

Horticulture for Achieving Higher Income and Quick Returns for Farmers in Mizoram

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Abstract: Horticulture has established its credibility in improving income through increased productivity, generating employment, enhancing exports and providing nutritional security to the people. It has played a significant role in improving the economic status of our farmers. Mizoram is suitable for growing a variety of horticultural crops and has made significant gains in the sector in the recent past. The gestation period of many horticultural crops are short and has the capability to provide quick returns to farmers. The sector has shown promise in alleviating the income of the farmers in Mizoram.

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I. Introduction

Horticulture, including fruits, vegetables, roots and tubers, spices, mushrooms, floriculture, medicinal and aromatic plants, nuts, and plantation crops, has emerged as an important sector. There are several advantages of growing horticultural crops. These crops produce higher biomass than field crops per unit area resulting in efficient utilization of natural resources, are highly remunerative for replacing subsistence farming and thus alleviate poverty level in rain fed, dry land, hilly, arid and coastal agro-ecosystems. Horticulture crops have potential for development of wastelands through planned strategies, require comparatively less water than food crops, provide higher employment opportunity, are important for nutritional security and are environment-friendly. Moreover, they are high-value crops with high potential of value-addition, have high potential for foreign exchange earnings, and make higher contribution to gross domestic product (GDP) from a limited land area under these crops.

Mizoram is fortunate to be blessed with agro-climatic conditions pre-eminently suited for a variety of horticultural crops. It enjoys a splendid blend of climatic conditions of tropical, sub-tropical and temperate zone climates and the hill ranges run in North-South direction with varying altitudes with an average height of 920m above sea level, coupled with high mean annual rainfall of 2500 mm and high relative humidity up to 90 percent. The soils are loamy to clay, rich in organic carbon and moderately rich in available potash. The temperature during summer varies from 20^o C to 34^o C and during winter season from 8^o C to 17^o C. These factors present an attractive opportunity for taking up horticulture farming in a large scale in the state.

II. Literature Review

According to Chadha (2006), India has favourable climates and soils for growing a larger number of horticultural crops. Soon after Independence, India faced the challenge of providing food security to millions of its people. It was only in the mid-80's that the government identified horticulture sector as a means of diversification for making agriculture more profitable through efficient land use, optimum utilization of natural resources and creating skilled employment for rural masses especially the womenfolk. Horticulture has emerged as an integral part of food and nutritional security and an essential ingredient of economic security.

According to Prasad and Kumar (2008), there is a great demand for horticulture produce in India as the majority of Indian population is vegetarian.

The FAO (Food and Agriculture Organization) Agricultural Services Bulletin 76 (2007) has mentioned that the production/marketing chain for horticulture produce is a two-way process. Produce flows from the rural areas into the cities and money and market information should flow back. As tastes in the city market evolve the rural community can use this market information to target its production accordingly. In horticulture farming, where prices are rarely regulated, financial viability depends as much upon business and marketing skills as on the farmer's technical expertise.

Objective of the study

The study is an attempt to ascertain whether horticulture farming provides higher income for Mizo farmers and the whether it provides quick returns on their investment.

Hypotheses:

The proposed research study will attempt to prove or disprove the following hypotheses:

- Horticulture farming in chayote, turmeric and grape increases employment, provides higher income and gives quick returns to farmers.

III. Research Methodology

For the purpose of this research, the following horticulture products that have made significant gains in the recent past have been selected:

1. Grape (Fruit crop)
2. Turmeric (Spice crop)
3. Chayote (Vegetable crop)

The study was conducted with the help of primary and secondary data. A structured questionnaire was developed and administered to horticultural farmers engaged in the cultivation of grape, turmeric and chayote. Simple random sampling method was employed for selection of sampling units. The structured questionnaire was successfully administered on 361 farmers (113 turmeric farmers, 90 chayote farmers and 158 grape farmers).

Data was also gathered from the records and publications of Department of Horticulture and Department of Agriculture, Government of Mizoram.

