CLIMATE CHANGE IMPACT ON CROP YIELD IN USA, CANADA, AND AUSTRALIA

Introduction

The effects of climate change on crop yield in Australia, Canada, and the USA have been examined in this paper. Among all the 10 countries of the dataset, these 3 countries have been selected since it was the focus of the analysis. Thus, the correlation of temperature, precipitation and economic losses has been analyzed to establish how these climate variables influence agriculture in these countries.

Dataset Overview and Preprocessing

It presents the crop yield along with data on temperature, economic effect, and precipitations of Australia, Canada and the USA. The variables included in the dataset are,

- **Average Temperature (°C):** The average temperature upon which each country averagely settled on for the duration of the study.
- **Crop Yield (MT/HA):** Crop yields per hectare of recognized crops.
- **Economic Impact (Million USD):** Economic benefits stem from the enhancement of agricultural yield.
- **Total Precipitation (mm):** The total volume of water that fell on the observation area for the time under consideration.

Preprocessing

The dataset was filtered to choose only data from the USA, Canada, and Australia. On the other hand, missing values were checked, and necessary columns were aggregated to create summary tables for analysis.

Trend Analysis

The pattern of temperature and crop yield over the comparative period was generally upward for the three countries. Based on the three crops of interest for Australia, crop yield was relatively constant at around 2.23 MT/HA, regardless of the changes in temperature. The coefficients of variability of yields in Canada and USA were also relatively homogenous with the averages of 2.23 MT/HA and 2.24 MT/HA, correspondingly. This means that temperature affects crop yield although it is not clear if other factors help to regulate stability.

The regression of precipitation and crop yield shows that yield increases with an increase in rainfall. The countries that received higher and more consistent quantities of precipitation during the period under consideration, namely the USA and Canada, revealed rather stable rates of crop production. Meanwhile, Australia which had suffered more volatile rainfall regimes was more volatile in both crop yields and economic losses. There was an indication that precipitation played a key role in determining yields in crops in nations that experienced considerable fluctuations in weather.

An analysis of the correlation between economic effects and crop production indicated that the yields always had a direct proportional effect on the economy. Australia recorded a different economic loss ranging between 599.23 million USD and 731.29 million USD. Canada had an economic impact which varied between 639.68 million USD and 695.39 million USD and the USA had a variation of between 639.68 million USD and 676.74 million USD. It

was established that these fluctuations had an association with the differences in yield levels and adaptation strategies in crops grown.

Key Findings

Summary Table

- Australia was expected to have stable crop yields of an average of 2.23 MT/HA. The total value of the economic loss was between 599.23 million USD and 731.29 million USD, shifts in crop yield were reflected in variations in the overall amount.
- Canada also kept an average crop yield of approximately 2.23 MT/HA constant. The economic impact was as follows ranging from 639.68 million USD to 695.39 million USD. Yield and economic returns seemed to be stabilized by precipitation.
- USA had yielded a slightly higher average of crop yields of 2.24 MT/HA. Economic loss-gain estimates ranged between 639.68 million USD and 676.74 million USD influenced by crop yield and temperature.

Conclusion

The factors of the temperature, Precipitation, and Crop yield illustrated the interaction of various elements where used in the analysis. Overall for Australia, Canada, and the USA, steady yield was obtained for crops for the coefficient of temperature variation. Thus it can be stated that other factors such as precipitation and the practising of agriculture have considerable influence. It was established that crop yields were strongly correlated with economic positive repercussions for the farmers. Therefore, this information is invaluable in informing the decision-making process concerning agriculture, especially for climate change adaptation as well as for the development of sustainable agriculture.

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