



## RESEARCH ARTICLE

## CONSTRAINTS FACED BY THE KIWI FRUIT FARMERS IN ILAM MUNICIPALITY AND SANDAKPUR RURAL MUNICIPALITY OF ILAM DISTRICT

Manisha Giri<sup>a\*</sup>, Ganesh Rawat<sup>b</sup>, Anup Sharma<sup>c</sup>

<sup>a</sup>Department of horticulture, Institute of Agriculture and Animal science (IAAS), Mahendra Ratna Multiple Campus, Ilam

<sup>b</sup>Department of horticulture, Institute of Agriculture and Animal science (IAAS), Mahendra Ratna Multiple Campus, Ilam

<sup>c</sup>Faculty of Agriculture, Agriculture and Forestry University (AFU), Rampur, Chitwan

\*Corresponding Author e-mail: [manishagiri9823@gmail.com](mailto:manishagiri9823@gmail.com)

This is an open access article distributed under the Creative Commons Attribution License CC BY 4.0, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

## ARTICLE DETAILS

## Article History:

Received 18 February 2021

Accepted 02 March 2021

Available online 16 March 2021

## ABSTRACT

The survey research entitled “Constraints faced by Kiwi fruit farmers in Ilam Municipality and Sandakpur Rural Municipality of Ilam District” was conducted to access the problem faced by kiwi fruit farmers of Ilam district. For the study, 80 households were selected using simple random sampling method. 40 households each from Ilam Municipality and Sandakpur Rural Municipality were selected. The study shows that the production is in slightly increasing rate in both Ilam Municipality and Sandakpur Rural Municipality. In both Sandakpur and Ilam areas, 25 and 20 percent farmers are producing seedlings in their own nursery respectively and rest of seedlings requirement is met from other nursery. The major problem was wild animal Kala at Ilam and Sandakpur. Unavailability of quality saplings, lack of male and female plant management in field, lack of modified storage and lack of refrigerator van were major constraints of Ilam Municipality. Lack of cemented support system, lack of training and pruning knowledge, lack of modified storage and poor connectivity of road were major constraints of Sandakpur Rural Municipality. Overall constraints of Ilam was technical factors whereas of Sandakpur was disease and pest constraints. Despite of all these constraints, the B:C ratio was 2.67 and 2.53 in Ilam and Sandakpur respectively, which means that the kiwi cultivation is profitable.

## KEYWORDS

Kiwi, Training, Pruning, Constraints, B:C ratio, Simple random sampling

## 1. INTRODUCTION

Kiwifruit is a dioecious vine, belonging to family Actinidiaceae and genus Actinidia with basic chromosome no  $2n=58$  (Pandey et al.). The fruit is rich in vitamin C and contains relevant levels of dietary fibre, potassium, vitamin E, folate, antioxidants and many other bioactive compounds (Chhetri & Subedi, 2019). Kiwi fruit, being native to China was also called Chinese gooseberry and plants were introduced into New Zealand in the early 1900s, which subsequently became the world's largest exporter of kiwi fruit. The fruit is derived from the bird name called Kiwi bird which is similar in appearance (Shrestha, 2014). Kiwi vines can be grown on a wide range of soil types at elevations ranging from 1000 to 2500 masl (Amkraut, 2017) Three main species of kiwi fruit are grown throughout the world: Actinidia deliciosa, Actinidia chinensis and Actinidia arguta. Actinidia deliciosa includes cultivars like Hayward, Abbot, Allison, Bruno and Monty while Actinidia chinensis includes Red Kiwi, Hort 16, Golden kiwi (Koyu et al., 2019). These emerging fruits are very new for both producer and consumers and these days Kiwi fruits getting popularity in major department store and super market of major cities of Nepal. Market price of kiwi fruit during the year of 2014/15 AD, was expensive and beyond the access of local consumers as most of the produce goes to the big cities like Kathmandu, Pokhara, Biratnagar and etc. with target and specific consumer (Atreya et al., 2020).

The global Kiwi fruit production reached 4.27 billion metric ton in 2016. In 2017, the major exporter are European countries (mainly Italy and

Belgium) 43.9% and Oceanian countries (mainly New Zealand) 43.7%. New Zealand is the largest exporter while China is the largest producer of Kiwi fruit (Dhorji & Penjor, 2019). Nepal ranked 83rd in Kiwi exporter with 0.0001% world total export and the export was about \$3000 only (Kc, 2018). Total import of kiwifruit was 1200 kg with the value of NRs. 57000 0/kg during (2015/16 AD) Kiwi fruit is gaining popularity and cultivated commercially by farmers of Kabrepalanchowk, (MOAD, 2016). In Lalitpur, Kathmandu, Dolakha and Ilam districts w sapling is supplied by a nursery in Kabrepalanchowk and by ICIMOD, which can be a source of cash income to farmers to improve livelihood and also, in sloping land it helps in erosion control and sustainable land management practice (NRMAT, 2013). The government of Nepal announced 2018 AD as a Fruit Year and the years 2016/17 to 2025/26 as the fruit decade, along with this context the Fruit Development Directorate (FDD) has a program in the FY 2016/17 to develop a “Fruit Development Project” to guide the fruit sector for the coming decades (NHPC, 2017).

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 To overcome the constraint regarding the Agri-products 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 Sandhakpur 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).

