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## Screening of advanced lines of slender rice against major diseases of rice under natural Conditions and their yield performance

**Sandeep Bhandarkar, PK Tiwari, B Sharma, SK Nair, D Sharma and AK Sarawgi**

### Abstract

In Chhattisgarh, rice occupies average of 3.6 million ha. With the productivity of the state ranging between 1.2 to 1.6 t/ha depending upon the rainfall. The state is comprised with three agro-ecological zones i.e. Chhattisgarh plain, Bastar plateau and northern hill region of surguja. Chhattisgarh is famous for its diversity of rice. In every district of CG specific traditional rice is famous, which is locally grown by the farmers and very much popular among the local peoples for consumption in daily diet. These varieties are locally adapted by farmers and grown as traditional rice by the farmers, such traditional aromatic varieties are very poor in yield due to low test weight, lodging losses, unawareness regarding fertilizer use, spacing and susceptibility to diseases and pests. Looking to poor yield response of traditional aromatic varieties, new crossed were attempted between high yielder, biotic stress susceptible/tolerant genotypes with traditional aromatic lines in the past and their advanced lines are developed. These prominent advanced long slender and medium slender lines were screened under natural conditions against major diseases of rice. Sixty eight long slender and medium slender advanced rice genotypes along with eleven checks namely Indira Sugandhit Dhan 1, Pusa basmati-1, IR 64, Chandrasahini, Indira Sona, Badsha Bhog, Chinnor, Mahisugandha, Dubraj, Shamjeera and Vishnu bhog were evaluated in field condition for yield and major diseases of rice prominent at Chhattisgarh during kharif 2014. Entries AS 996-HR 1, R 1656-1936-1-1-800-1, R 1656-2821-1-3245-1 and R 1629-234-6-1883-1 had exhibited moderately resistant reaction (score-5) against BLB whereas rest of the varieties showed susceptible to highly susceptible reactions for the disease. Under natural conditions, none of the genotype showed highly resistant reaction against sheath rot. Whereas, genotypes R 1656-1936-1-1-800-1, PR 26703-3B-PT25, R 1679-1860-1-783-1 and RSR 2011B-12-1 were found for resistant reactions (score-3) for sheath rot disease. Three genotypes namely, R 1656-3173-1-415-1, R 1545-184-3-22-1 and RRF 75 were showed highly resistant reaction for sheath blight. Hybrid check Indira Sona (6385 kg/ha.) was highest yielder followed by IR 84887-B-15 (5847 kg/ha.), R 1700-308-3-170-1 (5653 kg/ha.), IR 83376 B-B 110-3 (5484 kg/ha.) and R 1917-951-1-541-1 (5483 kg/ha.). All top five yielder entries were susceptible against BLB, Sheath rot and Sheath blight diseases except entries R 1700-308-3-170-1 and R 1917-951-1-541-1, which was resistant against sheath blight.

**Keywords:** slender rice, major diseases of rice, diseases and pests

### Introduction

It covers about one-third of geographical area of undivided Madhya Pradesh. The Chhattisgarh extends south east of Madhya Pradesh from 17° 46' N to 24° 5' N latitude and from 80° 15' E to 84° 20' E longitude. Chhattisgarh has a tremendous agricultural potential with a diversity of soil and climate, mountains, plateau, rivers, natural vegetation and forest. It is unique in sense in many ways. It has no seas and no connection with Himalaya and yet it has hilly and mountains with big rivers. The temperature goes down up to 1 °C in Chilpi and Surguja. The rainfall ranges from 800 mm to 1700 mm in different years. Diversified crops and cropping systems are the typical characteristics of Chhattisgarh. Rice is the major crop of the region, on the other hand kharif potato are being grown in plateau area of northern hills, while in Bastar plateau, crops like coconut, coffee and wide range of tuber crops, spices and medicinal plants are being grown. The state is known for rich forest of sal and teak wood, rich in mineral wealth and having tribal dominated population. Chhattisgarh has about 35 big and small tribes inhabiting the state. The cropping system of the state is mainly rain dependent. Mahanadi is the principal river of the state. The other major rivers are-Shivnath, Hosdeo, Mand, Ebb, Pairi, Jonk, Kelo, Indrawati, Arpa and Maniyari.

