



## SUSTAINABLE ECONOMIC ANALYSIS AND EXTENT OF SATISFACTION LEVEL OF KING CHILLI GROWERS IN NAGALAND

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### ABSTRACT

#### Keywords:

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The present study was undertaken on sixty farmers during 2009-10 in hilly zone of Dimapur district of Nagaland to examine the marketed surplus of King chilli and to assess the sustainability value indices of King chilli on different farm size groups. A linear type model viz; Cobb-Douglas Production Function was fitted to access the impact on different farms size group through available data on King chilli. On the small farm size group it was recorded as maximum fluctuation in market prices of King chilli (₹10.33), followed by marginal (₹9.81), it was recorded least on medium group as ₹7.53, even home consumption of King chilli inputs were recorded the negative impact on King chilli production as well on area too. While, it was observed that the sustainability value indices were recorded as 0.599, whereas on different farms it was found maximum under medium category (0.706), followed by small (0.690) and least (0.420) on marginal farm size group. As per the client satisfaction index 46.67% were medium satisfied, followed by 30% per cent were low satisfied and remaining 23.33% were highly satisfied with the extension services available at present.

### INTRODUCTION

Chilli was first introduced by Portuguese towards the end of 15<sup>th</sup> century, its cultivation gain popularly in 17<sup>th</sup> Century (Indira *et al.*, 2007). Important cultivated species of chilli are *Capsicum annum*, *Capsicum frutescense* and *Capsicum chinense*. The very hottest cultivar belongs to *C. chinense*. Naga King chilli (*Capsicum chinense Jacquin*) also locally called “Naga mircha” belongs to the genus *Capsicum* of Solanaceae or nightshade family. Naga King chilli has been considered as the world’s hottest chilli and entered in “Guinness book of world records” (measuring 855,000 scoville units), beating the “Mexican red savana habaneros” (5,77,000 scoville units) (Shetalu, 2010). The State Government of Nagaland also got the patent rights of Naga King chilli and got Geographical indication from Government of India under Registration and Protection Act, 1999 (Anon, 2009). Demand of Naga Chilly is very high both in domestic and outside market. Earlier the State Agriculture Department had tied up marketing linkage with Imperial Tobacco Company (ITC), Spices Limited, spices Board of India and recently with the International Competence Centre for Organic Agriculture (ICCOA) Bangalore for marketing of dried Naga Chilli outside the state.

King chilli has great potential for value addition as supplement or complementary thereby; as in oleoresin (for

treatment of rheumatic disorders), tonic and carminative action, pain balm, prickly heat powders, essential oil (for aroma therapy), capsaicin, capsanthin. Its chemical constituents are in use in pharmaceutical and food industry as natural colouring etc; which has gained much importance in global market besides using as dried powder products. Capsaicin from King chilli is chemically a condensation product of 3-hydroxyl, 4-methoxybenzylamine, decylenic acid (N-vanillyl-8-methy-6-nonenamide, C<sub>18</sub>H<sub>27</sub>NO<sub>3</sub>). Capsaicin has significant physiological action and has carminative, tonic, stimulative and anti-cancerous properties. It is also reported that capsaicin is used externally for the treatment of tonsillitis, diphtheria and snake bite besides relieving cold, sore throat, rheumatism and stomach disorder (Sumathykutty and Methew, 1984; Baruah and Baruah, 2004). Capsaicin has beneficial effects in the treatment of acute stomach ache, loss of appetite and low blood pressure. Studies also reported that capsaicin interacts with protein molecules to decrease cholesterol absorption in the body and speeds up metabolism besides enhancing endorphins a substance that causes feeling of pleasure. In cosmetics like heat powders and skin ointments capsaicin is said to act as an effective counter irritant and chemical scratches. On food and varies front it is part of hot biscuits, ginger soft drinks and in

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chewing tobacco. It is also part of animal diseases control specially, Renikhet disease when given orally in the form of a paste along with garlic (Kumary and Reghunath, 2005). A new report also claims that combination of capsaicin and a local anesthetic, QX- 314, may help reduce trauma of labour pains, surgery and can treat chronic itching (Sharma, 2007).

