Comparative Analysis of Production and Marketing of Mandarin Orange in Kristhinachnechaur and Nirmalpokhari Villages of Kaski, Nepal

A. Kafle[1]

Abstract

Questionnaire based field survey among 100 farmers, 50 each from Kristinachnechaur and Nirmalpokhari VDC was conducted with the purpose of analyzing production and market situation of mandarin orange using simple random sampling techniques. The number of productive trees per unit area (ropani2) was found higher in Nirmalpokhari (55 trees). Similarly, the cost of production and return were also higher in Nirmalpokhari which were Rs.4427.48 and Rs14685.96 per ropani, respectively. Pre-harvest contract was the most common mode of selling oranges by the farmers. The marketing margin per kg was found higher in Kristinachnechaur VDC (Rs.11.43) whereas the producers' share was higher in Nirmalpokhari (56.4%) indicating better marketing efficiency of the mandarin oranges as compared to both. Cobb-Douglas production function was used to analyze factor of production. Number of productive trees, labor, and manures were significant factors affecting production in Kristinachnechaur while in Nirmalpokhari number of productive plants was highly significant factors of production. The output elasticity of production was less than one i.e. 0.952 for Kristinachnechaur and 0.725 for Nirmalpokhari, indicating decreasing returns to scale which provides enough space for the expansion of production with the proper utilization of productive resources.

Keywords: *Mandarin orange, marketing margin, return to scale, production efficiency.*

Introduction

Mandarin orange (*Citrus reticulata* Blanco) cultivation is one of the major economic activities in the mid-hills (550-1300 masl) of the western development region of Nepal. Fruit crops including mandarin orange contributes almost to the 8.0 % to the agriculture gross domestic product (MOAD, 2015)The mid-hill region of Nepal lying between 26°45' to 29°40' East latitude and 80°15' to 88°12' North longitude is quite suitable for mandarin cultivation. Mandarin is grown in 47 districts out of 75 and the area and production is increasing year after year in the western development region (NCDP, 1989). There was no evidence based study carried out in Kaski district about production and marketing aspect of mandarin, despite its major role in household economy. Therefore this study was carried out for the analysis of production and marketing behavior of mandarin orange in the selected areas of Kaski district due to its major contribution in rural economy and climatic suitability.

Objectives

The broad objective of this study was to analyze the production and market scenario of mandarin orange in two villages of Kaski district, however specific objectives were to:

1. explore the production situation of mandarin orange
2. identify the different of affecting production of mandarin orange
3. know the present mode of selling of mandarin orange

[1] Vegetable Crops Development Centre, Khumaltar, Nepal

@ Corresponding author: kaflearun8@gmail.com

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[2] Unit of land equivalent to 504.8 square meter

Theoretical Framework

In Nepal mandarin is cultivated in 26282.4 ha with productive area of 16247.7 and productivity of 9 Mt/ha (FDD, 2016/17). Kaski, the mid-hill district of western development region, is one of the important mandarin orange growing area of Nepal. The total area, productive area, and production in Kaski district were 1400 ha; 803 ha and 6700 Mt with average productivity of 8.3 Mt/ ha (MOAD, 2016/17). District Agriculture Development Office (DADO) Kaski has identified eleven different production pockets for the commercialization of mandarin in the district (DADO, 2016). The area is increasing but productivity seems at declining trend with inefficient marketing system in the major production pockets. Lack of market price information is the major problem for Marketing. There is also a large variation between farm gate and retailers price. Therefore, production and marketing activities of mandarin orange should be closely linked in order to maintain production and price harmony.

Generally farmers receive lower price while middlemen grab higher proportion of producers share. Price of mandarin becomes the lowest in the month of Poush while it goes the highest in the month of Jestha in Pokhara market (Buchanan-Smith, 1986). That also indicates seasonal effect and temporal variation in the price of mandarin orange. The price of the orange in Nepalese market is highly volatile and there is no assurance of nominal price at the harvesting period (Gurung, 2000). The most common and widely used marketing system in the hills of Nepal is the contractual system (Shrestha et al. 1998). Farmers make contractual agreements with traders just few months prior to the harvesting time of mandarin orange (Harston, 1990; Shah, 1992; Tomiyashu et al. 1998. Due to poor bargaining power and economic condition of mandarin orange growers, marketing intermediaries are getting more benefit (Pokhrel and Thapa, 2007). Based on those facts Cobb Douglas production function model was used to analyze the production situation and market channel and system study between two productions pockets were carried out for comparative analysis of mandarin orange in each area.

