

Research Paper

Resource Management in Naga King Chilli Production: Evidence from Nagaland, India

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ABSTRACT

This paper analyzes resource management and the problems faced by Naga chilli growers in Nagaland. A total of 100 respondents were chosen randomly for the study, comprising of 50 farmers, 20 intermediaries and 30 customers. Findings shows that the growers practiced organic cultivation and the profit earned by chain players per kg of Naga King chillies is comparatively higher than other normal chillies in the study area. The total number of working days required for the production and cultivation of NK chilli was 183 days/ha/year, respectively. The return over cost (2.80) shows that Naga King chilli production is remunerative for the growers of the study area. Major problems faced by the growers in the study area identified were wide fluctuation in price, availability/ supply shortage, handling and storage problems, perishable nature of chilli, *etc.* Initiating post-harvest handling practices for the tribal farmer, proper/scientific storages (like zero cooling chamber, cold storages,) forming cooperatives / FPO's, trainings could be initiated through KVK, NGO'S, state departments, *etc.* could be used for retaining the shelf life of the chilli.

HIGHLIGHTS

- Naga King chilli being a perishable in nature.
- Customers preferences for Naga King chilli is very much higher than normal chillies.
- The price of NK chilli is comparatively higher than the price of other chillies due to its tastes, pungency and other qualities.
- Economics of Naga King chilli shows its cultivation is more profitable in nature than normal chillies.

Keywords: Production, Marketing, Naga King Chilli, Nagaland, Resource utilization

Nagaland, a far north eastern state of Indian union is pre dominantly an agrarian state with 90 percent of its population dependent on agriculture. The state has high potential for horticultural crops with 25000 and 26300 ha under fruits and vegetables with the total production of 25600-32000 tonnes (KVK, Dimapur 2017). Naga King chilli (*Capsicum chinense* sacq), known by various names such 'Raja Merja' or 'Raja Mircha' at the local level, is one of the traditional food item of the Naga community in Nagaland. It is also known by other names like *Bhut jolokia* in Assam and *U-morok* or *Go-morok* in Manipur. The

northeast region of India is recognized as hot-spot for chilli diversity (Meetei, 2016). Nagaland has a huge potential of growing Naga King chilli among the northeastern states having 7739 million tons of production in 1385 ha area (Statistical handbook of Nagaland, 2017). Among the many landraces of chilli that are cultivated in the northeast, the Naga King chilli is the best known worldwide for

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its distinct taste, aroma and its pungency and has been considered as one of 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) (Malangmeih and Rahaman, 2016). It is well known that northeastern part of India is a hotspot for the diversity of chillies (Meetei, 2016). In accordance with the Registration and Protection Act of 1999, the state government of Nagaland also obtained geographical indication and the patent rights for the Naga King chilli (GoN, 2017). According to the FAO, around 18 million metric tonnes of capsicum are produced annually on 1.4 million hectares of land (Malangmeih, 2016). Similarly, during 2020 the biggest producers of dry chillies and pepper were India around 1702 thousand tonnes, followed by Thailand (322.88 thousand tonnes) and China (307.59 thousand tonnes), respectively. The biggest producers include tropical Asian nations like India, Malaysia, Thailand, Indonesia, and the Philippines, tropical African nations like Senegal, Nigeria, Ghana, and Kenya, and tropical American nations like Mexico and the Caribbean; whereas over 48 percent of the world's red pepper were produced in Asia (Dessie, 2017). Agro-climatic condition of India gives scope for growing 63 different spices, making India the 'Land of spices'. India has also become the world's largest cultivators of chillies (with 57 lakh hectares areas under chilli). India has also become world's largest producer (with 76 lakh MT), consumer with 73 lakh MT (where around 96% of India's production is consumed within the country) and exporter (3.8 lakhs MT) of chilli with India's share in world trade of spices is 3.8 lakhs MT i.e. 48 percent (Prabhavathi, 2003). India exports chillies to nations like the United States, Sri Lanka, Bangladesh, the Middle East, and the Far East in the form of dried chillies, chilli powder, pickled chillies, and chilli oleoresin (Geetha, 2017). Naga King chilli has its uses for various ways, it is both considered as food and spices and is consumed both in fresh (cooked or raw) and in dried forms. Naga king chilli is also specifically known for its medicinal properties and pharmaceutical activity and is used as treatments. Very limited study on economics of Naga King chilli in Nagaland had been reported so far. Therefore, an attempt has been made in this paper to analyze the resource management of Naga King chilli production and to identify the