Traditionally in Nagaland, King chillies are grown in burned bamboo soils while jhumming and also in kitchen gardens with some organic manures such as FYM, poultry droppings, etc. However, on large scale cultivation, traditional methods are not applicable. Since King chilli is a potential crop for NE region in general and Nagaland state in particular both for domestic and export purpose, which is yet to put under Research and Development, it is vital for any research pertaining to its improvement. Aim to assess the sustainable economic of King chilli in Nagaland. To identify the level of satisfaction on different farm size group of King chilli growers during the marketing in Nagaland.

#### MATERIALS AND METHODS

This study is based on the data collected from marginal, small and medium King chilli cultivators selected from two blocks of Dimapur district of Nagaland. Multi-stage stratified random sampling method was used for the selection of sample. In the first stage, out of the major King chilli cultivator from Dimapur district was selected purposively being highest production of King chilli in the State. In the second stage, out of three blocks, two blocks viz; Medziphema and Chumukedima were randomly selected from the district. Subsequently, 10% villages from the list of 62 villages altogether from both blocks and 3 villages viz; Kukrima, Suchonema and model village from Medziphema block and 3 villages viz; Seithekiema, Tenyiphe and Chumukedima village from Chumukedima blocks were selected randomly. At final stage of the sampling, all the King chilli cultivators of the selected villages were grouped in to three categories viz; marginal, small and medium. A sample of 20% King chilli cultivators were selected randomly from each size group in proportion to their number in each class. The primary data was collected with the help of pre-tested schedule by interviewing selected cultivators as well as traders personally during the year 2009-2010. The secondary data were collected from block office, district statistical and agriculture office, journals, periodicals, magazines etc;

Analytical tools: To find out the determinants of marketed surplus, a linear regression model of the following form was fitted:

$$Y = b_0 + b_1 x_1 + b_2 x_2 + b_3 x_3 + \mu$$

Where: Y = Marketed surplus (in kg),

$x_1$  = Production of King chilli (in kg),

$x_2$  = Home Consumption of King chilli (in kg),

$x_3$  = Market Price of King chilli (₹),

$b_0$  = Intercept,

$\mu$  = Random variable.

$b_1$ ,  $b_2$  and  $b_3$  are regression coefficients of variables selected.

The individual obtained score Client Satisfaction index = the individual obtained score/Maximum score possible (Kumaran and Vijayaragavan, 2005). Finally the data thus collected were tabulated and statistically analysed to interpret the results.

#### RESULTS AND DISCUSSION

The maximum households 318 (61.51%) was found on small farms (1-3 ha), followed by the marginal farms (>1 ha) the total households was 112 (21.66%) and it was found least on medium farm ( $\geq 3$  ha) with 87 (16.83%), respectively (Table-1). The marginal farm is having 18 respondents (30%), 30 respondents (50%) on small and 12 respondents (30%) on medium farm size groups, respectively.

**Table 1 Selected respondents on the basis of land holdings (ha)**

Farm Size group	Total house	Total Chilli Cultivators	Samples Farmers
Marginal (> 1 ha)	112	61	18
	(21.66)	(30.20)	(30.00)
Small (1- 3 ha)	318	102	30
	(61.51)	(50.49)	(50.00)
Medium ( $\geq 3$ ha)	87	39	12
	(16.83)	(19.31)	(20.00)
<b>Total</b>	517	202	60
	(100.00)	(100.00)	(100.00)

(Figures in the parenthesis indicates percentage to the total)

**Table 2. Production and Marketed surplus of King chilli on sample farm in Nagaland**

Particulars	Farm size groups			
	Marginal	Small	Medium	Average
Total Production (qtl)	117.50	337.95	482.18	312.54
Retention at Farm (qtl)	8.95	26.57	36.82	24.11
Marketed Surplus (qtl)	89.07	248.57	337.60	225.08
Marketed Surplus as Percentage of Production	75.80	73.55	70.01	72.01

