CHAPTER 1

INTRODUCTION

1.1 Background

Myanmar is situated on mainland of Southeast Asia region, a member of ASEAN and bordered on the north and northeast by China, on the east and southeast by Laos and Thailand, on the south by the Andaman Sea and the Bay of Bengal and on the west by Bangladesh and India (Figure 1.1). It is geographically located between latitude 09°32' N to 28° 31' and longitude 92° 10' E to 101°11' E. It has a total area of 677,000 square kilometers with three distinct seasons, namely; summer, rainy and cold seasons. The country is surrounded by mountains in the north, west and east. Myanmar is in the agro-eco-zone, which characterized as warm sub humid tropics. The annual distribution of rainfall in Myanmar ranges from 4,850 mm to 5,812 mm per year in the coastal areas, about 2,997 mm in the delta region, 1,248-2,323 mm per year on the hilly region and less than 1,000 mm in the dry zone area (M.O.A.I, 2006).

In Myanmar, agriculture constitutes one of the most important economic sectors and is particularly important in terms of employment generations and its contribution to the national Gross Domestic Product (GDP) and export earnings. Agriculture sector contributes 32% (2009-2010) of GDP; 17% of total export earnings; and employs 61% of the labor force (M.O.A.I, 2011). Myanmar possesses plentiful natural resources and a favorable climate which forms the basis for development of agriculture sector. The total cultivated area under various crop production system is 67.61 million ha in 2009-2010 crop year (M.O.A.I, 2010).

