

Weed Identification:

Using Plant Structures as a Key



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Weed identification is necessary to the success of any weed control program. Frequently, simple plant keys or “picture book” identification guides are used to identify weeds. However, some plant taxonomy keys can be quite complex and require an advanced understanding of plant structure and taxonomic terminology. While more difficult to use, a detailed key or guide allows for the precise identification of weeds.

This handbook is intended for use as a companion piece to better understand the plant part terminology used in less complicated identification guides.



Introduction

Classification

Weeds can be classified into one of three different categories: **broadleaves, grasses** or **sedges**. Broadleaf weeds often are referred to as dicots; the seedlings produce two cotyledons (seed leaves) that are evident as the plant emerges through the soil surface. Broadleaf plants generally have wider leaves than grass plants and the stems are often branched. Leaf venation is netlike or has a branched appearance.

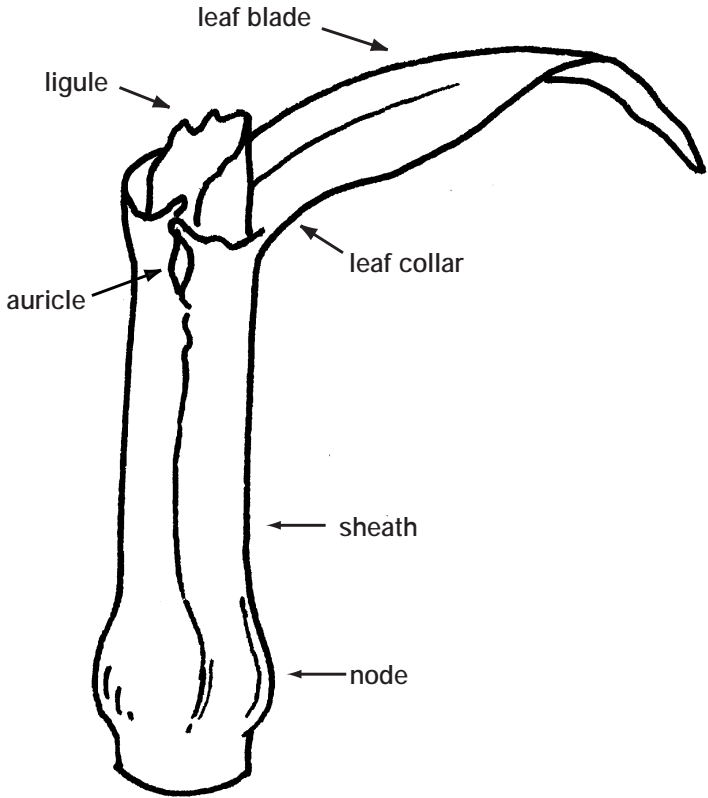
Grasses and **sedges** are **monocots**; their seedlings produce only one cotyledon (sometimes referred to as the coleoptile in grasses). Grasses have bladed leaves that are parallel veined and this venation extends onto the sheath. In cross-section, the stems in grasses are usually round or somewhat flattened. The stems of sedges, in cross-section, are usually triangular.

A second, relatively simple method of weed classification is by the categories of **annuals, biennials** or **perennials**. **Annual** plants live for one growing season and are often referred to as either summer annuals or winter annuals. **Summer annuals** germinate from seed in the spring, produce vegetative growth, set flower and produce fruit mid- to late summer, and die back in the fall. **Winter annuals** germinate in the late summer to early fall, produce vegetative growth, flower and produce seed in mid- to late spring, and die off in the summer.