Rice is an important crop grown in nearly 44 million ha of land in the country with the productivity of 2.2 t/ha which is less than the productivity of many countries. Annual population growth rate of the country is nearly 1.8% and if per capita consumption of rice is

expected to be 400 gm of rice per day then the demand for rice in 2025 will be 130 m. tonnes. In Chhattisgarh, rice occupies average of 3.6 million ha. With the productivity of the state ranging between 1.2 to 1.6 t/ha depending upon the rainfall. The state is comprised with three agro-ecological zones i. e. Chhattisgarh plain. Bastar plateau and northern hill region of surguja. These zones have huge variations in terms of soil topography, rainfall intensity and distribution, irrigation and adoption of agricultural production system and thus varies in the productivity of rice in these regions.

Chhattisgarh is famous for its diversity of rice. In every district of CG specific traditional rice is famous, which is locally grown by the farmers and very much popular among the local peoples for consumption in daily diet. These varieties are locally adapted by farmers and grown as traditional rice by the farmers, such traditional aromatic varieties are very poor in yield due to low test weight, lodging losses, unawareness regarding fertilizer use, spacing and susceptibility to diseases and pests. Looking to poor yield response of traditional aromatic varieties, new crossed were attempted between high yielder, biotic stress susceptible/tolerant genotypes with traditional aromatic lines in the past and their advanced lines are developed. These prominent advanced long slender and medium slender lines were screened under natural conditions against major diseases of rice.

### Materials and Methods

Sixty eight long slender and medium slender advanced rice genotypes along with eleven checks namely Indira Sugandhit Dhan 1, Pusa basmati-1, IR 64, Chandrahasini, Indira Sona, Badsha Bhog, Chinnor, Mahisugandha, Dubraj, Shamjeera and Vishnu bhog were evaluated in field condition for yield and major diseases of rice prominent at Chhattisgarh during kharif 2014. 21 days old seedlings of the test variety were transplanted in 6.0 x 1.6=9.6 m<sup>2</sup> plots. The spacing between plants to plant was 15cm and row to row was 20cm. The experiment was laid in Randomized Block Design (RBD) with two replications. Recommended dose of fertilizer was applied @ N P K /ha. Total P was given as first basal dose. All standard agronomical practices were applied during the crop season for its normal development. The Incidence of diseases, their intensities are to be recorded from the first diseases symptoms till the physiological maturity at 7 days intervals. In case of foliar diseases i.e. Observations on severity of sheath blight (*Rhizoctonia solani*) and bacterial leaf blight (*Xanthomonas oryzae* pv. *oryzae*) is recorded based on percentage of leaf /sheath area covered by particular disease. At any crop stage, the physiologically active leaves in each tiller of a hill has been taken for assessing the severity to arrive at the average for each hill and there after for all the hills in each sampling unit. In case of sheath rot (*Soracladium oryzae*) disease record the no. of percent panicle/sq. m affected. Score for the diseases in the particular varieties adopting SES scale. Lot of diversity in cultivated as well as its wild relative's prominent in the state. All three agroclimatic zones of Chhattisgarh have traditional rice varieties famous in that area for their good test and aroma and in much demand by the consumers. Since in some parts of the state the rice crop is grown twice or even thrice, the pressure of diseases and pests in irrigated rice is very much almost every year. Meteorological factors are the most important elements in the epidemiology of rice disease. Normal regular distribution of rains combine with cloudy weather make suitable moisture and temperature conditions favourable for natural infection of

diseases and which is better for natural screening purpose, Blast, bacterial leaf blight, sheath blight, sheath rot, and brown spot are the major diseases of the state. Most of the long and medium slender rice genotypes were crossed and advanced at Raipur. These genotypes were also evaluated against mentioned diseases in the kharif 2014. Observations were recorded under natural conditions.

### Results and discussion

Entries AS 996-HR 1, R 1656-1936-1-1-800-1, R 1656-2821-1-3245-1 and R 1629-234-6-1883-1 had exhibited moderately resistant reaction (score-5) against BLB whereas rest of the varieties showed susceptible to highly susceptible reactions for the disease. During the present study no genotype was found to be free from BLB disease. Long duration of rainy days and cloudy conditions favours the development of disease. This observation is in accordance of the findings of Tasleem-uz-Zaman *et al.* (2000) and Thimmegowda *et al.* (2011). Meena and Ramamoorthy *et al.* (2000). Kotasthane and Agrawal (1991) revealed that out of 278 entries, 33 entries were highly resistant score 1; 66 entries were resistant with score 3; 82 entries were moderately resistant with score 5 and remaining 97 entries were in susceptible group with score 7 and above during their study at Raipur.

