Quiz Time


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GLASBERGEN
"WHEN YOU WANT TO GET SOMEBODY'S ATTENTION, THROW A ROCK AT HIS HEAD. IT'S THE LATEST THING IN WIRELESS COMMUNICATION!"

Basic Plant Nutrition and Soil Fertility

Basic NRCCA Training
Competency Areas 1 and 2

Northeast Region Certified Crop Advisor Training
For 2016 Performance Objectives

Nutrient Management Spear Program
http://nmsp.cals.cornell.edu

N_2

N_2O

NH_4^+

NH_3

NO_3^-

NO

dinitrogen gas

N_2

nitrous oxide

N_2O

NH_4^+

ammonium

NH_3

ammonia

NO_3^-

nitrate

NO

nitric oxide

dinitrogen gas

N_2

nitrous oxide

N_2O

NH_4^+

ammonium

NH_3

ammonia

NO_3^-

nitrate

NO

nitric oxide

dinitrogen gas

N_2

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NO_3^-

nitrate

NO

nitric oxide

dinitrogen gas

N_2

nitrous oxide

N_2O

NH_4^+

ammonium

NH_3

ammonia

NO_3^-

nitrate

NO

nitric oxide

Where do you expect the greatest N fixation?

Soybeans

Corn

Where do you expect the greatest N mineralization?

NY Spring

NY Winter

What about nitrification?

NY Spring

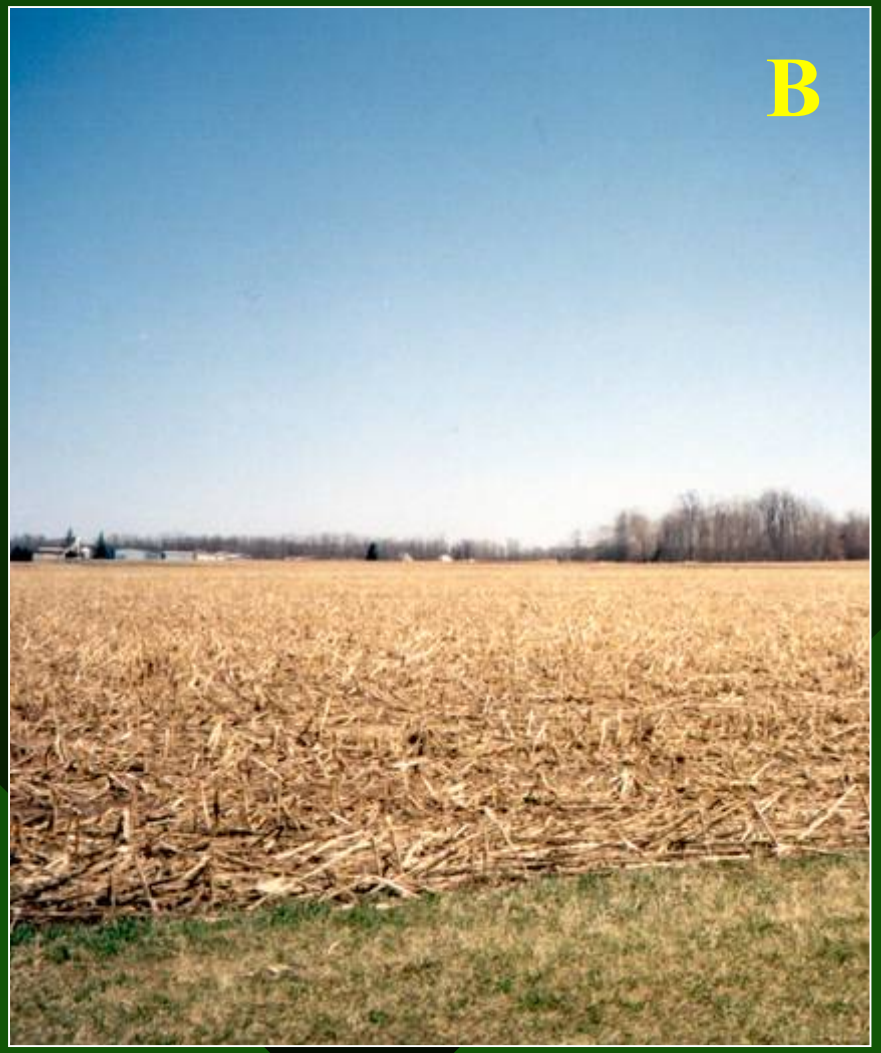
NY Winter

What about denitrification?


