



Weed identification – the basics and significance

May 29, 2018

Ramdas Kanissery

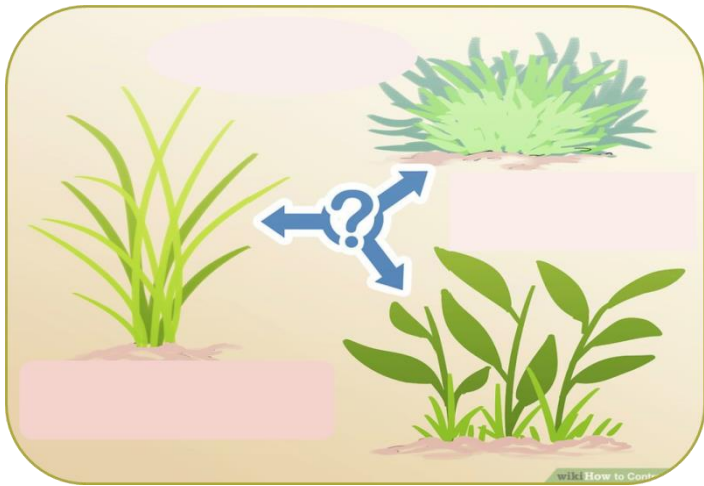
Assistant Professor - Weed Scientist

Southwest Florida Research and Education Center
Immokalee, FL

UF | IFAS
UNIVERSITY of FLORIDA

**Horticultural
Sciences**

Talk contents



Introduction

- Significance of weed id

Weed identification - basics

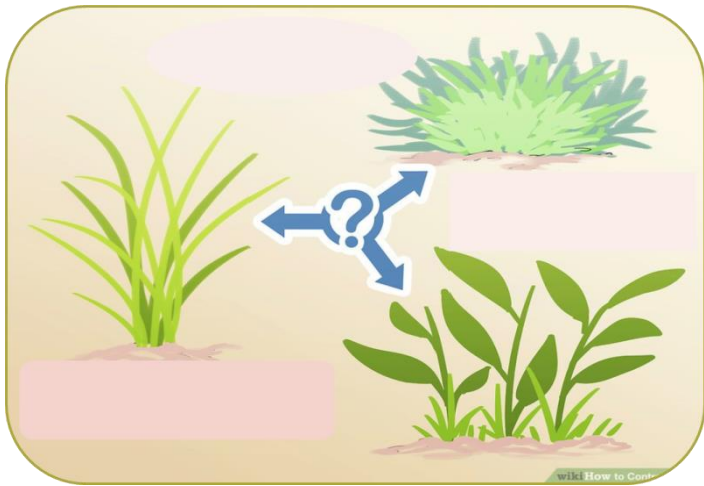
- Morphology
- Life cycle

Weed id resources & tools

Plant identification services

Summary

Talk contents



Introduction

- **Significance of weed id**

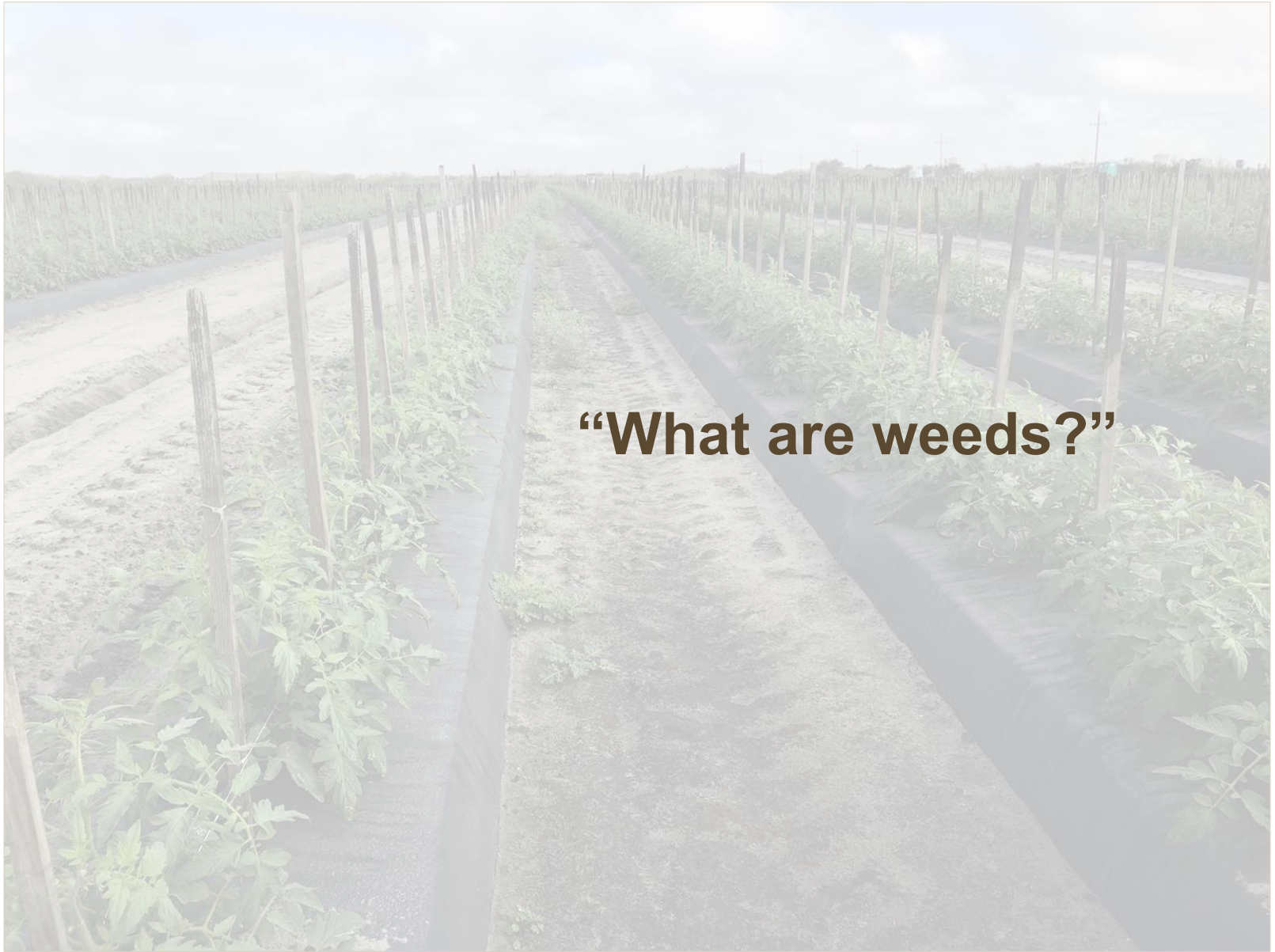
Weed identification - basics

- Morphology
- Life cycle

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Plant identification services

Summary



“What are weeds?”

“What are weeds?”

A plant growing where it is not wanted



Purslane: weed in vegetable beds

“What are weeds?”