Methodology

Kristinachnechaur and Nirmalpokhari, two adjoining villages near to the Pokhara valley were selected purposively for the study due to commercial production. Although 175 farmers in Kristinachnechaur and 120 farmersin Nirmalpokhari were involved in the mandarin production, 50 from Kristinachnechaur and Nirmalpokhari each were selected randomly. Regarding the number of trees, the growers were categorized into three groups as; small (having 5-24 bearing trees), medium (25-44 bearing trees) and large (more than 45 bearing trees). The distribution of sample by the categories of grower is presented in Table 1.

Table 1. Distribution of sample by categories of growers in the study area

Categories of growers	Villages		
	Kristinachnechaur	Nirmalpokhari	Total
Small	33 (66)	18 (36)	51 (51)
Medium	15 (30)	17 (34)	32 (32)
Large	2 (4)	15 (30)	17 (17)
Total	50 (100)	50 (100)	100 (100)

Figures in parenthesis indicate percent

Information like distribution of trees, number of productive plants, production cost and return, marketing pattern, gross margin, marketing margin and factors of production were collected through questionnaire survey with producers and traders. Then obtained data were analyzed by using descriptive and inferential statistics.

Gross margin analysis for price variation among different actors was also carried out. Gross margin is the difference between total value product and variable cost associated to particular enterprise. Only variable cost items were included for this analysis.

The gross margin was calculated as:

Gross margin = Gross return – Total variable cost

Where, gross return = Average price of mandarin × total quantity sold

Total variable cost = Summation of all the cost of variable items

Marketing margin is the difference between the net price received by the farmer and the price paid by the consumer. This was calculated by subtracting the farm gate price from the retail price. Marketing margin and producer's share was analyzed by using following formula:

Marketing margin = Retailer price (Pr) – Farm-gate price (Pf)

Similarly producer's share is the price received by the farmer expressed as a percentage of the retail price that is price paid by the consumer.

$Ps = Pf/Pr \times 100.$

Cobb-Douglas production function was used for the analysis of factors of production in terms of explaining input and output relationship for mandarin orange production. The mathematical specification of the model is:

$Y = \alpha\ Acb1\ Lub2\ Mnb3\ Pplb4$

In log linear form the above model can be expressed as follows:

$In\ Y = In\ \alpha + In\ Ac + In\ Lu + In\ Mn + In\ Ppl$

Where,

Y = Total mandarin production in Mt

Lu = total labor used

α = coefficient

Ac = area under mandarin cultivation in ropani[3]

Ppl = Total productive plants

Mn = Total manure used in Kg

Results and Discussions

Study Area

Kristinachnechaur is the adjoining village of Pokhara sub-metropolis and demarked by Pokhara in the east, Syangja district in the west, Pumdibhumdi in the north and Nirmalpokhari in the south. Maize and millet are the main cereal crops of this village. Mandarin orange cultivation has been a major leading source of income for last 40 years onwards.

Nirmalpokhari is another adjoining village of Pokhara valley. This VDC is bounded by Kristi villagein the north, Bharatpokhari villagein the south, Pokhara city in the east and Syangja district in the west. Maize and millet are the dominant cereal crops of this village. Commercial mandarin orange cultivation has been started from the year 2042 B.S. in the district (DADO, 2016).

Production Situation of Mandarin Orange

The *bari*[4] land is covered by the mandarin orange in the most of the hills of Kaski district. The average area under mandarin orange is presented in Table 2. The density of the trees were higher in Nirmalpokhari village (55 trees) as compared to Kristinachnechaur village (21 trees) that may be due to the farmer's awareness about benefit of fruit cultivation as well as climatic and edaphic suitability for the mandarin cultivation.

