CHAPTER III

RESOURCE BASE AND FARMING SYSTEMS

This chapter deals with the general charecteristics of the study areas, their resource bases (natural and human) and it analyzes the existing farming systems. It also covers the analysis of farm and off-farm income and the cost and return of both crop and citrus based systems of the study sites in the middle hills of Nepal.

3.1 RESOURCE BASE

3.1.1 General Characteristics

Patlekhet and Sankhu village development councils (VDC's) are located in Kavre district, central middle mountain physiographic region, approximately 55 and 50 km east of Kathmandu respectively, the capital city of Nepal. These two study sites are very close to each other and are separated by a ridge of mountain which consists of Namobudha temple an important religious place for the Budhists.

Patlekhet VDC (the study site I) lies south western part of the Jikhikhola watershed and about 1.0 hour walk towards south direction from Dhulikhel, the headquarter of Kavre district. With in the Patlekhet VDC,
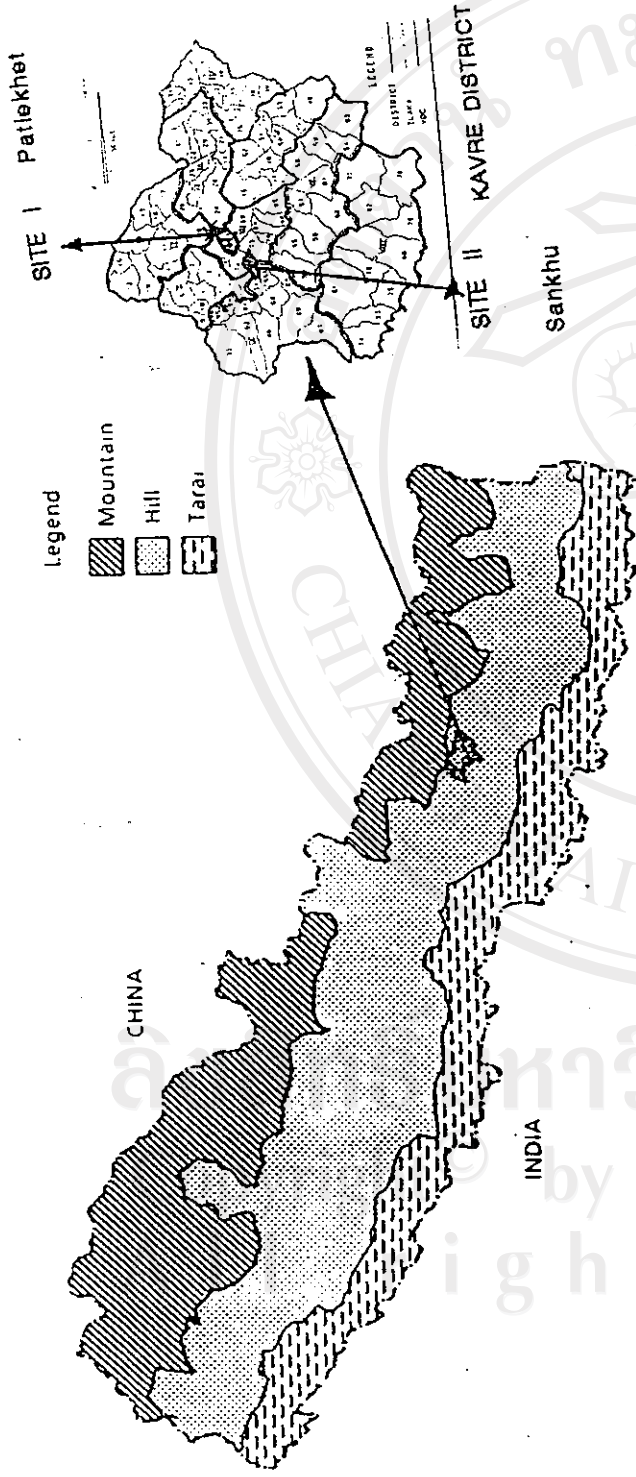
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Figure 2 Agroecological Regions of Nepal

the study site covered 5 wards namely 1,5,6,7,8, consisting of small scattered villages: located towards south-west side of Patlekhet adjoining to Phulbari VDC. The aspect of the site is generally north east facing. Soils are loamy to sandy loam. Patches of red soils are also common. The altitude ranges from 800m - 1700m above the mean sea level.

