Research Paper

Assessment on Farmers' Perception and Adoption of Kiwi Fruit in Sandakpur Rural Municipality of Ilam District, Nepal

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ABSTRACT
A study entitled 'Assessment on farmers' perception and adoption of kiwi fruit in Sandakpur Rural Municipality of Ilam was conducted to explore the perceptions and adoption of kiwi cultivation among farmers .The study comprised 80 participants, evenly divided between 40 kiwi growers and 40 non-kiwi growers, and incorporated two FGDs and two KIIs. The simple random sampling technique was used for sampling, and MS Excel and IBM SPSS 26 for data analysis. Farmers in Sandakpur generally had a positive view of kiwi cultivation, acknowledging its economic potential. Key factors influencing kiwi adoption included access to information, training, financial resources, land availability, agricultural extension services, and technical support (p-value < 0.05). However, age and gender did not significantly contribute (p-value > 0.05). Problem ranking identified challenges for kiwi growers. The most significant problem reported was inadequacy of storage, with an index value of 0.89, making it the top-ranked issue for kiwi growers. The challenge of insufficient kiwi product and processing factories ranked second with an index value of 0.75. Additionally, the unavailability of good quality of seedlings was identified as the third-ranked problem, with an index value of 0.565 followed by inadequate market intelligence. Finally, insect pest and disease infestation was ranked fifth, with an index value of 0.33.In conclusion, this thesis underscores the importance of providing farmers with the necessary knowledge, resources, and support to fully embrace kiwi cultivation as a sustainable and profitable agricultural endeavor.
Keywords: Kiwi Fruit, Farmers' Perception Analysis, Farmer's Adoption, Logistic Regression Model

I. INTRODUCTION

The growth of technology in agriculture and its related sectors has contributed to an expansion in agricultural output (Lanauskas , *et al*.,2009). There has been a notable and impressive expansion in agricultural production over the past twenty years. (Gras *et al.,*2020). There has been a growing interest in diversifying crop cultivation including fruit cultivation to enhance income generation and improve livelihoods of people which plays a crucial role in securing food and nutritional stability, boosting income, alleviating poverty, and enhancing the quality of life for the people of Nepal (Sah and Babu 2019). Cultivation of fruits are increasingly gaining interest among farmers for commercial fruit farming in recent years (Atreya , *et a.,* 2020). According to Poudel, *et al.,* (2019), the growing demand for fruit has created a significant opportunity for crop development In Nepal. One such fruit that has gained attention is kiwi fruit (Actinida deliciosa), known for its nutritional value and export potential (Emily, 2002). Kiwi Fruit has gained popularity in recent years due to its distinct flavor, tolerance to many climates, and great nutritional and therapeutic benefits. (*Actinidia species*) Kiwi fruit

is indigenous to China's Sichuan province (Yang Tze river valley), where the largest *Actinidia* germplasm heritage is still preserved (Ferguson, 2011). The history of kiwi fruit cultivation in the country can be traced back to the early 1990s when a few farmers started experimenting with growing kiwi plants (Dhamala, 2017).

Nepal begun commercial kiwi farming in Ilam from 2007 (Malla *et al*., 2022). The area covered by kiwi fruits in Nepal in FY 2017/18 was 949 ha with the productive area of kiwi 322 ha, production of 2188 mt with productivity of 6.8 mt/ha (MoALD, 2016). To overcome the constraint and influence about cultivation and productivity regarding kiwi the Agriproducts Government of Nepal (GoN) has initiated the PMAMP under Agriculture Development Strategy (2015-2035) from the fiscal year 2016 and Ilam municipality (1-4) and Sandakpur Rural Municipality (1-5) of Ilam district has been selected as kiwi zone. The area covered by kiwi fruits in Ilam during 2016/17 was 110 ha with the productive area of 99 ha and production of 169 mt with productivity of 1.7mt/ha (MoALD, 2016). Sandakpur Rural Municipality in Ilam is known for its favorable climatic condition and suitable soil for fruit cultivation, making it a promising area for kiwi fruit cultivation.