problems faced by different value chain players in Mon district of Nagaland.

METHODOLOGY

Sampling design

The purposive sampling method was used for the selection of the Tizit block of Mon district and random sampling was done to draw the Naga King chilli growers and other stakeholders and customers. The total sample size was 100 from the study, where 50 of them are Naga King chilli growers, 20 intermediaries (5 local wholesalers, 5 distant wholesalers, 5 local retailers and 5 distant retailers) and lastly, 30 consumers of Naga King chilli were selected randomly to fulfil the objective of the study.

Analytical tools utilized

The collected data were compiled, analyzed through appropriate statistical tools and methodology like average, percentage, *etc.* and also simple tabular/graphical analysis and marketing analysis was used as major analytical tool to determine the parameters. Cost concepts and returns has been calculated to estimate the economics of Naga King chilli in the study area.

Producer's price

This is the farmer's net profit at the moment of the initial sale. This is equal to the principal assembling center's wholesale price less any fees a farmer incurs when selling his produce (Harpreet, 2019).

$$\text{Producer's price (PF)} = \text{PA} - \text{CF}$$

Where, PA = wholesale price in the primary assembling market,

CF = the marketing cost incurred by the farmer.

Garrett ranking method

Henry conducted research to determine the most important aspect that affects the respondent and this method was employed to assess the issues the respondents faced. The algorithm was used to turn the respondents' orders of merit into ranks to identify the most influenced factors (Garrett and Woodsworth, 1969).

$$\text{Percent position} = \frac{100(R_{ij} - 0.5)}{N_j}$$

Where, R_{ij} = Rank given for the i^{th} variable by j^{th} respondents

N_j = Number of variable ranked by j^{th} respondents

RESULTS AND DISCUSSION

Labor requirement for production and operational activities at the farmer's level

Table 1 shows the distribution of labors requirement on the basis of operational activities, number of days required and gender-wise labor required for the cultivation of NK chilli per farm and per hectare. In the study area, it was observed that labor was one of the most vital cost factors as labors were consistently needed in all kinds of operational activities in the region. The labour's daily wage during the study were is ₹ 200/day and it is being believed it will increase much more than expected in wages in the coming years, due to high demand for labors in the study region especially after the covid-19 crisis. It was found that increasing farm size has a positive impact on farmer's net profit, as well as economic, technical and labour efficiency (Ren, 2019). Small Farmers Agri-business Consortium (2012) in their

research on value chain analysis of selected crops (specifically, NK chilli) in Nagaland had observed that the labor required for carrying out all farm operations were 200-250 days.

Economics of Naga King chilli cultivation

Table 2 revealed that the total cost incurred for NK chilli production was ₹ 81,612.00 per ha. It was observed that the highest labor cost was accounted for weeding and mulching (25.51%) followed by forest/field clearing activity with 18.80 percent, harvesting (18.26%), transportation and loadings (12.11%), cleaning and storing (8.93%), field preparation (8.03%), and nursery planting and transplanting (7.78%). The least expense was contributed by seed cost (0.58%). A high labour cost (78%) in the production of chilli in Wokha district of Nagaland was reported by Tsope and Murry (2020). However, the total returns from all sources which included, NK chilli fresh as well as dried was estimated to be ₹ 2,28,288/ ha and net return (profit) was accounted to be ₹ 1,46,676/ha. The per kg cost of production of Naga King chilli was estimated to be ₹ 99.04 while total return and net return per kg were found to ₹ 277.04 and ₹ 178, respectively.

