

Chapter 1

1.0 INTRODUCTION

Ornamental plants are mainly used for beautification and decorative purposes. Normally, the customers of such products tend to vary or replace their plants consistently, estimated at every 1 to 2 years. The short implied replacement cycle may augur well for industry players, but dynamic market trends and preferences pose a strong challenge for cultivators to consistently invest in Research and Development to be at the forefront of agro biotechnology innovation and creativity. A report shows that the global trade for floriculture products was estimated at over US\$7.9billion in 2001, with cut flowers accounting for 50% of total sales followed by plants 41% (The Star, 2005).

Based on the future market and the commercial values of ornamental plants, this research was conducted to establish the tissue culture protocol for two variegated *Sansevieria* species. Plants used in this study are familiar to landscaping for a very long time. Snake plant or scientifically known as *Sansevieria trifasciata* var. *Laurentii* (goldband *Sansevieria*) and *Sansevieria trifasciata* var. *Hahnii* (birdnest *Sansevieria*) are members of ornamental foliage plants in the family Agavaceae (Agave family), which contains approximately 60 species which have been recognized namely as *Sansevieria zeylanica*, *Sansevieria triafsciata*, *Sansevieria cylindria* and other species. The most common species is *Sansevieria trifasciata* and also known as bowstring hemp, snake plant, mother-in-law's tongue and leopard lily which are native primarily to tropical Africa (indigenous to Africa, Arabia and India). They have short, thick roots and long, narrow basal leaves that stand erect. Many species have water-resistant leaf fibres used in the manufacture of ropes and for bowstrings. Some reports also show that

the *Sansevieria* leaves consist of strong fiber that resembles hemp and could be used as cordage (Henley, 1982).

Several species and their cultivars are grown commercially for use as interior foliage plants. Due to their ability to flourish on reduced sunlight; their leaf composition allows them to photosynthesize well in household light. It is popular as house plants as it is tolerant to diffused light and irregular watering.

Sansevieria plants are also often claimed as an air purifier because it has a tendency to absorb certain poisonous substances. It is one of the air filtering plants listed and compiled by NASA to clean air in space stations. The plants also helped to neutralize the effects of sick building syndrome (skin irritations, headache and respiratory problems caused by indoor pollutants, microorganisms or inadequate ventilation). Besides, these plants also eliminate significant amounts of benzene, formaldehyde and trichloroethylene (Wolverton *et al*, 1989).

In this study, a tissue culture method was developed to mass propagate *Sansevieria* plants. Plant tissue culture techniques may offer certain advantages over traditional methods of propagation including the production of exact copies of plants that produce particularly good agronomic traits, to mass produce plants within a comparatively short period and to transport disease, pest and pathogen free plants with ease.

Since it is important to induce variation in the *Sansevieria* species so as to remain competitive, an approach which involves the application of physical mutagen to tissue cultured *Sansevieria* sp. using irradiation by γ -ray (Gamma ray) and manipulation of plant growth regulators are also applied. In this study, the lethal dose at 50% survival leaf explants was determined. This is compulsory steps prior to mutation breeding through Gamma ray irradiation. This method accelerates the chance of producing leaf chimeras (shape and colour) and the development of new variants. Theoretically,

mutation frequency increases with increasing dose but vice versa for the survival and capacity to regenerate (Broertjes and Van Harten, 1978). For this reason, the lethal dose (LD₅₀) must be determined where a high mutation frequency is achieved with a 50% population survival. The irradiation doses were obtained by evaluating the reduction or survival of growth due to mutagenic affects.

Based on the future market and the commercial values of ornamental plant, this study was conducted to fulfill the certain purposes which are:

- i. To establish the micropropagation protocol for *Sansevieria trifasciata* var. *Laurentii* (goldband *Sansevieria*) and *Sansevieria trifasciata* var. *Hahnii* (birdnest *Sansevieria*)
- ii. To determine the lethal dose at 50% survival (LD₅₀) of leaf explants through Gamma ray irradiation.