Over the last decade, kiwi fruit has emerged as a prominent cash crop that has the potential to rehabilitate mid-hill villages that have been impacted by urbanization and outmigration (Amkraut, 2019). Mian et al., (2022) reported that the adoption of kiwi fruit growing is still limited due to a variety of problems such as a lack of information, insufficient technical support, and limited market access. Feder et al., (2024) discovered that availability to credit, training, and market knowledge, availability of farm size influences farmers' adoption of agricultural innovation in farming. Farmers' regards about new crops are influenced by their access to accurate and reliable information sources.

This research aims to assess farmers' perception in adoption of kiwi fruit and to identify factors influencing the adoption of kiwi fruit among the farmers in Sandakpur Rural Municipality as well as to identify and rank the problems faced by farmers in adopting kiwi fruit production practices. This study is taken to gain insights into the potential for kiwi fruit production in Sandakpur rural municipality, Ilam. The main goal of this research is to learn more about how farmers feel about kiwi farming and support farmers in adopting this fruit cultivation.

II. MATERIALS AND METHOD

A.   Selection of Study Site

This research focused on kiwi fruit cultivation in Ilam district of Koshi Province, particularly in Sandakpur Rural Municipality. The study aimed to understand how local farmers perceived and engaged in kiwi farming. A semi-structured questionnaire was used in this research to explore factors influencing farmers' decisions to grow or not grow kiwi. The study area, with significant kiwi production potential, was chosen purposefully and three wards were selected for surveying. A total of 80 farmers, 40 kiwi growers, and 40 non-kiwi growers, were surveyed using simple random sampling technique. Primary data were collected through household surveys, Focus group discussions, and interviews, focusing on farmers' views, challenges, awareness, and reasons for adopting or not adopting kiwi cultivation. Secondary data were gathered through a comprehensive literature review, including sources from reputable institutions and online searches, providing additional insights into kiwi farming in Nepal and comparable regions.
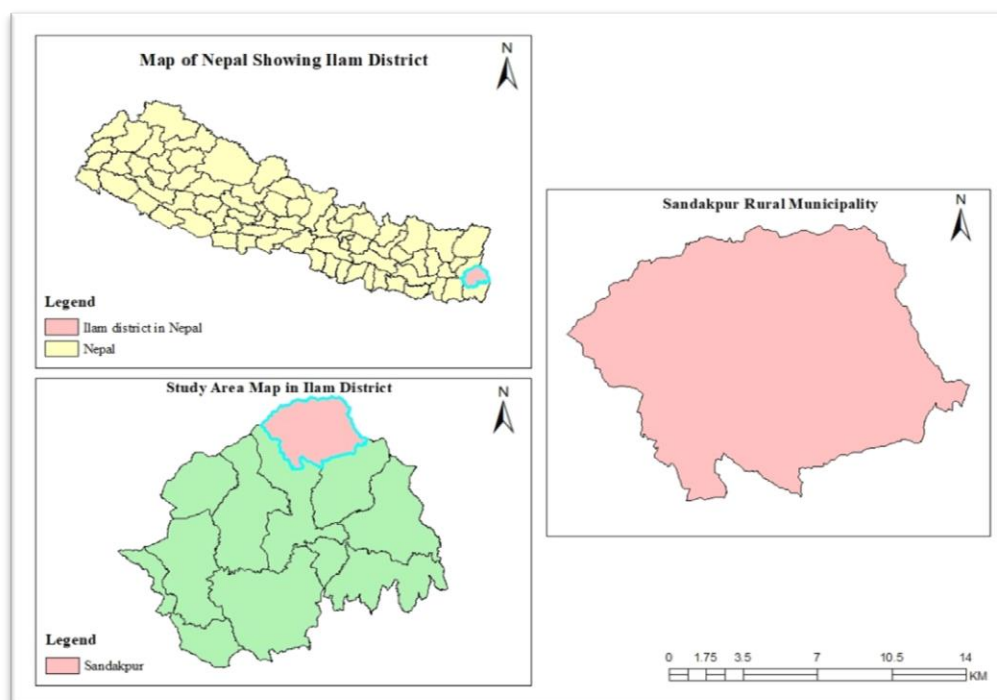
Fig.1 Map of study area

B.   Source of Data

1.   Household Survey: The household survey was conducted using a face-to-face technique, employing a semi-structured pre-tested interview schedule. A total of 80 respondents from which 40 respondents were kiwi growers and 40 were non- kiwi growers from the study area were interviewed for primary data collection. Respondents were interviewed with questions designed focusing on farmers' views, challenges, awareness, and reasons for adopting or not adopting kiwi cultivation.

