

# Chapter 9

# Weed Control

by F. Baldwin, L. Oliver and K. Smith

The following information guides are available from the Cooperative Extension Service, University of Arkansas to aid growers in making weed control decisions:

1. *Soybean Weed Control Computer Program*
2. *Recommended Chemicals for Weed and Brush Control in Arkansas (MP-44)*
3. *Your County Extension Agent*

*Soybean Weed Control* is a computer program that will determine the potential yield losses due to any given combination of weeds and infestation levels. In addition, it will select the most effective soil-applied and postemergence herbicides for any combination of soybean weeds entered. The cost of the computer program is \$15, and it is available from the Cooperative Extension Service, Attention: Steve Hall, P. O. Box 391, Little Rock, AR 72203; or by contacting your county Extension agent.

*Recommended Chemicals for Weed and Brush Control in Arkansas (MP-44)*, available from any county Extension office, contains a complete listing of all herbicides available for weed control in soybeans. It also contains other information, such as:

- Herbicide Rates
- Reduced Rate Recommendations
- Weed Response Ratings
- Crop Rotation Restrictions
- Tank Mix Compatibility
- Proper Nozzle Selection
- Herbicide Application
- Guideline for Preventing Herbicide Resistance

*Your County Extension Agent* receives extensive training and updates on soybean weed control technology. The agent also has immediate access to research scientists and Extension specialists within the University of Arkansas system.

## Keys to Weed Management

### Proper Weed Identification – Don't Guess!

Weeds must be properly identified in the seedling stage in order to select the most effective herbicides. Weeds such as hemp sesbania versus northern jointvetch and prickly sida versus hophornbeam copperleaf can be difficult for the untrained eye. While the weeds may look similar, they can have an opposite response to any given herbicide.



### Management Tip

Get immediate identification of any new or "strange" weed that may appear in a field for the first time and stop reproduction.

Sources of help on weed identification are:

- The *color photos (Figure 9.4, Seedling and Immature Weeds)* at the end of this chapter (also refer to Figure 9.3).
- *SWSS Weed Identification Guide* available as a reference in the county Extension agent's office or order forms are available for purchase from the county Extension office.
- The *County Extension Agent* – Take the weed in to the agent or ask the agent to come look.

### Scouting – You Have to Look!

Fields should be scouted at harvest and maps constructed identifying all weed species present. This information is important for selecting soil-applied herbicide for the following crop. Fields should then be scouted beginning about seven days after crop emergence to determine both weed species present and plant density. This information is necessary to decide if treatment is needed and which postemergence herbicides will be most effective.

## Give the Advantage to the Soybeans

Any practice that promotes rapid soybean stand establishment, proper plant density and rapid canopy closure will increase the ability of soybeans to compete with weeds, thereby increasing the effectiveness of a given herbicide program.

### How Weeds Affect the Crop

Weeds reduce income by lowering yields, reducing harvesting efficiency, causing foreign matter dockage and contaminating the soil for future crops.



### Management Tip

Have fields weed free by 14 days after soybean emergence for the greatest returns on herbicide investment.

### Proper Use of Soil-Applied Herbicides

Growers are becoming increasingly dependent on postemergence herbicides. However, in situations where weed densities are severe or proper application timings for postemergence herbicides are

Table 9.1. Example Interference Losses Caused by Selected Weeds at Various Plant Densities (Percent Soybean Yield Reduction Due to Weed Interference)

Weed Species	Weeds/20 Ft of Row (Full-Season)			
	5	10	20	40
	----- (% Yield Loss) -----			
Palmer amaranth	26	40	64	66
common cocklebur	30	44	58	73
entireleaf morningglory	26	36	46	56
smooth pigweed	11	22	45	49
sicklepod	7	16	31	47
velvetleaf	9	14	25	38
common ragweed	6	12	24	48
johnsongrass	12	15	21	32
spurred anoda	0	---	5	16
jimsonweed	4	7	12	13
barnyardgrass	0	0	1	2
hemp sesbania	7	17	37	59
pitted morningglory	1	16	31	46