## Quick Response Code



## Access this article online

Website:  
[www.fabm.org.my](http://www.fabm.org.my)

DOI:  
10.26480/fabm.02.2021.54.61

Farmers face a number of problems more prominently to market and finances where marketing problem is characterized by non-availability of sufficient marketing storage, grading, poor processing, infrastructure and financial problem by limited access to institutional finance which demotivate farmers to enhance the input technologies, to invest in land improvements, mechanization in kiwi orchard (Mani et al., 2018). The major horticulture production constraints include pests, drought, shortage of fertilizer, and price of fuel for pumping water for irrigation. Lack of desired seed variety was also stated (Emana & Gebremedhin, 2007). It is also found that most of the kiwi fruit growers faced different kinds of constraints such as non-availability of inputs like good quality of planting materials, manures and irrigation, scarcity of skilled labour and also availability of unskilled labour, their wages, technical problem while kiwi fruit is new to the state and farmers therefore the occurrence of pest and diseases were minimal and the farmers lacked knowledge and awareness regarding the management of kiwi fruit (Chavai et al., 2018).

## 2. MATERIALS AND METHODS

The study was carried out in Ilam Municipality and Sandakpur Rural Municipality of Ilam district of Province 1 of Nepal. It is a hilly district with area of 1,703 square kilometre and the population of 290,254, according to census 2011 (CBS, 2011). The 2011 census counted 48536 population and area coverage of 173.32 square kilometre by Ilam Municipality and 16065 population and area coverage of 156.01 square kilometre by Sandakpur Rural Municipality (JV Grid Consultant Pvt. Ltd, 2017).

### 2.1 Selection of the study area

Constraints of Kiwi fruit growers was studied in their representative sites of the hilly area of the Ilam district, Ilam Municipality and the Sandakpur Rural Municipality. So, both area of Ilam Municipality (ward number 1 to 4) and Sandakpur Rural Municipality (ward number 1 to 5) was studied.

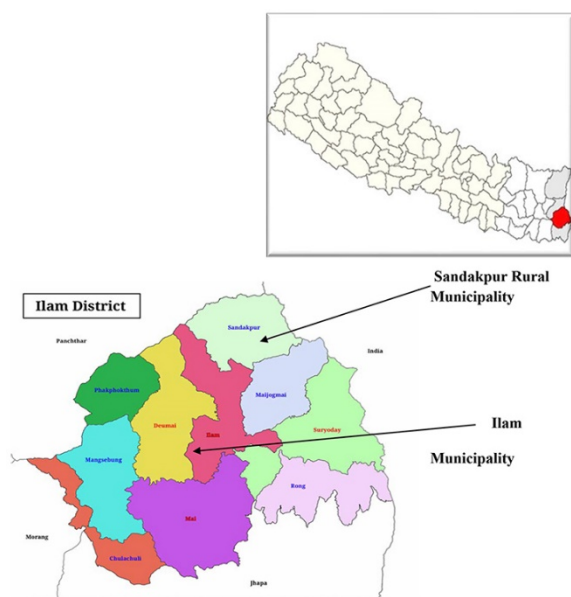


Figure 1: Map of Ilam district (Ilam Municipality, Sandakpur Rural Municipality)

### 2.2 Sampling design and Sample size

Purposive simple random sampling was used for sampling Ilam Municipality and Sandakpur Rural Municipality. A list of kiwi fruit farmers of command area of kiwi zone – Ilam Municipality and Sandakpur Rural Municipality was obtained through the registration of zone. Out of total kiwi farmers (sampling frame) residing the command area of kiwi zone, 40 and 40 kiwi fruit farmers was selected each from two command areas (Ilam Municipality and Sandakpur Rural Municipality). Thus, the sample size comprised 80 household selected randomly and proportionately from the two areas. Simple Random sampling was done in various stages to obtain the required size.

### 2.3 Sources of data

The primary data were collected from the field survey while secondary data were collected by reviewing of various published and unpublished documents related to topic of the study.

### 2.4 Primary sources of data

For the purpose of primary data collection, field survey was conducted during February to July 2020. Primary data was collected by visiting the kiwi fruit growers from door to door visit and interviewing the farmers using various tools. The primary data was collected from the farmers of respective site by developing the questionnaire, farm visit, key informants and personal communication etc. Informal talks were done with local traders, retailers, middleman, and extension workers to get necessary information.

#### 2.4.1 Tools used for primary data collection

Following tools were used to collect the required and relevant primary data from the sample household.

##### i) Questionnaire

In order to collect the information about problem faced by Kiwi fruit farmers, a set of questions related to problem were asked to the farmers. The questionnaire sets were consisting of mostly close ended and open ended questions. In questionnaire demographic information, socioeconomic information, production cost, income, problems etc. related closed and few open ended questions were used during survey. A set of questionnaire were asked to 80 large Kiwi fruit farmers.

##### ii) Discussion with farmers and Key Informant Interview (KII)

Further discussions with the respondents were done in the view of making their answer more clear and relevant. All the information was recorded for supporting the data and also the information that were not captured by the survey questionnaire.

##### iii) Personal observation

Personal observation is one of the most important and reliable tools of the survey. The kiwi fruit farms were personally observed as far as possible during the survey.

#### 2.4.2 Secondary Sources of data

Secondary data have also been used in this work when ever needed. Secondary information was collected from various published material like journals, proceeding of various NGOs and INGOs, report of Prime Minister Agriculture Modernization Project (PMAMP), research articles. The local government and working agencies was also the source of secondary data.

### 2.5 Methods and techniques of data analysis

All the information obtained from survey were analyzed and interpreted by Microsoft Excel and Statistical package for social science (SPSS 26.0 version). Obtained result from survey was represented by appropriate graphical means like tables, histograms, pie charts and bar diagrams.

