luster leaf®

No. 1885

rapitest® Digital 4-WAY ANALYZER

FOR USE IN SOIL ONLY. DO NOT USE IN LIQUIDS.

Important Information Regarding Your New Digital Analyzer

These instructions cover all aspects related to the analyzer's function and will help guide you toexperiencing the proper soil moisture, pH, temperature and light intensity range for the plants you intend to grow.

Before Testing the Soil

If you are preparing to plant a bed of plants or shrubs, or to plant a crop of fruits and vegetables, or to put out grass seed, you will find it beneficial to sample and test the soil in a number of locations in the area to confirm that the soil is warm enough for what you want to plant, that the soil's pH is generally consistent over the entire area and that it is within the plant's pH range.

Basic Operating Instructions

Step 1. Press the power button to turn the meter on and off.
Step 2. Press the arrow keys to change the test function.
Step 3. The test function in use is indicated by the blinking arrow on the meter face.
Step 4. When not in active use, the meter will turn itself o f after about four (4) minutes to preserve battery life.

How to Use Your Meter to Measure pH

Step 1. Remove the top 2" of the surface soil. Break up any soil clumps to a depth of 5". Remove stones or organic debris such as leaves and twigs because they can affect the final result.

Step 2. Thoroughly wet the broken up soil with water (ideally distilled or de-ionized water) to a mud consistency.
Step 3. Tamp the wet soil to compact thoroughly.
Step 4. Using the supplied pad, lightly shine 4"-5" (10-12 cm) of the probe, carefully avoiding the bullet shaped tip, to remove any oxides that may have formed on the surface of the metal. Wipe the probe clean using a cotton ball or tissue. Always wipe away from the probe tip, toward the probe handle.
Step 5. Use the arrow buttons to move the indicator arrow to point to pH.
Step 6. Take the initial reading: Push the probe directly into the moistened soil to a depth of 4"-5". If it does not slip into the soil fairly easily, select a new position. Never force the probe! Twist the probe clockwise and counter-clockwise between your fingers several times to ensure that muddy soil is well distributed over the surface of the probe. Wait for 60 seconds for the probe to acclimatize and note the LCD reading. Remove the probe from the soil.
Step 7. DO NOT SKIP THIS LAST STEP!
Based on the results of the initial reading, take the final reading:
a. If the initial reading is pH 7 or higher, wipe any soil particles from the surface of the probe. Re-shine the probe and insert back into the soil at a different point, avoiding the first hole made by the probe. Twist the probe two or three times between the fingers, as before, and wait 30 seconds before taking the final reading.
b. If the initial reading is below pH 7, wipe any soil particles from the surface of the probe. Do not re-shine the probe. Insert the probe back into the soil at a different point, avoiding the first hole made by the probe. Twist the probe two or three times between the fingers, as before, and wait 60 seconds before taking the final reading.

In order to obtain an even more accurate result when measuring soil pH with your unit, take the sample of soil to be tested from the ground. Prepare the sample by breaking the soil into small particles, removing stones and organic debris. Measure two cups of soil from the prepared sample. Fill a clean glass or plastic container with two cups of distilled or de-ionized water and add the measured soil sample. Ensure the soil and water are thoroughly mixed and compact the sample firmly. Drain off any excess water. Proceed to step 4 above.

Adding Lime to Increase pH

Lime can be added at any time of year but it does need time to take effect – which is why the autumn, winter and early spring are the preferred times. The two main types of lime are ground limestone and hydrated lime. Ground limestone is slower acting but more pleasant to handle. Hydrated lime may take effect in two or three months but ground chalk or limestone may take up to six months. The amount of lime needed to raise a spade's depth of top soil by 1 pH varies from 5.5 oz. of hydrated lime or 7.5 oz. ground limestone on sandy soil to 11 oz. of hydrated lime or 15 oz. ground limestone on heavy clays or peaty soils per square yard. So do not expect pH correction to be too precise! Avoid adding lime at the same time as sulfate of ammonia, superphosphate, basic slag or animal manures. Lime may be used in combination with sulfate of potash or muriate of potash. It is because of the natural drop in pH that there is such an emphasis on adding lime. While lime stimulates the availability of most plant foods, you will see from the "pH and Plant Nutrient" table that soils should not automatically be limed because large amounts of plant food become increasingly "locked up" over pH7.

Benefits of Liming

- Reduces acidity, increases pH.
- Binds the fine particles of clay into larger particles and so helps aerate and drain the soil.
- Helps to retain moisture and plant foods in sandy soils.
- Balances the addition of acidic fertilizers.
- The lime content of soil will sometimes affect flower and foliage color. Blue & red hydrangea flowers are the most common examples.
- Supplies the plant food calcium.
- Makes nitrogen available by stimulating the micro-organisms that help decompose organic matter.
- Increases the earthworm population.
- Protects against a few diseases, such as club root in brassicas (but causes scab in potatoes) and is disliked by organisms that help decompose organic matter.

Adding Chemicals and Organics to Reduce pH

The best way to reduce pH is to use the compost heap and farmyard manure to regularly introduce decaying humus. This not only reduces pH gradually but helps hold plant foods and moisture. Peat, relatively inert and usually only about 4% nitrogen content, is another useful soil conditioner of an acid nature.

Sulfate of ammonia and flowers of sulfur are chemical treatments that help reduce soil pH. Sulfate of ammonia also adds nitrogen.

While the tiny bacteria and micro-organisms work unseen in the soil, breaking down fresh organic matter into plant food, they produce acids. If this process eventually creates too low a pH, the organisms will work less efficiently. Lime is then needed as a balance and stimulant It is sensible to progress gradually towards a reduced pH and certainly not to expect to be able to be precise in exactly how much of a material will reduce pH by a given amount.

Avoid adding animal manures or sulfate of ammonia at the same time as lime or basic slag (a phosphate food).

How Much to Apply

How much to apply depends on the particle size of your soil. A sandy soil needs less lime for an equivalent pH change than a heavy clay but will not hold its pH as long. **Refer to Chart A.**

Soil Types

Sandy Soils: A light, coarse soil comprised of crumbling and alluvial debris.
Loam Soils: A medium friable soil, consisting of a blend of coarse (sand) alluvium and fine (clay) particles mixed within fairly broad limits with a little lime and humus.
Clay Soils: A heavy, clinging, impermeable soil, comprised of very fine particles with little lime and humus and tending to be waterlogged in winter and very dry in summer.

