

Native Plant Collection.

Objective.

The objective with this exercise is to develop a Native Plant collection for future reference. You will also develop an understanding of the characteristics and the processes that are used to identify plants. By the end of this exercise (8th week), you should begin to recognize how different plant species are more or less related to one another at the family level of classification.

Introduction.

In order to be effective, post-emergent Native Plant management programs require that the Native Plant flora be accurately identified well before seed set when seedlings are most susceptible to chemical/mechanical control. Therefore, Native Plants must be identified as seedlings. For pre-plant and pre-emergent control programs, the Native Plant flora in the seedbank must be known before control measures are taken. Therefore, Native Plants from a previous season that have set seed may be identified from their adult and flower stages or from their seed in the seedbank. However (as a side note), you still don't know for sure if the seeds from these plants will germinate the following year.

In addition to providing you with a future Native Plant identification reference, this exercise will aid you in the fine art of plant identification and understanding the habitats under which Native Plant species flourish.

As you will experience, Native Plants in the seedling stage are usually difficult to identify because many species have a similar morphology. The same species of plant can have different morphologies depending on the environment. For example, some seed of summer annuals may germinate in the fall even though most germinate in the spring. These plants will have a dark reddish hue to them.

This is caused by the production of anthocyanin pigments in response to the cold. The adaptive advantage to these pigments is not clear, but may confer a tolerance to the cold.

Collection process:

Materials:

- polyethylene bags (sandwich size)
- 4" X 4" square piece of moist napkin
- permanent marker
- trowel (or substitute with old knife, etc.)

Methods:

EACH WEEK: bring in four Native Plant seedlings to lab, and you will be given time to key them out and mount them onto index cards. In your travels to and from campus (or out of town on weekends), carry several polyethylene (plastic) sandwich-size bags with you → be on the prowl for Native Plant seedlings. Put a wet paper towel in your plastic bags to help preserve the seedlings until you are ready to mount them.

Once you have located that perfect seedling, label the plastic bag with the date, location, and any other details that you might not remember for the specimen label (see below).

Dig up the seedlings with a garden trowel, an old table knife, a pocket knife blade, a screwdriver. Dig down so that you get as much of the root system as possible. Knock off any loose soil, and place in the bag. Seedlings should be stored in a cool/dark place until they can be mounted.

Mounting Process:**Materials:**

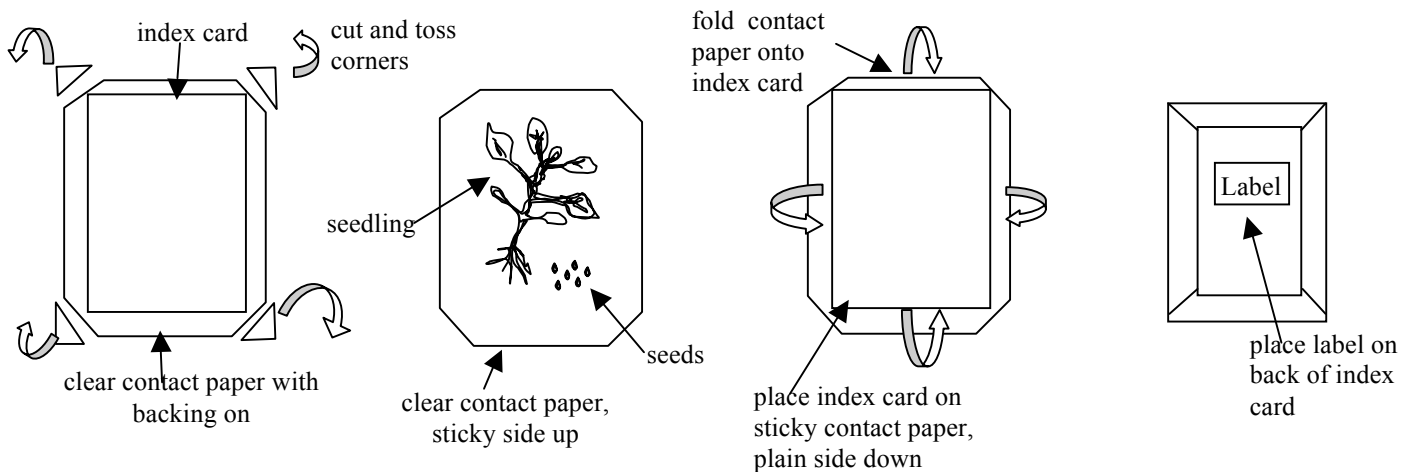
- newspaper
- 1 roll clear contact paper (used for lining cupboards and shelves)
- 25 X 4" X 6" index cards
- permanent marker

