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SCREENING OF INDIGENOUS RICE (*Oryza sativa* L.) AGAINST GALL MIDGE, STEM BORER, LEAF FOLDER, INSECT PEST AND LEAF BLAST BROWN SPOT DISEASE IN BASTAR REGION

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ABSTRACT
The investigation was conducted S.G. College of Agriculture and Research Station, Jagdalpur, Chhattisgarh. Using 97 genotypes during *Kharif* 2016 tested against different insect pests, in gall midge, 55 were free, 1 exhibited 1 score, 20 and 21 were 3 and 5 score. For stem borer, 69 having 0 score. Remaining was 1 score. For leaf folder, 6 were free, 88 and 3 were 1 and 3 score. From the result, out of 97 genotypes tested against different insect pests, 55, 69 and 3 promising entries against gall midge, stem borer and leaf folder. Out of 97 genotypes, 7 free from leaf blast and 0-1 % percent disease incidence (PDI) while, 15, 23, 20 and 32 exhibited 2-10 %, 11-20 %, 21-30, > 30 % were PDI respectively. For brown spot, 15 having 0-1% PDI, 20 with 2-10 %, 24 with 11-20 %, 12 with 21-30% and 26 with >30 % PDI respectively. From the result, it was concluded that out of 97 genotypes tested against diseases, 7 and 15 promising entries for leaf blast and brown spot. The desirable traits from these sources can be merged into elite entries with higher yield potential or exploited for advanced genetic analysis studies.

INTRODUCTION

Rice (*Oryza sativa* L.) is one of the important cereal crops of the world and forms the staple food for more than 50 per cent of population.Screening is the primary method for identify of resistance donors further these isolated genotypes should be used for field screening then after identify the responsible gene for resistance. In this way, an attempt has been made in this study to examine the mass screening, probing marks and honeydew excretion for identification of new source of resistance against BPH. (Joshi *et al*., 2015) and India ranks second in rice production next to China (Chowdhury *et al*., 2014). The total area under rice cultivation is globally estimated to be 162 million hectares with annual global production for 2016 at 745.5 million tonnes (495.2 million tonnes, milled basis) (Anonymous, 2016). Rice is life, for most people living in Asia

Indigenous varieties are rapidly being lost due to changes in land use and agricultural practices, which favour agronomically improved varieties. In order to develop suitable detailed understanding of these varieties in necessary. The old and existing landraces are important genetic resources of region having the quality for climate resilient agriculture in consideration of moisture stress, insects, diseases etc. The Germplasm Section at Shaheed Gundadhoor College of Agriculture & Research Station Kumhrawand, Jagdalpur maintains a collection of more than 390 accessions, which is biggest in Bastar. The collection was collected and conserved as biological treasure from overall Bastar division. The collection includes traditional cultivars like Safari, Gurmatia, BhataMokdo, Chudi Dhan, Kalimoonch, Laicha *etc*. are according to the traditional healers of Bastar region many of these medicinal rice varieties are used in traditional medicine system for treatment of rheumatism, skin infections, paralysis, diabetes *etc*. (Das and Oudhia, 2001).

For the development of economically high-yielding varieties with all of the desirable agronomic traits it is also important to consider other characteristics when selecting the parental material such as aspects related to difference in grain type and shape, plant height, resistance to biotic and abiotic stresses like Brown planthopper (BPH), *Nilaparvata lugens* (Stal) (Hemiptera: Delphacidae) is a typical piercing sucking insect pest of rice (*Oryza sativa* L.; Poaceae), which feeds on phloem sap and thus affects the growth of rice and results in "hopper burn" in rice fields (Park *et al*., 2008). In addition to direct damage, BPH also transmits viruses, such as the ragged stunt

virus and grassy stunt virus, and associated diseases to rice plants (Jena *et al.*,2006).Attempts to control brown planthopper with chemical pesticides have given rise to many problems, including elimination of natural predators, environmental pollution, resurgence and outbreak (Balakrishna and Satyanarayana, 2013) Keeping these points in view, to find out suitable genotypes or donor to meet any current or future demand for improvement of the rice crop, various indigenous rice genotypes are identified.