2.   Focus Group Discussions (FGD) and Key Informant Interview (KII): Two Focus Group Discussions (FGDs) were carried out in the research area to pinpoint the primary production challenges encountered by both the groups of farmers. The participants comprised 15 local farmers and three agricultural officers. In total, three key informant interviews were conducted such as the kiwi zone officer, AKC officer, and Krishi Bikas Farm Officer who played a crucial role in providing additional insights. The data obtained from key informant interviews were valuable for verifying information with information collected from household farmers. In total, three key informant interviews were conducted.

3.   Data Analysis: The information obtained from the survey underwent coding and editing, with the standardization of local measurement units into scientific units. All relevant primary data gathered from household survey were entered into MS-Excel and the Statistical Package for Social Science (SPSS 26) for analysis. The analysis encompassed descriptive statistics, frequency distributions, independent sample t-tests, Logistic regression model and other applicable methods. The presentation of findings utilized tables, bar diagrams, pie charts, and other suitable graphical representations.

i.   Logistic regression analysis : It is a statistical method used to analyze the relationship between a binary outcome variable (i.e., a dichotomous variable with two possible values, such as "yes" or "no", "0"or "1") and one or more predictor (independent variable) variables (Harrell, 2015). In context of assessing farmers' perception and adoption of kiwi fruit in Sandakpur Rural Municipality, Ilam, the logistic regression model was used to understand the factors that influence farmers' decision to perceive and adopt kiwi fruit as a farming practice. The dependent variable in logistic regression model is the binary outcome variable indicating farmers adoption of kiwi fruit and the independent or predictor variable included, socio demographic characteristics of farmers (age, education level, household size), Farm characteristics (Farm size, farming experience), access to resource (availability of land, access to credit) and other relevant factors that may influence farmers perception and adoption of kiwi fruit. The binary outcome variable i.e. dependent variable Y can represent whether a farmer has adopted kiwi fruit (coded as 1 for 'yes') or not (coded as 0 for 'No').The predictor or independent variables X_1, X_2,…..X_n can include variables such as farmers' perception of kiwi fruit ,socio demographic characters ,farm characteristics etc. In context of binary logistic regression, the formula can be expressed as:

$$P(Y=1|X) = 1/(1+\exp(-(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + …….. + \beta_n X_n)))$$

Where:
- P(Y=1|X) is the probability of event of dependent variable (Farmers adopting kiwi fruit) occurring given the independent variables (X) and their corresponding coefficients ($\beta 0, \beta 1, \beta 2 ……. \beta n$).
Exp () represents the exponential function.
- $\beta 0, \beta 1, \beta 2, ….. \beta n$ are the coefficients estimated from the data, which represent the relationship between the independent variables (X1, X2,……Xn) and the dependent variable.
- X1, X2,…….Xn are the independent variables (farmers' perception of kiwi fruit, socio-demographic factors etc).

For example, X1= Age of respondents
X2=Education Level of respondents
X3=Gender
X4= farm size
X5= Technical support
X6=Training and extension services
X7= Access to credit

- Y is the binary outcome variable, typically coded as 0 or 1 (for example, farmers not adopting kiwi fruit cultivation = 0, farmers adopting kiwi fruit cultivation = 1)
- Percentage Change in Odds can be explained by the formula,
(Exp (B) −1)×100%.
- If the odds ratio is 1, there is no change in odds.
- If the odds ratio is greater than 1, there is an increase in odds.
- If the odds ratio is less than 1, there is a decrease in odds.

ii. Indexing: Qualitative data were utilized in the formulation of the index. The index of importance was determined using the following formula(Bhatta et al, 2024).

$I_{imp} = \Sigma$ (Si Fi)/ (N)

where,
I_{imp} = Index of importance
Σ = Summation
Si = I^{th} scale value
Fi = Frequency of ith importance given by respondents
N = Total number of respondents

III. RESULTS AND DISCUSSION
1. Socio-demographic Characteristics

Table 1 provides information about two groups of people i.e. Kiwi growers and non-kiwi growers. It breaks down the characteristics of these groups based on gender, education level, primary source of income, and their average age. The gender of kiwi growers revealed that, about 61.25% were male, and 38.75% were female among kiwi growers. Among non-kiwi growers, around 67.50% were male, and 32.50% were female.