N_2
NO
NO
N_2O
N_2
NO
N_2O
N_2O

What about ammonia volatilization?

What about immobilization?



What about leaching?

Row crops

Grasses

What about leaching?

B

Practice Questions

Which part of the rotation needs the least amount of external (fertilizer) N?

a) First year corn

b) Second year corn

c) Third year corn

d) Fourth year corn

Practice Questions

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a) First year corn

b) Second year corn

c) Third year corn

d) Fourth year corn

Practice Questions

What happens with N fixation if we apply manure to alfalfa

a) Reduced fixation of N from the air
b) Increased fixation
c) Nothing changes

Practice Questions

What happens with N fixation if we apply manure to alfalfa

a) Reduced fixation of N from the air

b) Increased fixation

c) Nothing changes

Practice Questions

If we surface apply manure and don't incorporate, what portion of the N in the manure do we lose and how?

a) Ammonium N, through volatilization

b) Organic N, through volatilization

c) Ammonium N, through denitrification

d) Organic N, through leaching

Practice Questions

If we surface apply manure and don't incorporate, what portion of the N in the manure do we lose and how?

a) Ammonium N, through volatilization

b) Organic N, through volatilization

c) Ammonium N, through denitrification

d) Organic N, through leaching

Practice Questions

Which of the following are all essential nutrients?

a) Ca, K, P, N, B
b) Na, Mg, Cl
c) Fe, Al, Cu, Cl, Mo, Mn, Zn
d) Cu, Co, Si

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a) Ca, K, P, N, B
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c) Fe, Al, Cu, Cl, Mo, Mn, Zn
d) Cu, Co, Si

Practice Questions

The secondary nutrients are?

a) Ca, Mg, K
b) N, P, K
c) Ca, Mg, S
d) Cu, Zn, Mn

Practice Questions

The secondary nutrients are?

a) Ca, Mg, K
b) N, P, K
c) Ca, Mg, S
d) Cu, Zn, Mn

Practice Questions

Nitrogen is taken up by the plant as?

a) NO_3^-
b) NH_4^+
c) N_2
d) NO_3^- and NH_4^+

Practice Questions

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a) NO_3^-
b) NH_4^+
c) N_2
d) NO_3^- and NH_4^+

Practice Questions

Excess potassium may induce?

a) Zn deficiency
b) S deficiency
c) Mg deficiency
d) Cu deficiency

Practice Questions

Excess potassium may induce?

a) Zn deficiency
b) S deficiency
c) Mg deficiency
d) Cu deficiency

Practice Questions

If a ammonium is released to the soil solution during decomposition of an organic nitrogen source, _____ has occurred?

a) Mineralization
b) Immobilization
c) Volatilization
d) Nitrification

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Practice Questions

Symbiotic nitrogen fixation is the process where atmospheric nitrogen is converted to ammonia in the root nodules of _____?

a) Legumes
b) Grass
c) Fungi
d) Corn

Practice Questions

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c) Fungi
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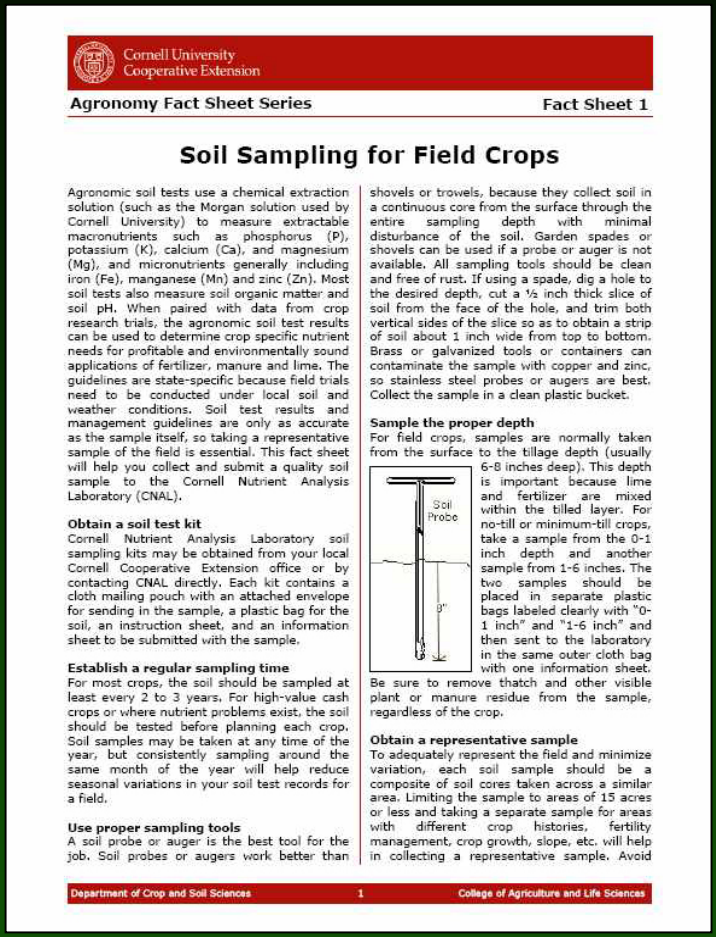
Soil Testing & Plant Analysis

