

Arizona Department of Agriculture  
Agricultural Consultation & Training Program  
CNMP Assistance Program  
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# **Sampling Procedures for Nutrient Management Planning**

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This document serves only as a guide and provides suggestions for properly collecting a variety of samples required for a nutrient management plan. Please contact your laboratory or extension specialist for clarification on specific techniques or requirements.

This document is available in alternative formats by contacting the ADA Coordinator at (602) 542-4316 (voice) or 1-800-367-3839 (TTY Relay).

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## Before You Begin

**Contact your laboratory or extension specialist for clarification on specific techniques or requirements.**

### General Supplies:

- permanent marker(s)
- white adhesive labels
- gloves
- notepad
- pencil/pen
- tape measure
- tarp(s)
- clean core sampler (a probe/tube, auger or shovel can be used)
- clean 5-gallon bucket(s) for mixing
- clean shovel or some type of mixing tool
- clean utensil or plunger for mixing liquids
- clean 1-gallon plastic zip-seal bags for solids
- clean paper bags for plants and/or solids
- clean 1-quart plastic bottles with lids for liquids
- cooler for transporting sample

### Document:

- Label all sample containers with the following information before filling:
  - Farm and owner name
  - Date
  - ID # and/or name (i.e.: Field 1, Sample A)
- Complete the Sampling Worksheet provided for each sample; keep the original with your records, make a copy for your nutrient management plan and send one to the lab with your samples. Do not put the worksheet in the sample bag.

### Sample Analysis:

- In order to comply with the Arizona Pollutant Discharge Elimination System (AZPDES) Permit and the Natural Resources Conservation Service (NRCS) Code 590:
  - Manure and wastewater samples must be collected at least *annually* and *minimally* tested for: **total nitrogen, TKN, ammonia, nitrate, total phosphorus** and **potassium**.
  - Soil samples must be collected at least *every five years* and tested for **available phosphorus ( $P^2O^5$ ), nitrate ( $N-NO^3^-$ ) and potassium ( $K^2O$ ); pH, cation exchange capacity (CEC), electrical conductivity (EC) and soil organic matter content.**

# Soil

## A. Considerations

1. Before entering the field, prepare a sampling plan: random, grid, V- or X-pattern sampling
2. Use a soil probe/tube or auger; if not available, a garden spade or shovel may also be used
3. Each sample submitted should be representative of uniform area conditions (same type, slope, texture, color, drainage, crop history, management and fertilizer practices)
4. Avoid small non-typical and salty areas
5. Take samples before planting, or from the side of the planting bed
6. Make a composite sample by combining 15-30 small subsamples
7. Banded fertilizer areas: consult your laboratory or extension specialist for instructions
8. Row crop areas: confirm depth with your lab. Typically, 12 inches is sufficient for general soil fertility; some sources state to sample to plow depth (6-9 inches).
9. Permanent pastures, lawns and turf: sample to 4-inch depth

## B. Collection

1. **Soil probe/tube or auger:**
  - a. Before digging, scrape away all surface litter
  - b. Push probe/tube (or turn auger) to a depth which will allow a core sample of soil (equal in length to the distance from the surface to the desired depth), to be easily removed from the probe
  - c. Only discard the first 2 inches if your lab specifies to do so. Either way, make note of whether or not the sample includes the top 2 inches and report it to your lab.
  - d. Each core should be the same length

## Soil, continued

### 2. Shovel:

- a. Before digging, scrape away all surface litter
- b. 1st Cut: remove one shovel full of soil from the spot to be sampled by inserting the blade to the sampling depth or slightly deeper
- c. 2nd Cut: Cut a 2-inch thick slice of soil from the face of the hole
- d. With a trowel or knife, trim away the soil remaining on the shovel until a 2-inch wide strip of soil remains on the blade
- e. Length of strip should be a little longer than the distance from the surface to the bottom of the desired sampling depth; added length is to compensate for the angle of the shovel blade

### C. Package/Ship

1. Mix all the subsamples thoroughly in a clean container to make a composite sample
2. Bag approximately 1 pound of the composite sample for testing
3. Wet samples may be air-dried on a clean paper towel or paper plate before shipping; consult your lab for instructions
4. Samples should be packed tightly in a sturdy container to prevent spillage during shipping; keep cool

# Solid Manure

## A. Considerations

1. It is recommended to sample from loaded spreaders, rather than manure pack
2. If that is not practical, see #5 below

## B. Collection

### 1. **Sampling while loading:**

- a. Take at least 5 subsamples while loading several spreader loads; make one composite sample