A plant growing where it is not wanted

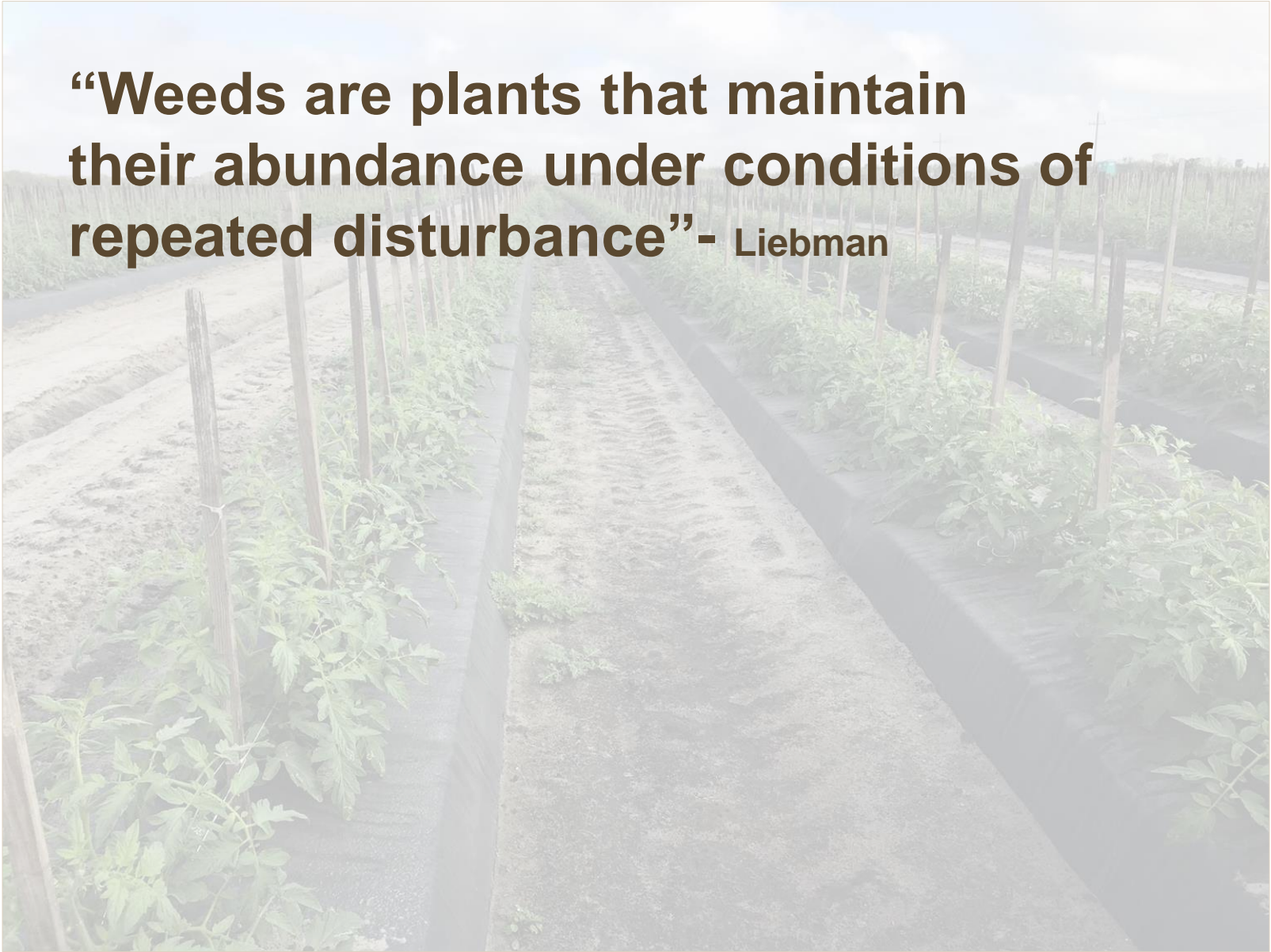


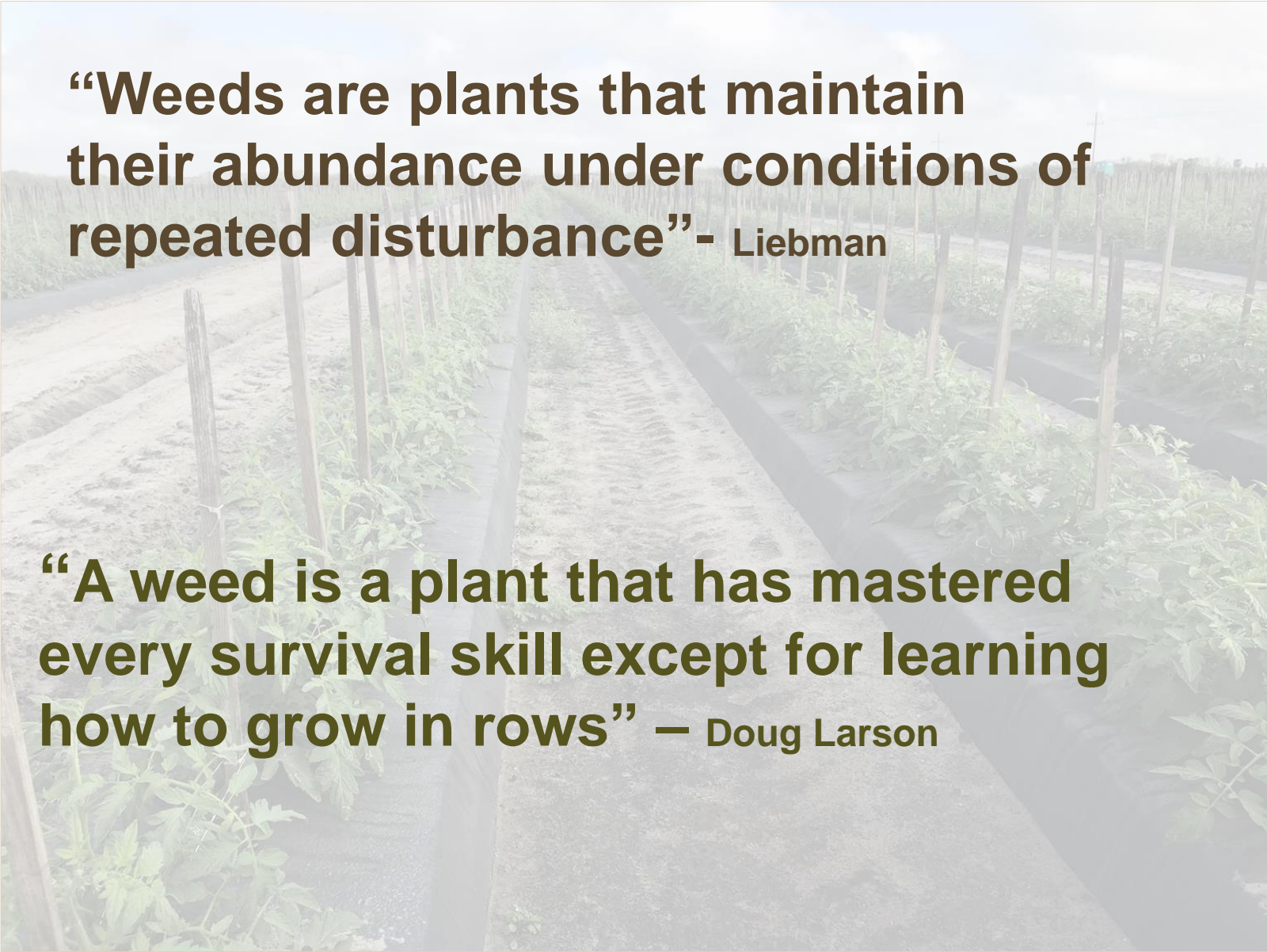
Purslane: weed in vegetable beds



Purslane: Potted plant \$10 - \$15

“Weeds are plants that maintain their abundance under conditions of repeated disturbance” - Liebman



A photograph of a vegetable garden with rows of plants supported by stakes, overlaid with text. The garden is organized into neat rows, with plants growing in black plastic mulch. The background shows a clear sky and a fence.

“Weeds are plants that maintain their abundance under conditions of repeated disturbance” - Liebman

“A weed is a plant that has mastered every survival skill except for learning how to grow in rows” — Doug Larson

What are weeds doing in my farm or garden?



Weedy row-middle in sweet corn
SWFREC Veg Farm

Compete for
light, nutrients,
moisture and
space

What are weeds doing in my farm or garden?



Compete for
light, nutrients,
moisture and
space

Giant Amaranth or Pig weed
Immokalee, FL

What are weeds doing in my farm or garden?



Interfere with
harvesting

Giant Foxtail in snap beans

Figure credit: Mark Schonbeck, Virginia
Association for Biological Farming.

What are weeds doing in my farm or garden?



Source of pest
and diseases

- Alternate host for pests and diseases

What are weeds doing in my farm or garden?



Source of pest and diseases

- Alternate host for pests and diseases

Weeds growing adjacent to the crop row providing a moist and favorable environment for fungal growth on the tomato foliage



“Weeds can hurt your garden and they have to go”

“Four **S** of weed management”

Scouting

Selection of control timing

Sanitation

Systematic weed identification

“Four **S** of weed management”

Scouting

Selection of control timing

Sanitation

Systematic weed identification

Get the correct Id



**Heavy infestation of a weed species
in a vegetable farm near Immokalee**

Get the correct Id

Ragweed



**Heavy infestation of a weed species
in a vegetable farm near Immokalee**

- Not responding to Glyphosate or Paraquat
- \$\$ spend but no control

Get the correct Id

Ragweed



Parthenium



Weed was correctly identified as parthenium

- Specific herbicide used

Get the correct Id

- Similarly looking weeds
- Responds differently to herbicides

Ragweed



Parthenium



Sweet clover



Get the correct Id

- **Dayflower**

- Looks like a dicot
- Actually a monocot
- So better response to grass killers



Dayflower growing in the drip line under the citrus tree

“Four **S** of weed management”

Scouting

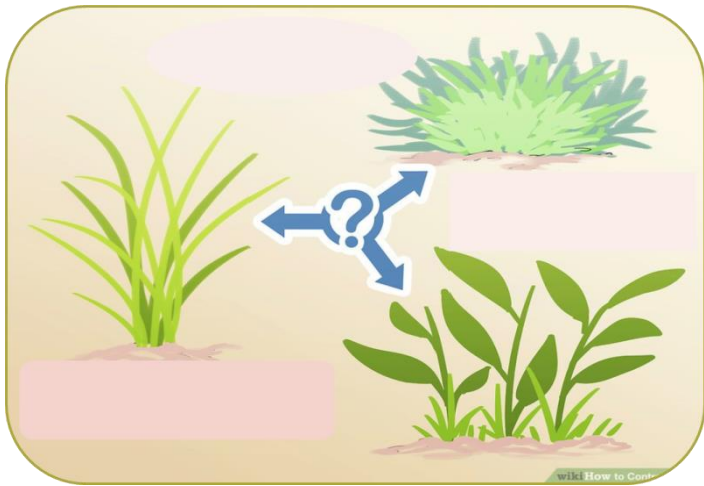
Selection of control timing

Sanitation

Systematic weed identification

“**Very important step for efficient and sustainable weed control**”

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- Significance of weed id

Weed identification - basics

- Morphology
- Life cycle

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Weed ID basics

- **Morphology**

- Structure and form

- **Life cycle**

- How it develops and reproduce

Weed ID basics

- **Morphology**

- **Structure and form**

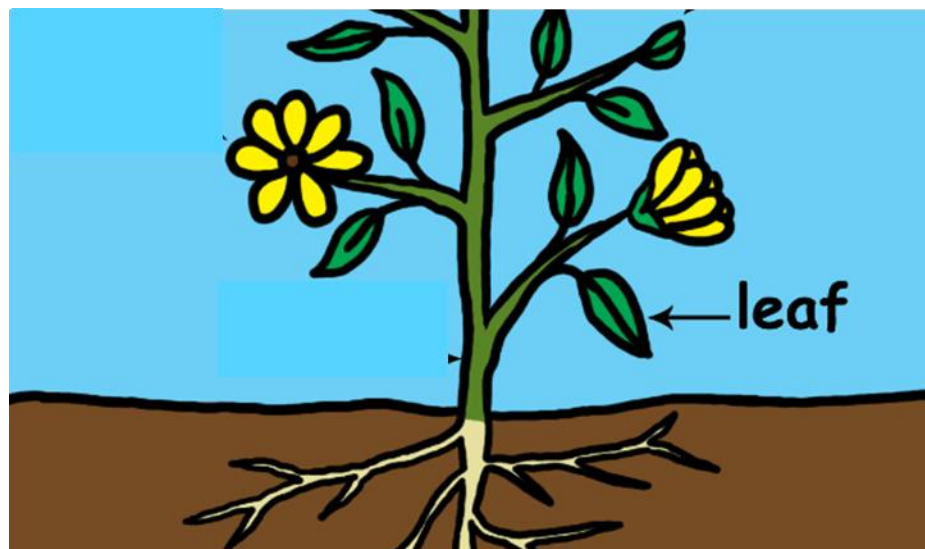
- **Life cycle**

- **How it develops and reproduce**

Weed ID basics

■ Morphology

- Identifying characteristics



Leaf - shape, arrangement, venation etc.

