ANALYZING THE IMPACT OF TEMPERATURE CHANGES ON CROP PRODUCTION AND YIELD IN IRELAND (2008-2023)

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Introduction:

The primary objective is to analyze the impact of temperature changes on crop yields in Ireland from 2008 to 2023.

The focus is on two major crop categories: “Total wheat, oats, and barley” and “Beans and peas”, “Oilseed rape”, and “Potatoes”.

Datasource1: Temperature change countrywise

•Metadata: https://www.fao.org/faostat/en/#data/ET/metadata
•Dataset: https://bulks-faostat.fao.org/production/Environment_Temperature_change_E_Europe.zip
•Data Type: CSV
The CSV file contains temperature change data for Ireland from 1961 to 2023

Datasource2: Crop Yield (2008 - 2023) - Ireland

•Metadata: https://data.gov.ie/dataset/aqa04-crop-yield-and-production/resource/ca2113ee-d9f3-4654-acc6-777213ae9330
•Data URL: https://ws.cso.ie/public/api.restful/PxStat.Data.Cube_API.ReadDataset/AQA04/CSV/1.0/en
•Data Type: CSV
The CSV file contains data of crop yield in Ireland.

Data Pipeline:

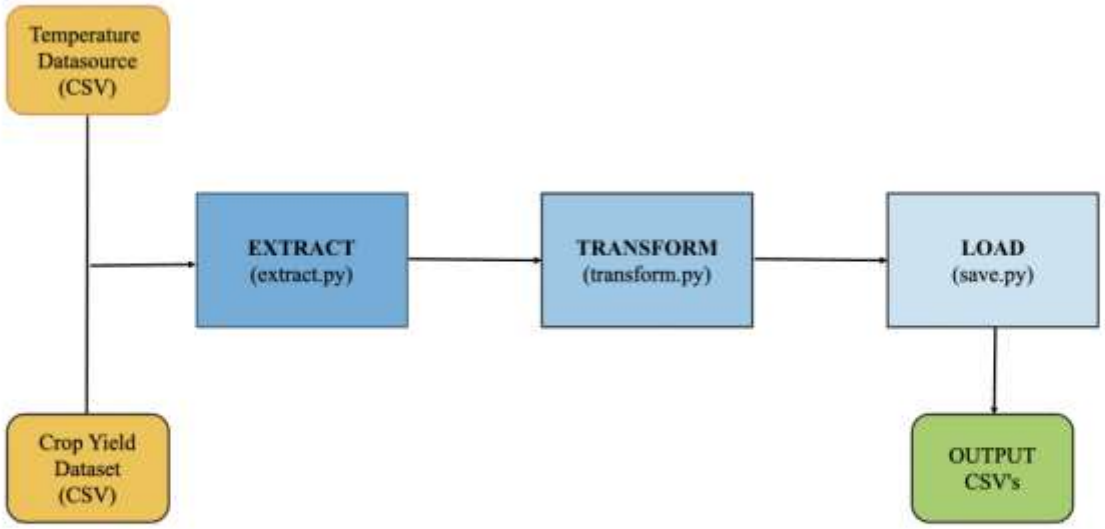
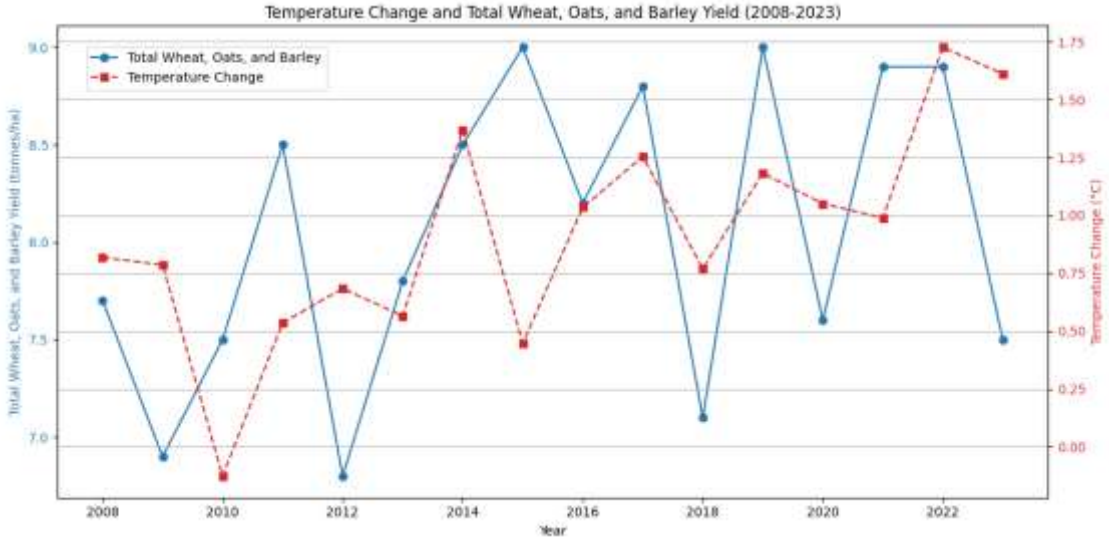
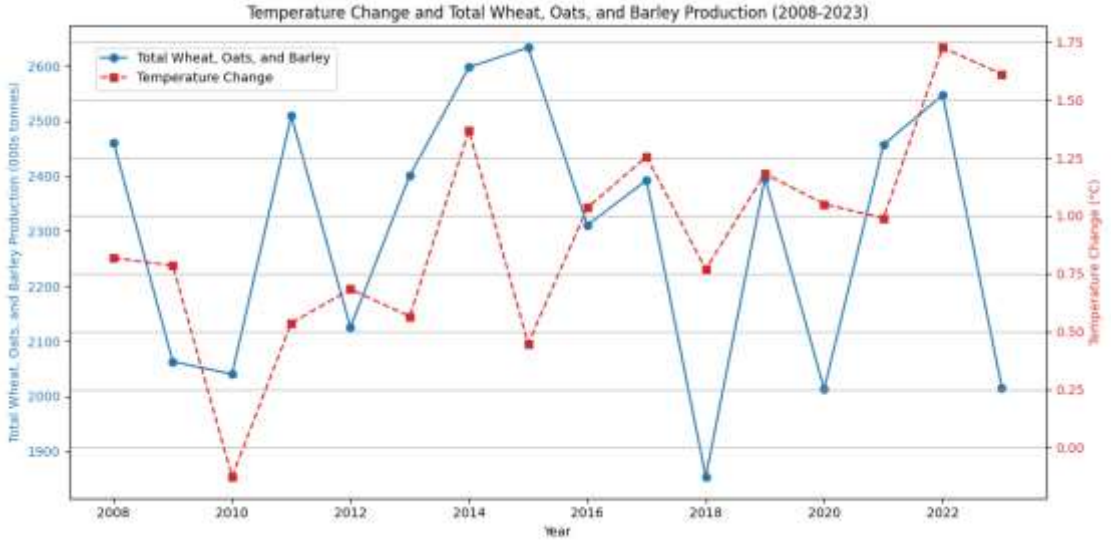