### 2. **Sampling during spreading:**

- a. Spread tarp in field; catch manure from one pass
- b. Sample several locations to create a composite sample

### 3. **Sampling during daily haul:**

- a. Place a 5-gallon bucket under the barn cleaner 4-5 times while loading a spreader

### 4. **Poultry litter:**

- a. Collect 8-10 sub-samples throughout house at level which litter will be removed to create a composite

### 5. **Stockpiled waste:**

- a. Take at least 10 subsamples (15-30) from different locations, at different depths

## C. Package/Ship

1. Thoroughly mix subsamples in a clean container
2. Bag approximately 1 pound of the composite
3. Store sample in freezer if not delivered immediately to lab
4. Samples should be packed tightly in a sturdy container to prevent spillage during shipping; keep cool

# Liquid Manure

## A. Considerations

1. Use only clean 1-quart plastic containers with lids; do not use glass or soda pop bottles
2. Label the sample container
3. Rinse the clean sample container and the lid three times with the liquid to be tested (do the same if using a different container to collect the samples)

## B. Collection

### 1. **Sampling from storage:**

- a. Agitate storage facility thoroughly (2-4 hours minimum because of nutrient stratification)
- b. Collect at least five subsamples from storage or while loading a spreader tank using a 5-gallon bucket

### 2. **Sampling during application:**

- a. Place 5-gallon buckets around field to catch manure from spreader or irrigation equipment

### 3. **Sampling during irrigation:**

- a. Water source should be turned on for a minimum of fifteen minutes; allow lines to clear before taking sample
- b. Take a minimum of 3 subsamples throughout the irrigation (i.e.: beginning, middle and end)
- c. Keep subsamples refrigerated until all are collected

### 4. **Sampling during a discharge:**

- a. See the Discharge Collection section on Page 10 for specific instructions

## C. Package/Ship

1. Combine subsamples in a clean container to form a composite
2. Thoroughly mix subsamples; can use a plunger to mix, using an up-and-down action
3. Fill the collection bottle not more than three-quarters full (leave one inch empty for expanding gases); seal tightly
4. Samples should be packed tightly in a sturdy container to prevent spillage during shipping; keep cool
5. Deliver samples within 24 hours of collection
6. Store in freezer if not delivered to lab immediately

# Water

## A. Considerations

1. Use only clean 1-quart plastic containers with lids; do not use glass or soda pop bottles
2. Label the sample container
3. Rinse the clean sample container and the lid three times with the water to be tested (do the same if using a different container to collect the samples)

## B. Collection

1. Water source should be turned on for a minimum of fifteen minutes; allow lines to clear before taking sample
2. Fill the collection bottle not more than three-quarters full (leave one inch empty for expanding gases); seal tightly

## C. Package/Ship

1. Samples should be packed tightly in a sturdy container to prevent spillage during shipping; keep cool
2. Deliver samples within 24 hours of collection
3. Note any fertilizer being injected into the system

## Plants/Petioles

### A. Considerations:

1. Before entering the field, prepare a sampling plan: random, grid, V- or X-pattern sampling
2. Do not enter a field recently sprayed with pesticide; wait 48 hours after application (or recommended safe re-entry interval)
3. Do not sample from a wet field; wait for it to dry
4. Do not take samples from border rows or within 50 feet of the end row
5. Recent fertilizer application will affect lab results, but should not impede collection. Collect necessary samples, and make note of fertilizer type, application rate, application method and date.

### B. Collection:

1. Generally, collect the most recently matured or fully expanded leaves
2. According to your sampling plan, collect random samples from various rows
3. Collect at least 30 samples
4. If submitting petiole samples, separate the leaf from the petiole or midrib immediately
5. Sample during the daytime (and if taking multiple samples, sample at the same time of day to insure sample uniformity)
6. Do not sample when the plants are stressed. Sample plants that are representative of the plants growing in the field. Do not sample diseased, damaged or insect infested plants. Do not collect dirty or dusty leaves.

### C. Package/Ship

1. Place samples in a paper bag. Do not put in a plastic bag; moisture may cause rotting of the plant.

## References

- A. California Plant Health Association. Western Fertilizer Handbook. Danville, IL: Interstate Publishers, 2002.
- B. Openshaw, Martin D., Cooperative Extension Service. How to Sample Arizona Soils. Tucson, AZ: The University of Arizona, undated.
- C. Peters, John, et al. Recommended Methods of Manure Analysis. Madison: Cooperative Extension Publishing, 2003.
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