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## *Variability*

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Keywords: grid sampling, variability, precision agriculture, zone sampling, soil type, hands-on activity, percentages

**In this lesson, students will be able to:**

- Demonstrate different soil sampling methods and observe how data can be interpreted differently when looking at different parts of the field versus the whole.
- Understand the purpose of soil sampling.
- Define variability and explain some of the data we receive in soil test reports.

Sampling=the act of taking observations

**Materials Needed:**

Grid Dimensions 7 feet by 7 feet

- 49 cups
- Cards labeled 1-49 for the cups
- 49 Crayola markers representing four to five different colors. Example:
  - 7-10 red markers
  - 7-10 orange markers
  - 7-10 yellow markers
  - 7-10 green markers
  - 7-10 blue markers

**Activity Class Time**

Intro = 10 minutes

Activity= 20 minutes

Activity Add-On=10 minutes

Conclusion = 10 minutes

## *Introduction*

**Precision agriculture** is a way of thinking where we are more intentional with our decision making. The reason precision agriculture exists in the first place is because of variability. **Variability** is how something changes over time and space. In our activity today, we will explore how variability in soil type, texture, and nutrients changes across a field through a soil sampling activity.

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## *Soil Sampling*

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**Sampling** is the art of taking observations about something. When you soil sample, you can make more informed decisions on your field based on the data that you find. Today, we are going to explore soil sample results. Soil test reports give us a look at values of different nutrients and other physical and chemical properties in the soil. Some examples include nitrogen, phosphorus, and potassium levels, other nutrients, pH, organic matter, and cation exchange capacity.

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## *Soil Sample Methods*

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There are multiple layouts to how we collect our samples. Grid sampling and zone sampling are the most talked about in precision agriculture. There are more specific methods within each of those categories, but we will focus on these two broad methods today.

1. **Grid Sample**=soil sampling method in which a field is divided into square sections (grids) of equal size. The University of Nebraska-Lincoln recommends a grid size of one acre. General sources recommend a grid size of 2.5 acres.
  - a. Full grid soil sampling should happen every 4-5 years. If you are working more intensely on improving soil health, it would be a good idea to have your soils tested more frequently.
2. **Zone Sample**= areas of fields that have been recognized to have similarities, so they are put together into management zones.

Regardless of the sampling method that you choose for your locations, in each sample spot you will set a bucket down on the ground. You will stay within a 10-foot radius of this bucket while you collect 10-15 samples, called cores from this sample spot. You use a soil probe to reach a depth of eight inches down into the ground to collect your sample. For today's activity, the marker in each cup will represent the total data from these 10-15 cores collected at that location.

Organization is important in precision agriculture and in sampling. When you collect samples, you will keep everything labeled and use sample IDs. Today our sample IDs are simply the numbers 1-49. Growers can use any ID organization method they want, as long as it makes sense to them.

The grid in front of you represents a field. Each cup represents one acre.

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*Activity*

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Today, you are the soil samplers!

Collect samples to match the soil sampling method assigned to you by the instructor. To sample, go to each “acre” in the “field”. Grab the marker out of the cup, and color the corresponding location on their data sheet. Color spot 1 on the sheet with the same marker color as cup 1 and so on and so forth.

The Sample Sheet is on the next page.

*Activity Add-ons*

*Calculate the percentage of your field that is represented by each color. Write your percentages in the space below:*

*Red:* \_\_\_\_\_

*Orange:* \_\_\_\_\_

*Yellow:* \_\_\_\_\_

*Green:* \_\_\_\_\_

*Blue:* \_\_\_\_\_

*Conclusion*

The key takeaway is soil sampling is a critical component of our farming and ranching process. Soil sampling helps reveal variability and allows us to make more informed decisions on that field to better control inputs (what we put into that field such as seed, grazing, irrigation, nutrients, etc.). Precision agriculture exists because of this variability and our effort to make sense of those differences that we see.



## Sample Sheet

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	32	33	34	35
36	37	38	39	40	41	42
43	44	45	46	47	48	49

What could the different colors in this map above represent? \_\_\_\_\_

\_\_\_\_\_

Why is variability important for people to understand? \_\_\_\_\_

\_\_\_\_\_

What are some examples of decisions you can make from this data?

\_\_\_\_\_

How often should you fully grid sample? \_\_\_\_\_