Sankhu VDC (the study site II) is located 5km east of Banepa town adjoining to Sharada Batase, Sunthan and Khopasi VDCs' of Kavre district. The site in general has moderate slope with south facing aspect. The altitude ranges approximately from 1300 to 1600 m above mean sea level. Soils are loamy to sandy loam with good drainage. This site is unique to whole Kavre district and also probably to many mid hill regions of Nepal because of its highly successful citrus dominated farming systems.

The climate of the both Patlekhet and Sankhu are almost similar. However, Patlekhet is relatively cooler even in the same altitude, since the aspect of the village is generally north east facing towards the Himalaya. As observed from nearest meteorological station at Balua, Jikhikhola watershed, Kavre the climate of the area is warm temperate ranging from minimum of 7 degree celsius (December -January) to 30 degree celsius (April- September). The annual average precipitation is about 1300 mm which is mainly distributed during June to September (Appendix Figure 1). Winter months are dry and relatively cool in both the study sites. Within the area also a lot of variations is observed in temperature due to topography and aspect.

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3.1.2 Natural Resource Base

3.1.2.1 Farmland Resource

As common to many mid-hill region of Nepal, there were two distinct land use patterns practiced by farm households in both the study sites: Irrigated Paddy land (Khet) and rainfed upland (Bari). However, some farmers (28.8%) also found to own some forest and pasture land (Pakho land) in the Sankhu study site. Among the land types, the size of rainfed upland (Bariland) was larger and the most common type in all farm households. About 99% of the sampled households in both the study sites own upland where as 20% households are reported to have no paddy land (Khetland). The area under cultivation was 17.92 % paddy land and 45.62 % upland in Patlekhert. However in Sankhu 66% of the area is under upland. There were some patches of upland in Patlekhet where rice could be cultivated in monsoon rains and depending upon the availability of water.

Citrus orchard occupied considerable area in Sankhu site. The cultivation of citrus was mostly done in rainfed upland. Citrus orchard of varying size ranging from 0.06 – 4.2 hectare were found in Sankhu site. Size of orchard and number of citrus trees were related. The percentage area under fruit tree to total holding was highest in group I (marginal) farms as compared with large farms (Table 4). About 90% sampled households at Sankhu have integrated orange tree into the existing systems.

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Table 4 : Land endowments (hectare) in sampled farm households

Groups	Paddy land (Khet land)	Rainfed Upland (Bari land)	Orchard	Total Land	No. of farms
Patlekhet					
I	0.103	0.205	–	0.308	13
II	0.375	0.485	–	0.860	23
III	0.355	0.975	–	1.330	17
IV	0.854	1.200	–	2.054	10
Mean	0.422	0.716	–	1.130	–
Sankhu					
I	0.103	0.076	0.151	0.331	11
II	0.341	0.226	0.210	0.778	21
III	0.512	0.477	0.341	1.336	18
IV	0.852	1.100	0.382	2.304	10
Mean	0.452	0.470	0.271	1.187	–

Source : Household survey , 1993

Table 5. Average number of fruit trees in sampled households

Farm type	Size of Orange grove (ha.)	% of area under Orange	Average No of trees		
			NB	FB	Total
Group I	0.15	45.62	40.71	96.5	137.2
Group II	0.20	27.05	93.77	128.9	222.26
Group III	0.34	25.56	103.26	146.70	249.96
Group IV	0.38	16.35	190.66	333.75	524.41
Mean	0.27	28.64	107.10	176.46	283.56

Note: NB = Non bearing; FB = Full bearing
Source: Household survey, 1993

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The average farm size varied from 0.30 hectare in group I farm to 2.05 hectare in group IV farm in Patlekhet and 0.33 hectare in group I (marginal farm) to 2.30 hectare in group IV (large farm) at Sankhu site (Table 4).

