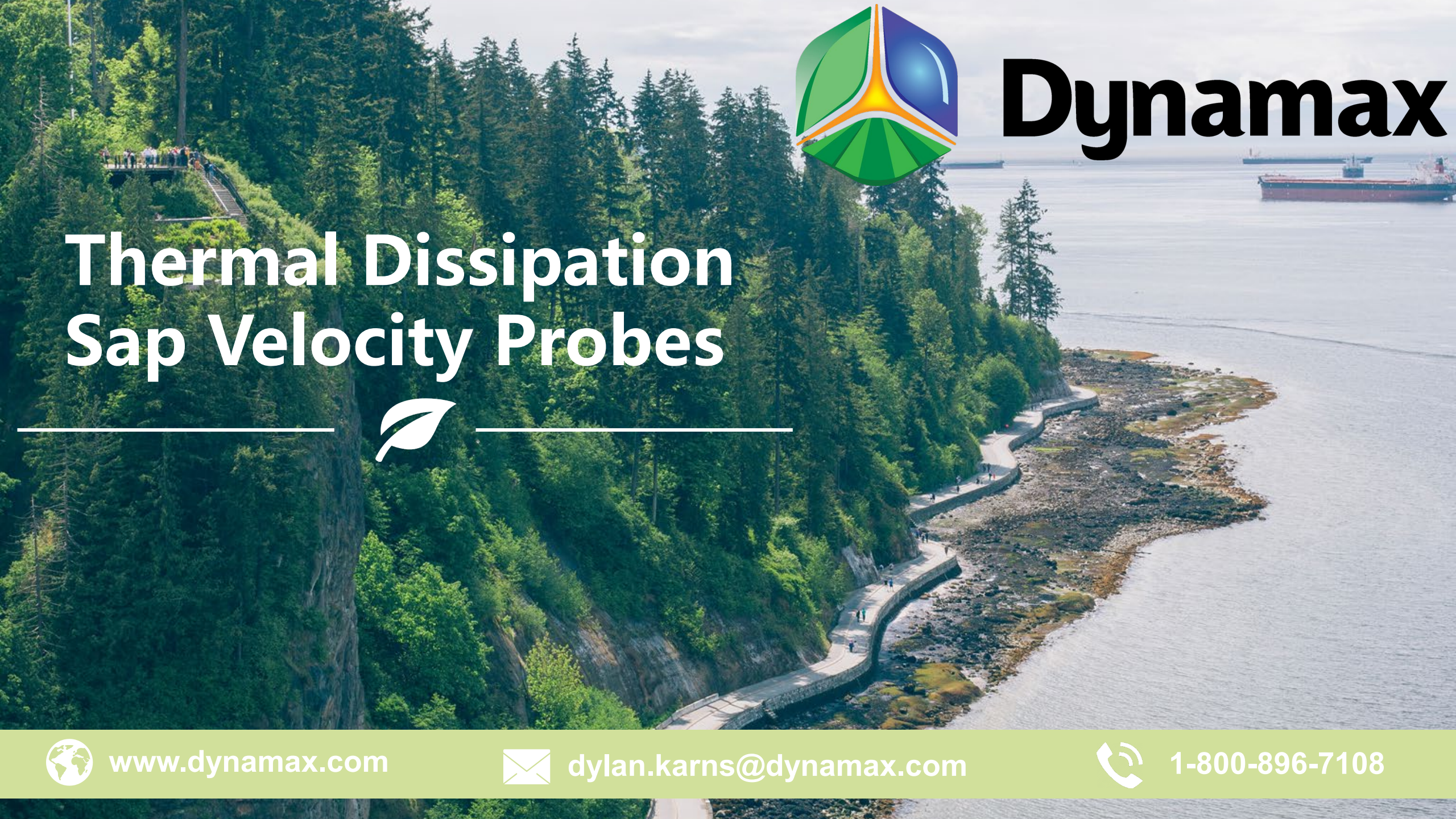


Dynamax

Thermal Dissipation Sap Velocity Probes

www.dynamax.com
dylan.karns@dynamax.com
1-800-896-7108

Overview

TDP Sap Velocity Sensor

Features & Benefits

TDP Measurement Principles

Specifications

Installation Procedure and Tips

Dynamax TDP Systems

TDP Sap Flow Applications

Water Balance

Plant transpiration

Disease Effects

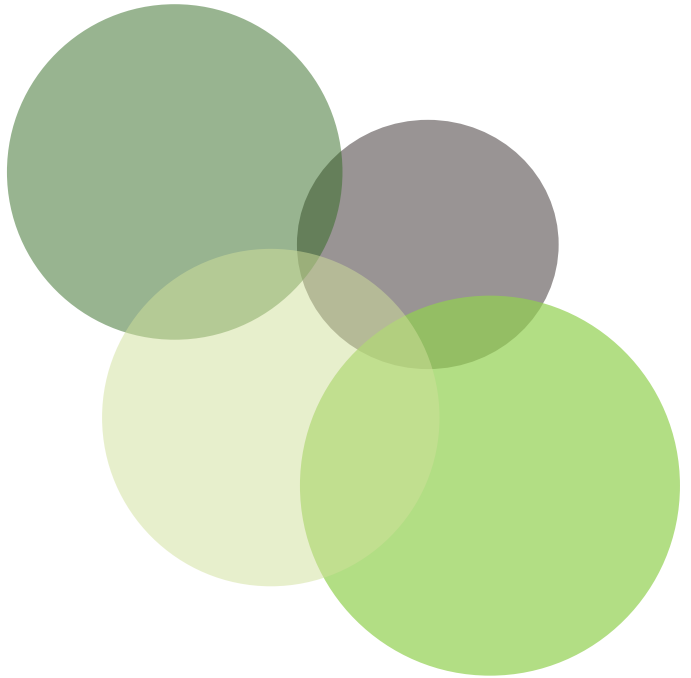
Fertilizer Efficacy

Greenhouse Management

Irrigation Scheduling

Phytoremediation

Global Climate Change

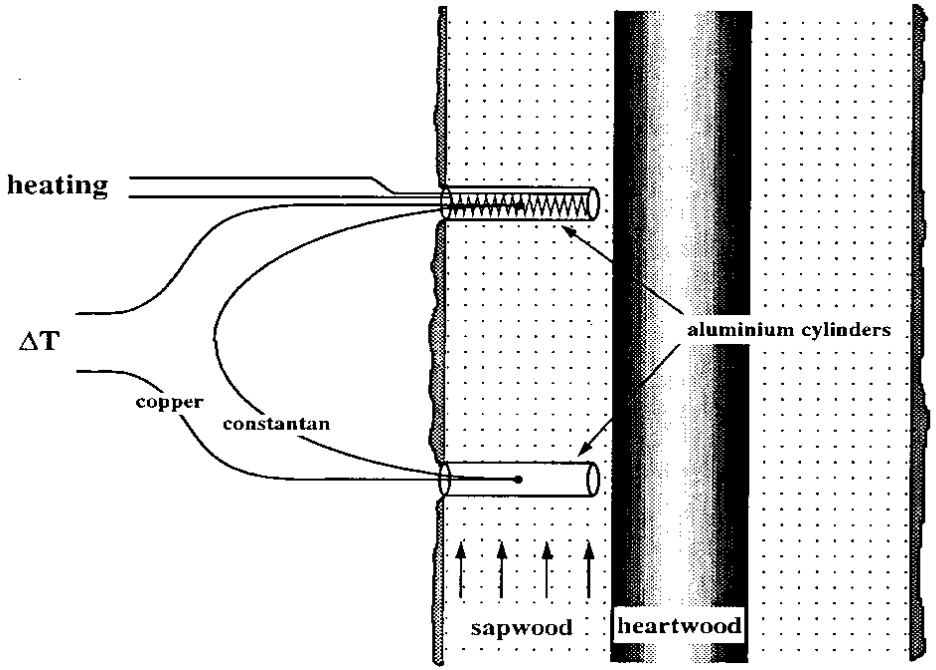


Thermal Dissipation Sap Velocity Probe

Probe consists of two needles

