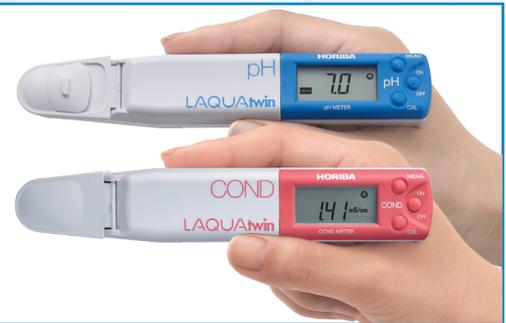


## pH and Conductivity Measurements in Coconut Coir Substrate

Coconut coir testing involves extracting a sample solution with distilled water and measuring the pH and conductivity of the extract. The acceptable conductivity ranges for 1:2 (v/v) dilution and pour thru sampling methods are 0.26-0.75 mS/cm and 1.0-2.6 mS/cm, respectively. The ideal pH range is 5.4-6.2 for both methods.



### Introduction

Coir is the fibrous material found between the hard, internal shell and the outer coat of the coconut. Ripe coconuts have thick, strong brown coir, which is typically used in upholstery padding, sacking and horticulture. Unripe coconuts have fine, white or light brown coir, which is used in producing household products such as mats, brushes, strings, ropes and fishing nets to name a few. To harvest coir traditionally, the fibrous husks are soaked in pits or in nets in either fresh water or sea water or both to swell and soften the fibers prior to extraction.

The brown coconut coir has become popular growing substrate or medium in horticulture due to its high lignin content, which lasts long, holds more water, and does not shrink when dry allowing for easy re-wetting. Most commercially available coir is washed thoroughly to remove high sodium and potassium content that can

damage crops. After washing, some suppliers treat coir with calcium buffering solution to adjust its cation exchange capacity (refers to the ability of substrate to absorb and release positively-charged cations, thus buffering the substrate against sudden changes in pH or nutrient levels). Good quality coir is essential to achieve optimum growth for your crops. To determine if the coconut coir that you purchased is suitable for growing crops, measure the pH and conductivity before using it.

The LAQUAtwin pH meters and conductivity meters provide direct readings with micro-volume samples in just few seconds. These waterproof pocket meters are programmed with automatic calibration and temperature compensation to ensure accurate measurement. Both meters come in three different models and each is packed with two standard solutions for calibration.

### Method

Calibrate the LAQUAtwin pH meter and conductivity meter using standards that bracket the expected sample values according to manufacturer's instructions.

#### Sample Preparation and Measurement

Two sampling methods are described below.

##### 1:2 (V/V) Dilution Method

1. Combine 1 part of coconut coir with 2 parts of distilled water (neutral pH, without mineral content) in a clean beaker or container. For example, 50 ml coir with 100 ml distilled water or 1 cup coir with 2 cups water.
2. Mix and let the sample stand for 30 minutes to equilibrate.
3. Pour the mixture into a clean funnel lined with a filter paper.
4. Collect the extract in a clean container, mix again, and place drops of extract onto

Continued at the back

the calibrated pH sensor and conductivity sensor.

**Pour Thru Method**

1. Place a container under the coconut coir sample and apply 100ml distilled water.
2. Collect 50ml leachate, mix and place drops of extract onto the calibrated pH sensor and conductivity sensor.

Refer to Technical Tip 01 LAQUAtwin pH Sensor Maintenance Procedures and Technical Tip 03 LAQUAtwin Conductivity Sensor Maintenance Procedures for conditioning, cleaning, and storing the sensors. The tips can be downloaded from the support section of [www.horiba-laqua.com](http://www.horiba-laqua.com).

**Results and Benefits**

Growing substrate or medium serves as an environment for the root system of a plant to grow and function. The substrate's chemical properties such as pH and conductivity must be suitable to the crop that you intend to grow. Each crop has specific pH and conductivity values for substrate to achieve optimum growth.

pH affects the amount of nutrients available to plants and all are readily available at pH 5.4 to 6.2. Conductivity indicates the nutrients or salt levels (salinity) affecting the development and health of crops. The substrate conductivity ranges suitable for seedlings, bedding plants, and salt-sensitive plants are 0.26 to 0.75 mS/cm by 1:2 dilution method and 1.0 to 2.6 mS/cm by pour thru method.

As your crop grows, monitor the pH and conductivity values of substrate every 2 to 3 weeks by random sampling since they tend to change over time. In this case, 1:2 (v/v) dilution method requires sampling from the bottom 2/3rd of the pot. This disturbs the roots and care must be taken. The pour thru method samples the entire root without disturbing it, but the results are variable. Choose a sampling method and use it throughout your monitoring program.

**References And Suggested Readings**

1. Coir – Wikipedia. Available at: <https://en.wikipedia.org/wiki/Coir>
2. Argo, B. (2004). Understanding pH Management and Plant Nutrition Part 4: Substrates. Journal of the International Phalaenopsis Alliance, Vol. 13 (3). Available at: <http://www.atlantorchidsociety.org/wp-content/uploads/2012/02/Part-4-substrates2.pdf>
3. Camberato, D., Lopez, R. and Mickelbart M. pH and Electrical Conductivity Measurements in Soilless Substrates. Commercial Greenhouse and Nursery Production. Purdue Extension HO-237-W. Available at: <https://www.extension.purdue.edu/extmedia/hg/hg-237-w.pdf>

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**pH Pocket Meters Lineup**

**pH 11**

Icons: pH, mV, WATER PROOF, MICRO VOLUME, 2 PT CAL, 0.1 pH

**pH 22**

Icons: pH, mV, WATER PROOF, MICRO VOLUME, 3 PT CAL, 0.01 pH

**pH 33**

Icons: pH, mV, Temp, WATER PROOF, MICRO VOLUME, 5 PT CAL, 0.01 pH



**Features**

Flat pH sensor with built-in temperature sensor for accurate automatic calibration and temperature compensation.

**Applications include**

Fresh water and Seawater Testing, Soil/Soilless Media, Horticulture, etc.

**EC Pocket Meters Lineup**

**EC 11**

Icons: COND, WATER PROOF, MICRO VOLUME, 2 PT CAL, ~19.9 mS/cm

**EC 22**

Icons: COND, Temp, WATER PROOF, MICRO VOLUME, 3 PT CAL, ~199.9 mS/cm

**EC 33**

Icons: COND, TDS, Temp, WATER PROOF, MICRO VOLUME, 3 PT CAL, ~199.9 mS/cm



**Features**

Corrosion-resistant titanium/platinum black conductivity cell for conductivity/ TDS measurement. Auto-ranging and temperature compensation.

**Applications include**

Fresh water and Seawater Testing, Soil/Soilless Media, Horticulture, etc.

**LAQUAtwin Pocket Ion Meter Lineup**



- pH** Acidity and alkalinity
- COND** Conductivity and TDS
- Na<sup>+</sup>** Sodium Ion
- K<sup>+</sup>** Potassium Ion
- NO<sub>3</sub><sup>-</sup>** Nitrate Ion
- Ca<sup>2+</sup>** Calcium Ion
- Salt EC** Salt (NaCl)



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