#### 2.5.1 Socio-economic variables

Socio-economic variables of the farmers were used for comparative descriptive analysis of the study sample. Variables such as family size, gender, age, occupation, education level, land holding were analyzed by descriptive tools such as frequencies, percentages and mean

#### 2.5.2 Economic variables

Cost of production, return from the product and benefit cost (B/C) ratio was taken as economic variables. Economic evaluation was mainly done by calculating B/C ratio. The collected data are analyzed by applying the following methods of analysis

##### B/C ratio

B/C is the ratio obtained when the present worth of the benefit stream is divided by the present worth of the cost of stream (Gittinger, 1982). Benefit cost ratio simply gives an idea about recovery of cost incurred during the production by return from products. It is also defined as a systematic process for calculating and comparing benefits and costs of a project. The process involves the monetary value of initial and ongoing expenses vs. expected returns.

$$B/C \text{ Ratio} = \frac{\text{Gross return}}{\text{Total cost}}$$

### 2.6 Problem ranking

Problems related to kiwi fruit production were ranked with the use of index. The intensity of problems being faced by the farmers during kiwi production was identified by using five-point scaling technique comparing

most severe, 2<sup>nd</sup> choice, 3<sup>rd</sup> choice, 4<sup>th</sup> choice..... and least severe at all using scores of 1.00, 0.9, 0.8, 0.7.... and 0.00 respectively.

### 3. RESULTS AND DISCUSSION

#### 3.1 Demographic and socio-economic characteristics

##### 3.1.1 Gender of the respondents in the study area

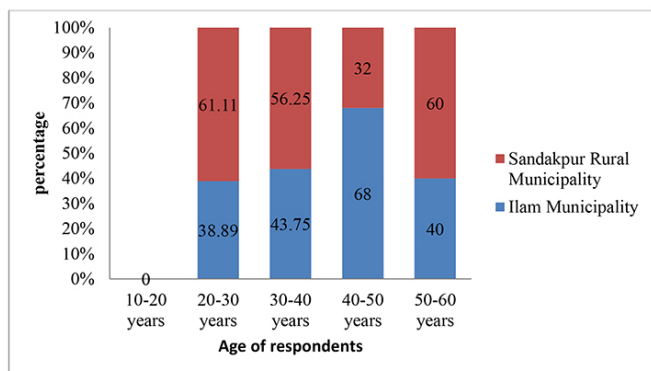
Among 80 respondents, 90% male and 10% female were from Ilam while 85% male and 15% female were from Sandakpur. Female respondents were less because mostly female were unable to answer the questions that was in questionnaire. So, to collect the specific and accurate data male were chosen rather than female.

**Table 1:** Gender of the respondents in Ilam Municipality and Sandakpur Rural Municipality, Ilam districts, 2020.

Address	Male	Female
Ilam Municipality	36 (90%)	4 (10%)
Sandakpur Rural Municipality	34 (85%)	6 (15%)

##### 3.1.2 Age group of the respondent

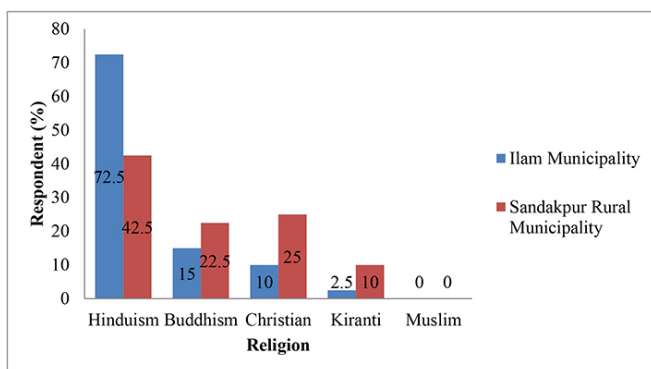
This study revealed that majority (68%) of the respondents in the Ilam Municipality was between the age group 20-30 years followed by less than age group between 30-40 years (43.75%), 50-60 years (40%) and 20-30 years (38.89%) while (61.11%) of respondents in Sandakpur Rural Municipality was between the age group 20-30 years followed by less than age group between 50-60 years (60%), 30-40 years (56.25%) and 40-50 years (32%).



**Figure 2:** Age group of the respondents in Ilam Municipality and Sandakpur Rural Municipality, Ilam districts, 2020.

##### 3.1.3 Religion of the respondents in study area

Out of total respondents 72.50% followed Hinduism followed by Kiranti (15%), Buddhism (10%), Christian (2.50%) and Muslim (0%) in Ilam Municipality while that majority of the respondents in the Sandakpur followed Hinduism (42.5%) followed by Kiranti (25%), Buddhism (22.50%), Christian (10%) and Muslim (0%).



**Figure 3:** Religion of the respondents in Ilam Municipality and Sandakpur Rural Municipality, Ilam districts, 2020

##### 3.1.4 Ethnicity of the respondents in study area

It was found that majority of the respondents in the Ilam were Brahmin (14%) followed by Janajati (13%), Chhetri (12%) and Dalit (1%) while

that majority of the respondents in the Sandakpur were Janajati (25%) followed by Brahmin (15%), Chhetri (1%) and Dalit (0%).

**Table 2:** Ethnicity of the respondents in Ilam Municipality and Sandakpur Rural Municipality, Ilam districts, 2020.

Address	Brahmin	Chhetri	Janjati	Dalit
Ilam Municipality	14(35.0%)	12(30.0%)	13(32.5%)	1(2.5%)
Sandakpur Rural Municipality	15(37.5%)	1(2.5%)	24(60.0%)	0

##### 3.1.5 Family type of respondents

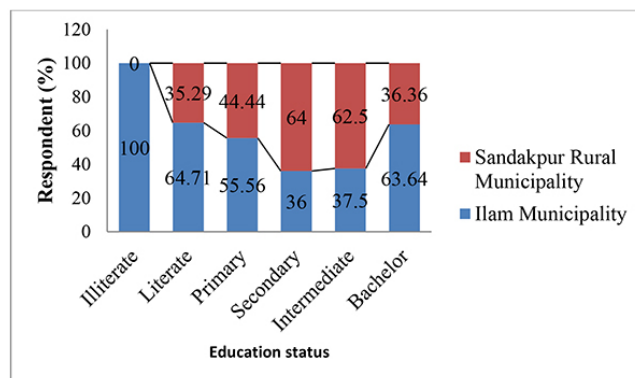
Study shows that both Ilam Municipality and Sandakpur Rural Municipality acquire higher percentage of nuclear family with 72.5% and 67.5% each respectively.