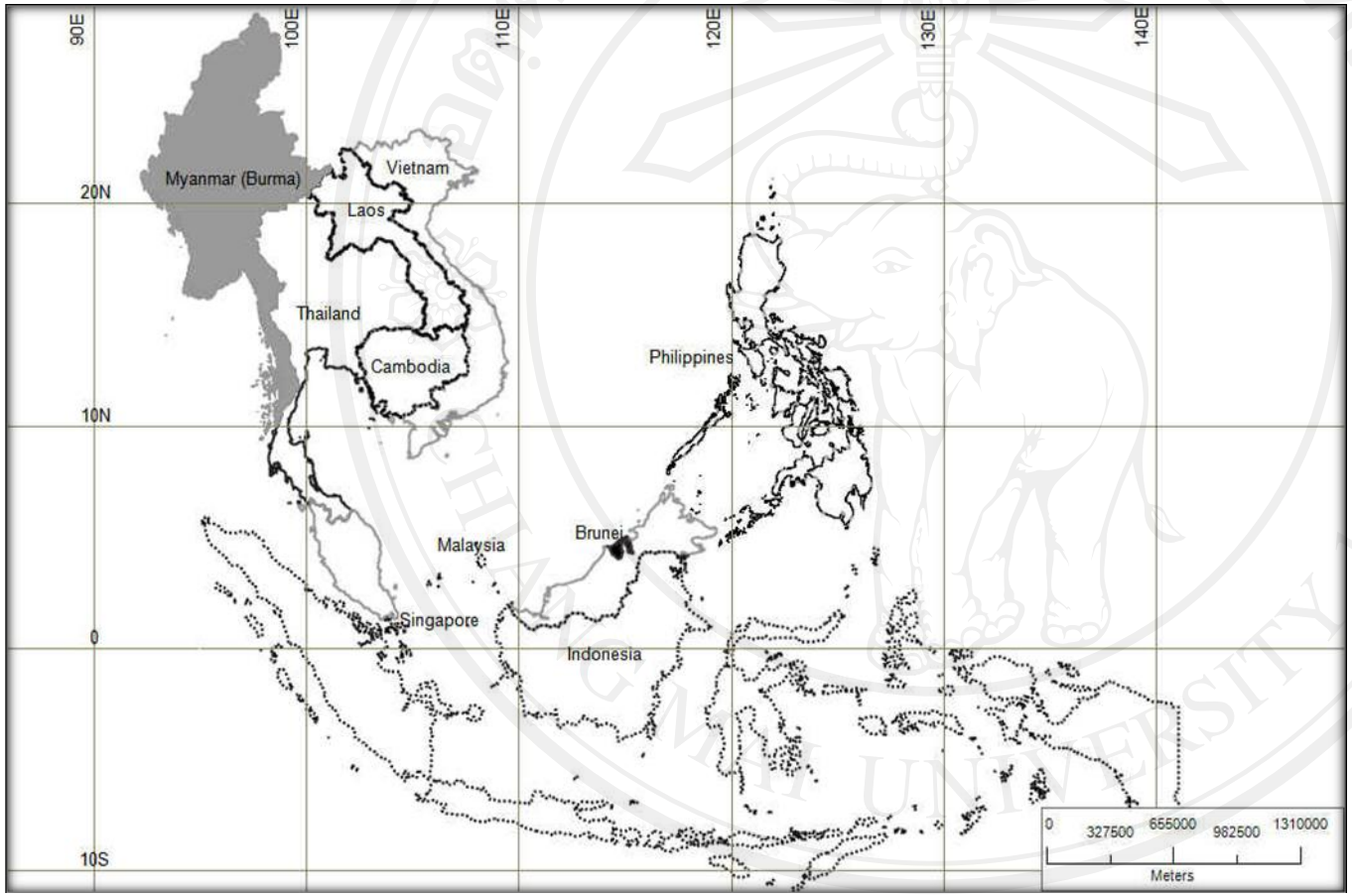

Figure1.1 Map of Myanmar and ASEAN countries

Source: http://www.un.org/Depts/Cartographic/map/profile/seasia.pdf

The population of Myanmar is gradually increasing at the average rate of 1.29% per year. The population was therefore estimated to be about 59.13 millions in 2011. Sugarcane (*Saccharumspp*) is one of the major industrial crops, and also a food crop with increasing local consumption and export in Myanmar. Total sugarcane cultivated area accounted for about 160,577 ha and total sugarcane production was 9,249,000 MT in 2008-2009. Within 15 years, total sugarcane growing area increased 3.22 times from 49,807 ha in 1994-1995 to 160,577 ha in 2008-2009 and total sugarcane production was about 4.17 times.

Table 1.1 shows that the sown area, yield and production of sugarcane from the year of 2001 to 2009. The average sugarcane yield is 60.61 tons per ha (2009-2010) which is lower than 65.46 tons per ha of Asia and 70.42 tons per ha of the world average (M.O.A.I, 2011).

According to Figure 1.2, in Myanmar, there were 54,299 ha of sugarcane cultivation area with 37,565 sugarcane growers in sugar industry area in 2007-2008. The average possession of a sugarcane grower is, therefore, 1.5 ha only and most of them own the land less than 2 ha each.

Due to this economic situation there is the need of several hundred sugarcane growers for sugar factory. The sugarcane becomes the least attractive to farmers compared to rice and pulses from the stand point of profitability and transport cost. High cost of cane production, low cost and benefit ratio and huge burden of sugarcane handling and delivery upon farmers are major obstacles to area expansion of sugarcane (Sugarcane Division, 2008).

Table 1.1 Sugarcane productions in Myanmar

Year	Sown Area (000' ha)	Yield (t/ha)	Production (000' MT)	Sugar Export (000' MT)
2001-2002	162	44.63	7,011	22
2002-2003	148	43.89	6,071	8.7
2003-2004	149	44.73	6,381	-
2004-2005	148	50.73	6,923	-
2005-2006	133	50.83	6,480	-
2006-2007	153	54.41	7,688	-
2007-2008	171	55.03	8,823	-
2008-2009	166	55.13	9,249	25
2009-2010	160	60.61	9,121	-

Source: (M.O.A.I, 2011)

Moreover, scattered and fragmented nature of the sugarcane fields with limited infrastructural facilities, are posing some extent of constraints. Sugarcane is usually delivered by several hundred of farmers and it makes difficult for assignment of harvest schedule to each individual of small scale farmers to have a fair quota system. Consequently, a piece meal harvest quota for farmer is not often large enough to enable the replacement of cane in his field on time (Sugarcane Division, 2008).

