

# UF/IFAS Extension

## The Journey to Sustainability Begins with Education



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# **Farmscaping**

## **A Small Farming Tool**

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# Outline

- Farmscaping Definition and Concepts
- **Examples**
- Summary

# Definition



**Farmscaping** is “the modification of agricultural settings, including management of cover crops, field margins, hedgerows, windbreaks, and specific vegetation growing along roadsides, catchments, watercourses, and adjoining wildlands.”(Bugg et al 1998).

# **Farmscaping**

## **Examples of Related Terms**

- **Companion Plants**
- **Trap Crops**
- **Banker Plants**
- **Ecological Pest Management**
- **Conservation Pest Management**

# Definition

- **Farmscaping for Crop Pest Management for Crop Protection**
- **Strategies for Encouraging “Beneficials” (e.g., Insects) in the Field**
- **Integrated Parasite/Predator /Pathogen Management**
- **Use of insectary plants, usually non-native species**

# Concepts

## THE AGROECOSYSTEM CONCEPT

25

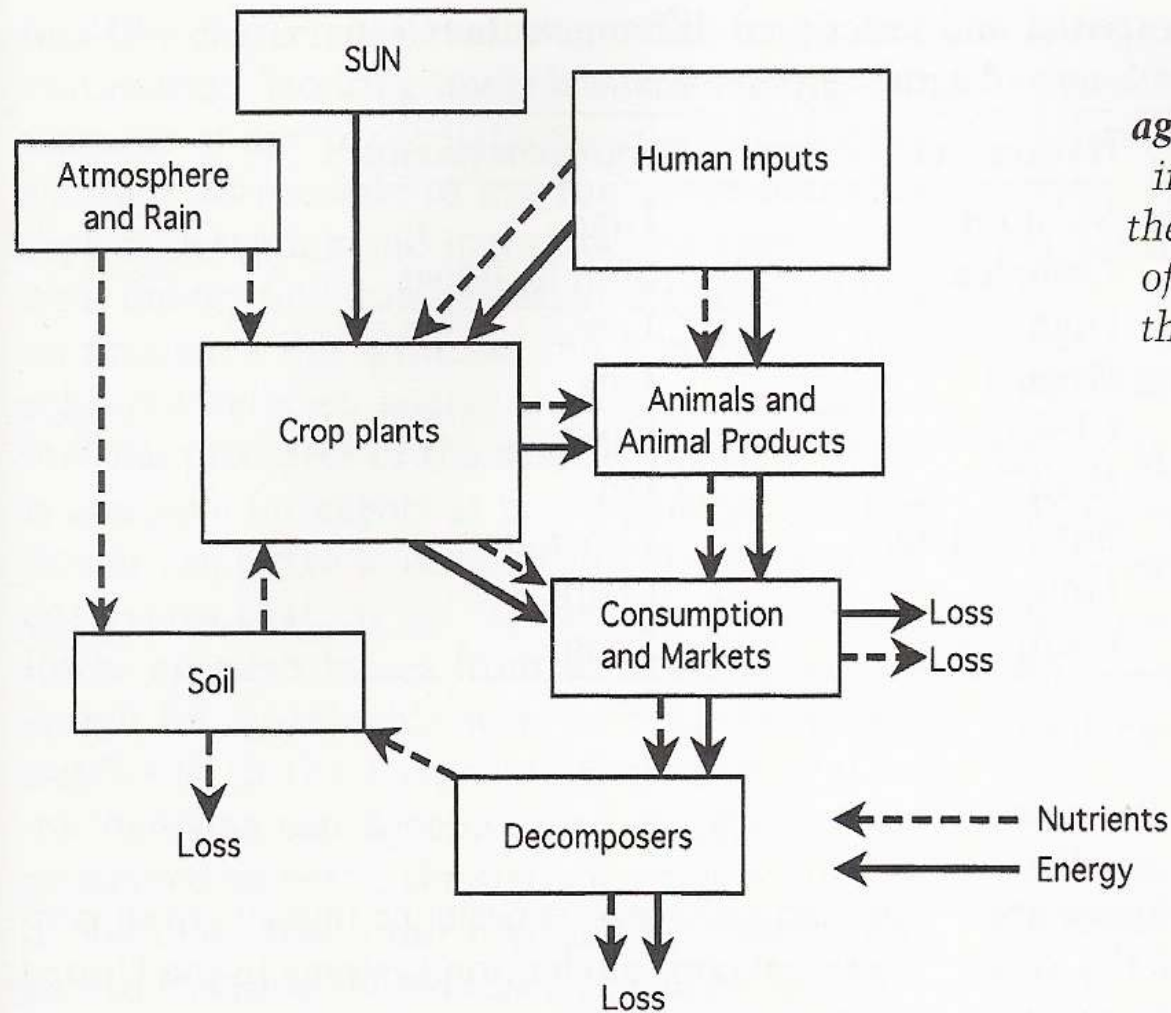
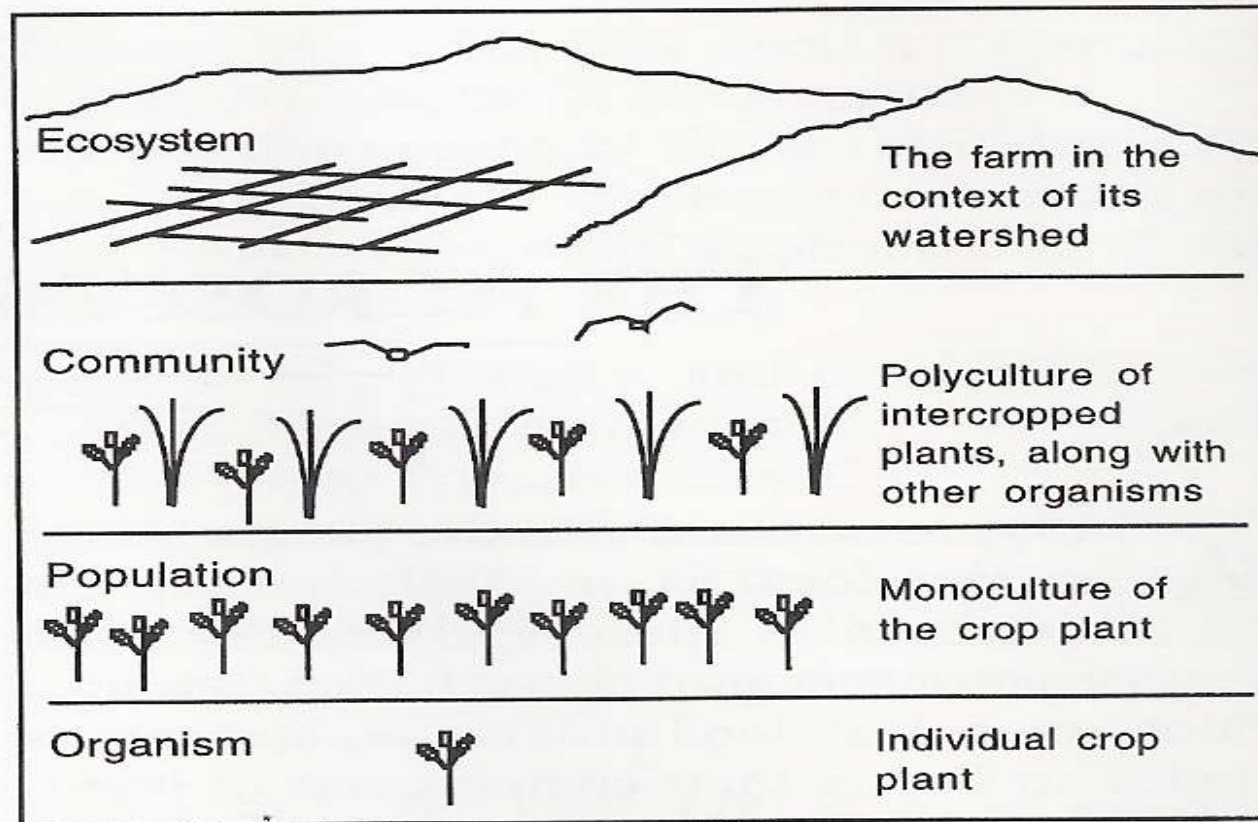