[4] Unirrigated upland

Table 2. Distribution of fruiting trees in land of sampled households by villages

Villages	Area in ropani	Distribution of trees in numbers			
		Minimum	Maximum	Average	Standard dev
Kristinachnechaur (n = 50)	3.51	5	125	21	20.04
Nirmalpokhari (n = 50)	3.19	8	300	55	70.24
Total	**3.35**	**5**	**300**	**38**	**45.14**

Cost of Production and Return

The average variable cost of production per *ropani* was NRs.3642.66. The cost of production was higher in Nirmalpokhari (NRs. 4427.48). The benefit cost ratio analysis showed that the mandarin orange cultivation was profitable enterprise with the B/C ratio greater than one i.e. 2.57 for Kristinachnechaur and 3.31 for Nirmalpokhari (Table 3). This evidence is also supported by Gupta and George (1974) where they found B/C ratio ranging from 1.85 to 2.64 in Indian condition depending on the size of orchard where they considered both fixed and variable costs. The higher cost of production in Nirmalpokhari might be due to the higher amount of input used for producing the mandarin orange than Kristinachnechaur. The slightly higher benefit cost ratio might be due to only consideration of variable cost while calculating cost of production.

Table 3. Cost of production and return from mandarin orange by villages

VDC	Cost (NRs/ropani)	Return (NRs/ropani)	B/C Ratio
Kristi	2857.84	7360.11	2.57
Nirmalpokhari	4427.48	14695.96	3.31
Total average	3642.66	11028.03	2.93

Mode of Selling

Generally two types of selling practice i.e. selling to the wholesaler and pre-harvest contract practices were followed by the farmers of the respective VDCs (Figure 1). The pre-harvest contract was the most commonly preferred system of selling. Farmers preferred pre-harvest contract due to the low risk associated with it as well as ease of getting money without harvesting and transportation burden.

