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بعض الوثائق الاصليّة تالفه

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STUDIES ON HYBRID RICE BREEDING

By

Ibrahim Saad Mohamed El-Degwey

B.Sc. (Agric.) University of Tanta 1995

Thesis

Submitted in Partial Fulfilment of the Requirements

For the Degree

of

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In

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Studies on Hybrid Rice Breeding

BY

Ibrahiem Saad Mohamed El-Degwey

THESIS

*Submitted in Partial fulfillment of
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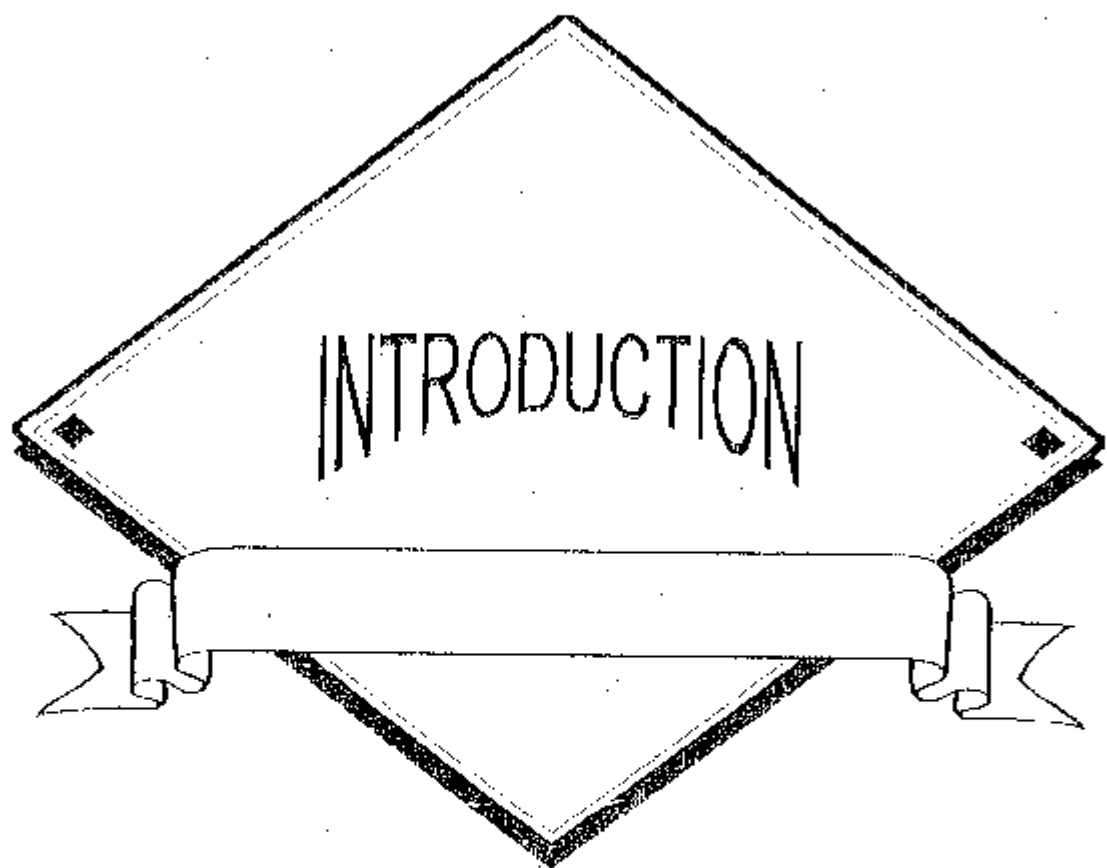
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INTRODUCTION

I. INTRODUCTION

Rice is the most important cereal crop beside wheat in the world. Such importance is more enormous in the developing countries, in Asia, Africa and Latin America. In 1995, it was cultivated in about 146 million hectares which produce about 520 million tons of grains. By the year 2030 the world must produce 60% more rice than it produced in 1995 to meet demands created by increasing population and rising incomes. This production increase must be achieved on less land, with less labour, less water, and less pesticides, and it must be sustainable (Virmani 1997).

In Egypt, rice grown on about one million feddans (about 0.42 million hectares). This area is centralized in North Delta, specially the Governorates. El-Dakahalia, Kafr El-Sheikh and El-Beheira. Increasing rice lands are very limited due to limited shortage of irrigation water in Egypt. Egypt must produce more rice on less land to achieve self-sufficiency in rice production which increase every year and to increase the export amounts from rice, in order to raise the income. Hence, increasing yield per feddan is the main objectives of the most plant breeding programmes.

Development and use of commercial rice hybrids is the important way for increasing rice varietal yields per each unit of area and water. Virmani *et al.*, 1991 reported that the hybrids yield about 20% more than inbred rices and have helped China to produce 33 million tons more rice per year. Hybrid rices were cultivated in about 17 million hectares in China which constituted 55% of its total rice area, and contributed 66% of total rice production in China and 20% of the total rice production of the world. Research in countries outside China indicates that heterosis in

rice can increase yields by 15-20% over the best commercial cultivars and commercial rice hybrids are being developed. Also rice hybrids show higher yield potential not only in irrigated conditions but also under some rainfed conditions (Virmani *et al.*, 1991).

In Egypt El-Keredy started the first steps to work in this field since 1993 in the faculty of Agriculture, Kafr El-Sheikh. He reported that utilizing hybrid vigor in rice became important tool to increase rice production (El-Keredy 1993).

The objectives of the present investigation are to study (1) the performance of some introduced cytoplasmic male-sterile lines and restorer lines in Egypt, (2) the possibility to use the Egyptian modern conventional rice cultivars as fertility restorers for hybrid rice production.



REVIEW OF LITERATURE

2. REVIEW OF LITERATURE

2.1. Heterosis:

2.1.1. Agronomic traits:

Saini *et al.* (1974) estimated the heterosis for number of spikelets per panicle in fifteen crosses involving six varieties of rice. Significant heterosis over mid-parents and better parent was found in 12 and 8 cross combinations, respectively. The range of heterosis was from 0.85 to 65.96% over the mid-parents and from -5.98 to 19.67% over the better parent. Jaya x Norin 18 showed the highest heterosis over both mid-parents and better parent for number of spikelets. Significant heterosis over mid-parents and better parent for panicle length was found in 14 and 13 crosses, respectively and the maximum increase over mid-parents and better parent for such trait was 23.08 and 14.18%, respectively.

Aly (1979) estimated the heterosis for plant height in five F_1 hybrids. He found highly significant negative heterosis in three crosses. The highest estimates was -14.24 for the cross Arabi x IR8.

Aly *et al.* (1981) estimated the heterosis for plant height and panicle length using four cultivars; one tall local (Giza 170) and three short introductions from Philippines. They obtained positive significant average heterosis over mid-parent for plant height, while highly significant negative average heterosis over the better parent was detected for panicle length.

Singh and Sinha (1987) estimated the fertility restoration in 40 F_1 hybrids results from 40 rice varieties crossed with the CMS line V20A. They found that 19 varieties were restorers of the cytoplasmic male