Table 9.2. Percent Savings in Potential Gross Returns by Controlling Common Cocklebur at Specified Times

Plants/20 Ft of Row	Weed Controlled by (Weeks After Emergence)			
	0-3	4	6	8
	----- (% Savings in Returns) -----			
2	13	11	8	5
4	26	22	16	11
10	43	36	27	18
20	56	47	35	24
40	68	57	43	28

frequently missed, soil-applied herbicides greatly improve weed control even in Roundup Ready programs.

Match the herbicides to the weeds.

- Refer to MP-44.
- Refer to *Soybean Weed Control* computer program.
- Refer to weed response ratings in Table 9.3 (later in this chapter).



### Management Tip

Take advantage of reduced rate recommendations and use soil-applied treatments consisting of a grass herbicide, plus a reduced rate of a broadleaf herbicide such as Scepter, Canopy or Canopy XL.

### Note

**Certain soybean cultivars are more sensitive to propanil, metribuzin in Sencor, Lexone and Canopy; and sulfentrazone in Canopy XL. This information is available from your county Extension agent.**

## Proper Choice of Postemergence Herbicides

Choose a herbicide that fits the weed spectrum in the field. If the herbicide does not match the weeds, failure is assured.

- Refer to MP-44.
- Refer to *Soybean Weed Control* computer program.
- Refer to weed response ratings in Table 9.3 (later in this chapter).

## Proper Herbicide Timing

- Applying postemergence herbicides too late is the number one cause for failure in soybean weed control programs.
- Proper timing for postemergence herbicides is from 5 to 14 days after weed emergence. Since

soybeans and the first flush of weeds usually emerge together, the application can be best timed to soybean emergence. An alternative would be to add the normal number of days from planting to emergence on your farm. If one assumes 5 days from planting until emergence, the proper timing would be 10 to 20 days after planting.

- The photographs below illustrate the beginning and ending window for proper postemergence herbicide timing.



Figure 9.1. The proper timing of most postemergence applications is between the V1 and V2 growth stages.

Figure 9.2. V3 growth stage.

Waiting to apply postemergence herbicide applications between V3 and V5 often results in disappointing weed control.



### Note

**After proper choice of herbicides, the three most important factors influencing post-emergence herbicide activity are Timing, Timing and Timing.**



### Management Tip

Apply the first postemergence application 10 days after soybean emergence.

## Environmental Conditions

Next to proper timing, environmental conditions are the most important factors in determining herbicide activity. Soil moisture, temperature and relative humidity (in that order) are the critical factors.

- Soil moisture and application timing often go hand-in-hand. One reason the 7 to 10 days-after-emergence (DAE) application timing is so effective is weeds will seldom be drought-stressed. In contrast, by 14 DAE, drought stress is common if rainfall has not occurred since planting. Beyond 14 DAE, weeds will almost always be drought-stressed if rainfall has not occurred since planting.



### Management Tip

If adequate rainfall does not occur after planting and soil moisture is being lost, consider making the postemergence application two or three days earlier than intended.

- Even a herbicide like Roundup Ultra that is capable of killing large weeds will fail unless soil moisture is adequate.
- Temperature and relative humidity cannot be changed. However, higher temperatures and higher relative humidity can mean lower herbicide rates can be used.
- Optimum soil moisture is needed for proper activation of preplant incorporated herbicides.
- Rainfall or overhead irrigation is needed within five days to activate preemergence herbicides.



### Management Tip

If soil moisture is getting marginal, consider application just before dark to take advantage of higher nighttime relative humidity and dew formation.

### Save \$\$

Early timing and good growing conditions will allow the use of reduced rates in MP-44 to save \$\$.

