



Wheat rust advisory - risk assessment from surveys and forecasts in Pakistan

Summary period: 06 Mar - 12 Mar 2024

Overall risk level:

Low

Key messages

Surveys are now covering most of the main wheat areas. Disease pressure is low. Leaf rust is virtually absent from Punjab and generally low levels elsewhere, with highest incidence / severity in Sindh. Low levels of stripe rust are being observed, with only isolated pockets in central and northern areas. Most stripe rust forecast spore deposition is occurring in Punjab. Forecast leaf rust spore deposition is occurring mainly in Sindh.

From recent surveys (mainly in Punjab) crops are currently predominantly at flowering.

Forecasts for risk of infection, both stripe and leaf rust, are decreasing.

During the period 7 – 15 Mar, rain is forecast for northern Pakistan and some western areas. For the 15 – 23 dry conditions are forecast. Temperatures generally rising, although some areas of Punjab may be cooler than normal during 7 – 15 Mar. Much warmer temperatures in southern areas are forecast for 15 – 23 Mar.

Monitoring for any appearance of stem rust in southern areas is advisable as temperatures increase.

Recommendations

Disease pressure remains low, but scouting should be undertaken and farmers informed to be vigilant for the emergence of rust. If rust starts to appear on younger crops farmers should be advised to undertake control if susceptible cultivars are grown.

The risk however is based on susceptible wheat lines. Different levels of resistance will reduce the risk of the disease at the farmer field. Before the decision on the use of fungicide, pls consider advisory from expert in your area.

- Awareness should be raised amongst stakeholders at all levels, including farmers, to be vigilant for early appearance of rusts. **Early control to stop increased spread and further build-up of disease is very important.**
- Sampling should be undertaken to determine races of rust present.

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Field surveys

Surveys undertaken Jan 02 2024 - Feb 29 2024. A total of 228 fields surveyed. No stem rust detected.

Legend for severity and incidence intensity: Low: less than 20%; moderate: 20-40%; high: more than 40%.

Leaf Rust reported from 68 out of 228 fields surveyed (30%). Moderate to high incidence of leaf rust has been seen in 13 fields (19% of infected fields). Moderate to high severity of leaf rust has been seen in 15 fields (22% of infected fields).

Stripe Rust reported from 38 out of 228 fields surveyed (17%). Moderate to high incidence of stripe rust has been seen in 2 fields (5% of infected fields). Moderate to high severity of stripe rust has been seen in 8 fields (21% of infected fields).

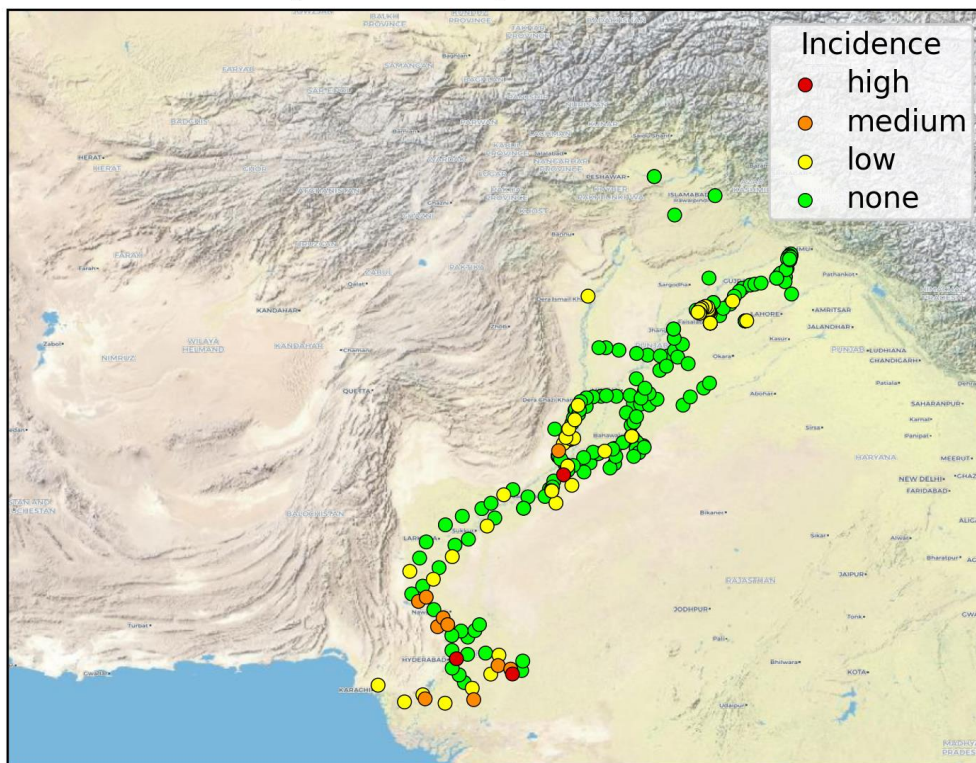
Table 1: Variety analysis of surveys.