Excessive acidity in the soil causes calcium, phosphorous and magnesium to be changed into forms that plants cannot use, causing them to suffer a deficiency of these elements. Plants won't tolerate highly acid conditions. Slowdown of beneficial bacterial action is part of the reason; increased toxicity from certain trace elements like aluminum is another. Deficiency of calcium and magnesium is a third possibility. The best explanation is that in acid soils, chemical reaction can lock up major nutrients, especially phosphorous, making them unavailable to plants. Heavy use of inorganic, high-analysis fertilizers causes soil to become more acid, as does heavy use of sulfur-containing fungicides. The same result can stem from using organic fertilizers that have an acidifying effect. Acidity and alkalinity are measured in pH units, the pH being a symbol for the relative amount of hydrogen in a substance. On a pH scale from I to 14, 5 and below are extremely acid and 10 or more extremely alkaline. Soil alkalinity or acidity, then, is determined by the reaction of various minerals and organic compounds with moisture in the soil. Plants are often listed according to their pH preference. Some plants respond differently to pH in different soils. Other plants tolerate a comparatively wide range of pH. Obviously, for high yields, the gardener or farmer must know the soil's pH. Then the gardener/farmer can either grow the kinds of plants that do best in soil of that particular pH, or steps can be taken to change the soil pH to within the preferred range for the plants desired. For the majority of common plants, a pH of 6.5 to 7 is optimum. Soils in this pH range offer the most favorable environment for microorganisms that convert atmospheric nitrogen into a form available to plants. It also offers the best environment for the bacteria that decompose plant tissue and form humus. In this pH range, all of the essential mineral nutrients are available to plants in sufficient quantities, and generally in a much greater amount than at any other pH. Also, soil having a pH within this range is more workable, because a good crumb structure is more easily maintained. Too acid a soil means the bacteria which decompose organic matter cannot live. Manganese & aluminum are so soluble in very acid soil that they become present in amounts toxic to plants. Strong acidity also decreases nutrient availability, and plants may literally starve to death for one essential mineral nutrient while having so much of another that it poisons them. This becomes accelerated the more you fertilize. On the other hand, too alkaline a soil decreases nutrient availability. It causes loss of soil structure and development of "puddling". Strong alkalinity dissolves and disperses humus. "Black alkali" is caused by the accumulation of alkali and humus at the surface of the soil. Strong alkalinity causes a concentration of salts that completely inhibit plant growth.

To Raise or Lower pH of Your Soil

Raising and lowering pH is not an exact science and most plants have a reasonably wide tolerance, certainly to within 1 pH point. Consult plant pH preferences in this booklet and you will see that the majority can manage well on a pH around 6.5 but some need an alkaline soil and some a particularly acid soil. Altering pH takes time so do not expect rapid changes; rather, work steadily towards giving a plant its ideal conditions. **Refer to Chart B.**

Chart A. Application of Lime, Chemical and Organics to Increase or Decrease pH

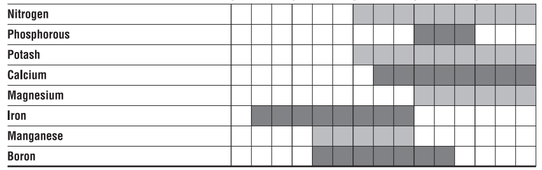
Amounts listed are pounds per 100 square feet. Do not add more than 5 lbs. of lime or sulfur in one application.

Material	ph Change	Sandy	Loamy	Clay
Dolomitic or	+ 0.5 unit (0.5 pH)	2.5	5	5.5
Calcic Limestone	+ 1.0 unit (1.0 pH)	5.0	8.5	11
Hydrated Lime	+ 0.5 unit (0.5 pH)	1.5 - 2.0	3-4	4.0 - 4.5
	+ 1.0 unit (1.0 pH)	3.5 - 4.0	6.0 - 6.5	8.0 - 8.5
Iron Sulfate	- 0.5 unit (0.5 pH)	0.75	1.5	2
	- 1.0 unit (1.0 pH)	1.5	3	4
Aluminum Sulfate	- 0.5 unit (0.5 pH)	0.5 - 0.75	1 - 1.25	1.5
	- 1.0 unit (1.0 pH)	1.0 - 1.25	2.25	3

Please note: To use Sphagnum Peat Moss to increase soil acidity, mix in up to one third total soil volume when planting acid loving plants.

Chart B. pH and Plant Nutrient Availability

pH readings at which various plant foods are most available in the soil



HOW TO USE YOUR METER TO MEASURE MOISTURE

1. Use arrow buttons to move indicator to "moisture".
2. At the start of every moisture reading session, use the special enclosed pad to gently wipe the entire probe 2 - 3 times.
3. Insert the probe, vertically if possible, into the pot half way between the edge of the container and the plant stem. In potted plants the depth of penetration will be influenced by the size of the container, probe deeper in a larger pot, shallower in a smaller one. A good rule of thumb is to probe about 1/2 to 2/3 of the way down from the surface. For containers over 12" in diameter, place the probe closer to the stem (about 1/3 of the way from the stem to the edge of the pot.)
4. While pushing the probe into the soil you may note that the meter reading varies as the probe moves downward. This is because the soil moisture conditions are not uniform. Certain types of soil have a tendency to create moisture pockets, which might give you a false high reading in small areas of the soil. We recommend you take at least two readings in order to confirm your findings. (Note: probing aerates the soil, which is good for the plant.)
5. Note your meter reading when the LCD display remains constant for about 4 - 6 seconds.
6. Remove the probe from the soil.
7. Wipe the probe clean with a soft cloth or tissue before taking another reading and when testing is completed.

IMPORTANT:

- The meter is designed and constructed for test readings. The probe should not be left in contact with moisture for extended periods of time. Do not store or leave your meter probe in the soil.
- The meter will turn itself off after about 2 minutes of inactivity. If the meter has turned itself off, press the power button to re-start.