Under natural conditions, none of the genotype showed highly resistant reaction against sheath rot. Whereas, genotypes R 1656-1936-1-1-800-1, PR 26703-3B-PT25, R 1679-1860-1-783-1 and RSR 2011-12-1 were found for resistant reactions (score -3) for sheath rot disease, rest of the genotypes showed susceptible to highly susceptible reactions for the disease sheath rot. (Table-2). These results confirms the findings of Mukerjee *et al.* (1980) Anonymous (2010) and Tiwari *et al.* (2014) who also reported resistance in aromatic entries against sheath rot disease in rice. Three genotypes namely, R 1656-3173-1-415-1, R 1545-184-3-22-1 and RRF 75 were showed highly resistant reaction for sheath blight and Thirty three genotypes namely R 1656-1936-1-1-800-1, R 1679-1860-1-783-1, R 1629-234-6-1883-1, R 1904-398-6-371-1, R 1706-2311-4-2432-1, R 1698-168-1-76-1, R 1607-321-1-34-1, R 1630-1237-2-827-1, R 1536-136-1-77-1 (21842), R 1930-397-1-364-1, R 1656-2815-9-3223-1, Badsha Bhog, Mahisugandha, Shamjeera, Vishnu bhog, R 1747-4941-1-515-1, IR 86871-3-3-1-1, R 2034-479-532-1, R 2020-338-2-291-1, R 1877-268-2-188-1, Indira Sugandhit Dhan 1, R 1656-428-10-1955-1, RS 2011-201, Ganjeikalli, IET 21053 (NDR 9542), R 1656-3171-414-1, R 1904-398-5-370-1, R 1700-308-3-170-1, R 1700-309-1-171-1, R 1750-937-1-530-1, R 1779-320-1-111-1 and IR 77537-24-1-1-3 showed resistant reaction against Sheath blight, whereas rest of the entries showed moderately resistant, moderately susceptible and susceptible reaction against Sheath blight infection, respectively (Table-2). Silva *et al.* (2012) and Tiwari *et al.* (2014) also reported resistance against sheath blight in traditional rice varieties.

Sixty eight long slender and medium slender advanced rice genotypes along with eleven checks namely Indira Sugandhit Dhan 1, Pusa basmati-1, IR 64, Chandrahasini, Indira Sona, Badsha Bhog, Chinnor, Mahisugandha, Dubraj, Shamjeera and Vishnu bhog were also evaluated for grain yield. Hybrid check Indira Sona (6385 kg/ha.) was highest yielder followed by IR 84887-B-15 (5847 kg/ha.), R 1700-308-3-170-1 (5653 kg/ha.), IR 83376 B-B 110-3 (5484 kg/ha.) and R 1917-951-1-541-1 (5483 kg/ha.). All top five yielder entries were susceptible against BLB, Sheath rot and Sheath blight diseases except entries R 1700-308-3-170-1 and R 1917-951-1-541-1,

which was resistant against sheath blight.

**Table 1:** Reactions of advanced lines of long slender and medium slender rice against major diseases of rice under natural conditions and grain yield.