→ any drug store and most super-markets will carry these items

Methods:

- Wash off seedlings to remove any soil.
- The seedlings should be partially dried between several sheets of newspaper before they are to be mounted. However, you'll want the seedlings to look as they do in the field, not a soggy crumpled mass nor a dried crispy potato chip. Spread the seedlings out on newspaper. Unfold the leaves. Place the marked plastic bag next to the seedling so you'll have the necessary information for the label.
- Then place several sheets over the top of both. Let sit in a dry location for at least a day (for thick, succulent seedlings you may have to change newspaper and allow them to sit longer).
- On index card (line side), write the information that was included on the plastic bag. Next, cut out a piece of contact paper that extends 1/2" beyond the edge of the index card (so: 5" X 7").

- Place the partially dried seedling on the unmarked side of the card, and place the contact paper squarely over that so that the contact paper edges extend 1/2" beyond each side of the card.
- Next, cut the triangle corners off the contact paper straight across the corners of the index cards. Now, when you fold over the edges of the contact paper there will be no crease or overlapping at the corners.



On the back label with the following information (copy and use the template provided below):

Your name: _____ **Date:** _____

Location: (e.g. as specific as reasonable, county, cross streets, mileage)

Habitat type: (e.g. if crop, which one. If non-crop describe it)

Latin family name: _____

Latin species name: _____ **Common species name:** _____

Distinguishing characteristics: (what is it often confused with, how is this different)

Reference: (e.g Native Plants of West pg# _____)

What to collect:

You should collect at least **30 different species of Native Plant seedlings** (2-6 leaf/tiller stage). Most of these species should come from several different crop environments (row crops, orchards) and remainder should come from a couple non-crop environments (e.g. landscape, roadside, lawn, sidewalk, etc.).

If possible, a mature leaf, flower, and seed of the same species should be included with the seedling specimen. Seed identification would be useful for pre-emergent management systems. Collecting several stages may be difficult since a species tends to be at a single stage at a given time of year. The seedling

stage with cotyledons and 2-6 true leaves is most important.

The best species to collect will be those from the PCA exam list of species included in this manual. The species on the PCA list are very common and problematic around California. There are several invasive species in the San Luis Obispo area that would be great in your collections. I will announce in class where certain species are around/near campus.

Identification:

Most species will be in your *Native Plants of the West* text. For those that are not, I will have other sources available from which they can be identified. It is in your best interest to have a species name since you will very likely utilize your collection as a reference in the future. Farm advisors, University Extension specialists, other Cal Poly SLO faculty are other sources for Native Plant identification

Keys to Keying Native Plants

One approach you could take is to match your unknown specimen to the pictures in the *Native Plants of the West* text or *The Grower's Native Plant Identification Handbook*.

Using a good key is the most reliable way to identify a plant. Your *Native Plants of the West* text has a key to the families of all the species in the book beginning on page 607 and a glossary of several morphological terms used in the key beginning on page 603. These terms are also used in the species descriptions. This key assumes a basic knowledge of flower anatomy, specifically, the four floral whorls: sepals, petals, stamens (anther and filament), and pistils (ovary and stigma).

Currently the best reference for keying out plants in California is probably the *Jepson Manual. Higher Plants of California*. 1996 edited by J. C. Hickman, University of California Press.

Keying plants takes intelligence, persistence, and common sense but most importantly practice. Below are a few points to remember while keying out an unknown plant.

1. To get the general idea of how keys work, key out a plant, the species name of which you already know. Try this with several species.
2. Now for an unknown plant, the first thing that you want to do is look over the plant carefully. Get familiar with leaf shape, presence of hairs, flower shape etc. without the suggestive statements you will be subjected to while reading a key.