INTERPRETING YOUR READINGS

1. The numbers from 1 to 9 signify increasing wetness and plants cannot tolerate either extreme for long. Plants are listed alphabetically by their popular names in the table provided. Check the name of the plant being tested, and look at the guide number listed in the column immediately to the right. If the meter reading you received is higher than the guide number, DO NOT WATER. If the number is the same or lower, water as directed. EXAMPLE: You are checking a Dumb Cane (Dieffenbachia.) The meter reads 4, the guide number is 1. You do not water!
2. It is important to adhere to the FREQUENCY intervals. The asterisks in the table indicate how often each plant likes water:
   * Check once a week ** Check every 4 to 5 days *** Check every 3 days
3. SPECIAL WATERING NEEDS are marked with Roman numerals. **Refer to Chart C.**

I - Spray foliage daily
II - Never let soil dry out.
III - Keep soil moist but never soggy.
IV - Keep soil wet at all times.
V - Allow soil to dry between watering.
VI - Soil should remain dry 4-5 days.
VII - Reduce watering during dormant period.
VIII - Water from beneath (in saucer). Never wet foliage.

HELPFUL TIPS:

Please keep in mind when using the information in the Watering Guide:
1. Pot Size: Small pots dry out faster than large ones, so plants in small pots may need to be checked and watered more frequently.
2. Type of Pot: Soil in clay pots dries out faster than soil in plastic containers because baked clay is more porous.
3. Light: Plants in full sunlight dry out faster and use more water than those in partial sunlight or indirect light.
4. Location: Plants close to a radiator, vent or heater will dry out more quickly.
5. Overwatering refers to an excessive frequency of watering, not to the amount of water at a given time. The result or overwatering is, inevitably, root rot.

CACTI AND SUCCULENTS:

These plants store water and require less attention than other plants. From March to September, do not allow the soil to dry out. Water when the meter reads 3. Form October to February (dormant period) moderately water every 2-3 weeks, just enough to prevent shriveling. Always use tepid water; cold water can severely shock plants.

LAWNS:

The greatest disservice you can do to your lawn is to water too lightly. Too little water will not accommodate the grass roots. If light watering occurs frequently, the roots will start to climb toward the surface seeking moisture. The heaviest root concentrations are usually 2 to 3" below the ground level of your lawn. Therefore, you should probe about 3" below the surface. A meter reading of 5 would indicate a satisfactory watering. Provided that your lawn has reasonably good drainage, it is virtually impossible to over-water.

GARDENS:

Most experts agree that plants should never be allowed to dry to their "wilting point". The following lists for Vegetables and Landscape plants give suggested approximate readings that indicate that the wilt point is near. Watering is recommended when your test readings coincide with our recommendations. When you do water, water thoroughly. Root depths vary greatly with different plants and vegetables. When you check the soil moisture level after watering, the meter should read 10. This would indicate sufficient water has seeped down. In soils with poor drainage (too much clay) allow about 15 to 30 minutes before checking.

SOIL:

The readings given are for the average garden loam. Technically, loam is a soil that has characteristics roughly midway between those of sandy soil and clay soil. It is a mixture of sand, clay, silt and, if fertile, contains a good proportion of organic material (humus). Humus is the name given to all decayed organic matter, whether plant or animal in origin. It is a vital component of fertile soils. If your soil conforms to the this description, use the Wilt Point numbers as indicated. If your soil is more on the sandy side, add one number to the number in the table. If your soil has a higher percentage of clay, subtract one number from the number in the table.

Vegetable Wilt Points

Vegetable	Wilt Point
Artichoke	3-4
Asparagus	3-4
Beans	2-3
Beets	3-4
Broccoli	2-3
Cabbage	3-4
Carrots	2-3
Cauliflower	3-4
Celery	4-5
Chard	3-4
Corn	2-3
Cucumbers	3-4
Eggplant	3-4
Lettuce	3-4
Onions	2-3
Peas	2-3
Peppers	2-3
Potatoes	2-3
Radishes	2-3
Spinach	3-4
Squash	3-4
Tomatoes	3-4
Turnips	3-4

Landscape Plant Wilt Points

Plant	Wilt Point
Bamboo	4-5
Cannas	3-4
Daffodils	4-5
Dahlias	4-5
Iris	3-4
Lilies	4-5
Palms	3-4
Pines	3-4
Primroses	4-5
Rhododendrons	4-5
Roses	4-5
Succulents	2-3
Tuberouw Begonias	4-5
Tulips	3-4