(-) Reference T-Type Thermocouple

(+) T-Type Thermocouple & Heater



NO FLOW Conditions

Maximum dT occurs when the needle is hottest

HIGH FLOW Conditions

Minimum dT occurs when the needle is coolest

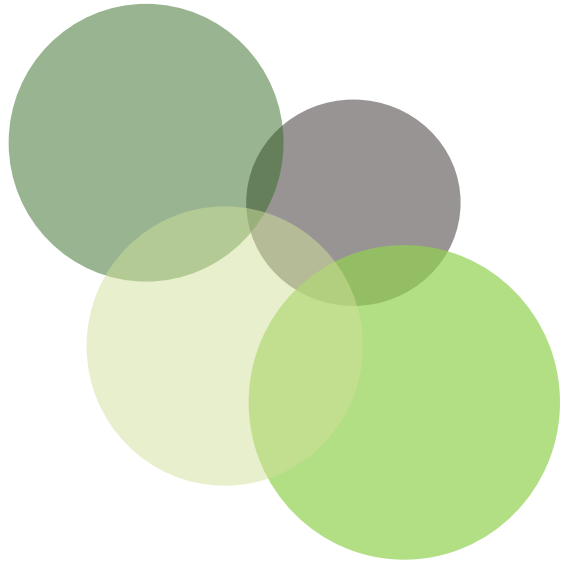
Auto Zero (dTM)

Maximum dT is recorded and averaged pre-dawn

i.e. the zero flow set point.

Features & Benefits

INRA research(Granier) design	Continuous Sap Velocity
Two needles epoxy sealed	Simple data calculation/analysis, Real time
Teflon coated probes	Durable, Reusable Design
Multiple probe sizes	Monitor multiple trees
One differential channel	Universal logger compatibility
Low voltage operation	Easy voltage regulation