## Put Together a Program

Today there are two primary types of weed control programs:

- Those for conventional soybeans and
- Those for Roundup Ready soybeans

Programs for most fields planted to conventional soybeans will include both soil-applied and post-emergence herbicides. Fortunately, there are a number of herbicides that are effective on weeds commonly found in Arkansas soybeans. There is usually no "one best" herbicide or herbicide program for all situations. Specific herbicide programs for individual fields must be based on weed species present.

*The following are examples of conventional weed control:*

- **Example 1:** For control of common cocklebur, smooth pigweed, morningglory species, hemp sesbania and annual grasses:

Prowl or Treflan plus reduced rate of Scepter or Canopy XL preplant incorporated, followed by reduced rate of Reflex or Storm applied at 10 DAE.

- **Example 2:** For control of annual grasses, red rice, prickly sida, morningglory and hemp sesbania:

Dual ppi followed by Assure II at 14 DAE followed by Storm one day later.

*Example program for control of most weeds, including sicklepod, Palmer amaranth and red rice in Roundup Ready soybeans:*

- **Example 1:** Roundup at 1 pt/A applied at 10 to 14 DAE and repeated 10 to 14 days later. If the proper timing cannot be assured, see next example.
- **Example 2:** Prowl, or Treflan plus one-half rate of Scepter or Canopy XL, followed by 1 qt/A Roundup at 14 to 21 DAE.
- **Example 3:** If red rice is a predominant weed:

Dual ppi followed by 1 pt/A Roundup 10 to 14 DAE and repeated 10 to 14 days later

### Note

Touchdown and generic glyphosate may be used interchangeably with Roundup Ultra if the formulation has a Roundup Ready label.

## Weed Resistance to Herbicides

In Arkansas and surrounding states, the following examples of weed resistance to herbicides in soybeans have been documented:

- common cocklebur resistance to Scepter
- Palmer amaranth resistance to Scepter, Classic and DNA (Prowl, Treflan, etc.)
- goosegrass resistance to DNA (Prowl, Treflan, etc.)
- johnsongrass resistance to Fusilade and Assure

*The following concepts promote resistance:*

1. Assuming weed resistance will not happen to you – even within a herbicide like Roundup Ultra.
2. Over-dependence on herbicides.
3. Relying on a single herbicide or mode of action.
4. Sequential applications of the same herbicide or mode of action.

In order to manage herbicide-resistant weeds and prevent the widespread development of resistance or weed shifts, the University of Arkansas recommends the following strategies:

*General Resistance Management Strategies – including those for Roundup Ready crops:*

1. Rotate crops where possible.
2. Use preplant tillage, cultivation and other cultural practices for weed control where possible.
3. Rotate herbicides having different modes of action.
4. Use tank mixtures of herbicides having different modes of action.
5. Avoid sequential applications of the same herbicide or herbicides having the same mode of action.
6. Control weeds on fallow or set-aside land.
7. **If you suspect resistance after herbicide application**, attempt to eradicate escapes with alternative herbicides or cultural methods, i.e., **do not let them go to seed**. Collect seed samples from suspect plants and take them to your county Extension agent who will have them tested at the University of Arkansas.



### Management Tip

Refer to the Weed Resistance section in MP-44 for examples of herbicides having the same mode of action.

## Remember – Herbicides Are Not the Only Answer!

A combination of cultural practices and timely herbicide applications, however, is the key to successful weed management.

Some cultural practices most favorable for soybean weed control are:

- Proper crop rotation
- Good seedbed preparation
- Delayed planting
- Row spacing
- Good stands
- Rotary hoeing
- Timely cultivation

Figure 9.3. Identification Terminology (Seedling 1-5 Leaf Stage)

