

## **CHAPTER V**

### **FARMERS' LIVELIHOOD STRATEGIES IN COTTON PRODUCTION AND COTTON-BASED FARMING SYSTEMS**

This chapter discusses the farmers used strategies to achieve their livelihood outcomes denoted by cotton productivity, increased income and more sustainable use of natural resources according to their accessibility of livelihood assets for the sustainability of livelihoods of cotton-based farming system. As defined by Chambers and Conway (1991) livelihood strategies is the combination of all the different activities that people are performing in the context of their livelihood. Farmers' livelihood situation can be improved by the appropriate strategies and these strategies can influence livelihoods' achievements toward the sustainability of livelihoods of cotton-based farming system.

#### **5.1 Farmers' strategies in post-monsoon cotton production**

##### **5.1.1 Constituents of farmers' strategies in post-monsoon cotton production**

According to the sustainable livelihoods framework, farmers' expected outcome in cotton production was increased yield by sustainable production. Farmers' strategies regarding post-monsoon cotton production system of selected areas are mainly based on the existing resources and management practices.

According to the investment of inputs and management practices on sustainable production, farmers used various kinds of strategies such as growing of

improved variety, using high quality seed, appropriate plant protection practices such as seed treatment method and spraying of pesticide by the occurrence of pest infestation, effective usage of labor and appropriate fertilizer management practices. They gave attention on the recommended growing practices for increased yield and extension officers' instruction to obtain advanced technologies of production system. They also used crop rotation method in their field to prevent soil depletion and incidence of pests and diseases. Table 5.1 presents different strategies in cotton production in the selected areas.

To decrease chemical pest control and provide more natural control, farmers normally used improved variety that is relatively resistant to bollworm. By using this resistant variety, there will be reduced pest incidence and hence reduced spraying frequency (number of sprayings per season). It will be prevent environmental pollution because of the reduction of spraying frequency. Seed treatment method was applied to prevent early season sucking pests. By the utilization of this method, additional pesticide spraying for sucking pests was avoided until 45 days old plants. Although about 54% of respondents in Myittha and 68% of respondents in Wundwin used seed treatment method, there was observed only 28% of respondents applied in Kyaukse area. In protection of bollworm and late season sucking pests, number of right time application of pesticide by selecting correct insecticide and correct dosage was depended on certain pest infestation. Pesticide costs spent by the respondents in all study areas were 38,329 kyats ha<sup>-1</sup> (US\$ 38) in Kyaukse, 35,943 kyats (US\$ 40) in Myittha and 42,321 kyats (US\$ 42) in Wundwin.

Majority of farmers used good quality seed to provide the highest germination rate and strong seedlings under certain moisture at growing time. The utilization of

the quality seed is essential for yield improvement. All of the respondents followed the recommended growing practices in Kyaukse because of their more experience than those of the other townships. With regard to the effective use of labor, cotton farmers avoided on the waste of labor use along the growing season especially in weeding and harvesting time.

In soil fertility management practices to increase productivity, the most commonly used chemical fertilizers were urea (N) and compound (N, P and K). Triple superphosphate (P) was rarely applied in cotton cultivation in the selected areas. Urea fertilizer was normally applied split applications, one-half side dress at the pin head square stage and one-half side dress at near peak blooming. Triple superphosphate and compound fertilizers were commonly used as basal application at the time of sowing. However, farmers used compound fertilizer as basal and also used as side dress by mixing with urea fertilizer in this study. The average amount of all types of fertilizer applied by the respondents of all townships was 40.51 kg ha<sup>-1</sup>. The recommended rates of urea, triple superphosphate and potassium fertilizers for the cultivation of Ngwe Chi 6 variety denoted by CSD are 126-63-94 kg ha<sup>-1</sup>. Application of all types of fertilizer in the study areas was substantially lower than the recommended rate. All the respondents commonly used FYM as basal at the time of land preparation with the average amount under all study areas was 1468 kg ha<sup>-1</sup>. Farmers' application of FYM in cotton production was relatively lower than the recommended rate (6125 to 12350 kg ha<sup>-1</sup>) denoted by CSD for the cultivation of Ngwe Chi 6 variety.