TDP Measurement Principles

Calculate Dimensionless Variable K

K=(dTm - dT)/dT

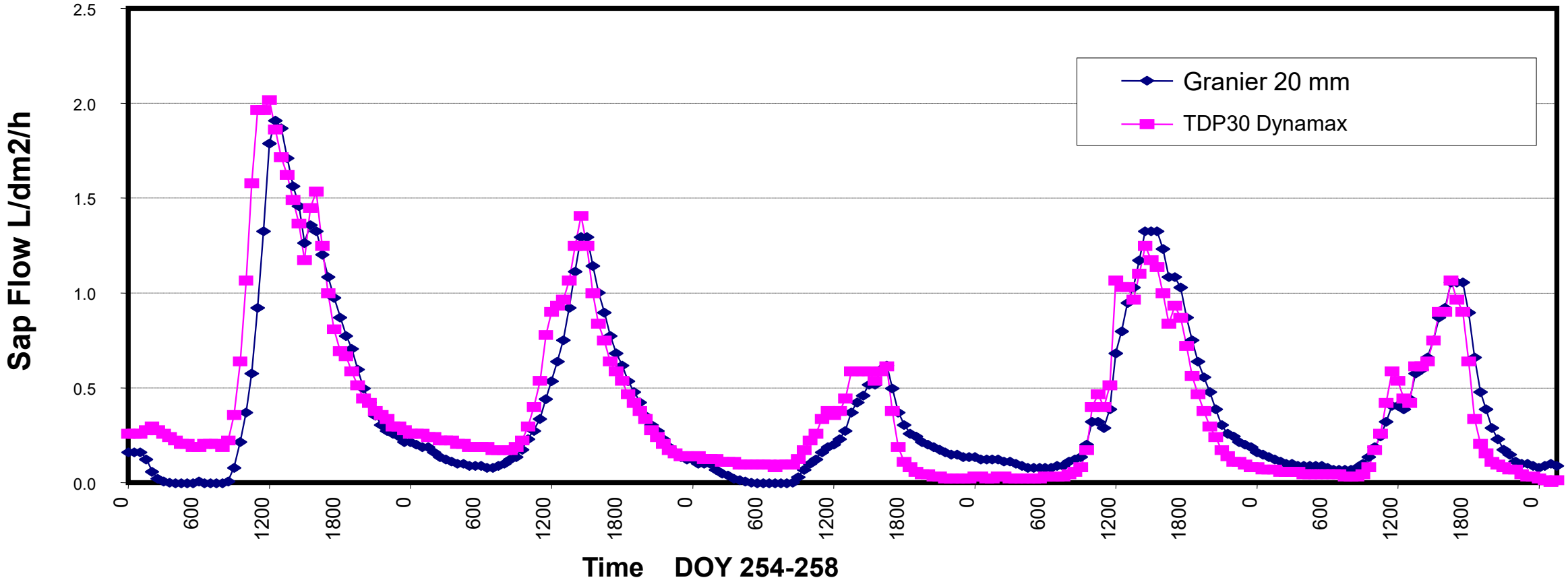
Calculate Velocity V

V= 0.000119 * K ^ 1.231 (m/s)

