Urban Small Farms Conference 2019

Thrusday, February 21st, 2019

Time	Soils
1:00	Sustainable Soil and Nutrient Management - Melanie Stock, USU **pg. 263**
1:30	Soil Testing: Why, How, and Interpreting Your Results - Grant Cardon and Melanie Stock, USU **pg. 268**
2:00	
2:30 - 3:00 Break	
3:00	To Till or Not to Till?... That is the Question - Grant Cardon, USU **pg. 271**
3:30	Mechanical Weed Control Tools for Small Acreage Producers - Katie Wagner, USU **pg. 272**
4:00	
4:30	

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Sustainable Soil and Nutrient Management

This presentation will introduce topics in precision agriculture for microfarming. The goal is to inform decision-making on soil fertility for both economic viability and environmental sustainability. We will broadly cover soil sampling; nutrient management; and determining compost and manure applications, as well as using cover crops.

Melanie N Stock
Assistant Professor
Utah State University
melanie.stock@usu.edu

I am a new assistant professor in the USU Plants, Soils, and Climate Department. I moved to Utah from Wisconsin in 2018. My background is in using soil science for manure and land management in the wintertime, and running community gardens. At USU, I am excited to work on resource use efficiency and high value crops with small scale producers. I am particularly excited to begin cut flower research and Extension programming.

Sustainable Soil and Nutrient Management II

Soils Track

Dr. Melanie Stock

Assistant Professor / Extension Urban & Small Farms Specialist

Department of Plants, Soils, and Climate, Utah State University

Certified Soil Scientist, SSSA

7th Annual Urban & Small Farms Conference
Utah Cultural Celebration Center – West Valley City, UT
February 21, 2019

Today's Topics

I. Sustainable Management: Begins with a Soil Test
   - Local considerations
   - How to test and what to expect

II. Meeting your soils' needs
   - Understanding and addressing test results
   - Adding fertilizer and manure

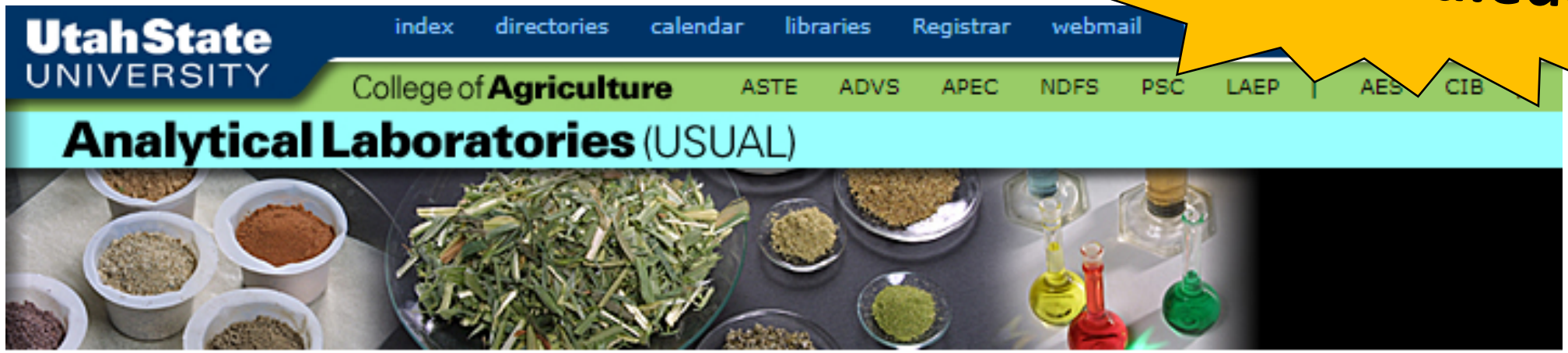
Regular soil testing is critical for determining your nutrient needs

- Opportunity to know exact crop needs
  - There are 14 nutrients *all* plants need. If one is deficient, yield drops
  - Using visual symptoms alone = often too late & misdiagnosis is common
- Avoid applying too much
  - Reduce fertilizer/amendment cost
  - Avoids salinity problems, environmental hazards