Variety	Number of surveys	Number of surveys reporting infection of		
		stem rust	stripe rust	leaf rust
AKBAR 19	1	n/a	0	0
Akbar 19, Dilkash	1	n/a	0	0
Akbar 19, Dilkash 20, Anaj17	1	n/a	0	0
Akbar 19, Dilkash 21, Fakhare Bhakar	1	n/a	0	0
Akbar 19, Fsd 08	1	n/a	0	0
Akbar-2019	9	n/a	0	0
Anaj-17	1	n/a	0	0
Different Fsd 08, Akbar19, Dilkash21	1	n/a	0	0
DILKASH 21	1	n/a	0	0
Dilkash 21	2	n/a	0	0
Dilkash, Arooj, Akbar	1	n/a	0	0
Dilkash, Arooj, Nishan	1	n/a	0	0
Faisalabad 08	2	n/a	1	1
Faisalabad-08	5	n/a	1	0
Galaxy 13	1	n/a	1	0
Punjab 11	1	n/a	1	0
Subahani21	1	n/a	0	0
Subhani 21	1	n/a	0	0
Unknown	196	n/a	34	67

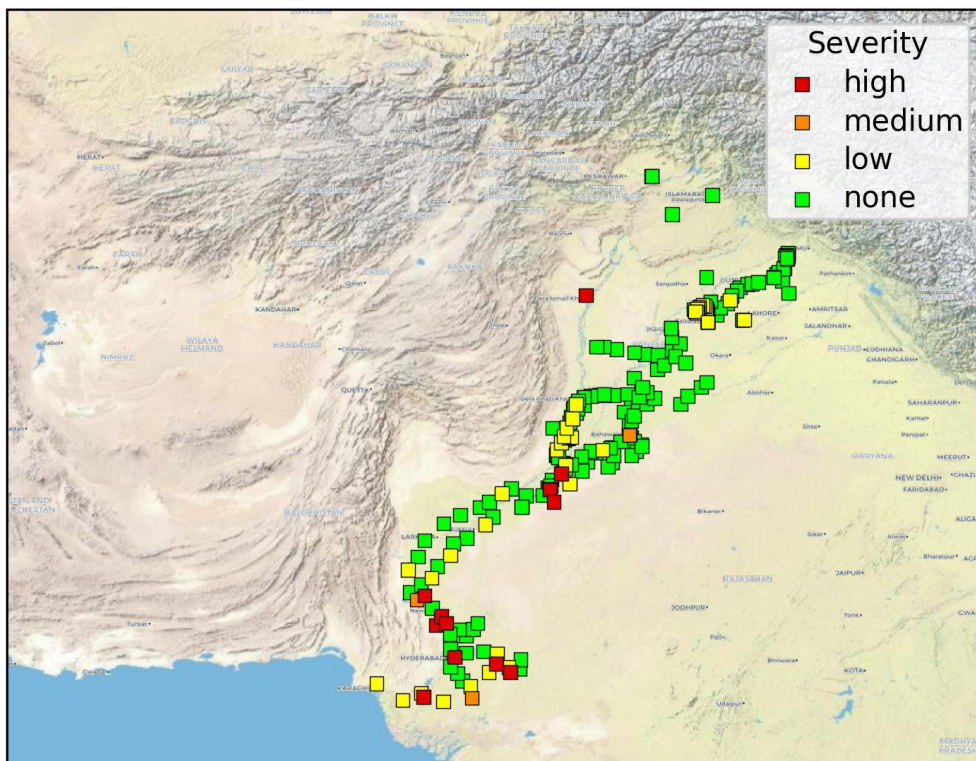
Table 2: Growth stage analysis of surveys conducted in the last week (since Feb 28 2024).