Calculate Area of Sapwood

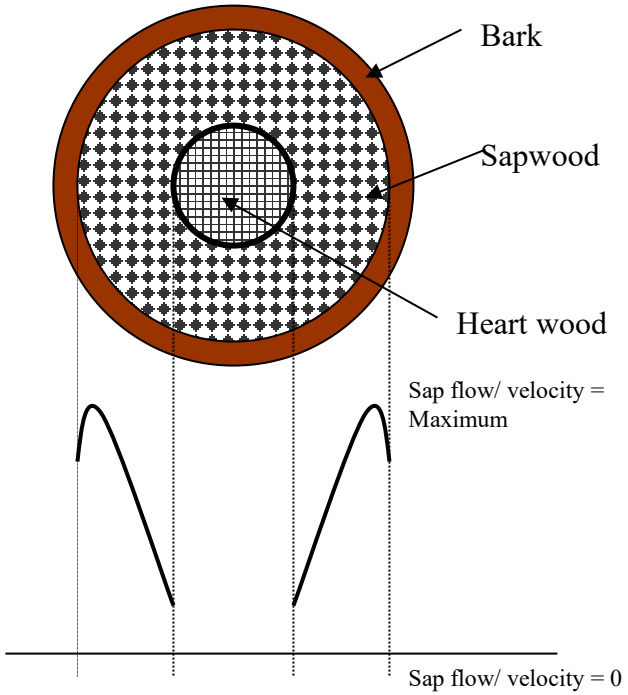
multiply to obtain volume flow

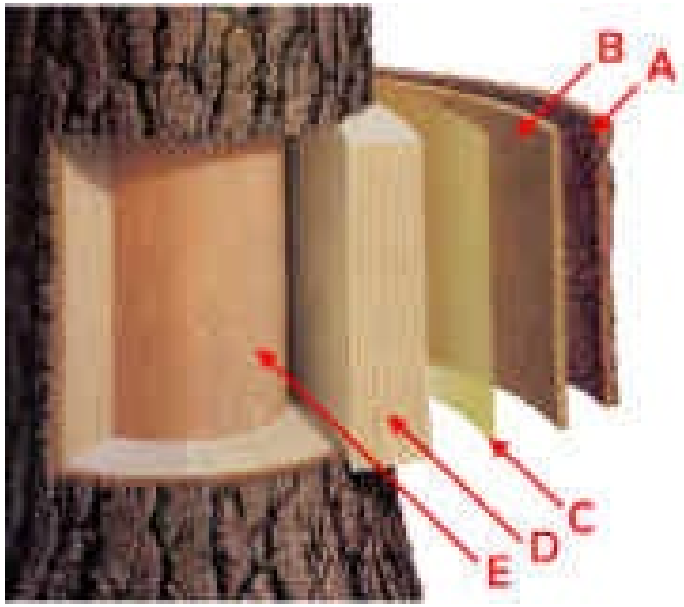
Sapflow =A * V



Sapwood Area

Only the sapwood conducts water and needs to be measured



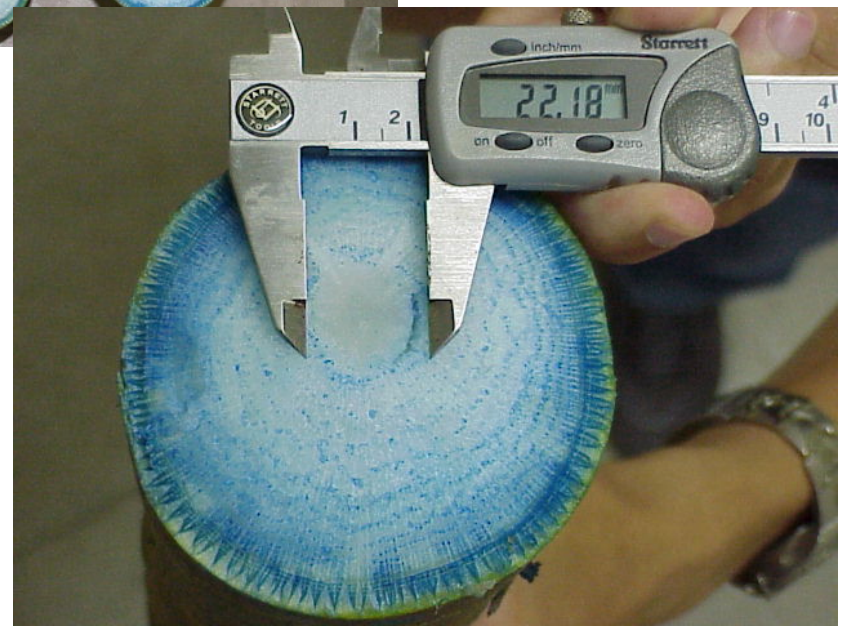


(A) Outer Bark