Table-2 reveals that on pooled data the total production was 312.54 qtl, which varied from 117.50 qtl on marginal farm to 482.18 qtl on medium farm. The retention of production at farm was more (36.82 qtl) on medium farm, followed by small (26.82 qtl) and it was least (8.09 qtl) on marginal farm size groups. The marketed surplus per farm was more (337.60 qtl) on medium farm, followed by (248.57 qtl) on small farm and it was found least (89.07 qtl) on marginal farm. Out of the total quantity 72% was recorded as marketed surplus on pooled data. Highest percentage with 75.80 of total quantity as marketed surplus on marginal farms, led by small farm with 73.55% and 70% on medium farm groups, as marketed surplus of production has been also observed.

**Table 3. Sustainability value indices on sample farm size groups**

Particulars	Farm size groups			
	Marginal	Small	Medium	Pooled
Average Net Income (ANI)	108506.68	135886.67	114848.51	119747.29
Maximum Net Income (MNI)	155960.27	155752.92	126214.77	145975.99
Standard Deviation (SD)	21921.66	13249.47	14150.22	16440.41
Coefficient of Variation (CV)	20.203	9.750	12.321	31.395
Sustainability Value Indices (SVI)	0.420	0.706	0.690	0.599

Table-3 reveals that on pooled data the sustainability value indices was recorded as 0.599, whereas on different farms it was found to be maximum on medium (0.706), followed by small (0.690) and least (0.420) on marginal farm. The average net income on pooled data was recorded ₹ 119747.29, whereas on different farms it was found to be maximum on small (₹135886.67), followed by medium (₹ 114848.51) and least (₹ 108506.68) on marginal farm. While the maximum net income on pooled data was recorded ₹ 145975.99, whereas on different farms it was found to be maximum on marginal (₹ 155960.27), followed by small (₹ 155752.92) and (₹ 126214.77) on medium farm, whereas, the coefficient of variation on pooled data was recorded maximum as 31.40, followed by 20.20 on marginal, then 12.32 on medium and least 9.75 on small farm. The standard deviation values was varying from 21921.66 (marginal farm) to minimum (₹ 13249.47) on small farm size.

**Table 4 Extent of farmer satisfaction (CSI Index) of extension services rendered**

Satisfaction level	Respondents	Percentage
Low ( $\leq 1.38$ )	18	30.00
Medium (1.39 - 6.70)	28	46.67
High ( $\geq 6.71$ )	14	23.33
<b>Total</b>	<b>60</b>	<b>100.00</b>

Data reveals that the extent of satisfaction level of respondent farmers over extension services and performance of demonstrated variety was measured by Client Satisfaction Index (Table-4). It is observed that majority of the respondent farmers expressed medium (46.67%) and low level (23.33%) of satisfaction for extension services and performance of technology under study area. The results are in conformity with the results of Sabarathanam (1988); Kumaran and Vijayaragavan (2005).

In case of transportation; the transport performance is a measure to evaluate the efficiency and effectiveness of service to meet the goals of all parties i. e; ` shipper, service provider and consignee (Kumar and Antiporta, 2001). The table-6 reveals that transport performance (y) is the major

dependent variable which is influenced by the seven independent variables ( $x_1$  to  $x_7$ ). To measure and evaluate the overall performance of road transportation services offered by an operator to meet logistics goals, it is considered as key indicator due to the movement of fresh produce from farm to market and protect the interest of producer by reaching the destination in the define time. To access the overall impact of these the following independent variables were selected.

- Local Market ( $x_1$ ),
- Sufficient Production ( $x_2$ ),
- Marketable Surplus ( $x_3$ ),
- Pun ( $x_4$ ),
- Storage facilities ( $x_5$ ),
- Octoi ( $x_6$ ) and
- Low ( $x_7$ )

Data reveals that all the above independent variables ( $x_1$  to  $x_7$ ) was positively associated, ranging from 45.03% (sufficient production with low) to 99.32% (storage with local market), as all the values were significant at 1% probability level (Table-5).