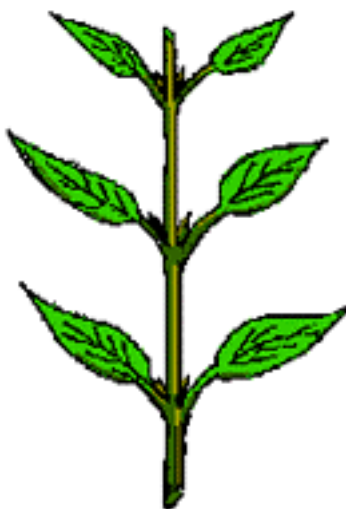
Weed ID basics

■ Morphology

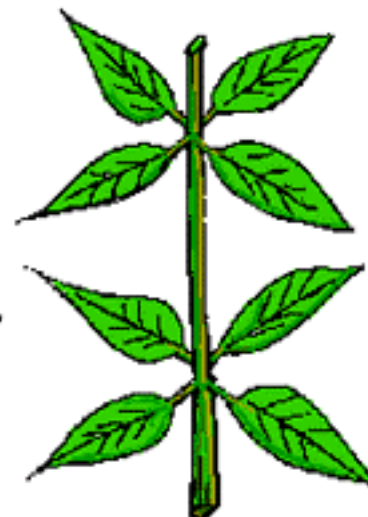
- Identifying characteristics



Alternate



Opposite



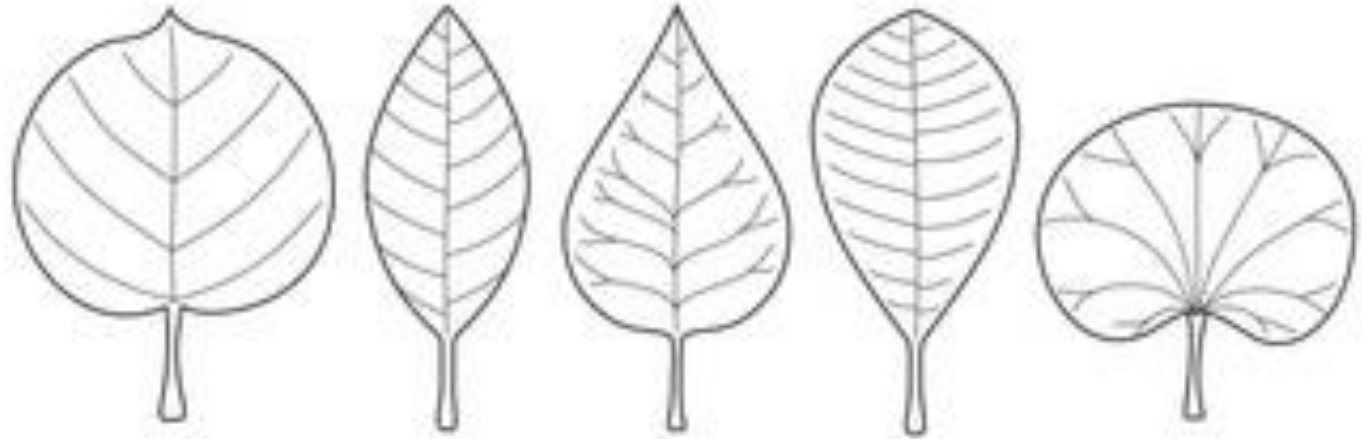
Whorled

Leaf - arrangement

Weed ID basics

■ Morphology

- Identifying characteristics



Orbicular

Elliptical

Ovate

Obovate

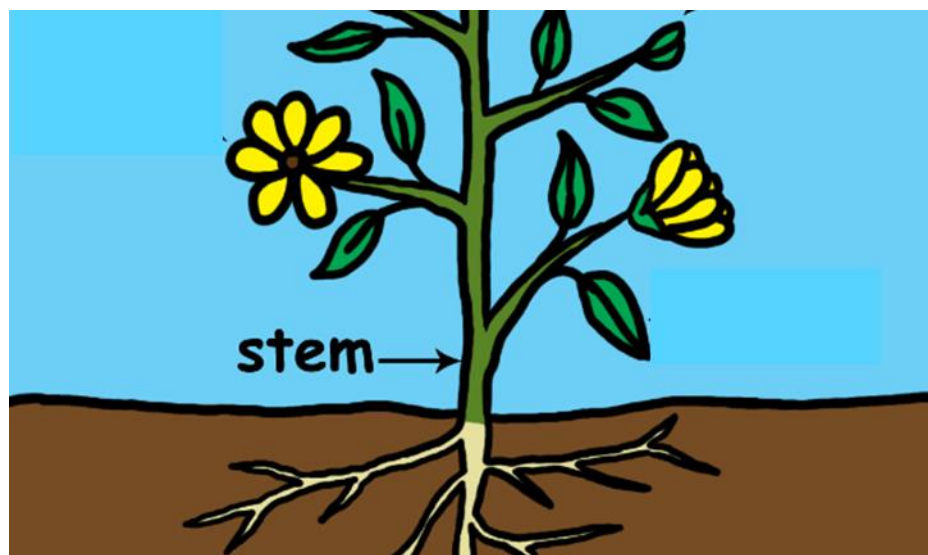
Reniform

Leaf - shapes

Weed ID basics

■ Morphology

- Identifying characteristics



Stem - presence or absence of hairs

Weed ID basics

■ Morphology

- Identifying characteristics



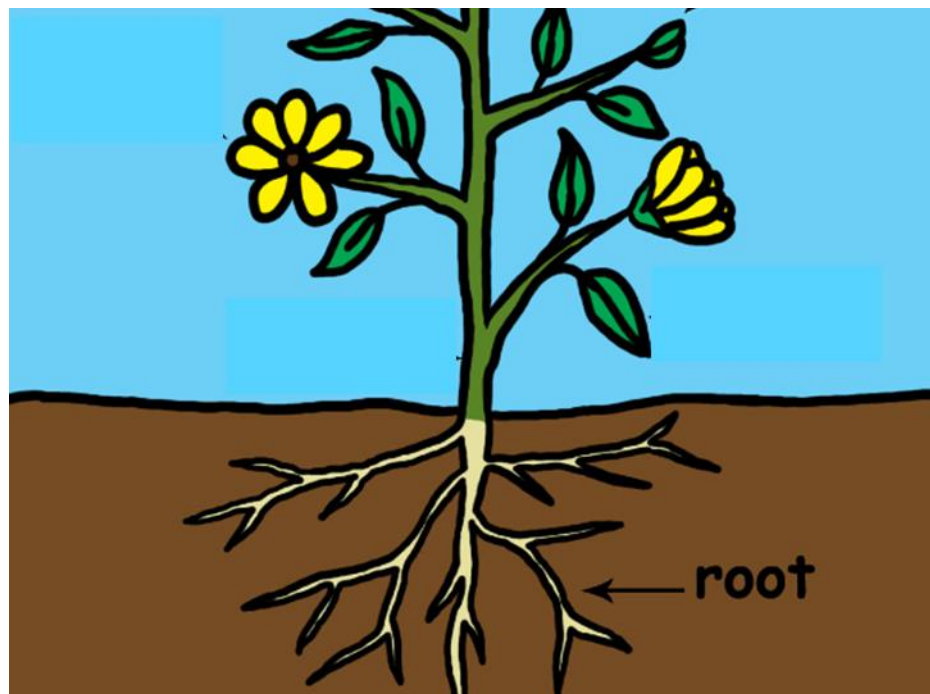
Stem - presence of hairs

Florida Pusley – *Richardia scabra*

Weed ID basics

■ Morphology

- Identifying characteristics



Roots – annuals vs perennials

Weed ID basics

■ Morphology

- Identifying characteristics



Flower heads/seed heads - Shape, color etc.

Morphology

Flower/Seed head

Yellow v/s Purple
Nutsedge



Morphology

Seed head

Bahia grass



'V' shaped seed head

Morphology

Seed head

Bermuda
grass



Seed head cluster of 3-5

Morphology

Seed head

Crow foot
grass



'Seed head looks like a crow's foot

Morphology

Purple

Yellow



Yellow v/s Purple
Nutsedge

Leaf tip

Morphology

Yellow v/s Purple
Nutsedge

Leaf tip

Purple

Yellow



Morphology

Stem attachment to leaf

Pennywort or Dollar weed:

- stem attaches to the leaf in the center of the leaf



Morphology

Stem attachment to leaf

Pennywort or Dollar weed:

- stem attaches to the leaf in the center of the leaf



Dichondra:

- stem attaches at the edge of a kidney-shaped leaf



Morphology

Stem attachment to leaf

Pennywort or Dollar weed:

- stem attaches to the leaf in the center of the leaf



Dichondra:

- stem attaches at the edge of a kidney-shaped leaf



Creeping Charlie:

- stem attaches at the edge of leaf
- leaves have ragged edge



Morphology

Sheath Color

Yellow foxtail:

- Reddish leaf sheath



Nutsedge

- green leaf sheath



Morphology

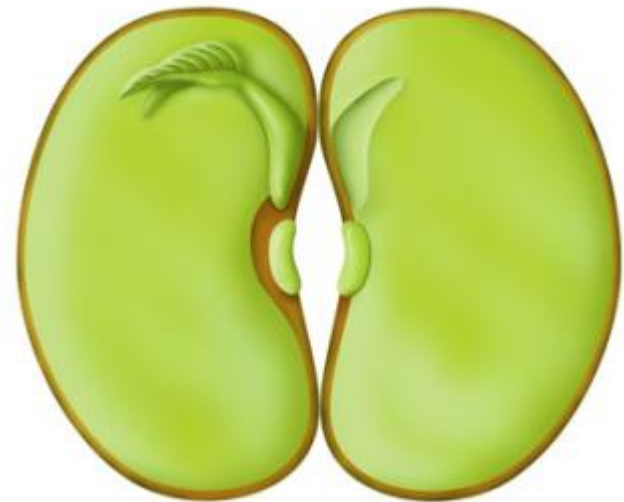
Monocots vs Dicots

- A cotyledon is the part of the seed that will grow into the leaves.

Monocots has one cotyledon



Dicots get their names from having two cotyledons instead of one.



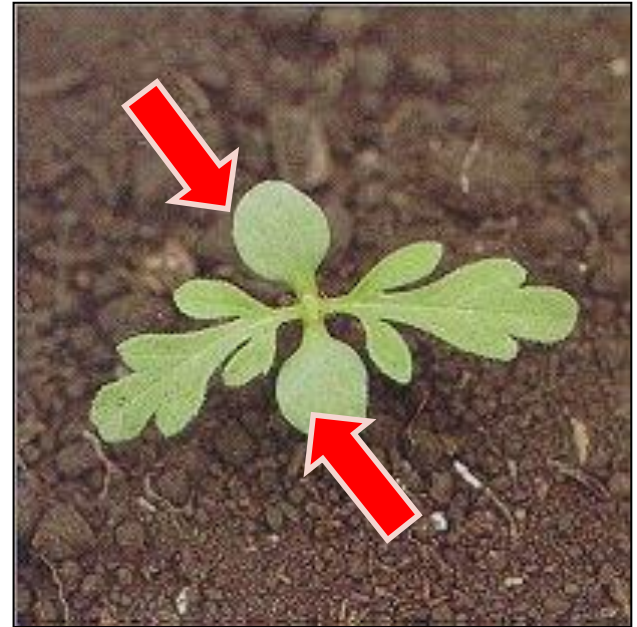
Monocots vs Dicots

- A cotyledon is the part of the seed that will grow into the leaves.