MATERIALS AND METHODS

The experiment was carried out at Research cum Instructional Farm, S.G. College of Agriculture and Research Station, Kumhrawand, Jagdalpur, Bastar, Chhattisgarh, India. The experimental materials were received from rice breeding section of S.G. College of Agriculture and Research Station, Jagdalpur, Bastar, Chhattisgarh. The experiment was conducted during *Kharif* 2016 in RBD Design to the screening of 94 local landraces of rice (*Oryza sativa* L.) and3 popular standard checks namely MTU-1010, Danteshwari and CR-40 (Table 1). The observations for incidence of major insect and disease of rice was total tillers, total leaves, rice stem borer (dead heart per hill), number of folded leaves per hill, number of brown plant hopper per hill, number of silver shoots per hill, leaf blast area covered on a hill with related scale and brown spot area covered on a hill with related scale were recorded. And genotypes were tested against gall midge, stem borer leaf folder, leaf blast and brown spot.The list of characters along with descriptor is mentioned in (Table 2).The data recorded on ninety four local landraces of rice and three popular standard checks for incidence of major insect and disease of ricewere subjected to find out the promising entry from entire genotypes for the disease Percent disease incidence (PDI) was calculated by the using observed and recorded disease scale of blast and brown spot its formula was developed by (Mckinney, 1923).

RESULTS AND DISCUSSION

In gall midge infestation, out of ninety seven genotypes, fifty five genotypes were free from the attack of gall midge insects.

Table1: List of ninety four local landraces of rice and three popular standard checks used in the present study

Entry No.	Genotype Name	Entry No.	Genotype Name
1	Ragovati	20	Narial
2	Hiranbako	21	Noni dhan
3	Band kari	22	Kal tut masilo
4	Baktichudi	23	Kari chudi
5	Ram jeera	24	Bghalmijo
6	Bans koria	25	Bhukukuda
7	Bariadhan	26	Koogdhan
8	Mayurfunda	27	Kapoorsai
9	Loktimachhi	28	Baku dhan
10	Pat dhan	29	Bhatadubraj
11	Surmatia	30	Sagipareta
12	Sendursenga	31	Haldighati
13	Tikichudi	32	Tama koni
14	Anjani	33	Bhasampatti
15	Kadamphool	34	Dumarphool
16	Sona sari	35	Bode bargi
17	Cheptigurmutiya	36	Kava padi
18	Bhatamokdo	37	Koorlu mundi
19	Kukdamor	38	Angadhan

Table 1: Cont.....

Entry No.	Genotype Name	Entry No.	Genotype Name
39	Lankeshri	67	Hisyadhan
40	Rami gali	68	Chagdikaj
41	Bhatagadakhuta	69	Dokramecha
42	Raikera	70	Barhasal
43	Kurlikabri	71	Kala umari
44	Altimijo	72	Kakdakdo
45	Alamdhan	73	Bargidhan
46	Ghaghardhan	74	Koosumjhopa
47	Mudria	75	Bas koriya
48	Kari khuji	76	Mankidhan
49	Dumarphool	77	Bhatakanai
50	Pharsaphool	78	Bhaludubraj
51	Hathipanjra	79	Basomati
52	Karmaribhog	80	Rang gadakhuta
53	Godavari	81	Ghdvaphool
54	Kari gudi	82	Son pari

Table 1: Cont.....

