Chapter 5

Resource Endowment and Management Practices for Rice Production

5.1 Overview of the study area

Omtekah and Wangjokha, located at an altitude ranging from 1,200m to 1,600m above sea level were selected as study area. There were 21 and 22 household in Omtekha and Wangjokha respectively. General overviews of the two villages are given in Table 5.1.

Table 5.1: Overview of selected studied areas.

District	Punakkha	Thimphu
Villages	Omteykha	Wangjokha
Altitude (m)	1,600	1,300
Households	21	22
Vegetation	Broadleaf forest	Coniferous forest
Access to forest(Distance)	Moderate	No forest area
Soil Type	Deep brown loam to sandy loam	Deep brown loam, sandy clay loam and clay loam.
Irrigated rice land (ha)	42	40
Dryland (ha)	1.1	3.6
Major Crops	Rice Wheat, Vegetables	Rice, Wheat, Mustard, Vegetables
Main Income source	Rice,	Rice, Off-farm,
Problems	Water shortage, labor	Water shortage, labor

(Source: Field Survey, 2004).

5.2 Land holding

The total cultivated paddy land in the study area is 82 ha, however, farmers of these villages own only about 50% (42.4 ha) of the available in the area, remaining land were owned by outsider. Average wetland holding of Omtekha farmer are more than the Wangjokha farmers (Tables 5.2 and 5.3). Almost every households owns wetland, however, holding size varies greatly. 54.5% of farmers in Wangjokha share-in wetland against 66.6% of the farmers in Omtekha.

Table 5.2: Landholding, Omtekha.

	Own Land	Share-In	Share-Out
	----------ha/household----------		
Maximum	1.00	2.50	0.00
Minimum	0.10	0.00	0.00
Mean	0.46	0.50	0.00
S D	0.24	0.67	0.00
CV (%)	53.00	136.00	0.00

(Source: Field Survey, 2004).

Table 5.3: Landholding, Wangjokha.

	Own Land	Share-In	Share-Out
	----------ha/household----------		
Maximum	3.20	3.00	1.60
Minimum	0.00	0.00	0.00
Mean	0.61	0.45	0.15
S D	0.66	0.74	0.38
CV (%)	108.00	164.00	247.00

(Source: Field Survey, 2004).

5.3 Material inputs

Among the material input used, cost of seed accounted highest followed by Farm Yard Manure (FYM) fertilizer and herbicide (Figure 5.1). Purchase of rice seed from market is occasional and farmers rarely change the seeds. Improved rice seed are freely distributed on promotional basis to the farmers by the extension services annually. However, all farmers are not benefited at one time and beneficiaries are rotated every year. All farmers maintain their own seed, only few purchases or borrow modern variety seed from neighbor.

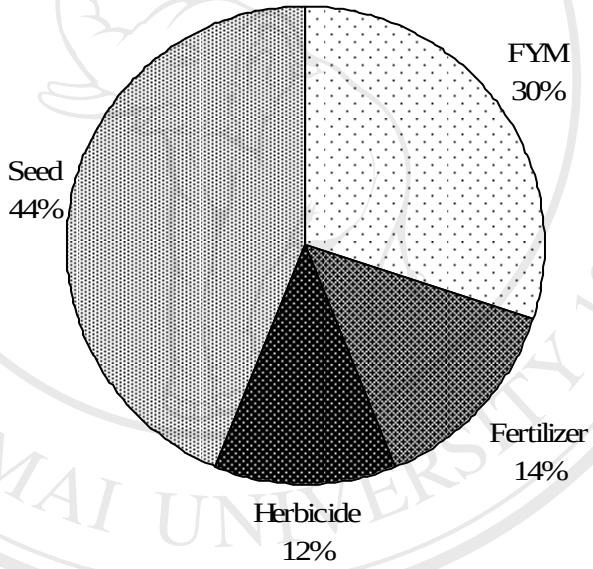

Figure 5.1: Proportion of total material resources use for rice production. (Source: Wangdi and Swinkles, 2000).

Omtekha farmers have better access to forest and grazing areas, as a consequence, farmers in Omtekha rears more livestocks and use more FYM than Wangjokha farmers. FYM is used by 100% of the farmers in the study area but only and 53.48% considered it is very important for rice production.

