

Field response of wheat against blast and rust diseases in Bangladesh

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Abstract

A survey was conducted in farmer's field and trial sites during the 2018-19 cropping season. Out of 152 fields, 61 sites were infected with wheat blast with lower infection and 113 were infected with rust which was 40% and 74% of total surveyed fields, respectively. Districts of Bhola showed higher level of blast disease severity in late planting conditions. Overall disease incidence was comparatively lower with insignificant yield loss. In case of rust, stem rust and yellow rust was not found, but leaf rust occurred with varying levels of severity depending on field locations, sowing times, and cultivars are grown. Timely (15-30 November) planted crops largely escaped or had less disease compared to those of late planted. Variety prodip found with zero to high disease levels with susceptible (S) type reactions where as Shatabdi was found free from leaf rust infection.

INTRODUCTION

Wheat is the most important cereal food crop next to rice in Bangladesh with a yield of 3.64 ton/ha. Bangladesh being driven by rapid urbanization, rising incomes, and more people joining the workforce outside their homes, the demand for wheat-made food and food products is on the rise. During the 2019-20 cropping season, around 1.25 million tons of wheat has been produced domestically from 0.34 million ha, which can meet only 20% of the national requirement. Among the constraints, Wheat diseases like leaf blight, leaf rust, wheat blast, are the most prominent concerns.

MATERIALS AND METHODS

- Survey in farmer's field and trial sites during the 2018-19 crop cycle.
- Covering 152 fields of different wheat-growing districts
- Five groups in a combination of pathologists, breeders, and agronomists from five regional stations.
- The BGRI protocols (BGRI 2008) and format were followed.
- Disease severity was estimated using the standard 0-100 scale and the modified Cobb scale for blast and rust, respectively.
- Scientists of BWMRI took their data by using a traditional and Smartphone/Tablet for rust survey toolbox which integrates with the SAARC Surveillance Toolbox.