(B) Inner Bark
(C) Cambium Layer
(D) Sapwood
(E) Heartwood

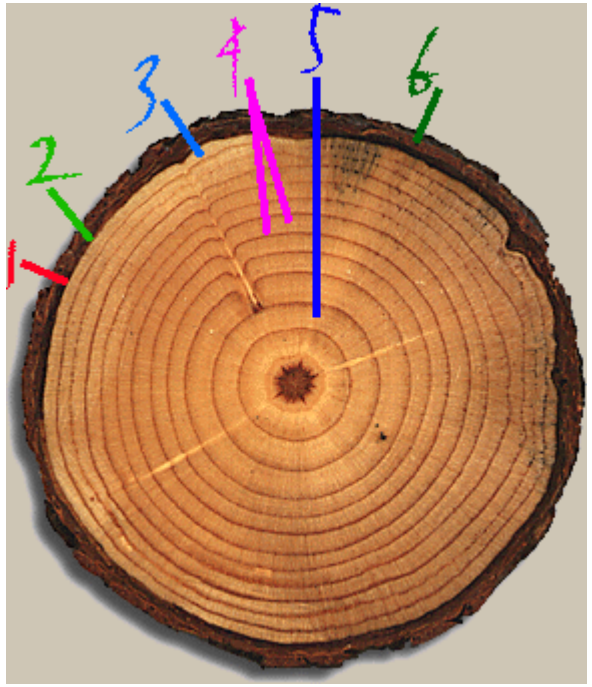
Sapwood Area

Methods to determine sapwood area

- Dye-test
- Using Incremental core
- Analytical methods
  - Establish Statistical relationship
  - $S_A = -0.0039 + 0.59\ S_T$