Table 5.1 Farmers' strategies in post-monsoon cotton production system

No.	Strategies	Kyaukse	Myittha	Wundwin
1.	Good quality seed	43 (86%)	49 (98%)	43 (86%)
2.	Recommended growing practices	50 (100%)	37 (74%)	35 (70%)
3.	Plant protection			
	- Resistant variety	50 (100%)	50 (100%)	50 (100%)
	- Seed treatment	14 (28%)	27 (54%)	34 (68%)
	- Spraying frequency (number season <sup>-1</sup> )	5.12	3.86	5.66
4.	Effective labor used (man days season <sup>-1</sup> ha <sup>-1</sup> )	127.84	103.94	130.55
5.	Fertility management			
	Chemical fertilizer amount (kg ha <sup>-1</sup> )	7.82	22.09	91.62
	- Urea – side dressing	1 (2%)	19 (38%)	38 (72%)
	- T-super – basal	1 (2%)	-	1 (2%)
	- Compound – basal	3 (6%)	-	9 (18%)
	- Compound – side dressing	-	-	12 (24%)
	FYM amount – basal (kg ha <sup>-1</sup> )	846	2192	1367
6.	Extension visits (times season <sup>-1</sup> )	2.98	2.66	3.24
7.	Crop rotation	18 (36%)	44 (88%)	40 (80%)

Source: Survey, 2010

Note: Number in parentheses is percentage of respondents in the study areas.

Regarding the maintenance of soil fertility and residual N from the preceding crops, farmers used crop rotation method as the one of the strategies in cotton production. Consecutive growing of the same crop will tend to exploit the same soil root zone which can lead to soil nutrient depletion and poor root development

(Christian and Patrick, not dated). In the study areas, farmers' grown rotation crops with cotton were especially leguminous crops such as chickpea and mung bean and sometimes they used sorghum with cotton. Chickpea and mung bean can provide all the benefits of a legume rotation and contribute to soil nitrogen and improve soil tilth.

It was found that only 36% of respondents in Kyaukse used crop rotation by growing mung bean and sorghum with cotton. This method used in this area was relatively lower than that of the others due to their small amount of land holding and cotton was also their staple crop compared to the other townships. In Myittha, chickpea, oilseed crops and sorghum were the main crops in rotation with cotton and 88% of respondents used this method to avoid consecutive growing of cotton in the same field. Chili, oilseed crops and pulses such as mung bean and chickpea were used as the rotational crops with cotton by 80% of the respondents in Wundwin to increase soil fertility and cotton productivity.

### **5.1.2 Contribution of farmers' strategies in post-monsoon cotton production**

According to the survey results, the average size of cotton planted land was 2.07 ha in Kyaukse, 1.55 ha in Myittha and 0.83 ha in Wundwin (Figure 5.1). The highest yield was observed in Kyaukse township under different farmers' used strategies. The average yield of seed cotton accepted by respondents in this area was 947 kg ha<sup>-1</sup> and this amount was relatively higher than that of the other two townships (770 kg ha<sup>-1</sup> in Myittha and 891 kg ha<sup>-1</sup> in Wundwin) (Figure 5.2). The reasons for this obtaining the highest yield were mainly due to the good soil condition for cotton cultivation, more experience of respondents in cotton and more emphasize on recommended growing practices compared to the other two townships. They also

emphasized the strategies on using resistant variety, extension officers' instruction and effectively use of farm labor. Although the highest yield was obtained in this area compared to the others, this yield was substantially lower than the national target yield of 1613 kg ha<sup>-1</sup> because of farmers' less attention on soil fertility management practices. There were necessary to fulfill the additional fertilizers due to the consecutive growing of cotton.

In Myittha, the lowest yield was accepted by the respondents with the average amount of 770 kg ha<sup>-1</sup> although the farmers emphasized on the strategies of using resistant variety, good quality seed and application of FYM. According to farmers' less emphasis on plant protection method and extension officers' field instruction and also insufficient utilization of chemical fertilizer, respondents in this area received the lowest yield.

