

Annual Census Protocol

Adapted from [Streptanthus tortuosus demography protocol](#) to reflect Int Bio UCD Garden set up 2022-2023

Supplies

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| -datasheets | -rulers (small transparent, large wooden/plastic) |
| -clipboards (one per team of 2) | -tool belts |
| -large rubber bands to secure datasheets | -meter sticks |
| -lots of pencils (at least one per person + 5 more) | -knee pads |
| -calipers and spare batteries (at least one per team of two + one extra pair) | -first aid kit |

Setting up

1. Orient yourself to the UC Davis Veg Crops field set up, with germination beds and transplant beds every other row.
2. Divide datasheets among partner pairs and gather tools.

Data collection

1. Measure the variables on the datasheet for each plant.
 - a. Pheno: Record the current phenology of the individual. See table 1 for codes.
 - b. Height: Measure height using your ruler or meter stick; measure to the highest point on the plant in centimeters without breaking or removing plant.
 - c. Total Branches and repro branches: Count total number of basal branches and how many (if any) branches are reproductive (see Figure 1 for examples). At low elevation sites many plants have just one main stem with leaves and flowers growing directly on it. Large plants at low elevation sites and many plants at high elevation sites often have multiple basal branches. These basal branches emerge near the base of the plant, contribute a “shrubby” look to the plant, and often have other small branches growing off of them.
 - i. (Panel A) If plant has one main stem with no other basal branches, then record “1” total branch. Plants with 1 main stem may have small secondary branches growing higher up on the plant, these branches do not count towards the total.
 - ii. (Panel B) If plant has one primary stem with a second primary basal branch and both are reproductive, then record “2” total branches and “2” reproductive branches. This second branch grows near the base of the plant and has all it’s own leaves, flowers, and fruits. It can also survive and reproduce even if the main branch is snapped off or dies.
 - iii. (Panel C) This plant has three total branches, and many smaller secondary branches higher up on the plant. This plant has a main stem that is flowering, and then two basal branches. One basal branch is flowering, and the other is still vegetative. This would be recorded as 3 total branches, and 2 reproductive branches.
 - d. Stem diameter:
 - i. Use the digital calipers to measure the stem diameter as close to the base of the plant as possible. Be careful not to pinch too hard and snip the plant.
 - ii. High elevation populations are bushy very low down on the stem and sometimes it is impossible to measure the stem accurately without damaging the plant. For these cases do not measure the stem and write a note “cannot measure stem.”
 - e. Longest leaf: If the plant is vegetative, then measure the length of the longest leaf from the petiole to the tip of the leaf in centimeters. If the plant is reproductive, then you do not measure the longest leaf.

- f. If plant is reproductive (having buds, flowers, and/or fruits):
 - i. # flowers: Count number of flowers. If there is a flower that is not fully open yet, you should only count it if it could be visited by a pollinator (e.g. is not dry or senescing). Pinch test: lightly pinch flower to see if it remains intact or falls apart. Only intact flowers should be counted.
 - ii. # fruits: Count number of fruits. If a fruit doesn't look like it has any seeds, do not count it. If the fruit is small but looks like green, fleshy, and like it may develop at least 1 seed then it can be counted.
 - iii. longest fruit: Measure the length of the longest fruit in centimeters. Do not try to flatten out the fruit to measure it as you may damage it.
 - iv. We do not count number of buds at each site or each year, but if it's been a hard drought year and reproductive structures have dried up, counting buds gives us a good sense for reproductive effort.
 - g. Wilt status: Assess the wilting stage of the plant and assign status as "N" for normal not wilted, "W" for wilted, "SW" for severely wilted, and "D" for dead. More details and examples can be found in the [wilting status protocol](#).
 - h. Herb dam: Finally, check the plant for herbivory damage presence. Damage is recorded as "Y" yes or "N" no.
2. Make sure to fill in ALL columns and cells of EVERY datasheet. No blanks.
 3. Place notes in "notes" column whenever possible, NOT in cells for data
 4. Once all plants have been surveyed, organize data sheets and return them to the bin.
 5. Double check all equipment and supplies are accounted for, make sure all temporary markers (toothpicks and swords) have been removed.
 6. Take photos of field site and plants.

Upon return to the lab:

1. Technicians will immediately scan datasheets and upload them to the [Int Bio Google Drive](#).
2. Run the AWS text extract script to enter data following the [text extract script](#).
3. Verify the data was entered correctly following the [verification protocol](#).
4. After verification, file the physical datasheets (currently in Schmitt Lab file cabinet).

Table 1. Phenology codes and descriptions

V	Vegetative; no reproductive structures on this plant, it is often a shrubby rosette
B	Budding; this plant has developed buds but none have opened into flowers
F	Flowering; this plant has developed open flowers that can be visited by pollinators, it has no fruits but may have buds in addition to open flowers
P	Post Flowering; This plant has developed fruits and may still have flowers and/or buds
S	TM2 only: Senescing. Plant is drying but is not dead yet. May or may not have reproduced, record this information if applicable.
X	Dead, no structures are alive, the plant is likely crispy and/or yellowed. If plant has disappeared altogether note that in the notes column

Figure 1. *Streptanthus tortuosus* branching patterns