Entries		Bacterial leaf blight	Sheath rot	Sheath blight	GY (kg/ha)
1	R 2020-338-2-291-1	7	9	3	4207
2	R 1904-398-5-370-1	9	9	3	4038
3	R 1904-398-6-371-1	7	7	3	3892
4	R 1915-426-2-454-1	7	9	9	4340
5	R 2054-563-1-669-1	7	9	5	3563
6	R 1595-13-1-5-1	7	9	5	4017
7	R 1530-130-1-68-1	7	9	5	4618
8	R 1706-2311-4-2432-1	7	7	3	4983
9	R 1698-168-1-76-1	7	7	3	4068
10	R 1625-1211-2-765-1	9	7	9	5243
11	R 1700-302-1-156-1	7	9	5	5017
12	R 1700-308-3-170-1	9	9	3	5653
13	R 1700-309-1-171-1	9	9	3	5333
14	R 1750-937-1-530-1	9	9	3	5097
15	R 1757-540-3-286-1	9	9	7	3705
16	R 1779-320-1-111-1	9	9	3	4368
17	R 1938-620-1-163-1	9	9	5	4215
18	R 1700-2240-4-2295-1	9	9	5	5403
19	R 1747-4941-1-515-1	9	7	3	5156
20	R 1695-2152-2-269-1	9	7	7	5226
21	IR 83376 B-B 110-3	9	7	7	5484
22	IR 84887-B-15	9	9	5	5847
23	R 1661-605-84-1	7	9	7	4646
24	R 1984-241-1-148-1	9	9	7	4052
25	CR 2702	7	9	5	3859
26	AS 996-HR 1	5	9	5	4590
27	R 2032-462-1-501-1	9	7	7	4194
28	IR 86871-3-3-1-1	9	7	3	4840
29	RRF 75	9	9	1	1368
30	R 1875-229-2-126-1	7	9	5	3799
31	R 1877-268-2-188-1	7	9	3	4139
32	R 2032-456-1-490-1	7	9	7	4472
33	R 2034-479-532-1	9	7	3	4507
34	R 1921-501-2-571-1	9	9	7	3325
35	R 1923-536-2-639-1	9	7	5	4502
36	R 1923-536-4-641-1	9	7	5	4719
37	R 1918-912-1-559-1	9	7	7	4406
38	R 1917-951-1-541-1	9	7	5	5483
39	R 1919-573-1-160-1	9	7	5	4281
40	IR 77537-24-1-1-3	9	9	3	5014
41	PR 26703-3B-PT25	7	5	5	5031
42	Indira Sugandhit Dhan 1	7	9	3	3993
43	Pusa basmati-1	9	9	5	3649
44	IR 64	9	9	7	5083
45	Chandahasini	7	9	7	4622
46	Indira Sona	9	9	5	6385
47	R 1751-99-1-4-1	9	9	7	3216
48	R 1751-99-2-5-1	9	9	7	3213
49	R 1630-33-1-23-1	7	9	7	4377
50	R 1679-1860-1-783-1	7	5	3	2650
51	R 1656-1936-1-1-800-1	5	5	3	3593
52	R 1698-2219-4-280-1	7	9	7	3414
53	R 1656-78-1-47-1	7	9	5	3586
54	CR 2713-11	7	9	5	4213
55	R 1679-1843-1-774-1	7	7	7	4012
56	R 1595-17-3-10-1	7	9	5	2407
57	R 1545-184-3-22-1	7	9	1	3241
58	R 1656-428-10-1955-1	7	9	3	3599
59	RS 2011-201	7	9	3	2043
60	R 1926-1013-2-595-1	7	7	5	3968
61	R 1656-2821-1-3245-1	5	9	5	3485
62	R 1607-321-1-34-1	7	7	3	4590
63	R 1629-234-6-1883-1	5	7	3	3852
64	R 1656-3173-1-415-1	7	7	1	3444

65	Ganjeikalli	7	9	3	4500
66	R 1630-1237-2-827-1	7	7	3	4590
67	IET 21053 (NDR 9542)	7	9	3	5346
68	R 1536-136-1-77-1 (21842)	7	7	3	4046
69	R 1930-397-1-364-1	7	7	3	3372
70	R 2093-1536-1-660-1	9	9	5	4864
71	R 1656-3171-414-1	7	9	3	3358
72	R 1656-2815-9-3223-1	7	7	3	3642
73	RSR 2011-12-1	7	5	5	2772
74	Badsha Bhog	7	7	3	1512
75	Chinnor	7	7	5	2565
76	Mahisugandha	7	7	3	3627
77	Dubraj	7	7	5	3019
78	Shamjeera	7	7	3	1441
79	Vishnu bhog	7	7	3	3228

