

**FIELD EVALUATION OF EXOTIC AND LOCAL RICE HYBRID  
VARIETIES**

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by  
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## CHAPTER 01

### INTRODUCTION

Rice is a high energy caloric food. Rice consists of carbohydrate in form of starch which is about 73% of total grain composition, 4% phosphorus and enzymes. Rice protein contains gluten, known as oryzenin and also in the pericarp of the rice contains most of the minerals. Rice protein nutritive value is much higher than of wheat, maize or other cereals. (Suganthi and Nacchair, 2015)

Rice plays an important role in the economy of Sri Lanka as the staple food crop. Rice belongs to the Family Poaceae and also rice is classified into two subspecies, japonica and indica (Qian *et al.*, 1995). In crop breeding, the use of hybrid vigour in first generation seeds is well known and much important. However, until about 40 years ago, its application in rice was limited because of self-pollination character of rice. Chinese scientists successfully transferred male sterility gene from wild rice to create the cytoplasmic genetic male sterile (CMS) line and hybrid combination (Cheng *et al.*, 2007).

Inbred rice variety is a pureline, which means that the offspring or succeeding generations produced by this variety have same genetic makeup. This is the result of cross between two or more varieties and subsequent selection through self-pollination or inbreeding. Rice flower contains both male and female organs. This structure is useful to enhance the self-pollination in rice crop.

Hybrid rice is the product of a cross between two genetically distinct male and female inbred parents. When the right parents are selected, it will have high vigour and higher yield than either of parents. There are many advantages as well as the disadvantages in hybrid rice. Some of the advantages are increased yields, increased vigour and increased resistance to pest and diseases. Also very few disadvantages such as expensive seeds, and farmers cannot use their seeds from past season because of the genetic segregation of hybrid rice. The use of hybrid rice revealed better heterosis in unfavorable soil and

Climatic conditions such as saline soils and uplands than in favorable irrigated rice conditions.

Hybrid seeds can be produced by cross pollination of plants and it can be used to increase the productivity of rice. Currently, hybrid rice technology uses intra sub-specific heterosis, *indica* × *indica* and *japonica* × *japonica*. Heterosis is the procedure in which F<sub>1</sub> hybrids derived from diverse parent shows superiority over parents in yield, panicle size, number of productive tillers, and number of spikelets per panicle and grain size.

In the Sri Lankan climatic conditions, less amount of better parental materials and also there are many difficulties in the seed production of suitable hybrid varieties. Therefore, Sri Lanka uses exotic hybrid varieties to overcome these problems. Although Sri Lanka is self-sufficient of rice, but to feed the increasing population have to produce high yielding rice varieties. Hybrid rice is one good option to increasing the productivity of rice.

Therefore, RRDI focus to develop new hybrid rice varieties by conducting an experiment to evaluate most suitable well adopted hybrid varieties for the local conditions. The hybrid performance may be location specific and it is necessary to conduct multi location trials to identify the wide adaptability for those that are adapted to the certain locations.

According to Cheng *et al.* (2007), hybrid rice technology contributed significantly toward food security, environmental protection and employment opportunities in China for past 25 years. Hybrid rice with a higher yield than inbred varieties helped China to produce more than 300 million tones of paddy. Hybrid rice not only has distinct yield advantage than inbred varieties but also is more responsive to fertilizer and can adapt to varying environments (Jumin *et al.*, 2000).

According to Jumin *et al.* (2000) in subsequent evaluation, hybrids need to be tested in replicated trials with a larger plot size. The hybrid performance is location specific. Therefore multi location trials have to be conducted to identify wider adaptability and specifically adapted to certain locations. Testing hybrid performance in farmers' fields along with regional local check varieties is necessary, before hybrids are released for commercial cultivation. Rice grain yield improvement is the main target of breeding program to develop rice varieties. Grain yield is complex trait, controlled by many

genes. In addition to that grain yield is related to other characters such as plant growth, durational plant type. (Yoshida 1981).

### **Objectives**

#### **General objective**

To evaluate exotic and local hybrid varieties under local conditions.

#### **Specific objective**

To find out the most suitable well adopted hybrid varieties for local environment.