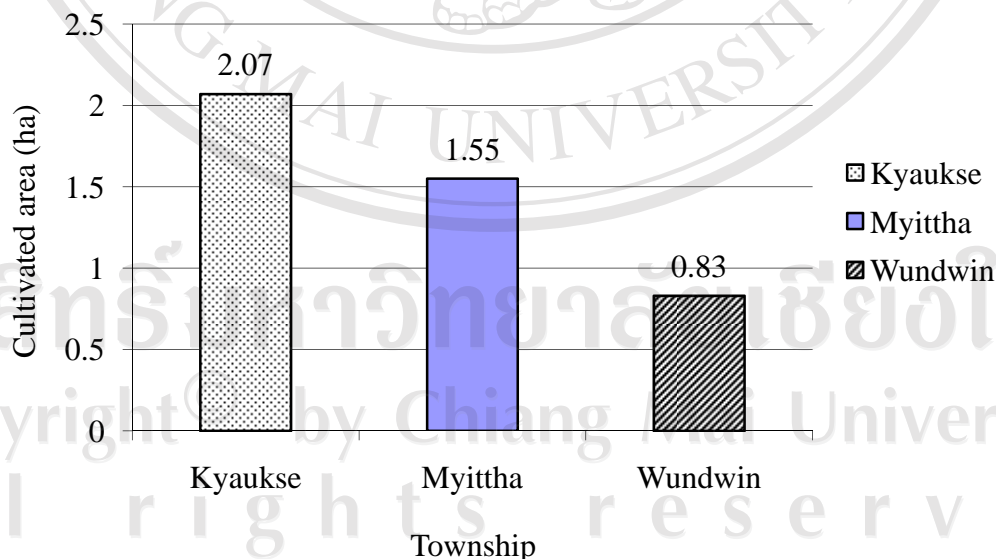


Figure 5.1 Comparison of cotton cultivated area (ha) in the study areas

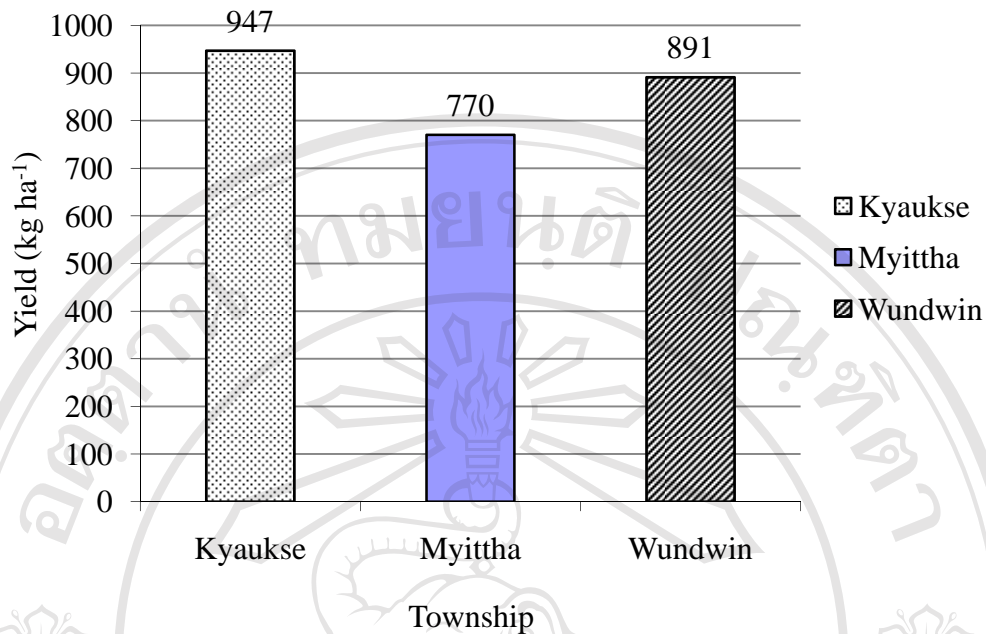


Figure 5.2 Comparison of seed cotton yield (kg ha<sup>-1</sup>) in the selected areas

The average amount of seed cotton yield was about 891 kg ha<sup>-1</sup> in Wundwin. The respondents in this area emphasized on the strategies of using resistant variety, good quality seed, appropriate methods of plant protection and soil fertility management practices and extension staffs' dissemination of improved production technologies to increase seed cotton yield. The weakness of farmers in cotton cultivation in this area was relatively lower experience in cotton compared to Kyaukse.

### 5.1.3 Cost of production and economic returns of post-monsoon cotton

Yield of seed cotton is one of the most important determinants of the profitability in all production areas. The net profit was also based on the farm gate price and cost of production. Farmers' acceptable price was depended on the quality of seed cotton. Individual farmers received the highest price of 607 kyats kg<sup>-1</sup> for the

first grade of seed cotton and the lowest price of 300 kyats  $\text{kg}^{-1}$  for the lowest grade of seed cotton across the selected areas.

Table 5.2 describes the cost of production (including the family labor cost), total revenue, yield, price of seed cotton and net profit of post-monsoon cotton in selected areas. Regarding the results across three townships, the average production cost of cotton cultivation was about 290,062 kyats  $\text{ha}^{-1}$  (US\$ 290), the average price received by the farmers was 491 kyats  $\text{kg}^{-1}$ , the total revenue was about 424,928 kyats  $\text{ha}^{-1}$  (US\$ 425) and the net profit was 134,866 kyats  $\text{ha}^{-1}$  (US\$ 135), respectively.