**Table 2:** Responses of advanced lines of long slender and medium slender rice to different diseases

	<b>BLB</b>	<b>Sheath rot</b>	<b>Sheath blight</b>
Highly Resistant (1)	Nil	Nil	3 (R 1656-3173-1-415-1, R 1545-184-3-22-1 and RRF 75)
Resistant (3)	Nil	Nil	33 (R 1656-1936-1-1-800-1, R 1679-1860-1-783-1, R 1629-234-6-1883-1, R 1904-398-6-371-1, R 1706-2311-4-2432-1, R 1698-168-1-76-1, R 1607-321-1-34-1, R 1630-1237-2-827-1, R 1536-136-1-77-1 (21842), R 1930-397-1-364-1, R 1656-2815-9-3223-1, Badsha Bhog, Mahisugandha, Shamjeera, Vishnu bhog, R 1747-4941-1-515-1, IR 86871-3-3-1-1, R 2034-479-532-1, R 2020-338-2-291-1, R 1877-268-2-188-1, Indira Sugandhit Dhan 1, R 1656-428-10-1955-1, RS 2011-201, Ganjeikalli, IET 21053 (NDR 9542), R 1656-3171-414-1, R 1904-398-5-370-1, R 1700-308-3-170-1, R 1700-309-1-171-1, R 1750-937-1-530-1, R 1779-320-1-111-1 and IR 77537-24-1-1-3)
Moderately Resistant (5)	4 (AS 996-HR 1, R 1656-1936-1-1-800-1, R 1656-2821-1-3245-1 and R 1629-234-6-1883-1)	4 (R 1656-1936-1-1-800-1, PR 26703-3B-PT25, R 1679-1860-1-783-1 and RSR 2011-12-1)	26 (PR 26703-3B-PT25, RSR 2011-12-1, R 1926-1013-2-595-1, Chinnor, Dubraj, R 1923-536-2-639-1, R 1923-536-4-641-1, R 1917-951-1-541-1, R 1919-573-1-160-1, AS 996-HR 1, R 1656-2821-1-3245-1, R 2054-563-1-669-1, R 1595-13-1-5-1, R 1530-130-1-68-1, R 1700-302-1-156-1, CR 2702, R 1875-229-2-126-1, R 1656-78-1-47-1, CR 2713-11, R 1595-17-3-10-1, R 1938-620-1-163-1, R 1700-2240-4-2295-1, IR 84887-B-15, Pusa basmati-1, Indira Sona, R 2093-1536-1-660-1.)
Moderately susceptible (7)	45 (R 2020-338-2-291-1, R 1904-398-6-371-1, R 1915-426-2-454-1, R 2054-563-1-669-1, R 1595-13-1-5-1, R 1530-130-1-68-1, R 1706-2311-4-2432-1, R 1698-168-1-76-1, R 1700-302-1-156-1, R 1661-605-84-1, CR 2702, R 1875-229-2-126-1, R 1877-268-2-188-1, R 2032-456-1-490-1, PR 26703-3B-PT25, Indira Sugandhit Dhan 1, Chandrasahini, R 1630-33-1-23-1, R 1679-1860-1-783-1, R 1698-2219-4-280-1, R 1656-78-1-47-1, CR 2713-11, R 1679-1843-1-774-1, R 1595-17-3-10-1, R 1545-184-3-22-1, R 1656-428-10-1955-1, RS 2011-201, R 1926-1013-2-595-1, R 1607-321-1-	30 (R 1629-234-6-1883-1, R 1904-398-6-371-1, R 1706-2311-4-2432-1, R 1698-168-1-76-1, R 1679-1843-1-774-1, R 1926-1013-2-595-1, R 1607-321-1-34-1, R 1656-3173-1-415-1, R 1630-1237-2-827-1, R 1536-136-1-77-1 (21842), R 1930-397-1-364-1, R 1656-2815-9-3223-1, Badsha Bhog, Chinnor, Mahisugandha, Dubraj, Shamjeera, Vishnu bhog, R 1625-1211-2-765-1, R 1747-4941-1-515-1, R 1695-2152-2-269-1, IR 83376 B-B 110-3, R 2032-462-1-501-1, IR 86871-3-3-1-1, R 2034-479-532-1, R 1923-536-2-639-1, R 1923-536-4-641-1, R 1918-912-1-559-1, R 1917-	16 (R 1679-1843-1-774-1, R 1695-2152-2-269-1, IR 83376 B-B 110-3, R 2032-462-1-501-1, R 1918-912-1-559-1, R 1661-605-84-1, R 2032-456-1-490-1, Chandrasahini, R 1630-33-1-23-1, R 1698-2219-4-280-1, R 1757-540-3-286-1, R 1984-241-1-148-1, R 1921-501-2-571-1, IR 64, R 1751-99-1-4-1 and R 1751-99-2-5-1)