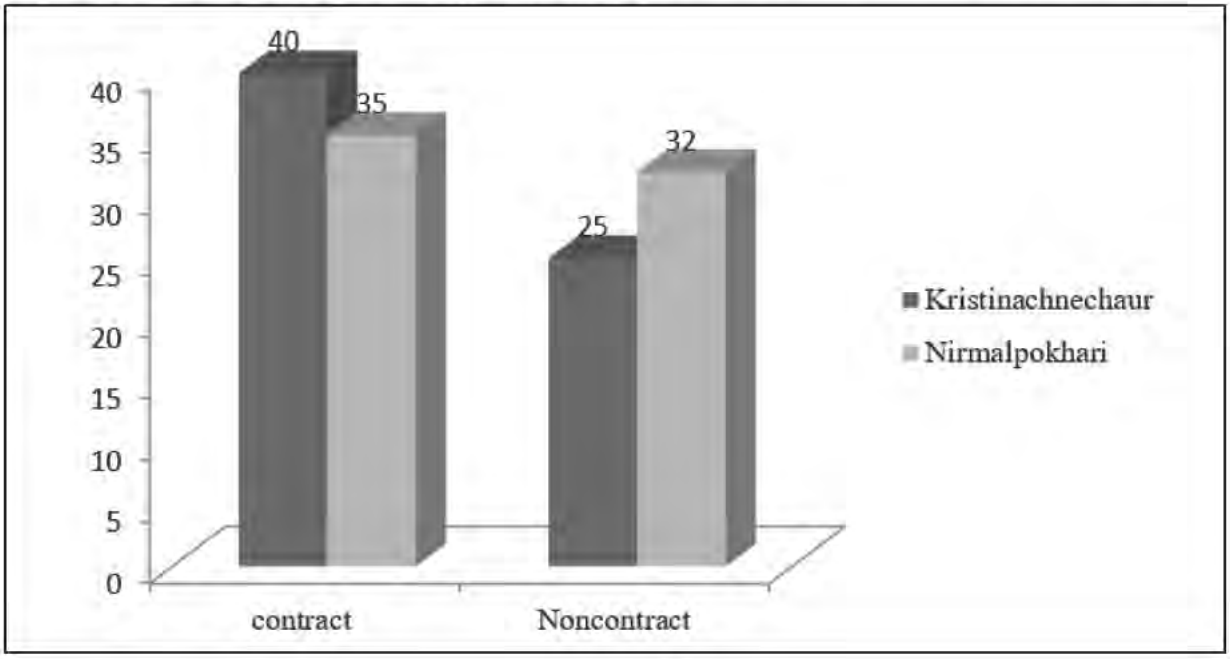

Figure 1 Selling practice of mandarin orange in the study areas

The Pre-harvest contract selling was more common in Kristinachnechaur (40 farmers) as compared to Nirmalpokhari (35 farmers) which might be due to the higher quantity of mandarin orange produced in the Kristinachnechaur. While the figure 1 indicates that the numbers of people following non-contractual system were more in Nirmalpokhari because of the low volume as well as scattered production areas than Kristinachnechaur.

Marketing Margin and Producers Share

The overall marketing margin of the study area was NRs 10.89, whereas the producers' share was 54.42 percent. The marketing margin per Kg was higher in Kristinachnechaur (NRs 11.43). The higher marketing margin might be due to the lack of market price information among the farmers and pre-harvest contractual system of selling followed by the growers. The producers' share was higher in Nirmalpokhari (54.42%) indicating higher marketing efficiency. Categorically marketing margin was higher in case of large producers in both of the surveyed areas which might be due to the contractual system of selling as well as lack of market price information to the producers. The marketing margin among each survey area and category is shown in Table 4.

Table 4. Marketing margin and producers share of each category of growers by villages

Villages	Category of growers	Marketing margin (NRs/Kg)	Producers' share
Kristinachnechaur	Small	10.7	53.47
	Medium	11.5	52.08
	Large	12.1	51.79
	Subtotal (n = 50)	**11.43**	**52.44**
Nirmalpokhari	Small	9.90	56.76
	Medium	10.20	56.46
	Large	11.00	56.00
	Subtotal (n = 50)	**10.36**	**56.4**
	Total	**10.89**	**54.42**

Factors of Mandarin Orange Production

Cobb-Douglas production function model was used for the analysis of factors of production. In this model, labor, manure, number of productive trees and area under mandarin cultivation were taken as explanatory variables whereas the production of mandarin orange was taken as explained variable. The coefficients of factors affecting production of mandarin orange are given in Table 5 and 6.

Table 5. Factors of mandarin orange production in Kristinachnechaur villages.

Variables	Coefficients	Standard error	P value
Constant	-2.324E-02	1.213	0.985
Number of productive treess	0.223*	0.126	0.028
Area under cultivation	-0.023	0.181	0.811
Labor	0.390*	0.215	0.004
Manure	0.362*	0.161	0.006
Adjusted R2	0.62		
F ratio	23.92	-	0.000

*Significant at 5% level of significance

Number of productive trees, labor, and manures were found to be significant factors affecting production of mandarin orange. The output elasticity of number of productive treess, labor and manures were found to be 0.126,0.390 and 0.161 indicating that holding the other explanatory variables constant one percent change in respective trees, labor and manure input caused 0.126; 0.390 and 0.611 percent increase in output from the respective variables. The summation of all the values of the parameters was found to be 0.952, which indicated decreasing returns to scale.

Table 6. Factors affecting production of mandarin orange in Nirmalpokhari villages.

Variables	Coefficients	Standard error	P value
Constant	5.332	1.061	0.000
Number of productive trees	1.129**	0.231	0.000
Area under cultivation	-0.531*	0.290	0.016
Labor	0.180	0.179	0.186
Manure	-0.053	0.156	0.690
R2	0.62		
F ratio	18.384	-	0.000

** Significant at 1% level of significance *significant at 5% level of significance

Number of productive tree was highly significant factor affecting production of mandarin orange. Similarly, the area under mandarin orange was significant. The output elasticity of number of productive tree was 1.129 indicating that holding the other explanatory variables constant one percent change in respective plant number caused 1.129 percent increase in output. Though the area under mandarin was significant it has negative contribution in the output. The summation of all the values of the parameters was found to be 0.725, which indicated decreasing returns to scale.

