Name: _____

CASE

Activity 6.1.1 In Search of N-P-K

Purpose

Each spring, when the weather turns warm and sunny, people flock to garden centers and home improvement stores. These would-be gardeners are eager to purchase blooming annuals, perennials, and vegetables. Some end up disappointed, with plants that do not bloom, vegetables that are sparse and shriveled, and plants that look weak, spindly, and diseased. Many of these problems could be solved with a simple soil test kit.

This activity will allow you to test for the three primary macronutrients that are the most critical for plant growth and health. Because plants derive their nutrients from the soil, a test for nitrogen, phosphorus, and potassium levels in the soil tells you what must be added to ensure proper growth.

Materials

Per pair of students:

- Rapitest® Soil Test kit for N-P-K
- (2) 8 oz. specimen jar
- Soil Sample A
- Soil Sample B
- Distilled water
- 30ml graduated cup
- 100ml graduated cylinder
- Plastic spoon
- Plastic pipette
- Permanent marker pen
- Paper towel

Per student:

- Pencil
- *Agriscience Notebook*

Procedure

You and a partner will conduct a soil test for nitrogen, phosphorus, and potassium for two soil samples. You will use a chemical test kit commonly purchased at any garden store.

Part One – Prepare Soil Samples

You will need to prepare the soil samples the day before to provide ample time for particles to mostly settle out of the mixture. You need to mix the soil sample with water at five parts water to one part soil ratio (5:1).

1. Measure 20 – 25ml of Soil Sample A using a 30ml graduated cup.
2. Pour the soil into an 8 ounce specimen jar. Label the specimen jar with “Soil A”.
3. Measure out 100ml of distilled water using the 100ml graduated cylinder and pour the water into the jar.
4. Use a plastic spoon to break up large particle clumps and stir.
5. Place the cap on the specimen jar and shake for approximately two minutes.
6. Set the jar aside in an area where it will not be disturbed.
7. Repeat Steps 1-6 for Soil Sample B.
8. Samples will need to sit until soil has settled completely. This may take 30 minutes or up to 24 hours depending on the soil. The water may be slightly cloudy but must be clear of sediment particles.

Part Two – Testing the Soil

1. After the samples have settled, very carefully move the jars to your workstations without disturbing the sediment.
9. Use the pipette and transfer liquid only from the specimen jar of Soil A to the nitrogen-comparator (purple testing chamber). Put the soil liquid in both chambers of the comparator and fill to the line.
10. The kit comes with capsules containing indicator chemicals. Select a purple nitrogen capsule. Carefully twist the capsule apart while holding the capsule horizontally and pouring the powder into the smaller chamber.
11. Replace the cap on the comparator and shake thoroughly for 30 seconds.
12. Let the test stand undisturbed for 10 minutes before reading.
13. Once the color has fully developed, hold the comparator up to a light source (a window or a classroom light fixture will work).
14. Record the result in Table 1.
15. Repeat Steps 2-7 for the phosphorus test using the blue test comparator and a blue capsule.
16. Repeat Steps 2-7 for the potassium test using the orange comparator and an orange capsule.
17. After the data is recorded in Table 1, wash out each chamber thoroughly and dry with a paper towel.
18. Repeat all three tests for Soil B and record the data in Table 1.
19. Clean up your workstation as directed by your teacher.

Table 1. *Levels of Nutrients*

Nutrient	Soil A	Soil B
Nitrogen	Deficient	Sufficient

Phosphorus	Adequate	Sufficient
Potassium	Sufficient	Depleted

Conclusion

1. Which of the soil samples in Table 1 provides evidence of a deficiency according to the scales provided on the testing chambers?

Nitrogen and Potassium have evidence of a deficient according to the testing chambers

20. Assuming that there was a deficiency in nitrogen for one or both of the samples, how would a nitrogen deficiency affect plant growth?

Nitrogen influences the development of proteins and it is essential for cell division, the use of carbs, photosynthesis, vitamins, and energy reaction in plants.

21. Assuming that there was a deficiency in phosphorus for one or both of the samples, how would a phosphorus deficiency affect plant growth?

Phosphorus influences root health and growth of seedlings. If ample phosphorus is available to young plants, they will develop strong root systems that are important for their survival. Later in the life of the plant, phosphorus will again play a major role in reproductive health.

22. Assuming that there was a deficiency in potassium for one or both of the samples, how would a potassium deficiency affect plant growth?

Potassium increases photosynthesis, water-use efficiency, and disease resistance.