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Keywords: Weather Pattern, Food Security, Crop Production, Extreme Weather, Climate Change

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Title

Consequences of Changing Weather Patterns on Barley and Maize Production: A Case Study of Rawat District, Rawalpindi

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Contents

Abstract

This study examines the impact of weather change patterns on maize and barley and maize farming in Rawat, District Rawalpindi. Farmers are facing significant issues due to rising temperatures, unpredictable rainfall, and an increase in extreme weather events. Farmers' income has been low because of changing weather patterns, which include high pest problems, low crop production, and high yield costs. The exploratory research method is used in this research. The results show that farmers need fast and proper support. Farmers can deal with problems easily if they have proper farming techniques, regular weather updates, and the help of government experts. These steps are important to keep crops developing well and protect the farmers' daily life in the area like Rawat.

Keywords:

Weather Pattern, Food Security, Crop Production, Extreme Weather, Climate Change

Introduction

In Rawat, District Rawalpindi, where income is primarily dependent on agriculture and food security, climate change is causing major difficulties in farming. Crops like Maize (corn) and Barley are affected by increasing temperatures, lower rainfall, and extreme weather. Sometimes, there is too much rain, and sometimes, there is no rain, which makes it harder for farmers to grow these crops.

Maize and barley are both important crops in Rawat and play an important role in food supply and income. They commonly grow in watered and rainy areas. Maize and barley both have increasing demand and value in Rawat, Pakistan. But they face many problems during their production, such as poor weather or climate change, a shortage of water, and poor farming techniques. Firstly, decreased production can cause food shortages, higher prices, and decreased income. And secondly, improper use of fertilizer can damage the

environment. To understand these challenges and make better facilities for farmers.

In countries like Pakistan, India, Nepal, and Bangladesh, many people are farmers and rely on rain. But now, rain comes at the wrong times or not at all, and extreme heat or weather can destroy and damage the crops, both maize and barley. Poor farmers face the most because they do not have enough money to afford better tools, seeds, instruction, or help. Crops do not develop properly due to less water. Heavy rain can damage crop production.

In Pakistan, areas like Punjab and Khyber Pakhtunkhwa grow a lot of Maize and Barley. However, extreme weather and increasing temperatures are making it harder to grow these crops. Barley needs cool weather, and Maize is sensitive and does not develop well if it is too hot and too dry. Because of this, farmers are losing crops like maize and barley, a source of income, and their way of life is being affected.

Problem Statement

The weather in Rawat, District Rawalpindi, has changed over the past year. Changes in weather patterns are making it harder to prepare and protect crops, putting pressure on food yield and farmers' sources of income. Maize and barley are both affected by climate change. Understanding how these weather differences are affecting Barley and Maize can help find better ways to support farmers, such as giving farming tools, guidelines, and crops, and keep stable crop production in the future.

Research Objectives

1. To investigate the consequences of extreme weather events on food production
2. To examine the ways farmers are adapting to protect their Barley and Maize production from climate change

Research Question

1. How do extreme weather events affect the growth and harvest of Barley and Maize?
2. What are farmers doing to protect their Barley and Maize crops from climate change?

Importance of Study

Barley and Maize are two basic crops that are essential for food and income purposes in the Rawat regions. The Changes in weather patterns can lead to lower production of crops, which affects farming fields and food sources. By studying the effect of climate change on crop productivity, we can find better farming techniques. I can explore the ways to adopt farming techniques, such as grafting crops that grow with less water and changing planting dates. This study is important because it helps communities prepare for the future and reduces the negative effects of climate change on agriculture. It also saves food security and supports farmers to be strong in the future. Farmers can grow healthy crops with better planning.

Research Approach

The research was done in Rawat, a rural District of Rawalpindi village, famous for its barley and maize crops. Data collection was conducted via in-depth interviews with 30 local farmers to understand how climate change affects crop yield. The main goal of this study is to learn how specific weather conditions affect farming. The research aims to understand how the production of Maize and barley is disturbed due to uncertain weather conditions. By focusing on this, we can understand the numerous factors that help us to create solutions for farmers to meet their livelihood needs.