Chart C. Watering Guide And Table

Plant	Moisture	Frequency	Special
African Violet	3	**	
Aloe	1	*	
Amaryllis	3	**	
Anthurium	8	***	I
Aralia	4	**	
Arrowhead Vine	4	**	
Asparagus Fern	6	**	III
Azalea	8	**	II
Baby's Tears	6	**	
Bamboo Plant	4	**	
Bay Tree	6	**	I
Begonia	7	***	III
Bebonia Rex	6	**	VI
Billbergia	6	***	I
Bird of Paradise	3	*	
Black-Eyed Susan	4	**	III
Bloodleaf	7	***	III
Blue African Lily	7	**	
Boston Fern	6	**	
Bottlebrush Plant	6	**	
Bougainvillea	8	***	II
Browallia	3	**	
Buddhist Pine	7	**	
Burro's Tail	3	***	
Buxus	4	**	
Butterfly Flowe	8	***	II
Caladium	7	**	III
Calceolaria	1	*	
Calla Lily	7	***	VII
Camellia	7	***	I
Cape Cowslip	7	**	
Cape Ivy	1	*	
Cardinal Flower	1	*	
Cast Iron Plant	3	*	
Castor Oil Plant	4	**	
Century Plant	1	*	
Ceropegia	1	*	
Chenille Plant	6	***	I
Chinese Evergreen	4	**	
Christmas Cactus	6	**	VII
Christmas Pepper	7	***	I, III
Chrysanthemum	6	**	
Cineraria	4	**	
Citrus	1	*	
Clerodendrum	7	***	
Coffee Plant	7	***	III
Coleus	9	***	I
Columnea	7	***	I
Copperleaf	6	***	I
Coral Berry	7	***	I, III
Corn Plant	7	***	
Creeping Moss	7	***	
Crossandra	7	***	I
Croton	7	**	
Crown of Thorns	3	*	
Cryptantyhus	1	**	
Cupid's Bower	6	**	
Cyclamen	7	***	VIII
Devil's Ivy	4	**	
Dipladenia	1	*	VI
Dracaena (all)	7	***	
Dumb Cane	1	*	VI
Easter Lily	4	**	
Echeveria	1	*	VI
Egyptian Star Cluster	7	***	
Euonymus	1	*	VI
Fat-Headed Lizzie	4	**	I
Ferns	6	***	I
Figs, Creeping	7	***	I
Figs, Fiddle Leaf	1	*	VI
Figs, Weeping	4	**	
Figernail Plant	7	**	
Firecracker Plant	7	**	II
Flame of the Woods	7	**	
Flaming Katy	1	*	VI
Flowering Maple	7	***	
Friendship Plant	6	*	
Fuchsia	7	***	I
Gardenia	8	***	I, II
Geranium	1	**	VI
Glory Lily	4	**	
Gloxinia	7	**	VIII
Gold-Dust Plant	1	*	
Grape Ivy	4	**	VI
Hedera Ivy	6	**	
Heliotrope	7	**	
Hen-and Chicken	1	*	
Hibiscus	4	*	
Hyacinth	8	***	III, VI
Impatiens Walleriana	7	**	VI
Inch Plant	1	**	VI
Jacaranda	6	**	I
Jade Plant	1	*	VI
Jacobinia	7	***	
Japanese Sedge	7	***	III
Jasmine	7	***	
Jasmine Plant	8	***	I
Jelly Bean Plant	1	*	
Jerusalem Cherry	3	**	
Jessamine	7	***	
Kalanchoe	1	*	VI
Kafir Lily	1	*	VI
Kangaroo Thorn	6	**	
Kentia Palm	6	**	
Lady Palm	8	**	
Lantana	1	*	VI
Lipstick Vine	7	***	
Lucky Clover	1	*	
Maidenhair Fern	6	***	III
Monstera	4	**	
Mosaic Plant	7	**	
Mosses-in-the-Cradle	7	**	III
Myrtle	1	*	
Narcissus	7	**	
Nasturtium	7	**	
Natal Palm	6	**	
Nasturtium	7	**	
Natal Palm	6	**	
Nicodemia	4	**	
Nicotinia	7	**	
Norfolk Island Pine	4	**	
Oleander	7	**	
Orchid	1	**	VI
Painter's Palette	8	**	
Panda Plant	1	*	V
Parasol Plant	4	*	I
Parlour Palm	7	**	
Passion Flower	7	***	III
Peace Lily	8	***	I
Peperomia	1	**	
Philodendron	4	**	
Piggyback Plant	6	**	III
Pigmy Date Palm	8	***	VII
Piles (Aluminum Plant)	6	**	
Plume Flower	7	**	III
Poimsettia	1	*	VI
Polyscias	6	**	
Pony Tail	1	*	
Pothos	4	**	
Prayer Plant	7	**	I
Primula	7	**	III
Rabbit's Foot Fern	7	**	
Rubber Plant	4	*	
Sensitive Plant	7	***	I
Sentry Palm	6	**	
Shrimp Plant	1	*	VI
Siderasis	1	*	
Silk Oak	4	*	
Snake Plant	1	*	VI
Snakeskin Plant	4	**	I
Spider Plant	7	**	
Star-of-Bethlehem	7	**	
Strawberry Geranium	1	**	
Sugar Almond Plant	1	*	VI
Swedish Ivy	4	**	
Sweet Flag	8	***	IV
Table Fern	8	**	
Temple Bells	7	**	
Tillandsia	7	**	
Umbrella Plant	9	***	
Umbrella Tree	1	**	VI
Vase Plant	7	**	
Veltheimia	7	***	
Venus Flytrap	9	***	
Verbena	1	*	
Violet Flame	7	**	
Vriesia	1	**	
Wandering Jew	1	*	VI
Wax Plant	4	*	I
Wood-Rose	6	***	I
Yesterday, Today, Tomorrow	6	**	
Zebra Plant	7	**	VII

INDICATORS:

moisture level	1- 9
frequency intervals	*/**/***
special watering needs	I-VIII

How to Use Your Meter to Measure Soil Temperature

Use the arrow button to move the indicator arrow to point to Temperature.
Press the both arrow buttons at the same time to switch the reading in Fahrenheit and Celsius.

Step 1. With the unit turned on, and in temperature mode, insert the probe to a minimum depth of 2" to 3" (5-8 cm) into the soil.

Step 2. Wait 60 seconds to acclimatize the probe and note the LCD reading. Remove the probe from the soil. **Refer to Chart D.**

Chart D. Soil Temperature Ranges

Vegetable	Will Germinate	Ideal Germination	Transplanting Seedlings Out
Asparagus	50°F - 90°F / 10°C - 32°C	70°F / 21°C	
Beans	60°F - 90°F / 16°C - 32°C	80°F / 27°C	
Beets	40°F - 90°F / 4°C - 32°C	80°F / 27°C	
Broccoli	40°F - 90°F / 4°C - 32°C	80°F / 27°C	50°F / 10°C
Cabbage	40°F - 90°F / 4°C - 32°C	80°F / 27°C	45°F / 7°C
Cantaloupe	60°F - 100°F / 16°C - 38°C	90°F / 32°C	65°F / 18°C
Carrot	40°F - 90°F / 4°C - 32°C	80°F / 27°C	
Cauliflower	40°F - 90°F / 4°C - 32°C	80°F / 27°C	
Celery	40°F - 80°F / 4°C - 27°C	70°F / 21°C	45°F / 7°C
Chard	40°F - 90°F / 4°C - 32°C	80°F / 27°C	
Corn	50°F - 100°F / 10°C - 38°C	80°F / 27°C	60°F / 16°C
Cucumber	60°F - 100°F / 16°C - 38°C	90°F / 32°C	65°F / 18°C
Endive	40°F - 75°F / 4°C - 24°C	75°F / 24°C	
Lettuce	40°F - 75°F / 4°C - 24°C	75°F / 24°C	
Okra	60°F - 100°F / 16°C - 38°C	90°F / 32°C	70°F / 21°C
Onion	40°F - 100°F / 4°C - 38°C	90°F / 32°C	45°F / 7°C
Parsley	40°F - 90°F / 4°C - 32°C	80°F / 27°C	
Parsnip	40°F - 90°F / 4°C - 32°C	70°F / 21°C	
Peas	40°F - 80°F / 4°C - 27°C	70°F / 21°C	45°F / 7°C
Pepper	60°F - 90°F / 16°C - 32°C	80°F / 27°C	65°F / 18°C
Pumpkin	60°F - 100°F / 16°C - 38°C	90°F / 32°C	65°F / 18°C
Radish	40°F - 90°F / 4°C - 32°C	80°F / 27°C	
Spinach	40°F - 80°F / 4°C - 27°C	75°F / 24°C	
Squash	60°F - 100°F / 16°C - 38°C	90°F / 32°C	65°F / 18°C
Tomato	50°F - 100°F / 10°C - 38°C	80°F / 27°C	60°F / 16°C
Watermelon	60°F - 110°F / 16°C - 43°C	90°F / 32°C	65°F / 18°C