In the study area, the NK chilli was usually being produced organically using traditional practices

Table 1: Labors and number of days required for the operational activities carried out

PARTICULARS		Family labor			Hired labor			Total no. of labors	% age of total no. of labors	Total no. of days	%age of total no. of days
		M	F	No. of days	M	F	No. of days				
Forest/field clearing	Per farm	1.60	1.48	3.60	3.74	0.56	1.46	7.32	29.28	5.06	11.00
	Per ha	7.00	6.00	16.00	16.00	2.00	6.00	31.00	34.44	22.00	12.02
Field preparation	Per farm	1.54	1.46	2.54	0.34	0.26	0.32	3.60	14.4	2.86	6.50
	Per ha	7.00	6.00	11.00	1.00	1.00	1.00	15.00	16.67	12.00	6.56
Nursery planting & transplanting	Per farm	1.58	1.48	2.24	0.14	0.18	0.14	3.38	13.52	2.38	5.41
	Per ha	7.00	6.00	10.00	1.00	1.00	1.00	15.00	16.67	11.00	6.01
Weeding & mulching	Per farm	1.42	1.26	8.92	—	—	—	2.68	10.72	8.92	20.27
	Per ha	6.00	5.00	39.00	—	—	—	11.00	12.22	39.00	21.31
Harvesting	Per farm	1.22	1.06	7.54	—	—	—	2.28	9.12	7.54	17.14
	Per ha	5.00	5.00	33.00	—	—	—	10.00	11.11	33.00	18.03
Cleaning & storing	Per farm	0.46	0.54	7.54	—	—	—	1.00	4.00	7.54	17.14
	Per ha	2.00	2.00	33.00	—	—	—	4.00	4.44	33.00	18.03
Transportation & loadings	Per farm	0.52	0.48	7.58	—	—	—	1.00	4.00	7.58	17.23
	Per ha	2.00	2.00	33.00	—	—	—	4.00	4.44	33.00	18.03
Total	Per farm	8.30	7.60	39.96	4.22	1.00	1.92	21.26	100.00	41.88	100.00
	Per ha	36.00	32.00	175.00	18.00	4.00	8.00	90.00	100.00	183.00	100.00

such as slash & burn of bamboo areas. Cost for any kinds of fertilizer, pesticides, FYM or even irrigation doesn't arise as they fully depend on slash-and-burn remains for minerals and natural irrigation (depending on rainfall alone). Therefore, not much cost was required for input except the cost of seedlings which the farmers purchased from one another within the village, and for some farmers, they retain the seeds from previous seasons. Table 2 shows the distribution of costs between inputs cost, labor cost and all other operational cost incurred by the farmers while cultivating NK chilli. The cost of the local NK chilli seeds were found to be around ₹ 2.20/gram in the study region. Seed usage for sowing per hectare were found to be 197g that costs an amount of ₹ 473 ha. The seeds required for sowing were 100-200g per ha has been reported in a study (Deepak, 2016; Das, 2017). The farmers spend more on labors as maximum of the activities (*viz.* forest cleaning, field preparation, nursery planting, *etc.*) for producing NK chilli were done by the labors alone without using any high-technology machinery. The total cost per hectare including seed cost and labour cost was found to be ₹ 81612.

