

THE EFFECT OF FARMYARD MANURE AND IRRIGATION IN DROUGHT ON PRODUCTION OF PEACH IN DISTRICT SWAT KHYBER PAKHTUNKHWA

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Abstract

This study aimed to identify the key factors influencing peach production in Swat District, located in Khyber Pakhtunkhwa, Pakistan. Data were gathered from 30 farmers across three agricultural zones within the district using a pre-tested interview format. The analysis was conducted using frequency distributions, percentages, and a multiple regression model incorporating dummy variables. Findings showed that most peach farmers (60%) cultivated fruit on land areas ranging from 2 to 11 Kanals, and nearly half (46.67%) reported average yields between 20 to 29 kilograms per tree. Additionally, 43.3% of farmers used Farmyard Manure (FYM), and 73.33% irrigated their orchards during dry spells. Regression results indicated a significant positive relationship between peach yield and factors such as FYM usage and irrigation during droughts. Based on these results, the study suggests enhancing peach production through improved outreach from agricultural extension services and research institutions. It also emphasizes ensuring the availability and appropriate application of FYM and irrigation in dry weather.

INTRODUCTION

The peach (*Prunus persica* L.) is an important fruit crop in Pakistan, significantly impacting the horticultural economy and supporting the livelihoods of numerous farming families. This crop predominantly flourishes in the northern and northwestern areas of the country, especially in Khyber Pakhtunkhwa (Swat, Dir, Malakand), certain regions of Balochistan (Quetta, Pishin, Zhob), and the Potohar Plateau in Punjab (PARC, 2015). The varied climatic conditions in Pakistan, which range from subtropical to temperate, create suitable environments for cultivating both low-chilling and high-chilling peach varieties. Over the last few

decades, peach production in Pakistan has experienced substantial growth. The Food and Agriculture Organization (FAO) reported that Pakistan produced around 161,000 metric tons of peaches in 2020, positioning it among the prominent peach-producing nations in South Asia (FAOSTAT, 2022). However, despite this advancement, the average yields in Pakistan are still lower than those in other leading producing countries, primarily due to various challenges such as inadequate orchard management practices, water scarcity, limited adoption of improved varieties, and post-harvest losses. Cultivating peaches in Pakistan necessitates

specific environmental conditions, particularly sufficient winter chilling to facilitate proper bud break and consistent flowering.

However, peach production is negatively affected by shifting climate patterns, characterized by milder winters and rising temperatures (Rana et al., 2011). The fruit size, yield and quality are affected by weather shortage mostly (Chaudhry & Wains, 2002). The trend of using new irrigation method is developing in Pakistan rapidly. In addition, in this country, farmyard manure and organic additives are often used by peach growers to enrich soil structure and fertility. But some growers did not apply the farmyard manure due to its low availability and sometime growers are not aware of its benefit (Shah et al., 2008). Moreover, some other obstacles exist to the production of peaches such as pest and disease problems. Swat district is in province of Khyber Pakhtunkhwa, Pakistan. It is a valley and famous for stunning scenery, sometimes known as 'the Switzerland of the East. Beyond its natural beauty, the district is famous for its abundant fruit production. The Swat economy depends on Horticulture and agro-based industries which make up around half of Swat's economy, with peaches the most important fruit grown there.

Peach tree cultivation has increased significantly in recent years, leading to a rise in peach output for the district. The fruit's great economic worth, which results from its outstanding flavor and dietary benefits, explains this development. Moreover, the peach business is very important in giving many Swat valley locals job options (Memon, 2015).

Several other studies have been carried out up until October 2023 to assess the elements affecting fruit output (Khan et al., 2022; Khan et al., 2021). This study seeks to investigate and pinpoint the main elements affecting peach output in Khyber Pakhtunkhwa's Swat District. Understanding these elements will help one to provide ideas on ways to raise peach yield, improve farmer incomes, and guarantee the continuity of peach growth in the area. The results should guide support programs addressing these issues, policy-making, and agricultural interventions intended to foster the peach industry in Swat. administratively divided into eight Tehsils: Barikot, Kabal, Charbagh, Matta, Khwaza Khaila, Babozai, and Bahrain. Though several sophisticated sampling methods are described in the literature,

cluster random sampling for identification was the most suitable approach for this study.