Although the lowest price (456 kyats  $\text{kg}^{-1}$ ) was found in Kyaukse, the highest profit of 149,497 kyats (US\$ 149) was observed because of the highest yield of 947  $\text{kg ha}^{-1}$  with the lower production cost of 279,865 kyats  $\text{ha}^{-1}$  (US\$ 280) compared to Wundwin. The higher price of seed cotton and the lower production cost was adopted in Myittha compared to Kyaukse township but the total revenue and net profit was lower according to the significantly lower yield of seed cotton compared to Kyaukse.

The maximum cost of production with the amount of 333,922 kyats (US\$ 334) was observed in Wundwin because large amount of inorganic fertilizer was applied compared to the other townships. Also, the highest revenue of 476,015 kyats (US\$ 476) was received with the highest acceptable seed cotton price (540 kyats  $\text{kg}^{-1}$ ) according to the high quality. However, their profit was lower compared to Kyaukse because seed cotton yield was lower than that of Kyaukse. Figure 5.3 shows the comparison of production cost, total revenue and seed cotton yield under Kyaukse, Myittha and Wundwin townships.



Table 5.2 Cost of production, total revenue and profit in post-monsoon cotton under the selected areas (thousand kyats ha<sup>-1</sup>)

Items	Kyaukse (N = 50)	Myittha (N = 50)	Wundwin (N = 50)	Average (N = 150)
Production cost	280	256	334	290
Yield (kg ha <sup>-1</sup> )	947	770	891	869
Price of seed cotton (kyats kg <sup>-1</sup> )	456	478	540	491
Total revenue	429	369	476	425
Profit	149	113	142	135

Source: Survey, 2010

Note: 1 US\$ = 1000 kyats

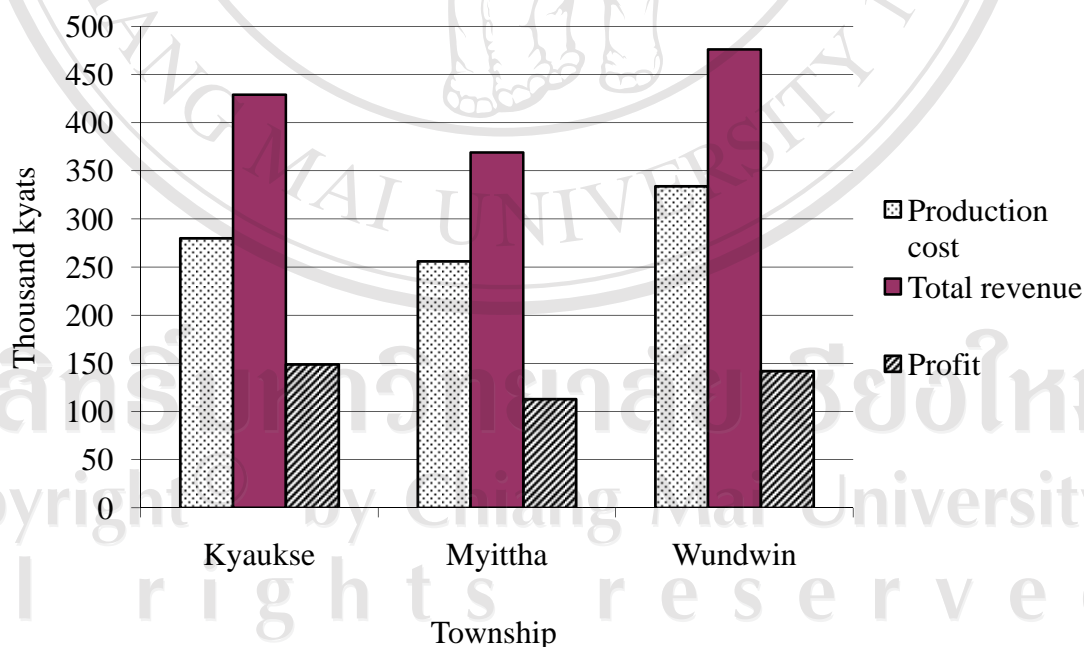


Figure 5.3 Comparison of production cost, total revenue and seed cotton yield in the study areas

## 5.2 Farmers' strategies in cotton-based cropping system

In cotton-based cropping system of the selected areas, the majority of farmers' expected outcome was to get more income for sustainable livelihoods and to achieve more sustainable use of natural resource especially for maintenance of soil fertility and reduction of pest incidence.

The combination of diversified crop production, off-farm and non-farm activities are concentrated for livelihood income in all study sites. All of these categories are related with agriculture. There are 4 main types of livelihood strategies adopted by the respondents in all study areas such as agriculture alone, the combination of agriculture and off-farm activity, the combination of agriculture and non-farm activity and the combination of agriculture, off-farm and non-farm activity. Table 5.3 describes the main types of livelihood strategies used by farmers in the studied sites.