3.1.2.2. Livestock

On an average a household in the study site I (Patlekhet) keeps 2.06 animals. Similarly, in the study site II (Sankhu) a house hold keeps about 2.10 animals. The rearing of milch animals mostly buffalo and cows are most common in both the study sites. The analysis of the data on livestock unit showed a positive relationship between the intensity of land use and number of livestock unit. On an average 30% of the sampled farm household owned a pair of bullocks in the study sites. Livestock raising not only provides draft power and the organic manure for the farms and the nutritious food to the farm family but also helps to augment and stabilize farm income in the study areas.

3.1.2.3. Forest and Pasture land

Forest of pine plantations and some patches of natural forests are common in both the study sites. The distance from farm to forests is relatively short as compared to many parts of the middle hills of Nepal. Apart from distinct forests land forest trees are also found grown in farm land and community land (scrub land and stream banks) adjoining to farm

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areas. Farmers have responded the scarcity of the fodder, firewood and timber by planting the trees in the farm land since farm households presently do not have access to forest. In both Patlekhet and Sankhu sites the major species observed in such land were *Alnus nepalensis, Melia ajadiracta, Choeriaspondis spp.* etc.

3.1.2.4 Water Resources

Since the study villages in Patlekhet lies between Nauchale and Satpatre minicatchment within Jikhikhola watershed, they provide fairly enough source of water for drinking, domestic use and to some extent irrigating few parcels of land during rainy season when water is enough in the streams. In Sankhu site, Ghattekhola on the east side of the village on the way to Namobudha temple, and Andheri and Sundi khola are the three streams used as the major sources of water for rice crops, drinking and domestic uses.

3.1.3. Human Resource Base

3.1.3.1 Ethnicity

The main ethnic groups of both study sites are Brahmin and Tamang. However, small number of other ethnic groups: Newar, Chhetrias, Bishwokarma were also present in the study sites. Brahmin and Tamang constitute about 50% and 30% of the total sampled households respectively.

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The literacy rate was found higher in Brahmin than Tamang ethnic
(Tibeto-Burmese origin) group. The major source of off-farm income for
Brahmin group came from working as village priests while in Tamang it was
mainly from wage labor in Patlekhet and trekking guide and portering in
Sankhu site.

3.1.3.2 Family Composition and Labor force

The average family size of the sampled household ranges from 5.48
in farm group I to 9.00 in farm group IV at Patlekhet, where as in Sankhu
it ranged from 6.1 in group I to 7.8 in group IV in Sankhu. This
indicates that family size and thereby labor force increases with farm
size. However, the man land ratio was found very high in group I farms
both in Patlekhet and Sankhu site which decreases with increase in farm
size (Table 6, and 7). This suggests a likely situation of excess
population pressure on land and also the labor supply on all the farms.

3.1.3.3 Education Status

The average literacy rate in all farm group was relatively higher
in Sankhu site as compared with Patlekhet site. The literacy rate is lower
in smaller farm group in comparison with medium and larger farms in both
the sites (Table 6 and 7). Large farm households (group IV) in both the
sites have 100% literacy rate and the average literacy rate among
different farm groups was above 80% which is very high as compared to
national average rate of 36% (CBS, 1991).

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3.1.3.4. Economically Active Memebers

The average number of economically active members which are involved both in farm and off-farm per household ranges from 3.4 to 4.8 in Patlekhet and 3.22 to 4.2 in Sankhu. Among farm groups, dependency ratio was found highest in group IV (large farm) and group III (medium farm) in Patlekhet and Sankhu respectively .

The information on family size, man-land ratio, average age of respondent household head, average labor force/ household involved in farming and total man days involved in off-farm activities are presented in the Table 6 and 7. Family size and average labor force were found related with farm size in both the study areas. Man-land ratio was found negatively related with farm size.

