## INTRODUCTION

Growth and yield of crop plants depend primarily on their genetic potential, and secondly on the environment in which they are grown. Without the optimum environment for a particular species, the potential of that species will not be realised - thus it is of fundamental importance that the effect of environment on the plant is carefully analysed.

The environment is a dynamic complex, all factors concerned are inter-related, and thus the effects of a specific factor are difficult to isolate in the field. Thus rooms have been constructed, in which experimental material can be studied under carefully controlled conditions; and so, all other factors being constant, the effect of one can be accurately measured. These controlled environment rooms vary greatly in their complexity and degree of control, the famous Phytotron at Pasadena in California (Went, 1957) being one of the most comprehensive.

This experiment was designed to find out exactly, and obtain some quantitative measurements, of the effect of different temperature regimes on the growth and flowering of cacao. Two growth rooms were used for the experiment, one being run at a high temperature, and the other at a low one. In order to obtain additional information on the effects of a fluctuating temperature, half the trees were interchanged between the rooms twice a day.

Being a preliminary experiment in this series, the two temperatures chosen were at the limits of the cacao tolerance scale; at the start of the experiment, the temperature of the hot room was 94°F, but this was gradually reduced to 88°F due to the detrimental effect of the higher temperature on the trees. The second growth room was maintained at between 72°F and 74°F for the course of the experiment.

The plants used were two-year old clonal (ICS 95) trees, each room being designed to hold four mature trees. Routine growth measurements were made on the trees, and weekly counts made of leaves, flowers and flushes.

In addition a small experiment on cacao seedlings was carried out. 24 seedlings (from ICS I pods) were grown in clay pots in each room, these were later harvested and a growth analysis done.

Fundamental to the efficient production of any crop, is an understanding of its physiology. Temperature having the most pronounced effect on the physiological processes of the plant; the detailed environmental - physiological study of the cacao plant was started with an analysis of temperature effects.