**Table 3:** Family type of the respondents in Ilam Municipality and Sandakpur Rural Municipality, Ilam districts, 2020.

Address	Nuclear	Joint
Ilam Municipality	29(72.5%)	11(27.5%)
Sandakpur Rural Municipality	27(67.5%)	13(32.5%)

##### 3.1.6 Education status of Respondents

It has been found respondent of Ilam majority respondents were illiterate (100%) followed by literate (64.71%) bachelor (63.64%), primary (55.56%) intermediate (37.50%) and 36% of secondary while remaining percentage were followed by Sandakpur.



**Figure 4:** Education status of the respondents in Ilam and Sandakpur, Ilam districts.

##### 3.1.7 Major crop cultivated

Among crops cultivated by the respondents in Ilam Municipality shows the highest percentage of vegetable (17%) followed by cash crops (5%), fruits (3%) and (0%) of cereals and others. While Sandakpur Rural Municipality study shows the higher percentage of fruits (37.5%) followed by cash crop (30%), vegetable (12%), others (17.5%) and cereals (1%).

**Table 4:** Major crop cultivated by the respondents in Ilam Municipality and Sandakpur Rural Municipality, Ilam districts, 2020.

Address	Vegetable	cash crop	Fruits	Cereals	Others
Ilam Municipality	7(17%)	21(5%)	12(3%)	0	0
Sandakpur Rural Municipality	5(12%)	12(30%)	15(37.5%)	1(2.5%)	17.5%

##### 3.1.8 Purpose of farming

Study shows that 62.5% and 72.5% of respondents of Ilam municipality and Sandakpur Rural Municipality involved in commercial farming followed by semi-commercial 27.5% and 17.5% by Ilam municipality and Sandakpur Rural Municipality respectively. 10% did home consumption by both regions.

**Table 5:** purpose of farming of the respondents in Ilam Municipality and Sandakpur Rural Municipality, Ilam districts, 2020.

Address	commercial	semi-commercial	home consumption
Ilam Municipality	25(62.5%)	11(27.5%)	4(10%)
Sandakpur rural municipality	29(72.5%)	7(17.5%)	4(10%)

**3.1.9 Total land and area occupied by kiwi**

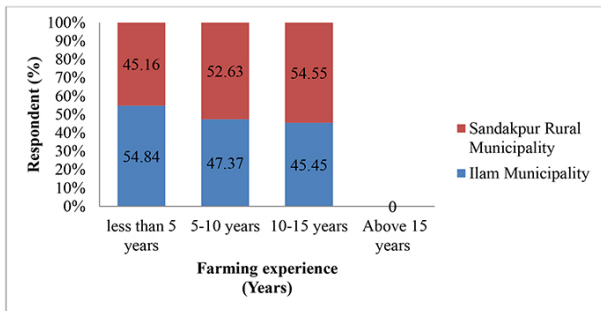
Study revealed that in Ilam Municipality average of total land holdings and area occupied by kiwi fruit was 38.78 ropani and 8.49 ropani respectively whereas in Sandakpur Rural Municipality average of these variables was 38.50 and 8.02 respectively. It means that there is no major difference of these both variables between two regions. But study shows that area occupied by kiwi fruit is less in comparison with total land holding.

**Table 6:** Total land and area occupied by kiwi in Ilam Municipality and Sandakpur Rural Municipality, Ilam districts, 2020.

	Total (n=80)	Ilam (n=40)	Sandakpur (n=40)	Mean difference	Standard error difference	T-value
Total land holding (ropani)	38.64	38.78	38.50	0.275	3.63	0.76
Area occupied by kiwifruit (ropani)	8.49	8.95	8.02	0.925	1.55	0.598

**3.1.10 Farming experience in kiwi fruits**

Study shows that 54.84% and 45.16% of respondents of Ilam and Sandakpur respectively has acquired farming experience of less than 5 years. 52.63% and 47.37% of respondents has acquired farming experience between 5-10 years. 45.45% and 55.55% of respondents has acquired farming experience of 10-15 years.

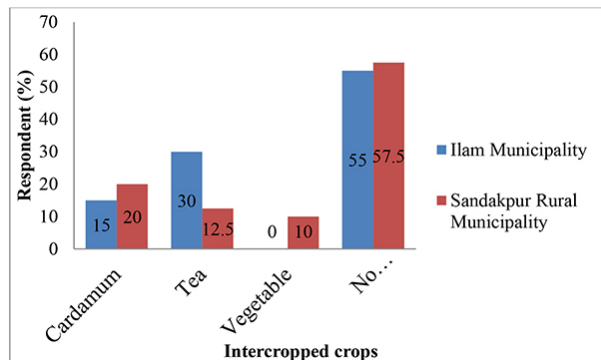


**Figure 5:** Farming experience in kiwi fruits of the respondents in Ilam Municipality and Sandakpur Rural Municipality, Ilam districts, 2020

**3.2 Kiwi fruit Production Information**

**3.2.1 Intercropped with other crops**

Both Ilam Municipality and Sandakpur Rural Municipality has highest percentage of 55% and 57.5% respectively of no intercropped with other crops.



**Figure 6:** Intercropped with other crops in Ilam Municipality and Sandakpur Rural Municipality, Ilam districts, 2020.

**3.2.2 Seedling from own field and other field**

Study reveal that Sandakpur Rural Municipality households (25%) and Ilam municipality (20%) were supplied with seedling from their own nursery field and rest seedling requirement were fulfilled from other nursery field. Its shows that production of seedling by own is very low in both regions.