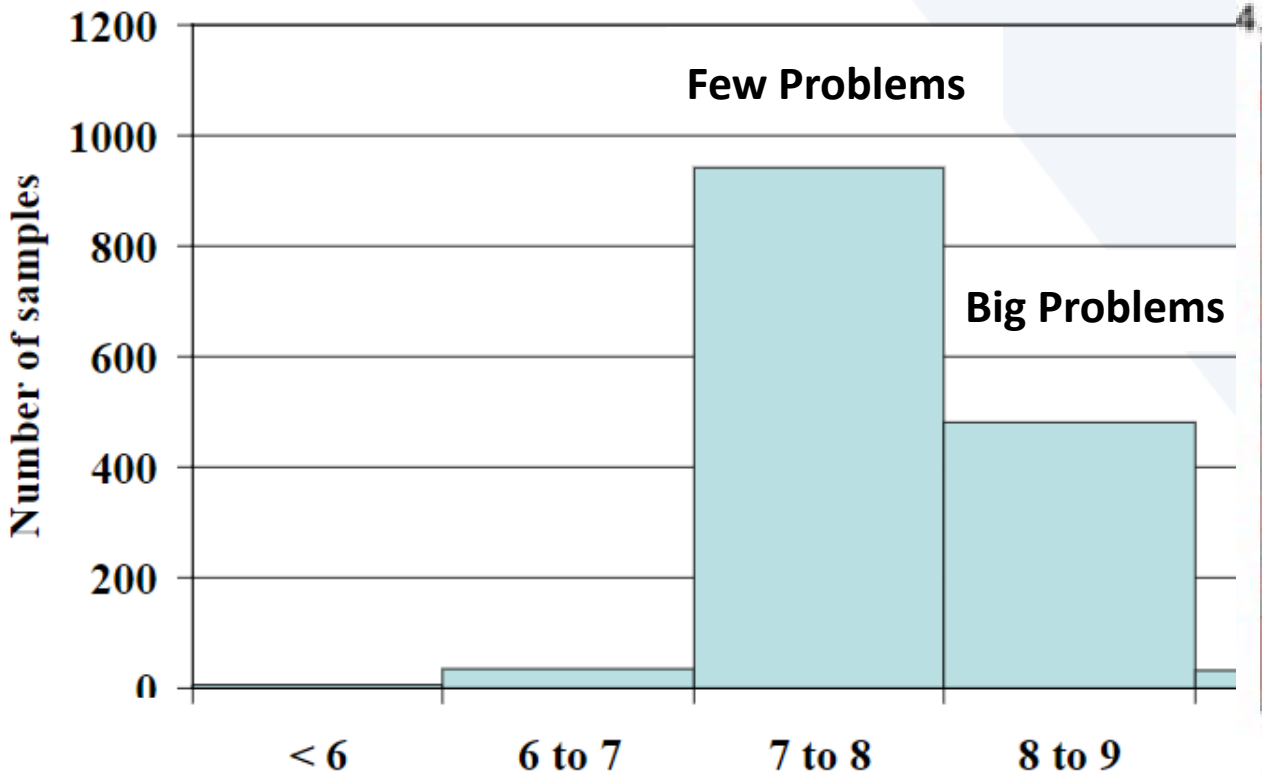
Soil Test Lab at USUAL

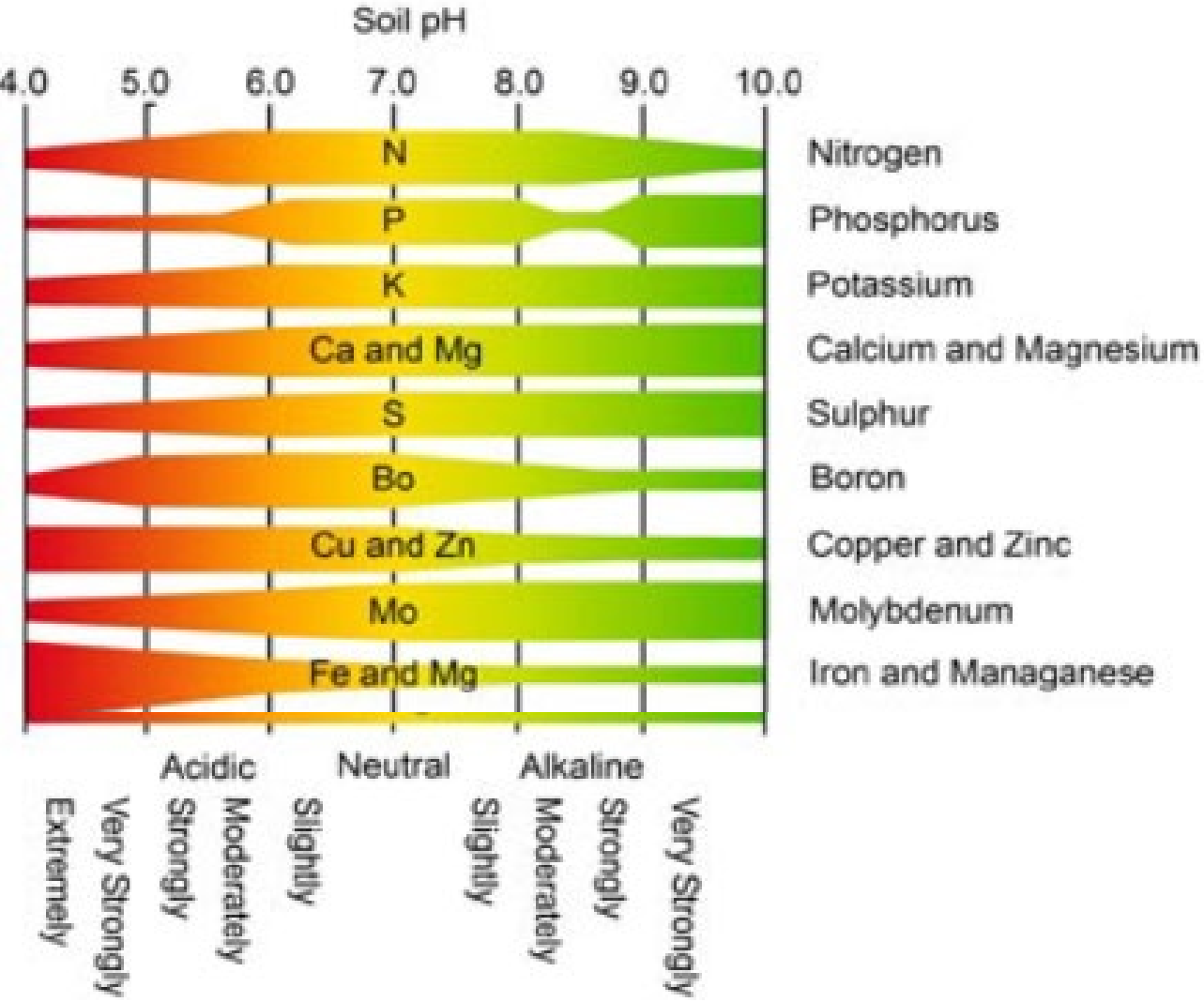
- Helpful documents for soil test interpretation
- Soil samples cost $14+ to test

