



CHAPTER I

INTRODUCTION

Cassia angustifolia Vahl (Tinnevelly Senna) and *Cassia acutifolia* Del. (Alexandrian Senna), the plants in the family Leguminosae, are the two most important sources of sennoside-containing laxative drugs, particularly in form of senna pod and senna leaf preparations. These leaves and pods have been used as laxative since the ninth century (Claus, 1949; อ้อมบุญ ล้วนรัตน์, 2534; Saad, 1972) and been described in most pharmacopoeias. Recent studies on the biological activities and metabolism of the anthraquinone derivatives of senna have confirmed that active purgative agents of this drug are sennosides A and B (Kisa, 1981; Baars, 1975; Dressen, 1982; Lemmens, 1977; Takahashi and Kunio, 1983). Nowadays, sennoside-containing formulations are still among the most widely used laxatives since markets have recognized the importance of natural product for medical uses.

Sennoside-containing drugs have also been popular in Thailand, particularly in form of senna pod preparation. The drugs manufactured locally by the Government Pharmaceutical Organization of Thailand are

prepared only from the pods of *Cassia angustifolia* which can be grown in Thailand more easily than the species of *C. acutifolia*. However, the content of total sennosides in this Thai Tinnevelly Senna pod has not yet been reported but has been claimed to be in the range from 3 to 4% of dry weight (วัลย์ลดา หงส์ทอง และนฤมล รื่นไวย้, 2533). This is considerably higher than the values specified in the European Pharmacopoeia (2.5%) or British Pharmacopoeia (2.2%).

The plantation site of Thai *C. angustifolia* has long been limited to only a few provinces in the central and north-eastern parts of Thailand such as Saraburi, Lopburi and Nakhon Ratchasima (วัลย์ลดา หงส์ทอง และนฤมล รื่นไวย้, 2533). Recently, there has been an increase in the local demand of senna pods. This has led to an expansion of the area for senna cultivation to the north of Thailand. It is expected that there will be a high variation in the total sennosides content of the harvested pods which is not favourable for preparation of the drugs.

Despite advances in the field of organic chemistry, sennosides still cannot be synthesized chemically. Senna plants are, therefore, an important commercial source of this group of compounds. However, these plants have not been subjected to intensive genetic programs for optimum production of the compounds. In addition, there have

usually been technical and economic problems in the cultivation of these plants (Shuler, 1981). Since plant cells isolated from field-grown plants and cultivated *in vitro* have the potential to produce and accumulate chemicals identical with those produced by the parent plant, plant cell cultures of Thai *C. angustifolia* is considered an alternative mean of producing sennoside compounds.

The potential advantages of plant cell cultures over traditional field methods of cultivation are clear, in particular, independence from geographical and climate problems (Fowler, 1983). Moreover, plant cell cultures, it may be possible to optimize growing conditions, minimize space requirement, achieve more consistent quality and recover the products more easily (Shargool, 1982). Undoubtedly, cell cultures could provide the continuous and rather homogenous supply of plant material of a defined physiological state required by commercial industry (Berlin, 1986).

The aims of this study are to establish cell cultures of Thai *C. angustifolia* and to evaluate its potential of producing sennosides. In doing this, we first selected high sennoside-containing plants from some locally grown Tinnevelly Senna. A simple, accurate and rapid method for estimation of plant sennoside content was developed for this purpose. After obtaining high

sennoside-producing plants, the appropriate plant parts were used for establishing cell cultures. The cell culture was then evaluated for its ability to produce anthraquinones including sennosides.