CHAPTER I

INTRODUCTION

1.1 Background

Agriculture supplies the livelihoods of the majority of the population in Myanmar. Agricultural sector in Myanmar is the most important sector in terms of generations of employment and its contribution to the Gross Domestic Product (GDP) and export earnings. The agricultural sector directly accounts for GDP of 34 percent (2008-09), 15.4 percent of the country's exports, and contributes the total labor force of about 61.2 percent (MOAI, 2010). The total net planted area under various crops cultivation is about 11.87 million ha in 2008-2009 cropping season (i.e. 17.5 percent of the total area) (MOAI, 2009).

Cotton popularly known as white gold is grown mainly for fiber and is a major source of income and export earnings to many developing countries. Although it is a perennial crop, commonly grown as an annual crop which is cultivated approximately 31 million hectares in many tropical and subtropical countries (2.4 percent of the arable land) (ICAC, 2005). In terms of volume and value traded, cotton is one of the most internationally traded agricultural goods (Serunjogi *et al.*, 2001). Cotton has justified as an economically viable crop that has possessed a significant and positive impact on exports, economic growth and rural development (Badiane *et al.*, 2002). Cotton production has a relatively long history in Myanmar. Pyu era belonged the earliest cotton production during 100-900 A.D. Cotton is believed to have been introduced from India into ancient Myanmar by the southern trade route along with

Thailand, Vietnam and Southern China even before Pyu era (Tin, 2006). Lint and seed are produced by ginning of cotton and these are applied as raw materials for the local textiles and seed crushing industries. Cotton seed also provides edible oil for human consumption and cotton seed cake with the composition of high protein content is used as raw materials for livestock feeds (Adeniji, 2007). In both industrial and developing countries worldwide, cotton has also used as an engine of economic growth and gives income to millions of farmers (Wang and Chidmi, 2009).

In Myammar, cotton production forms an important source of fiscal revenues and export earnings and that serves as a development strategy for governments. There are about 359,409 hectares under cotton cultivation (CSD, 2010) that is contributed to 3.03 percent of total cultivated area of the country. More than half a million people's income is derived directly or indirectly from cotton farming, ginning, by-product processing and trade. In addition, cotton has not only a significant role in growth of the economy in terms of employment generation, but also in the creation of a tax base to allocate national expenditures. Cotton constitutes a significant portion of total gross agricultural product of Myanmar. Therefore, cotton production plays important role in economic, political and social concerns in Myanmar.

Geographically and traditionally, cotton is mainly constricted to the central dry zone of Myanmar between 19° N and 23° N latitudes and the average maximum temperature of 32° C and minimum temperature of 20.2° C with an annual rainfall of approximately 740 mm (Tin, 2006). Cotton is commercially planted in the Mandalay, Sagaing and Magway Division under rainfed and irrigated modes of production as pre-monsoon, monsoon and post-monsoon growing seasons. Rainfed cotton is the predominant mode and occupied an average of 96.99 percent of the area and produced

96.92 percent of the production in 2009-2010 growing season. The largest cotton growing area is situated under Mandalay Division of the Central Myanmar. Its total cultivable area under three cotton growing seasons (pre-monsoon, monsoon and post-monsoon) is about 141,964 ha that is 39.48% of total cotton planted area of the country. Production of cotton is about 175,862 MT and that amount is 33.62% of total cotton production of the country (CSD, 2010).

Table 1.1 Annual planted area, yield and production of cotton in Myanmar (2000-2009)

Year	Planted area (thousand ha)	Harvested area (thousand ha)	Yield (kg/ha)	Production (MT)	Growth rate (%)
2000-2001	324	301	508	152,691	
2001-2002	295	264	534	140,952	-7.7
2002-2003	303	265	541	143,481	1.8
2003-2004	292	278	570	158,206	10.3
2004-2005	306	300	648	194,730	23.1
2005-2006	332	330	713	235,787	21.1
2006-2007	354	352	762	268,277	13.8
2007-2008	368	368	838	308,205	14.9
2008-2009	367	367	1233	452,805	46.9
2009-2010	359	359	1457	523,039	15.5
Average	330	318	780	257,817	

Source: Tin (2006); CSD (2010)

In Myanmar, production under cotton was increased from about 30,210 metric tons of seed cotton in 1940 (Tin, 2006) to 523,039 metric tons in 2009/2010 (CSD, 2010). Therefore, production is increased by about 1767 percent, this is because of the rapid area expansion and increased yield. According to ten years average of cotton production, cotton was picked an average of 318,411 ha and the average production of seed cotton was 257,817 metric tons, with an average yield of 780 kg ha^{-1} during the cropping seasons 2000-2001 to 2009-2010 and there has been significant fluctuation in production rate from one cropping season to the next (Table 1.1) (Tin, 2006; CSD, 2010).

