Chapter 1

Introduction

Curcuma alismatifolia Gagnep. is one of the species in Zingiberaceae family, which is the same as ginger, originated in the Indochina region (Wannakrairoj, 1996). This genus is one of the largest genera in the Zingiberaceae with approximately 80 species and distributed throughout tropical Asia from India to Southeast Asia and Northern Australia (Sirirungsa *et al.,* 2007). In Thailand, there are 38 species in this genera and *C. alismatifolia* Gagnep. is native to Thailand in the northeast and distributed to Laos and Cambodia. It has become an important economic plant for the aesthetics of its inflorescences (Sirirugsa *et al.,* 2007). The curcuma rhizomes are exported to the world market with the estimated value of 300 million bath (Postharvest Technology Information Network., 2007). The rhizome production area for exporting covers approximately 64 hectares. Chiang Mai province is the leading rhizome production, in terms of area, in Thailand, and to the lesser extent are Chiang Rai, Lampoon, Payao and Nakornrajchaseema provinces (Wichailak, 2006; Wannakrairoj, 1996).

The growth cycle of *Curcuma* sp. starts in May and flowering appears in the rainy season (June - August). After that, rhizome will be dormant during winter season (December) (Department of Agriculture, 2006; Wichailak, 2006). Off-season production is very tempting for growers as to increase more incomes from this plant. However,

off-season production reduces plant growth and quality of flower, as well as, rhizome growth, as compared with the production in regular season, where planting date is an important factor that affects product quality and yield (Ruamrungsri *et al.,* 2007).

Furthermore, daylength is one of several imperative factors that imposing an impact on product quality. There are many researches concerning about the increasing daytime period by giving the light at night time in order to improve flower quality of plant species. Chang (2000) reported that planting *C. alismatifolia* in Taiwan with supplemental lighting from 10.00 pm - 02.00 am could extend flowering period and increase length of stalk and diameter of inflorescence. Ruamrungsri *et al*. (2005) also found that a night break for 2 hours from 08.00 - 10.00 pm increased flower quality of this plant when they were grown from October to November. This may be due to the supplemental lighting could increase photosynthetic rate during the night time. However, there is no validated information to confirm this hypothesis as yet.

In addition, fertilizer application is also one of the most important factors for plant growth. The Good Agricultural Practice (GAP) for *C. alismatifolia* recommends that grower should supply the fertilizer at the ratio of 15-15-15 or 16-16-16 at approximately 15 grams per plant. When the first pair of leaves are fully expanded, the fertilizer with high nitrogen concentration, such as 21-7-14, 15-0-0 or 16-16-16 at 15 grams per cluster per month is necessary. At flowering stage, it is recommended to supply fertilizer grade 13-13-21 accompanying with foliar spraying supplementary micro elements, i.e., calcium, magnesium, boron, zinc and copper. Whenever yellow leaf presents, grower should feed more phosphorus and potassium fertilizer (8-16-24, 14-14-21 or 13-13-21) at 15 grams per cluster per month. For bag culture, the rate of

fertilizer should be less than that for the field production. The average amount of fertilizer for bag culture is 7-10 grams per bag per 3 weeks (Wichailak, 2006). All results mentioned above illustrate that planting dates, supplemental lighting and fertilizer application are important for growth in order to obtain good product quality for this plant.

Nevertheless, there are only a few research concerned with the combination of the three factors above that influences the growth of this plant. Thus, this research is aimed to investigate both the effect of individual and combined factors of the planting dates, night break treatments and fertilizer application rates on growth and development of curcuma plant. The physiological data from these experiments should be beneficial for regulating and controlling this plant both in regular and off-season production.

Objective

To determine the influence of planting dates, night break treatments and/or fertilizer application rates on the physiological response of *C. alismatifolia* Gagnep.