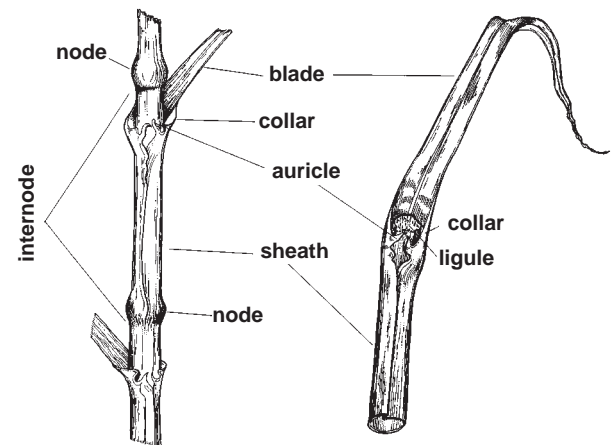


Table 9.3. Weed Response Ratings for Soybean Herbicides (January, 2000)

HERBICIDES Preplant	WEEDS																				Crop Tolerance G = Good F = Fair																	
	Barnyardgrass	Broadleaf Signalgrass	Crabgrass	Goosegrass	Seedling Johnsongrass	Rhizome Johnsongrass	Giant Foxtail and Fall Panicum	Cocklebur	Entire and Ivyleaf Morningglories	Pitted Morningglory	Palmett Morningglory	Smallflower Morningglory	Purple Moon Flower	Woolly Croton	Smartweed sp.	Hemp Sesbania (Coffebean)	Northern Jointvetch (Curly Indigo)	Prickly Sida (Teaweed)	Spurred Anoda	Palmer Pigweed and Tall Waterhemp		Smooth Pigweed	Balloonvine	Texas Gourd	Sickpod	Cutleaf Groundcherry	Common Ragweed	Nutsedge, Yellow	Flatsedge (Annual)	Velvetleaf (Wild Cotton)	Jimsonweed	Red Rice	Spurge	Hophornbeam Copperleaf				
Frontier	9	8	9	9	6	0	9	0	2	2	2	2	2	2	2	2	2	2	2	2	6	10	-	-	6	9	8	8	10	5	-	7	7	7	G			
Treflan, Prowl	9	9	9	9	9	3***	9	0	2	2	2	2	1	0	2	0	0	0	0	0	7	9.5	0	0	2	0	3	0	3	2	3	4	2	0	G			
Treflan or Prowl + Sencor/Lexone	9	9	9	9	9	3	9	5	2	6	7	8	5	5	9	9	-	-	5	3	8	10	7	6	6	9	9	2	8	7	6	9	9	F				
Dual	8	8	9	9	6	0	9	0	2	2	2	2	2	2	4	4	2	-	8	3	8	10	1	5	7	10	8	7	10	4	5	7	4	6	G			
Lasso/IFreedom/Micro-Tech	8	8	9	9	6	0	9	0	2	2	2	2	2	2	4	5	2	-	8	3	8	10	1	5	7	10	8	7	10	4	5	7	4	6	G			
Dual or Freedom + Sencor/Lexone	9	9	9	9	6	0	9	5	3	6	7	8	5	6	9	9	-	9	9	8	10	7	6	7	10	9	7	10	8	8	7	9	9	F				
Prowl or Treflan + Scepter	10	10	10	10	7	0	10	9	8	9	9	9	8	5	9	5	9	5	9	8	10	10	5	9	8	9	9	8	9	8	9	6	9	6	F			
Dual or Freedom + Scepter	9	9	9	9	8	0	9	9	7	9	9	9	7	5	9	5	-	9	8	10	10	5	9	8	9	9	9	8	9	8	7	9	9	6	G			
Prowl or Treflan + Canopy	10	10	10	10	5	10	9	8	9	9	9	9	5	5	9	9	7	9	9	9	9	9	8	7	8	9	9	7	8	7	9	-	9	9	F			
Broadstrike + Treflan	9	9	9	9	6	9	3	9	8	8	-	7	4	-	-	0	0	0	10	9	9	10	-	-	8	-	8	5	8	8	-	8	7	9	G			
Preemergence																																						
Broadstrike + Dual	9	8	9	9	7	0	8	8.5	7	7	-	7	4	-	0	0	0	0	10	9	9	10	-	8	-	8	-	8	7	9	9	8	7	8	7	G		
Frontier	9	8	9	9	6	0	9	0	0	0	0	0	0	0	0	6	5	-	6	5	9	-	5	9	-	6	8	6	9	4	-	5	6	6	G			
Command	9	9	9	9	3	9	3	9	5	0	7	6	6	0	5	9	0	-	9	9	0	6	5	0	0	10	8	2	0	0	0	0	0	0	0	G		
Canopy XL	8	6	8	7	-	0	-	9	8	8	-	-	-	-	3	-	3	-	9	-	9	10	-	3	-	-	5	-	-	-	-	-	-	-	-	F		
Dual or Lasso	8	7	9	9	5	0	9	0	0	0	0	0	0	3	4	0	-	3	0	9	9	1	3	5	8	5	6	9	3	4	5	3	5	5	G			
Sencor/Lexone	6	6	6	6	5	0	6	6	2	7	7	8	2	5	9	9	-	9	9	9	9.5	7	8	7	8	7	4	9	8	7	4	9	9	9	F			
Lasso or Dual + Sencor/Lexone	9	9	9	9	7	0	9	7	2	7	7	8	2	6	9	9	-	9	9	10	9.5	7	7	8	10	9	5	9	8	8	7	9	9	9	F			
