Present status of leaf rust of wheat and its chemical control: Bangladesh perspective

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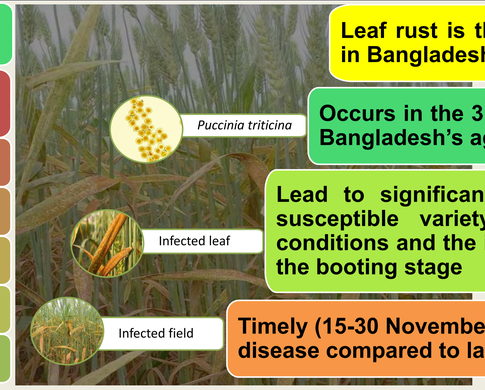
Wheat is the first significant and tactical grain crop for the majority of the world's populations. Globally, the demand for wheat has been increasing rapidly which makes it unique food products and it might be due to industrialization and urbanization. In Bangladesh, it ranked second in terms of consumption while third for production. The demand for wheat in the country is increasing day-by-day which reaches up to 13% per year to meet the present requirement while only one-fifth of its demand produced by the country. Besides the deficit in the demand–supply ratio, wheat also faces several biotic and abiotic factors that hinder the production. Among the biotic factors, leaf rust in wheat is responsible for significant economic damages to the production of wheat.

Season	Area (Lac ha)	Production (lac ton)	Productivity (ton/ha)	References
2018-19	3.29	11.48	3.49	BWMRI 2019
2019-20	3.42	12.46	3.64	BWMRI 2020
2020-21	3.40	12.37	3.64	BWMRI 2021

Area, Production and Productivity of wheat in Bangladesh from 2018-2021

Findings

- A total of 24 districts have been surveyed, among them, 21 districts had leaf rust incidence.
- 77% of surveyed fields had leaf rust infection.
- 50% of infected fields had low disease severity.
- BWMRI released latest varieties demonstrated comparatively lower disease infection.
- All the evaluated fungicides found effective against the disease.
- Fungicide application can increase grain yield by 39-70%.



- Leaf rust is the second most significant disease in Bangladesh
- Occurs in the 3rd week of February in each year in Bangladesh's agro climate
- Lead to significant losses of yield (10-35%) if the susceptible variety is grown under late seeding conditions and the infection begins at the beginning of the booting stage
- Timely (15-30 November) sown fields largely escaped the disease compared to late-planted crops

Materials and Methods

- Surveillance was conducted in 3rd week of March 2021
- The BGRI protocol (BGRI 2008) was followed during surveillance
- 107 fields of major wheat growing areas were surveyed
- Leaf rust incidence and severity were recorded

Table 1: Fungicides with doses used in this study

Fungicides	Content of ingredients	Application rate
Tilt 250 EC	Propiconazole 25%	1ml/L
Folicur 250 EC	Tebuconazole 25%	1ml/L
Nativo 75 WG	Tebuconazole 50% +Trifloxystrobin 25%	0.6g/L
Amister Top 325 SC	Azoxystrobin 20% + Difenoconazole 12.5%	1ml/L
Score 250 EC	Difenoconazole 25%	1ml/L
Xtracare 300 EC	Difenoconazole 15% + Propiconazole 15%	0.5 ml/L

- The susceptible variety 'Prodip' was used for the study
- Seeds were planted in late seeding conditions (3rd week of Dec.)
- Fungicides sprayed twice- once at after leaf rust initiation and second at 14 days later of first spray
- Leaf rust severity was recorded on F-leaf on 10 main tillers in each plot