Testing for Plants Potted in Soil or Potting Soil

Only test at the beginning of, or during, the growing season, never in the dormant period. Do not test the soil for a plant that has been recently repotted as the plant will be in a delicate state and not yet reestablished. For established plants a pH reading should be taken just after watering. First, water each plant (without adding plant food). Rainwater should always be used for houseplants as calcium present in domestic water systems can adversely affect acid loving plants, see pH preference list. Leave the pot to drain to ensure the soil is thoroughly moistened. Proceed to step 4 of "How to Use Your Meter to Measure pH". If you are testing the soil in a planter and the reading is not reflecting the plant's desired pH range, you should repot the plant. Do not try to add a balancing agent to the top of the soil in an attempt to alter the soil's pH. Note: If you have a healthy, thriving plant (despite a reading that does not conform to the pH preference chart) do not disturb the plant as it may have acclimatized itself.

Meter Tips

- Do not leave probe in soil longer than necessary.
- Always clean the probe immediately after using.
- Be sure to keep the probe away from metal objects.
- The tester is intended for measuring soils. DO NOT PLACE THE PROBE INTO ANY OTHER SOLUTION, INCLUDING WATER.

Gardening Tips

- Altering the pH takes time. Do not expect instant changes, but work steadily towards the ideal range. Most plants have a "range" of pH.
  Consult your "tables" for the pH range of your plants.
- Adding lime before planting is most beneficial because it takes time to take effect. Liming in the fall, winter or early spring is preferred.
- Avoid adding lime at the same time as fertilizers whether they are organic or chemical.
- Use lime sparingly. It encourages weeds and worms. Worms then attract moles.
- Save clippings, vegetable & fruit wastes for compost.
- Bone meal is an excellent fertilizer to be used at the time of planting.

Special Cleaning Pad

The cleaning pad supplied with this analyzer has been specially selected for its compatibility with the meter probe metals. Other types of cleaners may cut or otherwise damage probe surfaces and / or adversely affect readings. Additional pads are available at a cost of $2.00 for 3 pads, plus $1.00 for postage and handling to the address at the end of these instructions. Checks only please payable in US funds. No phone orders.

HOW TO USE YOUR METER TO MEASURE LIGHT

1. Move switch to light position.
2. Point the purple chromatic lens on the top of the analyzer directly at the light source while holding the analyzer at leaf level. Avoid positioning your hand or body between the light source and the plant or position you are measuring.
3. Record the reading (x 1000) and the time of day.
4. Take readings in the mid-morning, mid afternoon and early evening to determine the average light intensity.

Example:
9 AM reading X 4 hours = Foot-candle hours
(Average between 7AM and 11AM)
1 PM reading X 4 hours = Foot-candle hours
(Average between 11AM and 3PM)
5 PM reading X 4 hours = Foot candle hours
(Average between 3PM and 7PM)
Total Daily Foot Candle Hours = Total From Above

Plant Light Preference List

Foot-Candle Hours:
Maximum: 50,000
Minimum: 25,000
This category of plants will thrive in full sunlight for medium short periods. East and South exposures are preferred.

Bulbs
Agapanthus, Amaryllis, Anemone, Calla Lily, Freesia, Hoemanthus, Ixia, Montbretia, Oxalis, Ranunculus, Tulbaghia

Flowering Plants
Bird Of Paradise, Chrysanthemum, Geranium, Gerbera, Gloriosa, King's Crown Lilies, Miniature Rose, Passion Flower, Poinsettia, Shrimp Plant

Foliage Plants
Agave, Aloe, Aporocactus, Astorphytum, Bamboo, Caphalocereus, Echeveria, Enchinocactus, Echinocereus, Echinopsis, Eucalyptus, Gymnocalycium, Gynura, Herbs, Iresine, Jerusalem Cherry, Kalanchoe, Lobiva, Mamillaria, Notocactus ,Opuntia, Pereskia, Polyscias, Rebutia, Sedum, Stapelia

Shrubs
Acalypha, Allamanda, Azalea, Bouganvillea, Citrus, Coccoloba, Croton, Flowering Maple, Hibiscus, Hydrangea, Ixora, Myrtle, Oleander, Privet, Pyracantha, Rhododendron, Stephanotis

Foot-Candle Hours:
Maximum: 37,500
Minimum: 20,000
This category requires bright light with little direct sunlight. East and West exposures are preferred.

Bulbs
Clivia, Daffodil, Hyacinth, Narcissus, Tulip

Flowering Plants
Cineraria, Crossandra, Cyclamen, Flame, Violet, Gloxinia, King's Crown, Lipstick Vine, Shrimp Plant

Foliage Plants
Beaucarnea, Coleus, Columnea, Crassula, Dizygotheca, Euphorbia, Fatsia, Fittonia, Gynura, Haworthia, Hypoestes, Joseph's Coat, Pleomele, Rhipsalas, Rhoeo, Saxifraga, String-of-pearls, Swedish Ivy, Tomiea, Tradescantia Wax Plant, Zebra Plant, Zebrina

Shrubs
Ardisia, Aucuba, Camellia, Clerodendrum, Coffea, Dipladenia, Eleagnus, Eunonymus, Fuchsia, Gardenia, Nandina, Silk Oak

Foot-Candle Hours:
Maximum: 27,500
Minimum: 15,000
Plants in this category thrive on bright indirect light with no direct sun light. North exposures are preferred. Subdued light by screening or a lightweight curtain will be adequate at East, South or West exposures.

Bulbs
Caladium

Flowering Plants
Achimenes, African Violet, Begonia, Christmas Cactus, Flowering Tobacco, Impatiens, Orchids

Foliage Plants
Acorus, Anthurium, Brassia, Bromeliads, Cissus, Helxine, Hypoestes, Norfolk Island, Pine Pandanus, Pellionia, Peperomia, Pilea, Prayer Plant

Foot-Candle Hours:
Maximum: 15,500
Minimum: 7,500
The plants in this category are best suited to dim light. Light intensities within the interior of a room away from windows are preferred.