Country	Number of surveys in the last week that observed wheat growth stage:									
	tillering	boot	heading	flowering	milk	dough	maturity	NA	na	n/a
Pakistan	1	13	11	13	5	0	0	0	0	0

Leaf rust surveys Pakistan Jan 02 2024 - Mar 05 2024

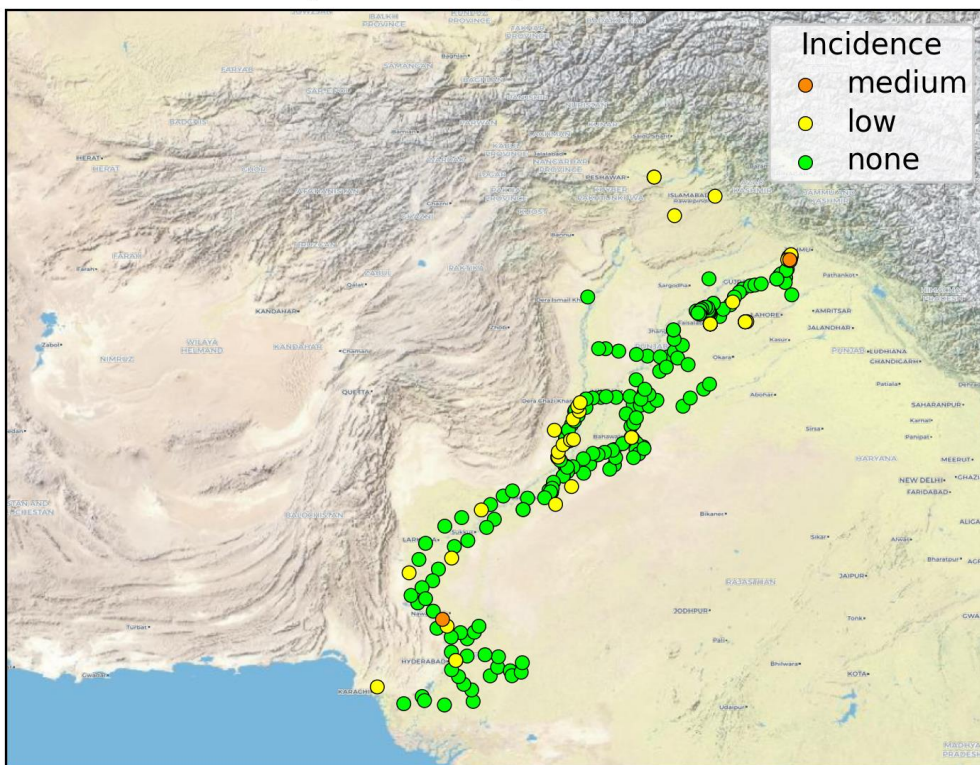


Leaf rust surveys Pakistan Jan 02 2024 - Mar 05 2024

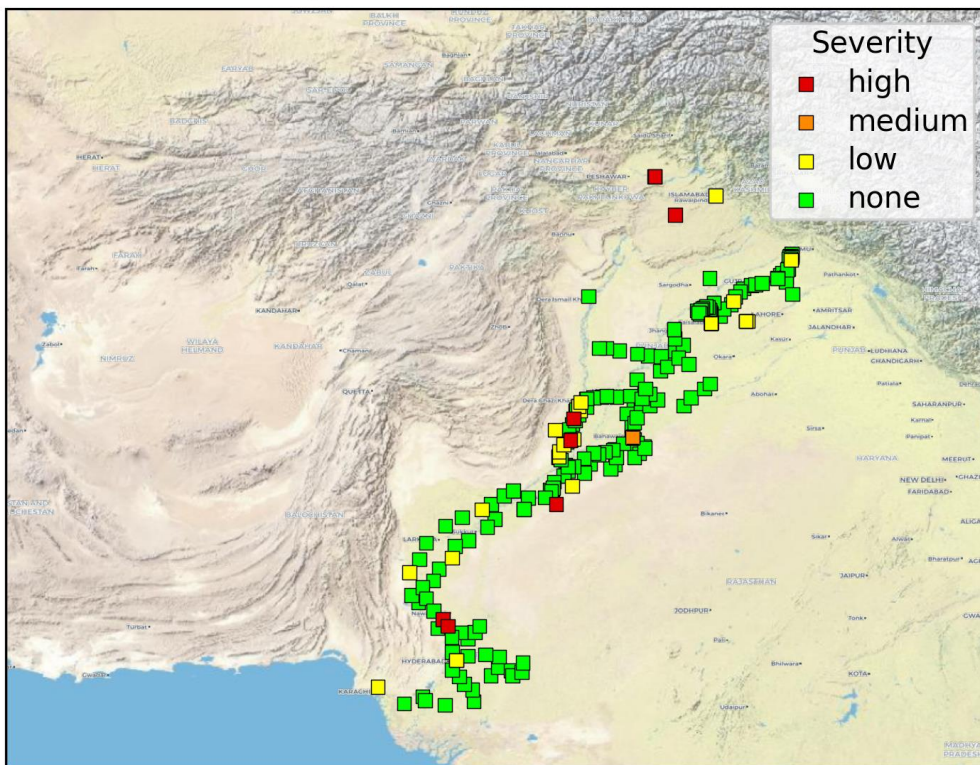


Map 1: Leaf Rust incidence (top) and severity (bottom) in Pakistan field surveys Jan 02 2024 - Mar 05 2024

Yellow rust surveys Pakistan Jan 02 2024 - Mar 05 2024



Yellow rust surveys Pakistan Jan 02 2024 - Mar 05 2024



Map 2: Stripe Rust incidence (top) and severity (bottom) in Pakistan field surveys Jan 02 2024 - Mar 05 2024

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Spore dispersal forecasts

Spore dispersal forecasts run by the UK Met Office and Cambridge University are displayed for stem, stripe and leaf rusts for the forecasted period. Surveys in each district are gathered to provide a single source per administrative area for dispersal forecasts (red dots in figure).

