

AccuGrow Soil Test Strips

Fast, Easy and Accurate!

Why Soil Testing Is Important.

Testing your soil is the smart way to start and maintain your garden. Only by knowing the nutrient levels in your soil can you determine what you need to add to your garden in order to maximize growth. Your AccuGrow Soil Test Kit results will give you the necessary information to make the correct fertilizer selections throughout the gardening season. In our gardening experience, we have found that adding fertilizer without testing first is like gardening with a blindfold on. Knowledge of the nutrient levels in your soil gives you an incredibly useful tool. Think of this information as you would any other necessary gardening tool and use it in achieving your goal of a successful garden.

Identifying Your Soil

What type of soil your garden contains is important to know because it influences how well nutrients and moisture will be maintained by the soil. There are two basic extremes in soil texture-sand and clay. Sandy soil has large, gritty particles and will feel coarse when rubbed between your fingers, much like beach sand. Sandy soil is loose enough to allow for good air flow through the soil, but does not hold moisture or nutrients very well, but can be difficult to dig or till during garden preparation because of its tendency to clump. Most garden soils will be a combination of sand and clay. The ideal combination of sandy and clay soil is referred to as loam. Loam combines the beneficial properties of each soil type and provides your plants with the best growing environment. Loam is sandy enough to allow for drainage and air circulation but also contains enough clay to retain adequate levels of moisture and nutrients. If your garden soil is not the perfect loam, don't worry. Sandy and clay soils can be compensated for in the treatment and maintenance of your garden.

Importance of Soil pH and Nutrients

Now that you know what type of soil your garden contains, let's talk about the importance of testing the pH, Nitrogen, Phosphorus, and Potassium levels of your soil. Each of these elements performs a different function in the growth of plants.

pH-pH is not a nutrient; it is a measure of soil acidity or alkalinity. The pH level of your soil determines how well the plants are able to use the nutrients in the soil. In general, the ideal pH range for garden soil is 6-7. At this pH level, plants are able to draw adequate amounts of nutrients from the soil efficiently. When the pH level of the soil is out of this range, plants are not able to use the nutrients in the soil efficiently. So a garden with good levels of Nitrogen, Phosphorus and Potassium may still not live up to expectations if the pH level is out of range. Even though the nutrients are there, an incorrect pH level will prevent the plants from drawing what they need from the soil. Because soil pH has a tendency to drop over time, it is important to test it regularly.

Nitrogen-Nitrogen in your soil will affect the part of the plant that is above the ground, especially the green, leafy sections. Correct levels of Nitrogen will promote healthy, green foliage. Therefore, you will find that vegetables such as lettuce and spinach, as well as lawns, have high Nitrogen requirements. Nitrogen is one of the most difficult nutrients to maintain in your garden as it is easily washed away by rain water. The Nitrogen level in your soil can, therefore, deplete quickly. For this reason, it is especially important to test regularly for Nitrogen.

Phosphorus-Phosphorus in soil is essential for strong root formation and root system development. Phosphorus also contributes to quicker flower and fruit production by helping to protect the plant against disease and poor weather conditions.

Potassium-Potassium is responsible for seed formation and germination in flowers, fruits or vegetables. Obtaining maximum vegetable, flower, or fruit formation requires correct levels of potassium. Tomatoes, potatoes, eggplant, and

beets thrive in levels of potassium. Potassium is also needed for sugar formation in fruits and vegetables. Therefore, sufficient levels of potassium in your garden soil will produce better-tasting fruits and vegetables.

We hope this brief discussion of soil nutrients will help you understand how different factors interact to create a healthy garden. As we mentioned before, soil testing is the only way to determine the levels of these nutrients in your soil. Results from the AccuGrow Soil Test Kit will help you make educated decisions when starting and maintaining your garden.

pH and Nutrient Requirements

Now that you know what benefit each nutrient provides for your plants, let's look at what nutrient levels you need to maintain. Note on the labels the test strip bottles in your kit that pH, Nitrogen, Phosphorus, and Potassium all have values assigned to each color block. pH has numbers and the three nutrients have letters. These letters are our way of showing different levels of nutrients. The letters range from A to D, with A being less, and progressing through D, which is more. These numbers and letters are what AccuGrow's easy-to-use treatment recommendations are based on. You can compare your test results to the table below and determine what soil adjustments you need to make.