**Table 7:** Seedling available in Ilam Municipality and Sandakpur Rural Municipality, Ilam districts, 2020.

Address	Own nursery field	Other nursery
Ilam Municipality	20.0%	80.0%
Sandakpur Rural Municipality	25.0%	75.0%

**3.2.3 Nursery plant preparing this year**

Average nursery plant prepared this year is 1400 and 4725 by Ilam municipality and Sandakpur rural municipality households respectively. There might be constraints for these low nursery preparation.

**Table 8:** Nursery plants prepared this year in Ilam Municipality and Sandakpur Rural Municipality, Ilam districts, 2020.

Address	Mean	N	Std. deviation
Ilam Municipality	1400.0000	40	3425.39535
Sandakpur Rural Municipality	4725.0000	40	9604.98669

**3.2.4 Affected by natural calamities**

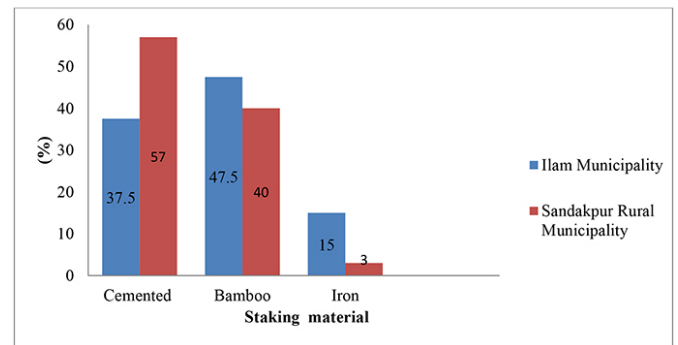
Monsoon period coincided with flowering stage (last week of April to first week of May), it results in the shedding off of flowers leading to low fruit bearing capacity (Chavai et al., 2018) Hailstorm affected kiwi fruit of 52.5% and 60% of households of Ilam and Sandakpur and rest by wind.

**Table 9:** Kiwi fruit affected by natural calamities in Ilam Municipality and Sandakpur Rural Municipality, Ilam districts, 2020.

Address	Hailstorm	High wind speed
Ilam Municipality	21(52.5%)	19(47.5%)
Sandakpur Rural Municipality	24(60.0%)	16(40.0%)

**3.2.5 Material used for staking**

Staking is still the major problem of Ilam district. Cemented support system for kiwi fruit and still found that only 47.5% and 40% households of Ilam and Sandakpur used cemented staking.



**Figure 7:** Materials used as staking in Ilam and Sandakpur, Ilam district, 2020

**3.2.6 Times of training pruning**

Training pruning is done 2 times in a year. This study shows that 2 times training pruning in a year was only done by 12.5% and 42.5% households of Ilam Municipality and Sandakpur Rural Municipality respectively. 87.5% and 57.5% households of Ilam and Sandakpur only did training pruning once in a year.

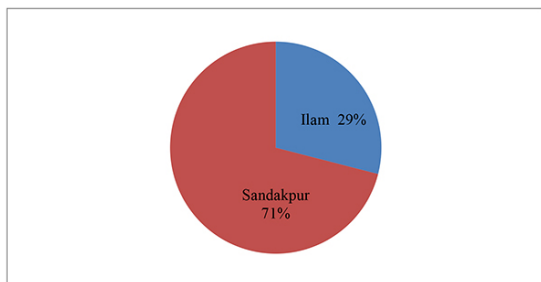


**Table 10:** Times of training and pruning in Ilam Municipality and Sandakpur Rural Municipality, Ilam districts, 2020.

Address	Training pruning times	
	1 time	2 time
Ilam Municipality	35(87.5%)	5(12.5%)
Sandakpur Rural Municipality	23(57.5%)	17(42.5%)

**3.2.7 Pruned water sucker**

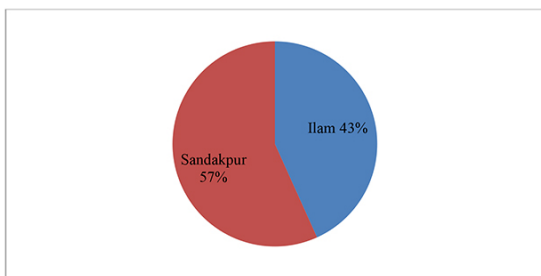
Water sucker absorbed all the foods of kiwi fruits during fruiting time so it decreased the size of Kiwi. Water sucker is usually remove in summer season and also called summer pruning. During summer pruning 75% of water sucker of a year are removed .Only 29% and 71% of Ilam Municipality and Sandakpur Rural Municipality households removed water sucker.



**Figure 8:** Percentage of respondents who pruned water sucker in Ilam Municipality and Sandakpur Rural Municipality, Ilam districts, 2020.

**3.2.8 Mulching on kiwi fruit plant**

Result shows that 43% and 57% of household had done mulching in kiwi fruit orchard and rest respondents had not done mulching in Ilam and Sandakpur respectively.



**Figure 9:** Mulching for kiwi plantation in Ilam and Sandakpur, Ilam districts, 2020

**3.2.9 Soil test for kiwi fruit plantation**

Result shows that 42.5% and 60.0% of household had done soil test rest had not done soil test in Ilam Municipality and Sandakpur Rural Municipality respectively.

