

**Weed Science, PLS 4601c Section 7644  
and Grad. – Prin. Of Weed Science AGR 6932 Section 9212  
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## **Material from May 28 for Quiz #4 on June 4**

Below are the main things from the book that might be on the quiz along with other discussion in class and some issue in the identification of weed species. Please also review Quiz 1, Quiz 2, and Quiz 3.

### **Chapter 5, The plant system (+ lecture)**

#### **1. Plant structures (continued in #6, below)**

Know the parts of the flowering plant (in contrast gymnosperms and nonvascular plants), e.g., stems (rhizomes, stolons), leaves, roots, etc., etc.

In class, I explained that the fruit is a mature ovary, a “seed” is a mature ovule (although “seed” more frequently is used as a unit of dispersal), and the types of fruits such as berries (including drupes and hesperidia) which are fleshy multi-ovule fruits, the caryopsis (very important) which is the dry single-ovule fruit of grasses with the fruit wall usually fused to the mature ovule, capsules (which split open to dehisce multiple seeds), and a samara which is a winged fruit good for dispersal by wind. What other kinds of “seed” structures can you think of that aid dispersal, and how?

You should know (and this is not covered in the book) the parts of the flower, sepals, petals, calyx, corolla, pistil, ovary, ovule, style, stigma, stamen, anther, filament, and what they do.

#### **2. Monocots vs. dicots**

Know that the dicots (dicotyledons) have two seedling leaves which you can see when dicotyledonous (usually broad-leaved) weeds germinate. Grasses germinate with only one apparent seedling leaf, and are monocots, however, what you are looking at is not truly the seedling leaf but the coleoptile which is a sheath that protects the emerging shoot. The true seedling leaf is a specialized structure that never gets out of the ground. Other differences are that monocots have flower parts generally in 3's versus dicots 4's and 5's; monocots have parallel veined leaves, and dicots have reticulate veined leaves; pollen of monocots has a single furrow or pore, whereas dicots have three furrows or pores.

### 3. Grasses (grass family or Poaceae)

Because grasses are so important as weeds and as crop plants you should be aware that there are 10,000 species of the grass family, that is, the Poaceae, also known formerly as the Gramineae. Also, the basic unit of the grass inflorescence is the spikelet which functions pretty much like a flower, except it may consist of one or more flowers (“florets”), protected by the “chaff” which are protective bract-like structures called the lemma and palea. Nobody likes to eat the chaff, which is why it is threshed off, by tossing in the wind in primitive agriculture, in machine combines in mechanized agriculture.



### 4. Legumes and composites (Fabaceae and Asteraceae)

Along with grasses (Poaceae), legumes (Fabaceae) and composites (Asteraceae) comprise the three important families that contribute a long proportion of the adventive or colonizing vegetation in first stage succession, particularly in temperate areas. In fact, after the orchids (Orchidaceae), the Asteraceae and Leguminosae have the second and third largest number of species. The Poaceae with 10,000 species are not far behind. For more on classification of plants please visit the Tree of Life project at [http://www.tolweb.org/Life on Earth/](http://www.tolweb.org/Life_on_Earth/)

The Asteraceae have distinctive heads (see weed illustration to the right which is coat buttons or *Tridax procumbens*) consisting of ray flowers and disk flowers. Sometimes all the flowers are ray flowers, sometimes all are disk flowers, and sometimes there are both types. The seed of Asteraceae is an achene with often a feather crown at the top called a “pappus”. Important crops include the sunflower, lettuce and several other garden vegetables.



The Fabaceae are traditionally in three subfamilies with three different flower types, the caesalpinoids, mimosoids, and papilionoids. The papilionoids are highly zygomorphic or asymmetric (specifically, papilionate, or butterfly-like, like a sweet pea), somewhat asymmetric (caesalpinoid, or like a bird of paradise), and mimosoid (powerpuff). The fruit of the legumes is the legume, a capsule with two carpels or halves that usually breaks open revealing the “peas in the pod”, but may diarticulate in segments (a loment).



## 5. Plant anatomy

Know the organelles in the cell (mitochondria, chloroplasts, nucleus, and ribosomes) and their function. Know the types of vascular tissue (phloem and xylem and which transports up and which down. Know that a meristem (including cambium) is a growing region which can be apical at the tip or lateral including cork cambium which divides in two directions producing wood and cork. The lateral meristem produces what is called secondary xylem, which is wood.

