Chapter 1

Introduction

At present, most thai farmers tend to grow more improved varieties or those which suggested by the government sector than local varieties because of their better performance such as high yield and high market demand. Ideal rice varieties should have good agronomic performances, good environmental adaptation and high infirmity (Karladee *et al.*, 2000). Nowadays, rice is still one of important economic crops for both domestic consumption and international market. Current cultivated rice varieties in Thailand are modified Thai rice genotypes: KDML 105, Khao Tah Haeng 17, Nahng Pa-yah and Neiw Sanpatong; improved varieties from breeding: RD 10, RD 21 and CNT 1 (Karladee *et al.*, 2000); and those from radioactive mutation induction: RD 6 (Sayumpol, 2000).

Hybridization is a way of generating something like sterility in plants, the seed from a hybrid crop cannot be advantageously saved for re-planting and it is expensive. Farmers who grow hybrids must buy new seed every year if they wish high yield (Devlin, 2000). The mentioned limitation needs long term in breeding programme through generations in order to achieve the best varieties. Since the technique provide doubled haploids with homozygous diploid could be induced in fewer generations from doubling chromosomes by cell division inhibitor (colchicines), the application of rice anther culture may be one of the alternatives in rice breeding programme. Production of doubled haploids through anther culture is a rapid approach to

homozygosity. It shortens the time required for the development of new rice cultivars comparing to conventional methods which require at least 6-7 generations. Haploids are also valuable to detect and fix desirable recessive traits introduced through mutation or hybridization. Moreover, anther and microspore culture of F1 hybrids lead to fixation of gene combinations which otherwise may not be possible to isolate from a segregating population through conventional means from F1 generation to develop homozygous lines as good as heterotic F1 hybrids (Hu and Zeng, 1984).

Rice haploids diploidization will be induced in order to select good agronomic characteristics and chromosomes assessments. Besides that, embryoids will be used to produce dried synthetic seeds in order to store at longer period, easy for transportation and sowing, their better survival rate and their advantages for breeding technique. There are some reports that use of anther culture technique in rice leads to increase the number of varieties and hybrids in rice where androgenesis is possible. It also increases the efficiency through technique manipulation (Chen and Lin, 1976; Tsai and Lin, 1977; Chaleff, 1978; Miah *et al*., 1985). Earlier, it was reported that anthers from rice Japonica type only were capable of regenerating sufficient number of doubled haploids in anther culture, for which selection can be predicted (Kim *et al*., 1991). Presently, it is possible to induce high regeneration efficiency also in rice indica type (Narasimman and Rangasamy, 1993). However, anther culture technique has some limitations: (a) lacking development of techniques for quick production of large number of doubled haploids; (b) high cost of obtaining haploids and doubled haploids; (c) doubling of chromosome number of the haploids is time-consuming and may not always result in the production of a homozygote; and (d) the risk of somaclonal variation and high frequency of mutation during the tissue culture.

Anyhow, the answers for all limit actions are still for further investigations. Therefore, in this *in vitro* study we tried to solve some of these limitations by combining the anther culture technique and hormone shock for doubled haploids production.

Objectives of the experiment

1. To investigate *indica* rice possibility to anther culture process for plantlets.
2. To investigate appropriate initiation media for Thai rice genotype plantlets.
3. To find out appropriate method for dried synthetic seed production of *Oryza sativa* L. in order to higher germination rate, higher survival rate and longer storage period.