

Above-Ground Biomass (Plant) Determinations

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Introduction

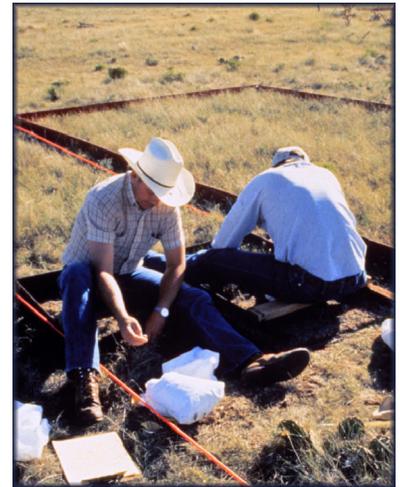
Measurement of the above-ground biomass and of the root biomass is required in calculations of root/shoot ratios. These ratios are used to assess plant vigor and health. In order to determine which plants are associated with the soil microbial communities, the plants should be identified in the field, at the time of sampling. Alternatively, plants with flowering structures can be saved for later identification with a dichotomous plant identification key.

Summary of Method

Surface litter and O horizons are sampled separately. All plant material is clipped down to the soil surface and separated by genus or species.

Equipment

- ✓ Garden clippers
- ✓ Pruning shears
- ✓ Cloth bags
- ✓ Drying oven (if desired)
- ✓ Analytical balance
- ✓ Sharp knife



Reagents

None

Procedure

Field Sampling Procedure

1. The area sampled in the field will be 50 x 50 cm unless otherwise noted on the samples.
2. Clip all vegetation to the soil surface.
3. Separate the plant material by genus or species.
4. Separate the plant material into live and dead fractions.
5. Weigh each species sample (and live and dead subsamples).
6. Oven or air dry and reweigh for gravimetric determination of above-ground biomass.
7. Surface litter and O horizons should be sampled separately in the field.
8. O horizons should be sampled by cutting out the 50 x 50 cm area in a square and to a measured depth so that the bulk density can be determined.

Laboratory Procedure

1. Weigh all plant, litter, and O horizon samples separately.
2. If the above-ground (plant) biomass was not separated in the field:
 - a. Separate standing dead from standing live (green) above-ground (plant) biomass.
 - b. Once the materials are separated, weigh each fraction in order to determine the fresh weight.
3. Air or oven dry (60 °C) each sample.
4. Reweigh each sample in order to determine the moisture content.

Report

Report all weights.

Report root/shoot ratio (described below).

Calculations

1. Calculate the moisture content.
 $(\text{Field Moist Weight} - \text{Dry Weight}) = \text{Weight of Moisture}$
 $(\text{Weight of Moisture} / \text{Dry Weight of Plant Material}) \times 100 = \text{Moisture Content (\%)}$
2. Record final values as mass/area. Above-ground biomass is typically reported on a mass/area basis.
3. O horizons will be reported on a mass/volume or a mass/area basis.
4. Calculate and report the kg/ha by converting the Grams Plant Material / 250 cm².
5. Convert the O horizon mass to Soil Bulk Density.
 $\text{Mass of O Horizon Material} / \text{Volume Sampled}$
6. Convert to area and report as kg/ha or lbs/ac for a given depth.
 $\text{Air Dry O Horizon (g)} \times \text{depth (cm)} \times \text{Soil Bulk Density (g/cc)}$
 $100,000 \text{ (cm}^2\text{/ha)} = \text{Air Dry O Horizon kg/ha Depth Interval}$
7. When paired with root biomass, only the above-ground material, not the O horizon or litter, should be used in the calculation of the root/shoot ratio.

References

USDA-NRCS. 1997. *National Grazing Lands Handbook*. USDA-NRCS, Washington, DC.

Bedunah, D.J., and R.E. Sosebee (eds). 1995. *Wildland Plants - Physiological Ecology and Developmental Morphology*. Society for Range Management, Denver, CO.

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