Table 2: Cost of cultivation per hectare for NK chilli

Particulars	Amount (₹)	% to total cost
Input cost		
Seed: (197gm/ha @ ₹ 2.20)	473.00	0.58
Labour cost		
Forest/field clearing	15,339.00	18.80
Field preparation	7,287.00	8.93
Nursery planting & transplanting	6,348.00	7.78
Weeding & mulching	20,817.00	25.51
Harvesting	14,904.00	18.26
Cleaning & storing	6,557.00	8.03
Transportation & loadings	9,887.00	12.11
Total cost	81,612.00	100.00
Income structure		
Total cost	Amount (₹/ha)	Amount (₹/Kg)
Total cost	81,612.00	99.04
Gross returns (Yield x Price)	2,28,288.00	277.04
Net return	1,46,676.00	178.00
Return over cost		
(GR/TC)	2.80	
(NR/TC)	1.80	

Usage of NK chilli in the value chain

The highest usage was reported for sole marketing purposes alone (85.41%), 6.54% of NK chilli faced crop loss in the field or in storage (Small Farmers Agri-business Consortium, 2012 in a research on value chain analysis of NK chilli in Nagaland had observed the crop loss of 5-10% field level), followed by 3.87% were sold in dried form. Lastly, the remaining NK chilli were used for home consumption and dried to store as seedlings for next season with 2.53% and 2.07%, respectively (Table 3).

Table 3: Usage of NK chilli after the harvest activities carried out

Particulars	Quantity (Kg/year)	
	Per farm	Per hectare
Home consumption	5.6 (2.53)	24.00 (2.48)
Crop loss in field/storage	14.52 (6.54)	63.00 (6.53)
Dried for sale	8.60 (3.87)	37.00 (3.83)
Dried to store seedlings for next season	4.56 (2.07)	20.00 (2.07)
Quantity for marketing (after the use of crops from harvest)	189.56 (85.41)	824.00 (85.47)
Total	222.78 (100)	964.00 (100)

Figures in parentheses indicate percentage to the column total.

Methods of price realization

Table 4: Methods of price realization

Particulars	Farmers	Wholesaler		Retailer	
		Local	Distant	Local	Distant
Based on demand and supply forces	40 (80)	3 (60)	3 (60)	3 (60)	3 (60)
Farmer decides the price	5 (10)	—	—	—	—
Channel players decide the price	—	—	—	—	—
Combination of all	5 (10)	2 (40)	2 (40)	2 (40)	2 (40)
Total	50 (100)	5 (100)	5 (100)	5 (100)	5 (100)

Figures in parentheses indicate percentage to the column total.

Prices are usually settle down during the full harvest season and increase at the crop-ending period. It was observed from the study area (Table 4), that majority of the respondent's farmers (80%), local wholesalers (60%), distant wholesalers (60%), local retailers (60%), and distant retailers (60%),

respectively, had revealed that price realization of vegetables was mainly depended on the demand and supply forces. When the supply of the NK chilli to the market was more, the prices were generally determined by the stakeholders and *vice versa* when the demand is high. Other times the farmers and stakeholders have a say together on the price.

Expenses from total quantity of NK chilli purchased by the different stakeholders

The average quantity of NK chilli purchased by the different stakeholders in the study area for further marketing are shown in the Table 5. The invested amount on purchase of chillies by local wholesalers (₹ 80300), distant wholesaler (₹ 740000), local retailer (₹ 121520) and distant retailer (₹ 321600) in the study area.

Table 5: Quantity of NK chilli purchased by the different stakeholders

Particulars	Quantity purchased		Total amount (₹)	Percentage
	Quantity purchased (Kg)	Selling price		
Local wholesaler	3,212	250	80,300	6.4
Distant wholesaler	2,840	258	7,40,000	58.6
Local retailer	472	258	1,21,520	9.6
Distant retailer	1,160	272	3,21,600	25.5

Income structure across different value chain stakeholders for marketing of NK chilli

Table 6 depicted that the total expenses from all sources which include, transport cost, gunny bag, storage, *etc.* were cumulated and the total expenses resulted for local wholesaler, distant wholesaler, local retailer, distant retailer were ₹ 19,684, ₹ 15,744, ₹ 11,568 and ₹ 27,263, respectively, and the