Entry No.	Genotype Name	Entry No.	Genotype Name
55	Dogarkanri	83	Mundrachudi
56	Bhanvargedi	84	Mehardhan
57	Machidhan	85	Kormel
58	Dhabdadhan	86	Gogalsathka
59	Kura dhan	87	Dogarkabri
60	Bhans path	88	Lalmakdo
61	Barangi	89	Mohadhan
62	Goyadi	90	Laycha
63	Ram bhog	91	Godandi
64	Aajandhan	92	Hare krishna
65	Masurlochia	93	Tagandhan
66	Aasanchudi	94	Machhalipoti
CH1	MTU1010	CH3	CR40
CH2	Danteshwari		

Note: CH = check variety

Table 2: Description of major insect and diseases of rice incidence.

S.No.	Injury Caused By	Scale	Description
1	Brown Plant Hopper (BPH) (*Nilaparvata lugens)*		No.of insect/hill
		0	Nill.
		1	<5 insect /hill.
		3	5.1-10.1 insect/hill
		5	10.1-20 insect/hill
		7	20.1-40 insect/hill
		9	>40 insect/hill
2	Stem Borers (SB) (*Scirpophaga incertulas*)		(Dead hearts)
		0	No injury
		1	1-10%
		3	11-20%
		5	21-30%
		7	31-60%
		9	61% and above
3	Leaf folder (LF)		(Injured plants)
		0	No injury
		1	1-10%
		3	11-20%
		5	21-35%
		7	36-50%
		9	51-100%
4	Gall Midge (GM) (*Orseolia oryzae)*		(Infected tillers)
		0	No injury
		1	Less than 1%
		3	1-5%
		5	6-10%
		7	11-25%
		9	More than 25%

Table 2: Cont....

S.No.	Injury Caused By	Scale	Description
5	Brown Spot (BS)		(Severity: % leaf area diseased)
		0	No disease observed
		1	Less than 1%
		2	1-3%
		3	4-5%
		4	6-10%
		5	11-15%
		6	16-25%
		7	26-50%
		8	51-75%
		9	76-100%
6	Leaf Blast	SCALE	(Lesion type)

Table 2: Cont....

S.No.	Injury Caused By	Scale	Description
		0	No lesions observed
		1	Small brown specks of pinpoint size or larger brown specks without sporulating centre
		2	Small roundish to slightly elongated, necrotic grey spots, about 1-2 mm in diameter with a distinct brown margin and lesion are mostly found on the lower leaves.
		3	Lesion type is the same as in scale 2, but significant number of lesions is on the upper leaves.
		4	Typical sporulating blast lesion, 3 mm or longer, infecting less than 2% of the leaf area.
		5	Typical; blast lesion infecting 2-10% of the leaf area.
		6	Blast lesion infecting 11-25% leaf area.
		7	Blast lesion infecting 26-50% leaf area.
		8	Blast lesion infecting 51-75% leaf area.
		9	More than 75% leaf area affected.

Table 3: Name of promising entries for Gall midge, Stem borer and leaf folder from 97 genotypes of rice.