Table 6. Demographic Features of Sample Households at Patlekhet Site

Demographic Features	Group I	Group II	Group III	Group IV	Mean
Respondent's age	40.60	44.82	43.80	35.80	41.25
Literacy Rate	44.00	41.10	69.23	100.00	82.15
Family Size	5.48	7.21	8.10	9.00	7.44
No of Dependents	1.96	3.11	3.66	4.20	3.23
EAM (No.)	3.40	4.12	4.37	4.80	5.22
ALF (No)	2.56	2.96	3.40	4.20	3.28
MLR	17.79	8.38	6.09	4.38	6.58
MOF	334.00	374.00	410.00	448.00	391.50

Note: EAM = Economically active member; ALF = Actual labor force in farming; MOF = Man days in off-farm (off-season) ; MLR = Man land ratio in hectare

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Table 7. Demographic Features of Sample Households at Sankhu Site

Demographic Features	Group I	Group II	Group III	Group IV	Mean
Respondent's Age	46.22	43.89	43.46	57.60	47.79
Literacy Rate	55.55	89.28	100.00	100.00	86.20
Family Size	6.11	7.48	7.93	7.80	7.33
No of Dependents	2.88	3.36	4.26	3.60	3.52
EAM (No.)	3.22	4.28	3.73	4.20	3.80
ALF (No.)	2.66	2.77	2.88	3.20	2.87
MLR	18.45	9.61	5.93	3.38	6.17
MOF	264.00	343.00	385.00	397.00	347.25

Note: EAM = Economically active member; ALF = Actual labor force in farming; MOF = Man days in off-farm ; MLR = Man land ratio in hectare

Source: Household Survey, 1993

3.1.3.5. Labor Endowment

The average number of labor force availability per household was higher in Patlekhet (3.28) as compared to Sankhu site (2.87). However, labor availability both in the peak season (June, July, middle of November to middle of December) and off- season (the rest of the months included other than in peak season) was found related with the farm size (Table 8).

This happens because many of the sampled large farm households have extended family systems. The total labor availability for each season (peak and off-season) is estimated from each household considering 8 hours working day as one man day. From each adult labor force, 26 man days per month is available which is used for calculation of labor coefficients.

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Table 8. Average labor availability (man day) per household by seasons.

Farm groups	Family size (No.)	Labor force in farming (No.)	Family labor man day /season		
			Peak	Slack	Total
a.Patlekhet					
I	5.48	2.56	200	599	799
II	7.21	2.96	231	693	924
III	8.10	3.40	265	795	1060
IV	9.00	4.29	335	1003	1338
Average	7.44	3.28	258	773	1031
b. Sankhu					
I	6.11	2.66	207	622	829
II	7.48	2.77	216	648	864
III	7.93	2.88	225	674	899
IV	7.80	3.20	250	749	999
Average	7.33	2.87	320	673	898

Source: Household Survey, 1993

3.1.3.6 Capital Endowment

Operating capital was a limiting factor particularly for households in Patlekhet site. However, for households in the Sankhu site, the revenue obtained from citrus was fairly sufficient for meeting expenditures requirements and further investment on citrus. Capital comes mainly through own saving, and non institutional sources such as farmers' relatives and local merchants. The interest rate charged by local merchants for the borrowed fund varied from about 24% to 39% per annum in

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both the study areas. Credit from institutional sources which mainly includes agricultural development bank and other commercial banks is not so common among sampled households. Cash used in crop production increased with the farm size. However, there was not so much variation in the cash used in the two different sites (Table 9).

Table 9. Cash (input) costs / hectare for crops by farm size

	Cash (input) used in different farm groups(NRs/ha.)				
crops	I	II	III	IV	Mean
a.Patlekhet					
Rice	4400	4000	5000	9000	5600
Wheat	3000	3700	6000	7600	5075
Corn	5000	7000	8200	10000	7550
Mustard	1800	2400	3000	3000	2550
b.Sankhu					
Rice	4120	4320	5320	9180	5715
Wheat	3160	3700	6680	8500	5510
Corn	4380	7160	7900	10580	7505
Mustard	1840	2600	2840	3540	2705

Source: Household survey, 1993

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3.2. EXISTING FARMING SYSTEMS OF THE STUDY AREAS

Two types of farming systems prevalent in two study sites of Kavre district as given below are studied and analyzed:

1. Annual Crop- Based Systems of study site I (Patlekhet VDC).
2. Citrus - Based Systems of study site II (Sankhu VDC).

3.2.1. Annual Crop- Based Systems

This type of production system, which is also common to many mid-hill regions, is prevalent in Patlekhet VDC. The landscape of the site is undulating and maize based rainfed production system (bari land) is practiced in numerous carved hill terraces.