usual.usu.edu

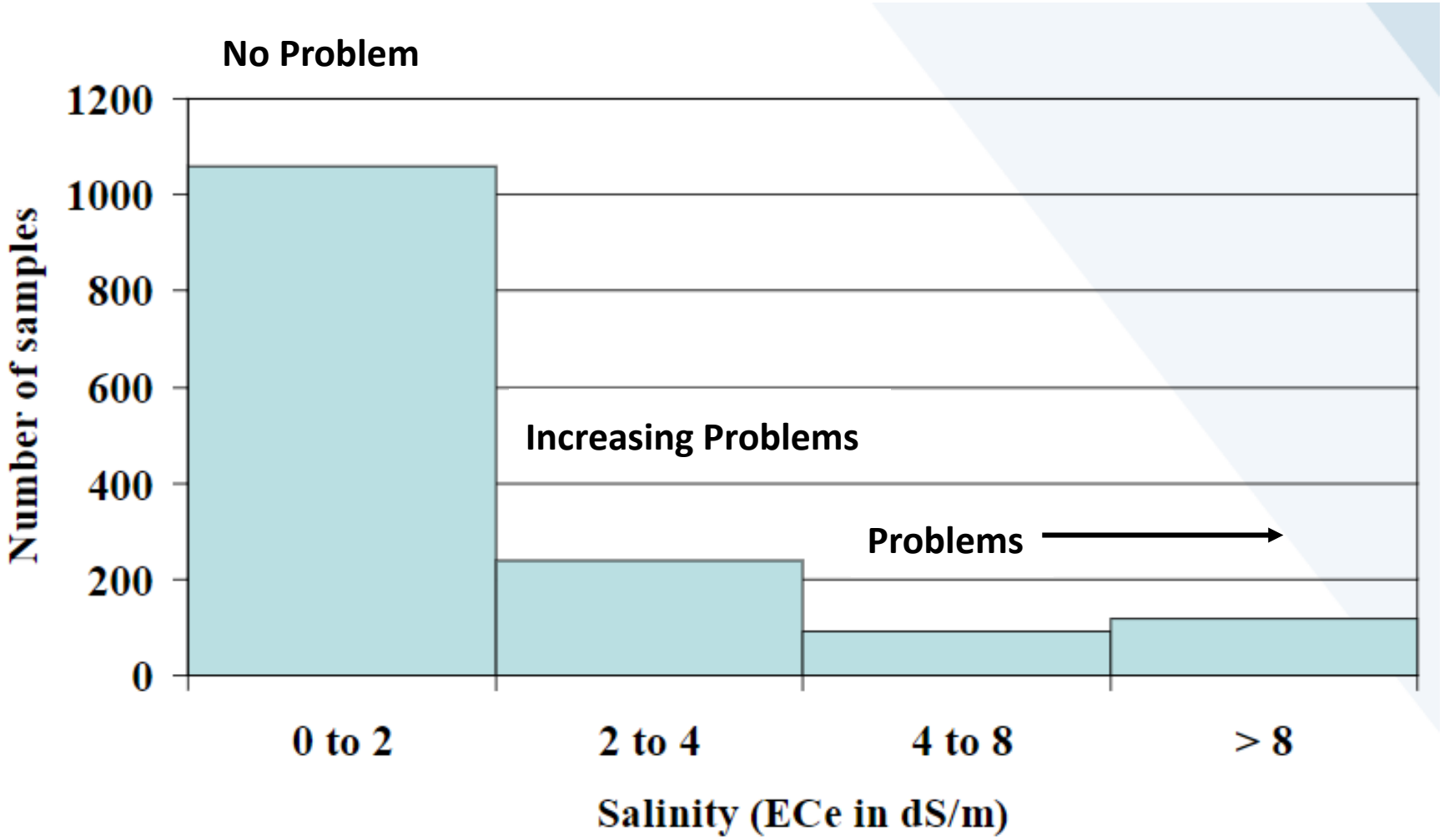


pH: Alkaline Soils

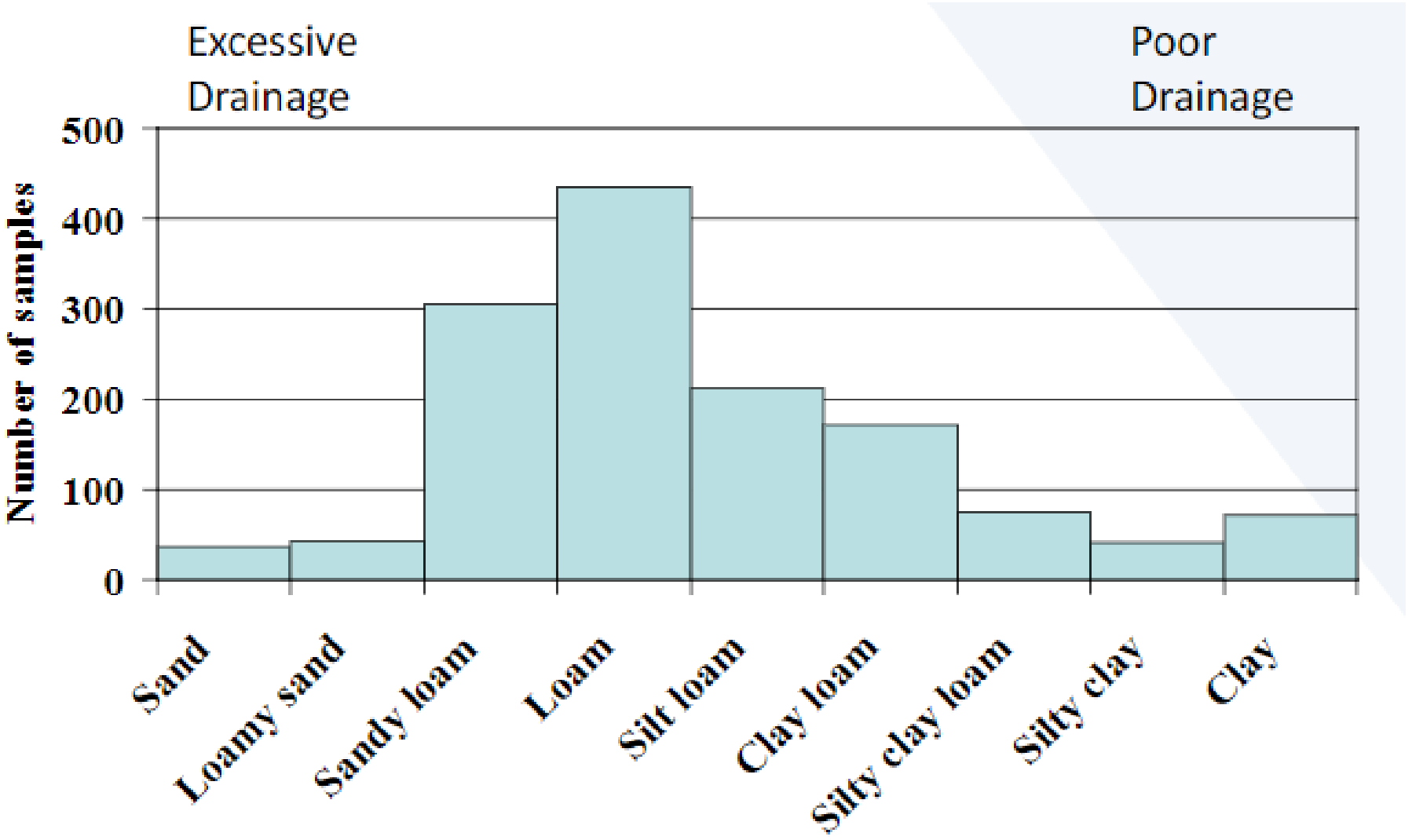




Salinity


No Problem
1200
1000
800
600
400
200
0
Number of samples
Increasing Problems
Problems
0 to 2
2 to 4
4 to 8
> 8
Salinity (ECe in dS/m)

Texture: Irrigation and fertility go hand-in-hand



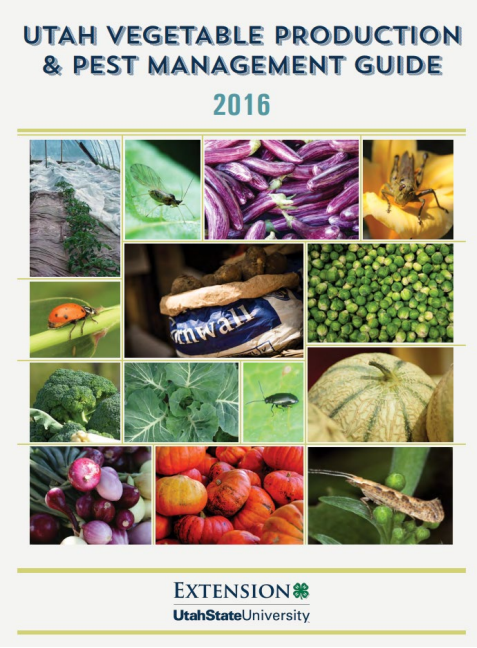
Step 1: Selecting soil tests

1. First tier – always consider these important tests
   - Phosphorus & Potassium (P & K) – soils can have high levels
   - Salinity (EC) and pH – knowing your baseline tells you how close you might already be to threshold values. It's easier to avoid salinity, pH problems than to try to fix later
2. Second Tier – one time only
   - Texture – this takes 100s to 1000s of years to change. Just test it once
3. Optional and follow-up tests
   - Nitrogen – not necessary, but can be helpful
   - Iron – if see iron deficiency in plants or if have a high pH
   - SAR – if salinity is very high
   - Total Elemental – micronutrients and metals

Nitrogen is NOT included in Routine tests because we can assume it is required each year

Table 1. Annual nitrogen recommendations for landscape and garden plants.

Plants	General requirements	Recommendation
Vegetables**	Low: peas, beans	1 to 2 pounds of nitrogen/1000 sq ft
	Intermediate: asparagus, beet, carrot, melon, cauliflower, broccoli, brussels sprouts, celery, pepper, tomato, lettuce, radish, spinach, turnip, squash, pumpkins	2 to 3 pounds of nitrogen/1000 sq ft (= 90-130 pounds N/acre)
	High: onion, sweet corn, potato	4 to 6 pounds of nitrogen/1000 sq ft



UtahState UNIVERSITY extension

SOIL ANALYSIS INFORMATION SHEET

USU Analytical Labs
1541 N 800 E / 9400 Old Main Hill
Logan UT 84322-9400
(435) 797-2217 or Fax (435) 797-2117
www.usual.usu.edu

USU ANALYTICAL LABORATORIES

Date: _____

Name: _____

Sample Numbers

	1	2	3	4
Sample I.D.				
Sample Depth				
Tests Desired*				

*TESTS OFFERED
Price is per sample

2. Routine (pH, salinity, texture, Phosphorus (P), Potassium (K), recommendations-indicate crop!)..... 25.00
4. Micro Plus (Routine + micronutrients (Zn, Fe, Cu, Mn))..... 35.00
5. Complete (pH, salinity, texture, P, K, Nitrate-N**, micronutrients, sulfate, organic matter) 67.00
6. UDOT Required (pH, salinity, SAR, organic matter, particle size, >2mm)..... 61.00
7. Landscaper (UDOT plus P, K, NO3-N**, micronutrients).. 90.00

Please contact the lab for individual analyses/additional analyses
**Nitrate-N analysis requires special sampling/handling. See procedures on reverse side.

TESTS REQUIRE 2 CUPS OF SOIL PER SAMPLE

Providing too much soil may cause delays, while too little soil may not be enough for all tests requested.

COMMENTS or special problems: _____

Total cost of analysis: $ _____

☐ Check # _____ ☐ Cash

LAWN • GARDEN • ORCHARD

Crops to be Grown	Sample Numbers 1	2	3	4
1. Garden/flowers/veg.	☐	☐	☐	☐
2. Leaves/ grass/residues	☐	☐	☐	☐
3. Commercial fertilizer	☐	☐	☐	☐
4. _____	☐	☐	☐	☐

FIELD CROPS

Crops to be Grown	Sample Numbers 1	2	3	4
IRRIGATED				
1. Alfalfa 100%	☐	☐	☐	☐
2. Grass Hay 100%	☐	☐	☐	☐
3. Legume /Grass Hay	☐	☐	☐	☐
% Legume(25% increments)				
4. Grass Pasture	☐	☐	☐	☐
5. Legume/Grass Pasture	☐	☐	☐	☐
% Legume(25% increments)				
6. Corn (silage)	☐	☐	☐	☐
7. Corn for grain	☐	☐	☐	☐
8. Wheat	☐	☐	☐	☐
9. Barley/Oats for Grain	☐	☐	☐	☐
10. Potatoes	☐	☐	☐	☐
11. Turf (golf/sports)	☐	☐	☐	☐
12. _____	☐	☐	☐	☐
NON-IRRIGATED				
13. Grain	☐	☐	☐	☐
14. Alfalfa	☐	☐	☐	☐
15. Grass Pasture	☐	☐	☐	☐
16. Reclamation	☐	☐	☐	☐
17. _____	☐	☐	☐	☐
YIELD GOAL**				
Acres in field				
CROP LAST YEAR				
Yield per acre				
Was straw/stover removed? Yes	☐	☐	☐	☐
No	☐	☐	☐	☐