Wangjokha farmers use more chemical fertilizers especially nitrogen for rice production. (Tables 5.4 & 5.5).Very few farmers in Omtekha use chemical fertilizers and, even if they do, it is in small quantities which is less then the recommended rate. Eighty five percent of interviewed farmers (most of them from Wangjokha) said accessibility of fertilizer is good but only 26.92% ranked number one or very important among different resources used for rice production. Only 9.3% of the farmers in the study area considered herbicide as important input and 75% of them said accessibility is poor.

Farmers in the study area follow only partial recommendations that are promoted by the extension and research centers. Use of nitrogenous fertilizer is common in study area. 95.5% of households in Wangjokha use nitrogen where as in Omtekha only 25% households use it. Moreover the rate of nitrogen application varies greatly from 30-300 kg/ha. Irrigation is done as per the rotational schedule fixed by the village committee. Use of herbicides is common in Wangjokha but rate of application varies greatly. Pesticide are rarely use due to religious sentiments.

Table 5.4: Nutrient use and yield, Omtekha.

	FYM	Urea basal	Urea TD*	Weedicides	Yield
	----------kg/ha----------				
Maximum	30,000.00	83.25	125.00	66.25	5,942.86
Minimum	7,000.00	0.00	0.00	0.00	1,733.33
Mean	17,625.00	6.44	13.35	17.13	3,349.42
SD	6,094.38	20.74	31.94	19.68	1,030.85
CV%	35.00	322.00	239.00	115	31.00

(Source: Field Survey, 2004).

Note*: Top Dress.

Table 5.5: Nutrient use and yield, Wangjokha.

	FYM	Urea basal	Urea TD*	Weedicides	Yield
	----------kg/ha----------				
Maximum	21,250.00	250.00	312.50	100.00	7,475.00
Minimum	00.00	0.00	0.00	0.00	2,166.00
Mean	13,966.00	120.49	110.89	48.07	4,925.00
SD	6,128	95.52	81.10	24.59	1,548.00
CV%	44.00	79.00	73.00	51.00	31.00

(Source: Field Survey, 2004).

Note*: Top Dress.

5.4 Labor

The average labor required for rice production was 205 man-day/ha with a standard deviation of 51 (Wangdi and Swinkles, 2000). The average proportion of hired labor out of the total labor required is 15% (31 man-days per ha.). The remaining 85% (174 man-days) consists of family labor or exchange labor. Main activities were planting (18% of the labor input), harvesting (14% of the total labor days) and followed by threshing and transport (13%). Crop guarding and weeding labor proportion is equal (eight percent each). Even when counted as one- third of total labor days, crop guarding still consisted of eight percent of the total labor input.

Of all labor, men provide most of the labor in rice production. On the average male contributes 60% of the total labor, while females provide 40%. Typical male activities are land preparation, fencing, fertilizer application and irrigation. FYM transport and spreading, and planting are in particular female activities (Wangdi and Swinkels, 2000).

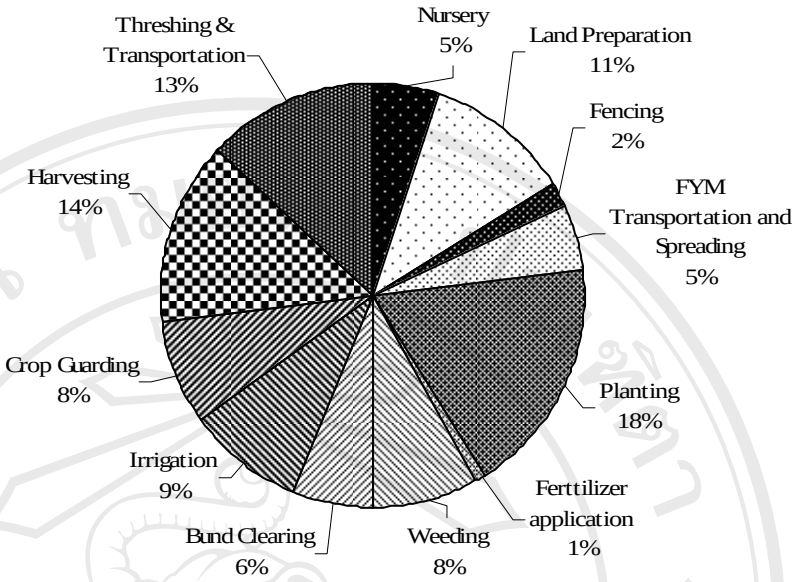

Figure 5.2: Proportion of total labor input for rice production. (Source: Wangdi and Swinkels, 2000).