The comparative analysis showed that the return to scale is lower in Nirmalpokhari than Kristinachnechaur that might be due to the improper utilization of the productive resources like proper orchard management practices for better yield in Nirmalpokhari as compared to Kristinachnechaur.

Conclusion

Kristinachnechaur and Nirmalpokhari were the potential production areas of mandarin orange production due to climatic and edaphic suitability as well as market access in Kaski District, Nepal. Further, mandarin orange cultivation was profitable business to farmers of the both villages due to its high benefit cost ratio.

The pre-harvest contractual system was the most common mode of selling in surveyed areas because of lower risk bearing capacity of the farmers and marketing system was not well developed.

For out-scaling mandarin orange cultivation, government should formulate plan and policies that benefit farmers directly. For example market price information, crop insurance, provision of quality production inputs and saplings as well as dissemination of improved packages of practices for the growers in the area.

References

APROSC .1989. Citrus Development Project for the Selected Mid-Hills District of Nepal. Final Feasibililty Study Report. Vol(1).

Buchanan-Smith, M.W. 1986. Horticulture Marketing Study in Pokhara. Lumle Agriculture Centre, Kaski, Nepal. pp:79.

Buchnan-Smith, M.W. and S.R. Gurung. 1986. Horticultural Marketing Study in Kusma, Baglung and Beni. Planning Unit, Lumle Agricultural Centre, Kaski, Nepal. pp: 73.

CBS. 2016. Statistical Pocket Book of Nepal. Central Bureau of Statistics, National Planning Commission Secretariat. Government of Nepal. Thapathali, Kathmandu, Nepal.

DADO. 2016. Annual Agricultural Development Programs and Statistics: A Glimpse (In Nepali). Government of Nepal, Ministry of Agriculture and Co-operatives, Department of Agriculture. District Agriculture Development Office, Pokhara, Kaski, Nepal.

District Agriculture Development Office. 2016. Annual Report, DADO, Kaski.

Fruit Development Directorate (FDD).2016/17. Annual Book. Fruit Development Directorate, Kirtipur.

Gupta, G.S. and P.S. George. 1974. Profitability of Nagpur (Santara) oranges cultivation. Indian J. Agri. Econ. 29 (July-Sept.): 132-142.

Gurung, C.B. 2000.Marketing of Mandarin Orange *(Citrus reticulata)* in Western Hills of Nepal: Analysis of Price Behavior and Contractual Arrangement (Thesis M.Sc.). Institute of Agriculture and Animal science. Rampur Chitwan, Nepal.

MOAD.2016/17. Statistical Information on Nepalese Agriculture. Ministry of Agriculture Development, Singhadurbar, Kathmandu.

National Citrus Development Program (NCDP). 1989. Annual Report. National Citrus Development Program, Paripatle, Dhankuta, Nepal.

Pokhrel, D.M., and G.B. Thapa. 2007. Are marketing Intermediaries exploiting Mountain Farmers in Nepal? A Study Based on Market Price, Marketing Margin and Income Distribution Analyses. July,2007. http://www.sciencedirect.com/science/page/satic.

Shah, R.B. 1992. Trainers Manual No.16. Citrus Fruit. Department of Agriculture, Central Agriculture Training Centre. Manpower Development Project, Kathmandu, Nepal.

Shrestha, B., P.P. Subedi and J.J. Thapa. 1998. Socio-economic Factors Affecting Adoption of Cellar Store as a Post-Harvest Technology for Mandarin Orange in the Western Hills of Nepal. LARC Working Paper No. 98/34. Lumle Agriculture Research Centre, Kaski, Nepal.

Singh, B.B., R.N. Yadav and S. Kumar. 1998. An Economic Analysis of Marketing and Export of Litchi in Muzaffarpur Market of Bihar. Indian Journal of Agric. Econ. 53(3): 411-412.

Tomiyashu, Y., S.K. Verma and D.B. Thapa. 1998. Citrus Cultivation in Nepal (in Nepali). Horticulture Development Project Phase-II, HMG/JICA, Kirtipur, Nepal pp: 120.