

## Two passionate soil ecologists in British Columbia

# Having new trees thriving in organic orchards

When she moved from Saskatchewan to British Columbia eight years ago, Louise Nelson brought over 100 strains of soil bacteria that she wanted to test against tree fruit replant disease, a disease that affects young trees planted in old apple orchard blocks.

Replant disease happens around the world but it is not really understood what causes this problem. When growers are pulling out old trees and putting new varieties in their orchard, the new trees do not always thrive. Some explanations are proposed, such as the fact that when the same species are grown in the same place for a long time, a population of soil pathogens may be built up that negatively affects the new seedlings.

Gerry Neilsen, an AAFC researcher at the Summerland's Pacific Agri-Food Research Centre (PARC), showed that replanted trees respond well to the addition of phosphorus. Given the importance of phosphorus in young tree establishment, Louise Nelson and other researchers focus on improving the availability of phosphorus in organic production systems, where synthetic sources of cannot be applied.

Nelson's approach, as a microbiologist, was to use soil bacteria that can efficiently solubilize phosphorus and make it available to plants. So Nelson and Neilsen, along with MSc. Graduate student Molly Thurston, tested the large Saskatchewan collection of soil bacteria in the laboratory and in greenhouse trials to find out which strains were the best P solubilizers. The five most effective strains are currently being tested in the greenhouse and on certified organic farms in the Okanagan Valley.



**Louise Nelson**

Their research project, one of the thirty Organic Science Cluster activities, is certainly in tune with organic tree fruit production's needs and principles. In organic production, rock phosphate is probably the most common source of phosphorus but the phosphorus from that source is not readily available to the plants. Seedlings inoculated with phosphate solubilizing soil bacteria at planting may play a vital role in improving the growth of replanted trees in organic orchards.

The project's field trials are now going on. Last spring, young apple trees were inoculated with P-solubilizing soil bacteria at two sites at the Okanagan Valley. A second inoculation is planned for this spring.

"The zones around the roots are where the action is, where there may be beneficial microorganisms as well as pathogens; this is where we have to maintain the right balance" says

Louise Nelson. “Much of my career has focused on using soil microorganisms to enhance plant growth and incorporating these into more sustainable practices. Organic agriculture fits very well with my interests, as we need to look at more sustainable practices to continue to be productive in agriculture”.

Louise Nelson surely knows about soil bacteria; she studied microbiology at the University of Western Ontario, did her PhD on arctic soil bacteria at the University of Calgary, postdoctoral work at McDonald Campus of McGill University, and studied agricultural sciences for one year in Oxford, England. In Saskatchewan, she worked at the National Research Council of Canada, Agrium Incorporated and the University of Saskatchewan, studying symbiotic nitrogen fixation and other bacteria that promote plant growth. She is now a professor, researcher and the Associate Dean of Research in the Irving K. Barber School of Arts and Sciences at the University of British Columbia - Okanagan Campus.

In BC, Nelson’s focus has shifted to horticultural crops, particularly the tree fruit industry, where she partners with Dr Gerry Nielsen and co-supervises graduate student Molly Thurston, who is also convinced that soil management is the basis for organic agriculture.



**Molly Thurston**

Thurston has observed variability in the phosphorous solubilizing ability of the bacteria that she analyzed; but she could identify the most promising ones to bring forward for orchard replant trials with “Nicola”, the new apple variety that was developed in the breeding program at PARC.

“As phosphorus can be limiting, we are trying to improve the efficiency of phosphorus uptake from rock phosphate, bone meal and compost in order to provide soluble P to the root system of the young trees” says Thurston, who did her undergraduate studies at the University of Guelph, where she was a student in the first organic agriculture course offered in 2003.

Thurston is also employed as an extension agent for the Okanagan Tree Fruit Cooperative, where she enjoys giving advice and guidance to growers of the tree fruit industry. Born in the Okanagan Valley and being an organic farmer herself, Thurston believes that similar yields can be achieved in organic orchards as compared to conventional systems, though organic production often requires more hand labor, because it cannot use the chemicals tools available to conventional producers.

“We have in BC our fair share of insect pests like any other part of the country, but growing apples organically is very achievable and not overly cumbersome if you have the right tools to manage the issues that come up!” confirms Thurston, adding that the dry climate of the Okanagan Valley also helps to prevent fungal diseases.

Louise Nelson and Molly Thurston are excited by the progress of their project. They continue to measure the effects of the P solubilizing bacteria in the lab, the greenhouse and the field. In her spare time, Louise Nelson enjoys gardening, cooking, making bread, and reading novels by

Canadian women authors. Molly also enjoys reading and she likes to run, on trails and in the forests around the Okanagan. As an organic producer herself, Thurston feels that her research is both timely and relevant to the replant challenges facing organic tree fruit producers and their goal is to overcome this problem with ecological solutions.

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