شبكة المعلومات الجامعية

بسم الله الرحمن الرحيم

شبكة المعلومـــات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

﴿ قـسـم ﴾

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأفلام قد اعدت دون آية تغيرات

يجب أن

تحفظ هذه الأفلام بعيداً عن الغبار

في درجة حرارة من 15 – 20 مئوية ورطوبة نسبية من 20-40 %

To be kept away from dust in dry cool place of
15 – 25c and relative humidity 20-40 %

بعض الوثائق الأصلية تالفة

بالرسالة صفحات

لم ترد بالأصـــل

STUDIES ON THE COMPLEMENTARY EFFECT OF THE RESISTANCE GENES TO LEAF RUST OF WHEAT

by

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CONTENTS

INTRODUCTION

Wheat is the most important cereal crops in Egypt. In 1997 / 98 the annual cultivated area reached about 2.421 million feddans producing a total of 6.1* million tons of grains.

In Egypt, wheat is liable to be attacked by stem leaf and stripe rusts. Wheat leaf rust is caused by *Puccinia recondita* Rob. ex. Desm. f.sp. *tritici* Eriks. It is widespread on most varieties of wheat grown in Egypt until 1980's. It caused severe losses in grain yield that reached 23 % on some varieties (**Nazim *et al;* 1983**). Moreover, this disease cause a eliminating of many varieties because of their susceptibility to the prevailing virulences. The failure of such varieties was mainly due to the appearance of new virulences which were able to attack them. Therefore, one of the most important and essential studies were to survey and study the distribution frequency of the virulence gene(s) in leaf rust populations. Such information is very useful in planning successful breeding program for leaf rust resistance in Egypt.

Disease resistance is controlled by major or minor genes or both together, however, complementary effect between major genes may enhance the response of a variety; genes at different loci or their products may interact to give higher levels of resistance (**Simons *et al.*, 1978**). This effect requires the presence of two or more genes, reacting for the resistance, to be expressed.

* Statistical report, ministry of Agriculture, 1998.

Complementary gene action as an interaction between the products of two or more genes. Therefore; resistance might be more stable than that caused by a single gene (monogenic resistance). Complementary gene action is commonly used to describe the interdependence of two or more genes, all of which are essential for the ultimate expression of a character **(Hooker, 1967).**

For planning a successful breeding programme to provide more durable resistance, the complementary effect among the leaf rust resistance genes was studied. The crosses among leaf rust monogenic lines and the commercial varieties were carried out.

REVIEW OF LITERATURE

A. Virulence survey

The causal organism of wheat leaf rust is known to be of dynamic state and consists of different physiologic forms.

Mains and Jakson (1926) early described distinct physiologic races of leaf rust using two wheat varieties i.e. Malakof and Kanred. They found 12 physiologic races using a differential series of 11 varieties wheat.

Johnston and Mains (1932) identified 26 physiologic races besides the previously identified races using a differential set of 8 varieties i.e. Malakof, Webster, Carina, Brevit, Loros, Mediterranean, Hussar and Democrat.

Furthermore, many physiologic races were identified in different parts of the world. Also, the basis of races identification and the differential set were revised several times. The differential varieties that were evaluated as standard differentials in **1932 by Johnston and Mains** were revised and accepted as international differential set for physiologic races of wheat leaf rust.

Johnston (1961) recorded 183 races of wheat leaf rust using the standard differential varieties.

Abdel-Hak (1962) and Abdel-Hak and Dessouki (1963) identified the races 184, 186 and 187 from rusted samples collected from Egypt.

Because of some difficults of race identification under controlled temperature in the greenhouse, **Johnston (1956) and Basile (1957)** suggested 27 unified groups using 5 wheat varieties of the standard differential set (cvs. Malakof, Webster, Loros, Mediterranean and Democrat) and droped the cvs. Carina, Brevit and Hussar because of their thermal sensitivety.

Designation of leaf rust resistance genes (Lr's) was started by **Ausemus *et al.* (1946)** through the identification of gene *Lr* 1 in Malakof. The genetic make up or the standard differential varieties were then studied.

Samborski and Dyck (1968) used the avirulence / virulence formulae to describe physiologic specialization in Canada using the standard differential varieties.

Dyck and Samborski (1968) studied the inheritance of leaf rust in seedling stage in the common wheat varieties to races 15 and 161. They isolated resistance genes and incorporated or transferred them to "Thatcher" background.

Although **Dyck and Samborski (1974)** reported the theory of two allelic genes i.e. *Lr* 2a and *Lr* 2c which can be used in two separate breeding programs. These genes can not be used in companion breeding program since isolates virulent on *Lr* 2a would also be virulent on *Lr* 2c.

Since that time the near isogenic lines carrying monogenic lines for leaf rust resistance were used as differentials for race identification in 1968 and 1985 in Canada and USA, respectively.