HERE'S HOW ... SAMPLING WASTES

ON GUAM MAKE FOR HEALTHY PLANTS & A HEALTHY ENVIRONMENT

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ORGANIC MATERIALS CAN...

- ⇨ provide essential plant nutrients
- ⇨ help soil hold water

TAKING SAMPLES CAN...

- ⇨ help you know how much organic waste to apply
- ⇨ avoid environmental pollution
- ⇨ serve as basis for analysis by Co-op Extension
- ⇨ be easier than you might think!

WHY SAMPLE?

ORGANIC WASTES, COMPOSTS OR OTHER ORGANIC MATERIALS

Sampling of Wastes, Composts or Other Organic Materials: For Healthy Plants and a Healthy Environment

by P.P. Motavalli, F.J. Cruz, and J. McConnell

Organic materials such as animal wastes, household compost, grass clippings or other plant residues, can be used as valuable soil amendments for increasing soil fertility. Not only can they provide essential plant nutrients, but they also can be beneficial to soil physical properties, such as increasing soil water-holding capacity and aggregation. A knowledge of the nutrient content of a particular organic material can help you determine how much material to apply to soil to meet plant nutrient requirements for current and succeeding crops. Excessive applications of organic materials, such as animal wastes, can result in environmental pollution, primarily due to the threat of high levels of nutrients or harmful microrganisms entering into surface or groundwaters. The Soil and Plant Testing Laboratory and Guam Cooperative Extension of the University of Guam analyze organic materials and provide recommendations on the handling and application of these materials for soil fertility purposes.

DIVERSITY

The Diverse Composition and Form of Organic Materials

Organic materials vary considerably in their nutrient composition and physical form as seen below in a table of common organic materials found on Guam. Organic materials contain many of the essential plant nutrients required for plant growth including: nitrogen, phosphorus, potassium, calcium, magnesium, sulfur and micronutrients.

For a given organic material, such as grass clippings, nutrient composition will be affected by the fertility of the soil on which the grass is growing, the stage of growth the grass is cut, and the way in which the grass clippings are handled and stored. A good measure of how fast an organic material will decompose in the soil is the carbon to nitrogen ratio of the material. Generally, plants growing on soils amended with organic materials with carbon to nitrogen ratios above 20 to 30 will tend to have short-term nitrogen deficiency. This occurs because soil microbes use carbon as an energy source and will take up nitrogen from the soil for their growth if not enough nitrogen is contained in the applied organic material. Materials that are more finely cut or ground up will decompose faster than larger pieces.

"A good measure of how fast an organic material will decompose in the soil is the carbon to nitrogen ratio."

Several methods exist for handling organic materials with high carbon to nitrogen ratios, such as paper, cardboard or woody stems. These methods include applying extra nitrogen with the organic material or composting the organic material before applying it to soil. Composting in the presence of sufficient air also decreases the large bulk of many organic materials and

reduces many unpleasant odors. If you have any questions regarding the health hazards or the dangers of handling a specific organic material, contact a public health official or your local extension office before handling it.

Organic materials exist in several physical forms such as solids, liquids or slurries. The large amount of water contained in some may increase transportation costs because of added weight. However, organic materials in liquid or slurry form such as hog waste contained in holding tanks, can be easily pumped, thereby reducing labor costs.

NUTRIENT CONTENT AND PHYSICAL FORM OF SEVERAL AVAILABLE ORGANIC MATERIALS ON GUAM

ORGANIC MATERIAL	NITROGEN CONTENT (% OF DRY WEIGHT)	CARBON TO NITROGEN RATIO	COMMON FORM
Swine manure	3.7	13	Solid, slurry or liquid
Chicken manure	6.1	7	Solid, slurry or liquid
Grass clippings	2.4	19	Solid
Tangan-Tangan leaves	3.2	13	Solid
Raw sawdust	0.1	511	Solid
Seaweed	1.9	19	Solid
Sewage sludge	5.5	6	Solid or slurry
Corn residue	1.0	43	Solid

AVAILABILITY

Plant Availability of Organic Nutrients

The nutrients contained in organic materials are often not immediately available for use by the growing plant. The biological soil process by which organic nutrients are converted to forms that plants can use is called "mineralization."

Since organic materials contain different forms of a single nutrient such as nitrogen, the process of mineralization usually occurs over a long period of time. Application of organic materials, therefore, tends to have long-term effects on nutrient release in a soil.

"A good rule to follow on Guam is that roughly 50% of the organic nitrogen applied will be available to plants the first growing season after application...."

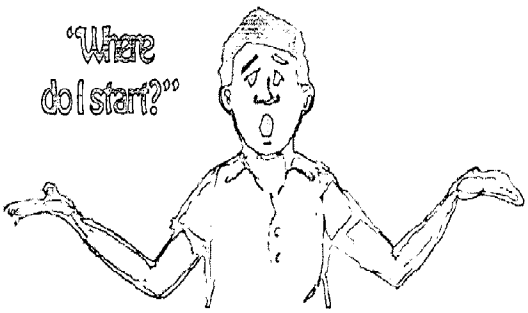
A good rule to follow on Guam is that roughly 50% of the organic nitrogen applied will be available to plants the first growing season after application of an organic material. In the following seasons approximately 10% of the organic nitrogen remaining after each season will be released for plant use.

