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Research Paper

Problems in apple farming: a case of kashmir valley

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ABSTRACT

Apple farming is a critical economic activity in the Kashmir valley, providing livelihoods to thousands of farmers. However, apple farmers in the region face several challenges that hinder their productivity and profitability. These challenges include climate change, unseasonal snowfall, lack of credit and insurance, pest attacks, high input costs, market access, and the selection of proper fungicides. Climate change has caused a shift in the apple-growing regions and has led to increased pest attacks, while unseasonal snowfall damages the apple trees and reduces the yield. Lack of credit and insurance prevents farmers from investing in their farms, while high input costs and the selection of proper fungicides add to their production costs. Market access remains a significant challenge for farmers, with many of them having to sell their produce at lower prices due to a lack of proper market infrastructure. These challenges require immediate attention and support from the government and other stakeholders to ensure the sustainability of apple cultivation in the region and the livelihoods of the farmers. In this context, this paper aims to highlight the challenges faced by apple farmers in the Kashmir valley, their impact on apple cultivation, and the measures that can be taken to address these challenges. The paper also aims to create awareness among stakeholders regarding the importance of sustainable apple cultivation and the need to support apple farmers in the region.

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1. INTRODUCTION

The apple industry is an essential part of the economy of Kashmir valley. It is one of the major sources of income for the people of the region, with an estimated 1.5 million people dependent on apple cultivation for their livelihoods [1]. The apple industry in Kashmir valley is known for its high-quality produce, particularly the Kashmiri apples, which are famous for their unique taste, flavor, and aroma. The apples grown in the region are primarily of two varieties - Delicious and Royal Delicious. The Delicious variety is harvested in September and October, while the Royal Delicious variety is harvested in late October and early November [2]. The apple industry in Kashmir valley faces several challenges, including climate change, unseasonal snowfall, pest attacks, high input costs, lack of credit and insurance and limited market access. These challenges have an adverse impact on the livelihoods of apple cultivators, as well as the overall economy of the region [3].

Despite these challenges, the apple industry in Kashmir valley continues to thrive. The government has taken several initiatives to support apple cultivators, including providing subsidies for apple orchard development, improving irrigation facilities, and establishing cold storage facilities. In addition, various non-governmental organizations are working to promote sustainable apple farming practices and provide training and support to farmers [4].Overall, the apple industry is a crucial part of the economy of Kashmir valley, and efforts need to be made to address the challenges it faces, so that it can continue to provide a livelihood for millions of people in the region.

Problems faced in apple farming

1.1 Climate Change

The changing climate in the valley is causing erratic weather patterns that have a significant impact on apple cultivation. The warmer temperatures have led to increased pest attacks and diseases such as apple scab. The unpredictable weather events such as untimely rains, hailstorms, and frost also damage the apple crops leading to yield reduction, which ultimately affects the farmers' income [5]. The valley's climate has been changing, resulting in unpredictable weather patterns that have a significant impact on apple cultivation. The warmer temperatures in the valley have led to an increase in the number of pests and diseases that attack apple crops, such as apple scab. The disease is a fungal infection that affects the leaves, fruit, and shoots of the apple tree, causing defoliation, blemishes on the fruit, and yield reduction. In addition, the unpredictable weather events such as untimely rains, hailstorms, and frost have been causing significant damage to apple crops, which affects the yield and ultimately affects the farmers' income. For example, if there is untimely rainfall during the harvesting season, the apples may get damaged, affecting the quality and shelf life. Similarly, frost can damage the apple blossoms, resulting in a reduced yield. Another impact of climate change is the change in flowering time. Apple trees rely on a specific period of chilling in winter to set fruit properly in spring [4]. However, due to climate change, the warming trend is reducing the winter chill, resulting in delayed or earlier flowering, which can impact the apple crop's quality and quantity. The changing climate also affects water availability, which is critical for apple cultivation. The reduced availability of water affects the growth and development of apple trees, resulting in lower yields and inferior quality apples.

Overall, climate change is causing several challenges for apple cultivators in the Kashmir valley, including increased pests and diseases, unpredictable weather events, changes in flowering time, and water availability. These challenges impact the quality and quantity of apple production, ultimately affecting the farmers' income and the apple industry's growth in the region. To address this issue, farmers need to adopt climate-resilient farming practices such as crop diversification, irrigation management, and the use of organic farming methods, which can help mitigate the effects of climate change on apple cultivation [5].