One of the most important strategies was agriculture that was the dominant activity for livelihood outcome. Regarding the rainfed agriculture, farmers' used strategies to obtain more income were mainly focused on cultivation of diversified crops, while grazing of livestock, mainly cattle, was also practiced. Cattle were mainly used for crop production and also applied to mitigate risk by selling these cattle when farmers faced economic shock to provide consumption and production smoothing. Crop diversification at farm level gives several advantages those listed as comparatively high net return from different crops, higher net returns per unit of labor, optimization of resource use, higher land use efficiency and increased employment opportunities (Gunasena, 2001).

Table 5.3 Main types of livelihood strategies as shown by percentage of number of participating households and income (thousand kyats year<sup>-1</sup>)

Main strategies	Kyaukse		Myittha		Wundwin	
	%	Income	%	Income	%	Income
Agriculture	38	1,673	74	1,730	58	3,070
Agriculture – off-farm	38	1,553	12	1,230	24	2,655
Agriculture – non-farm	22	3,033	14	2,451	14	3,339
Agriculture – off-farm – non-farm	2	1,938	-	-	4	4,178
Total	100	1,932	100	1,771	100	3,053

Source: Survey, 2010

In the study area of Kyaukse township, majority of crop production was situated under rainfed condition and the most important crop combinations were cotton followed by sorghum, oilseed crops, pulses and chili. Their cattle were mainly used for dairy farming and hiring draught power to obtain additional income. Myittha area possessed rainfed mode of production and partially irrigated low land. Cotton was also the major crop followed by chickpea, oilseeds, sorghum and rice. In Wundwin, farmers' used crop combinations was cotton, rice, chili, oilseeds and pulses. Rice was the major crop grown in the irrigated lowland and normally used for consumption and farm income followed by chili and cotton.

There are 4 sub categories under off-farm employment and 6 sub categories under non-farm employment. Off-farm activities carried by respondents were farm wage labor, hiring draught power and machinery power. All these off-farm activities

were observed in Kyaukse township, however in Myittha, only 1 activity such as farm wage labor was observed. In the study area of Wundwin, farmers used activities under off-farm income were farm wage labor and hiring machinery power. Under the non-farm activities, livelihood sub strategies adopted by the respondents were government staff, selling commodities, carpentry, sewing, cow dealer and driver respectively.

In Kyaukse township, the combination of agriculture and off-farm activity was performed by 38% of respondents and their average income was about 1,553,053 kyats (US\$ 1553) that amount was significantly lower than the other incomes. The combined activity of agriculture and non-farm gave the highest income with the average amount of about 3,033,137 kyats (US\$ 3033) received by 22% of farmers. There were 38% of respondents and only 2% of respondents used the strategies of pure agriculture and the combination of agriculture, off-farm and non-farm activities. These strategies offered the average income of about 1,673,064 kyats (US\$ 1673) from pure agriculture and 1,937,500 kyats (US\$ 1938) from the combination of agriculture, off-farm and non-farm activities.

According to survey results, 74% of respondents in Myittha performed only agriculture for their livelihoods followed by 14% of respondents used the combination of agriculture and non-farm activity and 12% of respondents used agriculture and off-farm activity. The highest income was obtained by the combined use of agriculture and non-farm with the average amount of 2,450,857 kyats (US\$ 2451) and followed by agriculture only with the amount of 1,729,682 kyats (US\$ 1730). The lowest income adopted by 12% of respondents was about 1,229,667 kyats (US\$ 1230) from the combined use of agriculture and off-farm activity.

There was about 4,178,085 kyats (US\$ 4178) of annual income from the strategy of the combined activities of agriculture, off-farm and non-farm in Wundwin. This was the highest income accepted by only 4% of respondents in this area. The second most important strategy to increase income was the combined use of agriculture and non-farm activity that was performed by 14% of respondents followed by the strategy of the cultivation of agricultural crops by 58% of respondents. About 24% of respondents applied agriculture and off-farm activities as strategy for their income with the average amount of 2,654,875 kyats year<sup>-1</sup> (US\$ 2655).

In comparison of the strategies across townships, there was observed that the highest incomes were obtained from all of the strategies in Wundwin. The strategy of the production of only agricultural crops gave nearly the equivalent amount of income in Kyaukse and Myittha. The lowest income was produced by the strategy of agriculture and off-farm activities by 12% of respondents in Myittha.

