



## ORGANIC CROPPING AND GRAZING SYSTEMS TRIALS

*Introductory Research Report E2006-21*

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### BACKGROUND

A fundamental tenet of organic agriculture is that more integrated and 'substrate diverse' production systems, built around excellence in agronomy, can yield benefits with respect to soil organic carbon (SOC) sequestration and nutrient efficiency, improved soil quality and biodiversity, and reduced impacts on air and water quality. Data to support this hypothesis is extremely limited, however. Long-term organic cropping or livestock systems trials are lacking, particularly in Eastern Canada, or are not designed to quantify impacts on water quality. The reliance on soil mineralization, N<sub>2</sub> fixation, livestock wastes, and un-acidulated mineral inputs presents specific research challenges for efficient management of nitrogen (N) and phosphorous (P) in organic systems.

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### CROPPING SYSTEM TRIALS

Replicated cropping systems trials will be established in 2006 at the Nova Scotia Agricultural College (NSAC) in Truro, NS to:

1. Examine the relationship between organic farming system productivity and resource efficiency;
2. Gauge the impact of reliance in organic cropping and livestock systems on legume-based forages and organic amendments on air and water quality and food safety; and
3. Examine the relationship between soil health and crop quality.

These activities are expected to also contribute to development of innovative management technologies for organic vegetable, potato, and grain production. A shorter term cropping trial commencing in 2006 at NSAC will examine the relationship between soil mineral N, labile soluble organic carbon and soil-surface nitrous oxide (N<sub>2</sub>O) fluxes under, fertilized or unfertilized, forage (grass or legume) and potato production.

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### GRAZING SYSTEM TRIALS

Access to pasture is a requirement of organic livestock management standards. A parallel research facility being established in 2006 will examine the effect of grazing management on soil, livestock, forage and water quality. This novel research site will utilize a replicated, tile-drained and instrumented cropping systems research site, and isotopic techniques, to gauge the impact of livestock/grazing management systems on livestock and forage productivity, SOC and water quality. The OACC/Brookside facility of NSAC is currently used for grazing studies and provides a corral and weigh scale. The experimental design will be a split-plot randomized complete block design with four replicates imposed on 20 hydrologically isolated (tile-drained) paddocks/plots, each fully instrumented with automated water samplers and tipping bucket gauges.

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These projects are a joint effort involving the: Canada Research Chair in Organic Agriculture at NSAC (Dr. Derek Lynch) Organic Agriculture Centre of Canada (OACC) Nova Scotia Department of Agriculture, New Brunswick Department of Agriculture, Fisheries and Aquaculture; and Prince Edward Island Department of Agriculture, Fisheries and Aquaculture.

Additional participants in this project are: Dr. Zhiming Zheng, Postdoctoral fellow, NSAC Graduate students and technicians (NSAC/OACC)



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