The nutrient and pH requirements for most vegetables, fruits, flowers, and plants are:

pH	Nitrogen	Phosphorus	Potassium
6-7	C	C	C

These can include:

- Chrysanthemums
- Corn
- Irises
- Peppers
- Roses
- Sunflowers
- Tomatoes
- Watermelon

Of course, some plants have specific needs in order to thrive. Below are lists of the more common exceptions to the general guidelines above:

Acid-Loving (Low pH) Plants-the following plants have a pH requirement of 5-6

- Azaleas
- Blueberries
- Calla Lilies
- Lily-of-the-Valley
- Orchids
- Strawberries

Alkaline-Loving (High pH) Plants-the following plants have a pH requirement of 7-8

- Asparagus
- Green Beans
- Paprika
- Turnips

High Nitrogen Requirements-the following plants have a pH requirement of D

- Annual Flowers
- Asparagus
- Beets
- Broccoli
- Cabbage
- Cantaloupe
- Celery
- Cucumbers
- Lawns
- Lettuce
- Spinach

High Phosphorus Requirements-the following plants have a Phosphorus requirement of D

- Annual Flowers
- Beets
- Broccoli
- Cabbage
- Celery
- Cantaloupe
- Cucumbers
- Lettuce
- Spinach

High Potassium Requirements-the following plants have a Potassium requirement of D

- Annual Flowers
- Asparagus
- Beets
- Cabbage
- Cantaloupe
- Cauliflower
- Celery
- Lettuce
- Potatoes
- Spinach

Soil Preparation Tips

- Soil sample is to be taken from the root zone of the plant, approximately 6 inches deep.
- If your garden is large, or if you want test results for different regions of your garden, you may take samples from several areas of the garden and test them individually. If you choose to use this method, be sure to follow steps 1-10 for each sample tested.
- Remove any obvious stones, sticks, or leaves so that the soil sample in the scoop consists only of soil.

1. Fill mixing vial to fill line with water (for best results use distilled water).

Green Tip-Why should you use distilled water to complete this test?

Distilled water allows for the most accurate pH readings. Plus, tap water may contain trace levels of nitrate. This nitrate may cause elevated test strip readings when you test soil. If you suspect or know levels of nitrate exist in your water, you may immediately use distilled water for your soil test. If you are unsure of the nitrate levels, you can test it with an AccuGrow test strip to determine if distilled water is needed, by the following procedure: Just fill the mixing vial to the line with a water sample and follow the directions

for completing an AccuGrow pH/Nitrogen test. If the Nitrogen reading is “B” (12 ppm) or higher, use distilled water with the AccuGrow product to test your soil.

2. **Fill scoop (packed lightly and leveled off) with soil to be tested. Add this soil sample to water in the mixing vial. Place cap on vial and shake vigorously for 30 seconds.**
3. **Remove one pH/Nitrogen test strip from the bottle. Replace cap tightly on bottle of test strips.**
4. **Dip strip into sample mixture for three seconds and remove (make sure that both test pads on the strip are submerged during this dip). *Note: retain the soil mixture in the vial for Part II of the test.***
5. **Hold strip level (pad side up) for one minute. Read your pH and Nitrogen results by turning the test strip over (pad side down) and comparing the resulting pad colors to the color chart on the bottle label. Be sure that you are reading the results through the clear plastic of the test strip. If you read the results with the pad side up, your results may not be accurate. Note the number (for pH) and letter (for Nitrogen) under the color block that matches your result. Record this number and letter in the test log.**

Part II-Phosphorus and Potassium:

6. **Using the same scoop as a measure, add one scoop full of Activator solution from bottle A to sample mixture already in vial. Replace vial cap and shake vigorously for 60 seconds.**
 7. **Remove one Phosphorus/Potassium strip from bottle. Replace cap tightly on bottle of test strips.**
 8. **Dip strip into sample mixture for ten seconds and remove (make sure that both test pads on the strip are submerged during this dip).**
 9. **Hold strip level (pad side up) for one minute. Read your Phosphorus and Potassium results by turning test strip over (pad side down) and comparing the resulting pad colors to the color chart on the bottle label. As before, be sure that you are reading the results through the clear plastic of the test strip. If you read the results with the pad side up, your test results may not be accurate.**
- Note the letters under the color blocks that match your results for Phosphorus and Potassium. Record these letters in the test log.**
10. **Rinse scoop and vial with tap water to remove any soil residue. Replace components into kit container for next use.**

