  - Shelter
    - Soft field edges are more inviting to predatory birds and bats.
- Benefits
  - Regulate pest population and prevent pest outbreak.
  - Provide an ecotourism opportunity.

Attracting Birds and Bats

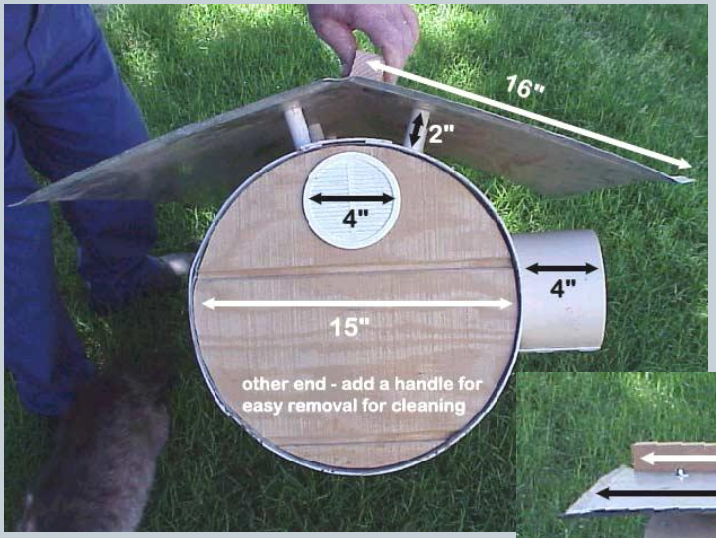
- Beneficial Birds to Agriculture
  - Barn Owls – 10 pairs of barn owls and their young were able to harvest between 15,000 to 25,000 rats per year in Florida sugar cane fields.
  - Black-capped Chickadees – Survive on a diet of insects and sunflower seeds.
  - Bluebirds – Feed on insects in the summer and berries in the winter.

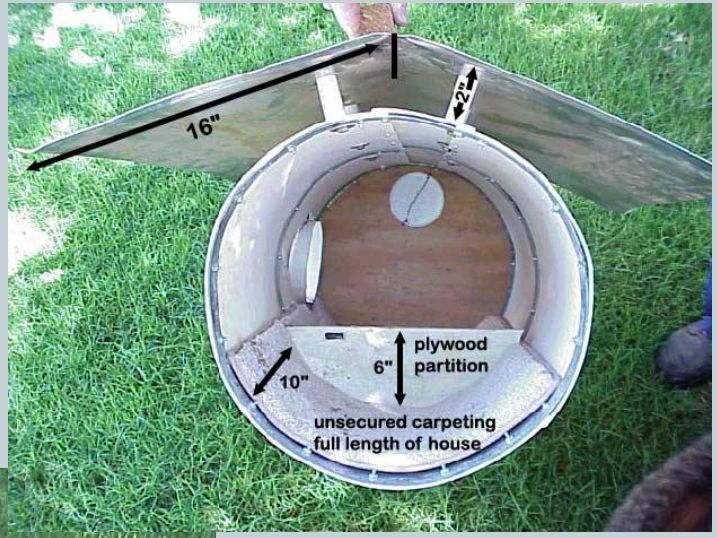
Attracting Birds and Bats

- Beneficial Birds to Agriculture
  - Attracting Barn Owls
    - White barrels, boxes, or PVC pipe.
    - Cut entrance hole 6-7” in diameter facing east.
    - Build 12-15’ above the ground.

Attracting Birds and Bats

- PVC Barn Owl House





Attracting Birds and Bats

- Beneficial Birds to Agriculture
  - Attracting Bluebirds
    - Mount house on a pole ~5 ft. off the ground to avoid predators.
    - Cut entrance hole 1.5” in diameter.
    - Drill ventilation holes just below roof line.