Rev. 2/01/2017

SOIL ANALYSIS

TEST	TEST DESCRIPTION	PRICE PER SAMPLE	SAMPLE SIZE**	NOTES ***
S1	Sample Preparation / Drying and Grinding (REQUIRED FOR MOST SAMPLES)	$ 4.00		
	CHEMICAL PARAMETERS			
S2	pH (saturated paste)	$ 4.00	100g	
S3	Electrical Conductivity (Ece) (saturated paste)	$ 6.00	100g	
S4	pH + Ece	$ 7.00	100g	
S5	SAR - Sodium Adsorption Ratio	$ 14.00	150g	
S6	pH + Ece + SAR	$ 17.00	150g	
S7a	Phosphorus - Olsen NaHCO3 Method (Available P)	$ 7.00	2.5g	
S7b	Potassium - Olsen NaHCO3 Method (Available K)	$ 7.00	2.5g	
S7c	Olsen P + K	$ 11.00	2.5g	
S8a	Nitrate-N (Available N) $Ca(OH)_2$ extract	$ 9.00	5g	a
S8b	Nitrate-N (Available N) 2N KCl extract	$ 10.00	20g	a
S8c	Ammonia-N (2N KCl extract)	$ 14.00	20g	a
S8d	Nitrate-N + Ammonia-N (2N KCl extract)	$ 19.00	20g	a
S9a	DTPA-extractable Elements Micronutrients (Fe, Zn, Cu, Mn)	$ 10.00	10g	
S9b	DTPA-extractable Elements Metals (Fe, Zn, Cu, Mn, Cd, Cr, Ni, Pb)	$ 11.00	10g	
S10	Sulfate-S (Available Sulfur)	$ 10.00	10g	
S11	Boron - Hot-water extractable	$ 17.00	15g	
S12a	Organic carbon/Organic Matter Walkley-Black	$ 13.00	0.5g	
S12b	Organic carbon/Organic Matter Loss on Ignition / Ash	$ 14.00	20g	
S12c	Combustion (Total Carbon)	$ 20.00	5g	
S13	Combustion (Total Nitrogen)	$ 20.00	5g	a
S14	Combustion (Total Carbon + Nitrogen)	$ 20.00	5g	a
S15a	Water-Soluble Elements (Saturation paste) Ca, Mg, Na, K, B, S	$ 17.00	250+g	
S15b	Water-Soluble Elements (Saturation paste) Chloride (Cl)	$ 15.00		
S15c	Water-Soluble Elements (Saturation paste) CO3 + HCO3	$ 18.00		
S15d	Water-Soluble Elements (Saturation paste) Nitrate-N (NO3-N)	$ 16.00		
S15e	Water-Soluble Elements (Saturation paste) All	$ 34.00		
S16	Ammonium Acetate Extractable Cations (Ca, Mg, Na, K)	$ 20.00	4g	
S17	Cation Exchange Capacity - NaOAc / NH4OAc Replacement Method	$ 39.00	4g	
	Exchangeable Cation Percentage (Includes tests - CEC, NH4OAc-ext.		200g+	
S19	Total Element Composition EPA 3050 Digestion + ICP analysis	$ 33.00	4g	b
			100g	
	PHYSICAL PARAMETERS			
S21	Coarse Fragment Analysis (>2mm fraction)	$ 8.00	100g	
S22	Particle Size by Hydrometer	$ 19.00	100g	
S23	Sand Sieving (VF, F, M, C, VC)	$ 17.00	100g	
S24	Particle Size by Hydrometer + Sand Sieving	$ 35.00	100g	

2. Routine (pH, salinity, texture, Phosphorus (P), Potass recommendations-indicate crop!).....

S19 | Total Element Composition EPA 3050 Digestion + ICP analysis | $ 33.00

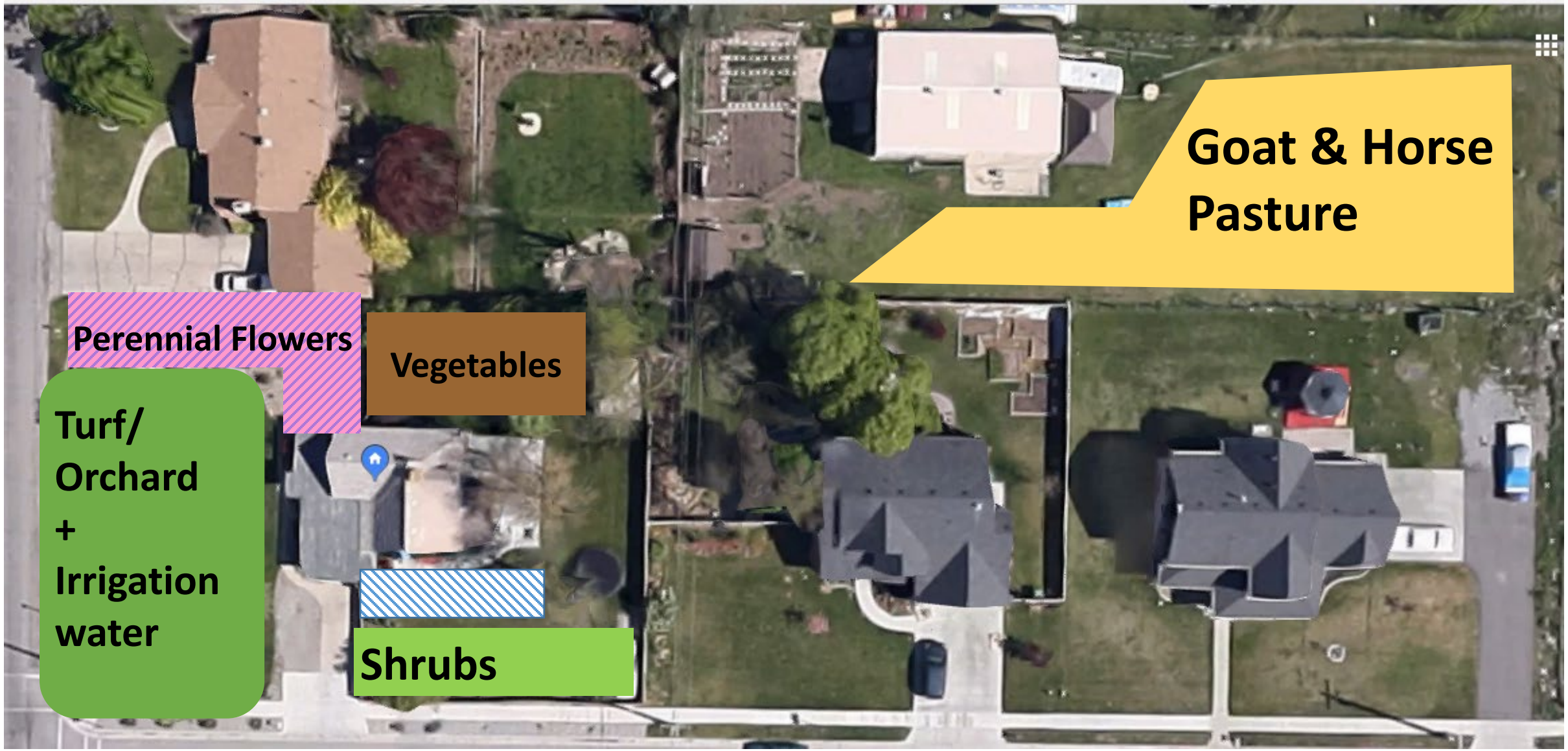
Step 2: Soil sample planning

- How often should I soil sample?
  - Perennials = every 3 years,
  - Annuals = every 1-2 years
- Goal: Collect samples that represent your yard/farm
  - Try to group different areas into management “zones”
- Home soil test kits not recommended
  - Most were developed for eastern soils
  - Our soils are special!

Step 2 cont'd: Determining "zones"

- 3 management zones are common, depending on budget, crops, goals, and property information
- Considerations:
  - Size of your field or property. <30 ac/sample
  - Crop or plant type
  - Natural features – slope, soil texture, drainage
  - History – fertilizer, manure/livestock, compost, irrigation, past use, possible contamination areas*
  - Intuition – isolate an area if it is underperforming or just seems different!

* by major highways, former mines or orchards, next to houses older than 1980


Goat & Horse Pasture
Perennial Flowers
Vegetables
Turf/ Orchard + Irrigation water
Shrubs

Finding your property's *native* soil type online

https://casoilresource.lawr.ucdavis.edu/gmap/

- SoilWeb, by University of California – Davis
- Soil maps cover across US
- Similar to the Web Soil Survey from the USDA-NRCS, but runs faster and has additional visuals that are useful. Apps available, too
- Caution: Maps have a coarse resolution and are of native soil

Secure | https://casoilresource.lawr.ucdavis.edu/gmap/

< Close

SoilWeb

UCDAVIS NRC

PARLO SILT LOAM, 0 TO 3 PERCENT SLOPES (PIA)

Map Unit Composition

100% - ***Parlo***
Geomorphic Position: *lake plains*

Map Unit Data

Map Unit Key: *482800*

Type: *Consociation* ?

