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## HOW WILL CLIMATE CHANGE AFFECT CROP GROWTH AND FOOD PRODUCTION?

**Recently, I was asked to attend and participate in two different climate change adaptation workshops.** It was interesting to me that these workshops were centered on the topic of adapting to climate change and not how to reduce greenhouse gas emissions to mitigate global warming. It was discussed that even if there was concerted international action on reducing greenhouse gas emissions and if the atmospheric levels of those gases were significantly decreased to levels of pre-industrial times, the Earth's average temperature is still going to continue to rise for a period of a decade or two.

**An increase in average annual temperature in a region can greatly affect what type of crops can be grown.** In areas of shorter growing seasons, such as the Northern Great Plains (NGP), this could mean that we will be able to grow longer season, more heat-requiring crops. The northern edge of where corn and soybean crops are grown could possibly move north from where it has traditionally been. Conversely, the bottom edge of the area where cooler temperature crops—i.e. canola, field peas, lentils and spring-seeded wheat, barley and oats—will move north, with cropping moving into northern areas where limited heat and length of growing season did not allow successful cropping of these crops previously.

**One of the great unpredictable aspects of climate change is what will happen to the amount of annual precipitation and how that precipitation will be distributed throughout a year, especially during the growing season.** There are numerous climate change models used to predict precipitation amounts and patterns for different regions. At one climate change workshop I attended, the majority of available climate prediction models discussed indicate that in Saskatchewan there will probably be more precipitation received, but it will shift somewhat more into the fall and winter and less during the growing season. This could affect how well different crops grow and yield. For example, this may mean that fall seeded winter wheat may grow more successfully in areas where spring seeded wheat was previously the dominant crop. Another possibility is that the development and reliance on irrigated areas may increase as precipitation received in the fall and winter may be successfully stored in irrigation reservoirs to be utilized in the warmer and drier summers to irrigate crops. Among other potential trends in precipitation is that there may be an increased chance of periods of drought, but also times of potentially higher than normal precipitation. My understanding of this is that there will be more variability and perhaps more extreme weather events.

**One of the more predictable effects of increased levels of carbon dioxide (CO<sub>2</sub>) in the atmosphere along with slightly higher temperatures is that crop growth will increase due to the increased efficiency of photosynthesis.** This is known because the greenhouse industry uses artificially elevated CO<sub>2</sub> concentrations and temperatures to increase the growth of horticultural crops such as ornamentals, flowers, and the growth and yield of vegetable crops. While CO<sub>2</sub> is an atmospheric greenhouse gas, it is also a plant nutrient taken in through crop leaves and is a vital building block of photosynthesis. If crop growth and yields increase, then nutrient application rates will need to increase to supply crops with the needed nutrients. This will mean that fertilizer demand may also increase.

**I was asked to attend the climate change workshops as an IPNI scientist, but also as an agricultural industry and fertilizer industry representative.** At one meeting I was asked if the agricultural industry was capable and ready to adapt to climate change. In answering this question I could confidently respond that, yes agriculture will be able to adapt to climate change ... it always has and always will. Agriculture has survived periods of cooling or warming, moisture deficits or excess, needed changes in crops grown sometimes due to climate change, but also adapting to changing market needs. Admittedly, the unprecedented rate of climate change we are presently experiencing will demand a timely and effective response by the agriculture industry to continue growing the food and fiber needs of humankind. Scientific knowledge, research, and adoption of new proven technologies will be important to successfully adapt to climate change.

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For more information, contact Dr. Thomas L. Jensen, Northern Great Plains Director, IPNI, 102-411 Downey Road, Saskatoon, SK S7N 4L8. Phone: (306) 652-3535. E-mail: [tjensen@ipni.net](mailto:tjensen@ipni.net).