Environmental / climatic suitability for infection forecasts

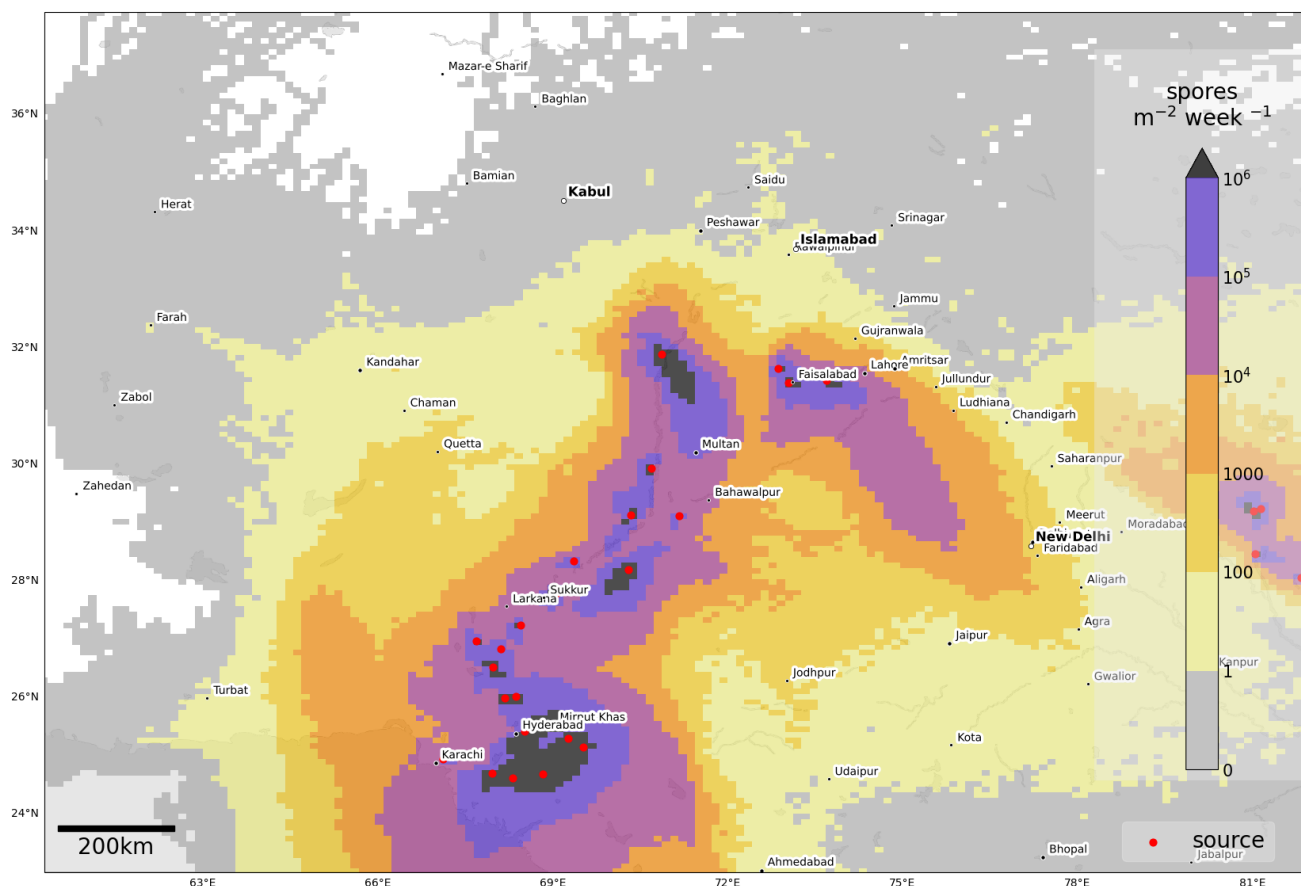
These forecasts give the probability of wheat rust infection occurring based on meteorological factors. The maximum infection efficiency that can occur is 100%. This means that 100% of the spores deposited on susceptible wheat plants could complete the infection process. Therefore, a forecast Infection Efficiency of 100% indicates the highest risk of wheat rust infection occurring in susceptible wheat varieties.

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Leaf rust

Dispersal: Current forecast (06 Mar - 12 Mar) indicates dispersal in a predominantly south easterly direction, with highest spore deposition forecast in Sindh and Punjab.

NAME dispersion forecast for the number of wheat **Leaf rust** spores deposited
2024-03-06-03:00 - 2024-03-13-00:00 (UTC)



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Map 3: Leaf rust spore deposition forecast Pakistan 06 Mar - 12 Mar 2024

The 20 most impacted districts (spore deposition) are presented in the table below.

