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Evaluation of Shallow Low Land Cultivated Rice Accession Against Yellow Stem Borer *Scirpophaga incertulas* Wlk. under Field and Green House Condition

D. PANIGRAHI[1*] AND S. RAJAMANI

Central Rice Research Institute, Cuttack 753006, India
[1]KVK, Angul Orissa University of Agricultural Sciences, Bhubaneswar, India.
**Correspondence*

Abstract

Out of the fifty one shallow low land cultivated accessions evaluated against *Scirpophanga incertulas Wlk* nine nine accession, viz. Mahalaxmi, Mahsuri, Seema, Rambha, Urbasi, Kanchan, Pankaj, Maniram and Ranjeet and four accessions viz, Gayatri, Dharitri, Sonamani and Ramachandi. Showed resistant and moderately resistant reaction respectively at both the vegetative and reproductive stages under both field and green house condition.

Key words : Evaluation, Accessions, *Scirpophanga incertulas Wlk.*, Field and green house condition.

Insect pest complex are one of the major constraints for increasing the productivity of rice, which cause an average yield of loss of about 25—30% (1) Among these, yellow sten borer is the most destructive widely occurring insect pest (2) causing an yield loss of about 1—19% and 38—80% in early and late planted rice crops respectively (3). Host plant resistance is the most feasible and eco-friendly approach to manage this pest in general and lowland rice in particular because it is no-cost, environmentally safe and amenable to fit in IPM strategies (4) Emphasis has been focused on the development of yellow stemborer resistant varieties due to its economical, drable, and non-hazardous effect on human beings and beneficial organisms (5). Keeping this in view, 51 shallow lowland cultivated accession were screened at vegetative and reproductive stages under both field and green house condition at Central Rice Research Institute, Cuttack to identify resistant/moderately resistant accession against this insect to utilize them for development of improved varieties and cultivate them in YSB endemic areas.

Methods

Green House Screening

Earthern pots measuring 8 cm. diameter were filled with well pulverized soil, FYM, basal fertilizer as per the requirement and puddled properly. Ten days old seedlings from, each of the test entries along with susceptible check Purnendu were transplanted at 5 seedlings/pot and were grown up to maximum tillering and mid booting stages for their testing at vegetative and reproductive stages respectively. The pots were fertilized and irrigated as per the requirement and were covered with mosquito net to prevent them from infestation of other insects. Each cultivated accession along with the susceptible checks were replicated ten times for their evaluation at vegetative and reproductive stages. Two freshly hatched larvae were implanted in each tiller of the potted plant with the help of a disinfected camel hairbrush at the maximum tillering and mid-booting stages. Plants are checked for production of dead heart and white ear heads at 10 days and 15 days after infestation respectively and percentage dead heart and white ear head was calculated.

Field Screening

Twenty five days old seedling of early shallow low land cultivated accessions was transplanted at a spacing of 20 × 15 cm with twenty hills/rows and four rows/accessions. After ten rows of test entries, the susceptible check, Purnendu were planted. Recommended agronomic practices were followed as per the requirement and the crop was left insecticide free throughout the cropping season. Five egg masses/

Table 1. Reaction of shallow lowland cultivated accessions of rice against yellow stem borer R—Resistant, MR—Moderately resistant, MS—Moderately susceptible, Susceptible (S), Highly susceptible (HS).

Field Condition.					
Vegetative Stage		Reproductive stage			
Damage (%)	Accessions	Damage (%)	Accessions	SES Score	Remarks
2.9—9.8	Mahsuri, Mahalaxmi, Seema, Samalei, Ranject, Rambha, Manika, CR-1002, Kanchan, Urbasi, Pankaj, Manoharsali, Maniram, Indravati	2.7—4.6	Mahalaxmi, Mahsuri, Seema, Rambha, Kanchan, Urbasi, Maniram, Pankaj, Indravati, Ranjeet, Manika, Prachi, Piolee, Mahanadi, Dinesh	1	R
11.3—19.2	Gayatri, Dharitri, Sonamani, Soubhagya, Kusala, Dinesh, Radha, Ramachandi, Piolee, Mandyvijay, Mahanadi, Prachi	6.1—9.4	Gayatri, Dharitri, CR-1002, Sonamani, Soubhagya, Ramachandi, Kushal, Manoharsali, Samalei	3	MR
20.6—29.2	PR-111, Vibhaba, Soubhagya, Santiphip-3, Pooja, Cr-1014, Lunishree, Moti, Jagannath, Co-46, Kushal	11.8—13.9	Pooja, CR-1014, Jagannath, Pratibha, Vibhaba, Salivahan, Co-46, PR-111, Radha, Mandyvijay	5	MS
32.8—49.8	Salibahan, Sabitri, Rajashree, Madhuri, Padmini, PR-110, Narendra-1, Mahendra, Amulya, Swarna, Bipasa	17.2—24.4	Padmini, Santiphip-3, Amulya, Mahendra, Manasarovar, Madhuri, Narendra-1, PR-110, Nagarjuna, Moti, Sabitri, Lunishree, Swarna, Bipasa	7	S
63.2 & above	Pratibha, Manasarovar, Nagarjuna, PR-111, Sugandha, Punjabbasamati, Nagabalee	28.3 & above	Sugandha, Punjab basmati, PR-111, Nagabalee, Rajashree	9	HS

Table 1. Continued.