1.2 Seasonal cotton cropping systems in Central Myanmar

In Central Myanmar, there are two cropping systems under dry zone, namely, dry zone lowland cropping system under irrigated area and dry zone upland cropping system under rainfed area. Under the dry zone lowland cropping system, common cropping practice is double cropping which is based on monsoon rice. It is produced before pre-monsoon cotton with the help of supplementary irrigation. In some areas, pre-monsoon sesame, chili (red pepper), mung bean or green gram are the major crops instead of pre-monsoon cotton.

In some fertile lowland, three crops are common in a year. Based on monsoon rice, chick pea is cultivated as a relay crop followed by pre-monsoon cotton or another pre-monsoon crop after chickpea is harvested.

In dry zone upland under rainfed conditions, the majority of cropping system is mono cropping or inter cropping. For mono cropping, cotton, sesame, sorghum or

pulses are the main crops. In some areas of dry zone, mixed cropping or intercropping is usually practiced because of the uncertainty of rain shower.

Irrigation facilities are available in some areas of upland cropping, however, there is comparatively poor to that of lowland. Nevertheless, double cropping is common in those areas with the help of possible irrigation facilities. Early maturing variety of monsoon season pulses such as green gram or early matured sesame are cultivated and then follow by post-monsoon cotton or sunflower with the help of supplementary irrigation. In some areas, post-monsoon cotton cultivation is practiced as a relay crop based on monsoon chili (Win, 2004).

1.3 Government support to cotton production

Myanma Cotton and Sericulture Enterprise (MCSE) was established at the beginning of the 1994-1995 budget year by the Ministry of Agriculture and Irrigation (MOAI) to strengthen the cotton sector. The responsibilities of separate agencies under MCSE included multiplication of seed cotton, research, distribution of quality cotton seed, supply of chemical fertilizer and pesticide, procurement of seed cotton, cotton ginning, supporting of cotton lint and by products to government owned cotton industries and the export of cotton lint. In 2007, the name has changed little from Myanma Cotton and Sericulture Enterprise (MCSE) to Cotton and Sericulture Department (CSD) (Win, 2008).

Myanma Agriculture Development Bank (MADB) provided as formal credits for long staple cotton production with the amount of 6175 kyats ha^{-1} at 15 percent interest rate. The cost of production under rainfed long staple cotton was approximately 40,300 kyats ha^{-1} and the production cost was 49,400 kyats ha^{-1} for

irrigated cotton, in 1999/2000 cropping season. The loan rate appeared too small compared with production cost. In 2004/2005, the loan rate has been increased to 7410 kyats ha^{-1} (Tin, 2006).

Myanma Cotton and Sericulture Enterprise (MCSE) supplied interest free as an early advanced payment for a certain portion of seed cotton to be procured. However, in 2004/2005, it was ceased due to the opening of cotton market and due to high failure rates (Tin, 2006). Cotton and Sericulture Department (CSD) currently provides contract farming system with selected cotton farmers. Under contract farming system, separate agencies under CSD provide credit with the amount of approximately 140,000 kyats ha^{-1} for advanced purchasing of inputs (usually quality cotton seeds, fertilizer and chemical pesticides) without interest rate or provide inputs according to farmers' demand with an agreement that these farmers will sell the equivalent amount of quality seed cotton with the formal loan to CSD at the CSD's procurement price (CSD, 2010).

Farmers usually receive credits in kind of cash from informal sources, mainly from cotton traders and ginners through interlocked contracts (Tin, 2006) and also from informal money lenders. Although the private agri-business companies did not work with a contract partner, these chemical companies selling products have an incentive to push their use by advertising advantages of their products (seeds, fertilizers and pesticides) and also disseminate technologies of production and they provide inputs on credit and then regained these credits from farmers at the end of cropping season.

1.4 Role of cotton research and extension system

Cotton research was initiated in central farm, Mandalay, Myanmar, along with the establishment of the Department of Agriculture by the government in 1906. Currently, cotton research is undertaken by the research stations under CSD, based in the heart of cotton growing areas in Central Myanmar. Consistent with the CSD's directive to regionalize research programmes, field experiments and trials are mainly conducted in department owned cotton research and seed farms, namely, Lungyaw, Shwedaung, Hlaingdet, Aunglan, Padawzet, Chaungmagyi and Pyawbwe, respectively.

Cotton research and seed farms are responsible for not only research but also multiplication of quality seeds of improved varieties. There is only one research site for cotton fiber and miniature spinning laboratory which has been set up in Meikhtila township since early 1980s (Win, 2008).

Peter (2002) described that research should place producer interests and on-field production conditions first. Generally, variety improvement should focus on parameters such as seed cotton yield, organic fertilizer application, pests and diseases resistance variety and the maintenance of predator populations. However, cotton research tends to put ginners' and exporters' interests first in sub-Saharan Africa.