Scepter	6	6	6	6	3	6	9	6	9	9	9	9	5	3	9	4	-	7	7	9	10	5	9	8	9	9	5	9	6	8	5	9	9	6	F			
Dual or Lasso + Scepter	9	9	9	9	8	3	9	6	9	9	9	9	5	3	9	4	-	9	7	10	10	5	9	8	9	9	5	9	6	8	5	9	9	9	F			
Canopy	6	6	6	6	5	0	6	9	8	9	9	9	5	5	9	9	7	9	9	9	9	7	7	7	8	9	9	5	8	7	9	-	9	9	F			
Dual or Lasso + Canopy	9	9	9	9	8	0	9	9	8	8	9	9	5	5	9	9	7	9	9	9	9	9	7	7	8	9	9	7	9	7	9	7	9	9	9	F		
Postemergence-OT																																						
Flexstar	0	0	0	0	0	0	0	9	8	9	9	9	9	3	9	9	9.5	7	6	6	8	10	8	-	2	9	9	6	-	7	9	0	-	9	9	G		
Basagran	0	0	0	0	0	0	0	9.5	3	7	8	9	9	3	9	4	-	9	9	4	8	4	8	0	0	0	0	8	8	8	0	0	0	0	0	0	G	
Blazer	2	2	2	4	0	6	7	8	9	9	9	9	9.5	9	9.5	-	2	2	8	10	8	9	0	9	0	9	9	3	7	4	9	2	5	9	9	G		
Blazer + Basagran or Storm	2	2	2	4	4	0	6	9	8	9	9	9	9.5	9	9.5	-	8	8	8	10	8	9	0	9	0	9	9	4	8	7	9	0	5	9	9	G		
Scepter	0	0	0	0	6	3	0	9.5	0	7	10	5	0	0	7	0	-	3	0	6	9	0	7	4	0	0	8	0	0	0	0	6	0	0	0	0	G	
Scepter + Blazer	2	2	2	2	6	3	2	9.5	8	9	9	9	9	9	9	9	-	4	0	8	10	8	9	4	9	0	0	0	0	0	0	0	0	0	0	0	0	G
FirstRate	0	0	0	0	0	0	0	9	8	9	9	10	6	-	-	5	-	4	9	2	3	-	-	6	-	6	-	-	8	-	0	-	-	-	-	-	G	
Front Row	0	0	0	0	0	0	0	9	8	9	9	10	6	-	-	5	-	7	9	2	3	-	-	6	-	6	-	-	8	-	0	-	-	-	-	-	G	
Liberty 1.75 pt/A 1 app	8	9	8	-	9	6	9	9	5	8	9	-	-	9	9	9	6	0	9	9	8	4	5	-	9	-	9	5	-	6	-	9	0	0	-	-	G	
Classic	0	0	0	0	0	0	0	0	8	8	9	8	9	5	-	9	10	6	0	0	0	5	9	5	6	7	-	9	6	-	7	10	0	0	-	-	G	
Cobra	0	0	0	0	0	0	0	8	6	8	8	9	7	9	7	9.5	9	6	0	0	0	8	10	9.5	9	5	9	2	2	8	9	0	8	9	0	8	9	G
Reflex	0	0	0	0	0	0	0	9	8	8	8	9	9	9	8	8	9.5	6	2	2	8	10	8	-	2	9	9	6	-	-	9	0	5	9	9	9	G	
Pursuit	7	7	7	5	8	5	8	7	9	8	9	9	3	-	7	0	-	6	6	6	10	4	4	0	-	5	7	7	7	9	8	9	5	9	5	9	G	
Poast	8	9	9	9	9.5	8	9	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G
Fusilade DX/Fusion	7	8	7	9	9.5	9	8	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G
Assure II	8	9	9	9	9.5	9	9	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G
Select	8	9	9	9	9.5	9	9	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G
Roundup, Glyphosate, Touchdown, Split	9	10	10	10	10	10	10	10	8	8	9	8	-	7	7	9	8	7	10	10	8	-	9	9	5	8	8	9	9	8	8	9	8	8	8	8	8	G
Roundup, Glyphosate, Touchdown, Single Post Direct (2 applications)	8	9	9	9	10	9	9	9	6	6	7	7	6	-	5	4	7	6	5	10	9	6	-	8	7	9	4	7	6	8	8	8	8	8	6	6	G	
2,4-DB	0	0	0	0	0	0	0	9	9	9	9	9	9	3	0	3	-	3	2	2	2	1	2	0	0	0	1	0	-	3	4	0	0	2	0	2	G	
Lorox + 2,4-DB	7	7	8	7	7	0	7	9	10	9	9	10	9	9	7	8	-	8	8	9	9	9	5	7	10	9	2	-	7	8	6	7	9	9	9	9	G	
Sencor/Lexone + 2,4-B	7	7	8	7	7	0	7	9	10	9	9	10	9	9	7	7	8	-	8	8	9	9	8	9	10	9	2	-	7	8	6	7	9	9	9	9	G	

