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Research Roundup September 2010

FIND OUT WHAT'S NEW IN THE WORLD OF RESEARCH

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THESE CROP RESIDUES ARE GOOD FOR YOUR SOIL

Joey Sabljic

Annually adding crop residues to soil is vital for sustaining its quality and health, says a University of Guelph soil science professor.

Dr. Paul Voroney says that besides protecting it from erosion, decaying crop residues contribute to the soil's continued fertility and regeneration. This adds organic carbon, maintaining the soil's organic matter content and promoting an active and diverse microorganism population that lives within the soil each passing season.

Voroney says crop residues add to the soil's organic carbon content, which is vital for healthy, consistent crops. However, a growing trend in recent years has been to remove crop residues – such as cereal straw or corn stover – from fields and then sell them to various bio-product industries or as a bio-fuel for electrical power generation.

"There's a notion that crop residues are waste materials," says Voroney. "But they provide the soil with an invaluable pool of fertile nutrients and food for the organisms."

Voroney's research receives support from the Natural Sciences and Engineering Research Council and the Ontario Ministry of Agriculture, Food and Rural Affairs•

FINDING NEW WAYS TO REDUCE NITROGEN

Vanessa Perkins

The Arabidopsis plant – a small flowering plant related to cabbage and mustard plants — has traditionally been used as a model to investigate fundamental processes in plant biology. It's a great model: it's tiny, it has a relatively small genome size, a short lifecycle and it produces many seeds which together make it a great plant on which to experiment.

A researcher at the University of Guelph is now using the plant to investigate ways to reduce nitrogen fertilizer use. In one test, Dr. Steven Rothstein, Molecular and Cellular Biology, has found genes which are crucial for the enhanced production of chlorophyll particularly when nitrogen levels are low. This knowledge has been transferred to corn and rice where the effects of the analogous genes are similar to those found in Arabidopsis.

Rothstein is now examining what's behind this effect, hoping to find a link to the genes associated with nitrogen use.

"We want to know which genetic factors enable plants to continue to grow well in nitrogen-limited environments," he says. "This could lead to a decreased need for nitrogen fertilizers down the road, helping the environment and saving farmers money."

This research is sponsored by the Natural Sciences and Engineering Research Council and Syngenta Canada. •

UNEARTHING THE SECRETS OF CORN ROOT ARCHITECTURE

Natalie Osborne

Corn's extensive root system can account for up to half of the plant's biomass. With that in mind, University of Guelph researchers are discovering what makes corn roots more efficient at absorbing nutrients important for plant growth.

Dr. Manish Raizada and PhD student Amelie Gaudin, Department of Plant Agriculture, are comparing corn's root characteristics with those of its hardier wild ancestor teosinte.

Teosinte's root system is bigger and can change its architecture more quickly to access water and nitrogen. The researchers want to know if its root system can be combined with modern corn varieties to improve production.

"I found that plasticity, the ability to grow towards nutrient sources contributes more to nutrient uptake efficiency than the size of the root system," says Gaudin.

Gaudin also believes teosinte's longer root hairs may improve its ability to dissolve phosphorus, a mineral vital to plant health. This could lead to more efficient crops that require less fertilizer to grow.

This research receives support from the Canada Foundation for Innovation and an Ontario Research Fund grant. Amelie Gaudin also received an S.J. Smith Memorial scholarship to support her research. •

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