1.2 Market Access

The lack of proper market infrastructure, limited market access, and middlemen's involvement make it difficult for farmers to sell their produce at fair prices. Middlemen often exploit farmers by paying lower prices than the market value, which can lead to lower profits for the farmers. In addition, the lack of

proper storage facilities, transport infrastructure, and processing units results in a lot of wastage and spoilage of the produce [4]. Market access is a significant problem for apple cultivators in the Kashmir valley. The region is known for its high-quality apples, but the farmers face several challenges in selling their produce at fair prices. The lack of proper market infrastructure, limited market access, and middlemen's involvement make it difficult for farmers to sell their produce at fair prices. Middlemen often exploit farmers by paying lower prices than the market value, which can lead to lower profits for the farmers. This is particularly true for small and marginal farmers who do not have the bargaining power to negotiate prices [4]. Another challenge is the lack of market information and access to market intelligence. Farmers often do not have access to market information such as demand, prices, and consumer preferences. This makes it difficult for them to make informed decisions about what to produce and how much to produce. Lack of access to market intelligence also makes it challenging for farmers to adopt modern farming techniques and practices that meet the changing market requirements.

To address these challenges, the government and other stakeholders need to invest in market infrastructure such as cold storage facilities, transportation, and processing units. Farmers also need to be provided with market intelligence and information on market demand, prices, and consumer preferences [4]. This will enable them to make informed decisions about what to produce and how much to produce. Access to markets and market intelligence will also help farmers to adopt modern farming techniques and practices that meet the changing market requirements.

1.3 Unseasonal Snowfall

Unseasonal snowfall and frost during the flowering season can damage the apple blossoms, resulting in a reduced yield. It can also affect the fruit quality, and the apples produced may not meet the required quality standards for export. This can lead to a financial loss for the farmers. Unseasonal snowfall is a significant problem for apple cultivators in the Kashmir valley. Snowfall during the harvest season can damage the apple crop, affecting the quantity and quality of the produce [6]. This can lead to financial losses for farmers, who depend on apple cultivation as their primary source of income. Snowfall during the harvest season can cause the apple trees to break under the weight of the snow, leading to damage to the trees, branches, and fruits. The heavy snow can also block roads, making it difficult for farmers to transport their produce to the markets, resulting in significant financial losses [5]. In addition, the snow can damage the irrigation infrastructure, making it challenging to provide water to the apple trees. This can lead to a reduced yield and affect the quality of the apples. Unseasonal snowfall can also lead to the growth of fungal diseases such as apple scab, which can affect the quality of the apples. The wet conditions caused by the snowfall can create a favorable environment for the growth of the fungus, leading to blemishes on the fruit and a reduction in yield.

The impact of unseasonal snowfall on apple cultivators is severe, as the farmers invest a lot of time, money, and effort into cultivating and harvesting their crops. A single snowfall event can wipe out an entire season's production, leading to financial losses and affecting the farmers' livelihoods. To mitigate the effects of unseasonal snowfall, farmers can adopt several measures such as ensuring proper drainage systems, pruning trees to reduce the weight of the snow on branches, and using crop covers to protect the apple trees. The government can also provide support to farmers by offering crop insurance, providing access to weather information, and investing in infrastructure to improve transportation and market access.

1.4 Lack of Credit and Insurance

Small farmers in the Kashmir valley find it challenging to get access to formal credit facilities and crop insurance. This makes it difficult for them to invest in their farms and protect themselves from losses due to natural calamities such as floods, landslides, or pest attacks. The lack of credit also hinders the farmers' ability to buy high-quality inputs, resulting in low yields. Lack of credit and insurance is a significant problem for apple cultivators in the Kashmir valley. Access to credit and insurance can help farmers to manage risks associated with apple cultivation, such as weather-related risks, pests, and diseases [7]. However, small and marginal farmers in the region often face challenges in accessing credit and insurance. One of the main reasons for the lack of credit is the absence of collateral. Many small and

marginal farmers in the region do not have collateral to secure loans from financial institutions. This makes it difficult for them to access credit to purchase inputs such as fertilizers, pesticides, and machinery.

Another reason for the lack of credit is the high interest rates charged by lenders. Many farmers are forced to borrow from moneylenders at exorbitant interest rates, leading to a cycle of debt and financial stress. The lack of credit also limits the farmers' ability to invest in modern farming techniques, such as drip irrigation and high-density planting, which can improve the quality and quantity of their apple crop. The lack of insurance is also a significant problem for apple cultivators in the region. Farmers face several risks, including weather-related risks, pests, and diseases, which can lead to significant financial losses [7]. However, many farmers do not have access to insurance, which can protect them from these risks. One of the main reasons for the lack of insurance is the high premiums charged by insurance companies. Many small and marginal farmers cannot afford to pay the premiums, which limits their ability to access insurance. Additionally, the lack of awareness and information about insurance products and procedures also limits farmers' access to insurance. To address these challenges, the government and other stakeholders need to invest in providing credit and insurance to small and marginal farmers. This can be done by creating a conducive policy environment, providing collateral-free loans at low-interest rates, and offering subsidies on insurance premiums. In addition, awareness campaigns and training programs can be conducted to educate farmers about the benefits of credit and insurance, and how to access these services. This will enable farmers to manage risks effectively and improve their income and livelihoods

1.5 Pest Attacks

Pests such as codling moth, apple scab, and mites can significantly damage apple crops, resulting in yield reduction and lower profits. The farmers have to use chemical pesticides to control these pests, which are expensive and sometimes hazardous to health and the environment.