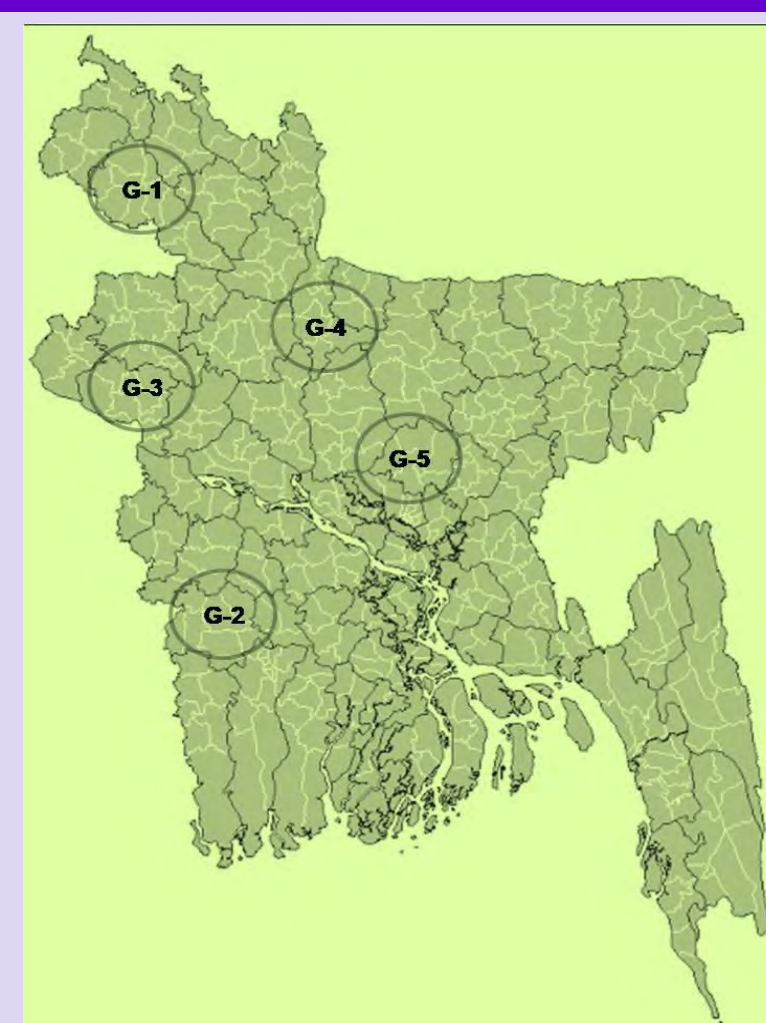


Fig. Wheat disease survey groups from different location of the country,

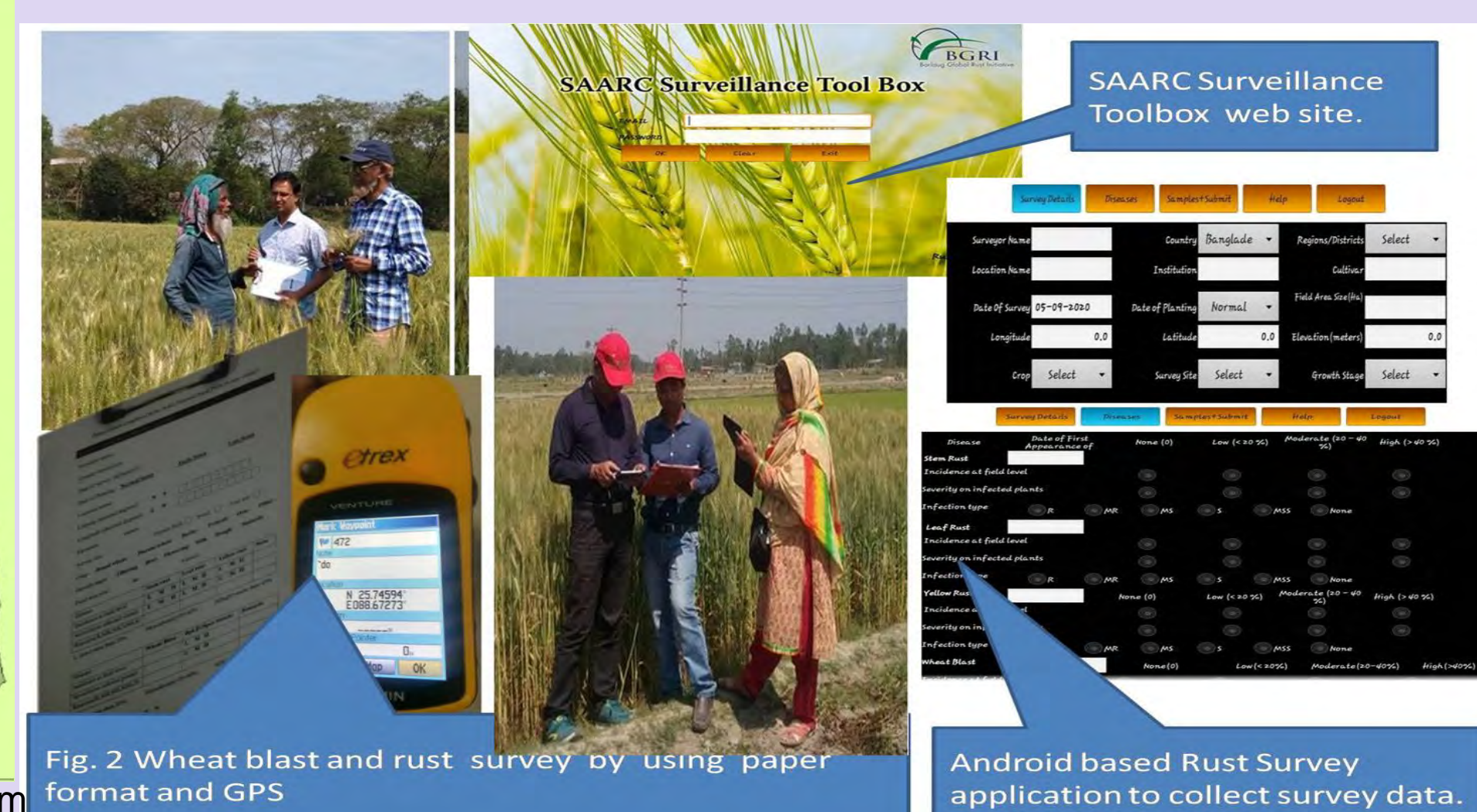


Fig. 2 Wheat blast and rust survey by using paper format and GPS

Android based Rust Survey application to collect survey data.

RESULTS

Field severity of wheat blast

Wheat blast incidence and severity in different districts

Sl No.	Blast infected District	No. of surveyed fields	Blast infected fields	%Disease incidence on spikes	%Disease area on spikes	Disease severity (%)
1.	Jashore	6	4	1	45	0.45
2.	Jhenaidah	6	5	2	50	1
3.	Narail	5	2	2.5	55	1.4
4.	Magura	6	6	4.2	60	2.5
5.	Meherpur	15	14	4.9	48.6	2.4
6.	Chuadanga	4	3	1.3	50	0.7
7.	Kushtia	2	2	1	45	0.45
8.	Rajshahi	16	2	1	45	0.45
9.	Naogaon	5	1	1	20	0.2
10.	Natore	3	3	2.3	46.7	1.1
11.	Pabna	2	1	1	60	0.6
12.	Faridpur	3	3	4	53.3	2.1
13.	Rajbari	2	2	1	45	0.5
14.	Madaripur	2	2	1	50	0.5
15.	Gopalganj	2	1	1	50	0.5
16.	Bhola	5	5	13	76	9.9
17.	Barishal	3	2	1	40	0.4
18.	Mymensingh	3	1	1	30	0.3
19.	Jamalpur	8	2	1	30	0.3
Total			61	-	-	-
Overall disease severity						1.35