5.5 Irrigation

There are five major irrigation networks in Lingmuteychu watershed. They are Limbukha, Dompola, Omteykha, Matalumchu and Wangjokha/Bajothangu. The first four schemes derive water from the Limtichu stream, and Wangjokha/Bajothangu is irrigated by Bajo canal that brings water from another watershed (Figure 5.3). Omtekha farmers receive irrigation water from Omtekha channel, which derives water from small river that flows down through the watershed. Wangjokha on the other hands receive water from same stream as well as from Wangjokha-Bajothangu irrigation channel. In principle, based on traditional rules, the upstream communities have greater control over water and tend to hold water for longer time (Gurung, 2004). As the majority of the canals are earthen without concrete lining, the conveyance efficiency of these canals is reported to be only 40%, which is extremely low (RNR-RC, 1998). Further, farmers greatly depend on the monsoon rain which increases the water availability at the source for irrigation and facilitate better sharing schedule.

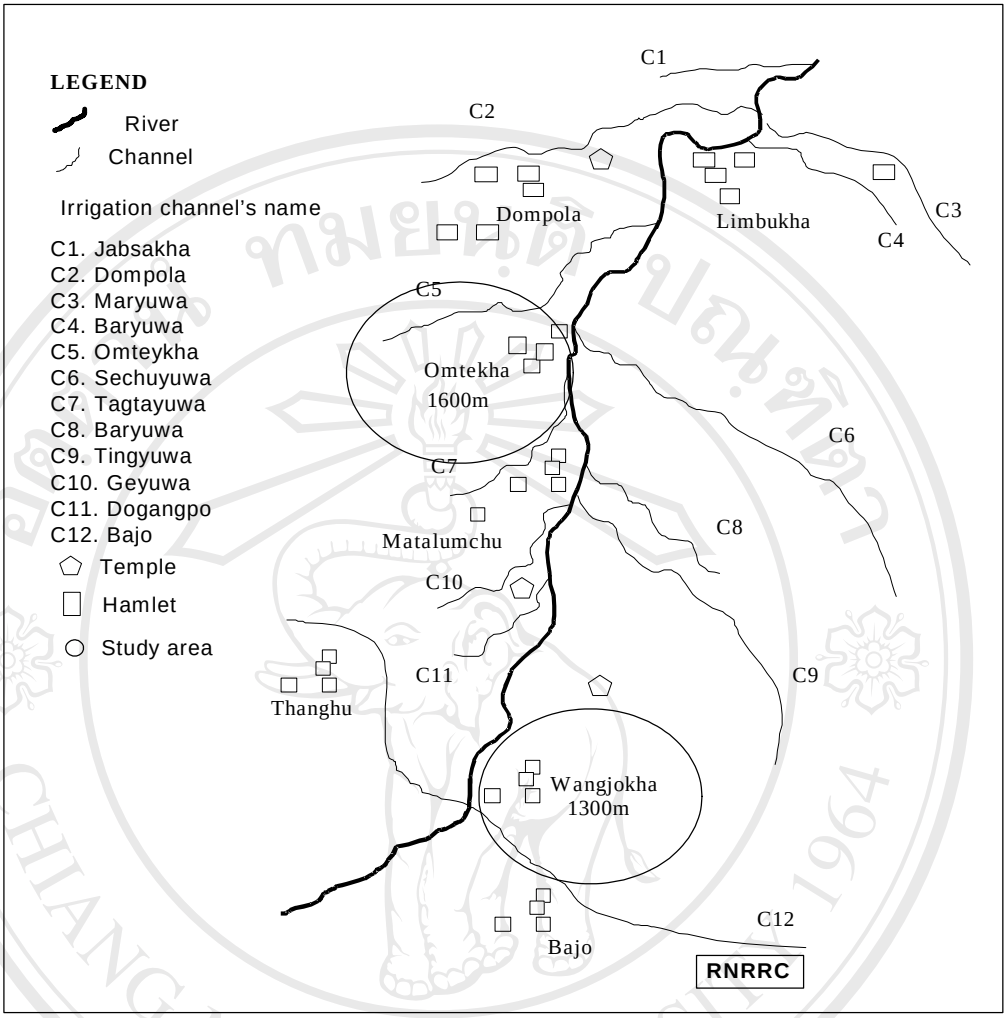

Figure 5.3: Sketch of network of irrigation canals in Lingmuteychu watershed. (Source: Gurung, 2004).