S. No.	Name of pest	Name of promising entry
		Ragovati, Band kari, Baktichudi, Pat dhan, Surmatia, Cheptigurmutiya, Bhatamokdo, Kukdamor, Narial, Noni dhan, Kal tut masilo, Kari chudi, Bghalmijo, Bhukukuda, Koogdhan, Kpoorsai, Baku dhan, Bhatadubraj,Tamakoni, Bhasampatti, Kava padi, Angadhan, Lankeshri, Rami gali, Bhatagadakhuta, Kurlikabri, Altimijo, Ghaghardhan, Mudria, Pharsaphool, Godavari, Dogarkanri, Dhabdadhan, Bhans path, Barangi, Aajandhan, Masur lochia, Aasanchudi, Hisyadhan, Kala umari, Kakdakdo, Bhatakanai, Bhaludubraj, Ghdvaphool, Son pari, Mehardhan, Gogalsathka, Dogarkabri, Lalmakdo, Laycha, Godandi, Tagandhan, MTU1010, Danteshwari, CR40.
1	Gall midge	Ragovati, Band kari, Baktichudi, Pat dhan, Surmatia, Cheptigurmutiya, Bhatamokdo, Kukdamor, Narial, Noni dhan, Kal tut masilo, Kari chudi, Bghalmijo, Bhukukuda, Koogdhan, Kpoorsai, Baku dhan, Bhatadubraj, Tama koni, Bhasampatti, Angadhan, Lankeshri, Bhatagadakhuta, Altimijo, Ghaghardhan, Mudria, Pharsaphool, Godavari, Dogarkanri, Bhans path, Barangi, Kakdakdo, Bhatakanai, Ghdvaphool, Gogalsathka, Dogarkabri, Lalmakdo, Laycha, Godandi, Tagandhan, MTU1010, Danteshwari, CR40, Dumarphool, Hiranbako, Ram jeera, Bans koria, Bariadhan, Loktimachhi, Tikichudi, Anjani, Kadamphool, Sona sari, Bode bargi, Koorlu mundi, Hathipanjra, Mohadhan, Machhalipoti, Sendursenga, Sagipareta, Haldighati, Kura dhan, Ram bhog, Dokramecha, Barhasal, Basomati, Mundrachudi, Kormel, Hare Krishna.
2	Stem borer	
3	Leaf folder	Mudria, arangi, Bode bargi, Koorlu mundi, Goyadi, Koosumjhopa.

Table 4: Reaction of 97 local landraces of rice along with checks for resistance to rice leaf blast under natural condition.

Leaf blast percent disease incidence (%)	Disease reaction	Number of genotypes	Name of genotypes
0.0-1.0	Highly resistant (HR)	7	Surmatia, Tikichudi, Anjani, Kadamphool, Tama koni, Dumarphool, Bode bargi
2.0-10.0	Resistant (R)	15	Bhukukuda, Hiranbako, Band kari, Baktichudi, Ram jeera, Sendursenga, Cheptigurmutiya, Koorlu mundi, Angadhan, Dhabdadhan, Bans koria, Bariadhan, Mayurfunda, Loktimachhi, Pharsaphool
11.0-20.0	Moderately resistant(MR)	23	Hathipanjra, Basomati, MTU1010, Kukdamor, Bhatagadakhuta, Altimijo, Dogarkanri, Hisyadhan, Kakdakdo, Danteshwari, CR40, Raikera, Dumarphool, Ragovati, Kal tut masilo, Aajandhan, Rang gadakhuta, Noni dhan, Haldighati, Kari khuji, vDokramecha, Bas koriya, Mundrachudi
21.0-30.0	Susceptible(S)	20	Sona sari, Sagipareta, Kurlikabri, Alamdhan, Son pari, Ghaghardhan, Kura dhan, Aasanchudi, Barhasal, Ghdvaphool, Dogarkabri, Bhatadubraj, Kari gudi, Masur lochia, Lalmakdo, Kari chudi, Bghalmijo, Kava padi, Karmaribhog, Hare krishna
>30.0	Highly susceptible (HS)	32	Mudria, Bhanvargedi , Rami gali, Barangi, Kala umari, Narial, Kpoorsai, Goyadi, Ram bhog, Bhatamokdo, Bhasampatti, Pat dhan, Baku dhan, Bargidhan, Koosumjhopa, Gogalsathka, Lankeshri, Godandi, Godavari, Mankidhan, Chagdikaj, Bhatakanai, Koogdhan, Mohadhan, Bhans path, Kormel, Laycha, Machidhan, Bhaludubraj, Mehardhan, Tagandhan, Machhalipoti

While, one genotypes i.e. Dumarphool exhibited one damage score. Remaining twenty and twenty one genotypes were scored three and five damage score, respectively. For stem borer infestation, sixty nine genotypes having zero damage

Table 5: Reaction of 97 local landraces of rice along with checks for resistance to rice brown spot under natural condition.

