Summary of experimental plots on Field 1

The area of land in the northwest corner of the CEF includes important and ongoing experimental plots:

1) **Tillage and crop rotation:** Tillage (ploughing or cultivating the land) has been widely used for millennia to control weeds, incorporate nutrients, and prepare for soil for planting seeds. Such tillage, however, has some costs: increased erosion, reduced soil carbon reserves, and higher fuel costs. But recent developments in weed control and farm machinery now allow crops to be grown without any tillage – a system known as no-till farming. Here at the Experimental Farm, a soil tillage experiment was established in 1990 to look at the long-term benefits of no-till farming on soil, environment, and plant yield. The experiment, including 72 plots of wheat, corn and soybean grown in rotation under tilled or no-till conditions, is now one of the oldest experiments in North America comparing the influence of mechanical tillage on soil health and plant yield, and is unique for a climate like ours. Soil is a biological system and the effects of tillage can be reliably measured only over time periods of several decades. Abandoning the experiment now would mean the loss of 24 years of accumulated ecological knowledge. More importantly, it would mean re-starting the experiment elsewhere, and delaying by several decades the findings so urgently needed by farmers in developing farming systems that foster high yields now, and also keep the land and environment healthy for their successors.

2) **Soil carbon cycling**: Agricultural practices, such as tillage and crop sequence, influence how much and how quickly the carbon trapped by photosynthesis in plants is released back to the air as CO_2 by decay. If too much CO_2 is lost, that depletes carbon in the soil, reducing its health, and at the same time also adds to atmospheric CO_2 linked to climate change. In Field 1, an experiment initiated in 2007 was established to determine how tillage influences the cycling time of carbon in our agricultural ecosystems. This experiment, led by researchers at CEF, is part of an international network of 14 identical experiments, which includes 10 sites in agricultural regions of Canada, one in the Arctic, and 3 international sites (Scotland, New Zealand, and California). The large network, perhaps unprecedented in the world, will allow us to measure the long-term effect of climate and soil type on the biological processes that release carbon and plant nutrients from crop residues. Loss of the Ottawa site would undermine the value of the international network, tarnish CEF's leadership in this experiment, and negate the findings most pertinent to our climate and soil conditions.

Long-term field experiments are designed to quantify and predict the influence of farmers' practices on crop growth and soil properties. They are the only way to measure directly the most important variable in ecological sustainability – time! – and are therefore essential for guiding farmers to methods that improve crop yield and crop quality, reduce nutrient loss to the environment and ultimately, to increase farmers' profits.

A number of collaborating scientists and institutions have contributed financial and technical resources to the project and are actively involved in supporting these experiments. Loss of this site, therefore, affects not only scientists at CEF but many collaborating scientists across Canada and around the world.

Collaborators in Canada:

AAFC scientists at Ottawa, Fredericton, Ste-Foy, Harrow, Morden, Indian Head, Swift Current, Lethbridge, and Saskatoon.

International collaborators:
James Hutton Institute, Dundee, Scotland
Plant & Food Research Institute, Christchurch, New Zealand
University of California, Davis, California
Royal Agricultural University, Cirencester, UK
Rothamsted Research, North Wyke, UK
Copenhagen University, Copenhagen, Denmark
University of Toronto, Scarborough, Ontario
The Ohio State University, Columbus, OH
Swiss Federal Institute of Technology, Zurich, Switzerland