5.6 Financial resource and credit

Almost 80% of the farmers in the studied area considered credit as an important resource for rice cultivation and it is mostly used for fertilizer and herbicide procurement. It was found, through the study, that 30% of farmers could meet the financial requirement on their own from the sale of agriculture and livestock products and off farm business. Omtekha farmers earn more from sale of agriculture products (34%) closely followed by sale of livestock product (32%) to meet the household financial requirement (Figure 5.4) while, other farmers said they avail loan from government to supplement the expenditure for rice production.

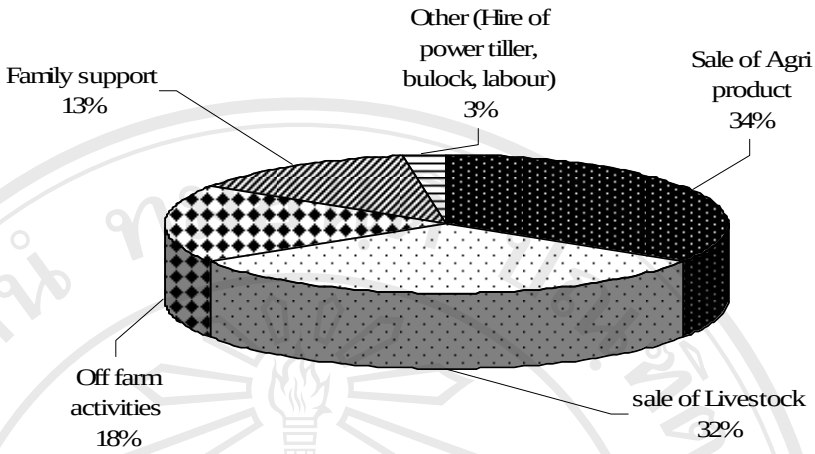

Figure 5.4: Sources of cash income for farmers, Omtekha. (Source: Field Survey, 2004).

Similarly, sale of agriculture products (38%) especially rice and vegetables form the major income source for Wangjokha farmers, it is closely followed by income from off-farm activities, 25%. (Figure 5.5). Sale of livestock products contribute only 13% to the over all income for the Wangjokha farmers. Financial support from the family members and relatives working outside are also considered important source of remittance in both villages.

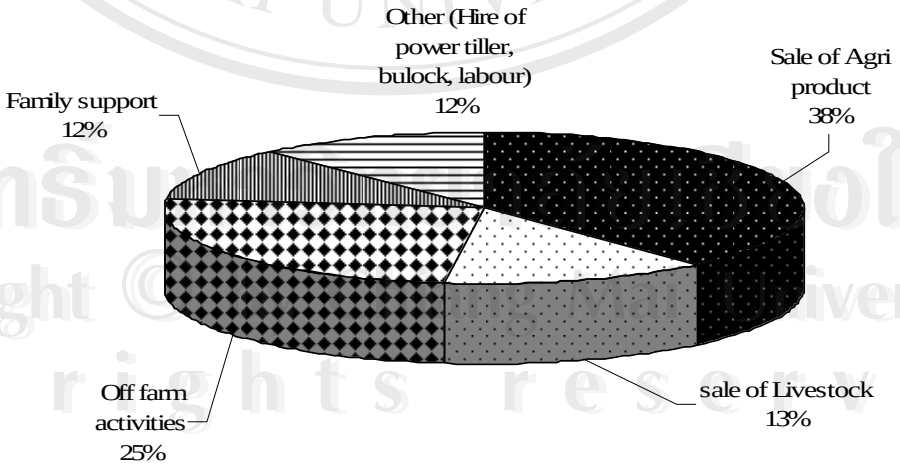

Figure 5.5: Sources of cash income for farmers, Wangjokha. (Source: Field Survey, 2004).

