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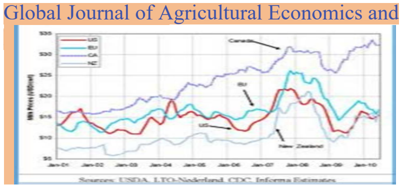

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Impact of climate change on agriculture and food industry

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ABOUT THE STUDY

Agriculture is a major source of Greenhouse gases which contribute to the greenhouse effect and climate change. However, the changing climate is having far reaching impacts on agricultural production, which are likely to challenge food security in the future.

FACTORS

The water needed for food production can be in short supply due to increased water usage and drought. As certain areas become more climatic, competition for land can intensify. Global food security depends on both adequate food production and access to food and is defined as the following conditions: Climate change can contribute significantly to future food insecurity by increasing food prices and reducing food production (Andersen et al., 2011). Food can be more expensive as efforts to mitigate climate change push up energy prices.

In addition, extreme weather events associated with climate change can cause abrupt declines in agricultural productivity, leading to sharp rises in prices. For example, the summer 2010 heat wave reduced yields and dramatically increased staple food prices in major production areas such as Russia, Ukraine and Kazakhstan (Benhin 2006). These soaring prices are driving more and more locals into poverty and calmly show how the effects of climate change can lead to food insecurity. Predicted climate change is not limited to rising temperatures and heat waves. Significant changes in precipitation patterns are also expected. Some areas may suffer further droughts in the future, while others are expected to face the contrasting problems of torrential rains and increased floods.

In coastal areas, rising sea levels can lead to the complete loss of farmland. Warm climates can also cause more problems from pests, diseases and changes in the geographical distribution of certain pests. For example, insects that act as mediators of disease transmission may move further in the polar direction in the future when livestock have not previously been exposed to these diseases (Batlle et al., 2010). Agriculture is an important sector of the economy.

The crops, livestock and seafood produced in the United States contribute more than $300 billion to the economy each year. When food-service and other agriculture-related industries are included, the agricultural and food sectors contribute more than $750 billion to the gross domestic product. Higher CO^2 levels can affect crop yields. Some laboratory experiments suggest that elevated CO^2 levels can increase plant growth.

However, factors such as temperature changes, ozone, water and nutrient limitations counteract these potential increases in yield (Duchaud et al., 2003). For example, if the temperature exceeds the optimum level for the crop, the increase in yield can be reduced or reversed if sufficient water and nutrients are not available. Elevated CO^2 levels are associated with reduced levels of protein and nitrogen in alfalfa and soybean plants, resulting in reduced quality.

Poor grain and feed quality can reduce the ability of pastures and pastures to support livestock grazing. Many weeds, pests and fungi breed at warmer temperatures, moister climates and increased CO2 levels. Today, US farmers spend more than $11 billion annually to control weeds that compete with their crops for light, water and nutrients. The range and distribution of weeds and pests is expected to increase with climate change (Estruch et al., 1996). This can cause new crop problems for farmers who have never been exposed to these species before.

Climatic Changes

This study focused on the effects of climate change. These models do not address economic incentives, changes in agricultural practices, and adjustments such as, breeding stronger plant varieties, which is an area of active research. The research team plans to investigate these aspects in follow-up work (Grau et al., 2005). These factors continue to determine the fate of future agricultural yields as humans respond to climate related changes.

The team looked at changes to long term average crop yields and introduced a new estimate for when climate change impacts “emerge” as a discernible signal from the usual, historically known variability in crop yields. Soybean and rice projections showed a decline in some regions but at the global scale the different models still disagree on the overall impacts from climate change.

For maize and wheat, the climate effect was much clearer, with most of the model results pointing in the same direction (Lambin et al., 2001). Temperature is not the only factor the models consider when simulating future crop yields.

High levels of carbon dioxide in the atmosphere have a positive effect on photosynthesis and water retention, often at the expense of nutrition, but increase crop yields. This effect occurs more often in wheat than in corn, which is more accurately recorded in the current model generation (Markandya 2001). Rising global temperatures are also associated with changing precipitation patterns, the frequency and duration of heat waves and droughts, which can affect crop health and productivity. Higher temperatures also affect the length of the growing season and accelerate the maturation of the harvest.

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