CONTANTS

SUMMARY

Rice blast disease caused by *Pyricularia grisea* is one of the most important diseases in Egypt as well as in most of the rice growing countries. This study was conducted to clarify some important aspects concerning determination of Physiological races, correlation between certain susceptible and resistant cultivars and pathogen isolates by polymeraze chain reaction (PCR), time of planting and epidemiology of such disease.

The results obtained could be summarized as follows: -

Isolation of the causal organism of rice blast disease *Pyricularia grisea* was carried out from seven rice commercial cultivars namely Giza 159, Giza 171, Giza 172, Giza 176, Reiho, Sakha 101 and Sakha 104 from Kafr El-Sheikh, Dakahlia, Gharbia, Sharkia, Behieria and Damitta Governorates during 2002 and 2003 growing seasons.

Forty fungal isolates including 37 isolates from rice plants were identified as 6 race groups while three weed isolates were identified as one race on the basis of the international differential varieties.Three weeds serve as a secondary host for rice blast fungus *P. grisea* namely. *Echinochloa crus-galli* L., *Echinochloa colona* L. and *Elusine indica* L. The physiologic races identified from rice isolates were IB (15 %), IC (7.5 %), ID (7.5 %), IF (5.0 %), IG (57.5 %) and IH (7.5 %), while the identified weed race was IG-1 only.

All rice fungal races were able to infect the susceptible rice cultivar (Giza 159, Giza 171, Giza 172, Giza 176 and Reiho), in addition to some

new resistant cultivars (Sakha 101 and Sakha 104). While the isolated weed race was able to infect its original host only and some old susceptible rice cultivars. Race IG-1 identified from some rice and weeds isolated, which represented 57.5 % from, rice and 100 % from weed isolates can be separated further to eight sub-races as IG-1_a, IG-1_b, IG-1_c, IG-1_d, IG-1_e, IG-1_f, IG-1_g and IG-1_h according to its reaction on the tested commercial rice cultivars namely, (Giza 171, Giza 172, Giza 176, Giza 177, Giza 178, Giza 181, Giza 182, Yasmine, Reiho, Giza 159, Sakha 101, Sakha 102, Sakha 103 and Sakha 104).

Genetic diversity of 8 cultivars and 12 isolates using RAPD marker was studied using one primer. The eight fragments were detected in rice cultivars, while the total fragments of 12 isolates were 11 fragments. Genetic relationships among the eight Egyptian cultivars based on RAPD marker were generated. The UPGMA cluster diagram showed that the variation formed two distinct groups. This result of genetic relationships revealed several unique features of the similarity among these 8 cvs. The first unique feature is the high level of diversity among the 8 cvs. It could be concluded that the amount of variation among the RRTC germplasm is enough for selecting and breeding for blast resistance without erosion in the germplasm. Second, it is important for the breeder to measure the amount of variation among the varieties before starting any program of improvement and selection. Third, it is necessary for the breeder not to include the very similar variation in his crosses. The variation among 12 fungal isolates by RAPD marker was due to the locations and pathogenicity.

Late transplanting date (10th July) showed higher blast incidence on leaves and panicle of the two tested cultivars Giza 171 and Giza 176. Giza 171 cultivar was more susceptible with higher number of lesions on leaf infection than that Giza 176, while Giza 176 was more susceptible with higher severity of panicle infection than that Giza 171 therefore, Giza 171 is considered more tolerant than Giza 176. More yield losses due to blast infection were found as a result of the third sowing date and then the second sowing date and then first sowing date. The highest grain yield was obtained from plots protected at vegetative and heading stages with the fungicide Beam.

Studying the disease severity of leaf and panicle blast infection in relation to number of trapped spores of *Pyricularia grisea* and certain meteorological elements at three sowing dates at Sakha station, indicated that the disease severity varied from one sowing date to another depending on meteorological elements and number of trapped spores. Disease severity of leaf infection correlated significantly with Maximum and air temperature, maximum relative humidity, dew period and number of trapped spores. However, number of trapped spores was positively correlated with meteorological elements.

Using different regression equations as models for predicting disease severity on leaf and panicle blast infection and their correlation with weather conditions resulted in proposing general model for Kafr El-Sheikh Governorate which led scout and forecast the disease severity, in addition to the number of trapped spores and its reliability on meteorological data. In addition,

determination coefficients of such models showed high level of acceptability the multifactor model and how it became reliable for such area of rice fields. However, this study could be the first in Egypt in this respect, which is considered of most important in controlling such disease.