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Review

Cost Benefit Analysis of the Production of spices in Peren District, Nagaland

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ABSTRACT

Nagaland State has rich biological diversity blessed with good agro-climatic conditions. The study was carried out in the Peren district of Nagaland with three major spices grown in the State i.e., Naga King Chilly, turmeric, and Ginger. In the year 2020-21 the production of Naga King Chilly was 12757.80 M. T with an area of 595-hectare, turmeric production was 9102.10 M. T with an area of 649.50 hectares and ginger production was 35303 M.T with an of 4694 hectare. The study aims to study the cost-benefit analysis of the species in the Peren District. Horticulture crops have better insight into sustained income as it is known to be cash crops and are labour intensive hence the high chance of labour employment in production and marketing. The cost-benefit analysis result shows that it has a positive benefit in the cultivation of spices. Thus, the farmers of Nagaland need to be inculcated with the utilization of modern equipment and this opportunity should be given by the Government of Nagaland. There is a need to enhance the horticulture development to meet the demands, exports and hence generate revenue for the State Economy.

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1. Introduction

Agriculture is known to be the backbone of the development of the Indian Economy. India is now considered to be the world's most populated country and thus needs major attention in the agriculture and allied sectors to meet the demands of the people in food security, employment, and export and revenue generation for the country. Horticulture which is a part of agriculture is also known to be the cash crop generation for the farmers and can lead to economic growth and development. In India, 75 types of spices varieties are grown out of which 109 varieties are listed according to the International Organization for Standardization (ISO).

Nagaland is registered in the Indian Union as the 16th State with its capital as Kohima District. Nagaland has very good agro-climatic conditions for growing crops and is regarded as an agrarian State. Under Nagaland State, Peren district is the eleventh district and is known as the land of the Virgin Forest. The State horticulture crops have attracted marketing opportunities comparatively to the past years and have achieved the Geographical Indication (GI) registration for Naga King Chilly as GI no. 109 on August 22nd, 2007. Nagaland cultivates 24 spices in total out of which the major spices cultivated in the State are Cardamom, Ginger, Turmeric, and Naga king chilly.

2. Objective

The objectives are as follows

- To analyze the production trend of the spices specifically Naga King Chilly, Turmeric, and Ginger in Peren District.
- To analyze the cost-benefit analyses of the spice cultivators specifically Naga King Chilly, Turmeric, and Ginger in Peren District.

3. Research Methodology

The study was carried out based on primary data and supportive of secondary data sources. Simple random sampling was applied and chooses a sample size of 150 respondents under Peren District which consists of six villages i.e., Tesen Village, Peletkei Village, Dunglwa Village, Peren Village, Tening Village, and Pulwa Village. The data collection was done in the Year 2022 through personal interviews along with the help of a structured questionnaire. To analyze the research objectives, simple statistical tools and SPSS software were used. Krejcie Morgan method was used for analyzing the sample size population with 95219 population of the Peren district according to the 2011 census with 382.93 thus taking 150 sample respondents.

4. Hypothesis

- H0: There is no significant relationship between the age of the farmers and income generation.
-

5. Result And Discussion

To analyze the objectives with the given hypothesis the following tables are shown which are collected from the primary data during field work. The years taken for analysis are 2019, 2020, 2021, and 2022.

5.1 Age-wise distribution of Sample respondents in Peren Districts

Table 5.1 explains the age-wise distribution of the sample respondents in the Peren district. The total sample respondents were 150 out of which 57.33 were male and 42.67 were female. Most of the age group was in the age group of 35-40 years.

Table 5.1 Age-wise distribution of Sample respondents in Peren Districts

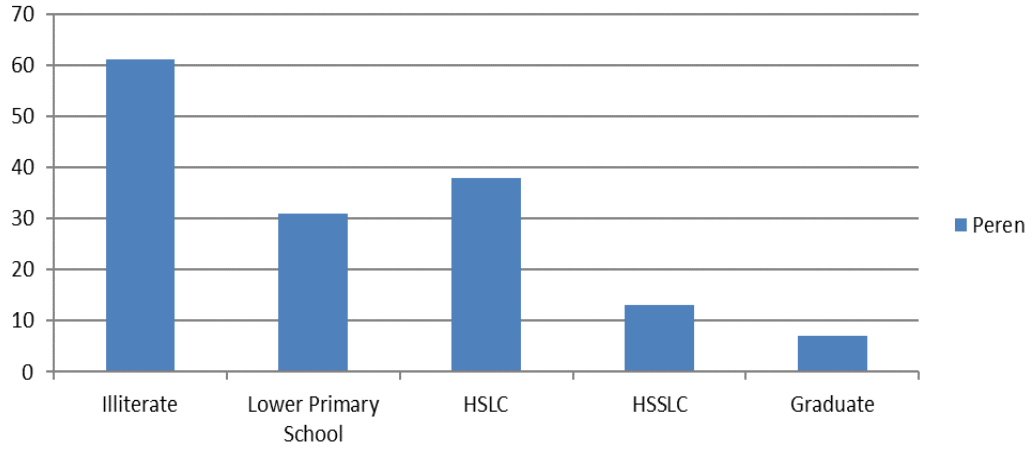
Age Group	Peren District		
	Male	Female	Total
20-25	1	1	2
25-30	1	6	7
30-35	12	12	24
35-40	34	23	57
40-45	20	13	33
45-50	05	05	10
50-55	05	--	5
55-60	05	01	6
60 above	03	03	6
Total	**86**	**64**	**150**