Analyzing Your Test Results

Now that you have your AccuGrow test results, let me explain how to interpret them. As an example, let’s assume that I tested my soil and got the following results:

- pH-5
- Nitrogen-A
- Phosphorus-B
- Potassium-B

As we already mentioned, the general nutrient requirements for most plants are:

pH	Nitrogen	Phosphorus	Potassium
6-7	C	C	C

Therefore, I can see that I need to INCREASE pH, Nitrogen, Phosphorus, and Potassium. My pH, Phosphorus, and Potassium all need to be increased by one unit (from 5 to 6 for pH and from B to C for Phosphorus and Potassium), while my Nitrogen level need to be increased by 2 units (from A to C). The Treatment Recommendations, to follow, will explain how to make these adjustments.

I would also check the list of pH and nutrient requirements exceptions to see if the plants you plan to grow have different requirements. If some of them do appear in these list, you can treat sections of your garden differently, For example, you may adjust half of your garden to the general (6-7, C, C, C) levels and the other half to a low pH (5-6) and high Nitrogen (D) level. It just depends on how much time you want to spend adjusting your soil nutrient levels. If you want to keep your treatment simple, adjust to the general (5-6, C, C, C) levels. While some plants may grow exceptionally well in other conditions, these levels would be adequate for any plant combination.

Treatment Recommendations

Now that you have your AccuGrow results and know which elements in your soil need to be adjusted, let's look at what to do in order to make these adjustments.

pH Adjustments

To raise pH (increase alkalinity)

Add: Lime
Ground Limestone
Oyster Shells

To lower pH (increase acidity)

Add: Alum
Sulphur
Compost
Manure
Tannic Acid

These elements to adjust pH can be found in your local lawn and garden retail store. They will be sold under different brand names, so look for the ingredients on the package to find the correct pH adjuster.

Nutrient Adjustments

Fertilizers that are pre-mixed are rated on their Nitrogen, Phosphorus and Potassium contents. The ratings on a fertilizer package are always in this order: Nitrogen (N), Phosphorus (P) and Potassium (K). Therefore, the numbers specified on a fertilizer package (5-10-5 or 10-20-10) refer to the percentages of N, P, and K that are found in that particular fertilizer. There are a large variety of fertilizers available.

It is easy to find a pre-mixed fertilizer selection that will have a nutrient combination to suit the needs of your soil. Simply look at your AccuGrow results and identify which nutrient levels need to be increased. If your AccuGrow test results show that you need to increase your Nitrogen level but your Phosphorus and Potassium levels are sufficient, look for a fertilizer selection that has a high N level and low or no P and K (25-5-5 or 25-0-0 for example). Or if all of your nutrients need to be increased, look for a fertilizer that contains all three nutrient levels in relatively equal amounts (20-20-20) or 10-10-10 for example). Using this idea, you can easily pick out a pre-mixed fertilizer that will meet the needs of your soil.

If your Nitrogen, Phosphorus or Potassium levels were higher than the recommended levels, don't worry too much about this. There is not any type of "anti-fertilizer" available to lower these levels. However, this is important information because you will know to choose a fertilizer that is very low in the nutrient that you already have an excess of. For example, if your Phosphorus level is higher than recommended but your Nitrogen and Potassium levels need to be increased, you would apply a fertilizer with a very low middle rating (20-0-20 or 10-0-10 for example). Because garden sizes and fertilizers will vary, refer to the directions on the fertilizer that you choose for specific application instructions or ask your local lawn and garden professional. As a general guideline, one application (per package instructions) of fertilizer will increase a nutrient by one rating (from A to B or B to C, for example). However, what type of soil you have will affect how much fertilizer you need to add. If your soil is clay, you may need to add up to 25% more fertilizer. Or if your soil is sandy, you may need to add up to 25% less fertilizer. Standard application instructions are sufficient for soil that falls into the loam category.