Farmland Class: *Prime farmland if irrigated*

Available Water Storage (0-100cm): *13.88 cm*

Flood Frequency (Dominant Condition): *None*

Flood Frequency (Maximum): *None*

Ponding Frequency: *0*

Drainage Class (Dominant Condition): *Well drained* ?

Drainage Class (Wettest Component): *Well drained* ?

Proportion of Hydric Soils: *0%* ?

Min. Water Table Depth (Annual): *n/a*

Min. Water Table Depth (April-June): *n/a*

Min. Bedrock Depth: *n/a*

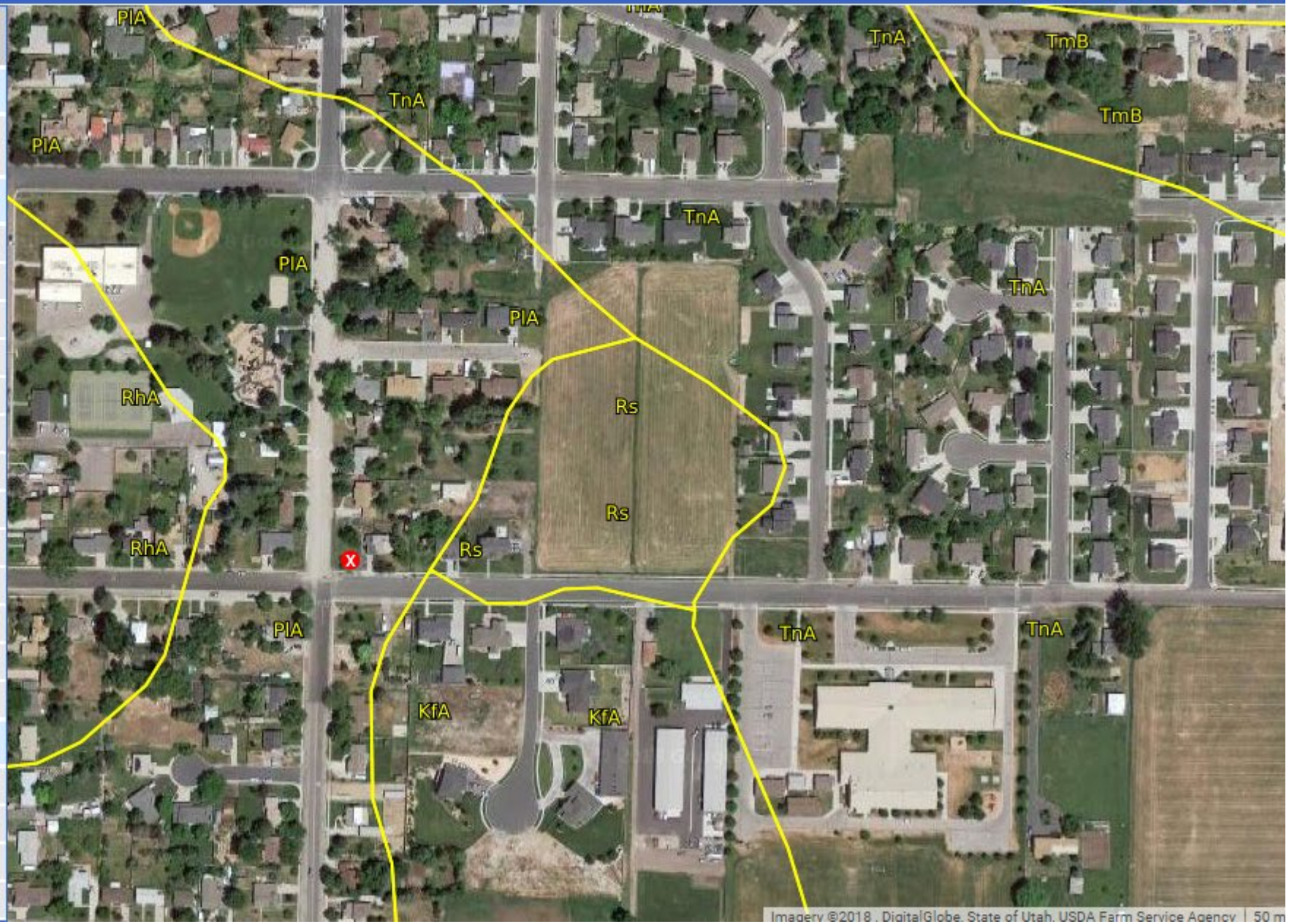
Survey Metadata

Soil Survey Area: *UT603* ?

Scale: *1:20,000* ?

Published: *1968* ?

Last Export: *Sep 6 2017* ?

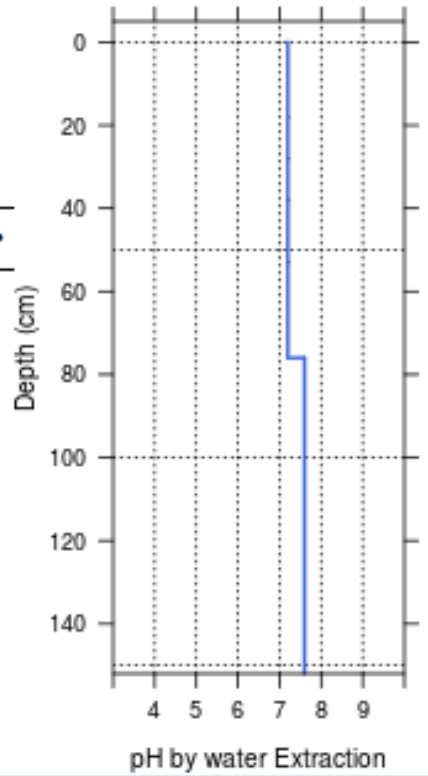


Parlo

Soil Data Explorer | Series Extent Explorer | Description

▲ Soil Profiles

Typical Profile | Org. Matter | Clay | Sand | Ksat | pH ? > | Kf Factor | EC | SAR | CaCO3 | Gypsum | CEC @ pH7 | Linear Ext.



▲ Soil Taxonomy

Order: *Mollisols*

Suborder: *Xerolls* *Map of Suborders*

Greatgroup: *Argixerolls*

Subgroup: *Calcic Argixerolls*

Family: *Fine-silty over sandy or sandy-skeletal, mixed, mesic Calcic Argixerolls*

Soil Series: *Parlo*

▲ Soil Taxonomy

Order: *Mollisols*

Suborder: *Xerolls* *Map of Suborders*

Greatgroup: *Argixerolls*

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Family: *Fine-silty over sandy or sandy-skeletal, mixed, mesic Calcic Argixerolls*

Soil Series: *Parlo*

▼ Land Classification

▼ Hydraulic and Erosion Ratings

▲ Forest Productivity

No data are available.

▲ Soil Suitability Ratings

Agriculture | Forestry | Waste Related | Engineering | Irrigation | Urban/Recreational | DHS | Wildlife | Runoff

▲ Details

Map Unit Name: *PARLO SILT LOAM, 0 TO 3 PERCENT SLOPES*

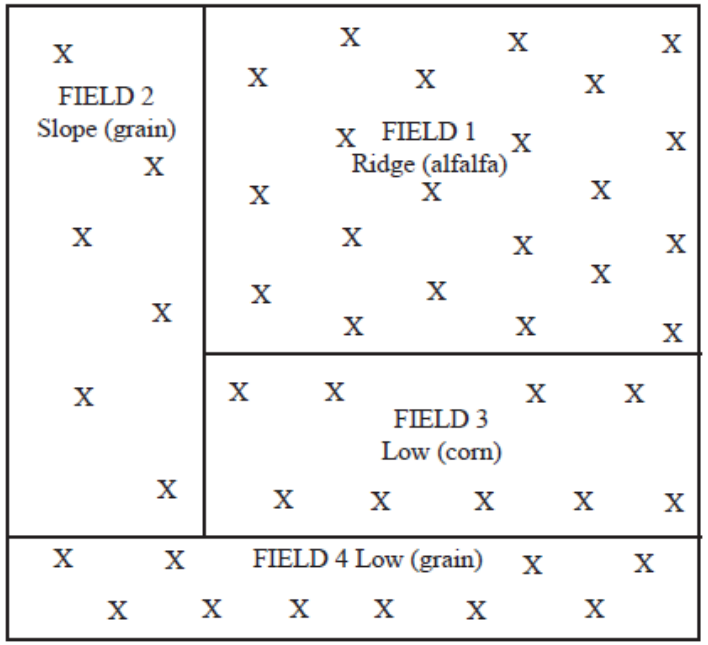
Component Key: *14453625*

Data: *Component* *All Horizons* *Lab Data*

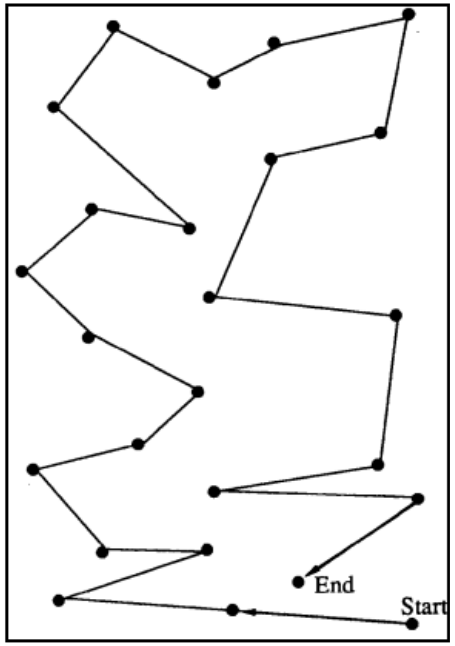
Step 3: Now that zones are identified, collect samples