## 6. Plant structures (continued from #1, above).

In class, I discussed how leaves can be simple or compound, how a trifoliolate leaf has three leaflets, how leaves have petioles and leaflets have petiolules, and how leaves can be compound either pinnately or palmately. Leaves can be attached either oppositely or alternately. The stipules are a pair of small bractlike leaves subtending the base of the petioles, however some plants such as the Rubiaceae (coffee family) have interpetiolar stipules.

Leaves can also vary in the margins from serrate (small stair-stepped notches) or entire, or various degrees of dissection. Leaf surfaces vary according to the presence or absence of pubescence or hairs, the length of the petiole, the shape of the leaf, both the overall shape and the appearance of the tip and the base.

## 7. Weed life cycles

Annual, biennial, and perennial are a simple way of categorizing weeds according to their life cycles, however in tropical and subtropical regions the distinction is not strict. The biennial plant usually forms a rosette or basal cluster of leaves one year, usually with a storage root, and resprouts the second year (or growing season) to produce an inflorescence. Dandelion is biennial.

# Chapter 6, The soil system (+ lecture)

## 8. Soil physics

This subject covers the size and shape of soil particles (sand, silt, or clay) and the physical relations with water. Clay particles (less than 0.002 mm in diameter) have a huge impact on the characteristics of soil. In the soil triangle the largest number of particle size combinations lead to clay soils. Silt particles are 0.002 mm to 0.05 mm in diameter (the book had this wrong). Sand particles, more than 0.05 mm in diameter, are common in Florida soils. Many species of weeds can grow in a wide range of soils, whereas many native species are more restricted in their adaptation to a narrow range of soils.

**9. Clay is both a particle size and a mineral**

Clay minerals include kaolin, illite, montmorillonite and although clay minerals may be clay particles as well, the surface characteristics of clay minerals can determine their characteristics, such as shrinking-swelling soils of Texas and clays that are prone to liquefaction which can lead to severe damage in earthquakes.



Effects of soil liquefaction from the Niigata earthquake, 1964, (from Earthquake Engineering Research Center Library, University of California at Berkeley).

**10. Soil structure**

This is an aspect of soil physics and it involves the aggregation of soil particles including organic matter into small crumbs or pedons. A friable soil has good tilth and it is crumbly. A soil can have drainage either because it has structure, which creates many pores, or because it is sandy even if it has no structure. Structured soils can be destroyed by traffic especially when they are wet.

Tillage is the preparation of the soil by turning it over, and/or loosening, and/or ripping it. Tillage both improves soil drainage and aeration for plant roots, but also can remove weeds.

**11. Soil chemistry**

Soil chemistry includes soil fertility and plant nutrition, and pH (soil reaction). An ion is a charged atom or molecule. Positively charged molecules and atoms are called “cations” and negatively charged ones are “anions”. Many fertilizer nutrients (ammonium and the metallic cations such as calcium, potassium, and magnesium all of which are positively charged) are held to soil particles by the negative charge of the soil.

## **Weed identification**

**12. Technical or gestalt?**

The following eight images show some of the weeds from our quadrat area to help remind you of the technical characteristics, especially vegetative ones, and to help you develop your “gestalt” image of weeds.



Is this a grass weed, sedge weed, or broadleaf weed? How do you know? (*Cyperus* sp.) and I can't tell you the common name or it would give it away.

Are these leaves opposite or alternate, simple or compound? (Broadflowered pusley, *Richard grandiflora*), without any flowers.



How is this leaf compound? (*Desmodium incanum*, creeping beggarweed).

Is this a bunch grass or a creeping grass? (smutgrass, *Sporobolus indicus*).



In contrast to the last grass weed, which also grows in compacted areas, this one has leaf blades that fold (goosegrass, *Eleusine indica*).



What kind of inflorescence does this plant have and what family does that put it in (straggler daisy, *Calyptracarpus vialis*).



This weed has an unusual inflorescence. (spurge, *Chamaesyce* sp.) and also has milky latex.



Is this weed a bunch type or a creeper? (*Dichondra carolinensis*, dichondra).