Table-6 reveals that the analysis of marketed surplus using linear regression model for all categories of farms (96.98-99.81%) were statistically significant at 1% of probability on different farm size groups. On pooled data it indicates 99.81% of the total variation in marketed surplus was explained by the selected variables of the model. Whereas, investment is further providing the future scope of profit ranging of ` 7.53-10.33 as an output against investment of ` 1 as input, which has to be explore for the benefit of King chilli growers. The market price of King chilli was found significant at 1% on all the farm size group, which shows direct impact on marketed surplus, if price can be control than in coming days having more scope of area increase or production can be increase, while home consumption of King chilli was found to be significant at 1% level of significance, which is further indication to influence by reducing the marked surplus from total production, also it indicates that small groups are consuming more King chilli in compare to other farm size groups.

## CONCLUSION

King chilli production is mainly governed by market price of King chilli, which indicate further area as well as production level in the study area, which may be due to the constrained of several factors viz; risk of high price fluctuation in the market during the season, lack of scientific knowledge/training about King chilli cultivation, value added like smoke candle, vodka etc; as well as other reasons, but on a lower scale. There are vast opportunities for improving the production; productivity and income of the farmers, while overcoming the constraints, utilizing better scientific inputs rising off-season growing of King chilli crops with improve

the conditions, better storage facilities and packaging materials, efficient and correcting price spread and in reality, if such things may happen it will be broom to King chilli

growers at state as well as regional level due to have potentially in smoke candle as well as used in Vodka too

**Table 5 Correlation coefficient for marketing functionalities**

Variables	Transport	Local Market	Sufficient Production	Marketable Surplus	Pun	Storage facilities	Octoi	Low
Transport	1.000							
Local Market	070223*	1.000						
Sufficient Production	0.67341*	0.98836*	1.000					
Marketable Surplus	077923*	0.88961*	0.92164*	1.000				
Pun	0.82499*	0.95408*	0.95417*	0.97180*	1.000			
Storage facilities	0.75838*	0.99323*	0.97248*	0.90267*	0.97128*	1.000		
Octoi	0.86782*	0.66868*	0.65709*	0.85688*	0.84666*	0.73938*	1.000	
Low	0.94762*	0.46790*	0.45028*	0.66444*	0.66705*	0.54370*	0.87021*	1.000

(\* - Significant at one per cent level of significance)

**Table 6 Results of Linear Regression Analysis for Marketed Surplus of King chillion sample farms**

Particulars	Farm size groups			
	Marginal	Small	Medium	Pooled
Number of observation(s)	18	30	12	60
Constant (b)	- 22.0598 <sup>NS</sup> (23.51256)	- 64.717 <sup>NS</sup> (24.86571)	19.685 <sup>NS</sup> (76.10784)	- 9.96295 <sup>NS</sup> (10.97646)
x <sub>1</sub> (Production of King chilli)	-0.13739 <sup>NS</sup> (0.320179)	- 0.41366 <sup>NS</sup> (0.199296)	0.160937 <sup>NS</sup> (0.370013)	- 0.12561 <sup>NS</sup> (0.119421)
x <sub>2</sub> (Home consumption of King chilli)	0.062661 <sup>NS</sup> (0.108224)	0.338907 <sup>**</sup> (0.137615)	0.060302 <sup>NS</sup> (0.480299)	0.043229 <sup>NS</sup> (0.066294)
x <sub>3</sub> (Market price of King chilli)	9.813479 <sup>**</sup> (0.908872)	10.32981 <sup>**</sup> (0.648549)	7.533622 <sup>**</sup> (1.367017)	9.205934 <sup>**</sup> (0.369821)
R <sup>2</sup> Value	0.969827 <sup>**</sup>	0.995743 <sup>**</sup>	0.990723 <sup>**</sup>	0.998098 <sup>**</sup>
F - Value	139.2829 <sup>**</sup>	1949.38 <sup>**</sup>	249.1976 <sup>**</sup>	9622.402 <sup>**</sup>

(Figures in parenthesis are standard errors; \*\* - significant at 1% level of significance and NS - Non-significance)

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