Monocots has one cotyledon



Dicots get their names from having two cotyledons instead of one.



Monocots vs Dicots

Monocot leaves have **parallel** or up and down veins



Dicot leaves have veins that are **scatter** or “**netted.**”
- They do not follow a pattern.



- **Dayflower**

- Actually a monocot
- So better response to grass killers



Monocot leafs have parallel or up and down veins

Monocots vs Dicots

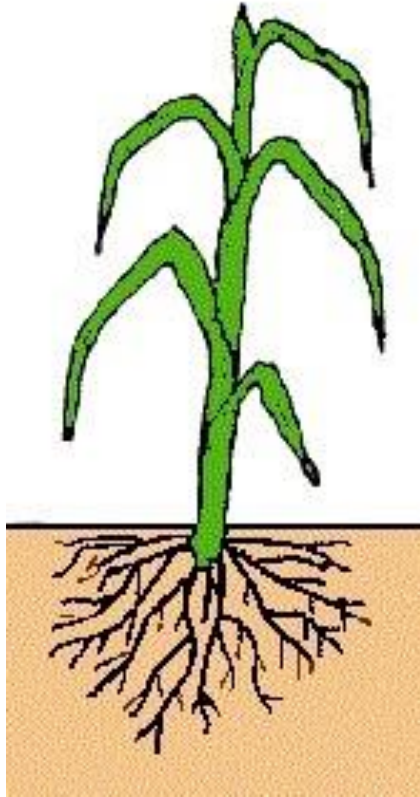
Monocot can be identified by their flowers parts. The flower parts on a monocot plant come in multiples of 3



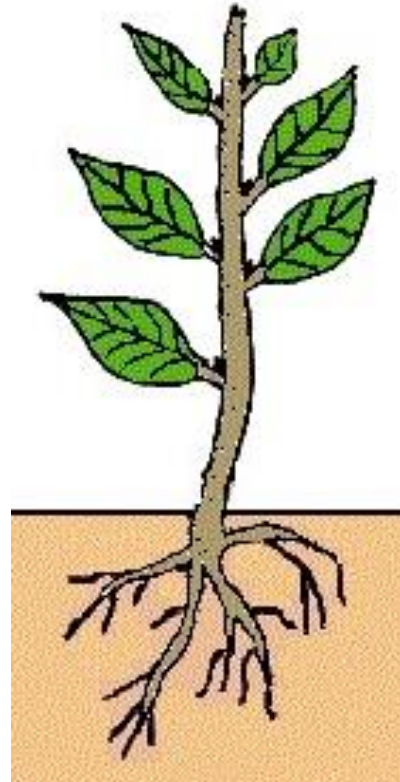
Dicot flower parts come in multiples of 4 or 5



Monocots vs Dicots

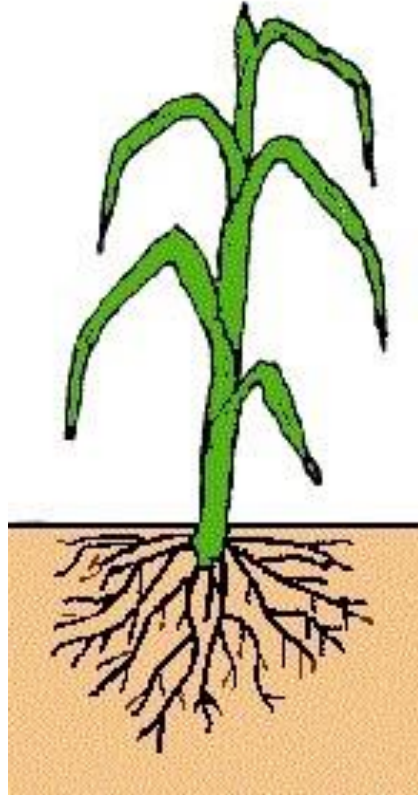


Monocot
Grasses, sedges



Dicot
Broad-leaf

Monocots



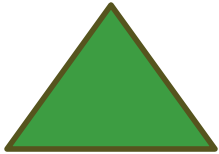
Monocot
“Grasses vs sedges”

