CHAPTER I

INTRODUCTION

Cambodia is rich country for biodiversity of rice germplasm resources, including wild species of rice. Compare with many other countries in Asia, annual and perennial *O. rufipogon* still remain very abundant in Cambodia (Lu, 1997). The wild rice were commonly called as RsEg: "Sror-nge" or RsUvéRB Srau-prey" by local farmers, the literal meaning of this both names is "Wild rice" but the name "Sror-nge" was very much popular and well known by local farmers. Five wild species of rice have been reported, there are *O. rufipogon, O. granulata, O. nivara, O. officinalis,* and *O. ridleyi* (Vaughan 1994). Among of those species, annual and perennial *O. rufipogon* were reported to be abundant and were mostly found scattering in swamps, small ponds, along canals or ditches, lakes, abandoned fields, and near or inside farmer's rice fields.

A number of wild rice populations are being threaten or destroyed. It has not been continuously distributed and in some region there was descended. Moreover, the results from decades of civil war, deforestation, bush fire, urbanization, extensive road construction and factory building, the human population growth, frequently cleaning and repairing irrigation canals and ditches, expansion of agriculture farming land, field preparation practices (e.g. plowing the field two times before rice transplanting), and the weed control procedures. These reasons may lead to the reduction and the extinction of natural resource including wild rice in the future in Cambodia (Men and Pith 2007). On

the other hand, some other farmers complained that wild rice became more serious problems in their rice fields in recent years (Ouk *et al*., 2006). In addition, the quick economic development and population growth in the future, the habitats for wild will be gradually deteriorated, and this will put pressure on the survival of wild rice species.

O. rufipogon is a cross-pollinated species, with 7-55% outcrossing (Barbier, 1989). In areas where cultivated rice and common wild rice coexisted, natural hybridization between them was not uncommon because they are closely related (Oka, 1988). Gene flow between wild and cultivated rice clearly plays a key role in the emergence of invasive weedy rice as a serious threat to rice production (Nirantrayakul, 2008). Today, *O. rufipogon* is growing together in rice fields (even in the fallowing season), that could drastically effect to quality of crop product. In Cambodia, according to farmers' report, wild species of rice became serious weed problems their fields when the farmers did not clean seeds before sowing and unawareness of field management including plowing, weed control and unpurified seeds are another obstruct, which led to yield reduction. Compared with the other weeds existed in the rice field, wild and weedy rice seemed to cause more yield damage of the cultivated rice, as much as 60 – 70% yield reduction (Lu, 1997).

In contrast, common wild rice *O. rufipogon* Griff., progenitor of the Asian cultivated rice (*Oryza sativa* L.), has been recognized as a good source for breeding materials and essential genes for rice improvements (Chang 1984). Various breeding program, *O. rufipogon* have played importance roles as valuable genetic resources to increase rice yield. For instant, it has been used as a source of genes for flooding

tolerance, acid soil and resistance to stem borer, brown plant hopper, bacterial blight and sheath blight (Xiao et al. 1998; Tian et al. 2006; Amante *et al*, 1990). Moreover, the Cambodian wild rice was used as food by farmer during the difficult times when rice production was insufficient. Even today, the wild rice is still used as food by some poor farmers to fill up the shortage. The vegetative part of the wild rice was also commonly used by farmers to feed their animals. In addition, wild rice was told by farmers to have certain medical functions, e.g., to cure malaria or release food poisoning, but this indigenous knowledge need to verify.

Hybridization between wild and cultivated rice studies provide information about the role of gene flow on evolution of novel genotypes and it can assist to the conservation program, strategies development for protection against weedy rice infestation or breeding program (Oka 1988; Gao *et al*. 2000a,b). Using DNA marker technology can help scientists to identify the genetic variation, making cross and obtaining recombination among genotypes, and make more accurate selection (Paterson *et al.*, 1999). The information of genetic diversity will assist in conservation strategies either in natural habitat (*in-situ*) or out of natural habitat (*ex-situ*) for genetic resource in rice breeding program for the future. Therefore, the main objectives of this study are:

- To identify the genetic structure of common wild rice populations.
- To characterize F_2 populations between cultivated rice and its wild progenitor from Cambodia.