However, medium and large farmers also have paddy land (Khet) far away from their houses. The major cropping pattern in the upland (Bari) is maize followed by wheat, mustard or mixture of wheat and mustard or Rapeseed, where as in the paddy land (khet) paddy followed by wheat/fallow. It was commonly observed that in the maize- based rainfed uplands farmers have practice of mixing mustard/rapeseed (Brassica spp.) with wheat probably as insurance in the event that the wheat crop performs poorly.

Farmers have increased the cropping intensity in the upland due to increasing population pressure. The low and highly variable

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production of annual crops in upland due to irregular rainfall and decline in soil fertlity have been mitigated to some extent by the use of chemical fertilizers. Thus, presently farmers tend to use more of purchased chemical fertilizers (> 40 kg of plant nutrients) in the upland to restore original fertility which is higher than national average use of 27.4 kg (FAO, 1992).

However, increased price of chemical fertilizers and deteriorating soil fertility due to intensive cultivation and soil erosion have declined return from traditional crop production and farming has become no more remunerative in the upland as before. On the other hand due to lack of technological information and extension support farmers have not been able to integrate citrus in their existing systems.

3.2.1.1 Economics of Crop production

Returns to major farm resources such as labor and capital vary in accordance with the productivity, price, labor and input requirements of the enterprises. However, the return (gross margin) from major upland crops maize and wheat is very low as compared with rice and mustard (Table 10). The low return is because of the declining productivity of these crops over the years despite their relatively higher use of labor and chemical fertilization for its cultivation.

Table 10. Economics of crop production systems

(Mean of four farm groups NRs./ha.)

Particulars	Rice	Corn	Wheat	Mustard
Yield (kg/ha.)	2912	1702	1625	607
Price (NRs.)	8.5	5	4.5	16
Gross value	24752	8510	7312	9712
Variable costs(input)	5600	7550	5075	2550
Gross margin	19596	960	2237	7160
Hired labor costs	2806	750	1125	1570
Labor use(M day/ha.)	217	182	115	77

Source: Computed from survey, 1993

3.2.2. Citrus- Based Systems

3.2.2.1 Flow and linkages among Citrus Based Farming systems

Farming systems of the study site II at Shankhu VDC is citrus based and covers a broad spectrum of land use, crop, cultural and ownership situation of livestock including various off-farm activities that a farmer perform for his living.

Annual crops, fruit (orange) trees, and livestock have been identified as the most important components of the farming systems in the study site II at Sankhu. A farmer or household manoeuvres these three components with his management skills in order to extract outputs that can be generated from each type of sub- systems. Various outputs

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have been generated as a result of the integration of different components of the farming systems. Some of the outputs obtained from one component have been used in other components in the form of inputs for deriving outputs from the latter and vice versa. Market forces play important role in shaping the farming systems. There is strong linkages among citrus, crops and livestock sectors through market. The cash income obtained from the fruit sale is utilized for buying chemical fertilizers for crop production and purchasing livestock feeds. Also, the farm household use this cash income obtained from fruit sale in hiring labor during peak seasons of farming. Apart from this citrus, annual crops and livestock activities are supportive among each other since livestock provides manure (compost) and orchard and crops provide fodder and forage for livestock. So there is a very good interaction of citrus fruit with the production of other components of the systems.

Citrus production is complementary to existing systems since its cultural requirements do not compete with planting and harvesting operations of food crops. Cultural operations for the citrus (orange tree) could be extended during slack period in the early summer months to avoid peak labor demands periods during which opportunity costs and market prices for labor tend to be higher. However, there is some competition between food crops and citrus for nutrients, moisture and labor management activities during early stages when intercropping of food crops is done between citrus trees. Improved dwarf varieties have less competition effect on crops because of lower canopy.