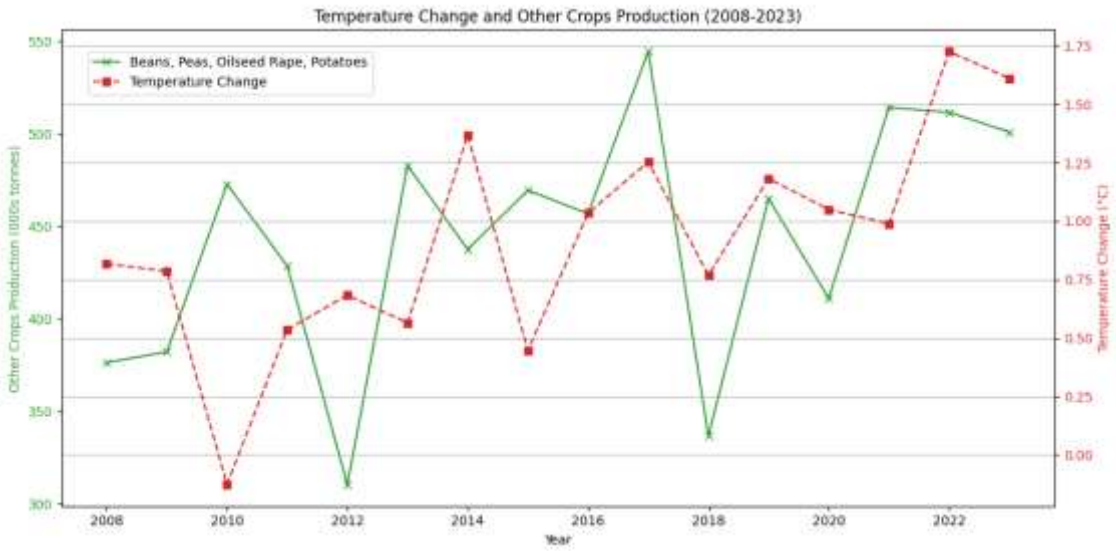
Figure 1: Data Pipeline

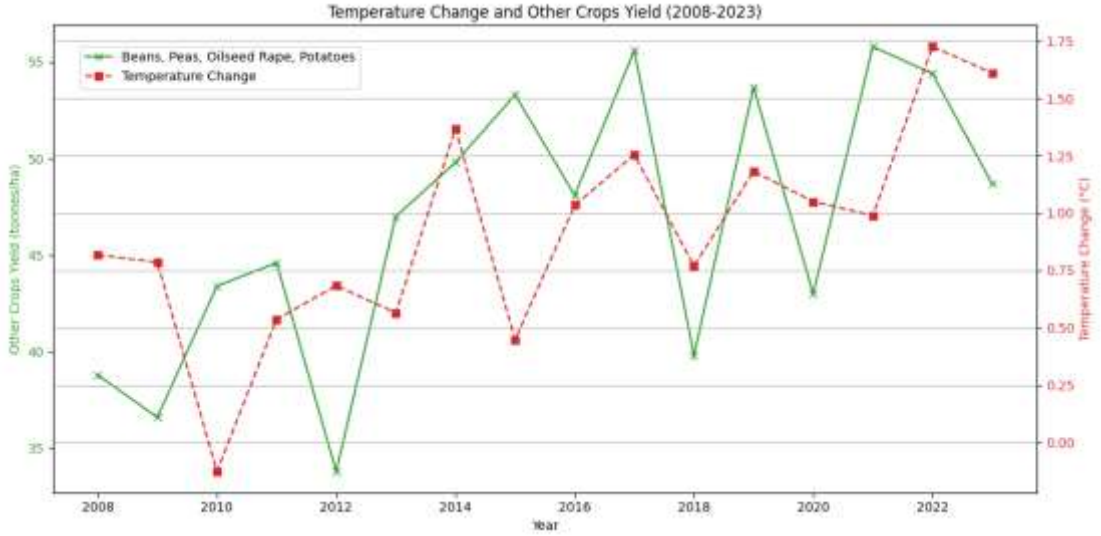
Analysis:


Temperature Change and Total Wheat, Oats, and Barley Yield (2008-2023)
Total Wheat, Oats, and Barley
Temperature Change
Total Wheat, Oats, and Barley Yield (tonnes/ha)
Temperature Change (°C)
Year
9.0
8.5
8.0
7.5
7.0
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
2008
2010
2012
2014
2016
2018
2020
2022


Temperature Change and Total Wheat, Oats, and Barley Production (2008-2023)
Total Wheat, Oats, and Barley
Temperature Change
Total Wheat, Oats, and Barley Production (000s tonnes)
Temperature Change (°C)
Year
2600
2500
2400
2300
2200
2100
2000
1900
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
2008
2010
2012
2014
2016
2018
2020
2022

Analysis:


Temperature Change and Other Crops Production (2008-2023)
Beans, Peas, Oilseed Rape, Potatoes
Temperature Change
Other Crops Production (000s tonnes)
Temperature Change (°C)
Year


Temperature Change and Other Crops Yield (2008-2023)
Beans, Peas, Oilseed Rape, Potatoes
Temperature Change
Other Crops Yield (tonnes/ha)
Temperature Change (°C)
Year

Results:

Total Wheat, Oats, and Barley:

- The correlation analysis showed a generally negative relationship between temperature changes and crop production.
- Certain years with significant temperature increases corresponded with noticeable drops in production, indicating that higher temperatures may adversely affect these crops.
- Similar trends were observed in crop yields, where years with higher temperature deviations often showed decreased yields
- This suggests that ”Total wheat, oats, and barley” are sensitive to temperature variations, which can negatively impact their productivity.

Results:

Beans and Peas, Oilseed Rape, and Potatoes:

- The analysis indicated a more varied relationship between temperature changes and the production of these crops.
- In some years, an increase in temperature correlated with an increase in production, suggesting that these crops might be more resilient or may even benefit from certain temperature increases.
- The yield data for these crops showed a complex relationship with temperature changes.
- While some years with higher temperatures showed increased yields, others showed decreased yields, highlighting the varied sensitivity of these crops to temperature variations.

Limitations:

Other Climatic Factors: The study focused solely on temperature changes, but other climatic factors such as precipitation, humidity, and extreme weather events also significantly impact crop yields.

Crop-Specific Variability: The analysis aggregated data for specific crop categories, which may mask variability within each category.

Geographical Variability: Ireland's diverse microclimates and regional differences in soil quality and farming practices were not explicitly considered.