Application Note

Measurement of Potassium in Rice

LAQUAtwin is a series of pocket ION meters. Using Ion Selective Electrode (ISE) technology, they are available for measuring Conductivity, Calcium, Nitrate, Potassium, Sodium, Salt concentration and pH measurement. Using just a tiny amount of sample, the LAQUAtwin proprietary flat sensors can quickly and accurately measure the values of the chemical parameters in the field.

Introduction

Potassium is a necessary nutrient for soil in which rice grain is grown, as it is critical in maximising yield.

In order to profitably produce rice, reliable information regarding the potassium content of the soil must be available to farmers. Thus, we can analyse the potassium content of the plant tissue in the roots of the rice grain.

To determine the potassium content, the Horiba LAQUAtwin K+ ion meter can be used. This is an easy and quick method used to determine the potassium content of soil for the growth of rice crops.

Method

1. The above ground portion of the crop is separated from the root using shears.
2. The lower stem is washed of soil.
3. The stem is cut into 1 cm pieces.
4. The pieces of stem are frozen overnight
5. A frozen piece of stem is placed in a sap press to obtain the sap
6. A small sample of the sap is placed on the sensor of the LAQUAtwin K+ ion meter and the potassium content is measured after one minute.
7. To repeat sampling, wash the sensor with tap water and pat dry with a paper tissue.

Results and Benefits

The use of the Horiba LAQUAtwin K+ ion meter to measure the potassium content of soil around rice crops will improve farmers' knowledge of the potassium accumulation. Accordingly, farmers can fertilise their crops with optimal amounts of potassium.

The LAQUAtwin K+ ion meter is small and compact, and convenient to carry for easy on-site testing. Its easy-to-use interface is simple for anyone to use the LAQUAtwin K+ ion meter.

Average tissue K levels for rice plant parts at growth stages for K treatments, 2004.

Growth Stage	Plant Part	Tissue K %		
		0 lbs K/a	50 lbs K/a	200 lbs K/a
First tiller	Whole	2.53	2.99	2.62
Internode elongation	Whole	2.19	2.27	2.82
Internode elongation	Flag leaf	1.85	2.34	2.37
Internode elongation	Lowest leaf	1.62	1.99	2.24
Internode elongation	Stem	2.77	2.88	3.20
10% Heading	Whole	1.50	1.71	1.74
10% Heading	Flag leaf	1.60	1.56	1.73
10% Heading	Lowest leaf	1.45	1.39	1.37
10% Heading	Stem	1.47	1.28	1.49
10% Heading	Head	0.92	0.91	0.86

Dry matter and K uptake for K treatments at three rice growth stages, 2004

Growth stage	Pre-plant K treatment (lbs K/a)			Pre-plant K treatment (lbs K/a)		
	0	50	200	0	50	200
	…Dry matter (lbs/a)…			…K uptake (lbs K/a)…		
First tiller	131	154	220	3.5	4.5	5.7
Inter-node elongation	1770	2070	1853	33.1	44.7	52.8
100% heading	6734	7055	7660	101	120	131

David Dunn, Gene Stevens "Plant Mapping Potassium in Rice Tissue: What Part to Sample When?: Second Year (2004) Progress report" University of Missouri-Delta Center

Pocket ION Meter

LAQUAtwin

Unique Features

Calibrate and measure at the touch of a button—the smiley face will tell you when the result can be read.

Hassle-free automatic calibration with a few drops of standard solution reassures you of your measurement accuracy. Two-point calibration is also possible.*1

*1 Except for B-711

LAQUAtwin is fully waterproof and dustproof.

The meter and sensor are fully waterproof*3 and dustproof, so you can take it anywhere.

*3 IP67 rated. Will withstand immersion for 30 minutes at 1 m. Not suitable for underwater use.

LAQUAtwin: the only meters with flat sensor technology.

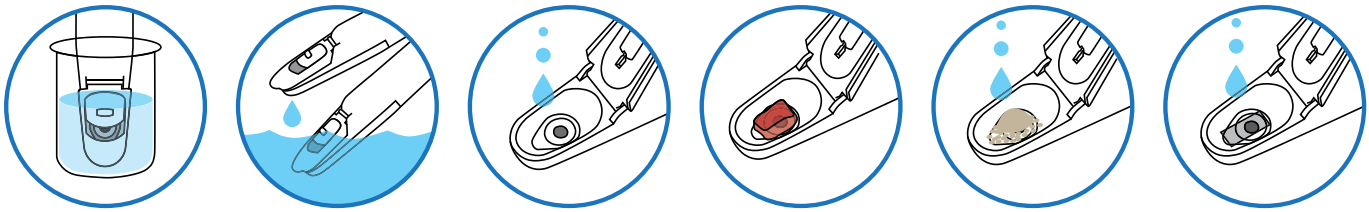
HORIBA's highly-sensitive, flat sensor technology opens up new possibilities for sampling and sample types. Only a small amount of sample is required, so you can easily sample in situ without the need for beakers or other labware. Sensors are easily replaced as required.

Carry case comes as standard for handy portability.

The compact carry case contains everything you need for your measurements, including the standard solution and sampling sheets.

1 X 6 One meter, six methods.

Only LAQUAtwin allows you to be this flexible!
Choose the best method according to your sample, your situation, and your needs.



01 Immersion

When you're in the lab, you can test the sample in a breaker. Ensure the sensor guard sliding cap is open.

02 Scoop

Use as a scoop to test water eg from a river. A vertical scoop for an aquarium is also available with a unique sensor guard.

03 Drops

Place a drop of the sample onto the sensor with a pipette. Laquatwin meters can measure sample volume as low as 0.1mL

04 Solid Samples

Foods containing some moisture can be tested by placing a small piece directly onto the sensor.

05 Powders

Laquatwin meters can also test dry powders. Simply place the powder sample onto the sensor and drop on your defined volume of pure water.

06 Paper and textiles

To test sheets of paper and textiles, cut up the sample into small pieces and place directly onto the sensor. Drop on your defined volume of pure water.

Lineup

pH

Accurate pH measurements in a few seconds, from a single drop.

Water pH varies in different environments, and a slight change can often have a major effect.

Whether you need to keep the pH of an aquarium within tight limits, are checking for the acidity of rain water or for the quality of meat and fish products, LAQUAtwin compact pH meters are ideal for you. No matter where and when you need to test.

COND

Determine water conductivity with as little as 0.12 mL of sample.

The conductivity of rain water is a trusted guide to determining atmospheric purity. In agriculture, measuring the conductivity of soil allows farmers and agronomists to determine optimum fertilizer usage and check the 'health' of soil after salt water damage. The LAQUAtwin meter makes conductivity testing simple, anywhere.

Na+

Only compact meter for a quick and reliable measurement of sodium ion at the scene using ion selective membrane.

K+

Only compact meter for a quick and reliable measurement of potassium ion at the scene using ion selective membrane.

NO3–

Only compact meter for a quick and reliable measurement of nitrate ion at the scene. Special application packages for crop (B-741) and soil (B-742) are also available.

Ca2+

Only compact meter for a quick and reliable measurement of ionized calcium at the scene using ion selective membrane.

http://www.horiba.com/laquatwin

IMS

HORIBA Group is operating Integrated Management System (IMS)
ISO9001 JOA-0298 / ISO14001 JOA-E-90039 / ISO13485 JOA-MD0010 / OHSAS18001 JOA-OH0068

CE RoHS COMPLIANT