Review of Literature

Change in climate has impacted the production of Barley and Maize, particularly in countries such as Pakistan. Rise in temperatures and unpredictable rainfall patterns have resulted in lower production of crops. In Pakistan, the temperature rise will be 2.8°C by 2069, which can negatively affect production crops owing to increased heat stress and water shortage (Ahmad et al., 2015). In particular, increasing the temperature by 1°C can lower maize production by about 7% (Hussain & Bangash, 2017).

Production of Maize is susceptible to climate change. In Africa, an increase in temperature by 2°C combined with a 20% reduction in rainfall led to a loss of 10% in maize production (Lobell et al., 2011). In China, a 1.32°C rise in

temperature is expected to decrease production of maize by about 35% by 2030 (Zhao et al., 2017).

From 1970 to 1999, global warming caused maize harvests to drop by about 2.5% on average in the United States. The Changes in weather patterns can lead to lower production of crops, which affects farming fields and food sources. Scientists warn that if the world releases many greenhouse gases, production of corn could shrink even more, possibly by 20% to 50% by the 2050s (Schlenker & Roberts, 2009). These studies emphasize the significant role of changes in temperature and rainfall in maize productivity.

The most commonly grown crop in semi-arid areas is Barley, which faces risk due to changes in weather conditions. Rising temperatures in Morocco have been linked to reduced production of Barley, especially in situations with increased concentrati ons of greenhouse gases (RCP 8.5) (Achli et al., 2024).

Changing weather patterns are becoming a major challenge for agriculture worldwide. In Pakistan—and especially in regions like Rawat, District Rawalpindi—these changes are having a serious impact on key crops such as barley and maize. Changes in rainfall patterns and increasing temperatures impact how these crops develop and how much farmers can yield (Khan et al., 2020).

Researchers show the value of increasing awareness, using modern farming practices, and providing government help to farmers due to changing weather conditions (Farooq et al., 2019). Many small-scale farmers in rural areas like Rawat still face problems due to limited resources and access to help (Khalid et al., 2022).

Many studies show that irregular rainfall patterns impact soil water levels and crop development stages. Maize is a sensitive crop and faces problems in drought conditions (Hussain et al., 2020). Increasing temperature during the flower development steps of barley can decrease grain quality and production (Rehman et al., 2022).

Materials and Methods

- Study Location: Rawat, a rural area within the District Rawalpindi, known for its maize and barley cultivation, it is important crops in Rawat. Rawat is a relevant location for this research because many local farmers are affected by the changing climate.
- Sample Size: This research can be conducted with 30 smallholder farmers in the Rawat region. These farmers can provide data on how the weather affects maize and barley production. Farmers' experience is important to find better ways to save crop production.
- Participants: Both male and female farmers from the local community who are directly involved in crop production, such as barley and maize. I have collected first-hand experience from farmers to show how climate change affects farming practices and crop production.
- Research Approach: Exploratory research design aimed at uncovering firsthand experiences, challenges, and adaptive practices. This method helps to clearly learn from the farmers, and also explore new things to support better farming techniques.
- Data Collection Method: In-depth, semi-structured interviews to gather detailed and nuanced insights. The farmer easily asks open-ended questions and shares their experience about climate change. These techniques are very useful to gather better information.

Research Instrument: A carefully developed interview guide to facilitate open and friendly discussions while ensuring all key topics are covered. It supports the farmers to share their thoughts, experiences, and ideas in their own words.

Research Methodology

This study used a qualitative research approach to truly hear the voices of farmers in Rawat. Through carefully guided in-depth interviews, we explored how these farmers see and experience climate change in their everyday lives. The focus was on understanding not just how shifting weather patterns affect their farming methods, but also the real struggles, worries, and tough choices they face as they try to protect their crops and income. It supports the farmers to share their thoughts, experiences, and ideas in their own words.

By listening to their personal stories and firsthand experiences, this research aims to paint a

clearer picture of what climate change looks like on the ground and highlight the resilience and creativity farmers bring to overcome these growing challenges.

