International Journal of Environment, Agriculture and Biotechnology
Vol-6, Issue-6; Nov-Dec, 2021

Journal Home Page Available: https://ijeab.com/
Journal DOI: 10.22161/ijeab

Factors Affecting Turmeric Production in Sunsari District, Nepal

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Received: 28 Sep 2021; Received in revised form: 03 Nov 2021; Accepted: 11 Nov 2021; Available online: 17 Nov 2021

Abstract— *A study was conducted in Barahachhetra Municipality of Sunsari district from April to August, 2021 with the objectives to study factors affecting turmeric production. For the study, 100 respondents were selected through a simple random sampling method. A properly design questionnaire was administered for primary data after pretesting it. Secondary data was obtained from journals, research articles, publications, and reports. The obtained data were analyzed using computer software packages such as: MS excel (2016) and SPSS (V 26.0). The correlation coefficient tested the strength of the relationship between various dependent and independent variables. In the study, the majority of respondents were male about 68% with a literacy rate of 68% whereas, 63 respondents use their own production as seed sources. The study showed that educational status, seed treatment, Irrigation practices, cropping system, training, and product demand had a positive and significant relationship with the level of production. Similarly, seed quantity, manure quantity, labor cost, and land size under turmeric cultivation were found to have a positive and significant correlation with the level of production with a Pearson correlation coefficient of 0.525, 0.230, 0.511, and 0.791respectively. Quality planting materials, proper irrigation facilities, training related to cultivation, seed treatment should be provided to the farmers.*

Keyword— ***Turmeric, Production, Farmers.***

I. INTRODUCTION

Turmeric (Curcuma longa is a spice made from the dried rhizome of turmeric plants which is also referred to as the "Queen of spices"(Begum et al., 2019). Turmeric is an important spices crop(Karthik and Amarnath, 2014)which is one of the top five major spices grown for culinary and seasoning of foods in Nepal(HVAP, 2019). Turmeric is an annual crop belonging to the Zingiberaceae family which may be sown on sandy or clayed loam soil, and the best sowing time of April- May(Saeed et al., 2017).

Turmeric can be regarded as a good cash crop as well as main source of income for the peasants of tropical mid-hills in Nepal(Begum et al., 2019) as its production required less water, low technology, less capital investment and its can be grown with a comparatively lower application of fertilizers especially lower use or not any chemical fertilizers and low pest/disease infestation. Land topography of hilly region and nature of the soil is favorable for turmeric cultivation as it allows no accumulation of water in turmeric field which also aids in lower infestation of Diseases. Turmeric on sloppy land also be beneficial as it prevents soil erosion and the use of organic manure and mulching helps to retain the soil fertility(HVAP, 2019).

Turmeric cultivation areas are increasing day by day. Turmeric occupied about 11 percent of the area and about 15% of production among the top five spices crops in Nepal(MoALD, 2020; Acharya et al., 2021). In Nepal turmeric was cultivated in 9795 hectares and production of 99907 mt, while productivity was found to be 10.199mt/ha(Krishi Diary, 2078).

II. MATERIALS AND METHODS

Study site

We selected the Sunsari district of Nepal for study as there was a higher production potential of Turmeric. In Sunsari, we selected BarahachhetraMunicipality for our study, which lies in eastern Terai in Nepal and has remarkable area coverage by turmeric, a large number of Turmeric farmers, good production, and better access to market and transport facilities.

Selection of Turmeric farmers

The list of Turmeric growers was obtained from Prime Minister Agriculture Modernization Project-Ginger/Turmeric Zone, Sunsari, Nepal. A total of 100 respondents were selected from Barahachhetra Municipality by random sampling technique to draw a representative sample.

Data Collection and Analysis

The information was collected through a household survey using interview schedule, focus group discussion, and key informant interview.