Pest attacks are a significant problem for apple cultivators in the Kashmir valley. The region is prone to pest attacks due to its unique climate, which provides an ideal environment for the growth and multiplication of pests. Pests can cause significant damage to apple crops, affecting the quality and quantity of the produce. One of the most common pests that attack apple crops in the region is the codling moth [6]. The codling moth larvae bore into the apple fruit, causing damage to the fruit and reducing its quality. Other pests that attack apple crops in the region include apple leaf miner, mites, and aphids. Pest attacks can have a significant impact on apple yields and lead to significant financial losses for farmers. The damage caused by pests can reduce the quality of the apples, making them unsuitable for the market. This can result in lower prices for the apples, affecting the farmers' incomes.

To address the problem of pest attacks, farmers in the region need to adopt integrated pest management (IPM) practices. This involves using a combination of cultural, biological, and chemical control methods to manage pest populations. Cultural practices such as proper pruning, orchard sanitation, and timely harvesting can reduce the incidence of pests. Biological control methods such as the use of natural predators, pheromone traps, and biopesticides can also be effective in managing pests. Chemical control methods such as the use of insecticides should be used judiciously and in accordance with recommended guidelines. In addition, the government can play a significant role in addressing the problem of pest attacks. The government can provide support to farmers by offering training programs on IPM practices, providing access to pest forecasting and monitoring systems, and subsidizing the cost of biopesticides and other pest management tools. By adopting IPM practices and receiving support from the government, farmers in the Kashmir valley can manage pest populations effectively and improve the quality and quantity of their apple crops, leading to increased income and improved livelihoods.

1.6 High Input Costs

The cost of fertilizers, pesticides, and other inputs required for apple farming is high, making it challenging for small farmers to afford them. This results in low yields and affects the quality of the apples produced. High input costs are a significant problem for apple cultivators in the Kashmir valley. Input costs include the cost of fertilizers, pesticides, labor, and machinery, among others. The high cost of inputs can lead to a decline in profits and reduce the financial viability of apple cultivation [8]. One of the main reasons

for the high input costs is the lack of availability of inputs in the region. Many inputs, including fertilizers and pesticides, have to be transported from other parts of the country, leading to higher transportation costs. Additionally, the lack of local production of inputs also leads to higher prices due to the limited availability. Another reason for the high input costs is the lack of access to credit. Farmers who cannot access credit often have to purchase inputs on a cash basis, which leads to higher costs. The high cost of inputs also makes it difficult for small and marginal farmers to invest in modern farming techniques, such as drip irrigation and high-density planting, which can improve the quality and quantity of their apple crop. To address the problem of high input costs, the government and other stakeholders need to invest in local production of inputs. This can be done by providing subsidies and incentives to local manufacturers to set up production facilities in the region. Additionally, the government can provide credit and loans to farmers at low-interest rates to enable them to purchase inputs. Farmers can also adopt practices such as organic farming, which reduces the dependence on chemical inputs, leading to lower input costs. Organic farming practices such as composting, crop rotation, and intercropping can improve soil health, leading to higher yields and improved quality of produce. In conclusion, the problem of high input costs is a significant challenge for apple cultivators in the Kashmir valley. However, by investing in local production of inputs, providing credit and loans, and adopting organic farming practices, farmers can reduce input costs and improve the profitability of apple cultivation.

1.7 Fungicide Selection

The selection of the proper fungicide is a crucial problem for apple cultivators in the Kashmir valley. Fungicides are essential for protecting apple crops from various fungal diseases that can severely affect the quality and quantity of the produce. However, the wrong selection or overuse of fungicides can also have adverse effects on the environment, human health, and the quality of the crop. One of the primary concerns with fungicides is the development of resistance in fungal populations [9]. Overuse or improper use of fungicides can lead to the development of resistant fungal strains, which can render fungicides ineffective. This can lead to significant losses for farmers and can make the management of fungal diseases more challenging. Another problem with the selection of proper fungicides is the lack of knowledge among farmers regarding the different types of fungicides available in the market and their efficacy against specific fungal diseases. This can lead to farmers using fungicides that are not effective against the particular fungal disease affecting their crops.