Attracting Birds and Bats

- Beneficial Bats to Agriculture
  - 13 species of bats live in FL year-round
  - All bats in this area feed on insects
  - Bats have high metabolism – they eat a lot!
  - Research has shown bats feed on crop pests
  - Attract bats by providing shelter
  - $22.9 billion/year value to agriculture

Attracting Birds and Bats

- Beneficial Bats to Agriculture
  - Bats Feed On…
    - Spotted cucumber beetles
    - Green stinkbugs
    - Leafhoppers
    - Fall armyworms
    - Cabbage loopers
    - Tobacco budworms
    - Corn earworms/cotton bollworms
    - Pecan pests

Attracting Birds and Bats

- Beneficial Bats to Agriculture
  - Attracting Bats
    - Tall (>2 ft.) and wide (>14”)
    - Multiple Chambers
    - Ventilation Slats
    - Landing Pad

Brush Pile Construction

Banker Plant Establishment

- Banker Plants
  - Plants that are intentionally infested with a herbivore that serves as an alternate host or prey for a specific parasitoid or predator.
  - The herbivore does not cause damage to the crop being grown for harvest.

Banker Plant Establishment

- Crape Myrtles
  - Add functional beauty to the farm.
  - Crape myrtle aphids are host specific
  - Supply food for native beneficials.
    - Lady birds, brown and green lacewings, wasps, bigeyed bugs, minute pirate bugs, assassin bugs, others.

Banker Plant Establishment

Banker Plant Establishment

- Recommended Crape Myrtle Cultivars
  - 'Biloxi': highest CMA, negatives unknown
    - tall, pink
  - 'Comanche': highest CMA, negatives unknown
    - medium, pink
  - 'Tuscarora': med-high CMA,
    - best tested on lacewings,
    - tall, pink
  - Others: 'Tonto'-med, 'Apalachee' - med, 'Victor' -small

Trap Crops

- Trap Crops
  - Trap cropping relies on manipulating insect host-finding mechanisms and host preferences.
  - A trap crop is a plant that draws a pest away from the main crop.
  - Effective use of trap crops requires that insects concentrated on trap crops must be destroyed by spraying or tillage before they disperse to other plants.

Trap Crops

- Extrafloral Nectaries

Trap Crops

- Extrafloral Nectaries
  - 2000 plant species have them
  - Location: leaf laminae, petioles, brachs, stipules, pedicles, fruit, etc.
  - Size, shape, and secretions vary by species
  - Flow rate and occurrence: pattern, fruiting
  - Vines: high frequency of EFN – ant “roads”
  - Nutrients – differ from floral nectar

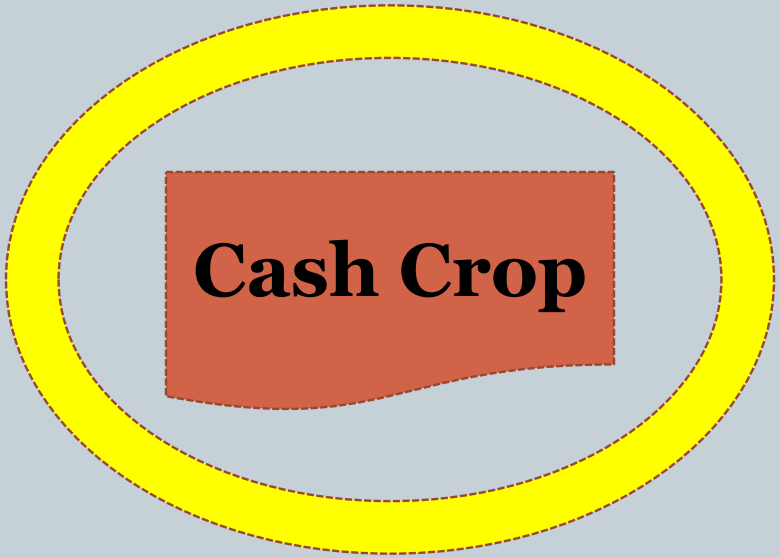
Trap Crops

- Extrafloral Nectaries
  - Passion flower, *Passaflora spp.*
  - Elderberry, *Sambucus* spp.
  - Fruit trees, *Prunus* spp., peach, wild cherry
  - Common vetch, *Vicia sp.*
  - Partridge pea, *Cassia spp.*
  - *Hibiscus spp.*
  - Beans- *Phaseolus spp.*, many legumes
  - Cotton cvs

