

Weighings									
Date	Site Location	Soil Type	Sample position	Sample depth (cms)	Wet Soil + tray (g)	Dry Soil + tray (g)	Tray (g)	% moisture	Comments
		Red Latosol	Mid row	10 to 20	430	403	40	6,9	example

Soil moisture protocol for farmer field school mulching plot

PS Baker May 2012

Purpose

For mulching to be a tool for climate change adaptation, it must have a measurable effect on helping to retain soil moisture during the dry season. It is therefore important to gain some direct quantitative evidence of how soil moisture changes throughout the dry season on covered and normal plots.

Method

Soil moisture meters are a possible way of doing this but a reliable instrument is expensive and finding the right one for this particular purpose would take some effort; it would need to be tested and we don't have time for this. If one is available, it should be used in addition to the gravimetric method here described.

Gravimetric method: this is the most simple and direct method though is also time-consuming. It involves weighing the soil sample then drying it in an oven to find the percentage moisture. A strict protocol needs to be followed to ensure accuracy.

Gravimetric protocol

Equipment needed includes:

- A soil sampler – preferably a tool designed for this purpose, or an auger for making fence-post holes
- Plastic bags – sealable or zip-loc (e.g. freezer bags) in which to place the soil samples
- A polystyrene cooler box to store the samples on their journey from the field to the laboratory
- A balance – this could be a good quality kitchen balance if a laboratory balance is not available
- An oven – either a kitchen electric or gas oven, or a microwave, though the latter would require more work (see below)
- Tin foil or paper trays (paper only or suitable plastic if using a microwave oven)
- Oven gloves

Method

Field samples: sample each plot at a minimum of three sample locations (more if possible) in the mid-row, intermediate and between tree positions as shown in the document '*Brachiaria mulch depth experimental protocol*'.

Take samples from three soil depths if possible – these should be superficial, mid and deep e.g. at 0-25 cm, 25-50 and 50-75 cm. The exact ranges will depend on the equipment available – e.g. samples at 10- 20, 30-40 and 50-60 would be fine. If this is too difficult then you will need to improvise, but a near-surface sample and a deeper one would be better than a single depth sample.

Size of sample: if an accurate balance (to 0.1g) is available, then a 50g sample is sufficient. However if a kitchen balance (reads only to 1 g) is used, then at least 250 g is advisable.

Place each sample immediately in a separate plastic bag and seal. Make a note of how the soil looks, if it is dry, moist, wet etc. As you place the soil in the bag, feel it with your hand and note down how it feels (e.g. 'powder-dry', 'slightly damp', 'damp' etc.), since this will help you in future to make quick but quite accurate estimations of soil moisture (e.g. during a field-school exercise).

Place the samples in the cooler box as soon as possible keep as cool as possible.

Laboratory

Gas or electric oven: turn it on low, to a temperature of about 100C – higher temperatures will burn the organic matter in the soil and give a false reading.

Mix up the sample in the sealed bag with your hands to get a homogenous sample.

Take a tray and weigh it, then add the sample from the bag into the tray and weigh again then immediately place in the oven.

Repeat for the other samples, making sure to mark each tray for easy identification. Leave in the oven for about 24 hours. Then remove, wait to cool and reweigh the trays.

Microwave: this gets the result quicker but takes more work.

As above, mix up the sample in the bag, empty into the tray then weigh in the paper/plastic tray.

Place in the oven for about 10 minutes. Remove and weigh and note down the weight, then replace for another 5 minutes and reweigh. Repeat until a constant weight is recorded; the final weight is the one used for the calculation.

Soil humidity calculation

From the initial and final weights, calculate a percentage moisture for each sample.

See separate Excel sheet for basic recording and calculation of moisture.

Note: it is advisable to practice the above procedure before doing it on