An average, kiwi growers were approximately 44.9 years old and non-kiwi growers had a slightly lower average age of about 41.97 years. The education level among kiwi growers showed that 12.5% were illiterate, 47.5% were literate, 2.5% were primary educated, 12.5% were secondary educated, and 25.0% had a bachelor's degree or higher. Among non-kiwi growers, a significant majority, 82.5%, were illiterate, 2.5% were literate, 5% were primarily educated, 10% were secondary educated, and none of the respondents had bachelor's degree or higher. The gender-related data findings indicate that both men and women participate in both kiwi cultivation and other farming activities. This implies that farming, whether related to kiwis or other crops, is not limited to a particular gender.

The primary source of income of kiwi growers showed, the main source of income was agriculture (67.5%), followed by government jobs (20.0%), private jobs (2.5%), abroad (2.5%), and business (7.5%). Non-kiwi growers had a different income breakdown with a significant portion relying on private jobs (25.0%), followed by business (27.5%), agriculture (42.5%), government jobs (5.0%), and no income from abroad. It's noteworthy that these findings are consistent with Tiwari et al., (2020) observation of relatively favorable education levels among farmers in the Sandakpur rural municipality.

Table 1 Socio-demographic characteristics of the respondents

Parameter	Variables	Kiwi Growers	Non-kiwi growers
Gender	Male (%)	61.25%	67.50%
	Female (%)	38.75%	32.50%
Education level	Illiterate (%)	12.5%	82.5%
	Literate (%)	47.5%	2.5%
	Primary (%)	2.5%	5%
	Secondary (%)	12.5%	10.0%
	Bachelor and above (%)	25.0%	0%
Source of income	Agriculture	67.5%	42.5%
	Government job	20.0%	5.0%
	Private job	2.5%	25.0%
	Abroad	2.5%	0%
	Business	7.5%	27.5%
Age (Mean years)		44.9	41.97

2.   Total land owned by the respondents

The land owned by the people surveyed was split into six categories based on size: 1 to 10 ropani, 11 to 20 ropani, 21 to 30 ropani, 31 to 40 ropani, 41 to 50 ropani, and 51 or more ropani. Here's what I found, 12.5% of kiwi growers had land between 1 to 10 ropani, while 87.5% of those who don't grow kiwi fell into this category. About 25% of kiwi growers had land between 11 to 20 ropani, whereas 12.5% of non-kiwi growers had land in this range. Among kiwi growers, 17.5% had land between 21 to 30 ropani. Interestingly, non-kiwi growers didn't own land in this size range. About 5% of kiwi growers had land between 31 to 40 ropani, but none of the non-kiwi growers had land between these.

A significant 22.5% of kiwi growers had land between 41 to 50 ropani, and 17.5% had more than 51 ropani. Non-kiwi growers generally didn't have as much land in these larger categories.

Table 2 total land owned by respondents

Total Owned Land (Ropani)	Kiwi Growers	Non Kiwi Growers	Total
1 to 10	5(12.5)	35(87.5)	40(50)
11 to 20	10(25)	5(12.5)	15(18.75)
21 to 30	7(17.5)	0(0.00)	7(8.75)
31 to 40	2(5)	0(0.00)	2(2.5)
41 to 50	9(22.5)	0(0.00)	9(11.25)
51 and above	7(17.5)	0(0.00)	7(8.75)
Grand Total	**40(100.00)**	**40(100.00)**	**80(100.00)**

(Source: Field survey, 2023)

(Note: 1 Hectare = 19.66 ropani; Ropani is the unit of land measurement commonly used in Nepal and some parts of India.)

Table II is evident that individuals with larger land holdings were more actively involved in kiwi cultivation compared to those with smaller land holdings. Most non-kiwi growers primarily had land holdings ranging from 1 to 10 ropani.

3.   Total kiwi cultivated land by respondents

Among the 40 kiwi growers surveyed, their land holdings for kiwi cultivation were categorized into four groups: less than 5 ropani, 5 to 10 ropani, 11 to 15 ropani, and more than 15 ropani. It is found that a majority, specifically 45% of the respondents, chose to cultivate kiwi on land ranging from 11 to 15 ropani. About 10.38% of the respondents chose to engage in kiwi cultivation on land less than 5 ropani. Another 42.5% of the respondents decided to grow kiwi on land between 5 to 10 ropani.

