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You can read the recommendations in the user guide, the technical guide or the installation guide for HANNA INSTRUMENTS HI 99121. You'll find the answers to all your questions on the HANNA INSTRUMENTS HI 99121 in the user manual (information, specifications, safety advice, size, accessories, etc.). Detailed instructions for use are in the User's Guide.

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Instruction Manual

HI 99121
Soil pH Test Kit


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... @@@@15 WARRANTY All Hanna Instruments meters are warranted for two years against defects in workmanship and materials when used for their intended purpose and maintained according to instructions.

The probes are warranted for a period of six months. This warranty is limited to repair or replacement free of charge. Damage due to accidents, misuse, tampering or lack of prescribed maintenance are not covered. If service is required, contact the dealer from whom you purchased the instrument. If under warranty, report the model number, date of purchase, serial number and the nature of the problem. First obtain a Returned Goods Authorization number from the Customer Service department, then return the instrument with the Authorization number included along with shipment costs prepaid. If the repair is not covered by the warranty, you will be notified of the charges. When shipping any instrument, make sure it is properly packaged for complete protection. 3 2
SOIL p H pH is the measure of the hydrogen ion concentration [H+]. Soil can be acid, neutral or alkaline, according to its pH value.

Fig. 1 shows the relationship between the scale of pH and types of soil. Most plants prefer a pH range from 5.5 to 7.5; but some species prefer more acid or alkaline soils. Nevertheless, every plant requires a particular range of pH, for optimum growth. Fig. 1. Types of soil according to the pH value pH strongly influences the availability of nutrients and the presence of microorganisms and plants in the soil. For example, fungi prefer acidic conditions whereas most bacteria, especially those supplying nutrients to the plants, have a preference for moderately acidic or slightly alkaline soils.

In fact, in strongly acidic conditions, nitrogen fixing and the mineralization of vegetable residual is reduced. Plants absorb the nutrients dissolved in the soil water and the nutrient solubility depends largely on the pH value. Hence, the availability of elements is different at different pH levels (Fig.2). Each plant needs elements in different quantities and this is the reason why each plant requires a particular range of pH to optimize its growth.

For example, iron, copper and manganese are not soluble in an alkaline environment. This means that plants needing these elements should theoretically be in an acidic type of soil. Nitrogen, phosphorus, potassium and sulfur, on the other hand, are readily available in a pH range close to neutrality. Furthermore, abnormal pH values, increase the concentration of toxic elements for plants. For example, in acid conditions, there can be an excess of aluminum ions in such quantities that the plant can not tolerate.

Negative effects on chemical and physical structure are also present when pH values are too far from neutral conditions (break up of aggregates, a less permeable and more compact soil). Management of the soil in relation to the pH value Once the pH value is known, it is advisable to choose crops that are suitable for this range (e.g. in an acid soil, cultivate rice, potato, strawberry). Add fertilizers that do not increase acidity (for example urea, calcium nitrate, ammonium nitrate and superphosphate) or lower alkalinity (e.g. ammonium sulfate). It is recommended that a cost evaluation is made prior to commencement of the soil pH modification. Corrective substances can be added to modify the soil pH, however, the effects are generally slow and not persistent. For example, by adding lime, the effects in clay soil can last for as long as 10 years, but only 2-3 years in a sandy soil.

For an acid soil, we can use substances such as lime, dolomitic, limestone and marl, according to the nature of the soil (Tab.1). Soil Ameliorants CaO Ca(OH)2 CaMg(CO3)2 Ca CO3 Clay soil 30-50 39-66 49-82 54-90 Silty soil 20-30 26-39 33-49 36-54 Sandy soil 10-20 13-26 16-33 18-36 Tab.1. @@2. @@@@Also in this case, a cost evaluation is necessary. @@@@Take 1 sample per 1000 m2 (0.25 acre) of homogeneous area. @@@@3)

Sample quantity: Take the same quantity of soil for each sample. For example, use bags with similar dimensions (1 bag per sample).

@@Herbaceous crops: from 20 to 40 cm of depth (8" to 16"). Orchards: from 20 to 60 cm of depth (8" to 24"). @@(7) From this mixture, take the soil sample for analysis. @@@@3) Mix for 30 seconds. 4) Wait for about 5 minutes.

@@@@@@@Mix for 30 seconds and then wait for 5 minutes. @@@@- 5 to 6 pH or 8.5 to 9 pH: sufficient, sensible crops could have problems. - 4 to 5 pH or 9 to 10 pH: scarce, use it carefully, avoid wetting the vegetation. - pH<4 or pH>10: very scarce, there are other anomalies that have to be identified via chemical analysis.

Artichoke Asparagus Barley Bean Brussels Sprout Early carrot Late carrot Cucumber Egg Plant Lettuce Maize Melon Oat Onion Pea LAWN 6.5-7.5 6-8 6-7 6-7.5 6-7.5 5.5-7 5.5-7 5.5-7.5 5.5-7 6-7 6-7.

5 5.5-6.5 6-7 6-7 6-7.5 Pepper Early Potato Late Potato Sweet Potato Pumpkin Rice Soybean Spinach Strawberry String Sugar beet Sunflower Tomato Watermelon Wheat 6-7 4.5-6 4.5-6 5.5-6 5.5-7.5 5-6.5 5.5-6.5 6-7.5 5-7.5 6-7.5 6-7 6-7.