Results and Discussion

Rawat is a relevant location for this research because many local farmers are affected by the changing climate. This research can be conducted with 30 smallholder farmers in the Rawat region. These farmers can provide data on how the weather affects maize and barley production. Both genders of farmers from the local community are directly involved in crop production, such as barley and maize. Due to changes in the climate, farmers faced a lot of difficulties in managing their production of crops and food availability. The majority of respondents said that with the passage of time, the weather was getting hotter and there were irregular rainfall patterns. An exploratory research design is used in this research. This study used a qualitative research method to truly hear the voices of farmers in Rawat. Some of the farmers respond that too much heat disturbs the productivity of crops, and because of this, insects and diseases are becoming more common. Farmers spend more money on it. Crops do not develop properly due to less water. Heavy rain can damage crop production. Farmers spend more money on irrigation systems to save their crops. Small or poor farmers can face many problems in crop production.

Farmers also respond that these factors make farming more expensive and complicated. Farmers said they do not get any help, such as Loans and Funds. They also said that they can no longer depend on regular seasons due to the changing climate and face difficulty in planting and harvesting. If this continues, it might damage the source of income and reduce the food supply. To reduce these changes, farmers need better guidance and help, such as weather updates and improved farming techniques. Farmers' crop varieties change due to lower rainfall and increasing temperature.

Conclusion

The farmers of Rawat are facing a lot of difficulties because of changing weather patterns. Rawat is a relevant location for this research because many local farmers are affected by the changing climate. Rise in temperatures, lower rainfall, and changing weather patterns make it hard to develop Barley and Maize properly. These factors are reducing crop yields, rising costs of fertilizers and seeds, and causing more pests and diseases. An exploratory research design is used in this research. In this method, farmer are openly asked anything and share their personal experience, thoughts, and ideas. This shows how climate change is affecting crop production like maize and barley. Barley and Maize are two basic crops that are essential for food and income purposes in the Rawat regions. Without better help, farmers who depend on it face more problems. Lower rainfall cannot be enough for healthy crop production, and heat can reduce the quality of grain. Farmers spend more money on pest control or fertilizer to control crop problems. In Rawat, farming is not just a job; it is a main source of income and livelihood. By studying the effect of climate change on crop productivity. I can explore the ways to adopt farming techniques, such as grafting crops that grow with less water and changing planting dates. In case of crop production failure, it directly affects the farming income. Farmers give more education about farming. The results show that farmers need fast and proper support. Farmers can deal with problems easily if they have proper farming techniques, regular weather updates, and the help of government experts. These steps are important to keep crops developing well and protect the farmers' daily life in the area like Rawat. This study is important because it helps communities prepare for the future and reduces the negative effects of climate change on agriculture. The government gives modern farming techniques, tools, support, income, etc. In case of heat or increasing temperature, they damage crop production. Lower rainfall can cause water shortage in farming areas, which also affects crop production. Changing weather patterns are also affecting the crop yield. To improve farming, farmers give proper guidelines to agriculture experts, using proper tools and techniques, and follow weather updates regularly. The majority of respondents said that with the passage of time, the weather was getting hotter and there were irregular rainfall patterns. Some of the farmers' responses are that too much heat disturbs the productivity of crops. Because of this, insects and diseases are becoming more common. Rise in temperatures and unpredictable rainfall patterns

have resulted in lower production of crops. Researchers show the value of increasing awareness, using modern farming practices, and providing government help to farmers due to changing weather conditions.

Recommendations

- It is important to provide the farmers with better weather updates and guidance on farming methods that work in changing weather conditions.
- Agricultural officers should provide better guidance to the farmers.
- Better help and advice will make farming more sustainable and protect the source of income for farmers.
- Farmers should give training about the effects of changing weather.
- Farmers should use a water distribution method to save water.
- Regular weather updates should be shared with farmers.
- The government should help farmers after a crop failure.
- Soil testing should be completed daily to improve yield.
- Farmers should make a group to share farming trips with each other.
- Policies should be made to save crops from changing weather patterns.

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