Lastly, 2.5% of the respondents chose to cultivate kiwi on land exceeding 15 ropani.

Table 3 Total kiwi cultivated land by respondent

Total Kiwi Cultivated Land(Ropani)	Frequency	Percentage
Less than 5	4	10.38%
5 to 10	17	42.5%
11 to 15	18	45%
More than 15	1	2.5%
Grand Total	**40**	**100.00%**

(Source: Field Survey, 2023)

(Note: 1 Hectare = 19.66 Ropani**;** Ropani is the unit of land measurement commonly used in Nepal and some parts of India.)

4. Independent sample t tests for examination of various factors and its impact on adoption and non adoption of kiwi fruit cultivation

The result of a statistical analysis comparing various variables between two groups: "adoption of kiwi fruit" (n=40) and "non-adoption of kiwi fruit" (n=40) with an overall sample size of 80 (n=80) was done. The table included several variables, their values for each group, the overall mean difference between the groups, and the t-value, which was used to assess the significance of the differences. For each variable, the test of hypotheses was done.

Null Hypothesis (H0): There is no significant difference between the adoption and non-adoption of kiwi fruit for each variable.

Alternate Hypothesis (H1): There is a significant difference between the adoption and non-adoption of kiwi fruit for each variable.

Result shows that there is a statistically significant difference in education status (t-value: 1.03*) and farm size (t-value: 2.59*) between the groups, supporting the alternate hypothesis. Specifically, the individuals with higher education status and larger farm sizes are more likely to adopt kiwi fruit farming. Access to credit also significantly differs (t-value: 0.02*) between the groups, indicating that those with better access are more inclined to adopt kiwi fruit farming. However, age, gender do not exhibit significant differences, suggesting that these factors do not strongly impact adoption of kiwi fruit farming.

Table 4 Independent sample 't' tests to find the difference between adoption and non-adoption of kiwi fruit cultivation among farmers.

Variable	adoption of kiwi fruit (n=40)	non-adoption of kiwi fruit (n=40)	Overall (n=80)	Mean difference	t-value
Age	44.9	41.97	43.43	3.025	0.09
Education status	2.35	2.12	2.23	0.225	1.03*
Gender	0.65	0.6	0.62	0.050	0.45
Farm size	6.15	4.6	5.375	1.550	2.59*
Technical support	1.65	1.52	1.585	0.125	0.70*
Extension services taken	0.45	0.37	0.41	0.075	0.67*
Access to credit	1.00	0.00	0.5	0.012	0.02*

(Note: * indicates level of significance at 5%)

5. Farmers' opinion on growing Kiwi fruit:

Based on the survey conducted among non-kiwi growers, out of 40 respondents, 35% of the farmers expressed their willingness to cultivate kiwi if they received adequate training and extension services. Another 35%

mentioned that they would consider kiwi farming if the government offered subsidy facilities, while 30% indicated that they would engage in kiwi cultivation if they had proper access to credit.
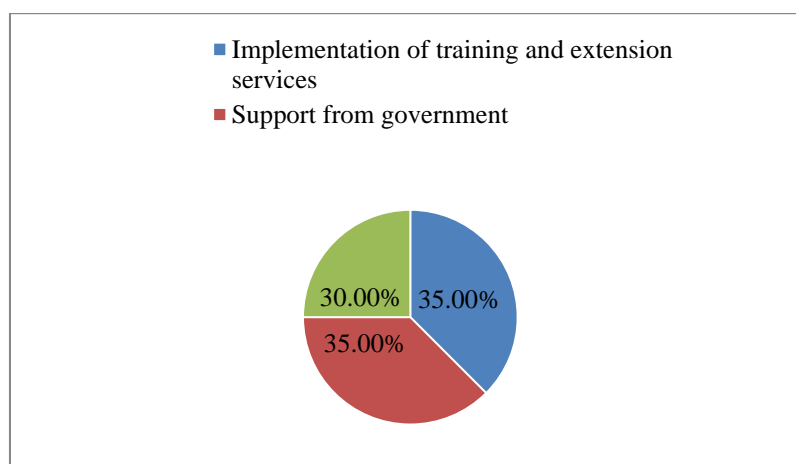

Figure 2 Farmers' opinion to grow kiwi

6.   Satisfaction with productivity of kiwi Fruit

The questionnaire inquired about the respondents' level of satisfaction with the current kiwi productivity. The available choices for their responses were:

a) Highly satisfied
 b) Moderately satisfied
c) Less satisfied

The results showed that none of the respondents expressed being highly satisfied with the productivity. A majority, specifically 61% of the respondents, indicated that they were moderately satisfied with the current kiwi productivity, while 39% of the respondents reported being less satisfied with it.