Table 6: Income structure across different value chain stakeholders

Particulars	Gross returns (₹)			Total expenses (₹)	Net income (₹)
	Total returns	Purchasing cost	Total amount		
Local wholesaler	8,54,550	8,03,000	51,550	19,684	32,200
Distant wholesaler	8,16,096	7,40,000	76,096	15,744	50,068
Local retailer	1,34,298	1,21,520	12,778	11,568	6,166
Distant retailer	4,63,800	3,21,600	1,42,200	27,236	1,14,964

gross returns from all sources after deducting the purchasing cost of NK chilli for local wholesaler, distant and wholesaler, local retailer, distant retailer included were ₹ 51,550, ₹ 76,096, ₹ 12,778 ₹ 1,42,200, respectively. Then, the net income (profit) annually for local wholesaler, distant wholesaler, local retailer, and distant retailer included were accounted for ₹ 32,200, ₹ 50,068, ₹ 6,166 and ₹ 1,14,964, respectively.

Income realization

Total expenses for all resources resulted for local wholesaler, distant wholesaler, local retailer and distant retailer were ₹ 6.21, ₹ 5.64, ₹ 25.30 and ₹ 25.01, respectively and the purchasing cost were accounted for local wholesaler, distant wholesaler, local retailer and distant retailer were ₹ 250, ₹ 261, ₹ 257 and ₹ 277, respectively. The total returns from all sources of NK chilli marketing for local wholesaler, distant and wholesalers, local retailers, distant retailers included were ₹ 270, ₹ 293, ₹ 294 and ₹ 446, respectively (Table 7). The gross returns from all sources after deducting the purchasing cost of NK chilli for local wholesalers, distant and wholesalers, local retailers, distant retailers included were ₹ 20, ₹ 32, ₹ 37 and ₹ 149, respectively. The net income realized (profit) annually for local wholesalers, distant wholesalers, local retailers, and distant retailers included were accounted ₹ 10, ₹ 18, ₹ 11.70 and ₹ 123.97, respectively.

Difficulties faced in production of NK chilli by the growers

Pest and insect attack was found to be a major problem (ranked I) faced by the growers in NK chilli production. Dessie (2017) studied value chain analysis of red pepper in South Ethiopia and reported that pests/diseases were found to be a major problem that influenced the marketable supply negatively. Lack of knowledge on modern techniques for disease and pest management (ranked

Table 7: Income structure across different value chains

Particulars	Gross returns (₹)			Total expenses (₹)	Net income (₹)
	Total returns	Purchasing cost	Total amount (₹)		
Local wholesaler	270.00	250.00	20.00	6.21	13.79
Distant wholesaler	293.00	261.00	32.00	5.64	26.00
Local retailer	294.00	257.00	37.00	25.30	11.70
Distant retailer	426.00	277.00	149.00	25.01	123.97

Table 8: Problems faced in production of NK chilli by the growers

Particulars	Garrett value	
	Mean score	Rank
Pest and insect attack	74.48	I
Lack of knowledge about modern techniques for disease and pest management	69.88	II
Lack of assistance and support from govt. agency/ NGO's/ extension agents/ private organization in NK chilli production	66.14	III
Non-availability of pest resistance and high yield variety of NK chilli	55.52	IV
Loss of crop in the field	52.4	V
Non-availability of processing industries	38.1	VI
Extreme rainfall	37.76	VII
Non-availability of credit facilities for crop production	28.74	VIII

II) in the NK chilli is the second problem identified. More so as the producers are being not educated with the kind of diseases and pest and even with the modern techniques used for pest and disease management. Eg. trapping, vacuuming, knowledge of using bio-controls (*viz.* bio-insecticides and bio-pesticides, *etc.*) or even synthetic pesticides, *etc.* Somashekhar (2016) stated that agri-business supply chain farmers prefer to receive information about government incentives, and were also interested to know about weather conditions, crop diseases, profitable markets and cold storage frequently.