Comparison of Sedges and Grasses

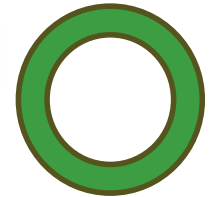
Stems and Leaves

- Sedge: solid, triangular; closed leaf sheath

- Grass: hollow, round; open leaf sheath



Sedges



Grasses

Weed ID basics

- **Morphology**

- Structure and form

- **Life cycle**

- How it develops and reproduce

Life-cycle of weeds

Annuals

Complete their life cycle
from seed to seed in
less than one year

Life-cycle of weeds

Annuals



Amaranth



Crab grass



Pusley

Life-cycle of weeds



**Winter
Annuals**

v/s

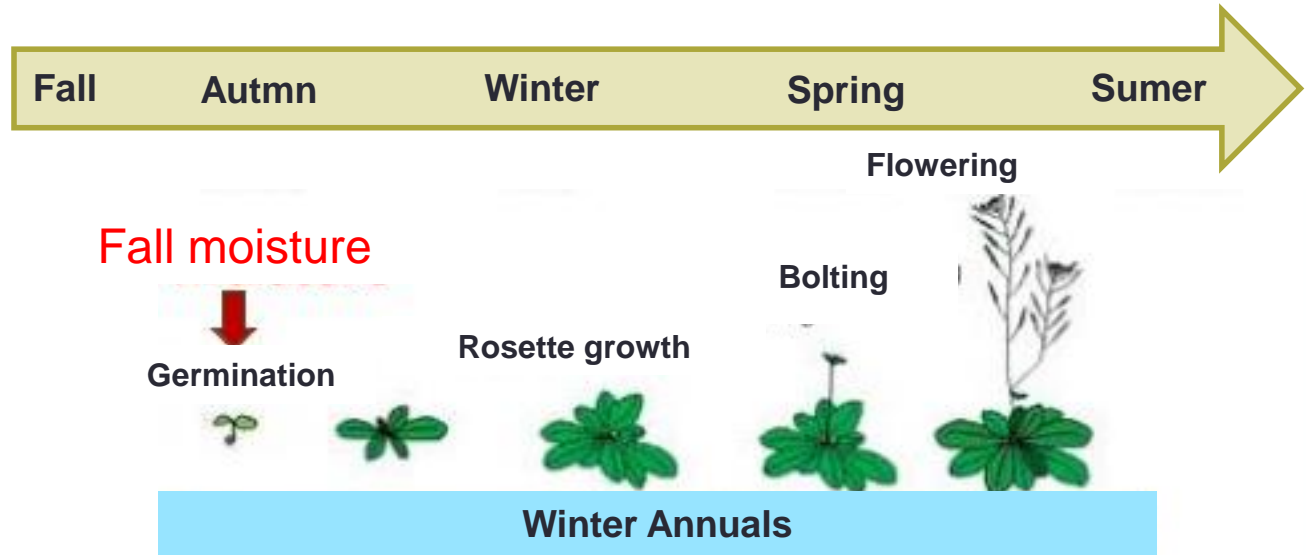
**Summer
Annuals**

Life-cycle of weeds

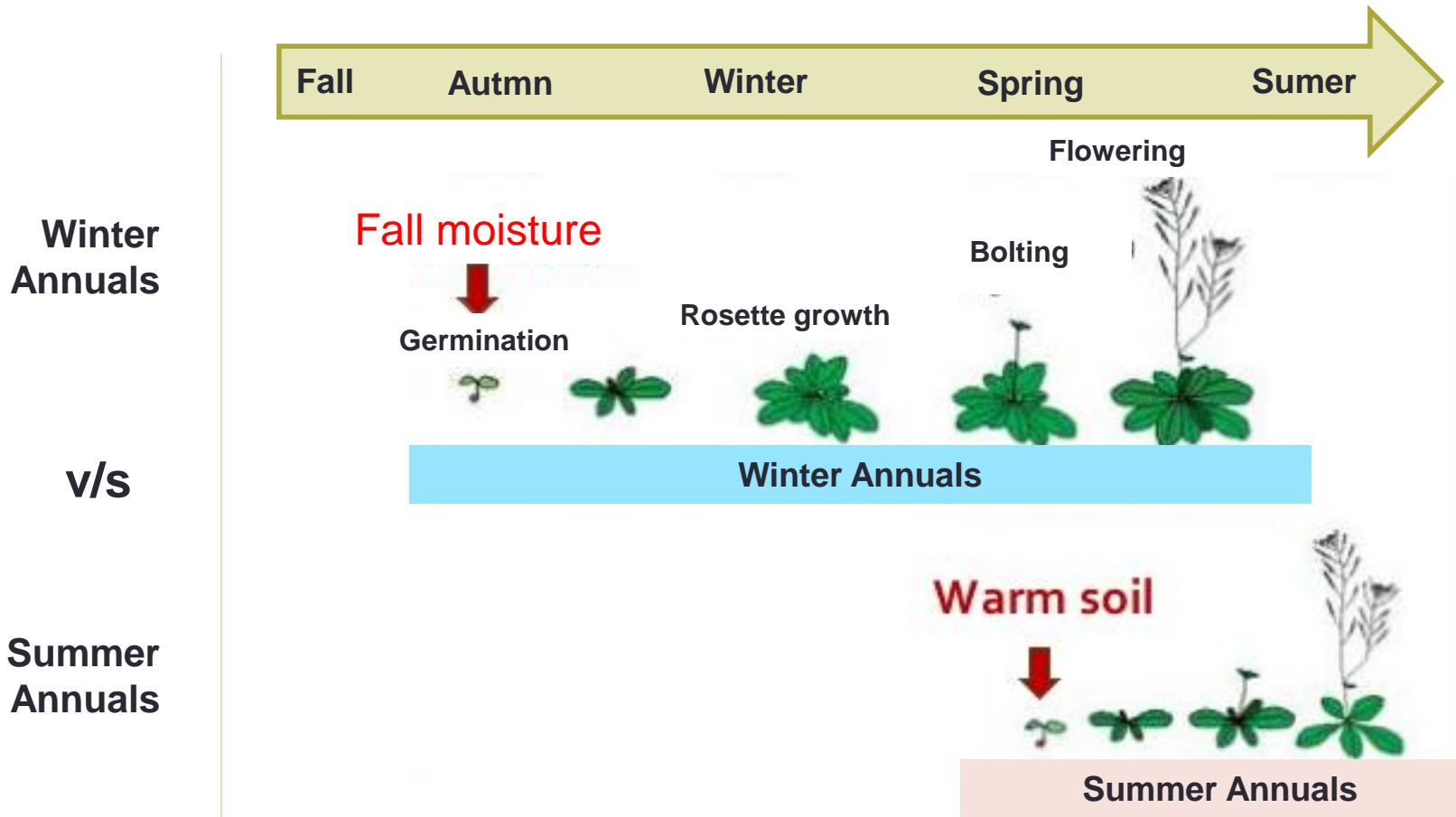
Winter
Annuals

v/s

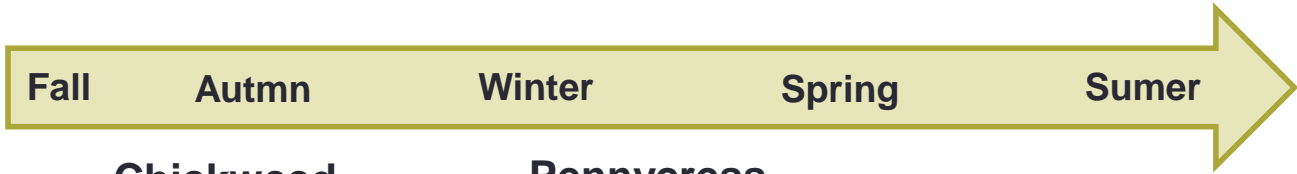
Summer
Annuals



Life-cycle of weeds



Life-cycle of weeds



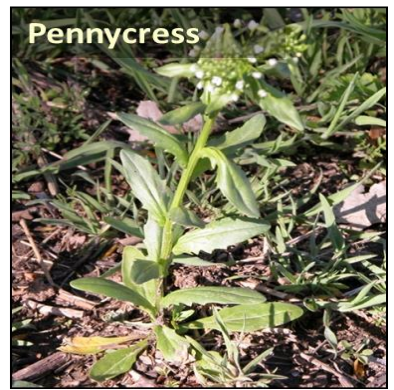
Winter
Annuals

v/s

Chickweed



Pennycress



Summer
Annuals



Crab grass

Life-cycle of weeds

Biennial

- Emerge from seed & grow during the first year
- Produce flowers and produce seeds in the second year

Life-cycle of weeds

Biennial



Cut leaf evening primrose
– Rosette stage (**First year**)

Life-cycle of weeds

Biennial



Rosette stage



Cut leaf evening primrose
– Flowering stage (Second year)

Life cycle of weeds

Perennials

- Perennial weeds can grow and produce flowers for multiple years
- Produce vegetative structures that generate new plants

Life cycle of weeds

Perennials



Nut sedge

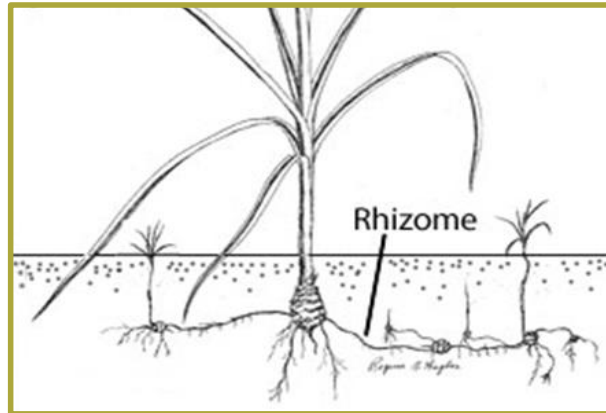
- Produce vegetative structures
- Eg., stolons, rhizomes, tubers, or large roots