Source: Primary data collected from fieldwork

5.2 Educational Qualification of the Sample Respondents

The below figure 5.2 depicts about the educational qualification of the farmers. It has been categorized into five parts i.e., Illiterate, Lower Primary School, HSLC, HSSLC, and Graduate. The sample respondents of the farmers were mostly illiterate followed by HSLC qualification.

Figure 5.2 Educational Qualification of the farmers



5.3 Landholding pattern of the farmers cultivating spices

The table 5.2 shows the landholding size pattern of the spice in the Peren district. The farm size is categorized as Marginal farmers, small farmers, semi-medium farmers, and medium farmers. The total land holding size is 327.60 hectares for all three species. The marginal farmer landholding size was 28.60 hectares, the small farmer landholding size was 93.50 hectares, the semi-medium farmer landholding size was 105.10 hectares, and the medium farmer landholding size was 100.40 hectares.

Table 5. 2 Landholding size pattern for the cultivation of spices

Farm Size	King Chilly	Turmeric	Ginger	Total
Marginal Famer (Below 1 Ha)	--	23.6	5.0	28.60
Small Farmer (1-2 ha)	61.1	28.2	4.2	93.50
Semi-Medium Farmer (2-4 ha)	105.1	--	--	105.10
Medium Farmer(4-10ha)	100.4	--	--	100.40
Total	266.6	51.8	9.2	327.60

Source: Primary data collected from fieldwork

5.3 Production of the cultivation of species

The table 5.3 explains the production of the cultivation of spices from Naga King Chilly, Turmeric, and Ginger from 2019, 2020, 2021, and 2022 years. The total production of all three spices was 243594 M.T. The total production of marginal farmers was 23824 M.T, small farmers' total production was 71950, semi-medium farmers' total production was 99080 M.T, and the medium farmer's total production was 48740 M.T.

Table 5.3 Production of Naga King Chilly, Turmeric, and Ginger

Farm Size	King Chilly	Turmeric	Ginger	Total
Marginal Famer (Below 1 Ha)	--	19744	4080	23824
Small Farmer (1-2 ha)	51960	17050	2940	71950
Semi-Medium Farmer (2-4 ha)	99080	--	--	99080
Medium Farmer(4-10ha)	48740	--	--	48740
Total	199780	36794	7020	243594

Source: Primary data collected from fieldwork

5.4 Productivity of the cultivation of spices

The table 5.4 explains about the productivity of Naga King chilly, Turmeric, and Ginger spices. The total

productivity of all three spices was 1308.94 M.T. The total productivity of marginal farmer was 413.15 M. T, small farmer total productivity was 538.75 M. T, semi-medium farmer total productivity was 235.68 M. T, and the medium farmer total productivity was 121.36 M.T.

Table 5.4 Productivity of Naga King Chilly, Turmeric and Ginger

Farm Size	King Chilly	Turmeric	Ginger	Total
Marginal Famer (Below 1 Ha)	--	209.15	204	413.15
Small Farmer (1-2 ha)	212.6	151.15	175	538.75
Semi-Medium Farmer (2-4 ha)	235.68	--	--	235.68
Medium Farmer(4-10ha)	121.36	--	--	121.36
Total	569.64	360.3	379.00	1308.94

Source: Primary data collected from fieldwork

5.5 Returns of Naga King Chilly, Turmeric and Ginger

The table 5.5 explains about the returns of spices like Naga King Chilly, Turmeric, and Ginger. The production was multiplied by the average prices of the spices of each year i.e., 2019, 2020, 2021, and 2022. The average Naga King chilly price according to years were 135, 155, 185, and 195. The average Turmeric prices according to years were 67.5, 77.5, 77.5, and 115. The average Ginger price according to years were 75, 95, 95, and 100. Thus, the total returns of the marginal farmer were 2337580, the small farmer's total returns were 10663150, the semi-medium farmer's total returns were 16858100, and the medium farmer's total returns were 8185900.