Foliage Plants
Asparagus, Aspidistra, Chlorophytum, Chinese Evergreen, Cyperus, Dieffenbachia, Dracena, English Ivy, Ferns, Ficus Liriope, Palms, Philodendron, Pothos, Selaginella, Snake Plant, Spathiphyllum, Syngonium

Shrubs
Pittsoporum, Podocarpus

Plant pH Reference List

Fruit

Plant	pH
Apple	5.0 - 6.5
Apricot	6.0 - 7.0
Avocado	6.0 - 7.5
Banana	5.0 - 7.0
Blackberry	5.0 - 6.0
Blueberry	4.0 - 6.0
Cantaloupe	6.5 - 7.5
Cherry	6.0 - 7.5
Cranberry	5.5 - 6.5
Current, Black	6.0 - 8.0
Current, Red	5.5 - 7.0
Current, White	6.0 - 8.0
Damson	6.0 - 7.5
Gooseberry	5.0 - 6.5
Grapevine	6.0 - 7.0
Grapefruit	6.0 - 7.5
Hazelnut	6.0 - 7.0
Hop	6.0 - 7.5
Huckleberry	4.0 - 6.0
Lemon	6.0 - 7.0
Lychee	6.0 - 7.0
Mango	5.0 - 6.0
Melon	5.5 - 6.5
Mulberry	6.0 - 7.5
Nectarine	6.0 - 7.5
Peach	6.0 - 7.5
Pear	6.0 - 7.5
Pineapple	5.0 - 6.0
Plum	6.0 - 7.5
Pomegranate	5.5 - 6.5
Quince	6.0 - 7.5
Raspberry	5.0 - 7.5
Rhubarb	5.5 - 7.0
Strawberry	5.0 - 7.5
Watermelon	5.5 - 6.5

Vegetables & Herbs

Plant	pH
Artichoke	6.5 - 7.5
Asparagus	6.0 - 8.0
Basil	5.5 - 6.5
Bean (Runner, Broad, French)	6.0 - 7.5
Beetroot	6.0 - 7.5
Broccoli	6.0 - 7.0
Brussels Sprouts	6.0 - 7.5
Cabbage	6.0 - 7.5
Calabrese	6.5 - 7.5
Carrot	5.5 - 7.0
Cauliflower	5.5 - 7.5
Celery	6.0 - 7.0
Chicory	5.0 - 6.5
Chinese Cabbage	6.0 - 7.5
Chives	6.0 - 7.0
Corn - Sweet	5.5 - 7.0
Cress	6.0 - 7.0
Courgettes	5.5 - 7.0
Cucumber	5.5 - 7.5
Fennel	5.0 - 6.0
Garlic	5.5 - 7.5
Ginger	6.0 - 8.0
Horseradish	6.0 - 7.0
Kale	6.0 - 7.5
Kohlrabi	6.0 - 7.5
Leek	6.0 - 8.0
Lentil	5.5 - 7.0
Lettuce	6.0 - 7.0
Marjoram	6.0 - 8.0
Marrow	6.0 - 7.5
Millet	6.0 - 6.5
Mint	7.0 - 8.0
Mushroom	6.5 - 7.5
Mustard	6.0 - 7.5
Olive	5.5 - 6.5
Onion	6.0 - 7.0
Paprika	7.0 - 8.5
Parsley	5.0 - 7.0
Parsnip	5.5 - 7.5
Pea	6.0 - 7.5
Peanut	5.0 - 6.5
Pecan	4.0 - 6.0
Pepper	5.5 - 7.0
Peppermint	6.0 - 7.5
Pistachio	5.0 - 6.0
Potato	4.5 - 6.0
Potato - Sweet	5.5 - 6.0
Pumpkin	5.5 - 7.5
Radish	6.0 - 7.0
Rice	5.0 - 6.5
Rosemary	5.0 - 6.0
Sage	5.5 - 6.5
Shallot	5.5 - 7.0
Sorghum	5.5 - 7.5
Soybean	5.5 - 6.5
Spearmint	5.5 - 7.5
Spinach	6.0 - 7.5
Swede	5.0 - 7.0
Thyme	5.5 - 7.0
Tomato	5.5 - 7.5
Turnip	5.5 - 7.0
Water Cress	6.0 - 8.0

