GENETICS OF GALL MIDGE RESISTANCE IN RICE IN SRI LANKA

by

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THESIS

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Abstract

Emergence of a new biotype (herein referred to as biotype II) of rice gall midge - *Orseolia oryzae* Wood Mason - (Diptera: Cecidomyiidae) virulent to all rice varieties grown during 1980s was first reported from Matale in 1986. By 1989 all gall midge resistant rice varieties released by the Department of Agriculture (DOA) since 1979 became susceptible to the pest throughout the country. The breakdown of gall midge resistance of commercial rice varieties was a major set back to a high priority rice varietal development objectives of the DOA. Since the varietal development for resistance is the most effective and economical control method a series of studies were initiated to, following objectives; 1). determinate the distribution of the rice gall midge biotypes in Sri Lanka, 2). identify resistant sources for the new biotype, 3). study the inheritance of gall midge resistance in rice and 4). develop breeding and selection strategies to incorporate gall midge resistance.

To study the distribution of rice gall midge biotype(s), unemerged rice galls were collected from seven different locations representing major rice growing areas of Sri Lanka. Eighteen rice varieties representing six differential groups (Ptb, Eswarakora, Siam 29, Muey Nahng 62 M, Leuang 152, Ob 677) were exposed separately to each of the gall midge populations obtained from the seven locations. The results indicated the presence of only one biotype (biotype II) of rice gall midge in the seven locations.

Forty five rice varieties known to be resistant to rice gall midge in Asian countries were field evaluated at Rice Research and Development Institute. Eight varieties, MR 1523, Rp 1551-2-7-1, CR 94-13, Ptb 21, Ptb 18, Prathap, Muey Nahng 62 M and CR 95 JR 721-2-1 found to be resistant to gall midge biotype II. Of these, the first six varieties are derivatives of Ptb group of varieties. The rest belonged to Muey Nahng 62M and Leuang 152 groups.

Fifteen crosses were made between some selected varieties resistant to gall midge biotype II and high yielding improved rice varieties. Pattern of segregation of the resistance to gall midge biotype II was studied using F_1, F_2, and F_3 generations of the above crosses under greenhouse and field conditions. The filial generations were advanced on family basis. Crosses made between biotype I (earlier biotype) resistant improved varieties and biotype II resistant varieties showed involvement of one recessive gene in controlling gall midge biotype II resistance. The crosses made between biotype I susceptible improved varieties and biotype II resistant varieties showed involvement of two recessive genes in controlling gall midge biotype II resistance.

In varietal development programmes for rice gall midge resistance, utilization of biotype I resistant improved varieties will be more productive than utilization of biotype I susceptible improved varieties. Furthermore, incorporation of the three identified sources of resistance, (Ptb, Muey Nahng 62 M and Leuang 152 groups) varieties will help alleviate breakdown of gall midge resistance.