IV. Results and Discussion

Reasons for Adoption of Horticulture Farming

An attempt was made to find out the reasons that led to the farmers in adopting horticulture farming. Several farmers have shifted from traditional farming (rice cultivation) to horticulture farming. Others have started horticulture farming without any prior farming experience. The government has taken effective steps in promoting horticulture sector in the state and encourage more farmers to adopt horticultural crops in the state. This has given a boost to the sector and the state has witnessed more and more farmers adopting horticultural crops. The prospect of higher income opportunity, success stories of other farmers, support from government etc. play a significant role in attracting more farmers to this sector. The respondents were asked to identify the reasons that made them adopt the trade. Respondents were asked to tick all the reasons that were applicable. Accordingly, ranking was assigned in order of the number of responses against each reason. The result is presented in the following figure.

Table 1: Reasons for adopting horticulture farming

Reason	Turmeric		Chayote		Grape		Total	
	%	rank	%	rank	%	rank	%	rank
Higher income opportunity	94.7%	1	91.1%	3	67.7%	1	82.0%	1
Shorter gestation period of crop	62.8%	3	93.3%	2	19.0%	6	51.2%	2
Higher yield per hectare	61.1%	4	54.4%	4	38.0%	2	49.3%	3
Success stories of other farmers	38.9%	7	54.4%	4	36.7%	3	41.8%	4
Ready market for sale of produce	71.7%	2	18.9%	6	29.1%	4	39.9%	5
Export opportunity	15.9%	9	98.9%	1	2.5%	8	30.7%	6
Requires low financial investment	53.1%	6	34.4%	5	5.7%	7	27.7%	7
Less labour intensive	56.6%	5	1.1%	7	6.3%	7	20.8%	8
Support from Govt.	26.5%	8	1.1%	7	24.7%	5	19.4%	9

Source : Primary data

From the data collected from the 361 horticulture farmers surveyed, the foremost reason that led to the adoption of horticulture farming by the respondents is the opportunity for attaining higher income, followed by the shorter gestation period of the crop selected by the farmers as compared to cultivation of rice. The third important reason cited is the prospect of higher yield per hectare of land area, followed by the encouragement from success stories of other farmers who have adopted the trade. The fifth reason is the availability of ready market for the sale of the horticulture produce. The sixth reason is the opportunity of exporting the produce, followed by the requirement of low financial investment with regard to the crop. The other reasons cited are the fact that horticulture farming can be less labour intensive and there are avenues for receiving support from the government.

Testing of hypothesis

Hypothesis: Horticulture farming in chayote, turmeric and grape increases employment, provides higher income and gives quick returns to farmers.

The hypothesis is tested through Multinomial Logistic Regression. The data is analysed by using SPSS ver. 20. The goal of the analysis is to examine the relationship among choices horticulture farming increases employment, provides higher income and quick returns. The dependent variable is horticulture farming consisting of chayote, turmeric and grape. The independent variables which we will use in this analysis are; increased in employment, higher income and quick returns represented by members, highinc and quickret. The method for including the multinomial logistic regression in SPSS is through direct entry, therefore only direct entry has been adopted. No missing data were observed and so the missing data analysis is bypassed in the process. In this stage, the underlying assumptions are also addressed regarding non-metric dependent variables of crops has three categories viz., chayote, turmeric and grapes. In the independent variables, nonmetric highinc and quickret are entered as factors while metric variable members are entered as covariates. Afterwards, the logistic regression model is computed.

The following table 2 shows the Model Fit Information. The table shows the initial log likelihood function, (-2 Log Likelihood or -2LL) which is a statistical measure like the total sums of squares in regression.

Table 2: Model Fitting Information

Model	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	482.352			
Final	150.252	332.100	24	.000

Source : SPSS output

The initial log likelihood value (482.352) is a measure of the model with no independent variable i.e only the constant or the intercept. The final log likelihood value (150.252) is the measure computed measured after all the independent variables has been entered into the logistic equation. The difference between these two is the model chi-sqaure value (332.100) that is tested for statistical significance. In this model, the Chi-square value of 332.100 has a significance fit of less than 0.0001, so we conclude that there is a significant relationship between the dependent variable and the set of independent variables.