Basic NRCCA Training Competency Area 3



Cornell University
Cooperative Extension

Agronomy Fact Sheet Series — Fact Sheet 1

Soil Sampling for Field Crops

Agronomic soil tests use a chemical extraction solution (such as the Morgan solution used by Cornell University) to measure extractable macronutrients such as phosphorus (P), potassium (K), calcium (Ca), and magnesium (Mg), and micronutrients generally including iron (Fe), manganese (Mn) and zinc (Zn). Most soil tests also measure soil organic matter and soil pH. When paired with data from crop research trials, the agronomic soil test results can be used to determine crop specific nutrient needs for profitable and environmentally sound applications of fertilizer, manure and lime. The guidelines are state-specific because field trials need to be conducted under local soil and weather conditions. Soil test results and management guidelines are only as accurate as the sample itself, so taking a representative sample of the field is essential. This fact sheet will help you collect and submit a quality soil sample to the Cornell Nutrient Analysis Laboratory (CNAL).

Obtain a soil test kit
Cornell Nutrient Analysis Laboratory soil sampling kits may be obtained from your local Cornell Cooperative Extension office or by contacting CNAL directly. Each kit contains a cloth mailing pouch with an attached envelope for sending in the sample, a plastic bag for the soil, an instruction sheet, and an information sheet to be submitted with the sample.

Establish a regular sampling time
For most crops, the soil should be sampled at least every 2 to 3 years. For high-value cash crops or where nutrient problems exist, the soil should be tested before planning each crop. Soil samples may be taken at any time of the year, but consistently sampling around the same month of the year will help reduce seasonal variations in your soil test records for a field.

Use proper sampling tools
A soil probe or auger is the best tool for the job. Soil probes or augers work better than shovels or trowels, because they collect soil in a continuous core from the surface through the entire sampling depth with minimal disturbance of the soil. Garden spades or shovels can be used if a probe or auger is not available. All sampling tools should be clean and free of rust. If using a spade, dig a hole to the desired depth, cut a ½ inch thick slice of soil from the face of the hole, and trim both vertical sides of the slice so as to obtain a strip of soil about 1 inch wide from top to bottom. Brass or galvanized tools or containers can contaminate the sample with copper and zinc, so stainless steel probes or augers are best. Collect the sample in a clean plastic bucket.

Sample the proper depth
For field crops, samples are normally taken from the surface to the tillage depth (usually 6-8 inches deep). This depth is important because lime and fertilizer are mixed within the tilled layer. For no-till or minimum-till crops, take a sample from the 0-1 inch depth and another sample from 1-6 inches. The two samples should be placed in separate plastic bags labeled clearly with "0-1 inch" and "1-6 inch" and then sent to the laboratory in the same outer cloth bag with one information sheet. Be sure to remove thatch and other visible plant or manure residue from the sample, regardless of the crop.

Obtain a representative sample
To adequately represent the field and minimize variation, each soil sample should be a composite of soil cores taken across a similar area. Limiting the sample to areas of 15 acres or less and taking a separate sample for areas with different crop histories, fertility management, crop growth, slope, etc. will help in collecting a representative sample. Avoid

Department of Crop and Soil Sciences 1 College of Agriculture and Life Sciences

Nutrient Management Spear Program
http://nmsp.cals.cornell.edu

Practice Questions

Which of the following does affect the amount of nutrient extracted by a certain soil test?

a) Nature of the extractant
b) Shaking time
c) Soil to solution ratio
d) All of the above

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Practice Questions

Can I enter soil test data obtained from a laboratory in Timbuktu into Cornell's software and obtain accurate recommendations?

a) No, never
b) Yes, it does not matter who does the analyses
c) Yes, but only if this lab used the exact same extraction solution and methodology
d) Huh? Cornell has accurate fertilizer recommendations?

