WORLD
PRECISION
INSTRUMENTS

PLANT SCIENCE

Make Your Plant Research Easy & Cost-Effective With WPI

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SOLUTIONS FOR THE STUDY OF PLANTS

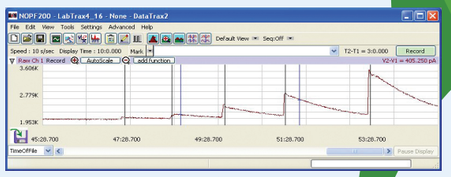

FREE RADICAL ANALYSIS FOR PLANT STRESS RESEARCH

WPI Free Radical Analyzer (4-channel **TBR4100** and single-channel **TBR1025**) and the LabTrax Data Acquisition System with a range of biosensors, enable real-time, highly sensitive detection of reactive oxygen species (ROS) including free radicals such as O_2, NO, H_2O_2, H_2S and CO in plants. Generation of reactive oxygen species (ROS) is one of the most common response to various stresses (biotic and abiotic) encountered by plants.[1]

ROS are important physiological indicators of intracellular cell signaling and homeostasis. They are generated as byproducts of photosynthesis and respiration, which are localized in chloroplasts, mitochondria and peroxisomes. They play an important signaling role in controlling processes such as growth, development, response to biotic and abiotic environmental stimuli, and programmed cell death.[2] They also induce oxidative damages under several environmental stress conditions including salinity, drought, cold, heavy metals, UV irradiation, etc. when the balance between ROS production and elimination is disturbed.[3] Plants have an innate capability to biosynthesize antioxidants to scavenge ROS. This makes plants a rich source of antioxidants with great therapeutic applications.[4]

WPI Free Radical Analyzers have been widely used for measurement of free radicals in various studies related to ROS. [5-11]

This is a typical laboratory setup of a WPI free radical analyzer with data acquisition system.



The output shows the raw data for an ISO-NOPF200 (NO sensor). Only one of the four channels is used in this application.

FLUORESCENCE DETECTION

The use of fluorescent probes in studying plant physiology has emerged as an indispensable tool in the analysis of cell functioning over recent years.

- Ca^{2+} signaling[12] - Calcium ion (Ca^{2+}) is an important ubiquitous intracellular second messenger molecule involved in many signal transduction pathways in plants. The cytosolic free Ca^{2+} concentration ([Ca^{2+}]cyt) has been found to increase in response to many physiological stimuli such as light, touch, pathogenic elicitors, plant hormones and abiotic stresses, including high salinity, cold and drought. Ca^{2+} imaging is an important tool to study a plant's response to stress.
- Chlorophyll imaging is used to evaluate the effects of stress on plant metabolism,[13] environmental field phenotyping, and remote sensing of crops for yield and biomass enhancement.[14]

BENEFITS OF WPI FIBER OPTIC PHOTOMETER

- The **SI-BF-100** is a 2-channel PMT high intensity LED-based photometer with the option of coupling to inverted microscopes or for using with a fluorescent probe.
- The Biofluorometer has the ability to excite two different fluorophores and detect the two differen fluorescence emissions simultaneously.
- Sampling rate up to 1kHz
- Automatic LED light drift correction for long-term measurements and automatic room light correction ensures highly accurate measurement
- It eliminates the need for expensive secondary external light sources and project-specific filter cubes.
- It enables analysis of larger areas at a fraction of the cost with a significant reduction in experimental complexity.

The Biofluorometer can be connected to the epifluorescence port of an inverted microscope and its high intensity LED light source is used for excitation of the corresponding dye.