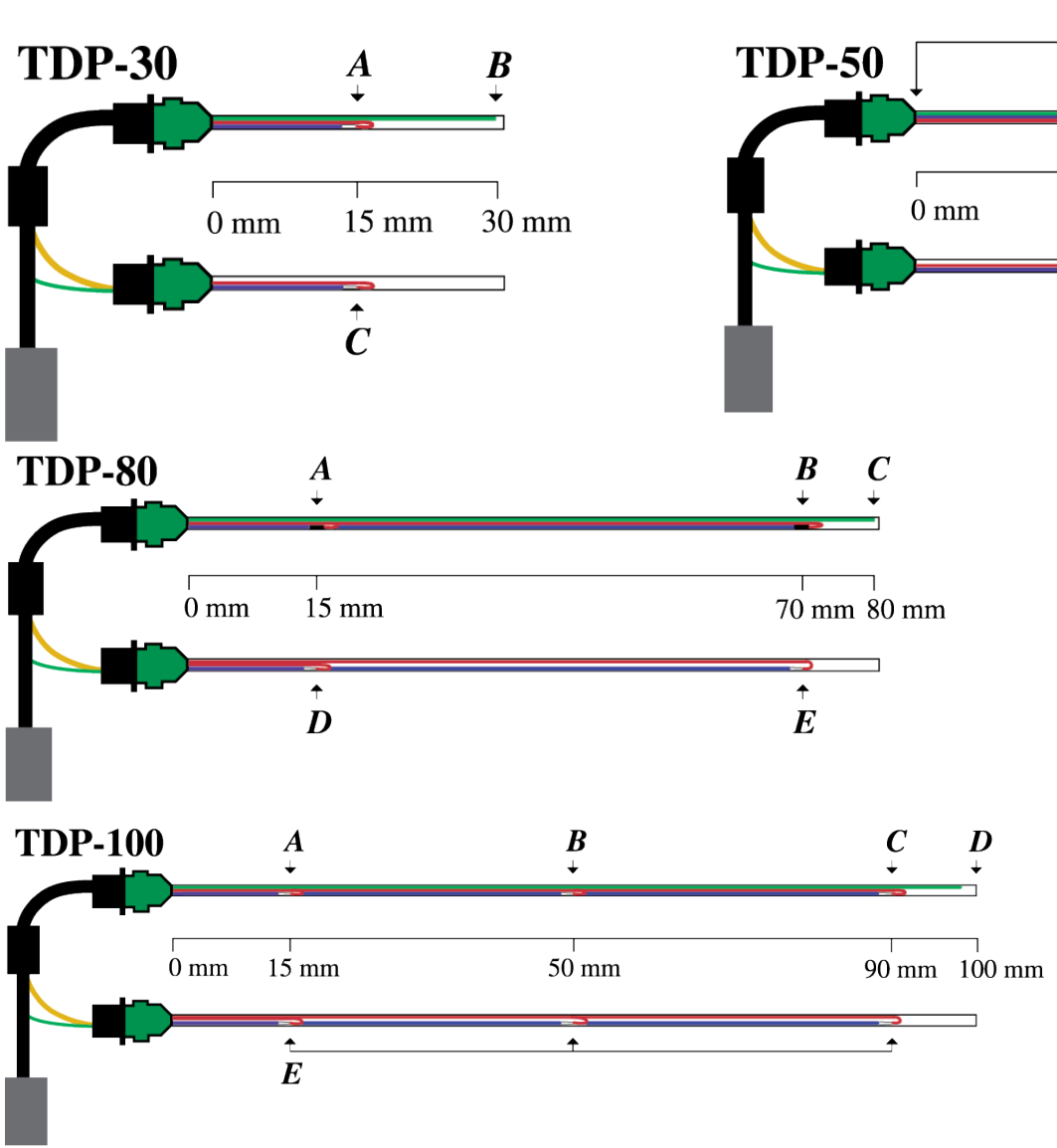
How Many Sensors, Not How Long!