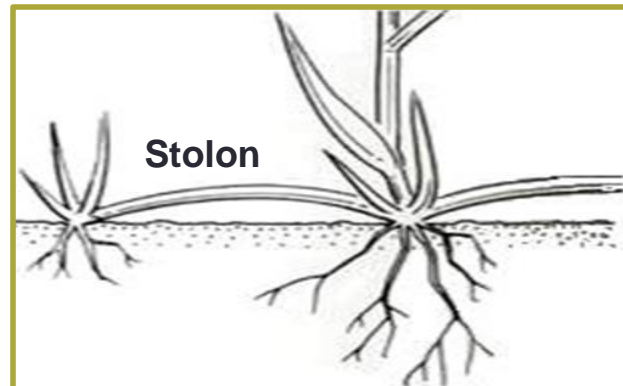
Creeping beggar weed

Life cycle of weeds

Perennials



Rhizome
- underground

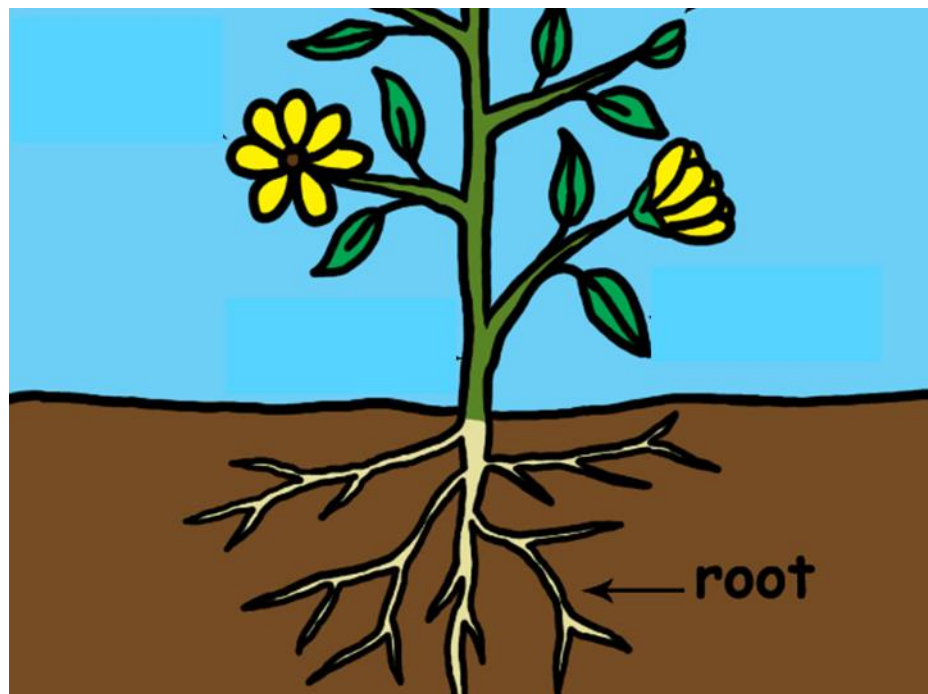


Stolon
- above ground

Weed ID basics

■ Morphology

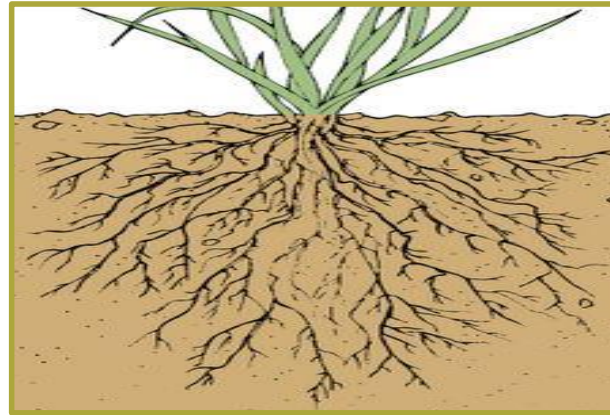
- Identifying characteristics



Roots – annuals vs perennials

Life cycle of weeds

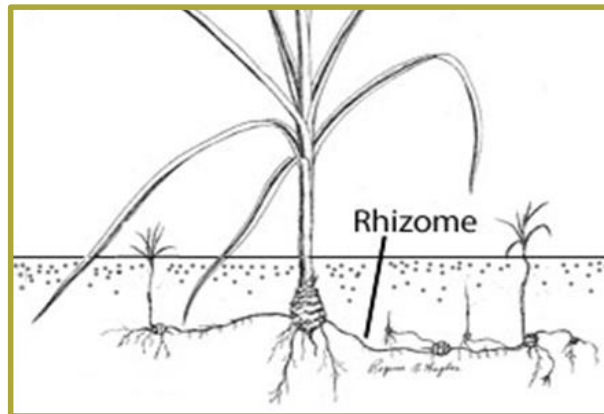
Annuals



Fibrous roots

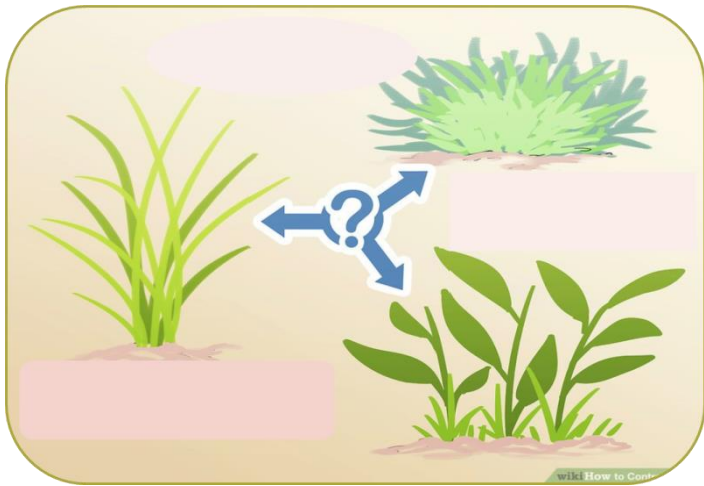
vs

Perennials



Rhizome, Stolon

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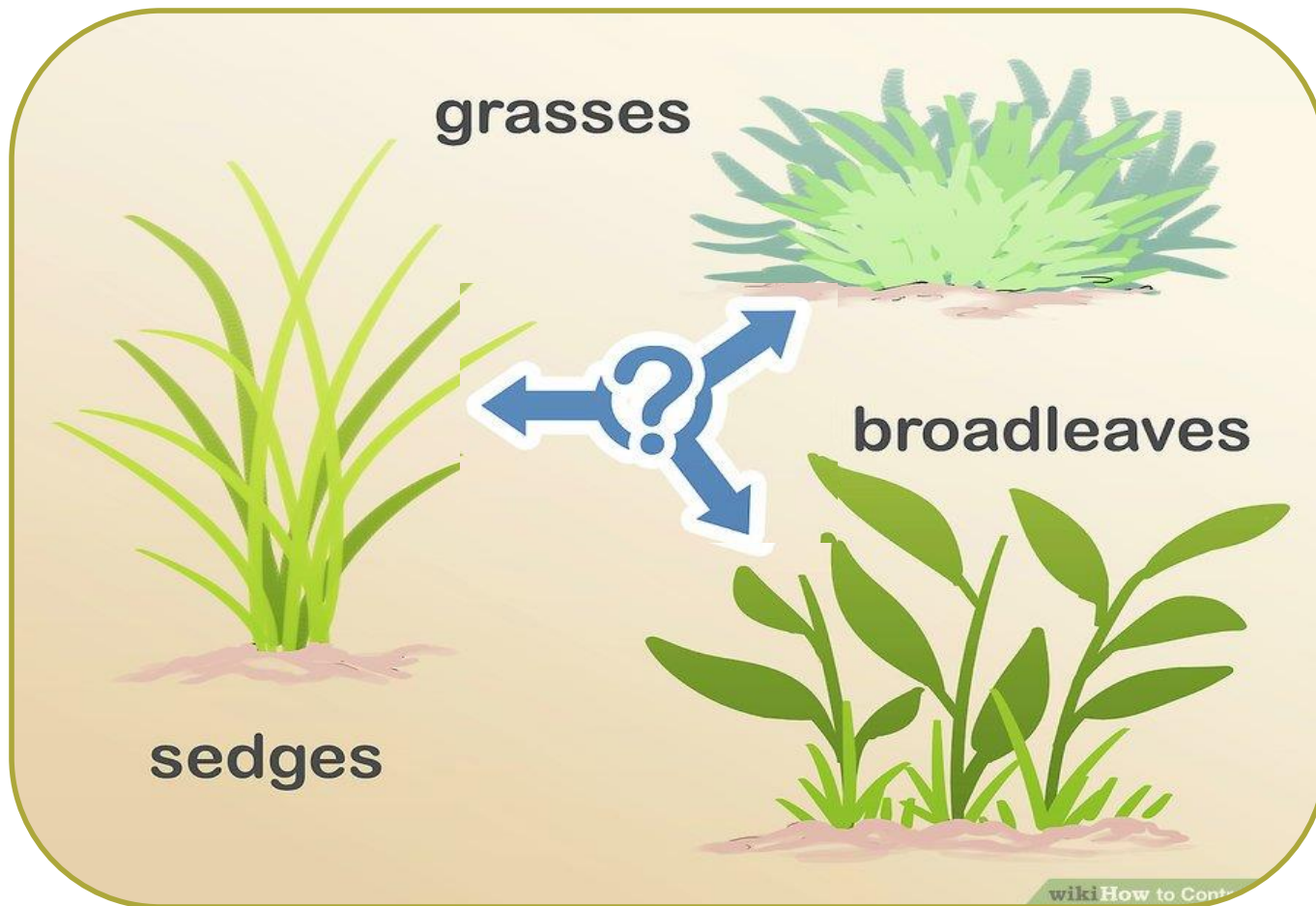
Weed id resources

Plant identification services

Summary

Weed Identification Tools

Stumped in the Field?



Weed Identification Tools

PLANTS National Database (USDA)

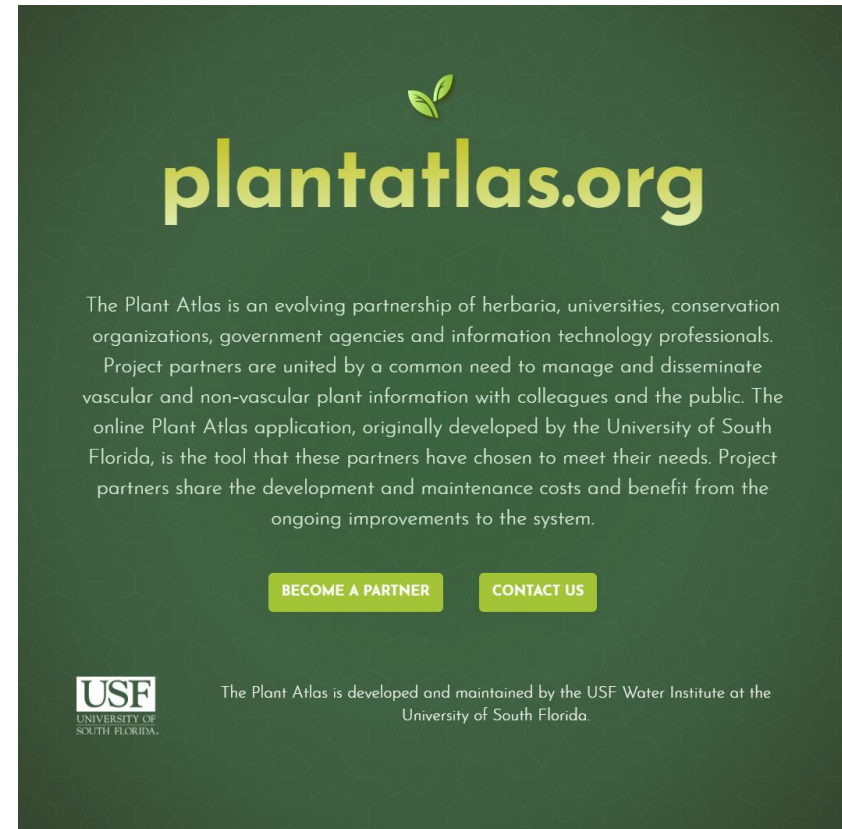
- Good information, some pictures
- Searchable format
- <http://plants.usda.gov/>

The screenshot displays the PLANTS National Database website. At the top, the USDA logo and 'United States Department of Agriculture' are on the left, and the NRCS logo is on the right. Below this is a banner for the 'PLANTS Database' featuring various plant images. A navigation menu includes 'Home', 'About PLANTS', 'Team', 'Partners', 'What's New', 'NPDT', 'Help', and 'Contact Us'. On the left side, there is a 'Search' section with a 'Name Search' input field, a 'Scientific Name' dropdown, and a 'Go' button. Below the search field are links for 'State Search', 'Advanced Search', and 'Search Help'. A 'PLANTS Topics' section lists categories like 'Alternative Crops', 'Characteristics', 'Classification', 'Cover Crops', 'Culturally Significant', 'Distribution Update', and 'Documentation'. The main content area features a 'Plant of the Week' section with a photo of a mountain lady's slipper, its scientific name *Cypripedium montanum* Douglas ex Lindl., and a link to its full profile. To the right, an 'I Want To...' section offers various options such as 'See a list of the plants in my state', 'Learn about the wetland plants in my region', and 'Download data or posters'. The breadcrumb trail at the top of the main content area reads 'You are here: Home/'.


Weed Identification Tools

Atlas of Florida Vascular Plants

- University of South Florida
- Taxonomic information, distribution maps
- <http://www.plantatlas.usf.edu/>




The screenshot shows the homepage of plantatlas.org. At the top, there is a small green leaf icon above the text "plantatlas.org" in a large, bold, yellow-green font. Below this, there is a paragraph of text in white: "The Plant Atlas is an evolving partnership of herbaria, universities, conservation organizations, government agencies and information technology professionals. Project partners are united by a common need to manage and disseminate vascular and non-vascular plant information with colleagues and the public. The online Plant Atlas application, originally developed by the University of South Florida, is the tool that these partners have chosen to meet their needs. Project partners share the development and maintenance costs and benefit from the ongoing improvements to the system." Below the text are two yellow-green buttons with white text: "BECOME A PARTNER" and "CONTACT US". At the bottom left is the USF logo (University of South Florida). At the bottom right is the text: "The Plant Atlas is developed and maintained by the USF Water Institute at the University of South Florida."


plantatlas.org

The Plant Atlas is an evolving partnership of herbaria, universities, conservation organizations, government agencies and information technology professionals. Project partners are united by a common need to manage and disseminate vascular and non-vascular plant information with colleagues and the public. The online Plant Atlas application, originally developed by the University of South Florida, is the tool that these partners have chosen to meet their needs. Project partners share the development and maintenance costs and benefit from the ongoing improvements to the system.

[BECOME A PARTNER](#) [CONTACT US](#)

 The Plant Atlas is developed and maintained by the USF Water Institute at the University of South Florida.

Plant Identification Tools

Invasive Plants of the U.S.

- Identification and control
- <http://www.invasive.org/>



Invasive Plant Atlas
of the United States

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Invasive Plant Atlas
of the United States

Contribute Plant Distribution Data to EDDMapS
Early Detection & Distribution Mapping System

Contribute Pictures of Invasive Plants to BUGWOOD Image Database System

Invasive Species News

- Tallotree Spread Increased by Hurricanes
- Cooperative Extension Advisor needed in California, serving Monterey, San Benito, and San Cruz Counties
- New Wood Boring Beetle Attacks Tree-of-heaven
- Minnesota Department of Agriculture is looking for an Entomologist!
- Antkey Mobile, USDA ITP's newest app
- Want to move to Wisconsin?
- Webinar on Invasive Species and Legal Challenges. Sponsored by: Agricultural and Food Law Consortium
- Using Drones to Track Dangerous Invasive Species
- Privet biology and management in southeastern U.S. forests
- Dobbins Air Reserve Base, Georgia Invasive Plant Control Update
- More News

Non-native invasive species are organisms that have been introduced by humans either purposely or by accident and that have become serious environmental pests. One reason for their success as pests is that they are typically introduced without the array of associated natural controls (herbivores, parasites, pathogens, predators) that occur in their native range. In addition to the great loss of biodiversity, habitat degradation and other ecological consequences, invasive species cause huge economic damages valued in billions of dollars annually and some pose a human health threat.

Invasive alien plants threaten native species and habitats by competing for critical and often limited resources like sunlight, water, nutrients, soil and space. They succeed through vigorous growth, prolific reproductive capabilities and by causing changes that favor their growth and spread. Invasive plant species displace and alter native plant communities, impede forest regeneration and natural succession, change soil chemistry, alter hydrologic conditions, alter fire regimes, cause genetic changes in native plant relatives through hybridization and some serve as agents for the transmission of harmful plant pathogens.

The Invasive Plant Atlas of the United States is a collaborative project between the National Park Service, the University of Georgia Center for Invasive Species and Ecosystem Health, the Invasive Plant Atlas of New England and the Lady Bird Johnson Wildflower Center. The purpose of the Atlas is to assist users with identification, early detection, prevention, and management of invasive plants. The focus is on non-native invasive plant species impacting natural areas, excluding agricultural and other heavily developed and managed lands. Four main components are species information, images, distribution maps, and early detection reporting procedures. The Invasive Plant Atlas is one step in the effort to combat invasive species, preserve our natural landscapes and the native plants, animals, and other creatures that inhabit them.