- Take care to collect good samples. Junk in = junk out!
- For each zone, collect several samples (“subsampling”) and mix them together to form one composite per zone that gets sent to the lab.

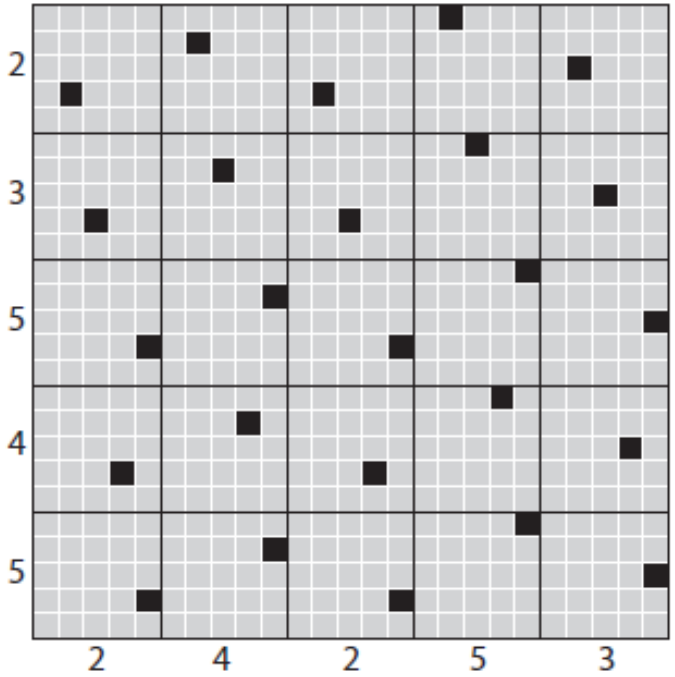
Subsampling Plans

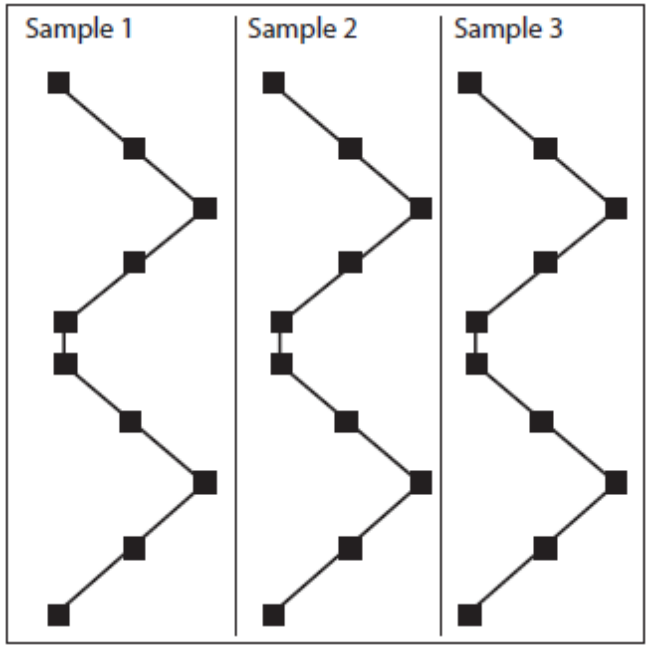


USUAL Soil Analysis Information Sheet
8-10 locations, 12” depth



Utah Fertilizer Guide
20-30 locations

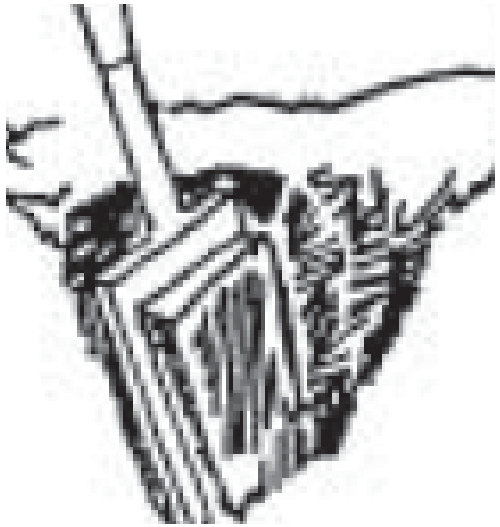


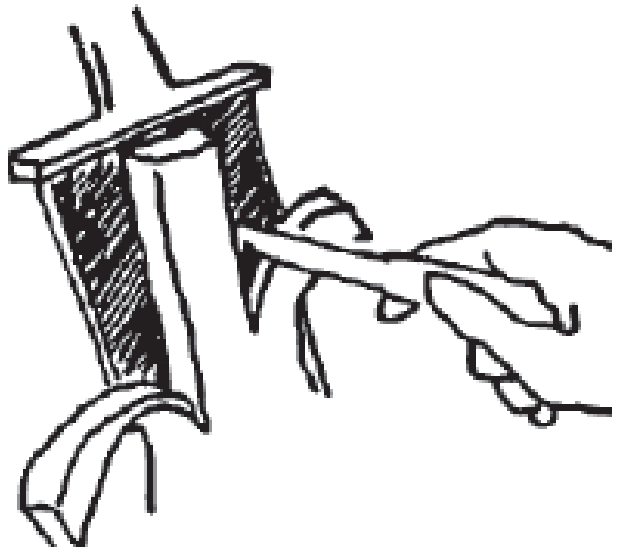


University of Wisconsin A2809,
10 locations. More subsamples = more representative

How to sample

- USUAL recommends going down 6” for turf, 12” for everything else
- Combine subsamples in a bucket, thoroughly mix, and let air dry
- Need about 2 cups





Soil Test Results			Interpretations	Recommendations
Texture		Sandy Loam		
pH		7.45	Normal	
Salinity – EC	dS/m	0.50	Normal	
Phosphorus – P	mg/kg	12.8		
Potassium – K	mg/kg	125		

(44-87 lbs/acre)

Test Category	Soil Test Value [mg/Kg or ppm)	
	Phosphorus (P)	Potassium (K)
Very Low	0-10	0-70
Low	11-20	70-125
Optimum	21-30	126-300
High	31-60	300+
Very High	60+	NA