DAM50
Basic Amplifier

SYS-773 *Dual Microprobe Intracellular Amplifier*

PLANT ELECTROPHYSIOLOGY

Plant electrophysiology is the study of the electrochemical phenomena associated with biological cells and tissues in plants. The conduction of bioelectrochemical excitation is a rapid method of long-distance signal transmission between plant tissues and organs. Plants promptly respond to the following changes:

- Luminous intensity
- Osmotic pressure
- Temperature
- Cutting
- Water availability
- Wounding
- Mechanical stimulation
- Plant growth stimulants
- Chemical compounds like herbicides
- Salts & mineral concentration in soil
- Soil water concentration

Every response initiates an electrical impulse that is propagated to adjacent excitable cells. The bioelectrochemical system in plants not only regulates stress responses, but also photosynthetic processes. The generation of electrical gradients is a fundamental aspect of signal transduction. There are two major divisions of cellular electrophysiology, intracellular recording and extracellular recording.[15]

WPI amplifiers have been extensively used and cited for electrophysiological studies for both intracellular and extracellular recording. [16, 17]

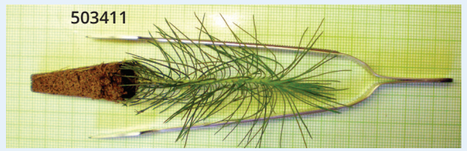
HORTICULTURAL INSTRUMENTS

We offer a unique assortment of instruments to aid on plant physiology, plant molecular, cellular and developmental biology.

15917	Iris Forceps, 10 cm, Curved, 1x2 Teeth
15914	Iris Forceps, 10 cm, Straight, Serrated
504473	Nugent Utility Forceps, 10 mm, Angled Tip
500456	Filter Forceps, 11 cm, Straight
500457	Filter Forceps, 11 cm, Bent Flat Jaw
503411	Horticultural Forceps, 12.5 cm
501241	Kelly Hemostatic Forceps, 14 cm, Straight
501715	Kelly-Rankin Hemostatic Forceps, 15.5 cm, Curved
501714	Kelly-Rankin Hemostatic Forceps, 15.5 cm, Straight
501708	Rochester-Pean Hemostatic Forceps, 19 cm, Curved
504639	Reusable Rapid Punch Kit with 0.5 mm Tip
504642	Replacement Tip for Rapid Punch size 0.5 mm
WPB315AS	Black Coated, 11 cm (4.3 in.), EZ Lever, Strong Blades, 6.5 mm from Tip to Bend
WPB315AB	Black Coated, 11 cm (4.3 in.), EZ Lever, 4.5 mm Tip

504639

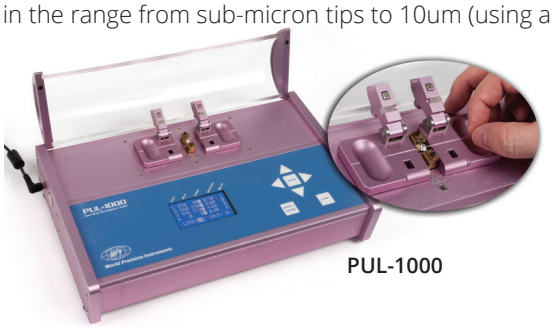
503411



WPB315AB

OTHER INSTRUMENTS & ACCESSORIES

WPI offers a wide range of instruments that can be used for plant protection research and plant manipulation. WPI carries dissecting instruments or tools, inverted microscopes, syringe pumps that can inject in ranges from nanoliters to milliliters, micropipettes puller that can produce micropipettes with tip diameters in the range from sub-micron tips to 10um (using a beveler).



PUL-1000

The WPI micropipette puller is a compact, versatile and reliable workhorse.

TW100F-4

WPI offers Thin-wall or standard borosilicate glass in different outer diameter with or without filament.

MICROMANIPULATORS

BEST SELLER

MANUAL

- High precision
- Left or right-handed orientation
- Ranges from 3 mm travel to 37 mm travel depending on the axis (x, y and z)
- Variety of stands – magnetic or tilt-base

MOTORIZED

- 3-axis manipulators (x, y and d (diagonal))
- 4-axis manipulators (x, y, z and d)
- Ergonomic hand controller or software controlled
- Ranges from 25 mm on the x, y and z and 50 mm diagonally

M3301L *on* **M-10**
Magnetic stand

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