### **5.2.1 Constituents of yearly income distribution under each major livelihood strategy**

Annual income was the most important source of every household in livelihoods. Household incomes in selected study areas were categorized as agriculture, off-farm employment such as farm labor, hiring draught power and hiring machinery power and non-farm employment such as government staff, selling commodities, carpentry, sewing, cow dealer and driver. The primary activity for yearly income of survey respondents was mainly come from agriculture, dominated by the production of cotton, rice, chickpea, sorghum, chili, oilseed crops and pulses and dairy farming. A relatively small amount of non crop income was observed in all

study areas. Table 5.4 provides the information concerning different income sources under the selected townships.

Table 5.4 Diversification of farmers' yearly income and share of income (%) in three selected townships by income categories (kyats year<sup>-1</sup>)

Activities	Kyaukse		Myittha		Wundwin	
	Income (Kyats)	Share of income (%)	Income (Kyats)	Share of income (%)	Income (Kyats)	Share of income (%)
<b>Agriculture</b>	<b>1,662,530</b>	<b>86.05</b>	<b>1,695,405</b>	<b>95.75</b>	<b>2,872,481</b>	<b>94.09</b>
- Cotton	824,690	49.60	592,610	34.95	398,861	13.89
- Rice	-	-	286,625	16.91	1,077,240	37.50
- Sorghum	285,950	17.20	95,590	5.64	-	-
- Chili	30,800	1.85	-	-	616,290	21.45
- Oilseeds	231,010	13.90	185,440	10.94	382,920	13.33
- Pulses	231,340	13.92	534,420	31.52	381,710	13.29
- Dairy farming	58,740	3.53	720	0.04	15,460	0.54
<b>Off farm</b>	<b>71,450</b>	<b>3.70</b>	<b>19,100</b>	<b>1.08</b>	<b>58,450</b>	<b>1.92</b>
- Farm labor	28,000	39.19	19,100	100	54,450	93.16
- Hiring animal power	33,050	46.26	-	-	-	-
- Hiring machine power	10,400	14.55	-	-	4,000	6.84
<b>Non farm</b>	<b>197,980</b>	<b>10.25</b>	<b>56,140</b>	<b>3.17</b>	<b>121,920</b>	<b>3.99</b>
- Salaries	88,080	44.49	24,240	43.18	109,920	90.16
- Shops	65,550	33.11	19,500	34.73	-	-
- Carpentry	5,400	2.73	-	-	-	-
- Sewing	10,950	5.53	12,400	22.09	-	-
- Cow dealer	10,000	5.05	-	-	9,600	7.87
- Driver	18,000	9.09	-	-	2,400	1.97
<b>Total income</b>	<b>1,931,960</b>	<b>100</b>	<b>1,770,645</b>	<b>100</b>	<b>3,052,851</b>	<b>100</b>

Source: Survey, 2010

In the study area of Kyaukse, agricultural income share constituted about 86% of total income and the majority of the crops grown were cotton, sorghum, oilseed crops, pulses and chili. Cotton was the most important income crop and its income was the highest among the other crops' income and also significantly higher than that of the other two townships. Cotton income accounted for 49.60% of agriculture income with the magnitude of about 824,690 kyats (US\$ 825), while sorghum accounted for 17.20%, pulses for 13.92%, oilseed crops for 13.90% and chili for just 1.85% of total agriculture income. On average, off-farm income constituted about only 3.70% of total income and the highest off-farm income was come from hiring animal power with the percentage of about 46.26% of total off-farm income. There was about 10.25% of total income under non-farm income and income from government servants was the highest with the average percentage of 44.49% of total non-farm income with the average amount of 88,080 kyats (US\$ 88) followed by income from selling commodities with the percentage of 33.11% and the average amount of 65,550 kyats year<sup>-1</sup> (US\$ 66).

Interviewed households in Myittha township, cotton, rice, sorghum, chickpea and oil seed crops were currently cultivated crops. Agriculture also remained the principal source of income for households about 95.75% on average and with the average amount of 1,695,405 kyats year<sup>-1</sup> (US\$ 1695). Among crop productions, cotton income was also the highest in this study area and the average amount was 582,610 kyats year<sup>-1</sup> (US\$ 583) with the income share of about 34.95% followed by chickpea (534,420 kyats year<sup>-1</sup> which is equivalent to US\$ 534) with the share of 31.52% of farm income. Income from sorghum was about 5.64% of farm income and the average amount was 95,590 kyats year<sup>-1</sup> (US\$ 96) which was relatively small

compared with Kyaukse study area. Off-farm income was accounted for only 1.08% of total income and that was come from farm wage employment with the average amount of about 19,100 kyats year<sup>-1</sup> (US\$ 19). There was about 3.17% of total income that accounted for non-farm income with the average amount of 56,140 kyats year<sup>-1</sup> (US\$ 56).

