Farmer-Led Research 2019: **Assessing methods for nutrient application for trees/woody shrub nutrition**

SOIL HEALTH

Farmer-Researcher(s):

Derick Greenly, Summergreen Tree Crops & Mushrooms - Central

EFAO Contact

Sarah Hargreaves, sarah@efao.ca,

This document outlines the steps that Derick will follow to execute her research project, *Assessing methods for sulphur application for trees/woody shrub nutrition*, including design, execution, data collection and data sharing. It also serves as a Memorandum of Understanding between Derick and EFAO.

Background

Many Ontario agriculture soils are limestone-based and neutral in pH, which presents challenges when attempting to produce economic yields of alkalinity-sensitive species like blueberry, peach and chestnut. Iron tie-up in calcareous soil leads to chlorosis and unsatisfactory growth and broadacre application of sulphur to correct the issue is expensive. For example, sulphur is upwards of $700/acre plus application costs for blueberries in Northumberland County.

In 1986, Carl Whitcomb developed a technique for solving chlorosis problems in new & established trees. This technique even solved nutritional issues species with pH sensitivity in extremely alkaline condition with lasting effects (i.e. pin oaks surrounded by concrete). The method involves applying small amounts of sulphur and micronutrients using a bulb planter in a circular pattern around the tree.

With this inspiration, Derick asked the question: *Can woody perennials, which are prone to chlorosis in neutral soils, be cultivated effectively with localized, hand-installed soil amendment treatments, rather than the typical broadacre application and tillage incorporation of sulphur and chelated micronutrients?*

Experimental Design

Derick will carry out this experiment on blueberry (*Vaccinium corymbosum*) and chestnut (*Castanea Mollissima*), that will be planted this year. All blueberries and all chestnuts are the same age, variety, rootstock. Soil pH in autumn 2017 was 7.4. Since then, then field has been reclaimed through careful mowing and some clover seeding.

Farmer-Led Research 2019: **Assessing methods for nutrient application for trees/woody shrub nutrition**

SOIL HEALTH

Chestnut trials include:

1. No treatment control - native soil
2. Entire-row surface sulphur application @ 20#/1000 sq. ft, with basalt dust, sul-po-mag and boron mix applied at the same rate by weight as the sulphur.
3. Localized 8-inch-deep sulphur cores with minute amounts of sul-po-mag, basalt dust and boron, arranged in a circular pattern around the plant.

Replicate block 1			Replicate block 2			Replicate block 3			Replicate block 4		
Local	Control	Broad	Local	Control	Broad	Local	Control	Broad	Control	Local	Broad

Blueberry trials include:

1. Entire-row surface sulphur application @ 20#/1000 sq. ft, with basalt dust, sul-po-mag and boron mix applied at the same rate by weight as the sulphur.
2. Localized 8-inch-deep sulphur cores with minute amounts of sul-po-mag, basalt dust and boron, arranged in a circular pattern around the plant.

Replicate block 1			Replicate block 2			Replicate block 3			Replicate block 4		
Local	Control	Broad	Local	Control	Broad	Local	Control	Broad	Control	Local	Broad

The experimental plot is 1 row of around 55 trees and around 110 shrubs, which Derick will divide into 12 sections of around 4 trees and 8 shrubs each.

Since elemental sulphur takes a year to affect soil pH, Derick will add the amendments in late May 2019, manage the plot as usual, and then take measurements to test for any differences in 2020.

Measurements

2019

Labour

- Derick will record the labour minutes needed to apply the sulphur by broadcast and in a localized way for each replicate.

Soil testing

- Derick will use a pH meter to measure soil pH in all test plots prior to application.

Soil testing

- Derick will use a pH meter to measure soil pH in all test plots prior to application.

Tissue testing

- Late July, one sample from each of the 12 sections.

Plant health

- Derick will assign each plant a number, and he will observe and record **quarterly**. He will measure all the trees and every second or third shrub (? TBD before 2020 season)
    - Height: Using a measuring stick
    - Leaf colour: A scale of very chlorotic, slightly yellow, pale green, bright green
    - Stem diameter: Using a stem caliper (mm) at ~ 2cm from the soil.
    - Stem number: Stem count or rating of sparse to dense

Winter tip dieback (added in 2020)

Research Expense Budget

Prices are approximate; NA or in-kind for any materials that you already own or have access to. Please indicate if you intend to give any of the supplies to EFAO's Tool Library for others to use after you are finished with them.

Material	Quantity	Unit	Total Cost	EFAO's Tool Library (Y/N
Elemental sulphur, Tiger 90 organic	20.75/20 kg;		$42 total	N
Small amounts each of Sul-Po-Mag, Borax and Basalt Dust			$40 each = $120	N
1 3/4" bulb-type soil auger			~ $15	N
Leaf tissue analysis	12	$28 + courier ($35 total)		N

pH Meter, Extech PH100	1		~ $200	Y
Total			~ 377	

Research Calendar

Time	Task	Action Item
Mid April	Amendment application, pH	Sarah will contact
2020	TBA	TBA

Deadline for data, progress report and photo submission

Preliminary results on establishing the experiment: September 1, 2019
Data collection in second year: Fall 2020, specific date TBD in 2020.

Memorandum of Understanding

Farmer-researchers agree to keep an active membership with EFAO throughout the duration of their trial. Reimbursement for research expenses and farmer-fees will be paid to current members only.

Please also refer to efao.ca/farmer-led research for a **Memorandum of Understanding** of other responsibilities. Specifically refer to sections:

- *What is expected of me as a farmer-researcher?*
- *What support will I receive from EFAO as a farmer-researcher?*

To check the status of your membership, log in here: https://efao.z2systems.com/np/clients/efao/login.jsp or contact Martina, martina@efao.ca.