Table 3 shows the strength of relationships between the dependent variables and the independent variables which is analogous to the R² measure in multiple regression. Cox and Snell R² measure with values close to 1 indicates greater model fit. So Cox and Snell as well as Nagelkerke R² is close to 0.7 which indicates that the model is of good fit. As per R² it could be characterised that the relationship is strong.

Table 3: Pseudo R-Square

Cox and Snell	.601
Nagelkerke	.681
McFadden	.429

Source : SPSS output

Table 4 displays the classification matrix to evaluate the accuracy of the model. The overall percentage of accurate predictions (74.5%) is the measure of the model which can be relied for this analysis which is the percentage of cases for which the model predicts accurately.

Table 4: Classification

Observed	Predicted			Percent Correct
	Chayote	Turmeric	Grapes	
Chayote	75	4	11	83.3%
Turmeric	18	54	41	47.8%
Grapes	7	11	140	88.6%
Overall Percentage	27.7%	19.1%	53.2%	74.5%

Source : SPSS output

The following two tables Likelihood Ratio Tests and Parameter shows that statistical significance of the individual predictor variables. Table 5: Likelihood Ratio Tests shows the contribution of the variable and the individual independent variables. The table test the hypothesis that the variables contribute to the reduction in error measured by the 2-Log Likelihood Statistic. In this model, the variables members representing the number of employees, high income and quick returns are the contributors in explaining the choice of crop cultivation in horticulture farming.

Table 5: Likelihood Ratio Tests

Effect	Model Fitting Criteria		Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.	
Intercept	150.252 ^a	.000	0	.000	
Members	189.805	39.553	2	.000	
Highinc	204.399	54.147	12	.000	
Quickret	349.074	198.822	10	.000	

Source : SPSS output

Table 6: Parameter Estimates

crps ^a		B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
								Lower Bound	Upper Bound
Chayote	Intercept	-16.651	5024.093	.000	1	.997			
	Members	-.098	.128	.584	1	.445	.907	.705	1.166
	[highinc=8]	-1.612	.990	2.652	1	.103	.199	.029	1.389
Turmeric	Intercept	-14.185	.534	705.042	1	.000			
	members	-.658	.127	26.785	1	.000	.518	.404	.665
	[highinc=3]	-2.758	1.066	6.691	1	.010	.063	.008	.513
	[highinc=8]	2.421	1.104	4.811	1	.028	.089	.010	.773

a. This parameter is set to zero because it is redundant.

Source : SPSS output

The two equations in table 6 are labeled by the group category in contrast to the reference group. Due to the limitation of data overflow SPSS is not able to calculate the third group and equation. The first equation is labeled as chayote and second as turmeric. The coefficients for each logistic regression equation are found in the column label B. The hypothesis that is tested here is that the coefficient is not equal to zero i.e., changes the odds of the dependent variable event is tested by the Wald statistic. The variables that have a statistically significant relationship to distinguishing crop choice for chayote is not visible as significance level is more than p value 0.05. But the variables that have a statistically significant relationship to turmeric growers are members meaning employees and highinc. The following table 7 summarizes the findings of the Multinomial Logistic Regression Model.

Table 7: Summarization of Findings

Model Chi Square	Nagelkerke R2	Accuracy Rate for Learning Sample	Significant Coefficients (p<0.05)
332.100	0.681	74.5%	Equation 2 *members *highinc=3 *highinc=8

Source : SPSS output

V. Conclusion

The foremost reason that led to the adoption of horticulture farming by the respondents is the opportunity for attaining higher income, followed by the shorter gestation period of the crop selected by the farmers as compared to cultivation of rice. The third important reason cited is the prospect of higher yield per hectare of land area, followed by the encouragement from success stories of other farmers who have adopted the trade. The fifth reason is the availability of ready market for the sale of the horticulture produce. The sixth reason is the opportunity of exporting the produce, followed by the requirement of low financial investment with regard to the crop. The other reasons cited are the fact that horticulture farming can be less labour intensive and there are avenues for receiving support from the government.

It is revealed from the study that the horticulture farmers of Mizoram have been able to benefit from adopting horticulture products. The study came to the conclusion that farmers adopted horticulture due to the opportunity for attaining higher income along with the nature of shorter gestation period of the selected crops.

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