Uniform Growth Conditions

Non-uniform Growth Conditions

TDP Specifications



Model	TDP-30
Length	30mm
Diameter	1.2 mm
T-Type T/C's	1 ea.
Probe Spacing	40 mm
Power	0.15 to 0.2 w
Cable Standard	10ft/ 5 cond
Heater Resistance	45 Ohms
Operating Volts	3.0 V @~8°C
Signal Out	40 uV/°C

Installation Procedure

1.Prepare the Probe Site:

- Select a height 1-2 meters above the ground
- Remove old rough bark. 4cm wide and 10 cm tall

2.Drill Holes:

- Place the Drilling Jig flat on the prepared surface
- Drill holes for tight fit

3.Install Probes:

- Insert the heater in the top hole & the reference in the bottom
- Insert needles slowly and gradually
- Tape cables to the tree for support

4.Insulation:

- Install a water proof seal around the needles
- Secure Foam Quarter spheres around probes
- Install thermal insulation using reflective foam Bubble Wrap

5.Probe Removal:

- Do NOT pull on the base of the needle, Never use Claw hammers or long Levers
- Always use the supplied nail removing Pry-bar

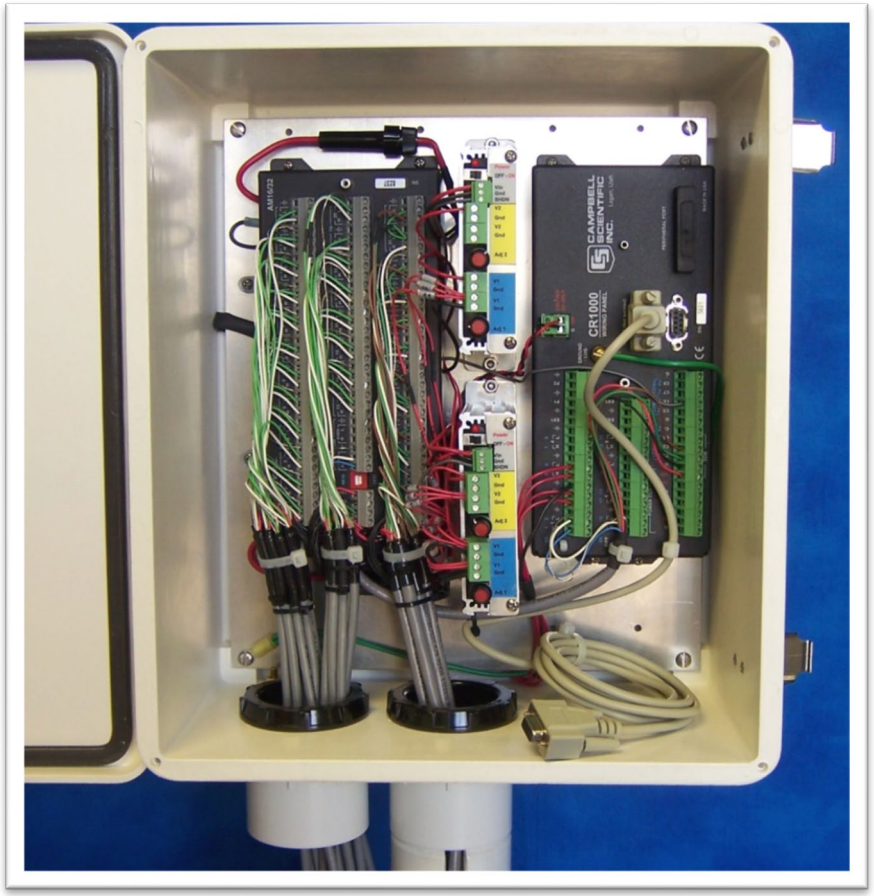
Dynamax TDP Systems

FLGS-TDP System

- Real time sap flow calculations
- Single FLGS can monitor up to 32 TDP probes
- Expandable up to 128 TDP Sensors on one system
- Daily accumulated stored in memory
- Sap flow indexing
- Easy, accurate, and portable system

SapIP Wireless TDP System

- Ideal for remote monitoring
- Each SapIP wireless node can handle up to 6 TDP probes
- Real time data monitoring on our Agrisensors.net portal




Dynamax
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