**Table 11:** Soil test for kiwi plantation in Ilam Municipality and Sandakpur Rural Municipality, Ilam districts, 2020

Address	Soil test	
	Yes	No
Ilam Municipality	17(42.5%)	23(57.5%)
Sandakpur Rural Municipality	24(60.0%)	16(40.0%)

**3.2.10 Ways of getting technical service**

Ilam Municipality respondents (64.1%) had not received any technical services while 48.8% respondents received from AKC/PMAMP, 41.7% from progressive farmers and 40% from NGOs/INGOs. Similarly, 60% respondents had received technical service from NGOs/INGOs, 58.3% from progressive farmers, 51.2% from AKC/PMAMP and 35.3% had not received technical service.

**Table 12:** Ways of getting technical service in Ilam Municipality and Sandakpur Rural Municipality, Ilam districts, 2020.

Address	AKC/PMAMP	NGOs/INGOs	Progressive farmers		No information
			Progressive farmers	No information	
Ilam Municipality	20(48.8%)	4(40.0%)	5(41.7%)	11(64.7%)	
Sandakpur Rural Municipality	21(51.2%)	6(60.0%)	7(58.3%)	6(35.3%)	

**3.2.11 Production trend of 2075/2076**

Ilam Municipality respondents had average production of kiwi in 2076 is 2903.7kg and in 2075 is 2834.75kg whereas the average production of Sandakpur Rural Municipality in 2076 is 2816.25kg and 2075 is 2500.50kg.

**Table 13:** Production trend of kiwi fruits in Ilam Municipality and Sandakpur Rural Municipality, Ilam, 2020.

Address		Minimum	Maximum	Mean	Std. Deviation
Ilam Municipality	2076	190.00	10560.00	2903.7500	3009.21805
	2075	140.00	13200.00	2834.7500	3178.53860
Sandakpur Rural Municipality	2076	210.00	14700.00	2816.2500	3347.76901
	2075	120.00	13200.00	2500.5000	3163.23670

**3.2.12 Diseases of kiwi fruits**

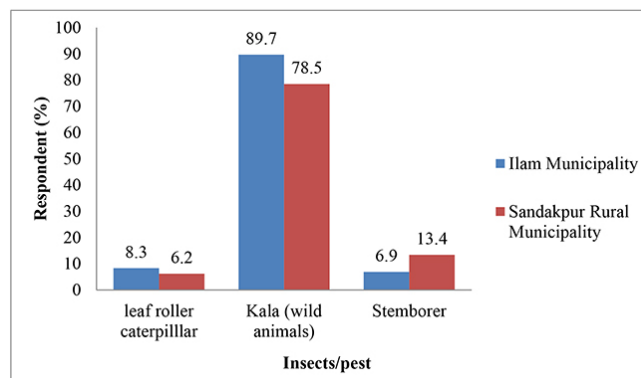
Root rotting (40%) was found more problematic in Ilam Municipality and damping off (66.7%) in Sandakpur rural Municipality. Leaf spot (20%) and botrytis (30%) was found to problematic in Ilam Municipality but not in Sandakpur Rural Municipality.

**Table 14:** Disease of the kiwi fruits of respondents in Ilam Municipality and Sandakpur Rural Municipality, Ilam districts, 2020.

Address	Damping off	root rotting	leaf spot	Botrytis
Ilam Municipality	1(10%)	4(40%)	2(20%)	3(30%)
Sandakpur Rural Municipality	2(66.7%)	1(33.3%)	0	0

**3.2.13 Insect/pest of kiwi fruits**

Kala (wild animals) was seen problematic in Ilam Municipality (89%) and Sandakpur Rural Municipality (78.5%) This is supported by the study made by (Tiwari & Bhandari, 2020) in kiwi in Ilam districts where wild animal (Kala) ranked major insect/pest. Lack of proper fencing around orchard is main reason for this wild attacks.



**Figure 10:** Insects/pest of the respondents in Ilam Municipality and Sandakpur Rural Municipality, Ilam districts, 2020

**3.2.14 Methods of disease and insects/pest control**

Majority of households of Ilam Municipality (54.1%) and Sandakpur Rural Municipality (63.3%) had not practiced any methods of controlling disease and insects/pest control.

**Table 15:** Method of disease pest control followed by the respondents in Ilam Municipality and Sandakpur Rural Municipality, Ilam districts, 2020

Address	Local method	IPM	No practices
Ilam Municipality	10(27%)	7(18.9%)	20(54.1%)
Sandakpur Rural Municipality	9(30%)	2(6.7%)	19(63.3%)

### 3.3 Cost and production of kiwi fruits

#### 3.3.1 Production of kiwi fruit in kg/ropani

In Ilam Municipality average production of kiwi fruits was 2903.75 kg/ropani and price of kiwi fruit was 579100 whereas in Sandakpur Rural Municipality average production was 2816.85 kg/ropani and price was 571938. From the analysis, production and price of kiwi fruits are non-significantly different which means that the production and price of kiwi fruits of Ilam Municipality and Sandakpur Rural Municipality are not different.

**Table 16:** Production of Kiwi of the respondents in Ilam Municipality and Sandakpur Rural Municipality, Ilam districts, 2020.

Variable	Total	Ilam Municipality	Sandakpur Rural Municipality	Mean difference	Standard error difference	T-value
Production of kiwi fruits (kg)	2860.3	2903.75	2816.85	87.5	711.74	0.123
Price of kiwi fruits (Nrs)	575519	579100	571938	7162	152671.88	0.47

#### 3.3.2 Total benefit, cost and B/C ratio of kiwi

Average B/C ratio obtained was 2.66 and 2.53 of Ilam and Sandakpur respectively. It shows that there is non-significantly difference of total cost, total benefit and B/C ratio between Ilam Municipality and Sandakpur Rural Municipality. The BC ratio is greater than one, which indicates that the selected farmers were getting profit from kiwi business. The reasons behind the fluctuation of BC ratio among the surveyed farmers were different years of experience, varieties, management practices, different marketing channels, quality and grades etc (Tiwari & Bhandari, 2020).