Quantitative and qualitative data obtained from the survey were entered and analysed by using SPSS and Microsoft Excel. Different descriptive statistics such as means, frequency, percentage, and standard deviation were used to derive a conclusion from the data. Chi-square test ($\chi 2$) was used to study the association of independent categorical variables; such as gender of the respondents, educational status, Seed treatment, Irrigation practices, cropping system, training received, and types of turmeric product with a dependent variable that is level of Turmeric production. Best of Average Turmeric production, production was categorized as high and low, and their relationships of individual production level to different socio-economic factors were analyzed using the Chi-square test ($\chi 2$). Chi-square test ($\chi 2$) was used to show the association between two categorized variables while the correlation was used to show the relationship between two continuous variables(Ghimire et al., 2019; Mahat et al., 2019).

III. RESULTS AND DISCUSSION

Socio-Economic Characteristics of the farmers

The Socio-economic variables such as Gender, Age, Ethnicity, Education, Seed source, Seed treatment, training, Irrigation practices, intercropping practices were studied. 68% of respondents were male while 32% were female as shown in Table-1.

Table-1: Socio-economic characteristics of the respondents

Gender	**Frequency**	**Percent**
Male	68	68
Female	32	32
Age		
Less than 30	12	12
30-50	66	66
Above 50	22	22
Ethnicity		
Janajati	72	72
Chhetri	17	17
Brahmin	9	9
Dalit	2	2
Education Level		
Illiterate	32	32
Primary	33	33
Secondary	20	20
Higher Secondary	10	10
Bachelor and above	5	5
Seed Source		
Self	63	63
PMAMP	12	12
Neighbor	14	14
Both Self and PMAMP	11	11
Seed Treatment		
Yes	6	6
No	94	94
Type of irrigation		
Rainfed	86	86
Seasonal Irrigation	14	14
Training		
Yes	23	23
No	77	77
Intercropping Practices		
Intercropping	25	25
Monocropping	75	75

The Majority of 66% of respondents farmers were from 30-50 year age groups while 22% were above 50 years and

the remaining 12% were below 30 years. The findings revealed that 72 respondents were janajati and the remaining were followed by 17, 9, 2, by chhetri, brahmin and dalit respectively. From the study, it was found that the literacy rate was 68% which was higher than the national literacy rate 0f 66.22%(CBS, 2011). The percentage of the respondents who had primary, secondary, higher secondary, and bachelor and above was 33%, 20%, 10%, and 5% respectively. According to Battese & Coelli (1995) higher the education greater would be the efficiency of producers(Mahat et al., 2019).

The majority of the Turmeric growers stored their produced turmeric rhizome for seed sources for the next period of cultivation. From the analysis, it was found that 63% used their own rhizome as a seed source and other 12% used Turmeric seed provided by PMAMP, Ginger/Turmeric zone, Sunsari, 14% brought from the neighbour and remaining 11% used own and a half from PMAMP, zone Implementation unit as shown in Table-1. Generally, most of the farmers practiced cultivatingTurmeric without any chemical application but some do not have any idea of seed treatment yet. From the finding, only 6% practiced seed treatment for diseases/pests management.

The majority of the respondents i.e. 75% in the study site followed the sole cropping of Turmeric while only 25% of respondents followed the intercrop system with maize. Few respondents followed mixed cropping with maize only as they were utilizing space for additional income and we don't supply much irrigation to maize.The study revealed that, only 14% of the total respondents were found to follow the irrigated type of farming. Most of the households 84% followed a rain-fed type of farming which indicated that their farming system was entirely dependent on the mercy of the monsoon.

Production level of Turmeric

The average turmericproduction per household was calculated and it was found to be 366 kg per kattha (10.98mt per hectare). Based on this, turmeric was categorized into two production levels; low production (turmeric yield less than 366 kg) and high production level (turmeric yield more than 366 kg per kattha).

Table 2: Production level of turmeric in the study area

S. N	Production Level of turmeric	Frequency
1	High	62
2	Low	38

Note: 1 Kattha = 338.63 m^2(Source: Field survey, 2021)

Chi-Square analysis between factors and turmeric Production

Results of Chi-square test on the relationship between characteristics of ginger farmers and ginger production level revealed that gender hasno statistically significant relationship with the level of Turmericproduction at 0.05 probability level as shown in Table-3.