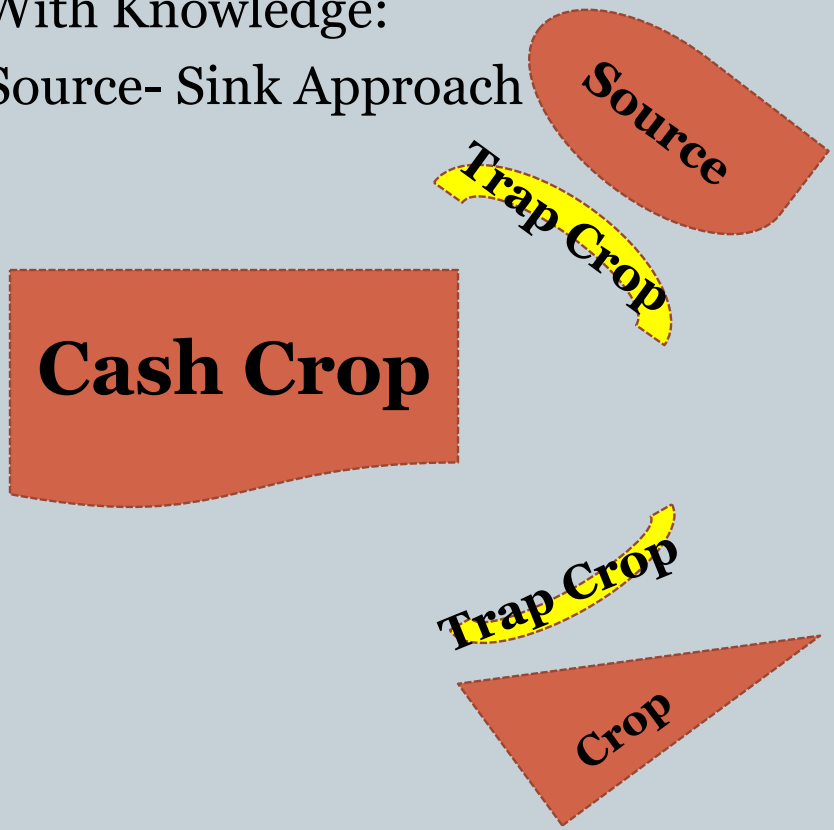
Trap Crops

- Field Configuration

Unknowns
Default – Ring It



With Knowledge:
Source- Sink Approach



- Multifunctional Plot

Trap Crops

Cover Crops

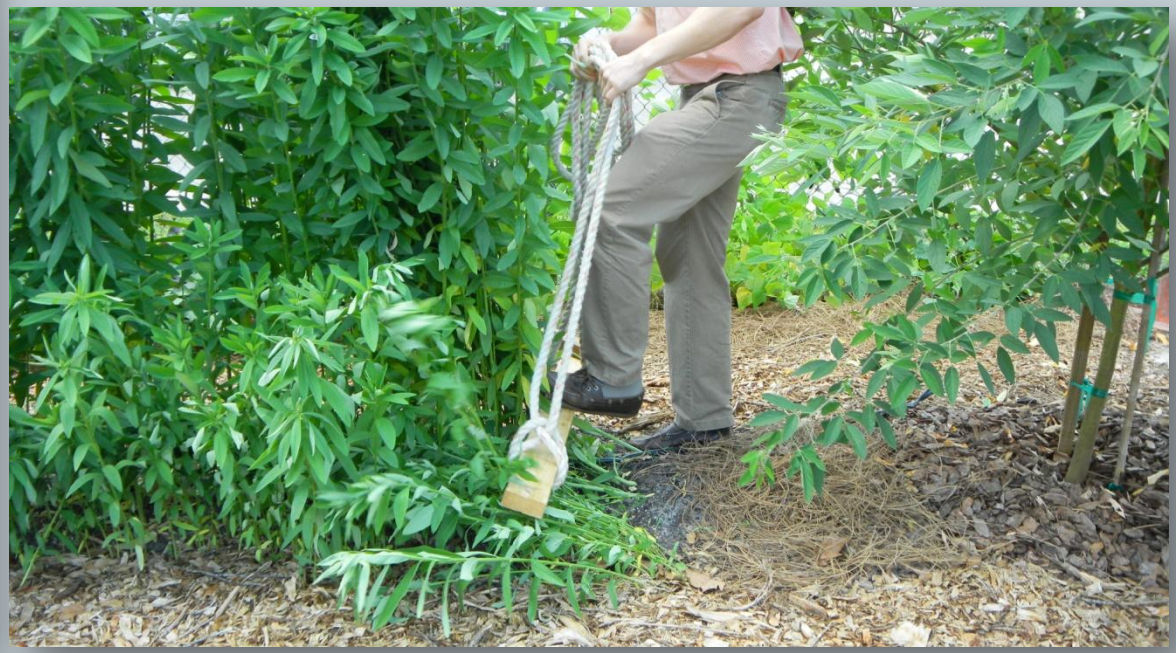
- A cover crop is not harvested for profit, but rather is included in the farming system to provide *one or more ecosystem services*.