Table 5.5 Returns of Naga King Chilly, Turmeric and Ginger

Farm Size	King Chilly	Turmeric	Ginger	Total
Marginal Famer (Below 1 Ha)	--	1793080	544500	2337580
Small Farmer (1-2 ha)	8908800	1512650	241700	10663150
Semi-Medium Farmer (2-4 ha)	16858100	--	--	16858100
Medium Farmer (4-10ha)	8185900	--	--	8185900
Total	33952800	3305730	786200	38044730

Source: Primary data collected from field work

5.6 Average Returns of Naga King Chilly, Turmeric, and Ginger

The table 5.6 explains about the average returns of Naga King Chilly, Turmeric, and Ginger. The total average net return marginal farmer was 584395, the small farmer's total average net return was 2665788, the semi-medium farmer's total average net return was 4214525, and the medium farmer's total average net return was 2046475.

Table 5.6 Average Return of Naga King Chilly, Turmeric, and Ginger

Farm Size	King Chilly	Turmeric	Ginger	Total
Marginal Famer (Below 1 Ha)	--	448270	136125	584395
Small Farmer (1-2 ha)	2227200	378162.5	60425	2665788
Semi-Medium Farmer (2-4 ha)	4214525	--	--	4214525
Medium Farmer (4-10ha)	2046475	--	--	2046475
Total	8488200	826433	196550	9511183

Source: Primary data collected from fieldwork

5.6 Per Hectare Average Returns of Naga King Chilly, Turmeric and Ginger

Table 5.6 explains the per hectare average returns of Naga King Chilly, Turmeric, and Ginger. The total average per hectare returns of marginal farmers was 46219.5, small farmers' total average per hectare return was 64248.6, semi-medium farmers' total average per hectare return was 40100.1, and the medium farmers total average per hectare return was 20383.2.

Table 5.6 Per Hectare Average Returns of Naga King Chilly, Turmeric and Ginger

Farm Size	King Chilly	Turmeric	Ginger	Total
Marginal Famer (Below 1 Ha)	--	18994.49	27225	46219.5
Small Farmer (1-2 ha)	36451.72	13410.02	14386.90	64248.6
Semi-Medium Farmer (2-4 ha)	40100.14	--	--	40100.1
Medium Farmer(4-10ha)	20383.22	--	--	20383.2
Total	96935.1	32404.5	41611.9	170951

Source: Primary data collected from fieldwork

5.7 Cost Estimation per Hectare of Naga King Chilly, Turmeric and Ginger

Table 5.7 explains about the cost estimation per hectare of the spices. Comprising of all farm size the Naga King Chilly has Rs. 55543.5 cost against 1 per hectare, Turmeric has Rs. 27264.3 cost against 1 per hectare and Ginger has 28795.2 cost against 1 per hectare. Thus, the total cost estimation of all the spices was Rs. 111603.

Table 5.7 Cost Estimation Per Hectare of Naga King Chilly, Turmeric, and Ginger

Farm Size	King Chilly	Turmeric	Ginger	Total
Marginal Famer (Below 1 Ha)	--	17218.22	16950	34168.2
Small Farmer (1-2 ha)	23371.52	10046.09	11845.24	45262.9
Semi-Medium Farmer (2-4 ha)	14963.84	--	--	14963.8
Medium Farmer(4-10ha)	17208.17	--	--	17208.2
Total	55543.5	27264.3	28795.2	111603

Source: Primary data collected from fieldwork

5.8 Cost and Returns of Naga King Chilly, Turmeric, and Ginger

Table 5.8 explains about the cost and returns of Naga King Chilly, Turmeric and Ginger. The total cost of all spices estimated to be Rs. 111603 against the total returns of 170951. The Naga King Chilly Spice Net Returns were estimated to be 41391.55 and 1.75 of Benefit-cost Ratio. The Turmeric spice Net Returns were estimated to be 5140.20 and 1.75 of the Benefit-cost Ratio. The Ginger Spice net Returns were estimated to be 12816.66 and 1.75 of Benefit cost Ratio.