Table 5 Satisfaction with kiwi productivity

Satisfied with current productivity of kiwi?	
Highly satisfied	0%
Moderately satisfied	61%
Less satisfied	39%

7.   Market price satisfaction of kiwi fruit

The questionnaire asked for the respondents' views on their satisfaction with the prevailing market price of kiwi. The response options provided were:

a) Highly satisfied
b) Moderately satisfied
c) Less satisfied

The findings revealed that none of the respondents expressed high satisfaction with the market price. A significant proportion, specifically 67.50% of the respondents, reported being moderately satisfied with the current market price of kiwi, while 37.50% indicated that they were less satisfied with it in the study area.
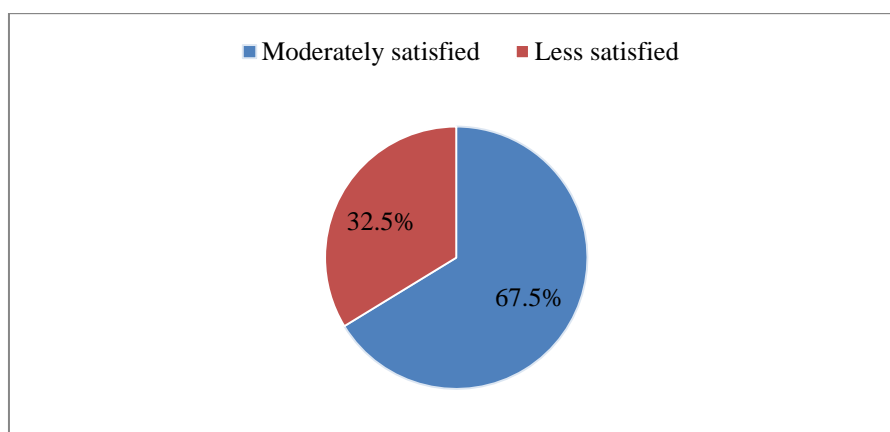
Figure 3 Market price satisfaction of kiwi

8. Factors influencing the adoption of kiwi fruit among the farmers

Logistic regression analysis was conducted to understand how independent variables affect both those who adopted kiwi fruit cultivation and those who do not in the study area. However, only the variables presented in Table 7 were identified as the key factors that have a significant influence on both kiwi growers and non-kiwi growers in the region. The results of the logistic regression model revealed that education status, farm size, technical support, training and extension services received and access to credit were the most significant positive predictors for the adoption of kiwi fruit cultivation, with p-values less than 0.05.Conversely, age and gender were not found to be significant contributing factors, with p-values greater than 0.05.

The coefficient (B) for each independent variable represents the change in the log-odds of the event associated with a one-unit change in that independent variable while holding all other variables constant. To see the effect of a one-unit change in an independent variable in terms of percentage change, the odds ratio (Exp (B)) was used. This study found that, other factors keeping constant, with one unit increase in education of farmers the probability of adoption of kiwi fruit cultivation increases by 27.3%. With an increase in farm size of farmers by 1 unit the probability of adoption of kiwi fruit cultivation increases by 14.0%. Similarly, with an increase in provision of technical support to farmers by 1 unit the probability of adoption of kiwi cultivation increases by 20.5% and with an increase in extension service as well as access to credit facilities to farmers by 1 unit the probability of adoption of kiwi fruit cultivation increases by 5.9% and 15.0% respectively. Since age and gender of farmers were not found to be significant so it does not show any probability of adoption of kiwi fruit cultivation.

