

Chapter 1

Introduction

Ornamental gingers encompass a diverse and versatile group of plants that are gaining increasing recognition in the flowering pot plant, landscape and cut flower markets. There are 90 genera of ginger in the Zingiberaceae family. The genera of flowering gingers include *Alpinia*, *Curcuma*, *Etingera*, *Globba*, *Hedychium*, *Kaempferia* and *Zingiber* (Paz *et al.*, 2006). The genus *Curcuma* is one of the largest genera in the Zingiberaceae, with about 80 species. *Curcuma* is a common name of the herbaceous plants collectively known in Thai as ‘Pathumma’, ‘Krachiao’ or ‘Bua Sawan’. It has its origin in the Indochinese region in such countries as Myanmar, Thailand, Laos and Cambodia. Local Thai people in the northern and northeastern regions are quite familiar with curcuma. When rains fall, curcuma flowers emerge and they can be consumed as a fresh vegetable with other vegetables and it is considered as a herb as well (Sirirugsa, 2007).

Curcuma is famous for its medicinal properties and as a spice plant as well as an ornamental plant in Thailand. *Curcuma* is a tuberous plant that was initially introduced as a cut flower and a pot plant. There are more than thirty species with different colors, forms, and sizes. Recently *C. alismatifolia*, Siam tulip or summer tulip, a species native to Indo-China, has gained popularity in the international market as a new ornamental bulb with a beautiful inflorescence resembling that of a tulip, hence its common name (Gagnepain, 1908). *C. alismatifolia*, which has wide variations in shape and bract color, has been cultivated for ornamental use. “Puthumma” products include cut flowers and rhizomes. The advantage of curcuma is that the flowers are highly attractive, beautiful with deep pink color, and fit to the taste of European market. In addition, the pastel colors of light pink bracts are also desired by the Japanese market.

In Thailand, the main exported cultivar of *C. alismatifolia* called “Chaing Mai Pink”, which has a lilac-purple lotus-like flower, terminal spike is very prominently high above the leaves, making it very suitable for cut flowers. The colored bracts are arranged resemble to a lotus flower, in the way that curcuma lovers in the Netherlands view it as a tulip (Vichailak, 2006).

