RESEARCH PROTOCOL: COVER CROPS, SOIL HEALTH 2018-2019
No-till Spring Cereal Trial

Farmer-researcher
Ken Laing, Orchard Hill Farm

This document outlines the steps that Ken will follow to execute his research project, *No-till Spring Cereal Trial*, including design, execution, data collection and data sharing. It also serves as a Memorandum of Understanding between Ken and EFAO.

Background
Can a farmer use winter killed cover crop to provide fall and winter cover on soil and make suitable field conditions to no-till plant spring cereals?

Most spring cereals are planted into fall tilled soil leaving fields susceptible to erosion and loss of nutrients. No-till planting should allow earlier planting dates which should translate into higher yields as spring cereal yields are depressed with late planting. Underseeding of legumes and grasses should be more successful with early planting too. Acreage of spring cereals in Ontario is 320,000 acres.

Experimental Design
Ken will conduct this trial in Field OHF 880, which is 319 feet x 412 feet. In 2017, Ken harvested spelt for grain, removed straw for animal bedding and underseeded with red clover and annual ryegrass.

Before establishing the trial in the summer, Ken will plough down red clover in all plots. He will also apply amendments to all plots at the same rate. Ken will plant the cover crop treatments in summer 2018 and till the control in fall 2018. In 2019, Ken will plant a spring cereal of oats/barley underseeded to hay/pasture legumes and grasses uniformly across the entire field. The yield of combined oats and barley in 2019 will be used to test for effects of the various cover crop treatments from 2018.

Layout

	319'		
15'	sorghum-sudan – planted July 1 –mowed 3 x's		
15'	oats/barley/peas – planted Aug 15		
15'	daikon radish – planted Aug 15		block 1
15'	fall tillage - control		
15'	faba beans/ oats/barley – planted Sept 1		
15'	daikon radish – planted Aug 15		
15'	faba beans/ oats/barley – planted Sept 1		
15'	fall tillage - control		block 2
15'	sorghum-sudan – planted July 1 –mowed 3 x's		
15'	oats/barley/peas – planted Aug 15		
15'	faba beans/ oats/barley – planted Sept 1		
15'	fall tillage - control		
15'	daikon radish – planted Aug 15	412'	block 3
15'	oats/barley/peas – planted Aug 15		
15'	sorghum-sudan – planted July 1 –mowed 3 x's		
15'	oats/barley/peas – planted Aug 15		
15'	faba beans/ oats/barley – planted Sept 1		
15'	sorghum-sudan – planted July 1 –mowed 3 x's		block 4
15'	fall tillage - control		
15'	daikon radish – planted Aug 15		
15'	faba beans/ oats/barley – planted Sept 1		
15'	daikon radish – planted Aug 15		
15'	sorghum-sudan – planted July 1 –mowed 3 x's		block 5
15'	oats/barley/peas – planted Aug 15		
15'	fall tillage - control		

Methods & Measurements Measurements from each strip

- Soil coverage for erosion control - Ken will take aerial photos of the plots at 3 times: **September 2018**, after winter kill in late **December 2018/early January 2019**, and just before planting in **March 2019**

- Weed control - Ken will take an aerial photo of the plots at harvest (**late July, early August, 2019**) and quantify % cover of weeds in each plot from the photo image
- Yield of oats/barley grain - 10' strip down centre of each plot; Ken will borrow or rent a weigh wagon (**2019**)
- Success of underseeding: After harvest (**October 2019**), Ken will take photos of quadrats from each plot to estimate underseeding success from photo images.
- Soil health: the specific test TBA; timing of the soil test is March 2019, before Ken plants the grain crop

Statistical test
Analysis of variance (ANOVA) with 5 blocks.

Materials and 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)**
No-till drill 8 runs x 8"=64"			In-kind	N
Combine – direct cut header 10 ft			In-kind	N
Seed	2018 cover crop seed cost ~ $112 2019 oats/barley/hay and pasture underseeding, $400 total		$512	N
Weigh cart rental			TBD	N
Drone rental			TBD	N
Soil testing			TBD	N
Total			$512 + other expenses TBD	

Notes on soil testing: Wet aggregate stability (Cornell Soil Health Laboratory, $20 USD per sample = $500 USD + 10% = $550 + shipping and exchange rate; Solvita Master Kit (25 samples), $1,795 USD; Solvita VAST for aggregate stability $15 USD per sample.

Memorandum of Understanding

Please refer to **efao.ca/research-mou** for Memorandum of Understanding. Ken will be compensated $750 because his trial starts in summer 2018 and runs until summer 2019.

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Contact

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