

## IMPORTANT INFORMATION REGARDING YOUR NEW METER

The Soil Tester is virtually indestructible in its solid state construction, gives accurate readings, will not stain hands or clothing, requires no solutions and is factory calibrated to known chemical standards. In other words, it is well adapted for its intended use.

The pH portion of the tester utilizes the chemical reaction known as oxidation reduction to measure pH within the range of 1 through 9, where pH 7 (neutral) is the pointer's resting point. Its primary function is to quickly discern an acid soil from an alkaline soil and after one minute, a weak acid/alkaline from strong acid/alkaline soil.

The fertility portion of the instrument measures the soil's Nitrogen, Phosphorous and Potash (NPK) content, in combination. The method used is termed conductometrics wherein a 1.5 volt AA battery is used. The standards by which the instrument is calibrated are as follows:

	Too Little	Ideal Range	Too Much
Nitrogen	50 ppm	50 to 200 ppm	200 ppm
Phosphorous	4 ppm	4 to 14 ppm	14 ppm
Potash	50 ppm	50 to 200 ppm	200 ppm

*ppm is defined as parts-per-million*

The pamphlet covers all aspects related to the tester's function and will help guide you to experiencing the proper pH and fertility range for the plants you intend to grow.

The cleaning pad supplied with this tester has been specially selected for its compatibility with the tester probe metals. Other type of cleaners may cut or otherwise damage probe surfaces and/or adversely affect tester readings. Re-order form enclosed if replacement pads are needed.

## BEFORE TESTING THE SOIL

If you are preparing to plant a bed of plants, or to plant a crop of fruit, vegetables or shrubs, 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's pH is generally consistent over the entire area and that it is within the plant's pH range.

## HOW TO USE YOUR METER TO MEASURE pH

1. Remove the top 2" of the surface soil. Break up & crumble the soil underneath to a depth of 5". Remove any stones or organic debris such as leaves and twigs because they can affect the final result.
2. Thoroughly wet the soil with water (ideally rain or distilled water) to a mud consistency.
3. Slide the switch up to the "pH" position.
4. Wet probes. Thoroughly clean the right probe only with the special cleaning pad provided.
5. Insert probes into soil up to base of the instrument.
6. Wait one minute and take reading.
7. To store, slide the switch to the off position. Clean & dry probes.
8. If you are going to make another test, repeat from step #1.

## HOW TO USE YOUR METER TO MEASURE FERTILITY

1. Remove the top 2" of the surface soil. Break up & crumble the soil underneath to a depth of 5". Remove any stones or organic debris such as leaves and twigs because they can affect the final result.
2. Thoroughly wet the soil with water (ideally rain or distilled water) to a mud consistency.
3. Slide the switch up to the "Fertility" position.
4. Wipe the meter probes clean with a tissue or paper towel. Insert probes into soil up to base of the instrument.
5. Wait one minute and take reading.
6. To store, slide the switch to the off position. Clean & dry probes.
7. If you are going to make another test, repeat from step #1.

## **ADVICE ON PREPARATION OF SOIL SAMPLE**

In order to obtain an even more accurate result with your unit, the following procedure may be adopted.

Take the sample of soil to be tested from the ground and remove stones and organic debris. Prepare the sample by crumbling the soil into small particles. Measure two cups of soil from the prepared sample. Fill a clean glass or plastic container with two cups of distilled or de-ionised 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 3 of "How to Use Your Meter to Measure pH".

## **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 3 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 probes in soil longer than necessary because the metal electrodes may pit and cause erroneous readings.
- Always clean both probes immediately after using.
- Be sure to keep the probes away from metal objects.
- The tester is intended for measuring soils. **DO NOT PLACE** the probes into any other solution, including water.

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## **LIMITED WARRANTY**

The tester is warranted free from defects for one year from date of purchase. During this period the unit may be returned to Luster Leaf Products, Inc. with proof of purchase and \$5.00 to cover postage and handling. It will be repaired or replaced. During the initial 90 days of this warranty period the selling dealer is also authorized to replace a defective meter.

This warranty does not cover abuse, accidental damage, repair by anyone other than Luster Leaf Products, Inc., or consequential loss or inconvenience resulting from use of the meter.

This warranty gives you certain specific legal rights and you may also have other rights which vary from state to state.

## **SERVICE**

If adjustment or repair becomes necessary after the warranty expires, return the meter to Luster Leaf Products, Inc. with \$10.00 to cover postage, handling and service. Service includes labor & parts as required, except for replacement of externally damaged or lost components.