Table 6 Analyzing the factors influencing the kiwi fruit cultivation

Target variable and Independent Variable		B	S.E.	P-value	Exp(B) OR	95% C.I. for EXP(B) (OR)	
						Lower	Upper
Factors Influencing the adoption of Kiwi Fruit	Age	1.004	.042	.384	1.001	0.018	1.104
	Education status	1.027*	.321	.011	1.273	1.105	1.326
	Gender	.166	.620	.533	1.010	0.104	1.814
	Farm Size	1.159*	.041	.021	1.140	0.081	2.503
	Technical support	1.003*	.225	.032	1.205	1.109	2.623
	Extension services	1.042*	.329	.031	1.059	0.402	1.312
	Access to credit	1.343*	.023	.004	1.150	1.005	1.553

(Note: B= coefficients where * indicates level of significance at 5%)

9. Collinearity test among the independent variables

Collinearity test among the variables was done and table 8 presents the Collinearity test results for various independent variables, including age, education status, gender, farm size, and technical support, and training and extension services taken. This analysis aims to understand the factors influencing the adoption of kiwi fruit.
The calculated mean Variance Inflation Factor (VIF) was 2.772, which is well below the recommended VIF value of 10, indicating that multicollinearity within the selected model was significantly low.

Table 7 Collinearity test for independent variables

Independent Variables		Unstandarized Coefficients		Standardized Coefficients	Collinearity Statistics	
		B	Std. Error	Beta	Tolerance	VIF
	(Constant)	.011	.256			
	Age	.012	.004	.046	.863	1.038
	Education status	.021	.030	-.010	.917	3.400
	Gender	1.23	.090	.098	.952	2.130
	Farm Size	.043	.002	.600	.865	2.175
	Technical support	.026	.041	.146	.951	3.011
	Extension services	.111	.092	.106	.902	4.109
	Access to credit	1.34	.023	.036	.675	3.541

Note: Dependent variable (Adoption of Kiwi fruit cultivation)

10.   Reasons for adoption of kiwi fruit cultivation

In a survey involving all 40 respondents, they were asked to prioritize the five main reasons for their decision to adopt kiwi fruit farming. The results were analyzed using a five point scaling techniques.

The findings revealed that the primary reason for adopting kiwi fruit farming was its perceived benefits, which scored the highest index value of 0.865. Following closely was the ease of caring for kiwi compared to other crops, with an index value of 0.780, ranking second. Additionally, climate suitability was a significant factor, scoring an index of 0.595 and ranking third. The fourth-ranked reason for farmers adopting kiwi cultivation was the influence of progressive farmers, with an index value of 0.430. Lastly, farmers also embraced kiwi cultivation because they recognized it as a high-value and highly nutritious crop, with an index value of 0.300, ranking fifth.

Table 8 Reasons for adoption of kiwi fruit

Reasons	Index Value	Rank
Profitable than Cereal crops	0.865	I
Easy to care	0.780	II
Suitability of Climate	0.595	III
Imitation of progressive farmers	0.430	IV
High value and highly nutritious crop	0.300	V

11.   Reasons for non-adoption of kiwi fruit cultivation

In the survey involving all 40 non-kiwi growers, they were asked to prioritize the top five reasons for their decision not to adopt kiwi fruit farming. The results were analyzed using five point scaling techniques. The results are shown in table 10 where the primary reason for the non-adoption of kiwi fruit farming emerged as market price fluctuations, scoring the highest index value of 0.905 and ranking first. Following closely, inadequate infrastructure facility was the second-ranked reason, with an index value of 0.865. Another factor was insufficient knowledge about kiwi cultivation, which ranked third with an index value of 0.460. Inadequate technical expertise was cited as the fourth reason, with an index value of 0.4. Lastly, the fifth-ranked reason for not adopting kiwi fruit cultivation was the inadequacy of resources, with an index value of 0.36.

Table 9 Reasons for non-adoption of kiwi fruit cultivation

Reasons	Index Value	Rank
Market fluctuations problem	0.905	I
Inadequate infrastructure facilities	0.865	II
Inadequate knowledge about kiwi cultivations	0.46	III
Inadequate technical expertise	0.4	IV
Inadequate resources	0.36	V

12. Problems faced by kiwi growers

In a survey involving all 40 respondents, they were asked to prioritize and rank the top five problems they encountered while cultivating kiwi fruit. The results were analyzed using a five point scaling technique.

