

<b>Thesis Title</b>	Relationship between Environmental Conditions and Sugarcane Phenology	
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### Abstract

A field experiment study was conducted at the Multiple Cropping Center, Chiang Mai University, in order to establish relationship between the environmental conditions and sugarcane phenology. The experiment consisted of two factors arranged in a split-plot design with four replications. Sugarcane variety namely CP 78-1628, K 88-92, K 84-200 and U-Thong 2 were the main-plots and planting date i.e., planting date 1 (19 October 1995) and planting date 2 (1 May 1996) were the sub-plots

Results showed that the average growing degree day (GDD) for both planting dates were 5,205 , 5,261 , 5,517 and 4,960 d°C which respect to CP 78-1628, K 88-92, K 84-200, and U-Thong 2 variety. Average phyllochron of all sugarcane variety at planting date 1 was 136 °C which indicated the rate of leaf appearance of 0.114 leaf day<sup>-1</sup>. The K 88-92 had the highest rate of leaf appearance (0.118 leaf day<sup>-1</sup>) whereas the CP 78-1628 had the lowest (0.106 leaf day<sup>-1</sup>) rate of leaf appearance. In contrast, average phyllochron of all sugarcane variety of planting date 2 was 116 °C which indicated leaf appearance of 0.146 leaf day<sup>-1</sup>. The U-Thong 2 had the highest rate appearance (0.155 leaf day<sup>-1</sup>) whereas the K 84-200 had the rate of leaf appearance lowest (0.138 leaf day<sup>-1</sup>). The average phyllochron of four varieties in both planting dates were 126 °C in which the rate of leaf appearance was 0.130 leaf day<sup>-1</sup>

The development of the leaf width, leaf length and leaf area were similar for all variety of both planting date in which leaf width, leaf length and leaf area were increased when increase the leaf position until leaf 32<sup>th</sup>. Subsequently they were decreased until flag leaf emerged. There were three groups of sugarcane as classified according to leaf width and leaf area, i.e., group 1 regarding to the highest value of leaf

width and leaf area were U-Thong 2 and K 84-200 then followed by K 88-92, and CP 78-1628 as group 2 and 3 respectively. The coefficient ( $K$ ) for estimation of leaf area from leaf width and leaf length was 0.7 for all varieties. Thus, estimated leaf area can be calculated as  $0.7 \times (\text{maximum leaf width} \times \text{maximum leaf length})$

Generally speaking, sugarcane phenology can be divided into five stages. The first stage is planting to emergence of main stem. The second stage is emergence of main stem to beginning of the first tillering. The third stage is the beginning of the first tillering to maximum tillering. The fourth stage is maximum tillering to stable tillering. And the final stage is the stable of tillering to panicle emergence. It was found that U-Thong 2 has the fastest phenological development when compared with K 84-200, K 88-92 and CP 78-1628.