5.7 Machineries

Only 18.6% of the farmers in the study area reported use of farm machineries like harvester and power tiller. Most of them hire or borrow from their neighbors in the village or the nearby villages. All the farmers using machineries said it is easily available on hire and considered it is important with regards to over coming labor shortage. Low percentage of mechanization is mainly due to difficult terrain and lack of cash to hire or purchase.

5.8 Rice area and production

Farmers in the studied area were found growing different varieties of rice as they have different purpose and value. Modern varieties are mostly grown due to high yield potential and market where as traditional varieties for its taste and high market price along with specific purpose such as Zaw (puffed rice) making religious offering gift etc. Growing and consuming local red varieties are considered as a sign of better social status. Further, Omtekha farmers still prefer to grow local red and white variety compared to the improved varieties (Figure 5.6). Possible reasons could be the longer distance to inputs and market. It is still considered socially well-off to consume local rice and it also has high market value and reported to be of good taste. Moreover, being situated on slightly higher elevation, the only improved variety suitable in Omtekha was IR-64.

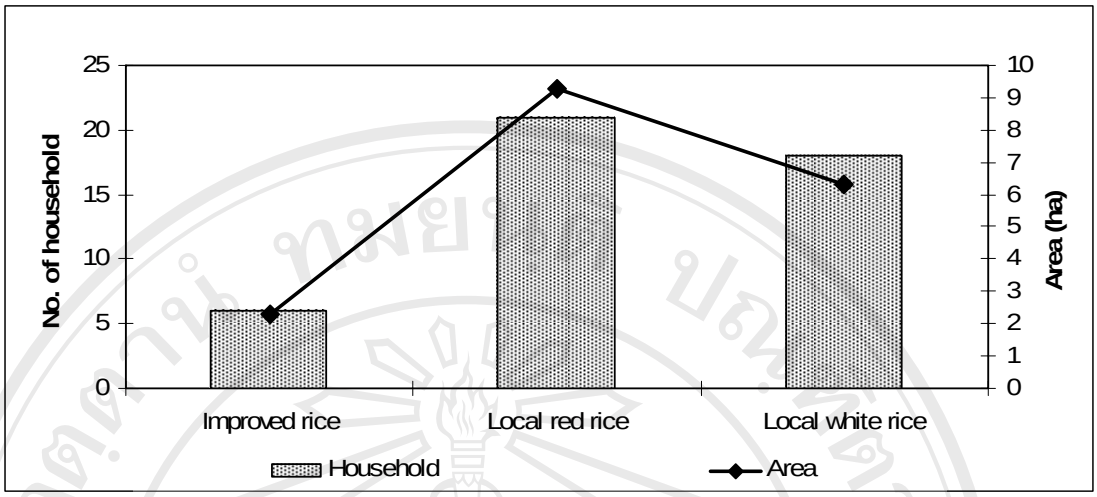

Figure 5.6: Rice variety grown and the area in Omtekha. (Source: Field Survey, 2004).

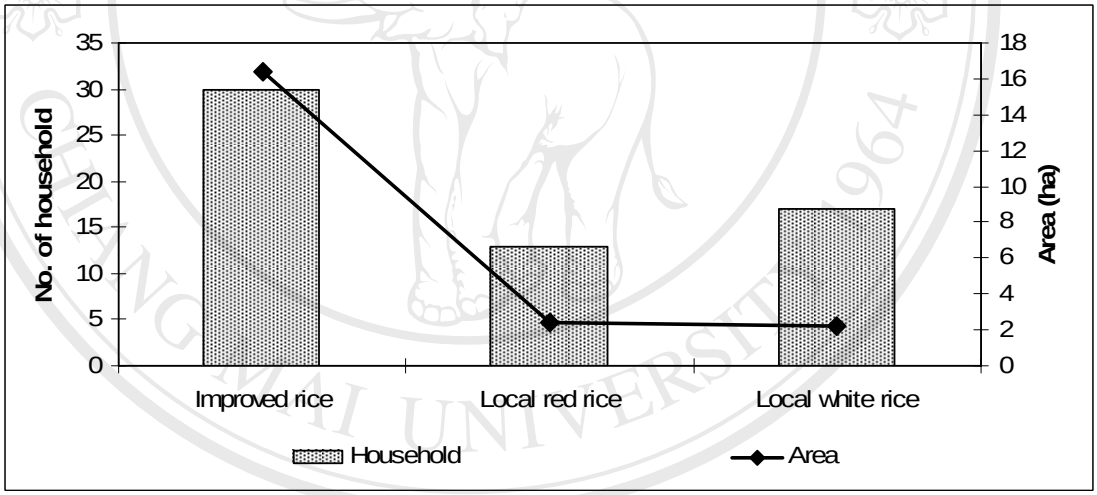

Figure 5.7: Rice variety grown and the area in Wangjokha**.** (Source: Field Survey, 2004)