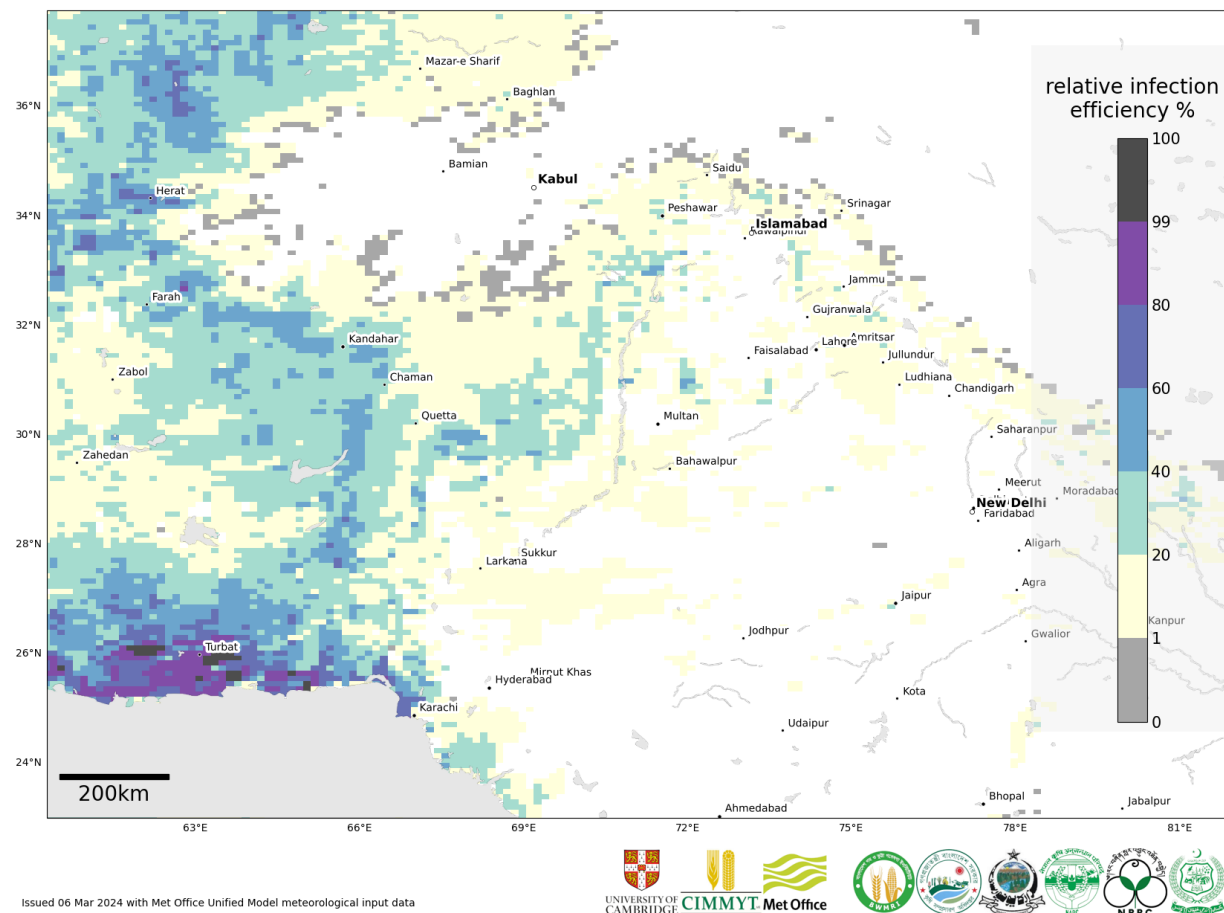
admin2Name	Leaf rust spores per m ² per week
Hyderabad	8800000
Tando Allahyar	6700000
Mirpur Khas	2900000
Tando Muhammad Khan	2900000
Matiari	2600000
Badin	2500000
Bhakkar	1800000
D. I. Khan	1500000

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Sujawal	1100000
Umer Kot	1100000
Thatta	940000
Rahim Yar Khan	850000
Shaheed Benazir Abad	670000
Leiah	490000
Nankana Sahib	410000
Naushahro Feroze	380000
Sanghar	350000
Chiniot	300000
Jamshoro	290000
Ghotki	280000

Risk of infection: Current forecast (6 – 11 Mar) indicates decreased risk of infection, with moderate to high infection efficiency in the far south west and some western areas.