FIGURE 2.7

*Functional components of an agroecosystem. In addition to the natural inputs provided by the atmosphere and the sun, an agroecosystem has a whole set of human inputs that come from outside the system. An agroecosystem also has a set of outputs, labeled here as "Consumption and Markets."*

# Concepts



Hierarchical Scale

# Expanded Definition

- **“Farmscaping” is a whole-farm, ecological approach to pest management.**
- **It can be defined as the use of hedgerows, insectary plants, cover crops, and water reservoirs to attract and support populations of beneficial organisms such as insects, bats, and birds of prey.**



<http://www.attra.org/attra-pub/farmscape.html>

# Research

- **Successful habitats for desired beneficial organisms have 4 requirements:**
  - **Food**
  - **Cover**
  - **Water**
  - **Space**

# **Insectary Plant Characteristics**

- **Provide the protein (in pollen) and carbohydrates (in nectar) that beneficials need to thrive and produce more offspring.**
- **Available as supplemental food source when the pest insects they feed on are in short supply.**

# **Insectary Plant Characteristics**

- **Commonly with small, shallow flowers suited for most beneficials that are minute in size, with shorter mouthparts**
- **Examples - umbel-type plants (flower clusters shaped like flat-topped umbrellas) like those found in the carrot or Apiaceae family (dill, cilantro, etc.) and certain flowers found in the composite or Asteraceae family (daisy and chamomile)**

# **Insectary Plant Characteristics**

- **Presence of extrafloral nectaries (nectar sources located outside the flower, e.g., the petiole or stem).**
- **A few examples include sunflowers, and legumes or Fabaceae family, e.g., lupines and vetch**

K. Wetherbee. 2004. Organic Gardening; Apr/May2004, Vol. 51(3)



Predator Insect	What to Plant (Insectary Plant)
Lacewings, aphidius, ladybugs	Achillea filipendulina
Hoverflies	Alyssum
Ground beetles	Amaranthus
Ichneumon wasp, ladybugs, lacewings	Anethum graveolens (dill)
Lacewings	Angelica gigas
Ladybugs, hoverflies	Convolvulus minor
Hoverflies, parasitic wasps, lacewings	Cosmos bipinnatus
Dicyphus	Digitalis
Lacewings, ladybugs, hoverflies	Daucus carota (Queen Anne's lace)
Damsel bugs, ladybugs, lacewings	Foeniculum vulgare (fennel)
Pirate bugs, beneficial mites	Helianthus annulus
Hoverflies	Iberis umbellata
Hoverflies, parasitic wasps	Limonium latifolium (Statice)
Aphidius, aphidoletes, hoverflies	Lupin
Parasitic wasps, tachinid flies	Melissa officinalis (lemon balm)
Parasitic wasps, hoverflies, tachinid flies	Petroselinum crispum (parsley)
Pirate bugs, beneficial mites	Shasta daisy
Pirate bugs, aphidius	Sunflowers
Ladybugs, lacewings	Tanacetum vulgare (tansy)
Dicyphus	Verbascum thaspus



# Farmscaping

## State of the Art

- **Use a multiple redundant systems approach (e.g., "guilds" of food plants and natural enemies)**
- **Consider dispersion indices for insects foraging behavior**
- **Establish overwintering sites for beneficials**
- **Entrainment - some insects (especially parasitic wasps and flies) can perform associative learning (i.e., "tune in" to a particular pest when "happy" in their environment)**



# Farmscaping State of the Art

Pest/ Life Stage	Egg	Larva 1	Larva2	Larva3	Larva4	Larva5	Pupa	Adult
Imp. Cabbage Worm	Ladybugs Syrphids Lacewings Trichogr.	Braconids Ladybugs Syrphids Lacewing	Same As Larva 1	Assassin Bugs, Carabid Stink Bug	Same As Larva 3	Paper Wasps Bugs, Carabid	Ptero Pupa, Bugs, Carab	Dragonfly Robber Fly Spiders
Japanese Beetle	Carabids Nematodes	Nematodes (Hb), Milky spore	Tiphia, Nemas, Milky Spore	Tiphia, Nemas, Milky Spore	No Such Stage	No Such Stage	None	Tachinid