For service, or information regarding other Luster Leaf Products, Inc. items, please address:

**Luster Leaf Products, Inc.**  
2220 Techcourt  
Woodstock, Illinois 60098

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# ***rapitest***

## ***Electronic Soil Tester***

### **FERTILITY**

A fertile soil is one which produces satisfactory yields of crops and, because of the incorporation of plant and animal residues, contains an abundance of organic matter or humus. It has good texture, not too loose and light nor too heavy and stiff, is well drained and has a proper pH for best plant growth. A fertile soil has sufficient amounts of the three major elements, nitrogen, phosphorous and potassium (potash). It also contains a sufficient supply of the micronutrients such as boron, copper, iron, sulfur, magnesium and molybdenum and consists of an abundance of organic matter and humus.

### **IF THE TESTER READS "TOO LITTLE"**

1. Liquid feed with a brand of soluble fertilizer that is recommended for the plants you intend to grow.
2. Liquid feed within 3 weeks after planting or potting and do this every month whenever you water your plants.

### **IF THE TESTER READS "IDEAL"**

1. Water once a month with a soluble fertilizer that is recommended for the plants you are growing.

### **IF THE TESTER READS "TOO MUCH"**

1. Water thoroughly to leach out the excess fertilizer from the soil.
2. For potted plants, repot with new soil.
3. For greenhouse plants water thoroughly to leach excess fertilizer from the soil.
4. Do not add any fertilizer. You can add manure, compost, clippings, plant wastes, residues, leaves and any other organic matter to the soil.

### **HOW TO INCREASE SOIL FERTILITY**

There are many ways to increase and maintain the valuable nutrients of your soil which contribute to its fertility. Just as some plants need a rather acid soil, while others need a slightly alkaline soil, they also need varying amounts of nitrogen, phosphorous and potash known as NPK. Each plant brings about changes in the soil and has soil needs different from other plants. You won't need to worry much about having exactly the right amount of each element for each plant you grow. As long as your soil is well balanced and rich in organic matter your plants will not suffer.

### **FERTILIZER**

Fertilizer is a substance added to the soil to improve fertility. Since a variety of elements contribute to the fertility of the soil, many individual elements and combinations of elements are considered fertilizers.

### **THE VALUE OF NITROGEN**

Nitrogen is synonymous with plant nutrition. It is directly responsible for producing leaf growth and green leaves.

A deficiency causes yellow leaves and stunted growth. Too much nitrogen causes overabundant foliage with delayed flowering; the plant becomes subject to disease and its fruit is of poor quality.

Soil deficient in nitrogen can be corrected by adding compost, manure or other nitrogen-rich fertilizers such as dried blood, tankage, cottonseed meal and peanut shells. Grass clippings, weeds and garden wastes returned to the soil will increase its humus and nitrogen content.

### **THE VALUE OF PHOSPHOROUS**

Growing plants need phosphorous. It is the major constituent of plant genetics and seed development. A deficiency causes stunted growth and seed sterility. Phosphorous aids plant maturity, increases the seed yield, increases fruit development, increases vitamin content and aids the plant's resistance to disease and winterkill.

The best source of phosphorous is phosphate rock, when it is finely ground. Bacteria that thrive in pH 6.5 to pH 7 help breakdown the phosphorous making it available to plants.

Other sources of phosphate are bone meal, cottonseed meal and activated sludge. Barring any great deficiencies, a pound of phosphate rock for every ten square feet of your garden space is a goodly amount to apply once every two or three years. Phosphorous has the tendency to "grab" hold of the soil. In this manner, phosphorous is not easily leached from the soil as is nitrogen and potash.

### **THE VALUE OF POTASSIUM (POTASH)**

Potash strengthens the plant. It helps form carbohydrates and promotes protein synthesis. It further aids early growth, stem strength and cold hardiness.

Plants deficient in potash are usually stunted and have poorly developed root systems. Leaves are spotted, curled and appear dried out at the edges. Yields for potash deficiency are low.

Sources for potash are plant residues, manures, composts and natural sources like granite dust, basalt rock or greensand, wood ashes, leaves and seaweed.

### **ACIDITY AND ALKALINITY**

Acidity and alkalinity of soils are the result of 1: the chemical composition of the rock from which the soil is derived, and 2: the partial or complete decomposition of vegetation. The acidity or alkalinity of the soil is measured in terms of pH. pH of the soil is the basic indicator of soil health and fertility. Soil pH is easy to determine and, in most cases, easy to control.