In the current research operations in Myanmar, the annual meeting of the formulation and review of research activities are generally conducted. Its aims are to support the improved agricultural technology, to conduct research programmes in different agro-ecological conditions and as a consequence of pressing problems and issue and to support the cotton growers from competitive with the other crops growers.

Research activities are improvement of varieties, improving agro-technology and management practices, searching for plant protection techniques and cotton production economy (Win, 2008).

Information on agricultural extension programs particularly on the production technologies is one of the most important factors for cotton growers. With a relatively favorable ratio of extension agents to cotton area (1:480 ha) which is supervised by each and individual agent (Tin, 2006), cotton extension constitutes a major strength in the basic functions of CSD. Although cotton extension service is essential in sustainable cotton production, the effective extension activities are by far constrained by inadequate logistic support including of transport facilities and extension aids. Extension staff are responsible for distribution of quality cotton seed, supply of chemicals, management of farmers' field, conduction of demonstration fields, procurement of seed cotton and especially dissemination of improved technologies such as sowing methods, soil fertility management, plant production and protection techniques, effective and safety application of chemicals and advantages and harmful effects of fertilizers and insecticides.

Government agricultural extension agencies tended to recommend not only the techniques but also the content of the work carried out by field agents. Field agents tended to be overloaded with tasks, they were paid irregularly, and they often lacked adequate means of transport to actually visit farmer fields. Extension systems were not designed so as to promote any active and open interaction between field agents and producers. Producers were perceived as passive recipients of information rather than as valuable sources of empirical research.

1.5 Rationale

Cotton is an important field crop in many developing countries supporting the livelihoods of millions of rural households. World fiber consumption on cotton fiber is roughly 50%. Cotton fiber consumption is persistently increasing and a scarcity of 15% has been predicted for 2010 (Scheffer, 2005). In Myanmar, cotton is outstanding important, being used for clothing, edible oil, and seed cake for fishery and dairy production. Myanmar is unique in having three ecologically different cotton growing seasons, namely, pre-monsoon, monsoon and post-monsoon seasons under both irrigated lowland cropping system and rainfed upland cropping system.

Geographically and traditionally, most of the cotton production is concentrated in the central part of the country which received uncertainty of rainfall along the growing season. According to their geographical situation and farming systems, the rainfed areas are repeatedly disposed to drought and which are quite complex with a wide range of crops and cropping system, agro forestry and livestock production. In these areas, the farmers are extremely poor and their ability to take risk and invest necessary inputs for optimizing production is weak (Sreedevi *et al.*, 2004).

As a consequence of uncertainty of rainfall, most of the cotton farmers under rainfed area face with crop production problems and receive unacceptable yield. On the other hand, Myanmar's cotton productivity is low compared to the other cotton producing countries. Cotton is considered to be quite a difficult crop to grow because it is sensitive to drought, low temperatures and attacks by various insects.

A satisfactory yield of cotton is dependent on soil fertility, favorable climatic conditions and appropriate timing of cultivation, sufficient labor availability and heavy application of insecticides and fungicides. In Myanmar,

individual farmers are obtaining yields in excess of 2400 kilograms per hectare. It only necessitates mass application to have an impact on the national yield. Unfortunately, although average cotton yield has increased gradually from year to year, which is still below the national target yield and is only around 30% of the world average yield (Tin, 2006).

This declined average yield of the crop on the farmers' plot is due to constraints for agricultural inputs and nonagronomic constraints such as the limited access to inputs (soil fertility, fertilizers, pesticides, water resource and labor), credit and market information to engage in productive activities, technical efficiency, training, demonstration and extension and also due to the effect of scheme management's decisions of area allocation between the different crops. All of these livelihoods assets are important to determine the acceptable yield. Moreover, yield and price fluctuation and increasing production costs have also affected cotton production and lead to high risk to livelihoods.

According to all these constraints factors, farmers are encountering with limited opportunities for alternative income generation activities as a source of supplementary income for daily subsistence. These make it difficult for smallholders to sustain their livelihood. To overcome these unsustainable factors of production, it is essential to study the association of accessible livelihood assets and cotton yield level on farmers' field and their production problems for developing sustainable cotton production.

1.6 Objectives

According to this background, the overall objective of this study is to analyze the farmers' strategies and outcome of cotton production and determining assets of this outcome under rainfed upland cotton production of Central Myanmar. Therefore, the specific objectives of this study are:

(1) To understand existing practices and production constraints of cotton production systems in rainfed upland of Central Myanmar.

(2) To assess farmers' livelihood assets under cotton-based farming systems in selected areas.

(3) To determine the effects of farmers' livelihood assets on their strategies and their outcomes in post-monsoon cotton production.