

## CHANGES IN LEAVES AND STEM DIAMETER OF COCOA TREE (*Theobroma cacao* L.) IN DROUGHT STRESS.

Erma Prihastanti

Biology Department  
Faculty of Mathematics and Natural Sciences Diponegoro University  
Email: eprihast@yahoo.co.id

### ABSTRACT

In general, research on plant drought response of cocoa has been done mainly on seedlings. However, information about the response of cocoa tree to drought stress is still very small. The purpose of this research to study the change in leaves number per branch, leaf mass per area ratio (LMA) and stem diameter of the 6-years old cacao tree before and during drought stress period. Drought stress treatment with through fall displacement experiment (TDE) system which is a method of using the roof panels plastic are placed under the canopy of trees where the roof can be opened and closed. Experimental design used in this study was completely randomized design with factorial treatment between drought stress treatment (no stress / control; drought stress (roofing) and time (month of sampling). Three designated as a control plot (plot of non-roofing), and three plots defined as a plot roofing. Measurement of variables made on each plot by randomly selecting six cacao trees. The result showed that drought stress with TDE system does not influence to the leaf number per branch, leaf mass per area ratio, and stem diameter of coco tree even though that TDE systems effectively reduce infiltration of rainwater into the ground, however, soil water content decreased by 30% had no effect on cocoa crop growth aged 6 years. The growth of cocoa plants before and during drought stress showed the leaves number per branch increased from 17.18 to 38.88 leaves; LMA values are relatively constantly is 8.7 mg/cm<sup>2</sup> and cocoa stem diameter increased from 29.72 cm to 33.67 cm.

Key words: *Theobroma cacao* (L.), leaves number, leaf mass per area ratio, stem diameter

### INTRODUCTION

As the long dry season and associated with ENSO events are often accompanied by death of trees (Nakagawa 2000; Condit et al. 2004; Van Nieuwstadt & Sheil 2005), seedlings (Edwards & Krockenberger 2006) and several types of fruit trees (Wright et al. 1999) and can cause forest fires (Ray et al., 2005). Drought can be defined as a meteorological phenomenon that is a period without rain that lasted long enough to cause a reduction in soil moisture and the decrease of plant growth. Drought can be permanent as in arid regions (Jones 1992; Larcher 1995, Kozłowski and Pallardy 1997). Tropical forests with low rainfall experienced the death of most trees. The death of trees (with dbh > 10 cm) reached 26% after a long dry season can be in the area of East Kalimantan, Sumatra, 10% forest and