House & Greenhouse Plants

Plant	pH
Abutilon	5.5 - 6.5
Acorus	5.0 - 6.5
Aechmea	5.0 - 5.5
African Violet	6.0 - 7.0
Aglaonema	5.0 - 6.0
Amarylis	5.5 - 6.5
Anthurium	5.0 - 6.0
Aphelandra	5.0 - 6.0
Araucaria	5.0 - 6.0
Asparagus Fern	6.0 - 8.0
Aspidistra	4.0 - 5.5
Azaela	4.5 - 6.0
Baby's Breath	6.0 - 7.5
Baby's Tears	5.0 - 6.0
Begonia	5.5 - 7.0
Bird Of Paradise	6.0 - 6.5
Bishop's Cap	5.0 - 6.0
Black-eyed Susan	5.5 - 7.5
Blood Leaf	5.5 - 6.5
Bottlebrush	6.0 - 7.5
Bougainvillea	5.5 - 7.5
Boxwood	6.0 - 7.5
Bromeliads	5. 0 - 7.5
Butterfly Flower	6.0 - 7.5
Cacti	4.5 - 6.0
Calcaolaria	6.0 - 7.0
Caladium	5.0 - 6.0
Calla Lily	6.0 - 7.0
Camelia	4.5 - 5.5
Campanula	5.5 - 6.5
Capsicum	5.0 - 6.5
Cardinal Flower	5.0 - 6.0
Castor Oil Plant	5.5 - 6.5
Cantury Plant	5.0 - 6.5
Chinese Evergreen	5.0 - 6.0
Chinese Primrose	6.0 - 7.5
Christmas Cactus	5.0 - 6.5
Cineraria	5.5 - 7.0
Clerodendrum	5.0 - 6.0
Clivia	5.5 - 6.5
Cockscomb	6.0 - 7.0
Coffee Plant	5.0 - 6.0
Coleus	6.0 - 7.0
Columnea	4.5 - 5.5
Coral Berry	5.5 - 7.5
Crassula	5.0 - 6.0
Creeping Fig	5.0 - 6.0
Croton	5.0 - 6.0
Crown Of Thorns	6.0 - 7.5
Cuphea	6.0 - 7.5
Cyclamen	6.0 - 7.0
Cyperus	5.0 - 7.5
Dieffenbachia	5.0 - 6.0
Dipladenia	6.0 - 7.5
Dizgotheca	6.0 - 7.5
Dracaena	5.0 - 6.0
Easter Lily	6.0 - 7.0
Elephant's Ear	5.0 - 6.0
Episcia	6.0 - 7.0
Euonymous	6.0 - 8.0
Ferns, Bird's Nest	5.0 - 5.5
Ferns, Boston	5.5 - 6.5
Ferns, Button	6.0 - 8.0
Ferns, Christmas	6.0 - 7.5
Ferns, Cloak	6.0 - 7.5
Ferns, Feather	5.5 - 6.5
Ferns, Hart's Tongue	7.0 - 8.0
Ferns, Holly	4.5 - 6.0
Ferns, Maidenhair	6.0 - 8.0
Ferns, Rabbits Foot	6.0 - 7.5
Ferns, Spleenwort	6.0 - 7.5
Fig	5.0 - 6.0
Fittonia	5.5 - 6.5
Freesia	6.0 - 7.5
Gardenia	5.0 - 6.0
Genista	6.5 - 7.5
Geranium	6.0 - 8.0
Gloxinia	5.5 - 6.5
Grape Ivy	5.0 - 6.5
Grape Hyacinth	6.0 - 7.5
Grevillea	5.5 - 6.5
Gynura	5.5 - 6.5
Hedera (Ivy)	6.0 - 8.0
Heliotropium	5.0 - 6.0
Hens And Chickens	6.0 - 7.0
Herringbone Plant	6.0 - 6.0
Hibiscus Plant	6.0 - 8.0
Hoya	5.0 - 6.5
Impatiens	5.5 - 6.5
Ivy Tree	6.0 - 7.0
Jacaranda	6.0 - 7.5
Japanese Sedge	6.0 - 8.0
Jasminum	5.5 - 7.0
Jerusalem Cherry	5.5 - 6.5
Jessamone	5.0 - 6.0
Kalanchoe	6.0 - 7.5
Kangaroo Thorn	6.0 - 8.0
Kangaroo Vine	5.0 - 6.5
Lantana	5.5 - 7.0
Laurus (Bay Tree)	5.0 - 6.0
Lemon Plant	6.0 - 7.5
Mimosa	5.0 - 7.0
Mind Your Own Business	5.0 - 5.5
Monstera	5.0 - 6.0
Myrtle	6.0 - 8.0
Never Never Plant	5.0 - 6.0
Nicodemia (Indoor Oak)	6.0 - 8.0
Norfolk Island Pine	5.0 - 6.0
Oleander	6.0 - 7.5
Oplismenus	5.0 - 6.0
Orchid	4.5 - 5.5
Oxalis	6.0 - 8.0
Palms	6.0 - 7.5
Pandanus	5.0 - 6.0
Peacock Plant	5.0 - 6.0
Pellionia	5.0 - 6.0
Peperomia	5.0 - 6.0
Philodendron	5.0 - 6.0
Pilea	6.0 - 8.0
Plumbago	5.5 - 6.5
Podacarpus	5.0 - 6.5
Pointsettia	6.0 - 7.5
Polyscias	6.0 - 7.5
Pothos	5.0 - 6.0
Prayer Plant	5.0 - 6.0
Punica	5.5 - 6.5
Sanserieria	4.5 - 7.0
Saxifraga	6.0 - 8.0
Scindapsus	5.0 - 6.0
Shrimp Plant	6.0 - 7.0
Spanish Bayonet	6.0 - 7.5
Spider Plant	6.0 - 7.5
Succulents	5.0 - 6.5
Synogonium	5.0 - 6.0
Tolmiea	5.0 - 6.0
Tradescantia	5.0 - 6.0
Umbrella Tree	5.0 - 7.5
Venus Flytrap	4.0 - 5.0
Weeping Fig	5.0 - 6.0
Yucca	6.0 - 7.5
Zebrina	5.0 - 6.0

Hunting Food Plot Varieties

Plant	pH
Alfalfa	6.5 - 7.5
Brassicas	5.5 - 6.5
Chicory	5.0 - 6.5
Clover	6.0 - 7.0
Radish	6.0 - 7.0
Soybean	5.5 - 6.5
Turnip	5.5 - 7.0