In years past, a gardener or farmer tasted his soil. If it tasted sour, he knew that it wasn't good for raising crops. The same thing went for a bitter taste. If it tasted sweet, he knew that he could expect high yields. He may not have known that soil that tasted sour was too acid to raise good crops and soil that tasted bitter was too alkaline to produce the yield wanted, but he knew that "sweet" soil was perfect for growing plants.

A few plants, like blueberries, flourish in fairly acid soil, but most garden crops, lawn grasses, trees, and shrubs prefer soils that are either neutral or slightly acid. Moreover, microorganisms and chemical elements in the soil work more vigorously to make nutrients available to plants when the soil is nearly neutral rather than too acid or alkaline. Nitrogen fixing bacteria are most prolific at pH 6.6 to neutral (pH7.)

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 1 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.

## 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.

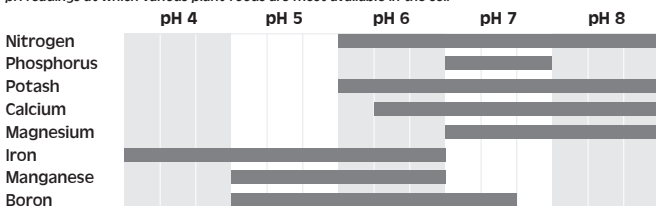
The amount of lime needed to raise a spade's depth of top soil by 1 pH varies from 5.5 oz. of hydrated lime or 7.5 oz. ground limestone on sandy soil to 11 oz. of hydrated lime or 15 oz. ground limestone on heavy clays or peaty soils per square yard. So do not expect pH correction to be too precise!

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.

### pH and Plant Nutrient Availability

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



## 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; nitrochalk is an example.
- 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 and 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. But if this process eventually creates too low a pH the organisms will work less efficiently, and 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.

## 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.

To increase soil by 1 pH (more alkaline):

Material	pH Change	Sandy	Loamy	Clay
Dolomitic or calcic limestone	+0.5 unit (0.5 pH)	2.5	5.0	5.5
	+1.0 unit (1.0 pH)	5.0	8.5	11.0
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	2.0
	-1.0 unit (1.0 pH)	1.5	3.0	4.0
Aluminum Sulfate	-0.5 unit (0.5 pH)	0.5 - 0.75	1 - 1.25	1.5
	-1.0 unit (1.0 pH)	1 - 1.25	2.25	3.0

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

*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.*

## GARDENING TIPS

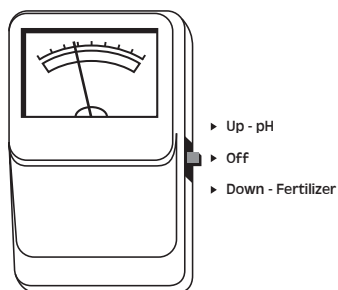
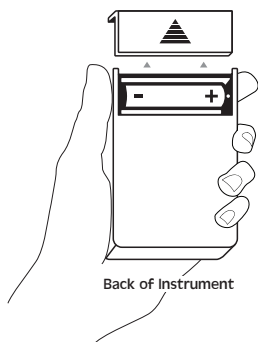
- Altering the pH takes time. Do not expect instant changes, but work steadily towards the ideal range. Most plants have a "range" of pH. Consult your "tables" for the pH range of your plants.
- Adding lime before planting is most beneficial because it takes time to take effect. Liming in the fall, winter or early spring is preferred.
- Avoid adding lime at the same time as fertilizers whether they are organic or chemical.
- When testing a lawn, water thoroughly and push the probes into the soil up to the plastic case base.
- 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.





## "METER PARTS" AND BATTERY REPLACEMENT

1. To open battery compartment, slide cover upwards with thumb.
2. Note battery position.
3. Replace with 1.5 volt AA battery.
4. Replace cover, snap in securely.



## CLEANING PAD REORDER FORM

To obtain replacement cleaning pads for your meter, complete the following form:

QUANTITY		PRICE	TOTAL
	PACKAGE OF 3 CLEANING PADS	\$2.00	
		SHIPPING	\$1.00
		TOTAL	

Name \_\_\_\_\_

Street Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Please enclose a check or money order, payable to Luster Leaf Products, Inc. (U.S. funds only) and send to:

**Luster Leaf Products, Inc.**  
 2220 Techcourt  
 Woodstock, Illinois 60098

No phone orders, please.