First year availability of organic phosphorus for plant growth is approximately 60% and is approximately 80% for organic potassium. These rates may vary depending on the method of application of organic materials, the type of soil, and whether the material is applied in the rainy or dry season.

TAKING SAMPLES

How to Take Samples of Organic Materials

The objective of sampling is to obtain a representative sample of the organic material you wish to use as a soil amendment. If possible before sampling, try to mix or stir up all liquid or slurries so that solids that have settled to the bottom will be in solution. Solids should also be mixed before sampling if they contain several types of organic materials.



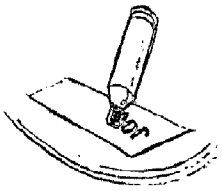
If an organic material is piled, take subsamples from several places in the same pile and mix together and submit as one composite sample. If you have several separate types of organic materials then you may wish to sample them separately and submit each one to the Soil and Plant Testing Laboratory for comparison.

Equipment for Taking Samples

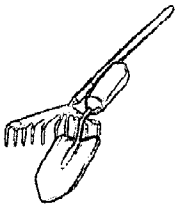
Several types of tools can be used for sampling organic materials including: a shovel; trowel; bucket, and glass or plastic containers. For sampling organic materials with potential human health hazards, such as animal wastes, rubber or plastic gloves are also recommended . Do **not** sample raw sewage or materials containing toxic wastes such as pesticides, heavy metals or petroleum products due to the potential health hazard to you and your family.

HOW TO SAMPLE

Sampling Procedure



1. **IDENTIFY** the organic material you wish to sample and determine the precautions you must take to safely handle the material. If you have any questions regarding the health hazards or dangers associated with handling a specific organic material, be sure to first contact Public Health, the Guam Environmental Protection Agency or the Guam Cooperative Extension office **before** handling the material.

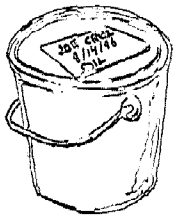


2. **MIX** the organic material together to insure a uniform sample. This mixing is especially important for liquids in which solid material may have settled.

3. **TAKE SEVERAL** subsamples from the pile or tank and mix together in a bucket. Place approximately 1/2 pound or 1 quart of the composite sample in a plastic bag or other suitable container which can be tightly sealed. If the material is

collected and stored in a plastic bag or container for more than several hours, be sure to refrigerate it to prevent the material from molding and further decomposing.

4. **CLEARLY MARK** the container with your name, the date of sampling and the type of organic material sampled using an indelible marker.



5. **FILL OUT AN ORGANIC** materials sample submission sheet which you can obtain from the offices of the Cooperative Extension Service or the Agricultural Experiment Station at the University of Guam. The information you provide on this sheet such as the type of organic material sampled, the date of sampling and the intended use of the material are essential for providing a good recommendation so please take the time to fill it out.

6. **YOUR SAMPLE** is ready to turn in for analysis.

GETTING RESULTS

Drop Off Samples

Drop off your sample and the submission sheet at the offices of the Cooperative Extension Service or the Agricultural Experiment Station at the University of Guam. Be sure to ask if there are any fees associated with the laboratory services and pay them prior to receiving laboratory results.

Agricultural Experiment Station
College of Agriculture and Life.Sciences
University of Guam
Telephone: 735-2134

Agriculture and Natural Resources
College of Agriculture and Life Sciences
University of Guam
Telephone: 735-2080

Inarajan Experiment Station
College of Agriculture and Life Sciences
University of Guam (Near Southern Regional Health Center)
Telephone: 828-8624

Results and Recommendations

You will receive your organic material sample test results within approximately two weeks after the time you submit the samples. A rush service of four working days is also available for an additional charge. Depending on the laboratory tests you requested, you will receive information on the nutrient and moisture contents of the organic material. Contact Guam Cooperative Extension or your local extension office if you have any questions about the best management program for your conditions.

SENDING SAMPLES TO GUAM

Sending Organic Samples for Analysis from Outside Guam

In order to insure that a new pest or disease is not introduced inadvertently into Guam, extra precautions are required to prepare organic samples coming from outside Guam for analysis. The following procedure is required for preparation and sending of organic samples to Guam:

1. Oven dry (60° to 70°C) the organic material for two days or more and grind to the form of a powder. No liquids or slurries will be accepted from outside Guam.
2. Double bag the dried material in plastic and securely seal the bags to insure no leakage of the material. Be sure to identify each sample on the outside of the bag. Fill out an organic waste submission sheet. If a submission sheet is not available, include a list of all the samples and their identification. Be sure to include your name, address and telephone and fax numbers. Please also indicate form of payment.
3. Place the marked bags in a sturdy mailing container and securely seal the container.
4. Send the package via U.S. mail or other postal services to:

   Soil and Plant Testing Laboratory
   College of Agriculture and Life Sciences
   University of Guam
   UOG Station
   Mangilao, Guam 96923 USA

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