Practice Questions

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Practice Questions

A soil test of 50 pounds P/acre means:

a) Of the total amount of P in the soil, 50 lbs will likely be taken up by the next crop
b) The soil contains 50 pounds of P per acre
c) The soil will supply 50% of the total amount of P to the plants
d) None of the above

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Practice Questions

Why do we need soil tests?

a) To determine the fertility status of a soil
b) To determine what and how much we need to supply to reach yield potential for a certain crop (or rotation)
c) To be able to monitor the effects of our management decisions on soil fertility
d) All of the above

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Practice Questions

Fertilizer recommendations developed by universities are generally based on which of the following philosophies?

a) Sufficiency level
b) Cation exchange ratio
c) Maintenance
d) Maximum yield

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Practice Questions

Fertilizer recommendation can never be more accurate than:

a) My fertilizer recommendation software
b) The weather I expect during the growing season
c) The soil sample I take
d) None of the above

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Practice Questions

Practice Questions

Practice Questions

What is wrong with this picture?

Practice Questions

Practice Questions

What is wrong with this?

Nutrient Sources, Analyses and Application Methods

Competency Area 4

Northeast Region Certified Crop Advisor Training

Practice Questions

Recommendation: 80 lbs K_2O/acre

Question: How much muriate of potash (62%) should be applied to exactly meet this recommendation?

a) 50 lbs/acre

b) 129 lbs/acre

c) 148 lbs/acre

d) 160 lbs/acre

Practice Questions

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a) 50 lbs/acre

b) 129 lbs/acre

c) 148 lbs/acre

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Practice Questions

Recommendation: 50 lbs P_2O_5/acre

Question: How much manure do I need to apply to meet this recommendation assuming manure contains 2.5 lbs P_2O_5/ton?

a) 10 tons/acre

b) 20 tons/acre

c) 30 tons/acre

d) 40 tons/acre

Practice Questions

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b) 20 tons/acre

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Practice Questions

Volatilization losses are highest when topdressing:

a) Urea
b) Ammonium sulfate
c) Diammonium phosphate
d) Ammonium nitrate

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c) Diammonium phosphate
d) Ammonium nitrate

Practice Questions

A ton of DAP (18-46-0) costs $300.

What is the cost per pound of P_2O_5? (assume N value at zero)

a) $0.326
b) $3.07
c) $0.0326
d) none of these

Practice Questions

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Practice Questions

Which practice results in the higher nutrient use efficiency?

a) 100 lbs N surface applied as urea at planting
b) 100 lbs N banded as urea at planting
c) 20 lbs N in starter band and 80 lbs broadcast urea at planting
d) 20 lbs N in starter band and 80 lbs injected at sidedress time

Practice Questions

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Practice Questions

In a manure analysis report, if it reports total N, ammonium-N and organic N, how can you double check to make sure the ammonium-N number is correct?

a) Ammonium-N = Organic + Total
b) Ammonium-N = NH_4^+ + Total
c) Ammonium-N = Total – Organic
d) I don't have to do this…it is all the same

Practice Questions

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Practice Questions

Which fertilizer source is a cheaper nitrogen source assuming UAN (32%) is $445 per ton, urea (46% N) is $640 per ton and ammonium sulfate (21% N) is $368 per ton?

a) UAN

b) Urea

c) Ammonium sulfate

d) UAN and urea are equally expensive

Practice Questions

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d) UAN and urea are equally expensive

PENNSTATE
College of Agricultural Sciences
Department of Crop and Soil Sciences

Soil Acidity and Aglime

Competency Area 5

Northeast Region Certified Crop Advisor Training

Practice Questions

The biggest source of acidity in agricultural soils is

a) Acid rain

b) Nitrogen fertilizer

c) Plant residue decomposition

d) Leaching of calcium

Practice Questions

The biggest source of acidity in agricultural soils is

a) Acid rain

b) Nitrogen fertilizer

c) Plant residue decomposition

d) Leaching of calcium

Practice Questions

The acid neutralization by a liming material is due to

a) Ca^{2+}

b) Mg^{2+}

c) CO_3^{2-}

d) SO_4^{2-}

Practice Questions

The acid neutralization by a liming material is due to

a) Ca^{2+}

b) Mg^{2+}

c) CO_3^{2-}

d) SO_4^{2-}

Practice Questions

Liming rates are determined from

a) pH

b) pH and Ca

c) pH and acidity

d) Ca and Mg

Practice Questions

Liming rates are determined from

a) pH

b) pH and Ca

c) pH and acidity

d) Ca and Mg

Practice Questions

The calcium carbonate equivalent is

a) The neutralizing value of a liming material compared to pure calcium carbonate
b) The pH of a limestone compared to pure calcium carbonate
c) The percent of the soil CEC saturated with calcium
d) The equivalent pH buffer capacity of a soil