Lack of assistance and support from government agency/NGOs/ extension agents/ private organization in NK chilli production (ranked III). They are not visited by the extension agents or state departments or NGOs to provide them knowledge of practice packages for the cultivation of NK chilli or to provide pest management training, post-harvest/ processing training, providing NK chilli inputs, *etc.* As a result, it was rarely possible for the farmers to cultivate in huge land areas, likewise, have less production in most of occasions (Table 8). Prabhavathi (2013) on her study found that farmers have poor understanding of volatile fluctuation of price.

Difficulties faced by farmers in marketing of NK chilli

Wide fluctuation in price was identified to be the major problem faced by the farmers in marketing of the NK chilli, despite of the good quality of the chillies. Prabhavathi (2013) in her study reported that poor understanding of volatile fluctuation of price by the farmers.

Tables 9: Problems faced by farmer in marketing of NK chillies

Particulars	Garrett value	
	Mean score	Rank
Wide fluctuation in price	73.36	I
Poor transportation facility	68.48	II
Lack of cooperative societies	63.28	III
Lack of govt. support price	55.28	IV
Lack of proper post-harvest storage of NK chilli	42.66	V
Exploitation of price by intermediate agents.	35.66	VI
Problem of grading	33.28	VII
Non-availability of bigger market nearby	28.0	VIII

There are times when farmers have to sell the chillies in lesser prices mainly to avoid market risk.

Others problems were poor transportation facility (ranked II), lack of cooperative societies (ranked III), lack of Government support price (ranked IV), lack of proper post-harvest storage of NK chilli (ranked V), exploitation of price by intermediate agents (ranked VI), problem of grading (ranked VII) and non-availability of bigger market nearby (ranked VIII) were other identified problems of farmers in marketing of NK chilli (Table 9).

Difficulties faced by the local wholesalers in the NK chilli value chain

Among various problems, wide fluctuation in price were the major problem faced by the local wholesaler, as in most of case, the wholesalers sell the chilli to the distant wholesaler but sometimes when the distant wholesaler gets the chilli directly from the farmer (especially during the peak season) then, the fluctuation in price takes place so the local wholesaler have to sell the NK chillies in lesser price and even faces loss sometimes. Other problems identified were lack of storage facilities (ranked II), Perishable nature of chilli (ranked III), SFAC (2011) in their study revealed due to perishable nature was causing the problem for transportation. High transportation cost (ranked IV), irregular supply of NK chilli (ranked V), non-availability of credit facilities (ranked VI), and high labour charges/ availability (ranked VII) (Table 10).

Table 10: Problems faced by the local wholesalers in the NK chilli value chain

Particulars	Garrett value	
	Mean score	Rank
Wide fluctuation in price	69.0	I
Lack of storage facilities	63.4	II
Perishable nature of chilli	67.2	III
High transportation cost	50.0	IV
Irregular supply of NK chilli	42.6	V
Non-availability of credit facilities	28.8	VI
High labor charges/ availability	28.0	VII

Difficulties faced by the distant wholesalers in NK chilli value chain

Table 11 shows that in case of the distant wholesalers, wide fluctuation in price were found to be the highest-ranking problem within this group of stakeholders. As most of them have to wait for the local wholesaler to come to the border markets

to purchase NK chilli and the price fluctuates in the markets accordingly. Another problem was irregular supply of NK chilli and thus, when the supply is irregular, the price also undergoes wide fluctuations. Other key problems identified in the study area were lack of storage facilities (ranked III), loss of NK chilli in the market (ranked IV), handling risk (ranked V), high transportation cost (ranked VI) and labor charges/ availability (ranked VII).