5 5.5-6.5 5.5-6.5 6-7 Preferred pH Range Lawn 6-7.

5 GARDEN PLANTS AND FLOWERS Preferred pH Range Preferred pH Range NUTRIENT SOLUTION A rational fertilization is needed for optimum plants growth in greenhouses. The pH value of the nutrient solution (water + fertilizer) has to meet the plants need. If a fertirrigation system with automatic pH control is used, ensure that it is functioning properly. Check the pH of the irrigation solution as well as any recycled solution.



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8 Acacia Acanthus Amaranth Bougainvillea Dahlia Erica Euphorbia Fuchsia Gentian Gladiolus Hellebore Hyacinth Iris Juniper 6-8 6-7 6-6.5 5.5-7.5 6-7.5 4.5-6 6-7 5.

5-7.5 5-7.5 6-7 6-7.5 6.5-7.5 5-6.5 5-6.5 Ligustrum Magnolia Narcissus Oleander Paulownia Portulaca Primula Rhododendron Roses Sedum Sunflower Tulip
Viola 9 5-7.5 5-6 6-8,5 6-7.5 6-8 5.
5-7.5 6-7.5 4.5-6 5.5-7 6-7.

5 5-7 6-7 5.5-6.5 HOUSE PLANTS Preferred pH Range Preferred pH Range pH METER SPECIFICATIONS Abutilon African violet Anthurium Araucaria
Azalea Begonia Camellia Croton Cyclamen Dieffenbachia Dracaena Freesia 5.5-6 checked, keep the ON button pressed while turning the meter on. The
meter will display all segments as long as the button is pressed.

To freeze the display While in measurement mode, press the SET/HOLD button, HOLD appears on the secondary display and the reading will be frozen on
the LCD (E.g. pH 5.73 HOLD). Press any button to return to normal mode. To turn the meter OFF While in normal measurement mode, press the
ON/OFF/MODE button. OFF will appear on the secondary display. Release the button. Note: The meter is provided with an acoustic signal feature, which
can be disabled using the switch located in the battery compartment. Note: When the meter detects the absence of a temperature probe at its input, the
Automatic Temperature Compensation is turned off, and the meter uses a default value of 25°C (77°F) for the temperature measurement and compensation.

In this condition, the secondary LCD shows 25.0°C (77.0°F) blinking. When a probe is connected, the meter automatically returns to the ATC mode, the ATC
tag is turned on, and the temperature is shown on the secondary display. 12 "7.01" (or "6.86") - "OK 1", and an audible signal is produced. After 1 second,
the meter automatically returns to the normal measuring mode. Note: It is always recommended to carry out a two-point calibration for better accuracy. · For
a two-point calibration, place the probe in pH 7.

01 (or pH 6.86) buffer. After the calibration point has been accepted, the "pH 4.01 USE" message appears. The message is held for 12 seconds, unless a valid
buffer is recognized.

If no valid buffer is recognized, then the WRNG message is shown. If a valid buffer (pH 4.01, pH 10.01 or pH 9.18) is detected, then the meter completes the
calibration procedure.

When the buffer is accepted, the LCD shows the accepted value with the "OK 2" message on the secondary display. The meter then returns to the normal
measuring mode. Note: When the calibration is completed, the CAL tag is turned on. To quit calibration and to reset to the default values · After entering the
calibration mode and before the first point is accepted, it is possible to quit the procedure and return to the last calibration data by pressing ON/OFF/MODE.
The secondary LCD displays ESC for 1 sec. and the meter returns to normal mode. · To reset to the default values and clear a previous calibration, press the
SET/HOLD button after entering the calibration mode and before the first point is accepted. The secondary LCD displays CLR for 1 sec, the meter resets to
the default calibration and the "CAL" tag on the LCD disappears. ELECTRODE CLEANING A frequent cleaning of the pH electrode is strongly
recommended to ensure correct calibration and reliable readings. Hanna Instruments has developed a complete series of cleaning solutions dedicated to
specific applications and kind of dirty that has to be removed from the electrode.

In soil measurements you can choose between two different solutions accordingly to the type of tested soil: · HI 700663 is indicated for inorganic soil deposits
(as minerals, limestone, adsorbed clays) · HI 700664 is specific for organic soil deposits (humus) If cleaning is performed frequently, soak the electrode in the
specific solution for a few minutes. If the electrode has not been cleaned for a while, for a complete removal of soil deposits, proceed as follows: · wipe the
electrode body (not bulb) with paper or soft tissue · rub the reference with abrasive paper · immerse into cleaning solution for at least 15 minutes. METER
SETUP Setup mode allows to select the temperature unit and the pH buffer set. To enter the Setup mode, press & hold ON/OFF/MODE until CAL on the
secondary display is replaced by TEMP and the current temperature unit (E.g. TEMP °C). Then: · for °C/°F selection, use the SET/HOLD button.

@@@If the battery level is low enough to cause erroneous readings, the Battery Error Prevention System (BEPS) turns the meter off. Unscrew the
4 screws located on the back of the meter and carefully replace the 3 AA batteries located in the battery compartment, while paying attention to their polarity.
Reattach the back making sure that the gasket is in place and tighten the 4 screws to ensure a watertight seal.

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