# Farmscaping Examples

- **Hedgerows**



Photo: C. Shennan

- **Inter-Plantings**



Photo: Rex Dufour

# Farmscaping Examples

- **Strip Planting**



Photo: G. Jones & K.Sieving

- **Remnant Habitats**



# **Farmscaping Opportunity With Florida Native Plants**

- **Native plant/insect research shows high levels of insect interactions**
- **Florida native plants are known insectary plants but more research needed**
- **Examples:**
  - **Butterfly plants**
  - **Coreopsis spp - syrphid flies, lady beetles, lacewings, and parasitic wasps**

# **Farmscaping Opportunity With Florida Native Plants**

- **Native plant ecotypes are better adapted to local stress factors**
- **Native plant ecotypes provide on-farm habitat restoration for landscape level benefits and increased biodiversity**

# **Florida Farmscaping Research**



**Dr. Gregory A. Jones**

**Santa Fe Community College, Gainesville, FL**

**Dr. Kathryn E. Sieving**

**University of Florida, Dept. of Wildlife Eco. & Cons.**

**Research Approach: Test a crop protection management strategy to enhance the presence and activity of insectivores birds based on field observations**



- **Assessment of increased foraging activity by insectivorous species.**
- **Visual observations confirm birds eating pest insects on crops.**



# Native Bee Diversity



**Sweat bee**  
(*Agapostemon* spp)



**Carpenter bee**  
(*Xylocopa* spp)



**Mason bee**  
(*Osmia* spp)



**Carder bee**  
(*Anthidium* spp)



**Bumble bee**  
(*Bombus* spp)

# Background

- **There are approximately 4,000 native bee species in North America**
- **In Florida there are 6 families and 360 genera of native bees**
- **Florida has a relatively large number of endemic species and subspecies**
- **Native bees are the most important pollinators of Florida native plants, although many other animals are also pollinators (e.g., butterflies, moths, beetle and birds)**

# Background

- **Native Bees Compared to Honey Bees**
  - Most native bees are solitary – except for bumble bees which are social, live in a colony and share foraging and brood rearing activities
  - **70 % nest in the ground**
  - Females create and provision their nest without the help of sister worker bees
  - **Come in a wide range of colors and sizes**
  - They are not aggressively stinging insects, i.e., they are the gentle pollinators