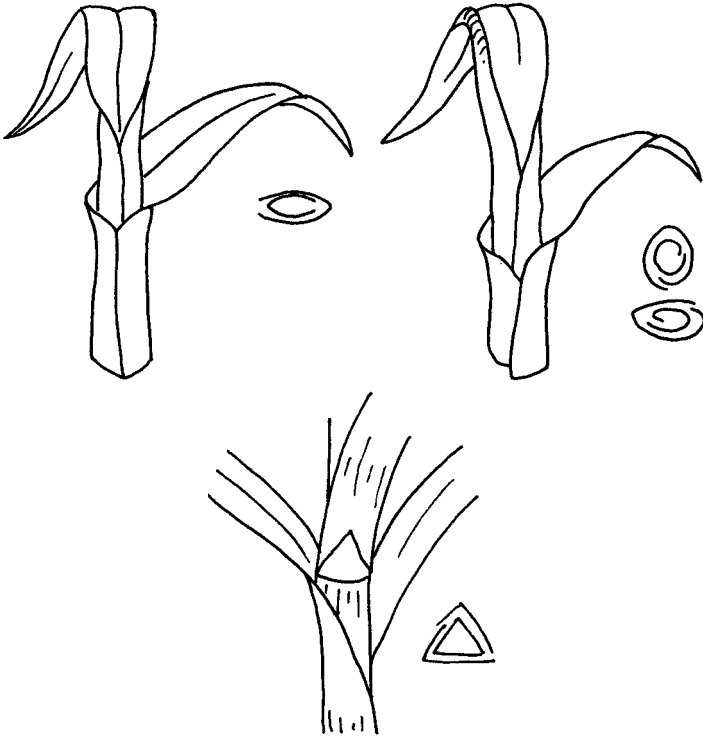
Biennials are plants that live for two years; seeds germinate in the spring, summer or fall of the first year and the plants overwinter usually as a rosette of leaves. During winter, the shoot tips are exposed to cold temperatures for a period of time. This vernalization promotes normal development of flowering and seed production during the summer of the second year. The plants then die in the fall.

Perennials are plants that produce vegetative structures that allow them to live for three or more years. These plants are classified as **simple** or **creeping perennials**. **Simple perennials** spread primarily by seed; they cannot spread vegetatively from underground roots. **Creeping perennials**, on the other hand, can reproduce by creeping roots and also through seed production. The creeping roots found above ground are called **stolons**, the below-ground roots are called rhizomes. **Rhizomes** are most common in perennial grasses. In broadleaves or sedges, these underground root structures are referred to as **tubers**.

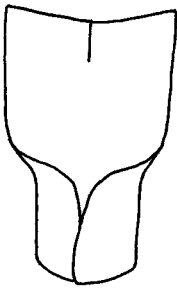
Plant Parts



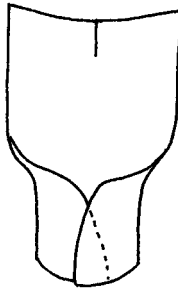
The first step in identifying grass weeds is to become familiar with some key grass parts: the **leaf blade**, the **collar**, the **ligule** and the **sheath**. The **ligule** may or may not be present on some grass seedlings. The **sheath** is an extension of the leaf blade that terminates at the node. The areas between the **nodes** are referred to as **internodes**. Some grass plants may have extensions of the sheath called **auricles**. A sedge, however, generally does not have a ligule or an auricle.



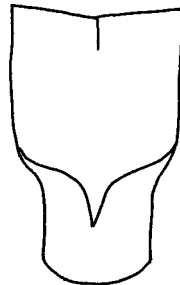
The cross-sections of grasses may be either **round** or **oval (flattened)**, compared to a sedge, which exhibits a **triangular** shape.



split

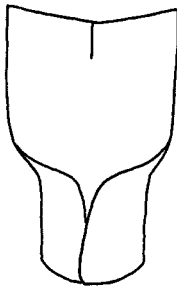


overlapping

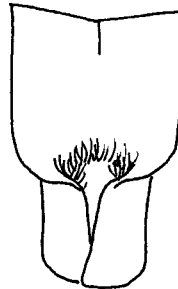


united

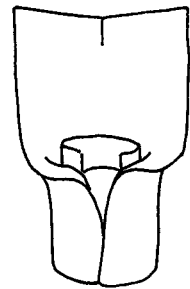
The **sheath** of a grass surrounding the stem is generally one of three types: **split**, **overlapping**, or **united**.



absent

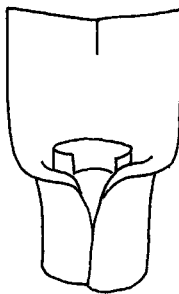


hairy

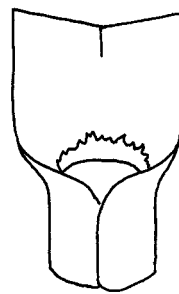


membranous

The **ligule** on a grass plant is a structure on the inside of the collar. It can be either **membranous** or **hairy**, or it may not be present at all.