	34-1, R 1656-3173-1-415-1, Ganjeikalli, R 1630-1237-2-827-1, IET 21053 (NDR 9542), R 1536-136-1-77-1 (21842), R 1930-397-1-364-1, R 1656-3171-414-1, R 1656-2815-9-3223-1, RSR 2011-12-1, Badsha Bhog, Chinnor, Mahisugandha, Dubraj, Shamjeera and Vishnu bhog	951-1-541-1 and R 1919-573-1-160-1	
Susceptible (9)	31 (R 1904-398-5-370-1, R 1625-1211-2-765-1, R 1700-308-3-170-1, R 1700-309-1-171-1, R 1750-937-1-530-1, R 1757-540-3-286-1, R 1779-320-1-111-1, R 1938-620-1-163-1, R 1700-2240-4-2295-1, R 1747-4941-1-515-1, R 1695-2152-2-269-1, IR 83376 B-B 110-3, IR 84887-B-15, R 1984-241-1-148-1, R 2032-462-1-501-1, IR 86871-3-3-1-1, RRF 75, R 2034-479-532-1, R 1921-501-2-571-1, R 1923-536-2-639-1, R 1923-536-4-641-1, R 1918-912-1-559-1, R 1917-951-1-541-1 and R 1919-573-1-160-1	46 (AS 996-HR 1, R 1656-2821-1-3245-1, R 2020-338-2-291-1, R 1915-426-2-454-1, R 2054-563-1-669-1, 1595-13-1-5-1, R 1530-130-1-68-1, R 1700-302-1-156-1, R 1661-605-84-1, CR 2702, R 1875-229-2-126-1, R 1877-268-2-188-1, R 2032-456-1-490-1, Indira Sugandhit Dhan 1, Chandrahasini, R 1630-33-1-23-1, R 1698-2219-4-280-1, R 1656-78-1-47-1, CR 2713-11, R 1595-17-3-10-1, R 1545-184-3-22-1, R 1656-428-10-1955-1, RS 2011-201, Ganjeikalli, IET 21053 (NDR 9542), R 1656-3171-414-1, R 1904-398-5-370-1, R 1700-308-3-170-1, R 1700-309-1-171-1, R 1750-937-1-530-1, R 1757-540-3-286-1, R 1779-320-1-111-1, R 1938-620-1-163-1, R 1700-2240-4-2295-1, IR 84887-B-15, R 1984-241-1-148-1, RRF 75, R 1921-501-2-571-1, IR 77537-24-1-1-3, Pusa basmati-1, IR 64, Indira Sona, R 1751-99-1-4-1, R 1751-99-2-5-1 and R 2093-1536-1-660-1	2 (R 1625-1211-2-765-1 and R 1915-426-2-454-1)

## Reference

1. Anonymous. DRR annual progress report, ICAR, Hyderabad, 2010.
2. Ganguly D, Padmanabhan SY. Helminthosporium disease of rice. III breeding resistant varieties; selection of resistant varieties from genetic stock. Indian Phytopathology. 1959; 12:133-140.
3. Kotasthane AS, Agrawal KC. Sources of resistance in rice to bacterial leaf blight Indian Phytopathology. 1991; 31:444-445.
4. Meena B, Ramamoorthy V, Banu JG, Thangavelu R, Muthusamy M. Screening of rice genotype against sheath blight disease. J Ecol. 2000; 12:103-109.
5. Mukherjee P, Singh BP, Rahman F. Testing of indigenous rice germplasm against sheath rot by artificial inoculating conditions. Indian phytopathology. 1980; 34:287-290.
6. Padmanabhan SY, Ganguly D, Chandwani GH. Helminthosporium disease of rice. VIII breeding resistant varieties; selection of resistant varieties from genetic stock. Indian n Phytopathology. 1966; 19:72-75.
7. Tiwari PK, Shrivastava PK, R Thakur MP. Reactions of traditional aromatic rice varieties against major diseases of rice under natural conditions. J Agril. Issues. 2014; 19(2):60-61
8. Silva J, Scheffler B, Sanabria Y, Guzman De, Galam C, Farmer DA *et al.* Identification of candidate genes in rice for resistance to sheath blight. Theory and Applied Genetics. 2012; 124(1):63-74.
9. Tasleem-uz-Zaman Khan, Gill MA, Khan MG. Screening of rice varieties/lines for resistance to bacterial leaf blight. Pakistan J of Phytopathology. 2000; 12:71-72.
10. Thimmegowda PR, Ambika DS, Manjunatha L, Arun R, Sataraddi Prasad PS, Chandrashekar M. Screening germplasm for resistance to bacterial blight of rice caused

by *Xanthomonas oryzae* pv. *Oryzae*. International Journal of Science and Nature. 2011; 2:659-661.