Results

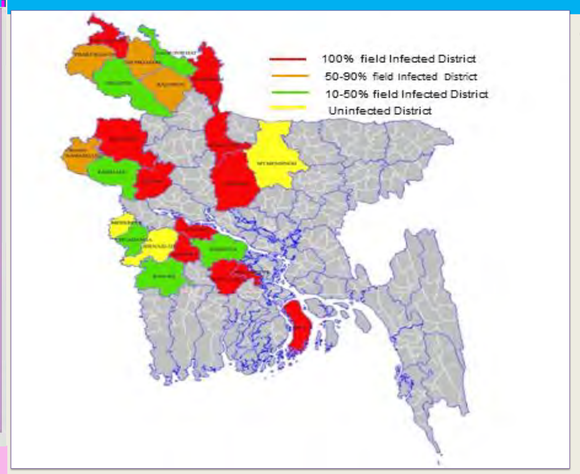


Fig 1: Map showing leaf rust severity in different districts of Bangladesh

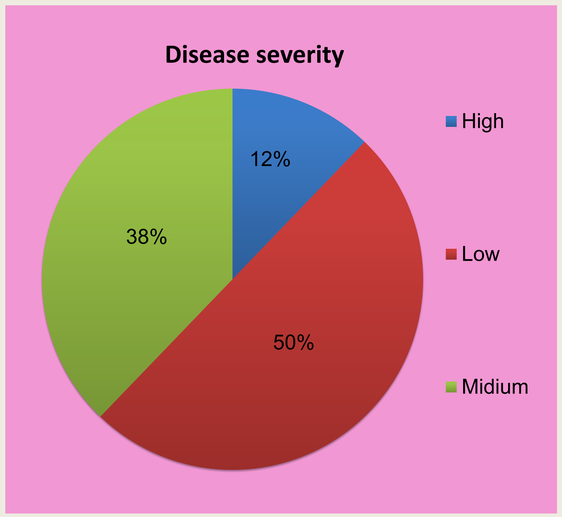


Fig 2: Leaf rust severity level on the surveyed fields

Table 2: Leaf rust severity in different wheat varieties

Variety/line	Incidence	Severity	Leaf rust reaction
BARI Gom 25	L-H	L-H	MSS
BARI Gom 26	0-H	0-H	S
BARI Gom 27	0	0	0
BARI Gom 28	0-H	0-H	MSS
BARI Gom 29	L	L	R
BARI Gom 30	0-M	0-M	MR
BARI Gom 32	0-L	0-L	MS
BARI Gom 33	L	L	MS
Prodip	0-H	0-H	S
Kanchan	L-M	M	MS
Mixture	L-H	L-H	S
Swarna	L	L	MS
Unknown	0-H	0-H	S

Legend: 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

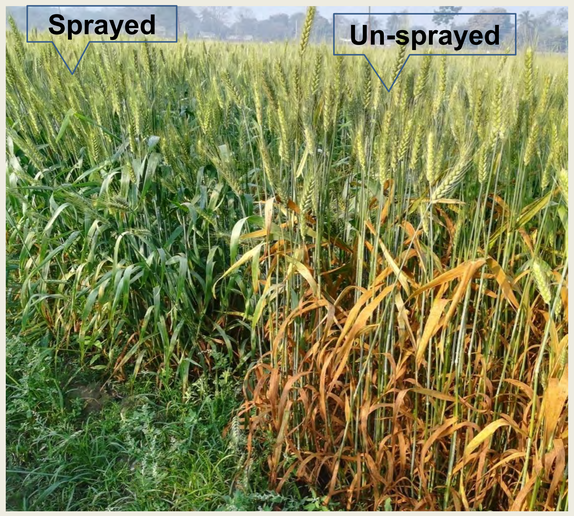


Fig 3: Effectiveness of fungicide against leaf rust

Table 3: Efficacy of fungicides on leaf rust severity and yield attributes

Fungicides	Diseased Leaf Area (%)	1000-grain wt. (g)	Yield/3m² plot (g)
Tilt 250 EC	1	49.39	911
Folicur 250 EC	0	52.58	927
Nativo 75 WG	0	51.75	972
Amister Top 325 SC	0	53.78	895
Score 250 EC	0	51.23	796
Xtracare 300 EC	0	45.87	807
Control (unsprayed)	77	34.64	573

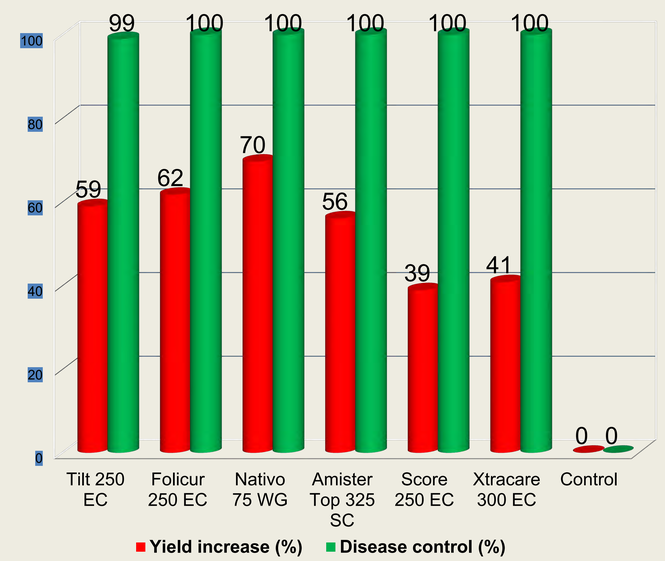


Fig 4: Efficacy of fungicides on disease control and yield increase

In Bangladesh, almost 100% of leaf rust can be managed through fungicide application with increasing grain yield by 39-70%. By applying fungicide in time farmers can be able to cultivate susceptible cultivar even after high disease pressure.

Recommendations

- Regular field monitoring is needed
- As a preventive measure, effective fungicides need to be applied
- If possible, leaf rust resistant/tolerant cultivar need to be used

References

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