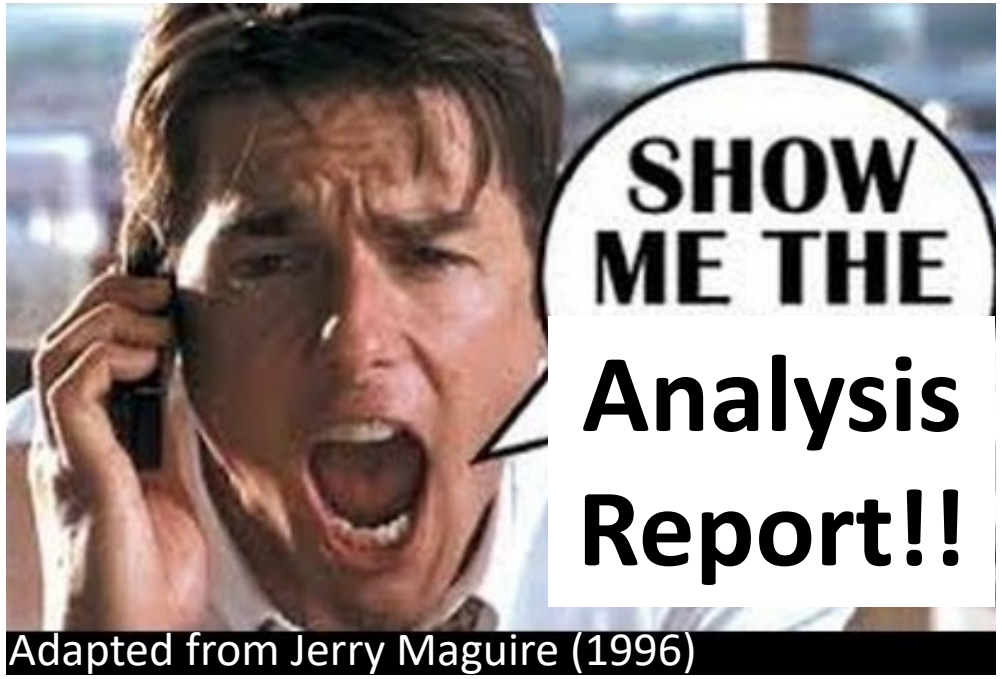
Understanding Your Soil Test Report

Grant E. Cardon, USU Extension Soil Specialist
Jan Kotuby-Amacher, Coordinator for North American Proficiency Testing Program
Pam Hole, Supervisor USU Analytical Labs
Rich Koenig, Washington State University

Step 4: Following soil test recommendations

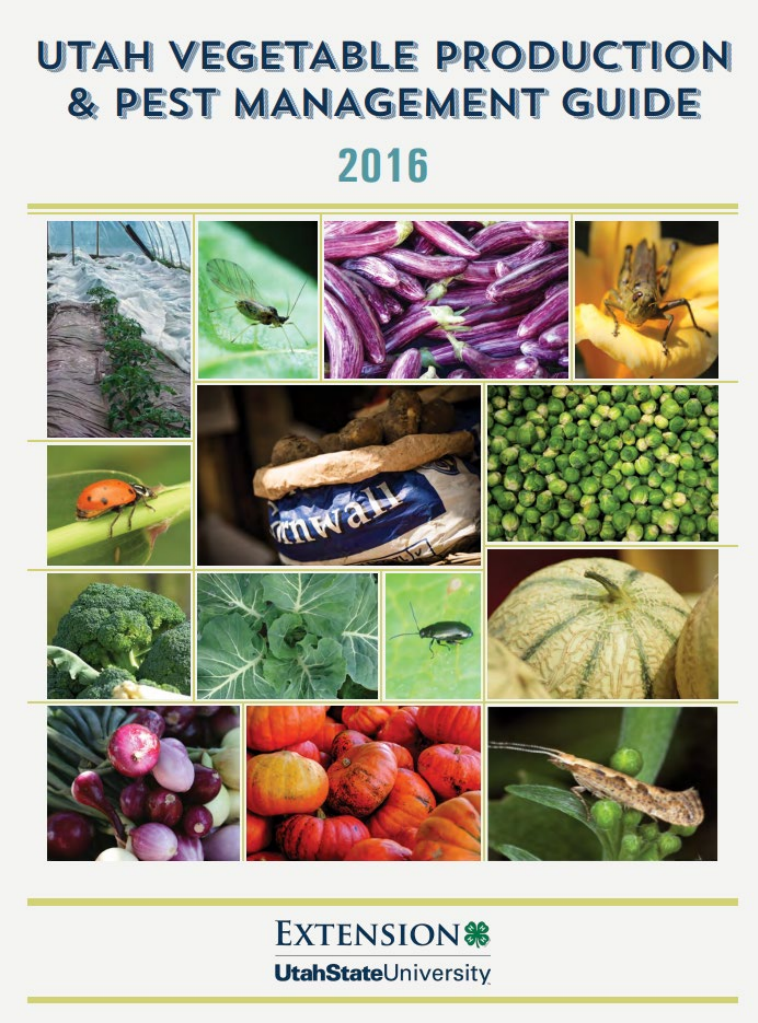
- Different crops require different nutrient rates
- Credit ALL nutrient sources when following recommendations

  (Chemical fertilizers + manure + cover crops + irrigation water content + …)
- Considerations for nutrient sources:
  - High Nitrogen
  - Phosphorus – often limiting factor
  - Salt content
  - Weed seeds (un-composted manures)
  - Woody/fibrous material (ties up N)



Adapted from Jerry Maguire (1996)

Fertilizer Amounts & Calculations



If the soil test recommends (per 1000 sq ft):

1 lb N 1 lb P 1 lb K

1. Use fertilizer with a 1:1:1 ratio, such as 16-16-16
2. Divide nutrient recommendation by the % of N, P, or K on the fertilizer bag. Then multiply by 100.
3. Ex: 1 lb/16 x 100 = 6 lbs of fertilizer per 1000 sq ft.

Manure Amounts & Calculations

1. From our soil test, we need:
   - Nitrogen = 3 lbs N/1000 sq. ft (aka 130 lbs/acre)
   - Phosphorus (P_2O_5) = 1 lb /1000 sq. ft (aka 44 lbs/acre)
   - Potassium (K_2O) = 1 lb /1000 sq ft. (aka 44 lb…

2. We have back…
   - …
   - … 44 lbs/ton)
   - … .3 oz/lb manure or 33 lbs/ton)

Use manure to meet your P goal, not your N goal

To hit o… N goal, we'd add 100 lbs of manure. To hit our P goal, we'd add 33 lbs manure

Summary

- Precision farming is not just for Big Ag. We can (and should) do it, too, with proper nutrient planning
- We need to know what our soil needs and what we are adding to it
  - By soil testing!!! Every 2-3 years is ideal.
  - Be mindful with soil sampling – make a custom plan and budget
  - Follow recommendations for sustainable nutrient management – do not blindly apply



Thank you for attending!

Dr. Melanie Stock

Assistant Professor / Urban & Small Farms Extension Specialist

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Phone: 435-797-0248

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Soil Testing: Why, How, and Interpreting Your Results

This session will cover how to interpret soil test. Soil test can help you understand the nutrient profile of your soil. This information can be useful as you develop a management plan for the growing season. They will use actual examples of soil test results to explain how to look at them and what they mean. They will also respond to question from the audience and can interpret your own result if you bring them.

Grant Cardon
Extension Soils Specialist
USU Plants, Soils and Climate Department
grant.cardon@usu.edu

A USU alum, Grant has had career stops with the USDA, Colorado State University, and now back at USU over his 28 years working in soil fertility, salinity and irrigation management. Grant, and his wife Kay Lyn are the parents of four married children, gracing them with 10 awesome grandchildren...and counting! Grant's interests outside of USU are sports, science fiction reading, gardening, music, and online news consumption.

Melanie N Stock
Assistant Professor
Utah State University
melanie.stock@usu.edu

I am a new assistant professor in the USU Plants, Soils, and Climate Department. I moved to Utah from Wisconsin in 2018. My background is in using soil science for manure and land management in the wintertime, and running community gardens. At USU, I am excited to work on resource use efficiency and high value crops with small scale producers. I am particularly excited to begin cut flower research and Extension programming.

SOIL ANALYSIS INFORMATION SHEET

USU Analytical Labs
1541 N 800 E / 9400 Old Main Hill
Logan UT 84322-9400
(435) 797-2217 or Fax (435) 797-2117
www.usual.usu.edu

Date: _____

Name: _____

Mailing Address: _____

City, State, Zip: _____

County: _____

Phone : _____

Email : _____

	Sample Numbers			
	1	2	3	4
Sample I.D.	_____	_____	_____	_____
Sample Depth	_____	_____	_____	_____
Tests Desired*	_____	_____	_____	_____

*TESTS OFFERED
Price is per sample

1. Basic (Phosphorus (P) + Potassium (K) only) 14.00
2. Routine (pH, salinity, texture, Phosphorus (P), Potassium (K), recommendations-indicate crop!)..... 25.00
3. Manure application - (Routine + Nitrate-N**) 35.00
4. Micro Plus (Routine + micronutrients (Zn, Fe, Cu, Mn))..... 35.00
5. Complete (pH, salinity, texture, P, K, Nitrate-N**, micronutrients, sulfate, organic matter) 67.00
6. UDOT Required (pH, salinity, SAR, organic matter, particle size, >2mm)..... 61.00
7. Landscaper (UDOT plus P, K, NO3-N**, micronutrients).. 90.00

Please contact the lab for individual analyses/additional analyses
**Nitrate-N analysis requires special sampling/handling. See procedures on reverse side.

