Protocols

esson

Plan







Plant Biomass Protocol

Background information

- Whether growing crops for food or biofuels, it is important for farmers to know how much their crops will yield. This can be measured as biomass.
- <u>Biomass</u> is material from living organisms that can be used to create energy.
- Measuring biomass can help farmers and scientists to understand how productive a site is and what benefits that site can provide to humans (ex: energy, food, water purification, and nutrient cycling).
- In terrestrial systems, such as the BEST plots, biomass is measured by harvesting all aboveground plants (including dead plants) within a certain area (e.g., a 0.25m x 0.25m frame).

Timeline/Frequency

Protocol activities are performed once a year between September 15th and October 15th. If necessary, data can be collected until October 30th.

Materials

- Plant Biomass Data Sheet
- Randomization Procedure Protocol
- Clippers (1 per group)
- Sharpie markers (1 per group)
- Brown Paper Bags (1 per group)
 Label each of the bags beforehand with plot treatment type (ex: Praire, Unfertilized, Unharvested), block number, and date of collection.
 There should be 1 bag for each of the 8 plots.
- PVC frame (inner dimensions 0.25m x 0.25m)
- Oven at 60 C or a warm, dry place.
- Balance accurate to 0.1 grams.

Instructions

- 1. Follow the instructions in 'Randomization Procedure' Protocol to obtain your sampling location within the plot.
- 2. Place a PVC frame in the plot so the center is at the coordinates you got from your randomization procedure.
 - a. The sides of the frame should be parallel to the plot borders.
 Note: If you find a disturbance (walking path, animal burrow, previous harvest, etc.)
 present in the harvest area, go back to Step 1 to get a new sampling location for the plot.
 - b. Place the center of the frame at your sampling location.
 - c. Work the frame through the standing plants to the ground surface such that:
 - No plant stems rooted outside of the frame are lying inside the frame.

Resources

- No plant stems rooted inside the frame are lying outside the frame.
- d. Remove any plant material that has fallen into the plot from the outside (e.g. oak leaves).
- 3. Clip the plants rooted within the frame close to ground level and place them in a labeled paper bag.
- 4. Place properly labeled paper bags into a drying oven at 60 C for a minimum of 24 hours. If no drying oven is available, the bags can be left in the warmest spot in the classroom, such as near the heater.
- 5. Weigh the bag with dried plant material to the nearest 0.1 grams and record the mass on the Plant Biomass Data Sheet.

a. For 1 or 2 of your bags, measure the mass three times with 1 or 2 days between each measurement. If the mass of the bags is relatively the same across all 3 measurements, then you will know that the vast majority of the water has evaporated from the plants. This will indicate that you have a good measurement of dry biomass.

Modified from KBS063: Above Ground Primary Productivity (ANPP)-GLBRC Extensive sites http://lter.kbs.msu.edu/protocols/115, Carol Baker

Plant Biomass Data Sheet	Switchgrass = S Prairie = P	Fertilized = F Unfertilized = UnF	Harvested = H Unharvested = UnH
Names:			
School District:	Teacher/Fellow:		
School / Location Name:			
Date: Time:	We	eather:	
Block Code: Plot Treatment Description (Ex: P UnF H)			
Method of drying			
(1) Mass of paper bag without biomass			
(2) Mass of paper bag and dry biomass (final*)			
(3) Mass of dry biomass [(2) minus (1)]			

*For some of your bags, you should measure the mass of the paper bag and dry biomass three times. The last measurement is your 'final' measurement, which you write in next to (2).

If you only measured the mass of the paper bag and dry biomass once for this bag, then your 'final' measurement is your first measurement.

<u>Multiple biomass measurements</u> (optional for some bags, wait at least 1 day between each measurement):

Mass of paper bag and dry biomass (first) _____

Mass of paper bag and dry biomass (second) _____

Mass of paper bag and dry biomass (third)

Mass of paper bag and dry biomass (final) _____

If your three measurements are very similar, then your third measurement can be your final measurement.

If the third measurement is less than your other measurements, then take an additional mass measurement.