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Small scale farmers who do not have sufficient extra land to grow food crops generally have a tendency to intercrop in between fruit trees during prebearing stages to meet their subsistence food and consumption requirements. Maize during summer season and mustard and wheat are common during winter season. Unlike the most of the other parts of the midhills, the forestry sector is loosely linked in Sankhu site, which can be attributed to the strong market integration of the citrus based farming system of the study area.

Cropping patterns in this village are usually orange/ maize- based in the rainfed uplands (Barilands) and paddy- based in the irrigated lands (Khet). Paddy is the major crop in the irrigated land (khet) followed by wheat while maize, mustard citrus mainly mandarin orange are the dominant crops in uplands (Bari and Pakho).

3.2.2.2 Relationships between Farm Enterprises and Farm Resources

Farming in the study area as mentioned above includes various enterprises such as citrus orchard, upland crops (maize, wheat, mustard), lowland rice and livestock. In order to have farming systems understanding and the farmers' decisions regarding land allocation and crop management (mainly input use) for orange, a correlation analysis is carried out. First the analysis covers the relationship that exists among various farm enterprises e.g. upland crops, orange trees, lowland rice and livestock and their possible relationship between these and such general farm

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characteristics as farm area, family size, family income, and family labor which are used to indicate farm resources.

Table 11 Relationship between farm enterprises and farm resources

for farm group I (Pearson correlation analysis) in Sankhu

Farm resources	Farm enterprises			
	orange	corn	rice	livestock
Farm size	0.4548	0.43	0.664	0.8394
Family size	0.0092	0.58	0.833	0.3693
Family labor	0.3203	0.01	0.552	0.0375
Family income	0.7290	0.01	0.080	0.1025

The relationship between crop size area or size of land allocated to these components and farm resources (farm size, family income, family labor) show the dominant resource allocation (Table 11). The data indicated that the correlation between the area planted with citrus or other crops and farm resources was positive. The positive relationship was found stronger with the farm size and area under orange, rice and livestock holding. Similarly, strong positive relationships existed between rice area and family size and family labor.

3.2.2.3 Comparative Economics of Orange and Traditional Crop Production

Mandarin orange (*Citrus reticulata*) is an important citrus fruit most commonly grown in the mid-hills region of Nepal. It is rich in

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Mandarin orange (*Citrus reticulata*) is an important citrus fruit most commonly grown in the mid-hills region of Nepal. It is rich in

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vitamin 'C' and other nutrients which are essential for human body maintenance and growth. The production of perennial crop such as orange involves planting, removal, yield and time dimension not similarly encountered in annual crops which is distinguished from the production of annual crops by; (i) The long gestation period between initial input and first output. (ii) An extended period of output owing the initial production or investment decision. (iii) Eventually a gradual decline of the prodcution capacity of the plant after certain years.

Thus the economics of orange production must consider the lags between input and the output and the effects of population in bearing plants on production. The per unit yield of orange varies with the age of bearing plants, with technology (varieties, cultural techniques), weather and biological factors. In some cases current yields may also be related to past yields by alternate bearing tendencies and conceivably varied in response to current profit expectations and primarily by more complete and careful harvesting practices.

Costs and return analysis of orange in this study has been done based on the input-output coefficients for existing orange production. The unit of analysis is in per tree basis and later it is converted into per hectare. While comparing the annual and orange crop combinations the per year net returns of orange is worked out and compared with the per year net returns of annual crops to have equal time dimension of comparison. Similarly the different (unequal) costs patterns of the orange

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in the year of gestation is averaged and compared on per year basis with the equal cost patterns of the annual crops.

The results of the cost return analysis (Table 12) indicates that compared to maize and wheat, the crops like orange and rice are profitable under present systems of production.

Table 12. Comparative economics of orange and traditional crop production (NRs/ hectare)

(Mean of four different farm groups)

Particulars	Orange	Rice	Wheat	Corn	Mustard
Yield (kg/ha.)	10240	2970	1640	1770	662
Price (NRs./kg)	7.00	9.00	4.50	5.00	16.00
Gross return	10355	6729	2128	3047	3142
Gross margin	8028	5448	1031	2824	2371
Variable costs	2327	1280	1096	2122	770
Hired labor costs	725	950	895	890	505
Labor use(M day/ha.)	161	211	111	157	69

Notes: Above economic parameters were calculated based on 20 years of economic life for orange and 16% discount rate for all crop activities. Therefore costs and return data are in net present value (NPV).