To address the problem of the selection of proper fungicides, farmers need to be provided with adequate training and knowledge regarding the selection and use of fungicides. This can be done through training programs conducted by government agencies, agricultural universities, and other stakeholders. These programs should focus on providing farmers with information regarding the different types of fungicides available in the market, their efficacy against specific fungal diseases, and the correct methods of application. Additionally, the government can play a crucial role in regulating the use of fungicides and promoting the use of environmentally friendly fungicides [10]). This can be done by providing incentives for the use of biofungicides and other environmentally friendly fungicides, regulating the sale and use of chemical fungicides, and conducting regular monitoring and evaluation of fungicide use in the region. In conclusion, the selection of the proper fungicide is a crucial problem for apple cultivators in the Kashmir valley. However, by providing farmers with adequate training and knowledge, promoting the use of environmentally friendly fungicides, and regulating the use of chemical fungicides, farmers can effectively manage fungal diseases and improve the quality and quantity of their apple crops. In summary, addressing the challenges faced by apple farmers in the Kashmir valley requires interventions such as investment in infrastructure, access to formal credit facilities and crop insurance, support for training in modern farming techniques and pest management, and market access support. This will enable farmers to improve their yields, increase their income, and contribute to the overall growth of the apple farming sector in the valley.

Dealers providing substandard fungicides to farmers for their margin are a significant problem for apple cultivators in the Kashmir valley. Substandard fungicides can be ineffective in controlling fungal diseases, leading to a significant loss of yield and quality of the crop. Additionally, substandard fungicides can also have adverse effects on the environment, human health, and can even lead to the development of

resistant fungal strains. One of the primary reasons for dealers providing substandard fungicides is the lack of proper regulation and monitoring of the sale and distribution of fungicides. The absence of a proper regulatory framework allows unscrupulous dealers to sell substandard and counterfeit fungicides to farmers, which can result in significant losses for the farmers. Another reason for dealers providing substandard fungicides is the lack of awareness among farmers regarding the selection and use of fungicides. Farmers who lack knowledge regarding the selection and use of fungicides are more susceptible to being duped by dealers who sell substandard products.

To address the problem of dealers providing substandard fungicides, the government needs to enforce stricter regulations and monitoring of the sale and distribution of fungicides. This can be done by setting up a regulatory framework for the sale and distribution of fungicides, including licensing and certification of dealers and retailers, and conducting regular inspections and monitoring. Additionally, farmers need to be provided with adequate training and knowledge regarding the selection and use of fungicides. This can be done through training programs conducted by government agencies, agricultural universities, and other stakeholders. These programs should focus on providing farmers with information regarding the different types of fungicides available in the market, their efficacy against specific fungal diseases, and the correct methods of application.

1.8 Transportation

Transportation of Kashmiri apples is a significant problem for apple cultivators in the region. There are several reasons why transportation can be a challenge for these farmers, including: Poor Road Infrastructure: The road infrastructure in Kashmir valley is often inadequate, particularly in rural areas. This can make it difficult for farmers to transport their produce to markets and storage facilities [11]. Limited Access to Transportation: Many farmers do not have access to transportation, which can make it challenging to transport their produce to markets or storage facilities. High Transportation Costs: The cost of transportation can be high, particularly for small-scale farmers who cannot afford to hire trucks or other vehicles to transport their produce. This can reduce their profits and make it difficult for them to compete with larger farmers. Lack of Cold Storage Facilities: Lack of cold storage facilities can result in spoilage of the apples during transportation, leading to reduced quality and lower prices. To address these issues, there is a need to improve the road infrastructure in the region, particularly in rural areas. This could involve building new roads, repairing existing ones, and ensuring that they are well-maintained. There is also a need to improve access to transportation, perhaps by establishing a cooperative system where farmers can share the cost of transportation. In addition, more cold storage facilities need to be established, so that farmers can transport their produce in a safe and efficient manner.

2. CONCLUSION

The challenges faced by apple farmers in Kashmir can be minimized through the adoption of sustainable and climate-resilient farming practices, access to irrigation facilities, promotion of good agricultural practices, investment in infrastructure, ban on substandard fungicides and pesticides and availability of fungicides and pesticides through government horticulture department. These measures will require the cooperation and collaboration of farmers, government, and other stakeholders to achieve sustainable and profitable apple farming in Kashmir.

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Author Contributions Statement

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Dr. Bilal Ahmad Sheikh	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓		✓	✓
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C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

Conflict of Interest Statement

The authors declare that there are no conflicts of interest regarding the publication of this paper.

Informed Consent

All participants were informed about the purpose of the study and their voluntary consent was obtained prior to data collection.

Ethical Approval

The study was conducted in compliance with the ethical principles outlined in the Declaration of Helsinki and approved by the relevant institutional authorities.

Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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