Green House Condition				
Vegetative stage		Reproductive Stage		
Damage (%)	Accessions	Damage (%)	Accessions	Remarks
3.1—9.9	Mahalaxmi, Mahsuri, Seema, Samalei, CR-1002, Urbasi, Kanchan, Pankaj, Manoharsali, Maniram, Ranjeet, Rambha	2.1—4.7	Mahalaxmi, Mahsuri, Seema, Rambha, Urbasi, Kanchan, Pankaj, Ranjit, Maniram, Mahanadi, Prachi	R
10.7—18.4	Mahanadi, Dinesh, Gayatri, Dharitri, Indrabati, Prachi, Sonamani, Radha,Mandyvijay, Ramchandi, Piolee, Manika	5.9—8.9	Samalei, Gayatri, Dharitri, Indrabati, Piolee, Sonamani, CR-1002, Soubhagya, Manoharsali, Ramachandi Kushal Mahanadi, Manika, Dinesh	
21.4—28.7	PR-111, Soubhagya, Vibhaba, Santiphip-3, Pooja, CR-1014, Lunishree, Kusala, Moti, Jagannath, Swarna, Bipasa, CO-46	11.3—14.9	Salivahan, Mandybijay, Ramchandi, Santiphip-3, Pooja, Jagannath, CR-1014, Rajashree, Vibhaba, PR-111 Radha, Co-46, Bipasa	

Table 1. Continued.

Green House Condition				
Vegetative stage		Reproductive Stage		
Damage (%)	Accession	Damage (%)	Accessions	Remarks
33.2—50.1	Amulya, Salivahan, Sabitri, Pabitri, Pratibha, Padmini, Narendra-1, Mansarovar, PR-110, Rajashree	16.6—24.2	Pratibha, Padmini, Mahendra, Madhuri, Moti, Narendra-1, Lunishree, Swarna, Sabitri, Amulya, PR-110	S
62.4 & above	Mahendra, Madhuri, Nagarjuna, Nagavalee, PR-111, Sugandha, Punjab basmati	28.4 & above	Manasarovar, Nagarjuna, Rajashree Nagabalee, PR-110, Sugandha, Punjab basmati.	HS

row was fixed on the leaf manually at the maximum tillering and mid booting stages with help of stapler to increase the insect pressure on the test entries along with the susceptible check. Plants are checked for production of dead heart and whit ear heads at 15 days and thirty days after infestation respectively. The percentage of dead heart and white ear heads was calculated. The cultivated accessions were than classified as resistant (R) moderately resistant (MR), moderately susceptible (MS), susceptible (S) and highly susceptible (HS) based on IRRI, SES (6).

Results and Discussion

The evaluation results of 51 shallow low land cultivated accessions presented in Table 1 indicated that nine accessions viz. Mahalaxmi, Mahsuri, Seema, Rambha, Urbasi, Kanchan, Pankaj, Mariram and Renjeet with 2.9—9.8% and 2.7—4.6% damage at vegetative and reproductive stages respectively under field condition and hence with score-1 (6) and 3.1—9.9 and 2.1—4.7% damages at vegetative and reproductive stages respectively under green house (Table 1) condition showed resistant reaction. Four accessions viz. Gayatri, Dharitri, Sonamani and Ramachandi exhibiting 11.3—19.2% and 6.1—9.4% damage at vegetative and reproductive stage respectively under field condition and hence with score-3 (6) and 10.7—18.4 and 5.9—8.9% damages at vegetative and reproductive stages respectively under green house condition (Table 1) showed moderately resistant reaction. CR-1002, Manoharsali and Samalei at vegetable stage with 2.9—9.8% damage under field condition (score-1) and 3.1—9.9% damage under green house condition showed resistant reaction and with 6.1—9.4% damage under field condition (Score 3) and 5.9—8.9% damage under green house condition at reproductive stage (Table 1) showed moderately resistant reaction. Indravati and Manika with 2.9—9.8% and 2.7 to 4.6% damage at vegetative and reproductive stage respectively under field condition and hence with score 1(6) showed resistant reaction and 10.7—18.4% and 5.9—8.9% damage at vegetative and reproductive stages respectively under green house condition showed (Table 1) moderately resistant reaction. Prachi and Mahanadi at reproductive stage exhibiting 2.7—4.6% damage under field condition (score 1) and with 2.1—4.7% damage under green house condition (Table 1) showed resistant reaction and at vegetative stage exhibiting 11.3—19.2% damage under field condition (Score 3) and with 10.7—18.4% damage under green house condition (Table 1) showed moderately resistant reaction. Piolee and Dinesh showed resistant and moderately resistant reaction at reproductive and vegetative stages respectively under field condition but showed moderately resistant reaction at both vegetative and reproductive stage under green house condition (Table 1). Mandyavijay and Radha showed moderately resistant reaction at vegetative stage and moderately susceptible reaction at reproductive stage and Soubhagya and Kushal showed moderately susepetible reaction at vegetative stage and moderately resistant reaction at reproductive stage both under field and green house condition.

Twenty five accessions showed either moderately susceseptible, susceptible or highly susceptible reaction either at one of vegetative or reproductive stages and one of the field or green house condition or at both vegetative and reproductive stages and both the field and green house condition. As reported

earlier shallow low land cultivated accessions live Manika and Rambha showed moderate level of resistant against yellow stem borer. As per present investigation, Rambha showed resistant reaction at both the vegetative and reproductive stages under both field and green house conditions but Manika showed resistance reaction under field conditions but moderately resistance reaction under green house condition at both the vegetative and reproductive stages. The twenty one shallow lowland cultivated accessions mentioned above showing resistant and moderately resistant reaction at vegetative and reproductive stages under both field and green house condition can be used as resistant donors for developing high yielding varieties and can also be cultivated in the yellow stem borer endemic areas to increase the productivity of shallow low land.

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