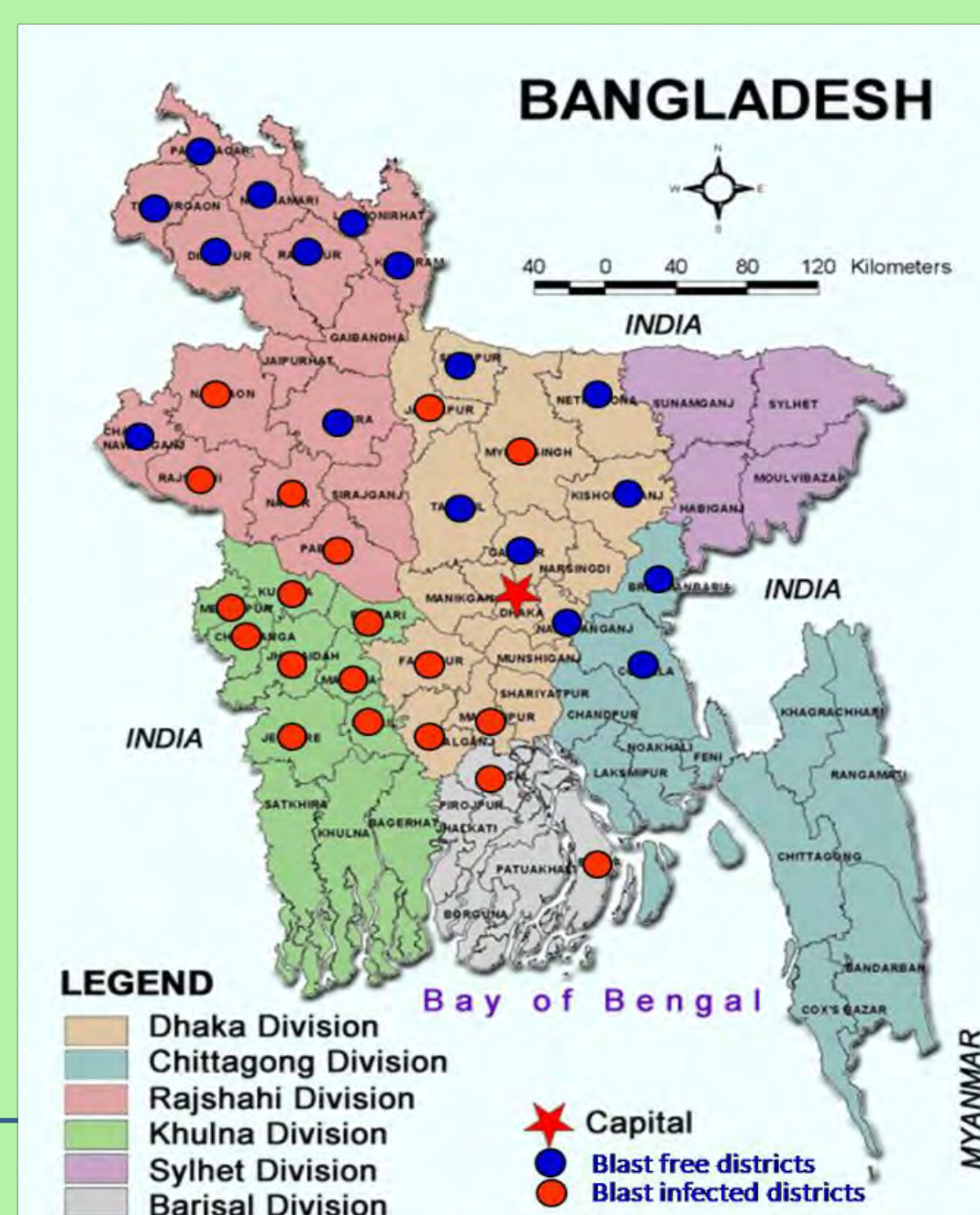


Fig. Bangladesh map showing wheat blast affected and non-affected districts

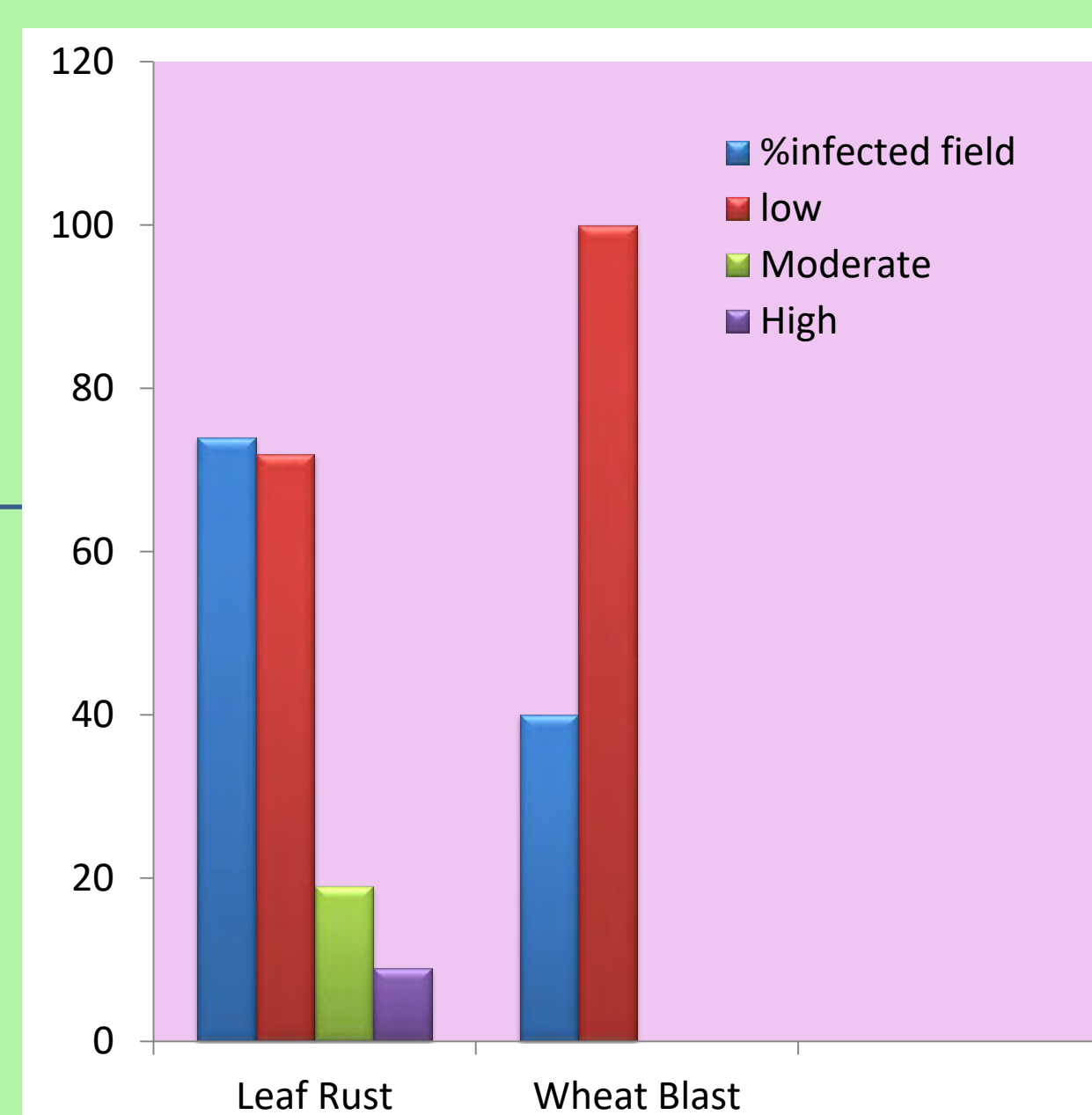


Fig. Incidence and severity of wheat disease L (low) = less than 20%; M (moderate) = 20-40%; H (high) = more than 40%;



Fig. Leaf rust and its pathogen (Puccinia triticina)

Fig. Wheat blast and its Pathogen (Magnaporthe oryzae)

Field severity of rust

Leaf rust reactions in different wheat varieties

Variety/line	Incidence	Severity	Leaf rust reaction
BARI Gom 30	0-M	0-L	MS
BARI Gom 29	L	L	MS
BARI Gom 28	0-L	0-L	MSS
BARI Gom 26	0-H	0-H	MSS
BARI Gom 25	0-L	0-L	MSS
BARI Gom 23	L	L	MR
Prodip	0-H	0-H	S
Shatabdi	0	0	0
Kanchan	L	L	MSS
Unknown	0-H	0-H	S
China 3	0	0	0
Mixture	0-L	0-L	MS

L (low) = less than 20%; M (moderate) = 20-40%; H (high) = more than 40% disease severity while R stands for = Resistant; MR = Moderately Resistant; MS = Moderately Susceptible; S = Susceptible

REFERENCES

BGRI (2008) Wheat Rust Survey Protocol. Borlaug Global Rust Initiative, Cornell University, Ithaca, NY, USA.
Stubbs RW, Prescott JM, Saari EE, Dubin HJ (1986) Cereal Disease Methodology Manual. CIMMYT, Mexico. p.46.

CONCLUSION

Leaf rust occurs in Bangladesh almost every year. Significant yield loss can occur if a susceptible variety is grown in late sown condition. Wheat blast disease is now considered as a permanent disease in Bangladesh and its spread to wheat growing areas of the country makes it a challenge for future wheat expansion. An array to adopt appropriate management approach to mitigate epidemic, breeding for resistant varieties and quick replacement of the susceptible cultivars would be the most dependable control strategy.