Flowers, Trees & Shrubs

Plant	pH
Abelia	6.0 - 8.0
Acacia	6.0 - 8.0
Acanthus	6.0 - 7.0
Aconitum	5.0 - 6.0
Adonis	6.0 - 8.0
Ageratum	6.0 - 7.5
Ailanthus	6.0 - 7.5
Ajuga	4.0 - 6.0
Althea	6.0 - 7.5
Alyssum	6.0 - 7.5
Amaranthus	6.0 - 6.5
Anchusa	6.0 - 7.5
Androsace	5.0 - 6.0
Anemone	6.0 - 7.5
Anthyllis	5.0 - 6.0
Arbutus	4.0 - 6.0
Arenaria	6.0 - 8.0
Aristea	6.0 - 7.5
Armeria	6.0 - 7.5
Arnica	5.0 - 6.5
Asperula	6.0 - 8.0
Asphodoline	6.0 - 8.0
Aster	5.5 - 7.5
Aubrita	6.0 - 7.5
Azalea	4.5 - 6.0
Balloon Flower	6.0 - 6.5
Bayberry	4.0 - 6.0
Bergenia	6.0 - 7.5
Bleeding Heart	6.0 - 7.5
Bluebell	6.0 - 7.6
Broom	5.0 - 6.0
Buddleia	6.0 - 7.0
Buphthalum	6.0 - 8.0
Butterfly Bush	4.0 - 6.0
Calendula	5.5 - 7.0
Camassia	6.0 - 8.0
Candytuft	6.0 - 7.5
Canna	6.0 - 8.0
Canterbury Bells	7.0 - 7.5
Cardinal Flower	4.0 - 6.0
Carnation	6.0 - 7.5
Catalpa	6.0 - 8.0
Celosia	6.0 - 7.0
Centaurea	5.0 - 6.5
Cerastium	6.0 - 7.0
Chrysanthemum	6.0 - 7.0
Cissus	6.0 - 7.5
Cistus	6.0 - 7.5
Clarkia	6.0 - 6.5
Clianthus	6.0 - 7.5
Clematis	5.5 - 7.0
Colchicum	5.5 - 6.5
Columbine	6.0 - 7.0
Convolvulus	6.0 - 8.0
Coreopsis	5.0 - 6.0
Coronilla	6.5 - 7.5
Corydalis	6.0 - 8.0
Cosmos	5.0 - 8.0
Cottoneaster	6.0 - 8.0
Crab Apple	6.0 - 7.5
Crocus	6.0 - 8.0
Cynoglossum	6.0 - 7.5
Daffodil	6.0 - 6.5
Dahlia	6.0 - 7.5
Day Lily	6.0 - 8.0
Delphinium	6.0 - 7.5
Deutzia	6.0 - 7.5
Dianthus	6.0 - 7.5
Dogwood	5.0 - 7.0
Edelweiss	6.5 - 7.5
Elaeagnus	5.0 - 7.5
Enkianthus	5.0 - 6.0
Euphorbia	6.0 - 7.0
Everlastings	5.0 - 6.0
Firethorn	6.0 - 8.0
Forget-me-nots	6.0 - 7.0
Forsythia	6.0 - 8.0
Foxglove	6.0 - 7.5
Fritillaria	6.0 - 7.5
Fuchsia	5.5 - 7.5
Gaillardia	6.0 - 7.5
Gazania	5.5 - 7.0
Gentiana	5.0 - 7.5
Geum	6.0 - 7.5
Gladioili	6.0 - 7.0
Globularia	5.5 - 7.0
Godetia	6.0 - 7.5
Golden Rod	5.0 - 7.0
Gypsophilia	6.0 - 7.5
Hawthorn	6.0 - 7.0
Heath	4.5 - 6.0
Heather	4.0 - 6.0
Helianthus	5.0 - 7.0
Helleborus	6.0 - 7.5
Holly	5.0 - 6.5
Hollyhock	6.0 - 7.5
Honeysuckle	6.0 - 7.5
Hyacinth	6.5 - 7.5
Hydrangea, Blue	4.0 - 5.0
Hydrangea, Pink	6.0 - 7.0
Hydrangea, White	6.5 - 8.0
Hypericum	5.5 - 7.0
Iris	5.0 - 6.5
Ivy	6.0 - 7.5
Juniper	5.0 - 6.5
Kalmia	4.5 - 5.0
Kerria	6.0 - 7.0
Laurel	6.5 - 7.5
Lavender	6.5 - 7.5
Liatris	5.5 - 7.5
Ligustrum	5.0 - 7.5
Lilac	6.0 - 7.5
Lily Of The Valley	4.5 - 6.0
Lithospermum	5.0 - 6.5
Lobelia	6.5 - 7.5
Lupinus	5.5 - 7.0
Magnolia	5.0 - 6.0
Mahonia	6.0 - 7.0
Marigold	5.5 - 7.0
Molinia	4.0 - 5.0
Moraea	5.5 - 6.5
Morning Glory	6.0 - 7.5
Moss	6.0 - 8.0
Moss, Sphagnum	3.5 - 5.0
Myosotis	6.0 - 7.0
Narcissus	6.0 - 8.5
Nasturtium	5.5 - 7.5
Nicotiana	5.5 - 6.5
Pachysandra	5.0 - 8.0
Paeonia	6.0 - 7.5
Pansy	5.5 - 7.0
Passion Flower	6.0 - 8.0
Pasque Flower	5.0 - 6.0
Paulownia	6.0 - 8.0
Penstemon	5.5 - 7.0
Periwinkle	6.0 - 7.5
Petunia	6.0 - 7.5
Pinks	6.0 - 7.5
Polygonum	6.0 - 7.5
Polyanthus	6.0 - 7.5
Poppy	6.0 - 7.5
Portulaca	5.5 - 7.5
Primrose	5.5 - 6.5
Primula	6.0 - 7.5
Privet	5.0 - 7.5
Prunella	6.0 - 7.5
Prunus	6.5 - 7.5
Pyrethrum	6.0 - 7.5
Red Hot Poker	6.0 - 7.5
Rhododendren	4.5 - 6.0
Roses, Hybrid Tea	5.5 - 7.0
Roses, Climbing	6.0 - 7.0
Roses, Rambling	5.5 - 7.0
Salvia	6.0 - 7.5
Scabiosa	5.0 - 7.5
Sedum	6.0 - 7.5
Snapdragon	5.5 - 7.0
Snowdrop	6.0 - 8.0
Soapwort	6. 0 7.5
Speedwell	5.5 - 6.5
Spiraea	6.0 - 7.5
Spruce	4.0 - 5.0
Stock	6.0 - 7.5
Stonecrop	6.5 - 7.5
Sumack	5.0 - 6.5
Sunflower	5.0 - 7.0
Sweet Pea	6.0 - 7.5
Sweet William	6.0 - 7.5
Tamarix	6.5 - 8.0
Trillium	5.0 - 6.5
Tulip	6.0 - 7.0
Vibernum	5.0 - 7.5
Viola	5.5 - 6.5
Virginia Creeper	5.0 - 7.5
Wallflower	5.5 - 7.5
Water Lily	5.5 - 6.5
Weigelia	6.0 - 7.5
Wistaria	6.0 - 8.0
Zinnia	5.5 - 7.5

Turf & Ornamental Grasses

Plant	pH
Bahai	6.5 - 7.5
Bent	5.5 - 6.5
Bermuda	6.0 - 7.0
Canada Blue	4.5 - 6.4
Clover	6.0 - 7.0
Kentucky Blue	6.0 - 7.5
Meadow	6.0 - 7.5
Pampas	6.0 - 8.0
Red Top	6.0 - 6.5
Rye	6.0 - 7.0
St. Augustine	6.5 - 7.5
Tall Fescue	6.0 - 7.0
Velvet Bent	5.0 - 6.0

Replacement Batteries
Three (3) #357 silver oxide, 1.55 volt.

This unit will operate for approximately 1,000 – 1,200 tests per battery set.

Luster Leaf Products, Inc.
1961 Dillard Court,
Woodstock, Illinois 60098