University of Florida - Plant Identification Resources

Aquatic and Invasive Plants - UF

- Excellent pictures and information



Center for Aquatic and Invasive Plants
University of Florida, Institute of Food and Agricultural Sciences

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[FWC Weed Alerts](#)

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University of Florida - Plant Identification Resources

Range Cattle REC - UF

- Excellent pictures and information

Range Cattle Research & Education Center

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Programs

- Agronomy
- Animal Sciences
- Economics
- Soil & Water Science
- Weed Science
- Rangeland Wildlife and Ecosystems

Extension

- Ask a Question
- Calculators
- Florida Cattle Market Price Watch
- Join Mailing List
- Links
- Publications
- Virtual Classroom (Videos & Slides)





Personnel

- Employment
- Faculty
- Staff
- Students

IFAS Resources

- EDIS Publications

Brent Sellers - Weed Identification

Common Name	Scientific Name	Picture (click to enlarge)
American Black Nightshade	<i>Solanum americanum</i>	
Angle-pod Blue Flag	<i>Iris hexagona</i>	
Arrowleaf sida	<i>Sida rhombifolia</i>	
Asiatic hawksbeard	<i>Youngia japonica</i>	

University of Florida - Weed Identification Education

“Weed garden at SWFREC Immokalee”

About 30 species of
weeds now

Programs planned

- Weed id training
- Youth programs etc.



KNOW YOUR WEEDS

Please visit our

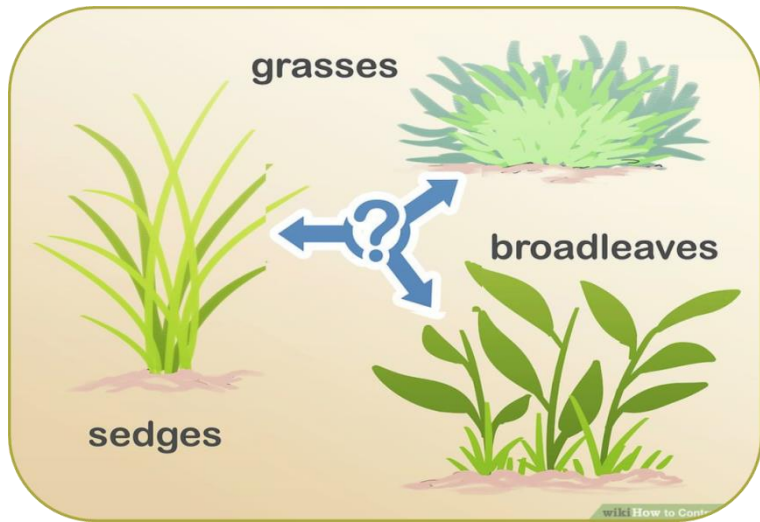
Weed Garden

**EDUCATIONAL DISPLAY OF
DIFFERENT TYPES OF WEEDS**

**UNIVERSITY OF FLORIDA
SOUTHWEST FLORIDA REC - WEED SCIENCE**

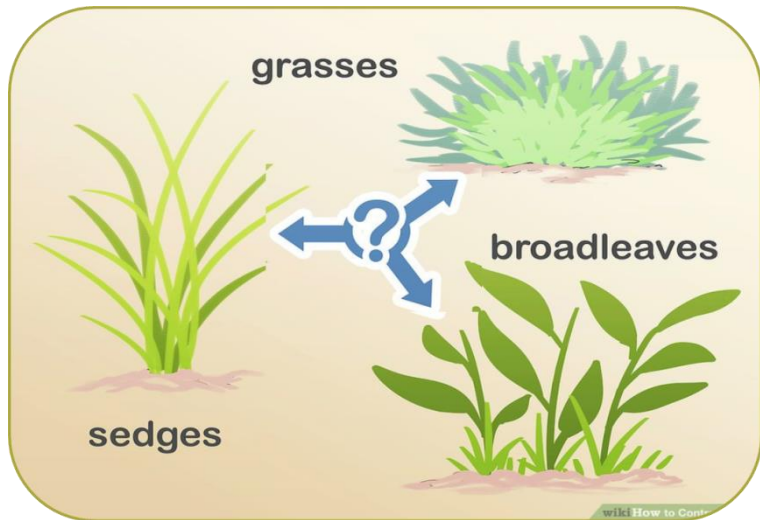
2685 STATE ROAD 29 N, IMMOKALEE, FL 34142

Stumped in the Field?



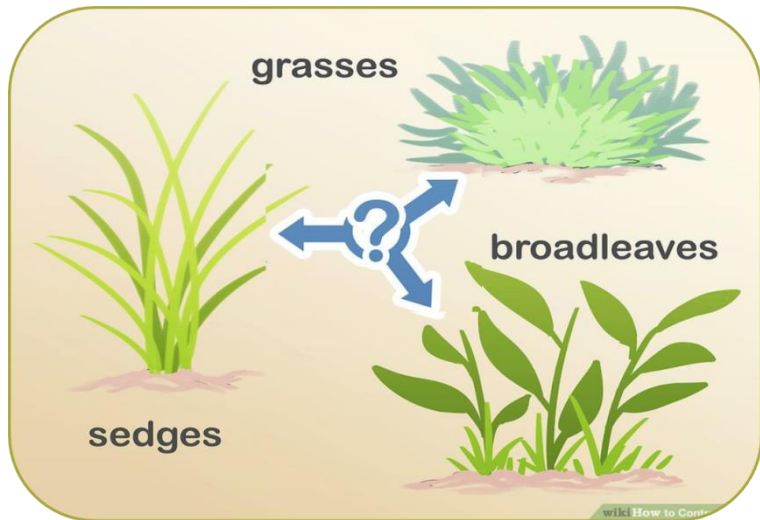
- Get the plant sample
- Store in plastic bag with damp paper towel
- 8-10 hours maximum!
- Change paper often while drying
- Don't store it in your hot car

Stumped in the Field?



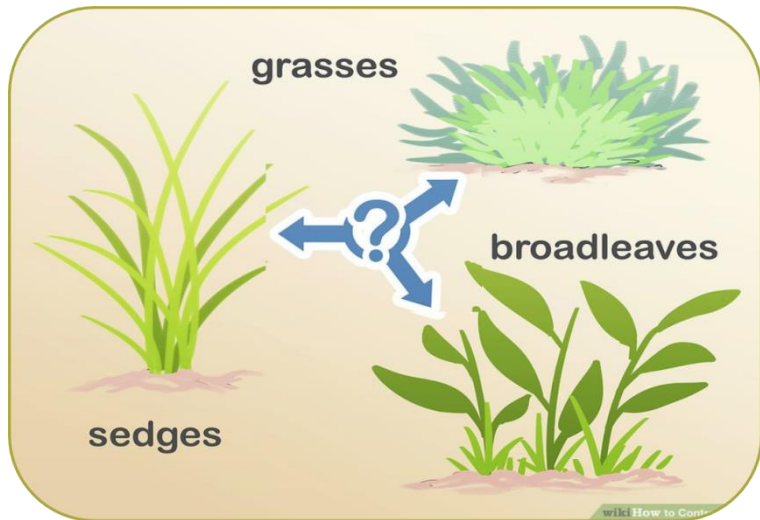
- Get the plant sample
- Store in plastic bag with damp paper towel
- 8-10 hours maximum
- Change paper often while drying
- Don't store it in your hot car
- **Pictures or Digital Images**
 - Overall view (growth habit)
 - Specific characteristics

Stumped in the Field?



- Plant diagnostic clinics
 - County Extension
 - SWFREC
- UF herbarium service

Stumped in the Field?

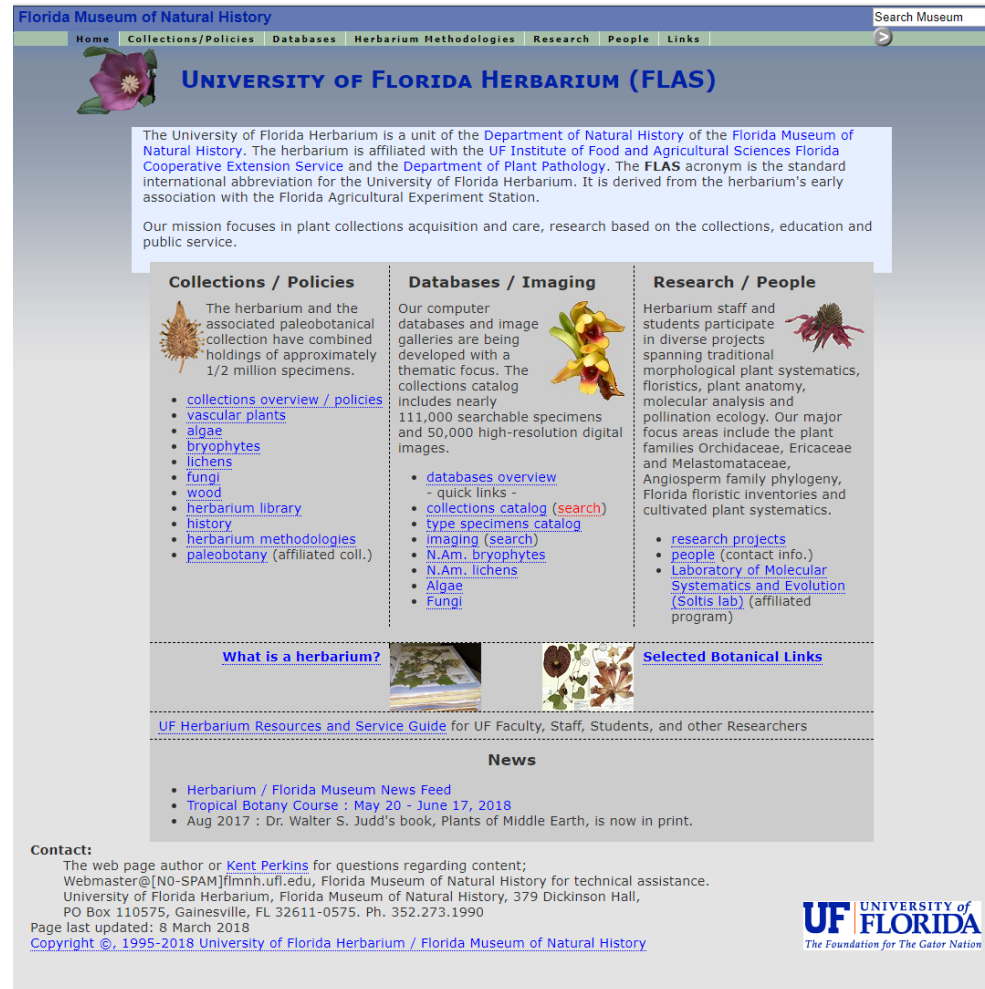


- Plant diagnostic clinics
 - County Extension
 - SWFREC
- **UF herbarium service**

University of Florida - Plant Identification Resources

UF Herbarium Service

Florida Museum of Natural History
379 Dickinson Hall
P.O. Box 110575
Gainesville, FL 32611-0575
(352) 273-1990
E-Mail: plantid@flmnh.ufl.edu



Florida Museum of Natural History



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UNIVERSITY OF FLORIDA HERBARIUM (FLAS)

The University of Florida Herbarium is a unit of the Department of Natural History of the Florida Museum of Natural History. The herbarium is affiliated with the UF Institute of Food and Agricultural Sciences Florida Cooperative Extension Service and the Department of Plant Pathology. The FLAS acronym is the standard international abbreviation for the University of Florida Herbarium. It is derived from the herbarium's early association with the Florida Agricultural Experiment Station.

