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Kanwar Aditya Singh

University Institute of Agriculture
Sciences, Chandigarh University,
Mohali, Punjab, India

Hardik Sharma

University Institute of Agriculture
Sciences, Chandigarh University,
Mohali, Punjab, India

Priyanshu Wadhwa

University Institute of Agriculture
Sciences, Chandigarh University,
Mohali, Punjab, India

Gurshaminder Singh

University Institute of Agriculture
Sciences, Chandigarh University,
Mohali, Punjab, India

Corresponding Author:

Kanwar Aditya Singh

University Institute of Agriculture
Sciences, Chandigarh University,
Mohali, Punjab, India

Impact of climate change on crop cultivation in Himachal Pradesh

**Kanwar Aditya Singh, Hardik Sharma, Priyanshu Wadhwa and
Gurshaminder Singh**

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Abstract

Among the most urgent issues of our day is climate change, which has a big impact on agricultural systems all over the world. India's Himalayan state Himachal Pradesh, which is tucked away in the Himalayan area, is especially susceptible to the effects of climate change because of its varied terrain and reliance on agriculture. The present level of knowledge on how climate change is affecting agricultural farming in Himachal Pradesh is reviewed in this research. It looks at how temperature, precipitation patterns, and extreme weather events have changed over time and how it has affected agricultural productivity. The adaptation and mitigation techniques that may be used to increase the agricultural systems' resilience in Himachal Pradesh to climate change are also covered in this study. Historical climate data spanning several decades are analysed to identify trends and variability in temperature, precipitation, and extreme weather events. Climate projection models are utilized to simulate future climate scenarios, considering different greenhouse gas emission trajectories. The findings of this study contribute to a better understanding of the complex interactions between climate change and crop production in Himachal Pradesh, informing the development of adaptation and mitigation measures to enhance the resilience of agricultural systems in the region.

Keywords: Climate change, crop production, agroecosystem, mitigation

Introduction

One of the biggest problems confronting humanity in the twenty-first century is climate change, which has profound effects on many different industries, including agriculture. According to the Intergovernmental Panel on Climate Change (IPCC), climate change is a long-term alteration in weather patterns that results from industrial processes, the burning of fossil fuels, deforestation, and variations in temperature and precipitation. Global warming and the intensified greenhouse effect are caused by these activities' atmospheric emission of greenhouse gases (GHGs). Numerous and intricate factors, including crop yields, water availability, soil fertility, pest and disease prevalence, and overall food security, are all impacted by climate change's effects on agriculture. Climate is a fundamental aspect of agriculture; various crops have varied requirements for growth and yield, such as temperature, rainfall, and seasonality. These circumstances are becoming more and more disturbed due to climate change, which presents serious difficulties for farmers all over the world.

Materials and Methodologies

The study was conducted in district Bilaspur, Mandi, Kullu & Shimla of Himachal Pradesh. 100 farmers were selected from these districts, 25 from Bilaspur, 25 from Mandi, 25 from Kullu and 25 from Shimla. The farmers were asked to participate in a thorough discussion on their social standing and the plant protection practices they employ during the cropping cycle. Both at their homes and on their farms, the respondents were questioned. To fully cover every facet of the farmers' agronomical practices, a questionnaire was created to interview the farmers and closely scrutinize each parameter.

Results and Discussion

Crops cultivated by farmers in Bilaspur and Mandi regions are wheat, maize, paddy, sugarcane, tomatoes, fruit crops like as mango, lichi, orange and pomegranate. With change in climatic conditions farmers of Kullu valley are taking interest in pomegranate and apple as well. Shimla is known for apple cultivation at national level. Upper valleys of Shimla and Kullu are good producers of Almonds, strawberries, peach, plum, apricot. But due to change in climate farmers are opting for hybrid varieties so that crops can tolerate change in climatic conditions. Mitigation and Adaptation plans can help farmers and growers in such conditions.

Awareness of farmers about weather changes in their regions.

Districts	Yes (percentage)	No (percentage)
Shimla	83	17
Kullu & Manali	92	8
Bilaspur	86	14
Mandi	94	6

Perception of people on climate change.

Indicators	Yes	No	Neutral
Has the climate changed?	85	5	10
Increase in temperature	80	15	5
Decrease in snowfall	70	25	5
Erratic rainfall/shift in rainfall	90	5	5
Shift in crop maturation	80	10	10
Decline in plant diversity	52	32	16
Increase in pest/disease in crops	85	10	5
Change in agricultural land use	80	10	10
Decrease in water availability	80	15	5
Change in agrobiodiversity	80	5	15
Decrease in forest resources	72	20	8
Change in phenology	74	2	24

Discussion

The Himalayan Mountain agroecosystem is heavily reliant on the weather; seasonal rains and alterations in the earth's temperature have a detrimental effect on the region's agricultural productivity and food supply. People experienced and acknowledged that the region's low yield of agrihorticultural crops and vegetables was caused by irregular rainfall over the past few years (delayed or shifted rainfall, low rainfall or no rainfall), drastic changes in the frequency and volume of precipitation patterns, low snowfall, and rising temperatures. Pests, illnesses, and invasive plant species have proliferated as a result of climate change, directly affecting crop yield and food security.

In recent times, there has been a decrease in the seasonal availability and amounts of nontimber forest products, fuel wood, fodder, and green grasses. These resources are essential for the agroecosystem and rural landscape to operate properly and to support everyday tasks. Fodder, fuelwood, leaf litter, and non-timber forest products (NTFPs) are examples of forest resources that have decreased over time as a result of a number of reasons, including climate change. The decrease in the availability of wild foodstuffs and medicinal plants as a result of overexploitation, which was further exacerbated by climate fluctuation, led to the loss of habitats, the migration of species towards higher or lower altitudes, and the extinction of entire species. A lot of individuals began growing therapeutic plants as a result of climate change.

Conclusion

Mitigation and adaptation strategies are needed to address the issues posed by climate change and variability. Given that adaptation is often a more cost-effective solution than mitigation when it comes to addressing the immediate and ongoing challenges posed by climate change, adaptation is typically a longer-term process. Most of the research done to far has ignored the indigenous knowledge of adaptation and mitigation strategies created by the local people in favor of concentrating on the negative effects of climate change. Although people's perceptions and awareness of climate change might be valuable resources for adapting to it, governments and policy planners at the national and international levels seldom take this into account when designing and implementing mitigation and adaptation plans. Individuals are experimenting with novel methods of adapting to climate change and unpredictability, which is improving their capacity for adaptation. However, organizations that provide services might not be identifying these innovations and sharing them with others who could find value in them. One strategy to increase human capacity for global climate change adaptation and mitigation is to integrate scientific information about climate change with people's perceptions and indigenous knowledge. This necessitates greater scientific investigation, awareness-building, and improved access to pertinent data and information, especially about local residents' understanding and experiences regarding climate change.

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