Table-3: Distribution of respondents according to different factors and level of production

Factors	Level of production			$\chi 2$ Cal	P-value
	High	Low	Total		
Gender					
Male	43	25	68	0.138 ^{ns}	0.711
Female	19	13	32		
Education status					
Illiterate	17	15	32		
Primary level	25	8	33	8.619***	0.071
Secondary level	14	6	20		
Higher Secondary	5	5	10		
Bachelor and above	1	4	5		
Seed treatment					
Yes	6	0	6	3.912**	0.048
No	56	38	94		
Irrigation practices					
Rainfed	50	36	86	3.886**	0.049

Seasonal Irrigation	12	2	14		
Cropping system				4.584**	0.032
Mono-cropping	51	24	75		
Intercropping	11	14	25		
Training				3.552***	0.067
Yes	18	5	23		
No	44	33	77		
Product demand				6.82**	0.033
Fresh Turmeric	16	12	28		
Dried Turmeric	35	12	47		
Processed Turmeric	11	14	25		

Note: * and ** indicate 10%, and 5% levels of significance, and ^{ns} indicate non-significant. Source: Field survey, 2021.

Results of the Chi-square test revealed that gender has no statistically significant relationship with the level of ginger production at 0.05 educational status probability level as shown in Table 4. However, educational status had a positive and strong relationship with the level of Turmeric production at a 10% level of significance. The higher the educational level, the higher will be the level of production. The level of production was also found to be positive and strongly dependent on seed treatment at a 5% level of significance. Seed treatment improved the level of production and quality of fresh Turmeric produced because it helps to prevent the spread of rhizome rot pathogens during the growth of Turmeric.

Similarly, Irrigation practices had also a positive and strong relationship with the level of production at a 5% level of significance. The cropping system and product demand had also a positive and strong relationship with the level of production at a 5% level of significance. Training received by the farmers was found to be positively significant at 10% with the level of production. Training received farmers used proper spacing for turmeric as well proper doses of manure, fertilizers with 2/3 times weeding and mulching with dried leaves help in improvingthe level of production.

Correlation

Correlation analysis revealed that manure quantity had a positive and significant relationship with the level of production at a 5% level of significance. However, family size showed a negative but not significant relationship with Turmeric production at a 0.05 level of significance. Area of Turmeric cultivation, seed quantity, labour cost, type of Irrigation practices hada positive and significant relationship with Turmeric production at a 1% level of significance. Similar, result was observed that seed quantity and labour cost show a positive and significant relationship with the production by Acharya et al., 2021.Begum et. al. (2019) also observed Land under turmeric, seed rhizome has significant relation with the production. However, family size shows non-significance with the level of production.

Table-4: Correlation analysis between factors and production.

Factors	Pearson correlation	Sig. (2 tailed)P	Sample size
Family size in number	-0.06 ^{ns}	.950	100
Land under turmeric cultivation	.791*	0.000	100
Seed Quantity	0.525*	0.00	100
Manure Quantity	.230**	0.021	100
Labour cost	.511*	.000	100
Type of irrigation	0.41 ^{ns}	.687	100

Note: ** and * indicates 5% and 1% level of significance and ^{ns} indicate non-significant.

IV. CONCLUSION

In the study area,a large number of farmers was found to be involved in Turmeric production and though they have idea or experience of turmeric cultivation and its importance, the majority were not satisfied with its production. The majority of 63% of the respondent use their own previous year's production as a seed source. However, 23 respondents have participated in training related to the cultivation of turmeric.

The results of the study revealed that practicing seed treatment, proper arrangement of irrigation, cropping system, availability of quality seed rhizomes, organic manure used, labour availability, and area under turmeric cultivation is the factor affecting turmeric production in Sunsari district of Nepal.

ACKNOWLEDGMENTS

The authors would like to thank Prime Minister Agriculture Modernization Project-Ginger/Turmeric Zone, Sunsari, Nepal, and GPCAR for their financial support and help during the research period.

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