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Short Communication

Screening for resistance to false smut (*Ustilaginoidea virens* Takahashi) of rice (*Oryza sativa* L.)

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Although, false smut (*Ustilaginoidea virens* Takahashi) is considered as a minor disease, but yet it causes considerable losses to rice crop in certain years, particularly when crop growth is excellent. Incidence of false smut has been observed to be higher in rice hybrids. Manibhushan Rao [1] reported upto 28 per cent loss in rice grains due to this infection. Pal and Hassnain [2], Brahmachari and Kolte [3], Mohanty *et al.*, [4] and Singh [5] reported associations of various plant morphological components with stem rust [*Puccinia graminis* tritici (Pers) Eriks & Henn.] in wheat, *Cercospora* leaf spot in groundnut, blast disease (*Pyricularia oryzae* Cav.) in rice and *Alternaria* blight in wheat, respectively. Such type of information is not available with respect to false smut in rice (*Oryza sativa* L.). This type of information will be helpful in the resistant breeding against this disease. The present article reports screening of rice cultures for resistance to false smut and the associations of the disease with different morphological characters of the crop.

Thirty days old seedlings of 98 rice genotypes were transplanted, having plot size of 4 rows with a spacing of 15.00 × 20.00 cm, during the *kharif* season. All the favourable conditions were created to ensure the incidence of false smut. The disease was recorded, adopting Standard Evaluation System (SVS) of IRRI [6], on the plot basis in the natural conditions under heavy pressure of the pathogen.

The disease was recorded upto 70 % (CR 758-5), (CR 758-132), indicating that the incidence of the infection was severe in the experimental plots under the natural conditions. Out of 98 genotypes under the studies, 27 cultures were observed to be highly resistant (infection < 1%) and 45 were resistant (1-5 % infection) (Table 1). These findings suggest that these cultures may be used as donor parents for transferring resistance to this disease in rice. The remaining genotypes had infection more than 5 % and upto 70 %.

Correlations between false smut disease and 26 different morphological characters of the rice plant (Table 2) were estimated, adopting the standard procedure. All the characters, except the disease, were recorded over the randomly selected five plants per plot. Single panicle was randomly selected from each of these plants for recording panicle traits. Randomly selected 10 grains from the bulk of grains of those spikes were used for recording grain length and breadth. Grain volume and grain density were recorded by water displacement method over 300 grains, randomly selected from the bulk of grains. Flag leaf traits were recorded from randomly selected plant. Plot mean of each character was used to estimate the correlations.

The wide range of variability for majority of the characters under the study indicates the presence of a high degree of variability among the experimental materials and hence, the materials were suitable for estimating the correlations. Out of 26 morphological characters under the study, only one trait, *viz.*, flag leaf length/breadth ratio exhibited highly significant positive correlation with false smut disease (Table 2), suggesting that genotypes with small broad flag leaf may bo preferred for improving the resistance against the disease. All the remaining traits had poor associations with the disease.

References

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Table 1. Rice germplasm resistant to false smut

Score of infection	Germplasm
Highly resistant (< 1%)	NDR 4031, OR 1206-21, CR 758-113*, NDR 30030*, NDR 30039*, CRK 7-11, OR 1356-RGA-DR 7, RP Bio. 150, Salivahana, CRK 7-17, CRK 2-26, RAU 491-85-10, CN 1054, CN 847-1, CN 845-80-7-2, Pusa 1176-1*, Pusa 1301-95-1, OR 1559-11-I*, NDR 4004, NDR 4007, RAU 1306-4-3-2-2, CR 609-7-6, R 944-33, RP 2731-105-36-19, RP 3152-1836, RP 1579-1, MRST 27-2027, CRK 13-11.
Resistant (1-5 %)	CRK 2-2, CRK 7-9, RAU 79-22-1, OR 1352-RGA-230, ORI 1358-RGA-4, ORI 534-RGA-129-I4, CR 333-74, NDR 96001, NDR 96005, RP 3930 P12-111-1-2-1, CN 847-2, IR 4633-PM 1-32-2-1, CN 1082-A, CN 847-10-4-4, TOX 3098-2-2-1, IR 60251, NDR 40011-3-1, KMJ 3-I44, OR 1575-1, NDR 4172, RAU 650-102-8, CR 835-9-3, CR 836-1-69, CR 683-1, IR 63429-23, ORR 47-4, CRK 13-11, CRK 4-1, RP 3148-1954, RP 2932-2350, CN 846-30-3-1, AN 31-39-7-1, CN 1035-59, CN 1035-60, CR 664-132-600, CR 780-1937, CRK 7-2-8, TRC 2229-F-4-1, OR 1335-7, OR 1360-RGA-DR 9, CN 847-5-5-N-7, CN 847-27-9-5, CN 1113-23-7-1, RP Bio. 146, Swarna

*Genotypes recording 0 % infection.

Table 2. Associations of false smut infection with 26 morphological characters of rice

Trait	Range	Mean ± S.E.	Association
False smut (%)	0-70.0	11.93±4.90	-
Plant height (cm)	64-141	98.08±15.63	0.213
Flag leaf length (cm)	15.8-33.0	25.50±4.42	–0.84%
Flag leaf breadth (cm)	1.0-2.0	1.45±-0.17	–0.015
Flag leaf length/breadth ratio	10.3-23.2	17.69±3.02	0.470**
Spike length (cm)	19.9-29.0	24.69±2.38	–0.196
Primary rachii/spike	9.2-19.2	13.94±2.27	0.036
Secondary rachii/spike	12.4-68.2	39.51±12.88	0.180
Secondary rachii/primary rachis	1.3-3.9	2.77±0.60	0.290
Primary rachii/unit spike length (per cm)	0.43-0.78	0.56±0.08	0.200
Secondary rachii/unit spike length (per cm)	0.62-2.64	1.58±0.47	0.300
Grains/spike	75.6-260.8	142.41±0.55	0.072
Chaffed spikelets/spike	14.6-135.4	50.25±25.45	–0.050
Chaffed spikelets (%)	11.3-44.2	25.22±8.55	–0.040
Grains/unit spike length (per cm)	3.4-10.6	5.72±1.52	0.150
Chaffed spikelets/unit spike length (per cm)	0.2-4.7	1.93±0.99	0.038
Spike weight (g)	2.0-5.7	3.86±0.89	–0.080
Grain weight/spike (g)	1.7-5.0	3.24±0.77	–0.032
Shelling (%)	57.8-91.6	84.19±6.45	0.110
Spike weight/ unit spike length (g/cm)	0.09-0.21	0.15±0.03	0.120
Grain weight/unit spike length (g/cm)	0.07-0.18	0.13±0.03	0.018
Grain length (mm)	7.4-11.2	8.85±0.92	–0.140
Grain breadth (mm)	2.5-3.2	2.76±0.20	–0.200
Grain length/breadth ratio	2.6-4.5	3.23±0.46	–0.020
1000-grain weight (g)	17.1-31.2	23.41±3.87	–0.190
Grain volume (cc)	5.0-10.0	6.58±1.12	–0.200
Grain density (g/cc)	0.85-1.51	1.07±0.15	0.036

**Significant at P = 0.01.

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