Source: Computed from survey, 1993

The analysis shows that return from orange is fairly high indicating the profitability of the enterprise, despite its relatively low total labor use per unit of land as compared with the existing annual crop rice. The total man days of hired labor used also is low in orange as

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compared to maize and rice (Table 12). The gross margin (net benefit) from existing orange tree is found negative until 6th year as the tree do not bear productive fruits. After the seventh year, the gross margin is positive which increases with increasing rate until the 14th year of its economic life. After the 15 years there is slight decrease in production of orange. The figure 3 shows the trend of net benefit from orange in different years of its economic life.
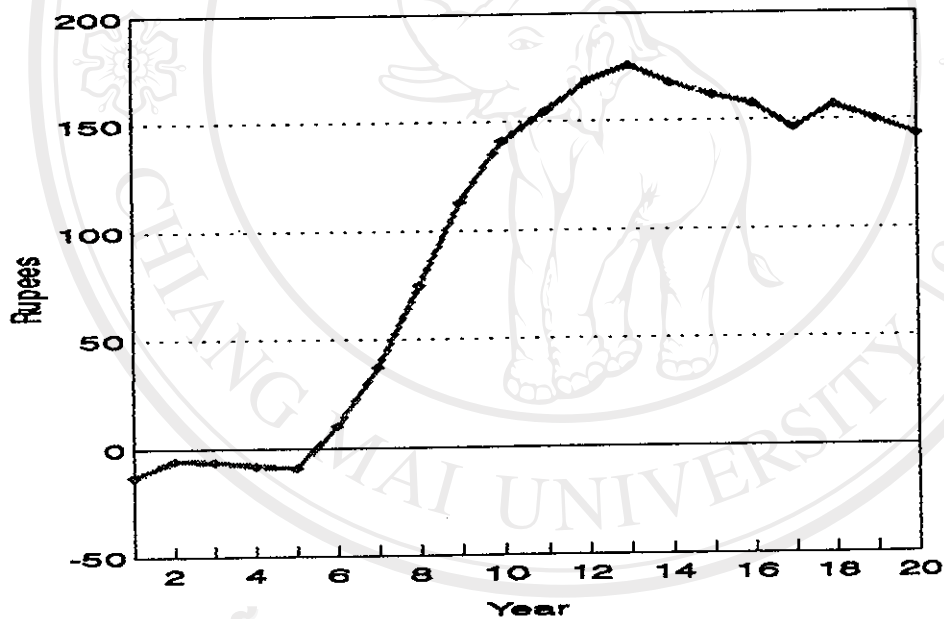

Figure 3 Net Benefit and Economic Life of Orange in Shankhu

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Existing orange production is purely traditional type with low use of labor and purchased inputs. They have been practicing their own methods of planting and spacing. They plant local variety of orange in very high density (averages high as 640 trees per hectare) without any distinct recommended practice which grows taller and has longer gestation period. There is no use of labor unit for harvesting and marketing since fruit is sold to preharvest contractor long before harvest time of fruits. Even under low input traditional management and inefficient marketing systems, farmers are reaping high monetary benefits. In fact growing orange was found supplemental to crop and other production systems.

3.2.2.3 Marketing Environment

Marketing systems in the both sites are underdeveloped. Input market is only well developed for chemical fertilizers. Whereas output market is almost non existent except for citrus fruits in Sankhu site. Most of the farmers in the study area sell their produce particularly citrus fruits to preharvest contractors who offer low prices. Such lower share and return to the farmers result from the perishable nature of the fruit, low disposable amount of fruits, inadequate cold storage space, lack of transportation systems, and processing facilities.