Our mission focuses in plant collections acquisition and care, research based on the collections, education and public service.

Collections / Policies	Databases / Imaging	Research / People
<p>The herbarium and the associated paleobotanical collection have combined holdings of approximately 1/2 million specimens.</p> <ul style="list-style-type: none">collections overview / policiesvascular plantsalgaebryophyteslichensfungiwoodherbarium libraryhistoryherbarium methodologiespaleobotany (affiliated coll.)	<p>Our computer databases and image galleries are being developed with a thematic focus. The collections catalog includes nearly 111,000 searchable specimens and 50,000 high-resolution digital images.</p> <ul style="list-style-type: none">databases overviewquick linkscollections catalog (search)type specimens catalogimaging (search)N.Am. bryophytesN.Am. lichensAlgaeFungi	<p>Herbarium staff and students participate in diverse projects spanning traditional morphological plant systematics, floristics, plant anatomy, molecular analysis and pollination ecology. Our major focus areas include the plant families Orchidaceae, Ericaceae and Melastomataceae, Angiosperm family phylogeny, Florida floristic inventories and cultivated plant systematics.</p> <ul style="list-style-type: none">research projectspeople (contact info.)Laboratory of Molecular Systematics and Evolution (Soltis lab) (affiliated program)

[What is a herbarium?](#)  [Selected Botanical Links](#) 

[UF Herbarium Resources and Service Guide](#) for UF Faculty, Staff, Students, and other Researchers

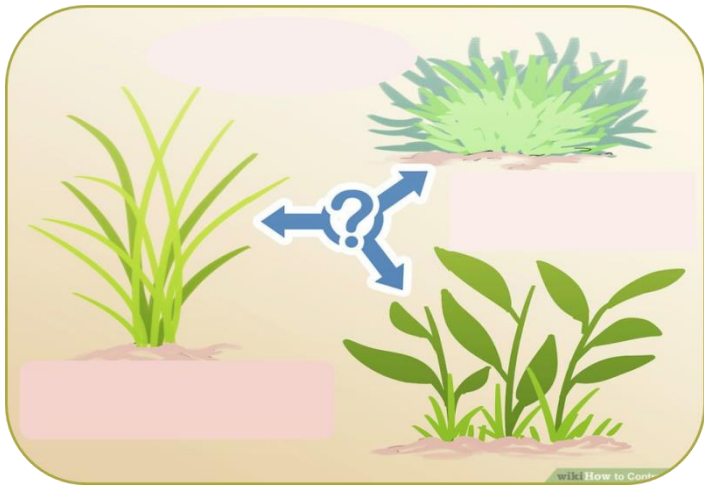
News

- [Herbarium / Florida Museum News Feed](#)
- [Tropical Botany Course : May 20 - June 17, 2018](#)
- Aug 2017 : Dr. Walter S. Judd's book, *Plants of Middle Earth*, is now in print.

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[Webmaster@\[NO-SPAM\]flmnh.ufl.edu](mailto:Webmaster@[NO-SPAM]flmnh.ufl.edu), Florida Museum of Natural History for technical assistance.
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Page last updated: 8 March 2018
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UF UNIVERSITY OF FLORIDA
The Foundation for The Gator Nation

Talk contents



Introduction

- Significance of weed id

Weed identification - basics

- Morphology
- Life cycle

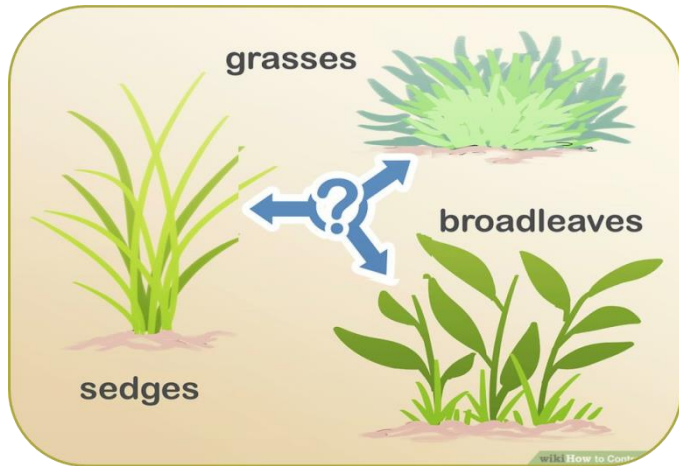
Weed id resources

Plant identification services

Summary

Weed identification

- Summary

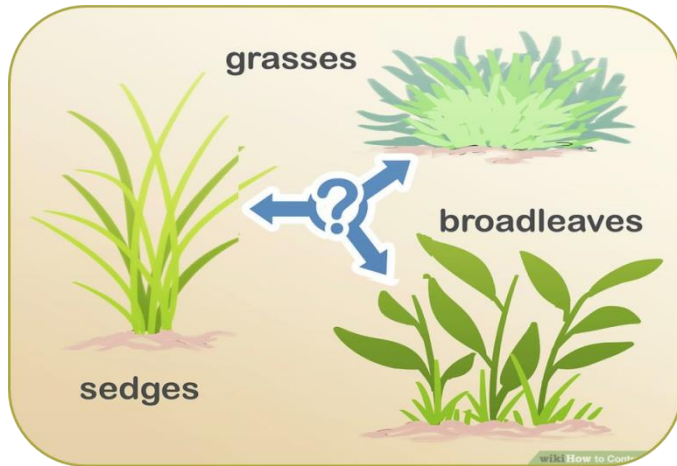


■ Systematic weed identification

- Important step in efficient weed management

Weed identification

- Summary



■ Systematic weed identification

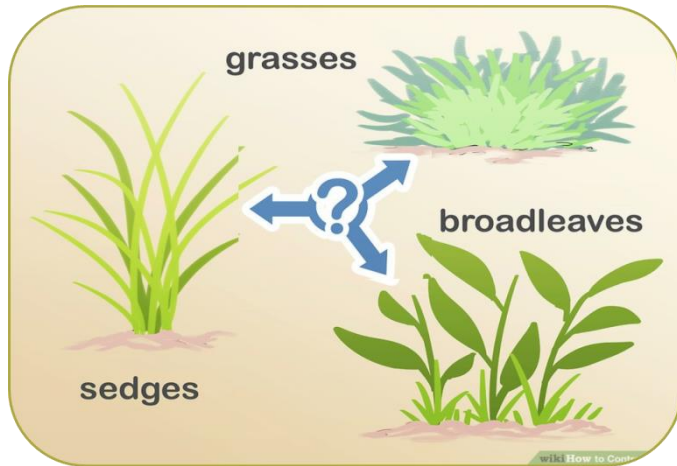
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■ Weed ID basics

- Morphology
- Life cycle

Weed identification

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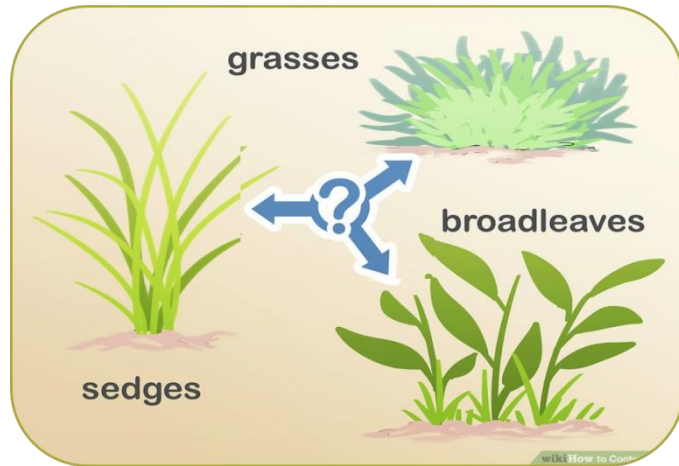
■ Weed ID basics

• Morphology

- Leaves, flower heads, roots
- Monocot vs Dicot
- Grass vs sedge

Weed identification

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■ Systematic weed identification

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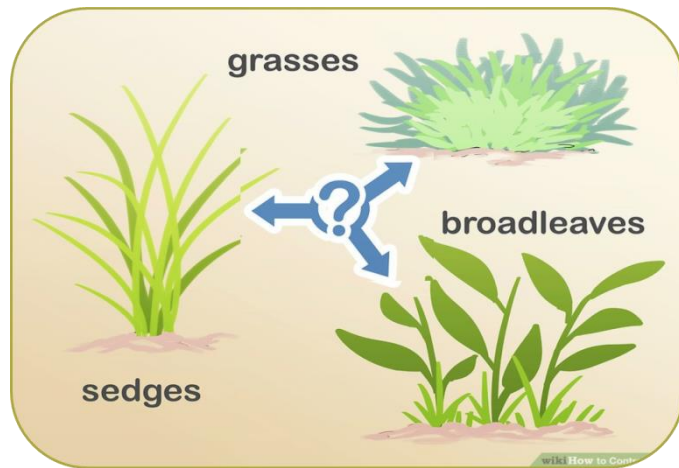
- Leaves, flower heads, roots
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• Life cycle

- Annuals
- Biennials
- Perennials – stolon, rhizomes

Weed identification

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■ Systematic weed identification

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• Morphology

- Leaves, flower heads, roots
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- Grass vs sedge

• Life cycle

- Annual
- Biennial
- Perennial – roots

■ Weed ID resources

- Web, UF resources, diagnostic clinic,
- Herbarium service
- SWFREC weed garden

Thank you...



SWFREC weed science team

Contact

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