Brown spot percent disease incidence (%)	Disease reaction	Number of genotypes	Name of genotypes
0.0-1.0	Highly resistant (HR)	15	Haldighati, Kurlikabri, Godavari, Kura dhan, Barangi, Ram bhog, Kala umari, Mankidhan, Kormel, Gogalsathka, Lalmakdo, Mohadhan, Laycha, Godandi, Hare Krishna.
2.0-10.0	Resistant (R)	20	Hathipanjra, Dogarkabri, Danteshwari, Noni dhan, Karmaribhog, Kari chudi, Koorlu mundi, Angadhan, Rami gali, Mudria, Dhabdadhan, Aasanchudi, MTU1010, Hiranbako, Narial, Bhatakanai, Bhaludubraj, Rang gadakhuta, Mehardhan, CR40.
11.0-20.0	Moderately resistant(MR)	24	Baktichudi, Bhatagadakhuta, Goyadi, Aajandhan, Chagdikaj, Sona sari, Sagipareta, Tama koni, Lankeshri, Raikera, Kadamphool, Cheptigurmutiya, Kari gudi, Machidhan, Barhasal, Bargidhan, Koosumjhopa, Tagandhan, Machhalipoti, Ragovati, Bhasampatti, Alamdhan, Dokramecha, Hisyadhan
21.0-30.0	Susceptible(S)	12	Pat dhan, Surmatia, Dumarphool, Masur lochia, Ghdvaphool, Ram jeera, Tikichudi, Kukdamor, Bas koriya, Mundrachudi, Kakdakdo, Bariadhan.
>30.0	Highly susceptible (HS)	26	Sendursenga, Bhatamokdo, Baku dhan, Bhatadubraj, Bhukukuda, Kava padi, Ghaghardhan, Bhanvargedi, Kal tut masilo, Mayurfunda, Bghalmijo, Dogarkanri, Anjani, Dumarphool, Pharsaphool, Bhans path, Basomati, Kpoorsai, Bode bargi, Koogdhan, Altimijo, Band kari, Kari khuji, Son pari, Bans koria, Loktimachhi

score. Remaining genotypes were grouped under one damage score. For leaf folder infestation, six genotypes showed zero damage score. However, eighty eight genotypes obtained one damage score and remaining three genotypes scored three damage score. Among the sucking insect pest, observation was also recorded on brown plant hopper (BPH) population. None of the genotypes exhibited zero damage score due to less BPH population. From the result, it was concluded that out of ninety seven genotypes tested against different insect pests, fifty five, sixty nine and three genotypes were categorized at most promising entries against gall midge, stem borer and leaf folder (Table 3). In leaf blast infestation, out of ninety seven genotypes, seven genotypes were free from the occurrence of leaf blast infestation and 0-1.0 % percent disease incidence (PDI) score while, fifteen genotypes exhibited 2.0-10.0 % PDI score, twenty three genotypes was 11.0-20.0 % PDI score, twenty genotypes are 21.0-30.0 %, remaining thirty two genotypes were scored more than 30.0 % PDI score. For brown spot infestation, fifteen genotypes having 0-1.0% PDI score, twenty genotypes with 2.0-10%, twenty four genotypes with 11.0-20.0%, twelve genotypes with 21.0-30.0% PDI score respectively, whereas remaining genotypes were grouped in more than 30.0 % score. From the result, it was concluded that out of ninety seven genotypes tested against leaf blast and brown spot disease, seven and fifteen genotypes were categorized at most promising entries against leaf blast and brown spot disease (Table 4 and 5).In the present study about the incidence of major insect and disease of rice, similar findings were also reported by the earlier workers (Pasha *et al.;* 2013) reported results higher level of resistance to leaf and panicle blast genotypes. (Tripathi and Saxena, 2013) reported results thatafter 60 DAS, Pusa basmati was recorded to be the highest infested variety having, 5.3 per m^2 and PA-6201 having 1.4 per m^2 incidence, being the lowest infested one. After 75 DAS Pusa basmati remained with highest incidence as 2.55 per m^2 and PA-6201 as 0.1 per m^2, the lowest incidence.

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