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3.2.3 Income and Employment Generation

3.2.3.1 Family Income

The total annual gross income per average household in the site II is very high as compared to the majority part of the hilly region, because of the income generated through the sales of citrus fruit. The sale of crops, fruit and livestock products are the immediate source of cash income for farm households in the study sites.

a. Farm Income:

Farm enterprise was the most important source of family income for all farm size groups in both Patlekhet and Sankhu site. However, Sankhu site had higher percentage of income from farm enterprises than Patlekhet. The higher farm income in Sankhu site, was due to integration of citrus fruits particularly orange production which played substantial contribution to farm income. It provides 80 , 69 , 68, 65 % of family income for the group I, II, III and IV farms respectively (Table 13).

b. Off-farm Income Opportunities

As return from existing farm activities has not been able to sustain their livelihood, farmers traditionally in those areas have adopted strategy to integrate off-farm activities with farm activities

which have been the major part of the farming systems. The off-farm income contributes about 40 - 56% of total family income in Patlekhet as compared to 24.5% to 34.5% in Sankhu site depending upon farm groups (Table 12). Since the contribution of income from citrus in Sankhu was substantially higher, the relative share of off-farm in total family income remained low though the actual amount of earning from off-farm was found higher. The share of off-farm earning increased with farm size in both the study sites. This is because in the bigger farms, members of the farm households are better educated and earn their living more by services and trading. However, there was not distinct differences in off-farm earning among farm groups in both the study sites.

Table 13 Contribution of farm and off-farm income and their % share to total income by farm groups at Patlekhet and Sankhu VDCs'.

Farm group	Income sources			Income sources		
	Patlekhet			Sankhu		
	Farm	Off-farm	Total	Farm	Off-farm	Total
I	7469(46.7)	8523(53.3)	15992	16180(80.1)	4000 (24.7)	20180
II	11995(59.0)	8320(40.9)	20315	36409(69.7)	15769(30.2)	52178
III	17139(48.6)	18114(51.3)	35253	56208(68.3)	26072(31.7)	82280
IV	27413(43.9)	35000(56.0)	62413	91137(65.5)	48000(34.5)	139137
Mean	16004(49.5)	17489(50.5)	33499	49983(70.0)	23460(30.0)	73443

*The figure in parenthesis indicates % share of total income.

Though, off-farm work is prevalent to all size of farm operators,

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some type of off-farm work viz, wage laboring was more prevalent to marginal and small farmers. The remainder of off-farm income comes from such sources as trade, portering of milk and professional activities such as priests, witch doctors etc.

3.2.3.2 Employment

The farm activities i.e cultivation of annual field crops and livestock rearing and off-farm activities are the major source of employment in Patlekhet where as in Sankhu, citrus farming was the main source of employment as compared with other farm and off-farm activities. The off-farm activities commonly involved by farm households in both the study sites include wage labor (skilled nonfarm and farm labor), portering of goods and milk, cottage industries, services, trading and working as village priests. There was variation in the type of off-farm activity performed by farmers by ethnicity. The percentage of farmers involved in wage labor activity was higher in case of Tamang and Biswokarma. However, upper caste group especially, Brhamins are mostly worked within the village as priests for their off-farm earning.

3.3 Summary

There is much similarities in terms of biophysical and socio-conomic resources between two sites Patlekhet (Aruboat, Dandagaon, and Panditthok villages) and Sankhu which are situated in almost similar

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altitude ranging from 1200 to 1500 m above the mean sea level. Both the areas have sandy loam soils, more upland sloppy areas with similar altitude, topography and climatic settings. The cropping pattern is similar except citrus components in Sankhu site. The two major ethnic groups like Brahmin and Tamang are common inhabitant of both study sites. The labor and capital resource availability of farm households were found related to farm size. Both the sites are close to each other and only demarcated by a mountain range in between them.

However, Sankhu site is more prosperous due to integration of orange into their farm systems. Farm households derive substantial amount of income from orange production besides equally higher amount from off-farm earnings. The contribution of off-farm income to total family income was found higher in patlekhet than Sankhu site despite the higher absolute total off-farm income in Sankhu. The correlation analysis also revealed that there was strong positive relationships between family income and area under citrus production. Citrus production was found supplementary to crop and livestock production systems.

The return from upland crops as observed in Patlekhet site was not sufficient to sustain the livelihood of farm households particularly for group I and II farms. This necessitates the integration of alternative high income generating activities such as citrus into the existing systems.

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