Chapter 1

Introduction

Mangoes are produced in more than 100 countries throughout the tropical and subtropical regions for both export and local market. World fruit production, mango ranks the fifth. It is cultivated in many countries, from 36 °North latitude, in Spain, to 33°South latitude, in South Africa (Galan Sauco, 1993). Because of this wide distribution and the development of techniques to control flowering, it is possible to supply the world markets all year round (Galan Sauco, 1996). World production in terms of continental regions, Asia produces around 80%, America continent rank second but far behind in actual production at 13%, and Africa third with 7%. Of all the countries, India is only one country given productions of over ten thousand tons; and there are three countries stand out given their productions of over a thousand tons : the first, Thailand, is neither particularly surprising nor new; the second is Mexico, which has overhauled its industry to produce a 50% increase over the last four years, with considerable incorporation of good-quality cultivars. China is the last of the three but, apparently, not the least although a great deal remains unclear as to the specific areas--tropical or subtropical--currently under mango cultivation in this country, and the same must be said for marketing details, data supplied to the FAO indicated a remarkable 400% increase in production over the same four-year period (Galan Sauco, 1996).

The main trade flows can be summarized as follows: regional within Southeast Asia and the Middle East; export from Mexico and Central America to the USA; the Japanese market supplied by American mangoes; Europe supplied by many exporters (71 in 1994) although Brazil, south Africa, and Ivory Coast are its main suppliers (Galan Sauco, 1996).

Flowering and fruit setting are the most critical problem of all events occurring after establishment of a fruit orchard. Given favorable growth conditions, the timing and intensity of flowering of most plants involves sensing of some environment cue, i.e. day length, water stress and vernalizing temperature. That event is translated to production of a putative floral stimulus or

alteration in the ratio of florigenic and antiflorigenic components which may be translocated to target cells in meristems (Bernier *et al,* 1981): however, a specific compound that acts as a floral stimulus has never been isolated, causting doubt on its existence. It has also been proposed that nutrient diversion to the meristems may be involved (Sachs and Hackett, 1983) and that floral induction might be controlled by multiple factors, including the putative floral stimulus, photoassimilates and phytohormones (Bernier *et al.,* 1993). The mango leaves appear to be the only site where the putative floral stimulus is produced. The putative temperature-regulated floral stimulus is short-lives, its influence only lasting 6-10 days (Nunez-Elisea and Davenport, 1989, 1992b). The floral stimulus is also graft transmissible (Kulkarni, 1986, 1988b, 1991). Early flowering of seedling stems was stimulated by grafting them on mature trees or by grafting the mature stems onto juvenile plants (Singh, 1959). Some mango cultivars selected in the tropics can flower at higher temperatures than others and are not restricted to winter flowering (Kulkarni, 1991). Transfer of the stimulus from tropical selections to those requiring lower temperatures for induction has been accomplished using reciprocal grafts between these cultivars (Kulkarni, 1986, 1988b, 1991). Cultivars which would never flower in warm temperature conditions were made to flower in the off-season using these techniques. In Thailand, Manochai (1994) had applied this techniques to induce off-season flowering of conventional mango cultivars (flowering once a year: cv. Man Khom, Nong Sang, Khiew Sawoey, Tong Dum, Nam Dok Mai and Fahlan) by grafting of such a scion on branch of multi-flowering mango cultivar (cv. Choke Anan). Therefore, the everbearing mango rootstocks must sent the floral stimulus and other substances different from conventional mango rootstocks. In order to prove this hypothesis, this research emphasized to study the difference between the two rootstocks (Choke Anan and Kaew) on their growth and development, flowering, fruit setting, fruit quality, photosynthesis, stomatal behavior, changes in accumulated photoassimilates, nutrient uptake and phytohormone (GA like substances and cytokinins) of mango trees.

Impact of vigorously climatic variability (strong El Niño occurred during May 1997 to October 1998 and strong La Niña occurred since October 1998 continues to mid year 2000) are directly or indirectly influenced on environmental variables such as light duration, temperature, water availability. Environmental conditions outside the range for optimum growth may also

impose stress which results in physiological changes that reduce growth or cause permanent damage to mango trees. For instance, major climatic event such as extended drought, floods, winds, storms, heat waves and freezing temp have the potential to cause severe damage due to the development of excessive stress (Schaffer *et al.*, 1994). As a greater understanding the impact of El Niño and La Niña conditions to the environmental factors that effect on tree physiology and growth is gained, therefor , opportunities to increase sustainable yield should improve.

Objectives of the experiment

1. To study the effect of everbearing mango rootstock cv. Choke Anan and conventional mango rootstock cv. Kaew on their growth and development, physiology, and flowering of scions
2. To study the impact of climatic variability from El Niño and La Niña conditions on the environmental factors that influence growth and development, physiology, and flowering of scions.