Cotton, rice, chili, chickpea, oil seed crops and pulses were staple crops in the study area of Wundwin. Among field crops, rice was the most important income crop with the average magnitude of 1,077,240 kyats (US\$ 1077) and accounted for 37.50% of total agriculture income followed by chili (21.45% of farm income) with the average amount of 616,290 kyats year<sup>-1</sup> (US\$ 616). Within the agriculture income, cotton income was situated in the third position and the average annual income was 398,861 kyats (US\$ 399) and which was substantially lower than the income from rice and chili and accounted for only 13.89% of total crop income. Under off-farm income, the average amount was about 58,450 kyats (US\$ 58) and 93.16% of off-farm income was come from farm labor with the average amount of 54,450 kyats (US\$ 54). Non-farm income was accounted for about 3.99% of total income and that income was come from the performance of government salary, cow dealer and driver.

In comparison of income among townships, results revealed that the households of Wundwin possessed the highest farm income which was significantly higher than that of the other two areas with the average amount of 2,872,481 kyats year<sup>-1</sup> (US\$ 2872) although income from cotton was relatively lower than the others. The highest off-farm income was observed in Kyaukse with the average amount of 71,450 kyats (US\$ 71) and the lowest off-farm income was received in Myittha and there was significantly lower than the other two townships. Also, the lowest non-farm



income was observed in Myittha compared to Kyaukse and Wundwin and this income was come from government salaries, selling commodities and sewing.

### **5.2.2 Farmers' perception of crop diversification and cropping patterns**

According to the survey results, yearly income is basically depended on agriculture for sustainable livelihoods by growing of different crops. Various cropping systems and cropping patterns under diversified cropping were applied in all study areas to sustain soil fertility and environmental pollution. Cropping systems of an area are decided by land holding and climatic conditions which determine overall agro-ecological situation for nourishment and appropriateness of a crop or set of crops for cultivation. Nevertheless, potential productivity and monetary benefits perform as guiding principles at farmers' level while opting for a particular crop/cropping system (Das, 2006).

Although cotton-based cropping system is predominated in rainfed upland survey area of Kyaukse and Myittha townships, rice-based cropping system is common in the study area of Wundwin township. Mono cropping and double cropping are predominated in all selected areas. Majority of the farmer respondents used cotton, sorghum, rice and chili as sole cropping and then fallow their land. Early monsoon oilseed crops such as sesame or groundnut and early monsoon pulses such as mung bean were sown and after harvesting of these crops, late monsoon oilseed crops or pulses (mostly butter bean and chickpea) were sown as double cropping. Also, rice was grown as the early season crop and then chickpea was sown after harvesting of rice as double cropping system.

Cropping system in Kyaukse township is mainly based on cotton, sorghum, oilseed crops and pulses. Cotton is the principal economic crop in the region followed by sorghum and the major food crops are butter bean, mung bean, pigeon pea, sesame and groundnut. In this study area, mono cropping of cotton and sorghum is predominant and double cropping is also observed. Early monsoon season crops such as oilseed crops (sesame or groundnut) or mung bean were planted followed by late monsoon crops like butter bean or pigeon pea or sesame or groundnut or sunflower were sown as double cropping. Table 5.5 describes the cropping calendar in terms of the sowing and harvesting time in the study area of Kyaukse.

Table 5.5 Cropping pattern in Kyaukse study area

April	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	
			Cotton									
	Sorghum											
	Sesame		Sesame/Groundnut									
	Sesame		Sunflower/Pigeon pea									
	Sesame					Butter bean						
		Groundnut/Mung bean					Butter bean					

Source: Survey, 2010

Cotton, chickpea, rice and oilseed crops are the major planted crops in the study area of Myittha township. Although there were a lot of lowland area for rice cultivation compared to Wundwin, irrigation facility is insufficient for all areas and source of supplementary irrigation is come from rain shower. Sole cropping and

double cropping are also common in this area. Cotton and sorghum were normally grown as sole crops. Chickpea is cultivated after rice or sesame, groundnut is also planted after early monsoon sesame as double cropping. Table 5.6 presents the existing cropping pattern of the 50 sample cotton farmer respondents in Myittha.

Table 5.6 Cropping pattern in Myittha study area

April	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	
					Cotton							
					Rice							
		Sorghum										
									Chickpea			
	Sesame					Groundnut						
	Sesame							Chickpea				

Source: Survey, 2010

In dry zone upland cropping system under rainfed condition of Wundwin study area, single cropping and double cropping is the major character of this system.