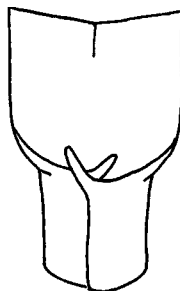


smooth lingule
margin

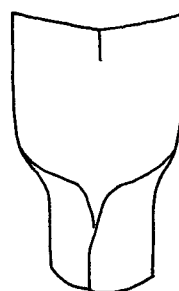


toothed lingule
margin

The ligule may exhibit either a **smooth margin** or a **toothed margin**.

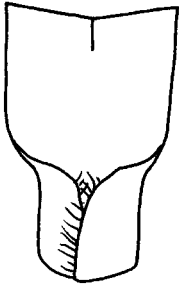


auricles present

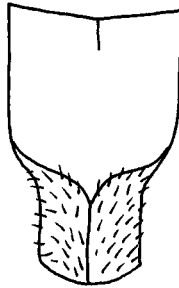


auricles absent

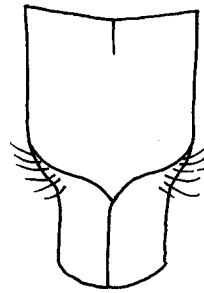
Auricles, appendages found at the junction of the leaf blade and leaf sheath, may or may not be present.



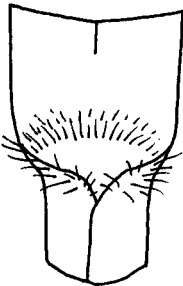
hairy sheath
margin



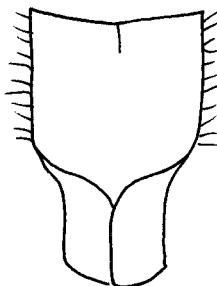
hairy sheath



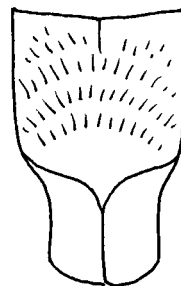
hairy collar
margin



hairy collar



hairy leaf
margin

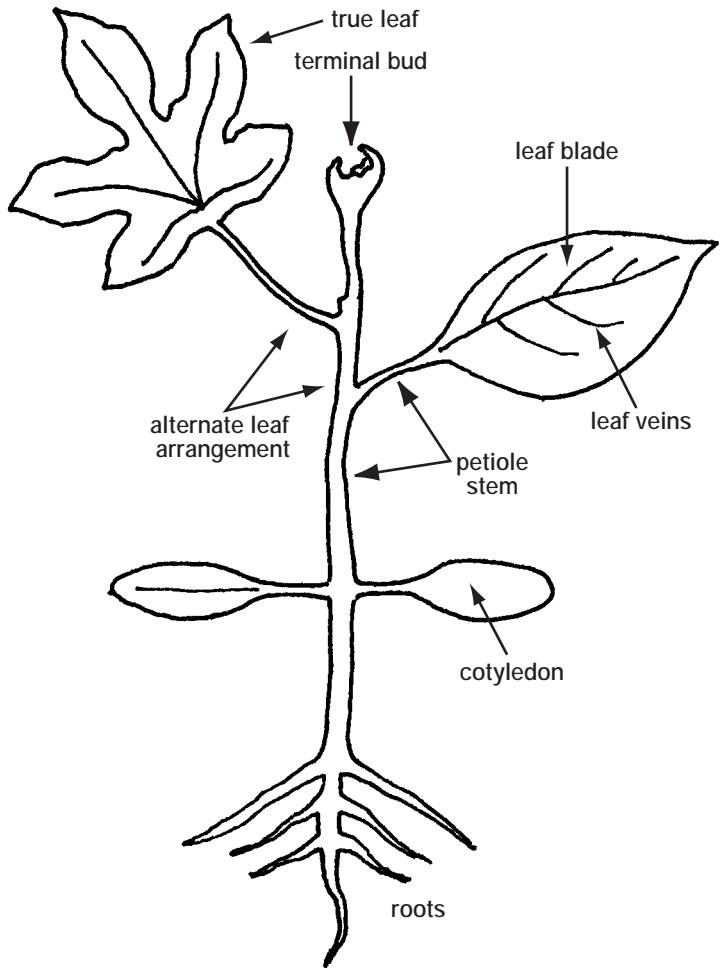


hairy leaf
blade

Pubescence or **leaf hair** is often a key to identifying specific grasses and weeds. Pubescence can appear in several different areas on a grass plant:

- only on the sheath margin,
- over the entire outside of the sheath surface,
- on the leaf collar margin,
- as a ring-like appearance surrounding the whole collar,
- on the leaf blade margins or leaf edges, or
- only on the blade surface, with hair absent over the other parts of the plant.

Leaves or other plant surfaces without any pubescence whatsoever are often referred to as **glabrous**.



A representation of a broadleaf plant with a few key descriptive parts labeled is shown above.



linear



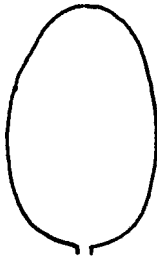
oblong



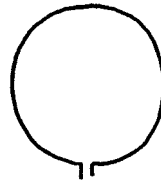
lanceolate



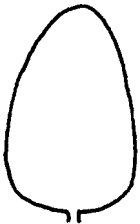
spatulate



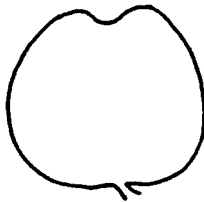
oval



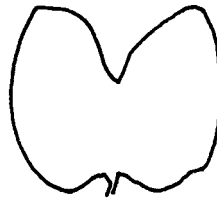
round



ovate



kidney



butterfly

Broadleaf weed **cotyledons** are a key identification feature. However, if cotyledons have fallen off the plant or are in poor condition, they may not be helpful in broadleaf weed identification. Various cotyledon shapes are illustrated above.



filiform



linear



lanceolate



oblanceolate



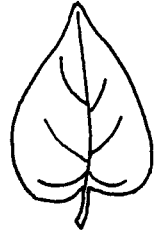
spatulate



obovate



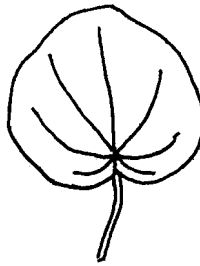
ovate



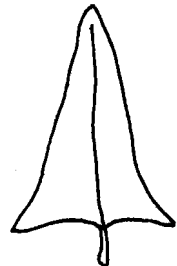
cordate



oblong

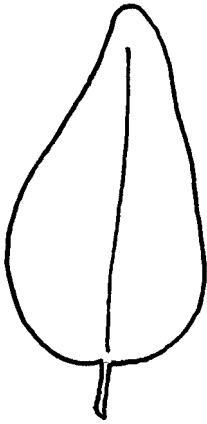


round

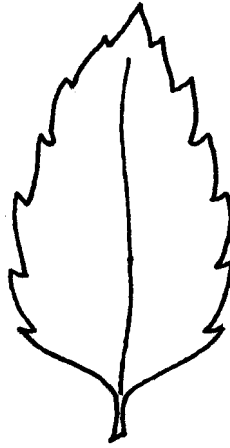


sagittate

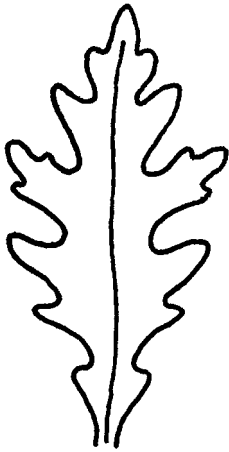
Using cotyledons with **true-leaf** identification features can help in the overall weed identification process. True leaves generally exhibit one of several leaf shapes similar to cotyledons.