**Table 17:** Total benefit, cost and B/C ratio of kiwi cost of the respondents in Ilam Municipality and Sandakpur Rural Municipality, Ilam districts, 2020.

Variable	Total	Ilam municipality	Sandakpur rural municipality	Mean difference	Standard error difference	T-value
Total benefit	354941.4	361566.14	348316.73	13249.41	128485.16	0.13
Total cost	220577.6	217533.86	223621.28	-6087.41	50049.71	0.122
B:C ratio	2.597013	2.663329	2.530697	0.1326	0.96	0.137

### 3.4 Problem faced by the Kiwi farmers in the study area

#### 3.4.1 Production constraints of kiwi

Production problem of two locations was done. respondents from Ilam Municipality stated that technical constraints was foremost production constraint Sandakpur Rural Municipality perceived disease and insect/pest constraint as the first ranked problem. Similarly, Financial constraint, Input constraint, Post harvest handling and processing constraint, Marketing constraint was in list of fourth, second, third and fifth prioritized order in Ilam Municipality while those problems were in the order sixth, third, fifth and fourth in Sandakpur Rural Municipality. Disease and pest constraint ranked sixth and technical constraint ranked second in Ilam Municipality and Sandakpur Rural Municipality respectively.

**Table 18:** Ranking of production constraint in the Ilam Municipality and Sandakpur Rural Municipality, Ilam districts, 2020.

Production constraints of kiwi	Index score		Rank	
	Ilam	Sandakpur	Ilam	Sandakpur
Financial constraints	0.72	0.69	4	6
Input constraints	0.86	0.84	2	3
Technical constraints	0.91	0.91	1	2
Post harvest handling and processing constraints	0.72	0.73	3	5
Marketing constraints	0.66	0.74	5	4
Disease and Pest constraints	0.62	1.41	6	1

#### 3.4.2 Input constraint on kiwi

Table 20 shows unavailability of quality sapling as first ranked problem of Ilam municipality followed by lack of cemented support system, used of FYM prepared by traditional methods and unavailability of inputs in time while lack of cemented support system ranked first problem in Sandakpur Rural Municipality followed by, used of FYM prepared by traditional methods, unavailability of quality sapling and unavailability of inputs in

**Table 19:** Ranking of input constraint in the Ilam Municipality and Sandakpur Rural Municipality, Ilam districts, 2020.

Input constraints on kiwi	Index score		Rank	
	Ilam	Sandakpur	Ilam	Sandakpur
Unavailability of inputs in time	0.49	0.57	4	4
Used of FYM prepared by traditional Methods	0.81	0.83	3	2
Unavailability of quality saplings	0.83	0.79	1	3
Lack of cemented support system	0.82	0.915	2	1

#### 3.4.3 Technical constraints

Table 21 shows that Lack of male and female plants management in Kiwi field was first ranked problem in Ilam while in Sandakpur lack of training pruning knowledge was first ranked problem Lack of knowledge regarding varietal selection according to altitude, Lack of technical knowledge regarding quality sapling production, Lack of technical service, Lack of training pruning knowledge and Lack of male and female plant management were other problems.

**Table 20:** Ranking of technical constraint in the Ilam Municipality and Sandakpur Rural Municipality, Ilam districts, 2020.

Technical constraints on kiwi	Index score		Rank	
	Ilam	Sandakpur	Ilam	Sandakpur
Lack of male and female plants management in kiwi field	1.64	0.74	1	3
Lack of knowledge regarding varietal selection according to altitude	0.71	0.77	3	2
Lack of training pruning knowledge	0.85	0.8	2	1
Lack of technical knowledge regarding the quality sapling production	0.68	0.6	5	5
Lack of technical service	0.7	0.73	4	4

#### 3.4.4 Post harvest handling and processing constraints

Table 22 shows that both Ilam Municipality and Sandakpur Rural Municipality perceived lack of modified storage as a first ranked problem.

Kiwi fruits are perishable in nature but its life can be extend upto 6 month through modified storage, cold storage which help growers to fetch high price than seasonable price but result in study area show modified storage 1<sup>st</sup> ranked problem which causes high post harvest losses and quality losses.

**Table 21:** Ranking of Post harvest handling and processing constraint in the Ilam Municipality and Sandakpur Rural Municipality, Ilam districts, 2020.

Post harvest handling and processing constraints on kiwi	Index score		Rank	
	Ilam	Sandakpur	Ilam	Sandakpur
Traditional way of cleaning, grading and storage	0.88	0.87	2	3
Lack of modified storage	0.98	0.98	1	1
Lack of processing knowledge and processing industries	0.84	0.87	3	2

### 3.4.5 Marketing constraint

Table 22 shows that among marketing problem lack of vehicles, refrigerator vans was ranked first in Ilam while Sandakpur Rural Municipality perceived poor road connectivity as the first ranked problem. This study is supported by study made by (Mani et al., 2018) in Kiwifruit in the state of Arunachal Pradesh where the constraints faced by the farmers were marketing constraints. Transportation constraints, storage constraints and lack of market intelligence were highest. Both region perceived Natural calamities as second ranked.

**Table 22:** Ranking of marketing constraint in the Ilam Municipality and Sandakpur Rural Municipality, Ilam districts, 2020.