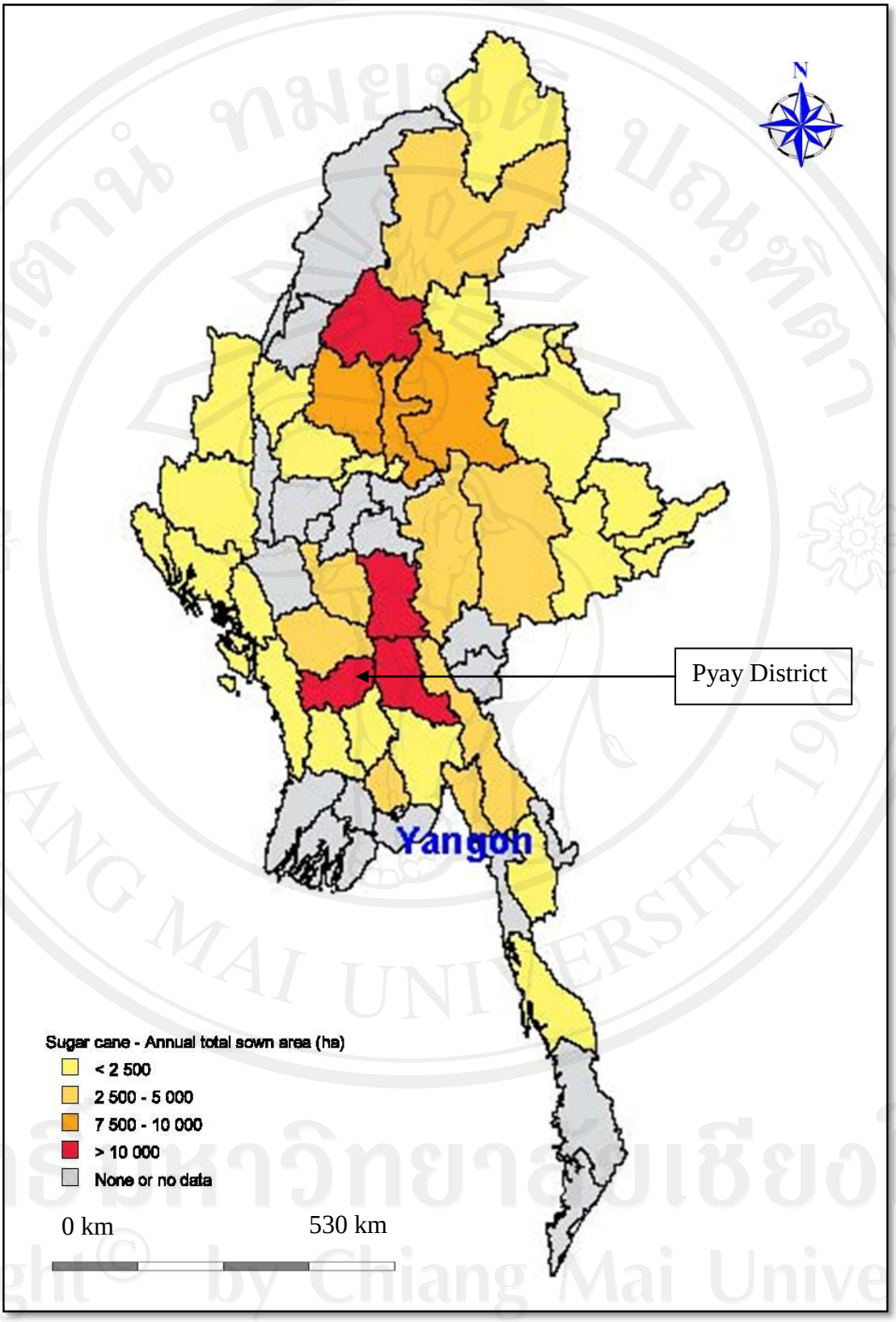

Figure 1.2 Myanmar sugarcane growing area (2007-2008)

Source: dwms.fao.org/atlases/myanmar/index_en.htm

1.2 Rationale

Sugarcane, being a long duration and exhaustive crop, and produces large biomass, it removes considerable amount of nutrients from soil for normal growth and development. Anthropogenic factors such as inappropriate land use systems, mono-cropping, nutrient mining and inadequate supply of nutrients are aggravated the situation. Consequently, the nutrient supplying capacity of its soil declines progressively causing productivity decline. Proper soil fertility management is of prime importance in an endeavor to increase sugar productivity. Sustainable crop production can never be achieved by using either chemical fertilizer alone or by applying only organic manure (Bair, 1990).

The causes of declining soil fertility include shortage of manure, tillage operation, continuous cropping on the same land, limited crop rotation, indiscriminate cutting of trees, burning of crop residues and bushes. Poor households lack knowledge of soil management options, the capacity to invest in soils and have less ability to bear risk and wait for future pay offs from investment. Farmers have reduced their use of inorganic fertilizer as a consequence of their higher prices, following devaluation, abolition of subsidies and credit systems, and break up of state bodies responsible for marketing and input distribution (Wang *et al.*, 2008).

Due to low fertility soils, variable climatic conditions and high fertilizer cost, many smallholders face difficulty in sustaining their livelihoods. The low productivity of sugarcane is concerned with high cost of sugarcane production, less profit than other crops, higher labor requirement, insufficient capital and high cost of transportation. Thus, the current sugarcane production has become a less attractive enterprise. Infertile soils are the major constraints for sugarcane production. Under

this circumstance, most of the small-scale famers are favorably disposed to substitute sugarcane with other cash crops such as green gram, sesame and peanut.

Chemical fertilizer has been a major component of the improved sugarcane production because sugarcane uptakes large quantity of plant nutrients. Soils in sugarcane growing area of Pyay district have a sandy loam to clay loam texture in the top layer with pH 5.0 and above. Because of acidic conditions, sugarcane responds unfavorably to fertilizer application, where soils are generally low fertility in Pyay district. Soil nutrient depletion as a result of continuous sugarcane cultivation without adequate addition of external inputs and improper integrated soil nutrient management practice is a major challenge in this study area. Given these conditions, it is essential to assess the most effective integrated soil nutrient management practices in sugarcane production in Paukkaung Township, Myanmar.

1.3 Objective of the study

According to this background, the overall goal of this study is to understand the factors which affect farmers' knowledge about integrated soil nutrient management (ISNM) and to compare sugarcane yield and profitability of different soil nutrient management practices. The specific objectives of this research are:

1. To investigate the current nutrient management practices and different knowledge levels of sugarcane growers about ISNM in the study area
2. To identify the factors influencing different knowledge levels about integrated soil nutrient management of sugarcane growers
3. To compare sugarcane yield and the profitability of different soil nutrient management practices and different farmers' knowledge levels