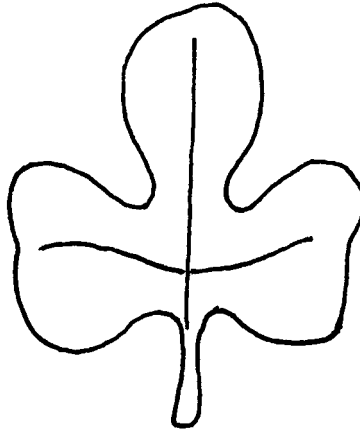
entire



serrated



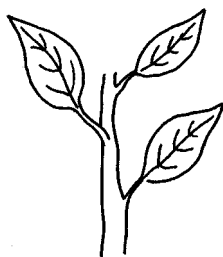
pinnately lobed



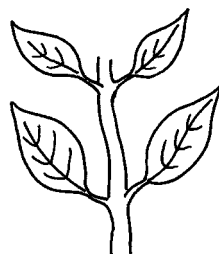
palmately lobed

Leaf margins (leaf blade edges) also are special features for identifying specific plants. Examples of **entire**, **serrated**, **pinnately lobed** and **palmately lobed** leaf margins are shown.

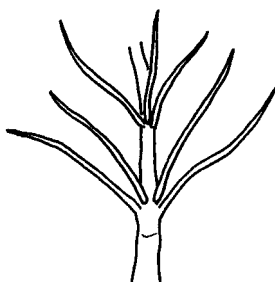
Pinnately lobed leaves can be distinguished from palmately lobed leaves by examining the veins on the leaves. In a pinnately lobed leaf, the veins will arise from several points along a central axis. A palmately lobed leaf has veins that arise at the same point at the base of the leaf.



alternate



opposite

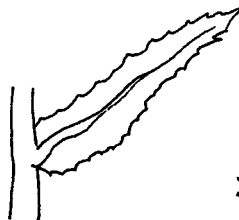


whorled

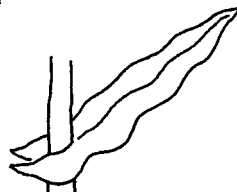
Leaf arrangement on the plant can be either **alternate**, **opposite** or **whorled**.



petiolate



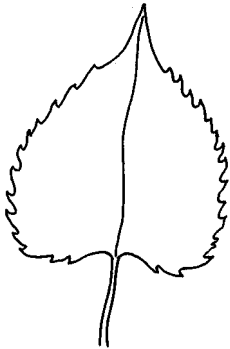
sessile



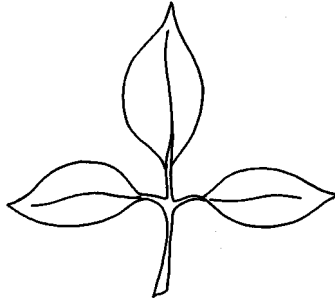
clasping

Attachment to the stem is referred to in one of three ways:

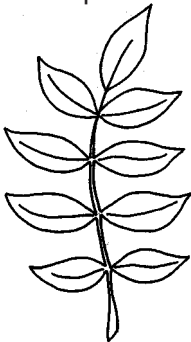
- **petiolate**, where a petiole exists between the leaf, blade and the stem;
- **sessile**, where there is essentially no petiole and the leaf base is attached directly to the stem; or
- **clasping**, where the base of the leaf partially surrounds the stem.



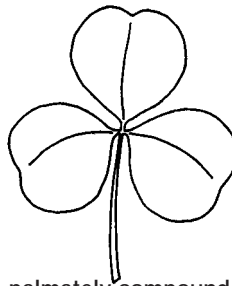
simple



compound

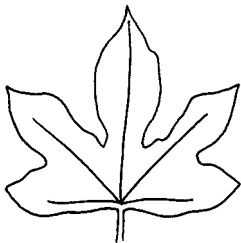


pinnately compound

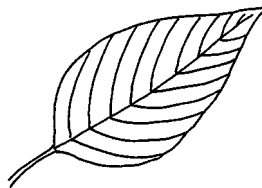


palmately compound

Individual **leaflets** may be classified as either **simple** or **compound**. Within compound leaves, there exists either **pinnately compound** or **palmately compound** leaf characterizations.