3. Now for the book: keys have successive pairs of statements called, leads. The two leads of a pair may be one line or many lines apart but they are numbered or indented alike. Read both pairs. Choose the one that most closely matches your plant and go to where it tells you---to the next pair or the identity. If another pair, then match your plant to the closest lead and continue.
4. Leads may have several phrases. Compare them to your plant one at a time, usually the first one is the most reliable and the others merely confirm your choice.
5. Look up ANY words that you are not absolutely sure about its meaning. Even the slightest misunderstanding could send you into oblivion.
6. If you reach a point where neither lead seems plausible, go back and be sure that all your previous choices are sound. If they are, then mark the spot where you are uncertain and go with the least unlikely lead.
7. It can be helpful to catch mistakes by putting your choices down on paper.
8. Never skip steps, even if you see picture or lead farther down the key that seems to match your plant. This could mislead you badly. Keying backwards is not a good habit to get into.
9. If your specimen lacks an essential piece of anatomy (e.g. fruit) that the key asks about, try going each way in the key and hopefully one way will lead to something reasonable.
10. Gleason (a famous plant ecologist) is quoted as saying, "If the presence of various small features is useful as a means of identifying some kinds of plants, then the absence of the same features must be equally useful in distinguishing other kinds. Persons using a key for identification seldom have any difficulty in recognizing the presence of a structural feature but often find it difficult to convince themselves of its absence. This is purely a matter of mental attitude and has nothing to do with the size and conspicuousness of the feature in question, guard against this tendency."
11. Eventually you will come to a family (or genus or species) name. It is imperative that you stop here and read the description of the family (or whatever) carefully. Keys are simply means by which one arrives at a tentative decision, which must be checked out. Discrepancies between the description and your plant are your only warning of error. Do not convince yourself that your plant has (or doesn't have) what the description says it should (or shouldn't).
12. Use more than one plant of a species while keying. Individuals vary widely in morphology due to slight genetic and/or environmental differences. This is especially true of Native Plant species. The other problem is that when you collect several plants you want to be sure that they are the same species---different species, especially Native Plant seedlings, often look very similar.
13. Occasionally, you will be completely stumped. Some species are just plain tricky---sepals look like petals, or if you are calling things by the wrong name----you're going to need help. Good sources are other students, plant science or botany faculty members, County

Agricultural Commissioner's office will have farm advisors who should be able to help, University Extension Specialists and the various herbaria that exist throughout the state. These latter sources may be reached through Native Plant Research and Information Center at UC Davis (web site: <http://wric.ucdavis.edu>). A very good book for helping with terms that apply to keying is, "How to Identify Plants" written by H.D. Harrington (1985, see complete reference in the syllabus).

For an exercise, select plant samples that will be available in class and go through the following series of questions:

	plant 1	plant 2	plant 3
Do leaves have parallel or netted venation?			
Is the plant annual (herbaceous) or perennial (e.g.woody)?			
Are rhizomes present?			
Name the type of inflorescence:			
How many sepals?			
How many petals			
How many stamens?			
How many pistils?			
How many carpels to each pistil?			
how many locules to each ovary?			
Ovary superior or inferior?			
Are flowers perfect (with stamens and pistils)?			
Are leaves opposite, alternate or whorled?			
Are leaves simple or compound (pinanate or palmate)?			
What terms describe leaf shape?			
What terms describe leaf margins?			
What terms describe leaf surface?			

IMPORTANT NATIVE PLANT PLANT FAMILIES

The ability to recognize important family characteristics will help you to quickly and correctly identify Native Plants to the species level. The families are listed in very rough order of "importance" in California. "Importance" is loosely defined here as common and/or problematic throughout the state.

SUNFLOWER FAMILY: ASTERACEAE

Very large family, characterized by having flowers in a head.

Examples: Common cocklebur, dandelion, prickly lettuce, Mexican whorled milkNative Plant, mayNative Plant, annual sowthistle, common groundsel, spiny clotbut, bull thistle, tocalate, milk thistle, bristly oxtongue, Russian knapNative Plant, yellow starthistle, Italian thistle

GRASS FAMILY: POACEAE

Monocotyledon, stems round or flat, usually hollow between nodes and jointed. Found in dry places as compared to similar plants found in the SEDGE FAMILY.