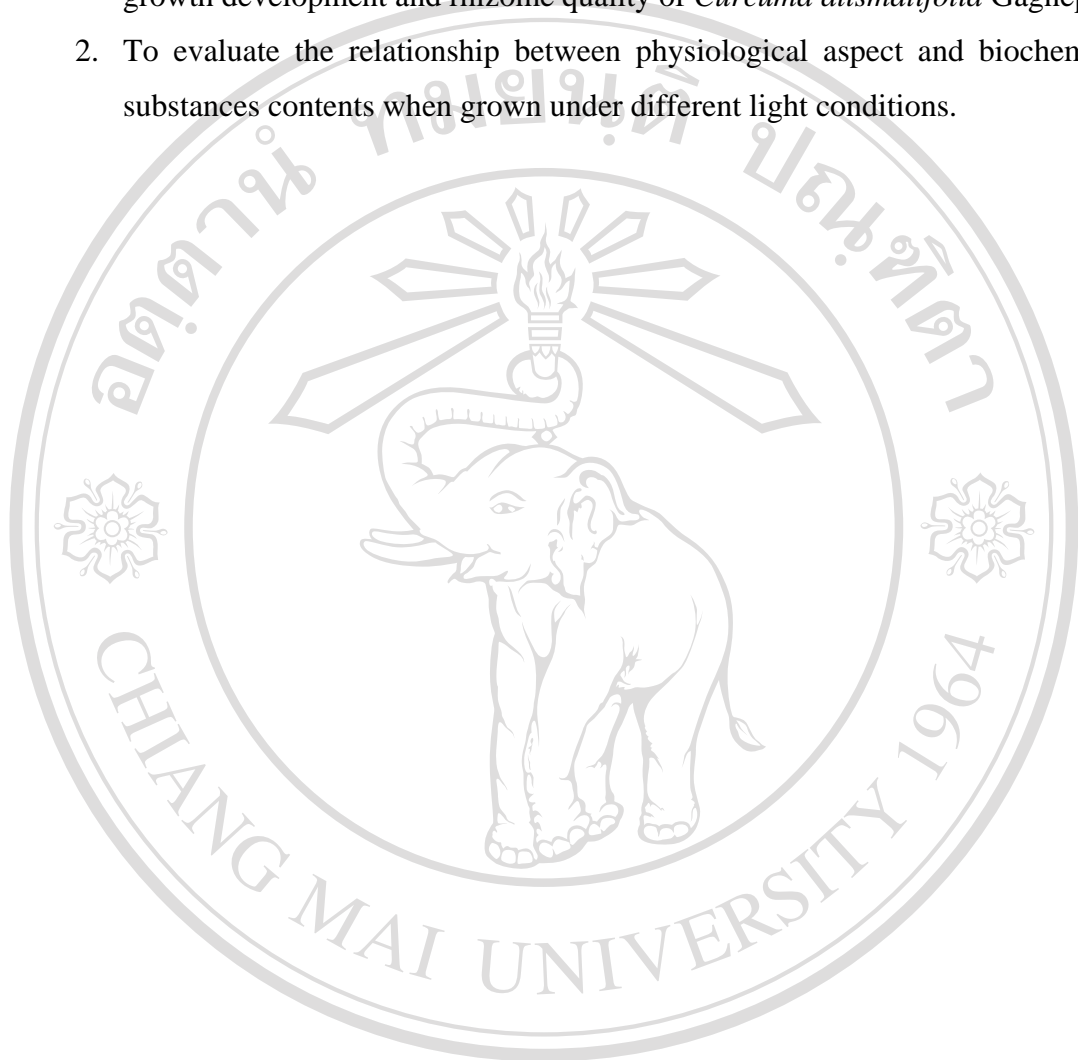
Cut flowers and rhizomes of *C. alismatifolia* are exported to many countries such as Japan, U.S.A, the Netherland and the New Zealand (Pubuwpern, 1992). In 2004, Thailand exported 1,233,581 rhizomes to the USA., Australia, Ecuador, Israel, Italy, Japan, Korea, Nepal, the Netherlands, Pakistan and Singapore (Department of Agricultural Extension, 2005). After arrival, rhizome are planted in temperature-controlled greenhouse and sold as both cut flowers and flowering potted plants (Vichailak, 2006).

Growers harvest rhizomes once a year during November and December. Crop starts from April to May, plants flower from June to August during the rainy season with about 13 hrs of day length, 29-30°C average temperature, 80% relative humidity and under 30-50% natural radiant flux density (Lawson and Roh, 1992). Then, they stay dormant with to dormant in October and November with about 10-11 hrs of day length and 15-20°C. Growers can sell their products (both flowers and rhizome) only once a year. Therefore, most of the products delivered to market may at the same time, which causes a decrease in price and small profitability. Off-season production in winter is a method of solve this problem. However, the quality of flowers and rhizome quality of the off-season production is lower than that of the season production (Ruamrungsri *et al.*, 2006). Due to lower temperature and/or shorter day length, rhizome size and number of storage roots are reduced. Therefore, factors affecting rhizome formation and quality should be clarified.

The research was aimed to investigate rhizome formation under natural condition and examined the effect of day length and wave length (red light) on plant growth and rhizome quality. This fundamental information may be useful for improving rhizome quality in off season production.

Objectives of the experiment

1. To investigate the effect of day length and light quality (wave length) on growth development and rhizome quality of *Curcuma alismatifolia* Gagnep.
2. To evaluate the relationship between physiological aspect and biochemical substances contents when grown under different light conditions.



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