The analysis identified five major problems faced by kiwi growers, and these were ranked accordingly using an indexing technique. The most significant problem reported was the lack of storage facilities, with an index value of 0.89, making it the top-ranked issue for kiwi growers. Following closely was the challenge of insufficient kiwi product and processing factories and industries, ranking second with an index value of 0.75. Additionally, the unavailability of good quality seedlings was identified as the third-ranked problem, with an index value of 0.565. The lack of market intelligence and poor road connectivity ranked fourth, with an index value of 0.475. Finally, insect pest and disease infestation was ranked fifth, with an index value of 0.33.

Table 10 Ranking of problems faced by kiwi growers

Problems in Growing Kiwi	Index Value	Rank
Inadequate Storage facility	0.565	I
kiwi products processing factories and industries	0.33	II
Unavailability of good quality of seedling	0.75	III
Lack of market intelligence and poor road connectivity	0.89	IV
Insect pest disease infestation	0.475	V

Nepal has numerous cold storage facilities, yet they are not being fully utilized. However, in Sandakpur Rural Municipality of Ilam District, there aren't enough storage places for keeping things cold, and this is a problem. For this problem to be addressed encouragement and support to local farmers to expand kiwi cultivation should be provided to increase the demand for storage facilities, awareness campaigns should be provided to educate farmers about the benefits of cold storage in preserving the quality and value of their produce. Advocate for government policies and incentives should be advocated to promote the establishment of cold storage facilities in rural areas.

13. SWOT matrix for kiwi growers

SWOT analysis was performed through FDG, KII and literature review.

Table 11 SWOT analysis of kiwi growers

Strengths	Weaknesses
☐ Government support. ☐ Good quality of kiwi production.	☐ Inadequate infrastructures facilities. ☐ Long time for bearing fruit and its maturity. ☐ Higher production costs due to specialized cultivation needs. ☐ Poor Research and development for disease-resistant kiwi varieties.

Opportunities	Threats
☐ Growing demand due to steadily increment in consumption of kiwi fruit. ☐ Has nutritional value and is appealing to health-conscious consumers. ☐ Appropriate soil condition.	☐ Fluctuating market price of kiwi. ☐ Adverse weather events affecting crop yield and quality. ☐ Unavailability of timely inputs.

IV. CONCLUSION AND SUGGESTIONS

This study, "Assessment on farmers' perceptions and adoption of kiwi fruit in Sandakpur Rural Municipality of Ilam district" revealed that farmers' adoption of kiwi fruit are influenced by various socio-demographic status, access to information, and agricultural knowledge which shows the positively significant relationship for the adoption of kiwi fruit. It means farmers who had larger farm size, were educated, had access to knowledge and extension services, got training on kiwi cultivation seemed to adopt kiwi fruit farming whereas age and gender has no significant relationship for the cultivation. According to farmers' perception, they perceive kiwi fruit as a beneficial crop and most of the non kiwi farmers are willing to cultivate kiwi in

future if they are provided with proper training and extension services, access to credit and other subsidy necessary for the cultivation of kiwi. The adoption rate is found to be gradually increasing, driven by the support from local agricultural authorities but none of the respondents were fully satisfied with market price due to its fluctuations along with the productivity.

The findings highlighted the need for targeted educational programs and extension services to enhance farmers' awareness and understanding of kiwi fruit cultivation practices. The findings also revealed several significant challenges hindering the successful integration of kiwi cultivation. The findings underscore the critical issues of inadequate storage facilities, the absence of accessible processing centers, limited market intelligence, poor road connectivity and the scarcity of quality seedlings. Addressing these issues through the establishment of proper infrastructures and creation of processing centers would not only enhance the adoption of kiwi farming but also contribute to the economic and to foster the sustainable growth of kiwi fruit industry in the region. Implementing targeted interventions that tackle these bottlenecks can potentially empower farmers, enhance their livelihoods, and contribute to overall development of the agricultural sector in the area.

V. Suggestions

Based on the findings, the following suggestions are made:

•The findings suggest the need for targeted farmers training, extension services, technical support, and access to credit facilities to farmers for kiwi cultivation.

•The finding highlights the provision for the establishment of cold storage facilities and processing centers within the study area. These facilities will serve the dual purpose of extending the shelf life of kiwi fruits and enabling value addition.

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