Table 11: Problems faced by the distant wholesalers in the NK chilli value chain

Particulars	Garrett value	
	Mean score	Rank
Wide fluctuation in price	71.4	I
Irregular supply of NK chilli	64.8	II
Lack of storage facilities	63.4	III
Loss of NK chilli in the market	48.6	IV
Handling risk	38.2	V
High transportation cost	36.4	VI
Labor charges/ availability	26.2	VII

Problems faced by the local retailers in the NK chilli value chain

Handling and storage problems were observed to be the major problems faced by retailer in the region (Table 12). Many retailers don't have any storage facilities nor any handling equipment, especially for perishable crops like NK chilli without which it has immense handling risk and affects their returns. The perishable nature of chilli were the second main problem, followed by wide fluctuation in price, unable to access the demand, and non-availability of support facilities from the government / NGOs.

Table 12: Problems faced by the local retailers in the NK chilli value chain

Particulars	Garrett value	
	Mean score	Rank
Handling and storage problems	64.0	I
Perishable nature of chilli	62.0	II
Wide fluctuation in price	52.0	III
Unable to access the demand	34.8	IV
Non-availability of support facilities from govt. or NGO's.	36.2	V

Difficulties faced by the distant retailers in the NK chilli value chain

The perishable nature of chilli was the major

problem faced by retailers (Table 13), which might be due to delays in the marketing channel, they don't get the best of the qualities and faces loss of chillies in the market. Hence, they tried to sell the chillies within few days of purchase to avoid huge market losses. Wide fluctuation in price, handling and storage problems, non-availability of credit facilities and lack of storage facilities were other difficulties reported in the study area.

Table 13: Problems faced by the distant retailers in the NK chilli value chain

Particulars	Garrett value	
	Mean score	Rank
Perishable nature of chilli	66.0	I
Wide fluctuation in price	59.8	II
Supply shortage	54.8	III
Non-availability of credit facilities	37.8	IV
Lack of storage facilities	30.6	V

Difficulties faced by the customers in the NK chilli value chain

Table 14 depicted that difficulties like availability/supply shortage (57.7%) and lack of processed product of NK chilli (55.5%) both were serious, as they feel that NK chilli products could be processed not just for home consumption but also for marketing (Table 14). Other problems identified were perishable nature of the chilli (ranked III) and heavy price fluctuations during off-season/season-ending (ranked III) in the study area.

Table 14: Problems faced by the customers in the NK chilli value chain

Particulars	Garrett value	
	Mean score	Rank
Availability/ supply shortage	57.7	I
Lack of processed product of NK chilli	55.5	II
Perishable nature of the chilli	42.9	III
Heavy prices fluctuations during off season/season ending	42.1	IV

CONCLUSION

In Nagaland large area is virgin, about nearly 45-50 percent of the area are under forest and only 10.6 percent are under net sown area category. Thus, it can be inferred that at least more than one-third area are not unutilized and if these areas could be

explored for area expansion program for NK chilli through mini-kit program then, there are huge potential for spices crop (particularly NK chilli) to prevail in the state. NK chilli which is one of the hottest chilli, needs to be processed immediately after the harvest. Initiating post-harvest handling practices for the tribal farmer, proper/scientific storages (like zero cooling chamber, cold storages, etc.) could be used for retaining the shelf life of the chilli. Trainings could be initiated through KVK, NGO's, state departments, etc. for farmers to be equipped more knowledge for production, marketing and even processing. etc. Contract agreements between farmers and buyers could improve the market linkage and enhance the knowledge regarding market opportunities which could improve the flow of market information in the chain, prices received, consistent supply, and quality. Measures to improvise technologies for packaging of NK chilli products to suit local conditions along with measures to improvise technologies for transportation facilities in order not to disrupt the supply of NK chillies in the chain. Any issue of spice marketing could be addressed seriously after collaborating with NERAMAC, APEDA and other related agencies must be accessed to credit support system from various financial institutes like NEDFi, NABARD etc. Collectively farmers (especially small-scale and marginal farmers) could form a cooperative or FPOs for a better value chain network in the state.

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