

## AGRICULTURAL ADAPTATION TO CLIMATE CHANGE IN MINNESOTA

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### **Abstract**

The challenge facing world agriculture is not simply to adapt to climate change, but to substantially and sustainably increase food production while doing so. Global population has doubled in the past forty years, and while the rate of increase is slowing, the number of mouths to feed will continue to rise in the foreseeable future. Per capita meat consumption has also doubled over the past forty years, a trend that is expected to continue, and significantly more grain is required to support a meat-intensive diet. To make matters worse, there is now an expectation that our shrinking agricultural land base will also make a meaningful contribution to society's need for energy.

How will a changing climate impact this task? In descending order of confidence, the following climatic changes are expected for the Upper Midwest: CO<sub>2</sub> concentration will continue to increase; mean annual temperature will continue to increase, with night-time minima increasing more than daytime maxima; the length of the growing season will continue to increase; annual precipitation will continue to increase; dew point temperatures will continue to increase; the frequency of more intense rainfall will increase.

At first glance, many of these changes would appear to favor increased crop production. However, there are concerns that they may be even more favorable for insect pests, weeds, and diseases. In addition, expected intensification of the hydrologic cycle may result in increased likelihood of productivity losses to flooding and erosion. Thus, adaptation may require 1) redoubled efforts to prevent or manage pathogenic impacts on crop production, 2) development of new crops, crop varieties, and management systems that resist or tolerate pathogen pressures, and 3) land use modifications that improve the hydrologic buffering capacity of watersheds.