Marketing constraints on kiwi	Index score		Rank	
	Ilam	Sandakpur	Ilam	Sandakpur
Lack of market intelligence	0.76	0.64	3	4
Lack of vehicles, refrigerator vans	1.27	0.75	1	3
Exploitation by middle man	0.51	0.63	5	5
Natural calamities	0.8	0.76	2	2
Poor road connectivity	0.6	0.85	4	1

## 4. CONCLUSION

The study shows that production is in slightly increased in both Ilam Municipality and Sandakpur Rural Municipality because farming experience of farmers in Kiwi fruit in Sandakpur was higher. The major problematic was wild animal Kala at Ilam (89%) and Sandakpur (78.5%). Unavailability of quality saplings and lack of cemented support system ranked first input constraints of Ilam and Sandakpur respectively. Lack of male and female plant management in field and lack of training pruning knowledge ranked first technical constraints in Ilam and Sandakpur respectively. Lack of modified storage ranked first post-harvest and processing constraints in both regions. Similarly, lack of refrigerator van, poor connectivity of roads ranked first marketing constraints in Ilam and

Sandakpur respectively. Overall production constraints of Ilam Municipality was technical constraints whereas Disease and pest constraints of Sandakpur Rural Municipality Despite of all these constraints the B/C ratio was 2.67 and 2.53 in Ilam and Sandakpur respectively, which means that the kiwi cultivation is profitable.

## CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this paper.

## ACKNOWLEDGEMENT

The fund and technical support for carrying out this research was provided by Institute of Agriculture and Animal Science, Mahendra Ratna Multiple Campus, Ilam and Prime Minister Agriculture Modernization Project (PMAMP). The authors also acknowledge all those helping hands for all of the technical and moral support.

## REFERENCES

- Amkraut, E. (2019, August 28). Kiwifruit and the promise of economic revitalization.
- Atreya, P. N., & Manandhar, R. (2016). Fruit crop development in Nepal: Achievements and future strategy. *Nepal Horticulture Preceeding*, 15.
- Atreya, P. N., Shrestha, C. M., Suvedi, B. D., & Pandey, S. P. (2020). Emerging fruits of Nepal: Pomegranate, kiwifruit, Avocado, Dragon fruit and Grape; opportunities, challenges and ways forward. *Proceeding of National Horticulture Seminar*, 11.
- CBS. (2011). National population and Housing census (NPHC). central Burea of statistics. Kathmandu: National Planning commison.
- Chavai, A. M., Ali, H., & Patil. (2018). Constraints Encountered by Kiwifruit grower of Arunachal Pradesh. *Contemporary Research in India*, 8 (2).
- Chhetri, B., & Subedi, R. (2019). Nematodes Associated with Kiwi plants in Central Horticulture Centre Kirtipur, Kathmandu, Nepal. *International Journal of Applied Agricultural Sciences*, 5 (3).
- Cook, J. S. (2020). Comparison of Trunk wraps in their ability to protect kiwifruit vines from Freeze injury. Auburn University.
- Dhorji, Y., & Penjor, T. (2019). Kiwi fruit in Bhutan: Value chain prospects and challenges. *Bhutan chamber of commerce and industry*.
- FAOSTAT. (2018). Retrived from Food and Agriculture Organization of The United States.
- Gittinger, J. (1982). *Economic Analysis of Agricultural Project*. Economic Development Institute (EDI), Washington, D.C.
- Guroo I\*, W. S. (2017). A Review of Production and Processing of Kiwifruit. *Journal of Food Processing & Technology*.
- JV Grid Consultant Pvt. Ltd, G. P. (2017). Preparation of GIS based Digital Base Urban Map Upgrade of Ilam Municipality, Ilam.
- Kc, B. (2018). Effect of GA3 on germination parameters of different varieties of kiwi. *Current investigations in Agriculture and current research*, 4 (3).
- Koyu, B., Singh, R. J., Devarani, L., Singh, R., & Hemochandra, L. (2019). Developing an intellectual learning scale to test knowledge level of kiwi growers of Arunachal pradesh on package od practice of kiwi. *Current Journal of Applied Sciences and Technology*, 1-6.
- Longsheng, F., Shipeng, S., & Shaojin, W. (2016). Classification of Kiwifruit grades based on fruit shape using a single camera. *Sensors*, 16 (7).
- Mani, G., Kundra, A., & Haque, A. (2018). Kiwi value chian in Arunachal pradesh issue and prospects. *Agricultural Economics Research Review*, 31 (11), 123-130.
- MoAD. (2020). Statistical information on Nepalese Agriculture.
- Monastra, F., Chiariotti, A., Colorio, G., & Proietti, G. (1997). Comparison of three irrigation systems of Pergola-Trained kiwifruit orchard. *Acta Horticulturiae*, 335-342.
- Pandey, D., Shrestha, B., Sapkota, M., & Banjade, S. (2019). Effect of scion

- varieties and wrapping materials on success of tongue grafting in Kiwifruit (*Actinidia Delisiosa*) in Dolakha, Nepal. *Journal of Agriculture and Natural Resources*, 2 (1), 180-192.
- Poudel, K., Shah, M., & Mandal, J. (2019). Fruit quality analysis of kiwifruit cultivars cultivated in eastern mid-hills in Nepal. *Journal of Agriculture and Environment*, 20, 217-225.
- Pyke, N. B., Stanley, C. J., & Warrington, I. J. (1986). Kiwifruit: Frost tolerance of plants in controlled frost conditions. *New Zealand Journal of Experimental Agriculture*, 14 (4), 443-447.
- Richardson, D. P., Anseli, J., & Drummond, L. N. (2018). The nutritional and health attributes of kiwifruit: A review. *European Journal of Nutrition*, 57 (8), 2659-2676.
- Singleton, K. (2012). Kiwifruit: Overview of Potential health benefits. *Nutrition Today*, 47 (3), 133-147.
- Tiwari, A., & Bhandari, T. (2020). Study on capital investment and marketing of kiwi fruit in Ilam, Nepal. *Acta Scientific Agriculture*, 4 (6), 13-20.
- Yasa, K., Kasim, M. U., & Kasim, R. (2017). The fungal disease in kiwifruit storage and Non-chemical methods of using to prevent these diseases. *Journal of Agricultural, Food and Environment Sciences*.