The farming systems become more dependent on rice as a major crop because irrigation facility is available in this area but it is comparatively poor to that of lowland. Rice-based cropping systems with cotton or chili as a secondary crop were predominant in this area. The cropping calendar in terms of the sowing and harvesting time of the farmers' major crops grown is presented in Table 5.7. Majority of the respondents cultivated cotton, sorghum and chili as sole crops. In double cropping of this area, early monsoon season oilseed crops such as sesame and groundnut were



sorghum with the sown area of about 0.84 ha and rice (0.82 ha). In the study area of Wundwin, most of the farmers emphasized on rice (94% of respondents) followed by sesame (80%), chickpea (74%) and chili (68%), groundnut (62%), mung bean (32%) and pigeon pea (8%). The largest amount of land was situated under rice cultivation with the average size of 1.47 ha. Figure 5.4 describes the comparison of cultivated crops (ha) under post-monsoon cotton-based cropping system in three selected areas.

Table 5.8 Existing cultivated crops and planted area (ha) under the selected areas

Cultivated crops	Kyaukse		Myittha		Wundwin	
	No. of farmers	Planted area (ha)	No. of farmers	Planted area (ha)	No. of farmers	Planted area (ha)
Cotton	50	2.07	50	1.55	50	0.83
Sorghum	38	0.72	46	0.84	20	0.23
Rice	-	-	40	0.82	47	1.47
Sesame	15	0.24	34	0.57	40	0.81
Groundnut	7	0.12	25	0.34	31	0.43
Sunflower	6	0.12	-	-	-	-
Chickpea	-	-	44	1.08	37	0.73
Butter bean	15	0.29	-	-	-	-
Mung bean	6	0.07	-	-	16	0.15
Pigeon pea	4	0.11	-	-	4	0.05
Chili	4	0.03	-	-	34	0.67

Source: Survey, 2010

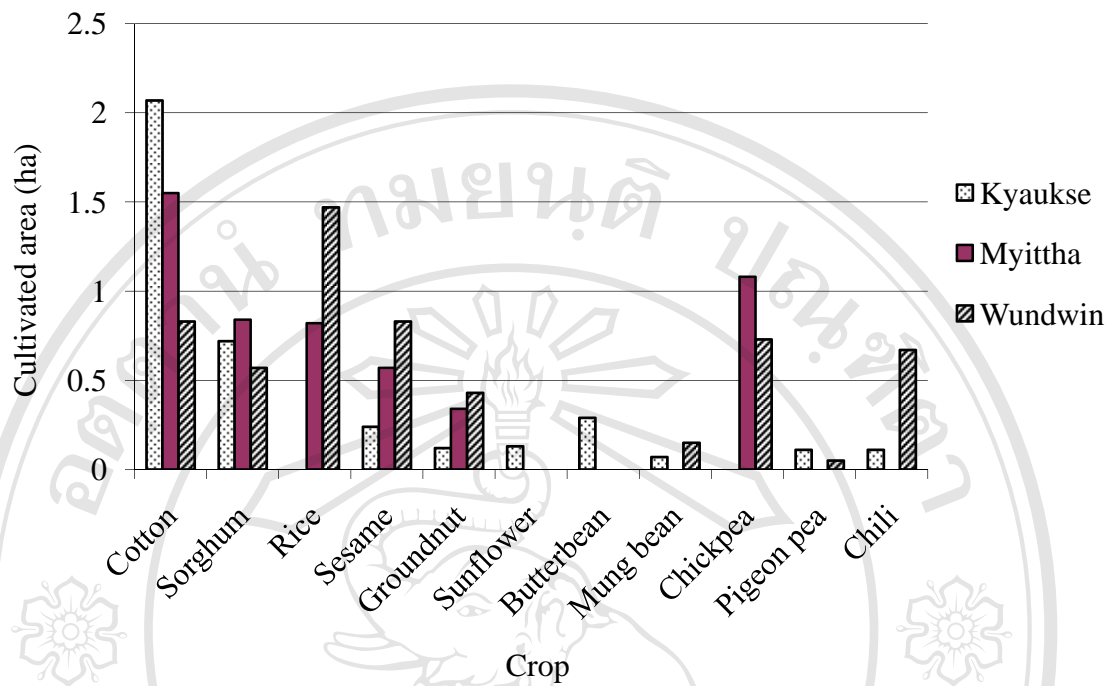


Figure 5.4 Comparison of cultivated crops (ha) under post-monsoon cotton-based cropping system in three selected areas