\*Follow-up postemergence spray will be necessary to achieve these ratings.  
 \*\*Red rice ratings with Poast, Fusilade and Assure can be increased if repeat applications used.  
 \*\*\*Rhizome johnsongrass ratings with Treflan and Prowl increased to 7, if 2x rate used.  
 Rating Scale - 0 = No Control 10 = 100% Control  
 Dash = insufficient data

PEST MANAGEMENT

Figure 9.4. Seedling and Immature Weeds



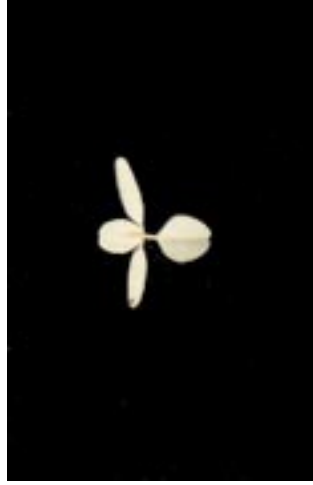
**smooth pigweed  
redroot pigweed**



Note pubescent stems.



**common lambsquarters**



**Palmer amaranth**



Note elongated petioles and rosette shape.



**common cocklebur**



**tall waterhemp**



Note elongated leaves and "wet" look.



**common ragweed**





**eclipta**



**ivyleaf morning glory**



Note leaf shape and densely hairy leaf and stem surfaces.



**pitted morning glory**



Note deeply lobed cotyledons; purple stems and leaf margins, and lack of hair. Leaf shape may vary from deeply lobed to heart-shaped as some are shown here.