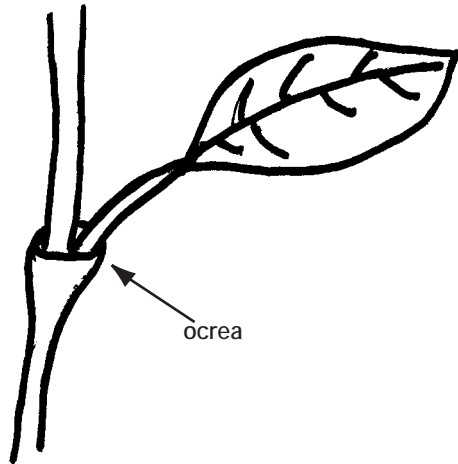


palmate venation

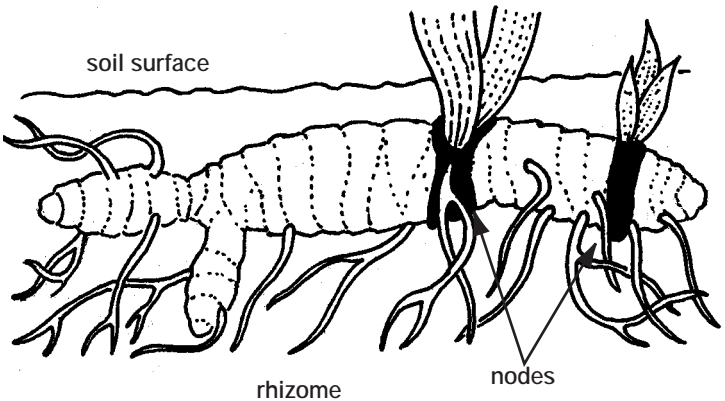


pinnate venation

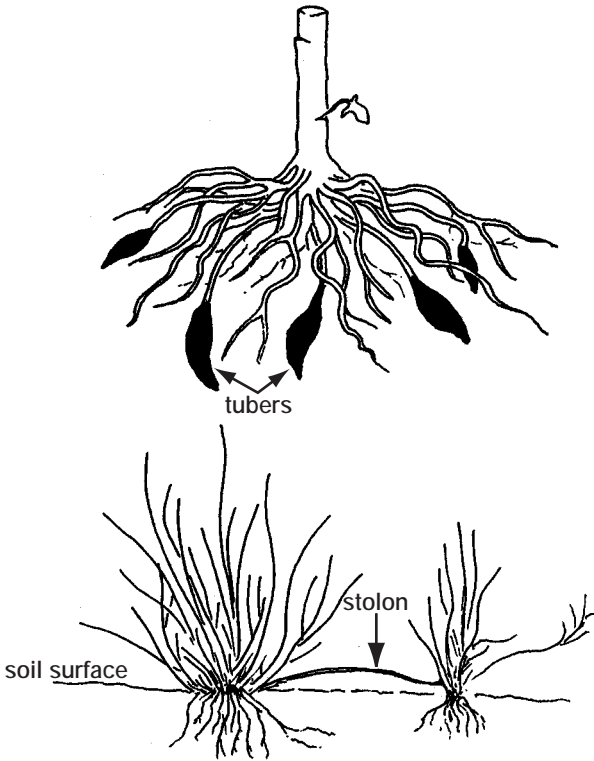
Leaf **venation** is different for both grasses and broadleaf plants. Venation in grass plants is a **parallel** type. Broadleaf plants may exhibit either a **palmate** venation or **pinnate** venation.



Some broadleaf plants may have other peculiar characteristics such as an **ocrea**. This is a membranous tubular sheath that surrounds the stem at the base of the petiole.



Vegetative reproductive structures also may be used as key plant identification features. **Rhizomes** are basically stems that develop below ground. Plant shoots can arise from underground nodes on these stems.



Tubers are thickened underground stems that develop at the end of rhizomes. **Stolons** are roots that grow horizontally above the ground. Roots often develop at the nodes of stolons and peg down into the soil. New shoots also develop at these sites.

Use

These depictions of plant parts can serve as a simple guide to understanding the terminology in simple field guides or plant keys used for weed identification. The use of more complicated keys for plant identification may require a thorough understanding of plant vegetative and flowering parts.

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