Table 5.8 Cost and Returns of Naga King Chilly, Turmeric, and Ginger

Spices	Cost	Return	Net Return	BCR
Naga King Chilly	55543.53	96935.08	41391.55	1.75
Turmeric	27264.31	32404.51	5140.20	1.19
Ginger	28795.24	41611.9	12816.66	1.45
Total	111603	170951	59348.4	4.39

Source: Primary data collected from fieldwork

5.9 Income Generation of Naga King Chilly, Turmeric and Ginger

Table 5.9 explains the income generation of the spices. The total production of Naga King Chilly was 199780 M.T and the income earned was 33463150 thus the income per hectare generated was 96935.08. The total production of Turmeric was 36794 M.T and the income earned was 3104677.72 thus the income per hectare generated was 32404.51. The total production of Ginger was 7020 M.T and the income earned was 618672.60 thus the income per hectare generated was 41611.90.

Table 5.9 Income Generation of Naga King Chilly, Turmeric, and Ginger

Spices	Production	Income	Income Per hectare
Naga King Chilly	199780	33463150	96935.08
Turmeric	36794	3104677.72	32404.51
Ginger	7020	618672.60	41611.90
Total	243594	37186500	170951.5

Source: Primary data collected from fieldwork

6. Regression Analysis of the Peren Districts

The table 6.1(I), (II), and (III) explain the model summary, ANOVA, and Coefficients.

Table 6.1 (II): ANOVAb Peren Districts

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.843[a]	.710	.700	.57521

a. Predictors: (Constant), Age, Land, Education, Labour, Seed.
b. Dependent Variable: Income

Table 6.1 (III): Coefficients of Chomoukedima Districts

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	116.549	5	23.310	70.451	.000[a]
Residual	47.645	144	.331		
Total					

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std.Error	Beta		
(Constant)	.227	.126		1.809	.073
Education	.068	.030	.106	2.281	.024
Land	.755	.073	.832	10.386	.000
Seed	.093	.049	.121	1.883	.062
Labour	-.128	.046	-.151	-2.798	.006
Age	-.011	.015	-.029	-.736	.463

Table 6 (I, II, III) of the beta coefficient regression line of the spice growers in Peren district has found that the income Y = 0.430, education = -0.007, land = -.329, seed = 1.002, labor = 0.238 and, age = - 0.010. These values represent that 1 per cent increase in income per hectare resulting with an increase in the corresponding value of the said inputs respectively influencing to the income. The collective effect of all independent variables on the dependent variables on the dependent variable combined effect R2 is 0.710. It is explained that 71 percent of the variation of total income by all selected variables. From F test statistics have observed that the collective effect of the independent variable is significant at a 1 percent probability level. The analysis has shown that the age of the farmers has an insignificant relationship with the dependent variable and thus proved that age has no relationship with the income earned.

7. Findings

- The study reveals that 57.33 percent of the respondents were male and 42.67 percent of the respondents were female.
- The study reveals that the educational qualification of the farmers says that 40.67 percent were literate, 20.67 were lower primary school, 25.33 were HSLC, 8.67 were HSSLS and only 4.67 were graduates.
- The study reveals that the land holding size of Naga King Chilly was 266.6 hectares, Turmeric was 51.80 hectares and ginger was 9.2 hectares.
- The study reveals that the total production of Naga King Chilly was 199780 M.T, Turmeric was 36794 M.T and Ginger was 7020 M.T.
- The study reveals that the total productivity of Naga King Chilly was 569.64 M. T, Turmeric was 360.30 M. T and Ginger was 379.00 M.T.
- The study reveals that the total returns of Naga King Chilly was 3395800, Turmeric was 3305730 and Ginger was 786200.
- The study reveals that the total average return of Naga King Chilly was 8488200, Turmeric was 826433 and Ginger was 196550.
- The study reveals that the total per hectare average return of Naga King Chilly was 96935.1, Turmeric was 32404.5 and Ginger was 41611.9.
- The study reveals that the cost estimation per hectare of Naga King Chilly was 55543.5, Turmeric was 27264.3 and Ginger was 28795.2.
- The study reveals that the Benefit Cost Ratio was 1.75 for Naga King Chilly, 1.19 for Turmeric and 1.45 for Ginger.
- The study reveals that the income generation of per hectare for Naga King Chilly was 96935.08, Turmeric was 32404.51 and Ginger was 41611.90.

8. Conclusion

The research study had addressed about the Cost Benefit Analysis of the Production of spices in Peren District, Nagaland. The study has shown a positive impact of cost benefit for the cultivation of the spices

of major spices like Naga King Chilly, Turmeric, and Ginger. The production of such spices which is considered to be cash crops has greater benefits to generate income with less cost management. With much Government intervention, there can be more generation of revenue not only for the farmers but also for the State. The infrastructure such as proper roads, and markets to sell within or export neighboring villages, districts, or states should be well arranged. The farmers need well-equipped machinery and pieces of training for more production with the initiative of seminars, practical training, and knowledge of financial assistance. With these corrective measures, there is a way to earn and generate employment for the State.

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