

CHAPTER I

INTRODUCTION

1. Rationale and Background

Sugarcane is an important economic field crop of Thailand. It produces the raw material for sugar production for local consumption and export. The value of sugar exported in each year is worth billions of baht. Moreover, it also leads to the production of other commodities and by-products such as syrups, alcohol, monosodium glutamate and animal feed. Northeastern region of Thailand is one of the largest sugarcane area in the country. In 1996/1997, there were 1.88 million rai under cane in the Northeast producing some 17.78 million tonnes cane which is equivalent to 31.5 percent of national production with an average yield of 9.1 tonnes per rai. The yield is considered quite low in comparison to other major sugar producing countries, e.g. Australia and Brazil where sugarcane yields are 15.6 and 11 tonnes per rai respectively. Compared to Thailand, Asian sugar exporters like India, Indonesia and the Philippines also obtain higher average cane yields of 11.2, 11.4 and 11.3 tonnes per rai, respectively (Agricultural Information Center, 1999). One of the causes for low cane yield could be attributed to inadequate soil phosphorus for cane growth because most soils in the Northeast of Thailand are very low in phosphorus. Furthermore, in most sandy soils with low pH and high aluminum oxide, phosphorus is fixed by soil reaction and is not available to the plant (Cholitkul *et al.*, 1987).

For any plant, phosphorus is a vital component of the cell structure, i.e. cell membrane, nucleic acid (DNA, RNA) which are important in gene transfer and physiological function such as high energy compound ATP, co-enzyme, and electron transport such as NADPH. Therefore phosphorus plays very important role in cell metabolisms. For physiological role, phosphorus is an essential element in promoting germination and growth of sugarcane. Phosphorus promotes root growth, tiller formation, leaf development, stalk growth, stem elongation and sucrose synthesis and accumulation. Phosphate is very important in sugarcane juice and helps in clarification process. So phosphorus is not only essential in sugarcane growth and

sucrose synthesis but also is a vital component in sugar processing and quantity of sugar. Purification of sugarcane juice reduces sucrose loss.

Under prevailing growth condition of sugarcane in Northeast Thailand, it is very important to study the effect of phosphorus fertilizer on growth, yield, and quality of sugarcane juice. It is also important to find out the optimum rate of phosphorus fertilizer required for good growth and yield of cane.

2. Objectives of the Study

- a) To study the effect of phosphorus fertilizer on growth, yield and quality of three sugarcane cultivars.
- b) To study the effect of various rates of phosphorus fertilizer on N, P and K content in different parts of three sugarcane cultivars.
- c) To study the effect of phosphorus fertilizer on phosphate content in juice of three sugarcane cultivars.