Tehsils in Swat are considered as clusters. Three clusters are randomly selected which are Matta, Kabal, Charbagh. Then, ten peach growers are selected randomly from each cluster for collecting information through structure questionnaire. Collected data is analyzed by frequency distribution and percentage. To investigate the dependence of per tree production on independent variables, multiple linear regression model is used. The reason behind using this model is the dependent variable being continued (Gujarati, 2004). In other studies, multiple linear regression and logistic regression models were used to investigate the dependency of continuous variable and categorical variables on independent variables (Khan et al., 2025; Haq et al., 2024; Khan et al., 2024; Cheema et al., 2024; Khan et al., 2024a; Khan, 2023; Khan, Israr and Cheema, 2022; Ismail et al., 2023).

Results and Discussion

The peach farmers were asked about the acreage allocated for growing peach. Information regarding this matter is outlined in Table 1. According to the table, the majority (60%) of farmers cultivated peaches on land measuring between 2 to 11 Kanals, with 20% managing 12 to 21 Kanals. An equal number of farmers (20%) reported growing peach on 22 Kanals or more. This data indicates a very small area is dedicated to peach farming within the researched region.

Peach yield depends on the specific variety cultivated and the farming management techniques employed. Farmers were surveyed regarding their overall production from peach trees, allowing for the determination of average yields per tree based on the data gathered in the study region. Table 1 reveals that the highest recorded per tree yield in the area was between 20 and 29 kg, whereas the recommended potential yield is up to 90 kg. The average yield per peach tree in the study area falls significantly below this ideal threshold, highlighting a substantial disparity between current yields and the suggested optimal yields for stone fruits. Numerous factors could contribute to the low peach production in the region. These factors may stem from inadequate management practices associated with stone fruit

cultivation, including issues related to fertilizer use, irrigation, pest control, and disease management. Table 1 shows that 43.33% of peach farmers utilized farmyard manure, while 57.67% did not. This observation suggests that a larger number of farmers chose to forego using farmyard manure. A possible explanation for this could be the elevated costs associated with it. This situation may partially contribute to the decreased production of peach per tree in the area being studied.

According to Table 1, a significant portion (73.33%) of peach growers provided irrigation to their crops even during dry spells, whereas 24.63% opted not to irrigate. Farmers with alternative irrigation sources, apart from rainwater, tended to irrigate. The main source of irrigation for most of these growers was wells or tube wells, whereas those residing in flat regions had access to canal irrigation. Farmers indicated that utilizing wells and tube wells for irrigation is costly, time-consuming, and requires considerable labor.

Table 1 Farm Size, Per Tree Production, Application of Farmyard Manure, Irrigation In Drought Periods

	Units	Frequency	Percentage
Farm Size (Kanal)	2–11	9	60.00
	12–21	3	20.00
	22–31	3	20.00
Per Tree production (kg)	10–19	13	43.33
	20–29	14	46.67
	30 and above	3	10.00
Application of farmyard manure	Yes	13	43.33
	No	17	56.67
Irrigation in drought periods	Yes	22	73.33
	No	8	24.63

Table 2 presents result from regression analysis examining the impact of fertilizers on the average yield per peach tree. The application of farmyard manure to peach trees has a statistically meaningful positive effect on the average yield per tree. Growers who applied farmyard manure achieved yields of 5.05 kg per tree more than those who relied solely on chemical and organic fertilizers. This result matches (Khan et al., 2012).

Further regression analysis in Table 2 reveals that growers who irrigated their peach trees during periods of drought experienced a noticeable yield increase of 5.98 kg per tree compared to those who did not irrigate. These were farmers equipped with irrigation systems such as wells, tube wells, and canal irrigation, not solely relying on rainfall. This finding aligns with the research conducted by Ullah, Khan and Zheng (2018) which indicated that improved irrigation method significantly affects the production of peach.

Table 2 Result of Regression Analysis of Per Tree Peach Production of Tree in Kg with its Independent Variables

	Co-efficient	SE coefficient	T value	P value	VIF
Constant	18.07	3.75	4.80	0.00	
Application of farmyard manure	5.05	2.67	1.89	0.07	1.06
irrigation in drought periods	5.97	2.86	2.09	0.047	1.10

Conclusion

According to the study's findings, Swat farmers frequently grow peaches. The results demonstrate that farmers frequently used farmyard manure and irrigation during dry spells to boost output. The regression model, which discovered the relationship between productivity and the usage of farmyard

manure and watering under drought conditions, further supports this. To increase stone fruit productivity, quality, and quantity, better agricultural extension services, line departments, research facilities, and esteemed institutions are required. These materials should also be used to make sure that farmyard manure is applied correctly and on time,

especially for people who might not have access to them or are not adhering to the suggested practices. Farmers may increase agricultural yields and make the most of what they have in this way.

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