When to Test Your Soil

As testing your soil with AccuGrow Test Strips becomes an important part of your ongoing gardening activities, you may develop your own testing schedule. As a basic guideline, we recommend the following :

- **In the Spring** before you begin any garden activities. This test will let you know how your pH and nutrient levels need to be adjusted before you plant your garden.
- **Every 4 weeks during the growing season** to verify that nutrient levels are still adequate. These periodic checks will allow you to quickly catch any deficiencies and make the necessary pH or nutrient adjustments. This is much more effective than waiting for deficiencies to become apparent in the growth pattern of your plants.
- **In the Fall** to prepare your garden soil for next year. If you end the season with correctly treated soil, your garden will be better prepared for the start of next season.
- **Any time you suspect a nutrient deficiency** in any of your plants. Use AccuGrow Soil Test Strips to quickly and easily determine if pH or nutrient levels are the cause of any problems you are experiencing with your garden.

Green Tip-Why do I need to test more than once per season?

Nutrient levels can vary over a growing season for several reasons. First, plants will use up nutrients in the soil as they develop. In addition, Nitrogen and Potassium are affected by weather influences. As we mentioned earlier, Nitrogen can be washed away by rain water. Potassium levels are affected by the weathering of the soil. As soil is continually moistened and dried out, its ability to release Potassium can vary. Therefore, Potassium readings can increase or decrease throughout the season.

Another reason for periodic soil testing is that different fertilizers have different nutrient release rates. Just because you add fertilizer doesn't mean that you will see its full effects immediately. It is a good idea to test periodically with the AccuGrow Soil Test Strips to monitor the effects of the fertilizer that you have applied.

How to spot Nutrient Deficiencies

Below is a quick reference table that may help you identify problems commonly associated with Nitrogen, Phosphorus, or Potassium deficiencies.

Nitrogen Deficiency	Droopy, pale green or yellow leaves and/or stems Growth rate that is much slower than expected
Phosphorus Deficiency	Purple or red leaves and/or stems Plants that are slow to produce fruit or flowers
Potassium Deficiency	Buds or flowers that do not fully develop Small or underdeveloped fruits or vegetables Leaves that turn brown

These symptoms are to be used as a general guideline to point you in the right direction. However, many symptoms for Nitrogen, Phosphorus, or Potassium deficiencies may overlap or be very similar. If your pH is out of range, any of these symptoms may appear, as all of the nutrients may not be utilized by your plants. Therefore, the only way to be sure which nutrients are deficient is to test with AccuGrow Soil Test Strips.

Green Tip-Why can't I just wait for nutrient deficiency symptoms to appear and then treat my soil?

Once physical symptoms appear, nutrient deficiencies are usually severe. By the time you are able to react and fertilize, your plants have lost much of the growing season. As we mentioned earlier, nutrients in fertilizers are not all immediately released. If your plants are failing, you will lose more time waiting for the fertilizer to take effect.

Houseplant Specifics

The nutrient and pH levels recommended for houseplants are basically the same as those for garden soil. When testing houseplants soil, keep in mind that the soil is probably a specific potting mixture and will, therefore, have certain properties that garden soil does not have. Potting soil is typically lighter and looser. It may be richer in nutrients to begin with, but it will tend to lose these nutrients quicker due to frequent waterings.

Choosing fertilizers to correct deficiencies in houseplant soil is also very easy. There are many forms of houseplant soil fertilizers, from sticks to liquid. Follow the same guidelines as you would for choosing a garden fertilizer. Use your AccuGrow results to determine which nutrients your houseplant soil is lacking and choose a fertilizer containing the necessary combination to combat these deficiencies.

Lawn Specifics

The main point to remember about lawn soil is that it has a high Nitrogen requirement. If you recall our earlier discussion of the benefits of each nutrient, it was emphasized that Nitrogen is responsible for the green foliage element of plants. And, what is the most sought after characteristic for lawns? Green, lush blades of grass, of course! Correctly balanced soil is an important step towards growing the thick, green lawn that your neighbors will envy.

Green Tip-I've tested, fertilized, and planted. What else can I do for a healthy garden?

- Keep your garden moist with regular waterings. Apply mulch to the garden floor in order to help retain moisture.
- Weed your garden. Weeds are often thought of as simply unsightly, but they can also have damaging effects on your garden. Weeds can deplete the nutrient supply in the soil and “crowd out” your plants.

Test Log

Date	pH	Nitrogen	Phosphorus	Potassium	Treatment
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