However, farmers in Wanjokha were found growing more improve varieties of rice compared to Omtekha farmers (Figure 5.7), as they have better access to market and inputs. Further, improved varieties released are more suitable to the cropping pattern of this village. Summer rice is generally followed by wheat and different types of vegetables in winter and spring.

Many traditional rice varieties are grown in both villages which can be grouped into red and white varieties. Improved varieties are more common in Wangjokha. Only one modern variety, IR-64 is grown in Omtekha. Average yield of IR-64 is more in Wangjokha. Performances of common modern and traditional varieties are below.

Table 5.6: Performance improved and local varieties in Omtekha.

Varieties	n	Maximum	Minimum	Mean	SD	CV
		----------kg/ha----------				--%--
IR64	6	5,200	1,890	4,295	1,288	30
Local Maap(Red)	21	4,063	1,170	2,778	958	34
Local Kaap(White)	18	5,200	2,450	3,788	720	19

(Source: Field Survey, 2004).

Table 5.7: Performance improved and local varieties in Wangjokha.

Varieties	n	Maximum	Minimum	Mean	SD	CV
		----------kg/ha----------				--%--
IR64	16	7,800	2,275	4,812	1,512	31
BajoKaap2(White)	7	5,525	2,600	4,646	986	21
BajoMaap2(Red)	5	5,525	1,950	4,375	1,475	34
IR20913	2	4,625	2,168	3,564	1,263	35
Local Maap	13	5,200	1,560	3,725	1,140	31
Local Kaap	17	5,200	1,040	3,420	1,040	30

(Source: Field Survey, 2004).

As per survey finding, only 57% of the household interviewed in Omtekah village reported that they can produce sufficient rice required for household consumption and 19% reported having surplus to sale. At the same time, in Wangjokha, 100% of household reported that they produce enough to meet their requirement and 77% household had surplus rice to sale in local market. (Figures 5.8

and 5.9). Higher yield and more rice self-sufficient households in Wangjokha could be due more use of nitrogenous fertilizer and modern varieties. Further, the nearness to market and road could also have contributed to these differences.

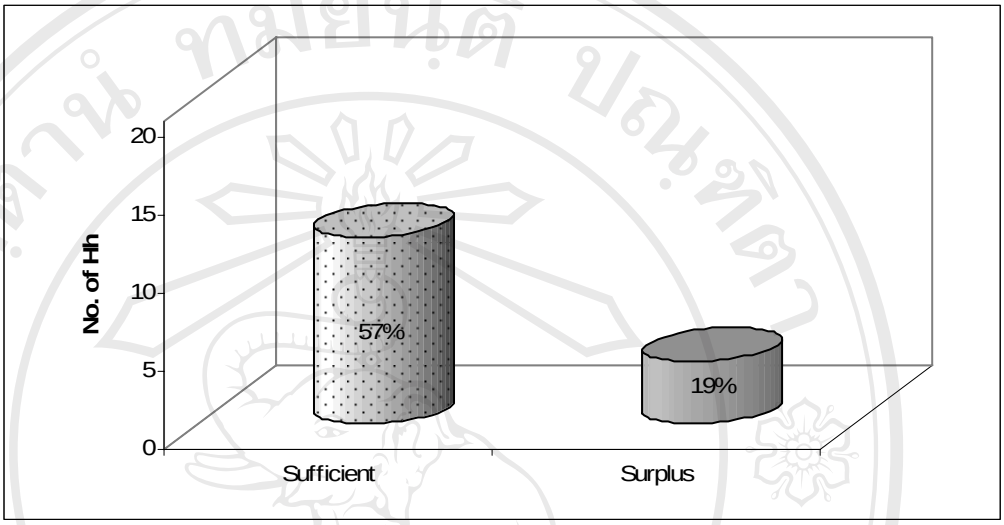

Figure 5.8: Proportion of rice sufficiency and surplus households, Omtekha. (Source: Field Survey, 2004).