- Primarily our interest is focused on how cover crops can reduce off-farm inputs and increase farm net income.

Cover Crops

- Examples
  - Sorghum
  - Sorghum sudangrass
  - Oats
  - Rye
  - Marigolds
  - Cowpea
  - Sunn hemp
  - Velvetbean

Cover Crops

Cover Crops



Cover Crops

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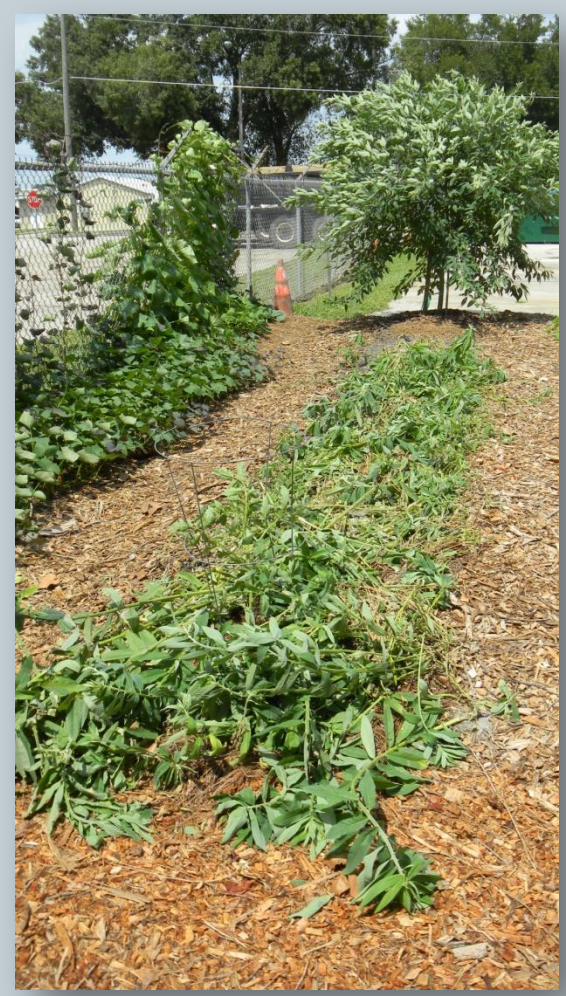

Cover Crops