



Global Warming and Agriculture

Meeting the Challenge

This is the first in a series of fact sheets aimed at discussing global warming and the Kyoto Protocol, and their relationship to agriculture in Canada. The series will begin with a discussion of the issues.

The problem - global warming

We've all heard of global warming; its existence, or non-existence has been discussed for years. Is something happening? Is there a problem? A quick look at some weather trends indicates that the earth's temperature is indeed rising.

The 10 warmest years on instrumental record have all occurred since 1983. Seven of the warmest years occurred in the 1990s, making it the warmest decade on record. 1998 was the warmest year of the decade. Normal global surface temperatures rose for the 21st consecutive year in 1999.

Global warming - what's causing it?

So what's causing the increase in the earth's temperature? Most scientists blame the rise in global average temperature on an atmospheric increase in what are referred to as greenhouse gases. While there are a number of gases implicated, carbon dioxide, methane, and nitrous oxide are of main concern.

The gases basically act like glass in a greenhouse. They allow sunlight through the atmosphere causing the earth to warm, and prevent some heat from escaping into space. Greenhouse gases aren't bad. For many years they have stabilized the earth's average temperature at approximately 15⁰ C. Without them average temperatures would be in the area of -18⁰ C. The problem is that human activity has radically increased the levels of these gases in our atmosphere. For example, carbon dioxide, considered to be the biggest contributor to global warming, remained constant in our environment for about 10,000 years but has increased 30% in the past 140 years.

While the burning of fossil fuels has been the main culprit in the increase of carbon dioxide levels, many other human activities increase levels in the air. For example, Environment Canada studies show that soil erosion currently releases about 2.5 million tonnes of carbon dioxide annually.

Another greenhouse gas, methane, is produced when vegetation is burned, digested or rotted without the presence of oxygen. Large amounts of methane are released by garbage dumps, rice paddies and grazing livestock.

Nitrous oxide is released when fossil fuels and organic materials are burned. Soil cultivation and fertilizer use add to the amount in atmosphere.

So, it's getting warmer - is that so bad?

While no one knows exactly what will happen as the earth's environment warms up by even a few degrees, the United Nations Intergovernmental Panel on Climate Change warns of the following possibilities:

- 1 A rise in the sea level of up to one meter (a rise of half that would displace up to 92 million people)
- 1 More deaths from heat-related sickness and disease spread by insects
- 1 More droughts, more floods
- 1 Extinction of many plants and animals
- 1 An increase of extreme weather events (i.e. hurricanes, ice storms, etc.)
- 1 Environmental refugees

Most climate change scenarios for Canada's interior predict:

- 1 More forest fires
- 1 Increased insect infestations
- 1 More drought, more floods and more extreme weather events
- 1 The arrival of diseases from warmer climates
- 1 Melting permafrost, with possible consequences for gas pipelines, roads, buildings and plant and animal life in the north
- 1 Loss of wetland habitats and consequent loss of species

What's being done? - The Kyoto Protocol

The discussion of global warming is not new. An early warning came from Swedish chemist Svante Arrhenius in 1896 when he predicted that carbon dioxide emissions from the burning of coal would lead to global warming. What is new is the level of attention global warming has received.

World wide discussion of global warming issues culminated in a 1997 gathering of 160 nations, including Canada, in Kyoto, Japan. From this the Kyoto Protocol was created. The Protocol is the result of a consensus among nations of the world that climate change caused by human activities is a definite risk, and that action must be taken. Previous agreements stressed voluntary emission control; the Kyoto Protocol is legally binding with compliance enforcement still being discussed.

While individual nations have different targets, the overall agreement is to cut emissions of greenhouse gases by 5.2 % of 1990 levels. Rather than allowing a single year as a deadline, the treaty allows countries to average their emissions over a five-year period (2008-2012).

What does this mean for Canada?

Canada has agreed to reduce emissions by 6% of 1990 levels by the 2008-2012 target - not an easy task. Canada's emissions continue to rise steadily, with an estimated increase of 10 to 13% between 1990 and 1996. To meet the agreement, estimates indi-

cate we will have to decrease current greenhouse gas emissions by 21-25%.

The Kyoto Protocol will create changes in Canadian society and will require all segments of society to do their part if our targets are to be met. And of course, Canada's agriculture industry will be no exception.

What does this mean for agriculture?

Farming practices that store carbon in our environment (carbon sequestration), rather than emit it into the air, will be encouraged. Some of these practices include reduced tillage and appropriate residue management techniques, covercrops, shelterbelt planting, fuel conservation by limiting the number and intensity of field operations, careful fertilizer management techniques, improved range management and manure handling and greater emphasis on biofuels.

Another area that could impact on farmers involves the trade of carbon credits. While negotiations of details are still in progress, this may become a widespread practice. One example of this scenario would be producers getting credits for using agricultural techniques that store carbon in their fields and trees, and selling or leasing these credits to other industries as a way of offsetting that industry's greenhouse gas emissions. A recent United States Department of Agriculture (USDA) publication entitled *Growing Carbon: A New Crop That Helps Agricultural Producers and the Climate Too*, states that earning credits for storing carbon could provide an additional source of income for agricultural producers.

This series of factsheets will explore in detail how the Kyoto Protocol will affect agriculture and how agriculture can best respond to help Canada meet the requirements of the agreement.

Sources

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For more information visit the Soil Conservation Council of Canada website: www.soilcc.ca