TESTS REQUIRE 2 CUPS OF SOIL PER SAMPLE

Providing too much soil may cause delays, while too little soil may not be enough for all tests requested.

COMMENTS or special problems: _____

_____

_____

Total cost of analysis: $ _____

☐ Check # _____ ☐ Cash

☐ #_____ **CALL FOR CC #** _____

☐ Visa ☐ Master card ☐ Discover ☐ AmEx

PLEASE INCLUDE PAYMENT WITH SAMPLE TO PREVENT DELAY ON SAMPLE PROCESSING.

LAWN • GARDEN • ORCHARD

Crops to be Grown	Sample Numbers 1	2	3	4
1. Garden/flowers/veg.	☐	☐	☐	☐
2. Lawn	☐	☐	☐	☐
3. Shrubs/trees	☐	☐	☐	☐
4. Fruit trees/canes	☐	☐	☐	☐
5._____	☐	☐	☐	☐

MATERIALS APPLIED DURING PAST YEAR

1. Manure	☐	☐	☐	☐
2. Leaves/ grass/residues	☐	☐	☐	☐
3. Commercial fertilizer	☐	☐	☐	☐
4. _____	☐	☐	☐	☐

FIELD CROPS

Crops to be Grown IRRIGATED	Sample Numbers 1	2	3	4
1. Alfalfa 100%	☐	☐	☐	☐
2. Grass Hay 100%	☐	☐	☐	☐
3. Legume /Grass Hay	☐	☐	☐	☐
% Legume(25% increments)____	____	____	____	____
4. Grass Pasture	☐	☐	☐	☐
5. Legume/Grass Pasture	☐	☐	☐	☐
% Legume(25% increments)____	____	____	____	____
6. Corn (silage)	☐	☐	☐	☐
7. Corn for grain	☐	☐	☐	☐
8. Wheat	☐	☐	☐	☐
9. Barley/Oats for Grain	☐	☐	☐	☐
10. Potatoes	☐	☐	☐	☐
11. Turf (golf/sports)	☐	☐	☐	☐
12. _____	☐	☐	☐	☐
NON-IRRIGATED				
13. Grain	☐	☐	☐	☐
14. Alfalfa	☐	☐	☐	☐
15. Grass Pasture	☐	☐	☐	☐
16. Reclamation	☐	☐	☐	☐
17._____	☐	☐	☐	☐
YIELD GOAL**	____	____	____	____
Acres in field	____	____	____	____
CROP LAST YEAR	____	____	____	____
Yield per acre	____	____	____	____
Was straw/stover removed? __Yes	☐	☐	☐	☐
__No	☐	☐	☐	☐
MANURE FOR THIS CROP:				
Tons per acre	____	____	____	____

**use realistic goals for your conditions

Rev. 2/01/2017

SOIL SAMPLING PROCEDURE

Good samples are required to derive useful information from soil tests.

WHEN: Any time of the year; early fall is often preferred. Allow two weeks to get results before buying fertilizer. For special nitrate tests, sample in the spring (see instructions below).

TOOLS: (a) A clean plastic container for each depth to be sampled. (b) Sampling auger or tube (USU Extension Office) or a shovel will serve for plow-layer samples.

AREA: Select an area having uniform color, texture, drainage, and the same cropping and fertilizer treatment last year. Leave out non-typical spots or sample them separately. For each area to be sampled, take separate samples from 8 to 10 locations in a pattern that will represent the entire area.

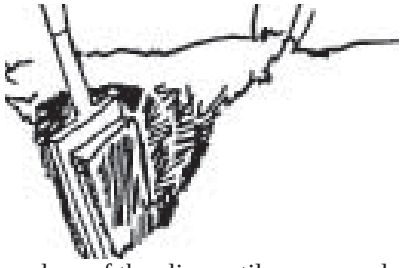
DEPTH: (a) Standard topsoil sample: from surface down to 12 inches; (b) Turf samples: surface down to 6 inches (4 inches for golf greens); (c) For special nitrate tests, see instructions below.

TAKING THE SAMPLE: Scrape away surface litter. Avoid manure spots. If previous fertilizer was banded, take special care to get a representative sample.

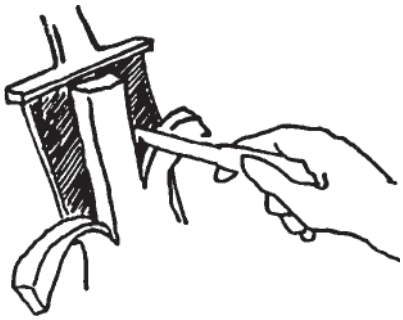
(a) Using a soil tube or auger: follow the instructions given with the tool.

(b) Using shovel:

1. Dig a V-shaped hole to plow depth. Remove a 1-inch slice of soil from one side.



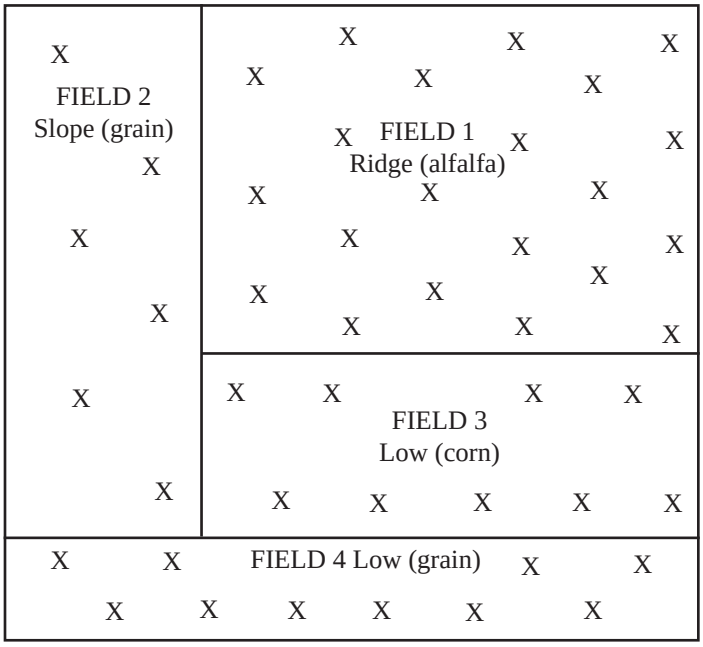
2. Discard the edges of the slice until your sample is about 1 or 2 inches wide. Put it in a clean bucket.



3. Repeat 1 and 2 for other samples for the sampling areas.

SAMPLE HANDLING: Combine the samples from the field in a clean container. Mix them well, then take about 1 pint (to fill the bag provided, or a heavy-duty, resealable plastic bag) to send for analysis. Assign it an identification (please keep it brief, and it should match both the form and the sample container sent to the lab) and record details in your files.

SHIPPING:Send samples prepaid by mail or express, accompanied by this description form and a check payable to USU Analytical Laboratories, Logan, UT 84322-9400. Retain a copy for your files.



SPECIAL SAMPLING for nitrate-N when applying manure.

b. Take samples 0 to 12 inches deep as described above. Put these in one container.

c. Starting at the bottom of the hole in (b), sample the 12 to 24-inch (or 12 to 36-inch) depth. Put these subsoil samples into a separate container. Mix and label the combined subsoil sample as above. This sample will be analyzed for Nitrate-N only, and is not included in the cost of the analysis for the 0-12 inch deep sample.

d. Spread samples out on a clean surface and air-dry them before mailing (or deliver them to the lab within 24 hours).

To Till or Not to Till?…. That is the Question

There is a lot of interest in “No Till.” However, most of the information available is for different climate and soil conditions than are found in Utah. This presentation will explain what it is. It will also go over local Utah conditions and how they affect the use of no till or partial till.

Grant Cardon
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A USU alum, Grant has had career stops with the USDA, Colorado State University, and now back at USU over his 28 years working in soil fertility, salinity and irrigation management. Grant, and his wife Kay Lyn are the parents of four married children, gracing them with 10 awesome grandchildren...and counting! Grant's interests outside of USU are sports, science fiction reading, gardening, music, and online news consumption.

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Mechanical Weed Control Tools for Small Acreage Producers

We will discuss some newly available technologies for weed control and have some tools on-site for participants to see in person.

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Katie works for USU Extension in Salt Lake County and educates homeowners on best management practices for gardening in Utah. Katie has a Master's degree from the University of Kentucky in plant and soil science and has helped gardeners interpret soil test reports in Salt Lake County for the past 9 years.