# Life Cycle

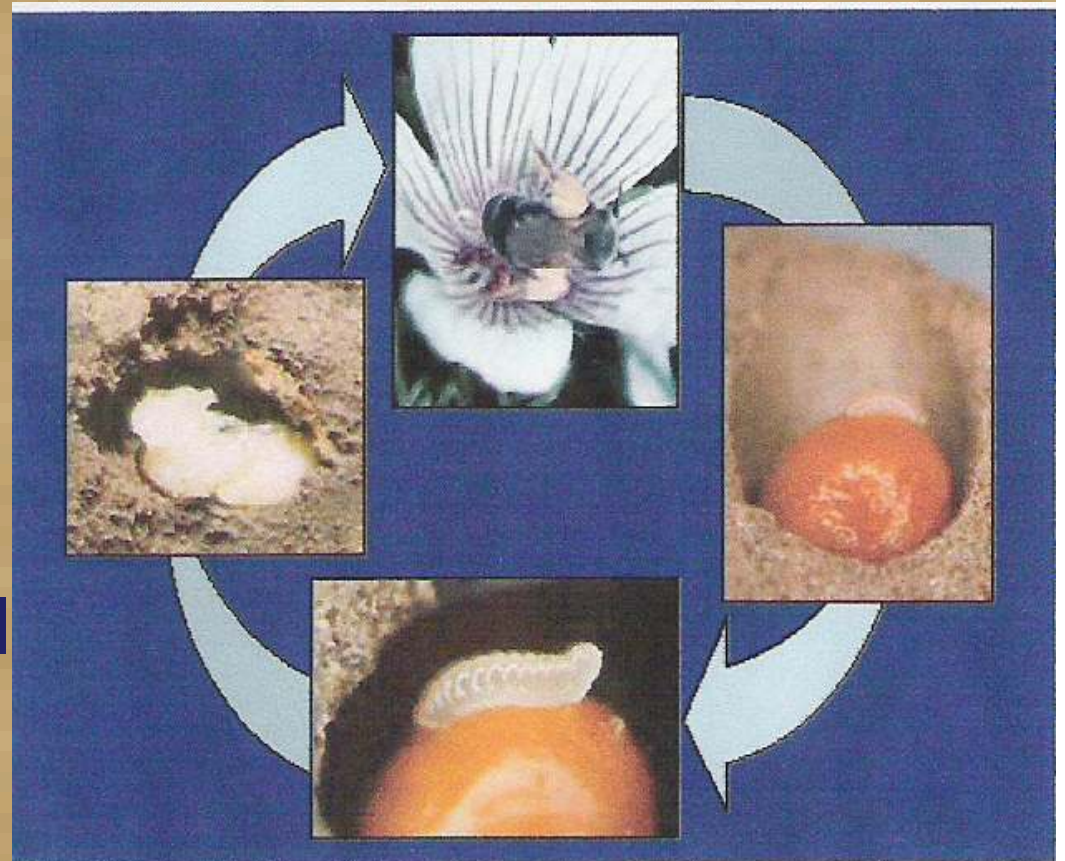
## Complete Metamorphosis

### 1) Inside brood cell

- Egg
- Larvae 11 months
- Pupae

### 2) Outside brood cell

- Adult 6 weeks



Mining bee

# Creating Nesting Cover

- Ground nesting bees:
  - protect areas with existing nests
  - make “vegetation free” areas
  - leave some rocks for basking
  - use well-drained, slightly sloped areas

# Ground Nest Example



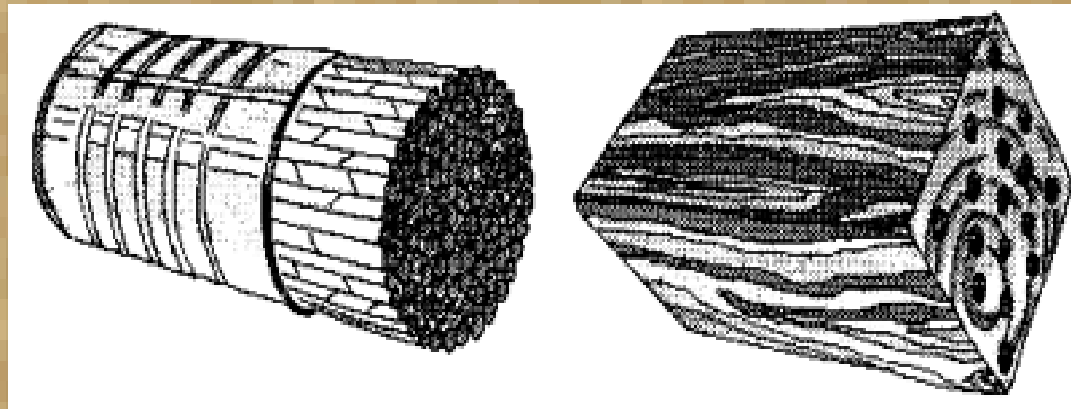
**Polyester bee  
(*Colletes* spp)**



**Soil nest profile**

# Creating Nesting Cover

- Wood or tunnel nesting bees example



**Bundle of  
paper straws**

**Wooden block  
with drilled holes**

# Leaf Cutting Bees

In Florida there are 63 different species (plus five subspecies) within seven genera in the family Megachilidea (*Ashmeadiella*, *Heriades*, *Hoplitis*, *Coelioxys*, *Lithurgus*, *Megachile*, and *Osmia*)



**Anthidium spp**



**Osmia spp.**



**Megachile spp.**



**Coelioxys spp**

# Summary

- **Farmscaping is the deliberate use of specific plants and landscaping techniques to attract and conserve “beneficials”.**
- **FL native native plants provide an opportunity to use locally adapted and more effective plants**
- **Beneficials include a multitude of species as predators and pollinators**