Practice Questions

The calcium carbonate equivalent is

a) The neutralizing value of a liming material compared to pure calcium carbonate
b) The pH of a limestone compared to pure calcium carbonate
c) The percent of the soil CEC saturated with calcium
d) The equivalent pH buffer capacity of a soil

Practice Questions

Increasing the amount of limestone that will pass 100 mesh sieve will

a) Increase the calcium carbonate equivalent of the material
b) Cause the soil pH to decline faster
c) Reduce the cost of the material
d) Increase the speed of reaction of the material in the soil

Practice Questions

Increasing the amount of limestone that will pass 100 mesh sieve will

a) Increase the calcium carbonate equivalent of the material
b) Cause the soil pH to decline faster
c) Reduce the cost of the material
d) Increase the speed of reaction of the material in the soil

Practice Questions

A laboratory analysis of your soil provides a pH of 6.3 and recommends an application of 1.5 tons/acre at 100% ENV.

The lime source you find has an ENV of 68%.

What is the actual application rate needed of this lime source to equal 1.5 tons/acre at 100% ENV?

Nutrient Management Planning

Competency Area 6

Northeast Region Certified Crop Advisor Training

Practice Questions

If manure is not incorporated, which nutrient form is most often lost in the first few days after application if rainfall does not occur?

a) NH_4^+
b) NH_3
c) NO_3^-
d) NO_2

Practice Questions

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a) NH_4^+
b) NH_3
c) NO_3^-
d) NO_2

Practice Questions

100 holstein cows weigh 1350 pounds each and excrete 10% of their body weight per day. How much waste do these cows excrete per year?

a) 1500 tons per year

b) 2500 tons per year

c) 3500 tons per year

d) 4500 tons per year

Practice Questions

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c) 3500 tons per year

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Practice Questions

If manure is applied to meet N requirements of third year corn, which nutrient(s) may be over applied that year?

a) P
b) K
c) both P and K
d) neither P or K

Practice Questions

If manure is applied to meet N requirements of third year corn, which nutrient(s) may be over applied that year?

a) P
b) K
c) both P and K
d) neither P or K

Practice Questions

Corn silage harvest (wet) was 16 tons/acre
Moisture content at harvest was 65%
Silage contained 0.272% P on DM basis
How much P_2O_5 was removed with harvest?

a) 30 lbs P_2O_5 per acre
b) 50 lbs P_2O_5 per acre
c) 70 lbs P_2O_5 per acre
d) 90 lbs P_2O_5 per acre

Practice Questions

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b) 50 lbs P_2O_5 per acre
c) 70 lbs P_2O_5 per acre
d) 90 lbs P_2O_5 per acre

Practice Questions

Phosphorus may be lost to the environment through:

a) runoff
b) erosion
c) leaching
d) all of the above

Practice Questions

Phosphorus may be lost to the environment through:

a) runoff
b) erosion
c) leaching
d) all of the above

Question

- As pH decreases, _____ increases?
  - A) hydrogen ion concentration
  - B) hydroxyl ion concentration
  - C) alkalinity
  - D) cation exchange capacity

Answer: a: why ?

Question

- What is pH dependent charge ?
  - A) as pH is decreases – CEC rises?
  - B) as pH increases - CEC decreases
  - C) total alkalinity
  - D) net negativity is dependent on amount of free H in the soil

Answer: d: why ?

Question

- Which of the following soils would have the highest lime requirement to meet the same target pH?
  - A) pH 5, 35% clay, 2% organic matter
  - B) pH 5, 10% clay, 1% organic matter
  - C) pH 6.5, 40% clay, 3.5% organic matter
  - D) pH 6.5, 60% clay, 2.2% organic matter

Answer: a: why ?

Question

- ENV is the product of the CCE and _____?
  - A) ag lime content
  - B) neutralizing power
  - C) basicity
  - D) calcium carbonate equivalence
  - E) fineness of grind

Answer: e: why ?

Question

- Which of the following is least likely to change soil pH
  - A) elemental S
  - B) alum
  - C) ammonium sulfate
  - D) gypsum

Answer: d: why ?