

# CHAPTER V

## CONCLUSIONS AND RECOMMENDATIONS

### 5.1 Conclusions

This research was divided into two parts including: field experiment and pot experiment. The field experiment was done to understand the situation in a real cadmium contaminated site in Mae Sot district, Tak province. Soil and sugarcane samples were collected from three sugarcane cultivated fields with different cadmium concentration in the soil (<3, 3-20 and >20 mg Cd/kg) as zoned by NRC-EHWM. Those three areas were named later in this study as Mae Ku, Mae Tao1 and Mae Tao2, respectively. Soil and sugarcane were collected from those areas at the end of the second and the sixth months after sugarcane was planted. The results showed that concentrations of total phosphorus and available phosphorus in soil in which reduced in the sixth months after cultivation indicated that further additions of fertilizer are often required in order to maintain high crop yields. The results from the concentration of available cadmium and zinc revealed that it was significantly higher in Mae Tao2 area (> 20 mg Cd/kg) as compared to the other two areas (Mae Ku and Mae Tao1). Therefore, higher accumulation of cadmium and zinc in sugarcane cultivated in Mae Tao2 area was expected to occur. Cadmium and zinc in sugarcane appear to be mostly accumulated in root and the lowest levels were found in sugarcane juice. However, there are still no reports so far on the threshold amount of cadmium in sugarcane juice which can cause repercussion when being used for as a raw material in the ethanol production process.

Farmers in Mae Sot districts generally use 16-16-8 NPK fertilizer to promote their sugarcane production. In order to investigate the effect of applying different rates of 16-16-8 NPK fertilizer, the fertilizer was applied to the pot at sample rates including: 0 (control group), 50, 100 and 200 kg/rai. The results from this study showed that increasing phosphorus nutrient through the application of 16-16-8 NPK fertilizer can increase sugarcane dry matter yield. Total phosphorus and available phosphorus also increased with increasing fertilizer application rate. Moreover, the result from pot experiment clearly demonstrated that there was no effect on the

accumulation of cadmium and zinc in soil resulting from fertilizer application although the rates of fertilizer application reach to 200 kg/rai. Increasing of available phosphorus and pH by adding 16-16-8 NPK fertilizer can induce lower availability of cadmium and zinc and also reduced the concentration of cadmium and zinc in sugarcane tissues and also in juice.

The problem of cadmium contamination in Mae Sot area become of concern in recent years. The implication of the results of this study to commonly fertilizer practice is that to maximize 16-16-8 NPK fertilizer efficiency and also benefit by potentially limiting cadmium availability and the uptake of this toxic element into sugarcane. Since the data obtained in the field experiment revealed that cadmium can be accumulated in great quantities by sugarcane cultivated in the Mae Tao2 area. Thus, lowering cadmium availability in soil would be consistent with lowering its uptake by sugarcane. For this reason, also this agronomical aspect the may be useful for the treating highly contaminated soil such Mae Tao2 area. Therefore, the finding from this study can be used for further site management

## **5.2 Recommendations**

Since the result from field experiment reveals that Mae Tao2 area (the range of  $> 20$  mg Cd/ kg dry soil) appear to be high availability of cadmium in soil and uptake by sugarcane, the soil in Mae Tao2 area was recommended to study in the pot experiment, in order to investigate the effect of applying difference rates of the 16-16-8 NPK fertilizer. Moreover, increasing the rate of applying fertilizer was also interested. However, it could be more reliable for interpretation of the results in field experiment if more samples were performed. From the results in the pot experiment in which indicated that the increasing fertilizer application rate tended to lower cadmium in sugarcane, the study for the effectiveness in capital cost for increasing of the rate of fertilizer application and the dry matter yield obtained was also interested.