Examples: Annual bluegrass, dandelion, watergrass, hairy crabgrass, red brome, bermudagrass, sandbur, johnsongrass

SEDGE FAMILY: CYPERACEAE

Monocotyledon, stems triangular, no ligules present. Usually in most habitats.

Examples: Yellow nutsedge

AMARANTH FAMILY: AMARANTHACEAE

Vegetative parts often red-pigmented, flowers inconspicuous and in clusters or spikes, subtended by greenish bractlets. Produces many black-reddish seed.

Examples: Redroot pigNative Plant, prostrate pigNative Plant

GOOSEFOOT FAMILY: CHENOPODIACEAE

Leaves usually alternate, underside often covered with shiny granular substance. Stems may be striped with reddish color.

Examples: Common lambsquarter, nettleleaf goosefoot, Russian thistle

NIGHTSHADE FAMILY: SOLANACEAE

Herbs, shrubs or trees, many perennial. Alternate leaves, fruits are capsules or berries.

Examples: Black nightshade, jimsonNative Plant, white horsenettle.

MALLOW FAMILY: MALVACEAE

Simple palmately veined leaves. Flowers with 5 separate or nearly separate petals.

Examples: CheeseNative Plant, alkali mallow

MORNINGGLORY FAMILY: CONVULVACEAE

Alternate simple leaves with twining habit, flowers funnel shaped.

Examples: Field bindNative Plant

MUSTARD FAMILY: BRASSICACEAE

Flowers form a cross with 4 sepals and 4 petals, fruit is a modified capsule. Variable family.

Examples: Black mustard, shepherdspurse, common yellow mustard, london rocket, wild radish, hoary cress

PURSLANE FAMILY: PORTULACACEAE

Leaves usually opposite and fleshy, flowers with 2 sepals and 5 petals.

Examples: Common purslane

BEAN FAMILY OR PEA FAMILY: FABACEAE

Leaves often trifoliolate or compound. Roots often with bacterial nodules, fruit typically a legume.

Examples: California burclover

BUCKWHEAT FAMILY: POLYGONACEAE

Stems usually have swollen nodes; leaves alternate and subtended by a sheathing stipular growth; flowers usually in a slender cluster or head; seeds are usually three sided.

Examples: Curly dock, knotNative Plant, sheep sorrel

PINK FAMILY: CARYOPHYLLACEAE

Leaves usually opposite, stems swollen at the nodes, petals usually notched.

Examples: Common chickNative Plant

GERANIUM FAMILY: GERANIACEAE

Mostly herbs, often in a rosette. Beak-like seedheads that when dried will curl in a corkscrew shape.

Examples: Redstem filaree, broadleaf filaree, Carolina geranium

CARROT FAMILY: APIACEAE

Mostly herbs, biennial or perennial; leaves usually alternate, compound with sheathing leaf bases; often aromatic.

Examples: Fennel, poison hemlock

MINT FAMILY: LAMIAECEAE

Four-sided stem, leaves opposite or whorled.

Examples: Henbit, horehound

PLANTAIN FAMILY: PLANTAGINACEAE

Leaves in basal rosettes, flowers minute and numerous in spikes or heads.

Examples: Broadleaf plantain, narrowleaf plantain

FIGWORT OR SNAPDRAGON FAMILY: SCHROPHULARIACEAE

Mostly herbs, leaves alternate or opposite, flowers zygomorphic

Examples: Common speedwell

SPURGE FAMILY: EUPHORBIACEAE

Often have milky sap when stems are broken. Flowers are inconspicuous, seeds in 3 chambered capsule.

Examples: Prostrate spurge, turkey mullein

CALTROP FAMILY: ZYGOPHYLLACEAE

Herbs or shrubs, with compound leaves, seeds may have spines.

Examples: Puncturevine

BORAGE FAMILY: BORAGNINACEAE

Bristly herbs, stems are round, flowers a scorpid cyme (multiple flowers on a curved stem), often aromatic.

Examples: Fiddleneck

Name: _____ Location: _____ Habitat: _____ Latin family: _____ Latin species: _____ common species: _____ distinguishing characteristics: _____ _____ _____ Reference: _____	Name: _____ Location: _____ Habitat: _____ Latin family: _____ Latin species: _____ common species: _____ distinguishing characteristics: _____ _____ _____ Reference: _____
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