

## CHAPTER 1

### INTRODUCTION

#### 1.1 Background Study

The quality, quantity, periodicity and direction of light are important factors as signals to optimize the growth and development of horticultural crops. For maintaining quantitative and qualitative characteristics of fruits, vegetables, flowers and foliage plants, it is important to manipulate the quantity, quality, duration and direction of light which is coming towards crops. As we know, light is a source of energy for photosynthesis and also an essential necessity for plant growth. Nevertheless, excessive lights can obstruct photosynthesis and prompt photo-oxidative destruction of the photosynthetic apparatus, therefore the photosynthetic rate of the plant growing in direct sun light will decrease. Apparently, most of agriculture production industry today had suffered due to increase in air temperature and intensity of solar radiation as a result of climate changes and urbanization. One of the ways to cope with this trend is by protecting the crops from the high radiation and keeping them in suitable temperature range. Moreover, there are a great number and variety of plants which grows naturally in various climate conditions have been transferred to a controlled crop conditions by modern agriculture.

Theoretically, one of the main factors affecting rate of photosynthesis and transpiration is light intensity. As far as we know, light intensity stimulates stomata opening. As far as we know, an increase in light intensity results in an increase of rate of photosynthesis. Photosynthesis requires gaseous exchange and the stomata is the pore in which gaseous exchange takes place. Therefore an increase in photosynthesis results in an increase in stomata opening. In addition, evaporation of water from the plant occurs

primarily through the stomata, thus an increase in light intensity results in an increase in transpiration due to the increase of stomata opening. However, at very high light intensity, chlorophyll may be damaged and causes the photosynthesis rate to drop steeply.

Therefore, one of the controlled crop condition that being implemented is the usage of shading nets. Shading nets gives appropriate micro-climate conditions to the plants. As an example, plants from tropical environments usually grows under big shady trees and mainly uses diffused light which filters through the treetops. In addition, these plants require relatively high humidity and temperatures. Moreover, shading nets in the form of covering materials are used world widely for different purposes. Recently, in hot and sunny regions, structures covered with shading nets have become more popular. This is because the net helps to reduce solar radiation. Shading net covering offers many advantages to the users and also benefits the environment.

In spite of their popularity, there are different types of shading nets with various colours offered in the market today. In addition, neither producers nor consumers have clear idea about how to select a shading net type for a specific application. During the last decade, protecting crops from strong radiation by using shading nets has become as an interesting technique as it offers many benefits. An extensive number of agricultural nets of various mesh sizes, types of fabric and colours with a large extent of physical properties are available in the market.

Contradict to the production of greenhouse, the application of shading nets mainly emphasis on the production of higher quality products and reduction of energy consumption by decreasing the microclimate under the shading nets moderately. Thereby, shading nets are used to magnify the productivity, quality and homogeneity of plants and fruits by producing moderate windbreak and greenhouse effects, thus allowing a better microclimate condition for the plants.

## 1.2 Problem Statement

The fear of the fast changing in global temperature which will cause severe climate changes and lead to catastrophic impact on many countries and populations are great around the world. As we know, agriculture and food productivity is one of the industries which are highly dependent on the climate. Changes in temperature, frequency and intensity of radical weather could have a serious impacts on the yields of crops. The consequences of increased in temperature is depending on the crop's optimal temperature for growth and reproduction. However, if the temperature overreached the crop's optimum temperature, it will cause the crop yield to decline.

Other than that, due to the high intensity of sunlight during the day, most of the farmers in Malaysia are likely to use the black shade net instead of the coloured nets to cover their crops. Thus, there is a lack of information about the coloured shade nets in Malaysia.

Moreover, these coloured shade nets have not been tested yet in Malaysia's climate especially on leafy vegetable such as Pak Choy and Cabbage.

## 1.3 Objectives

1. To analyse the physical characteristic of the shade coloured net in terms of the mesh number and thickness of the material.
2. To investigate the light property in terms of light intensity under various shading colour.
3. To evaluate Pak Choy and Cabbage performance under coloured shade net in terms of growth and chlorophyll content.