**purple moonflower**



**entireleaf morning glory**



Note heart-shaped leaf and densely hairy leaf and stem surfaces.



**entireleaf morning glory**



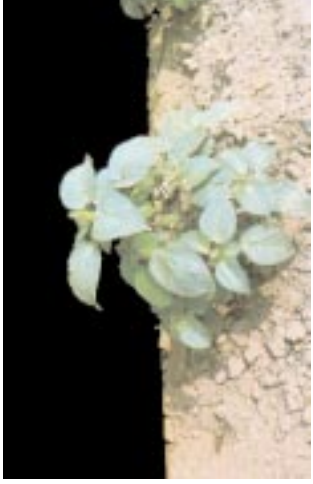




**smallflower morningglory**



**hophornbeam copperleaf**



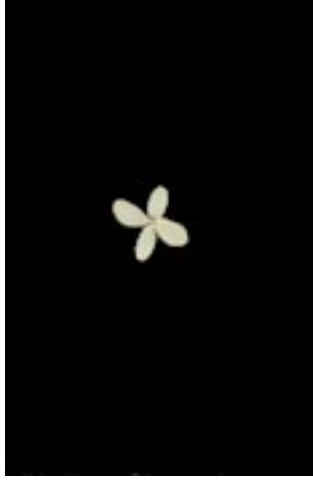
Compare the opposite true leaves in seedling stage to the alternate (single) true leaf of prickly sida.



**bigroot morningglory**



Note apical meristem (growing point) is below the soil surface.



**spotted spurge**



Note milky sap. Prostrate spurge similar but forms mat on soil surface.



**Texas gourd**



**woolly croton**





**tropic croton**



**sicklepod**



**hemp sesbania (coffeebean)**



Note 1st true leaf is simple leaf.



**showy croton**



**northern jointvetch (curly indigo)**



Note 1st true leaf is a compound leaf. Large stipules present at leaf axils of larger plants.



**prickly sida**



Note lack of hairs and small cleft in tip of cotyledons. Compare to spurred anoda, velvetleaf and hophornbeam copperleaf.



**spurred anoda**



Note larger cotyledons and distinct presence of hairs.



**Pennsylvania smartweed**



**velvetleaf**



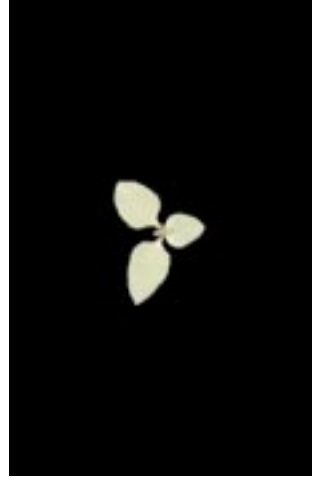
Note hairs present but plant must be closely examined to see.



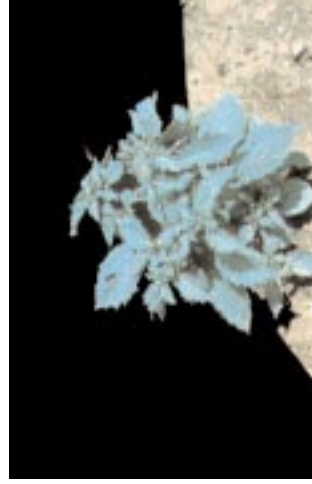
**balloonvine**



**pale smartweed**



**cutleaf groundcherry**





**jimsonweed**



**trumpet creeper**



**puncturevine**



**nutsedge**



purple nutsedge – left picture. Yellow vs. purple nutsedge vs. annual sedge (L to R) – right picture. Both plants have underground tubers. Purple nutsedge tubers are rough and have distinct camphor taste. Yellow nutsedge tubers are smooth and sweet.