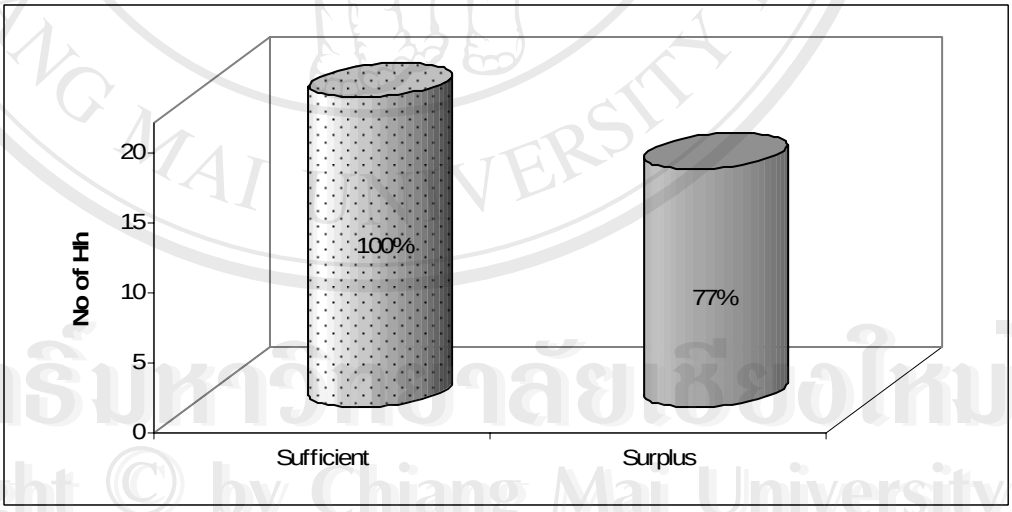

Figure 5.9: Proportion of rice sufficiency and surplus households, Wangjokha. (Source: Field Survey, 2004).

5.9 Constraints Faced by Rice Farmers in Study Area

Thirty seven percent farmers in the studied area reported irrigation and labor as major constraint and another 23% considered only irrigation as major, while 19% said irrigation/wild animal as main constraint. In general, labor and irrigation can be considered as two most important problems. None of the farmers reported agronomic issues like varieties, fertilizer management, water management etc for rice as constaints (Figure 5.10). As such there is a need to educated farmers on the availability of modern technologies to increase rice production.

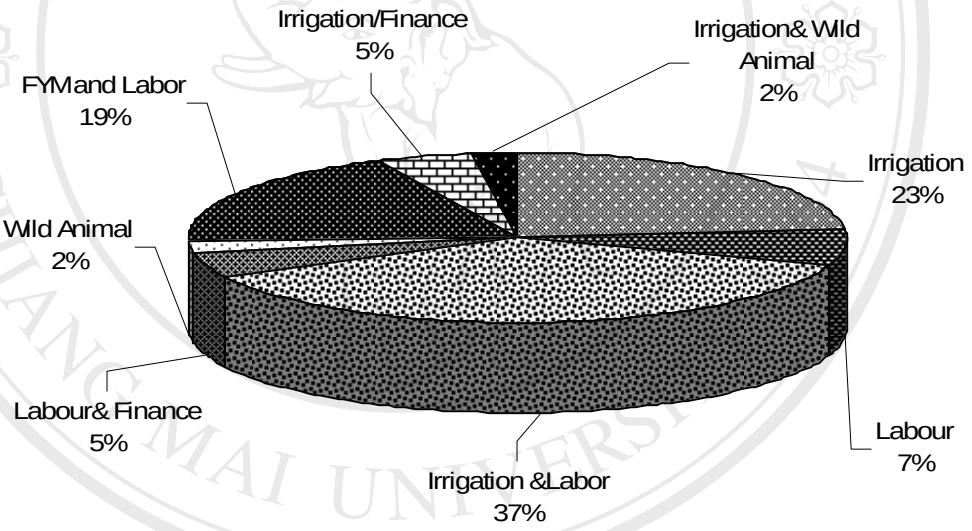

Figure 5.10: Constraints faced by farmers for rice production. (Source: Field survey, 2004).