

CHAPTER I

INTRODUCTION

1.1 Background of this study

Sugarcane (*Saccharum officinarum* L.) is an important economic crop in the world, which is most often planted in tropical and sub-tropical zones due to it being the C4 plant and can acclimatize to high temperatures and humidity. Globally, more than 100 countries are producing sugarcane, but productivity widely different between the countries. The largest producers are Brazil (41%), India (16%), China (6%), and Thailand (6%), which together account for over 50% of global sugarcane production (Figuroa-Rodríguez et al., 2019). Sugarcane productivity is mostly used to produce sugar and is the raw material of many industrial sectors i.e., alcohol, food, feed, and seasoning.

Sugarcane is Thailand's fourth most important commercial field crop, inferior only to rice, cassava, and para rubber. Thailand's northeastern region is the biggest sugarcane producing area and in 2018/19. This region had about 5.3 million rai which was about 43.6% of Thailand's total sugarcane producing area. The region produces 58.7 million tons of fresh's products. The average production in the northeastern region is 10.9 tons/rai (Office of the Cane and Sugar Board, 2018), which is very low compared to its potential yield. Therefore, the improvement of sugarcane production in the northeastern region will affect Thailand's total sugarcane production.

Generally, most of the sugarcane produced in the northeast is from rainfed agriculture and planted towards the end of the rainy season, which can increase the risk of water deficit in the beginning stage (3–5 months after germination). Besides extended dry conditions can also result in poor fertilizer uptake efficiency, since there is insufficient water in the soil. One of the main abilities of the water to all plants is a dissolvent of the ion, which ensures that fertilizer is transported from the soil to any part of the plant. When sugarcane experiences long dry conditions and poor fertilizer uptake, it will reduce the amount of stalk and biomass accumulation (Jangpromma et al., 2012), consequently, it will reduce yield and quality. Furthermore, low biomass accumulation can also affect the next year ratoon crop (Shrivastava et al., 2016; Yadav, 1991).

most of sugarcane farmers normally like to have two or more sugarcane ratoons because the investment is lower than new plant crop by 25–30% along with saving stalk material (Singh et al., 2014).

However, most of the farmers could not produce more than two ratoon crops and the ratoon crop also has limited productivity. The inefficiency of management and unpredictable conditions from preceding crop including water stress, nutrient deficit, etc., can affect the ratooning ability and ratoon crop productivity.

Drip irrigation is an efficient irrigation method, which can provide water directly into the soil at the plant root zone, thus minimizing conventional loss due to deep percolation, runoff, or soil erosion. It also permits the utilization of water-soluble fertilizer along with irrigation water (fertigation) (Sathiyaraj and Priya, 2017). Fertigation can enhance fertilizer uptake and reduce the risk of fertilizer loss resulting in higher yields and better-quality products. It appears to be the best solution for many problems in dryland agriculture and enables economical use of the water supply, high crop uniformity, and high water and nutrient use efficiency in several crops. It would be the best way to solve the problem of low yield and ratooning ability in sugarcane under the northeastern's conditions if irrigation control and fertilizer application are optimized.

This research aimed to investigate the effect of fertigation under drip irrigation on sugarcane yield, dry matter accumulation, and ratooning ability in two different texture soils in the northeastern conditions.

1.2 Objectives of the study

- 1) To compare the effects of drip irrigation with rainfed conditions on growth, yield, and quality of sugarcane.
- 2) To compare the effects of fertigation and soil fertilizer application under drip irrigation on growth, yield, and quality of sugarcane.
- 3) To evaluate the impact of fertigation on dry matter and stool accumulation and ratooning ability of sugarcane.