**redvine**



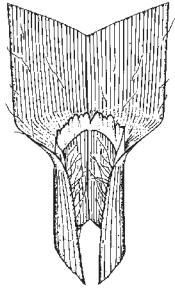
**annual sedge**





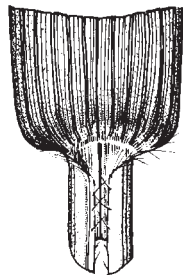
**large or southern crabgrass**

First leaf very short – only about two times as long as wide.  
Leaf sheath and blades hairy.  
Ligule – membranous.  
Auricles – absent.



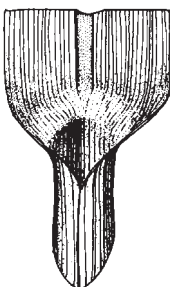
**goosegrass**

First leaf obviously ribbed with veins, and dark green lines.  
Basal stem silver in color.  
Leaf sheath – light green or white.  
Ligule – very short, ciliated membrane.  
Long hairs on leaf base.  
Auricles – absent.



**broadleaf signalgrass**

First leaf four to five times as long as wide – often reddish.  
Basal stem often purple to red.  
Hairs short (velvety texture).  
Sheath – densely hairy.  
Blades – often tinged maroon, velvety hairy. Collar region red on edges.  
Ligule – a fringe of hairs.  
Auricles – absent.



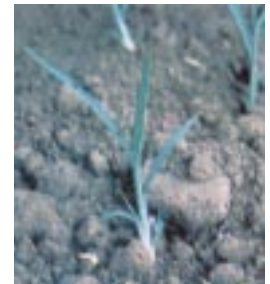
**barnyardgrass**

Stems flattened.  
Sheath – smooth and flattened with solid, overlapping, smooth margins. Sometimes tinged maroon.  
Blade – smooth on both sides.  
Ligule – completely absent.  
Auricles – completely absent.



**junglerice**

Very similar to barnyardgrass except leaf blade has red watermarks.  
Ligule – completely absent.  
Auricles – completely absent.





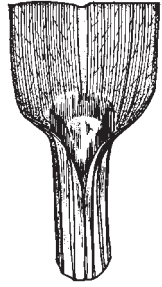
### fall panicum

Seedling leaf blades densely hairy on both surfaces.  
 Less hairy in older seedlings.  
 Leaf sheath – hairy with overlapping membranous margin.  
 Ligule – row of dense hairs approximately 1 mm long.  
 Auricles – absent.



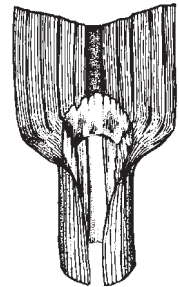
### giant foxtail

Leaf blade – hairy upper surface (must be closely examined on seedling) and smooth to rough lower surface.  
 Leaf sheath – smooth and split with overlapping sparsely hairy margins.  
 Ligule – a hairy ring.  
 Auricles – absent.



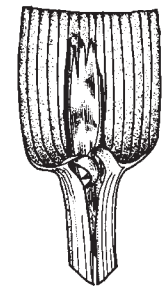
### johnsongrass

Leaf blade – smooth on both surfaces, midvein distinct at base as broad white line. Often has reddish spots caused by leaf rust. First leaf short.  
 Stem – reddish in lower portion.  
 Ligule – long rounded membrane.  
 Auricles – absent.  
 No evidence of rhizomes in seedlings up to 5th leaf stage.



### red rice

Leaf blade – rough textured when rubbed from tip to base.  
 Ligule – long membrane.  
 Auricles – present, clasping, hairy.



### loosehead (bearded) sprangletop

Leaf blade – flat to slightly inrolled. Youngest leaf rolled. Distinct white midrib but often not obvious on seedling plants. Leaf blades obviously ribbed on seedling plant. Leaf on older plants very long and slender.  
 Leaf sheath – smooth and open.  
 Ligule – very long, thin, pointed membrane.  
 Auricles – absent.  
 A similar species, tighthead sprangletop, has shorter ligule and lacks the white midrib on older leaves.