Infection efficiency of Wheat **Leaf rust** spores 2024-03-06-00:00 - 2024-03-12-00:00 (UTC)



Map 4: Leaf rust suitability for infection forecast Pakistan 06 Mar - 11 Mar 2024

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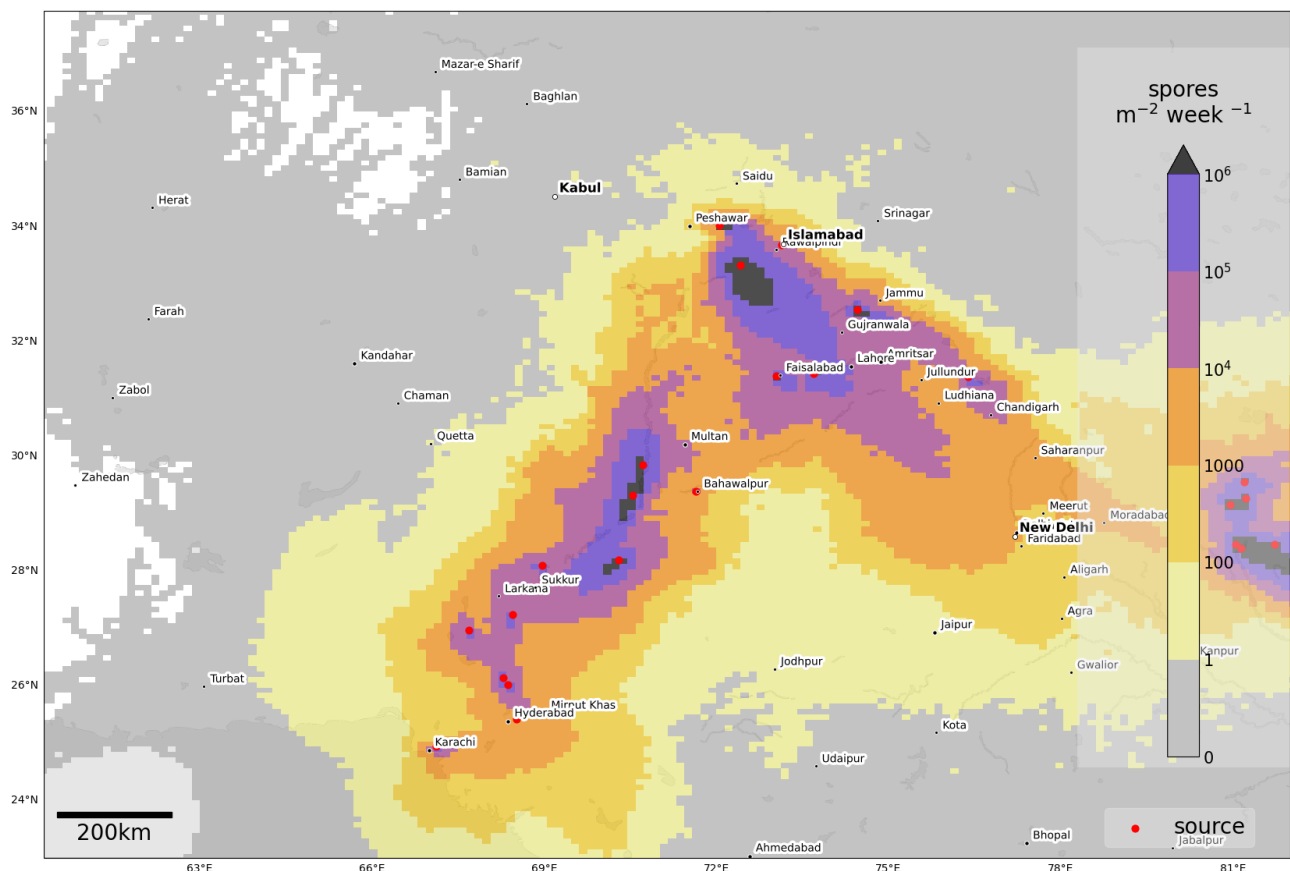
The 20 most impacted districts (infection efficiency) are presented in the table below. The information however should be considered along with presence of wheat, the growth stage and resistance level of the host.

admin2Name	RIE_leaf_rust_%
Kech	72
Gwadar	65
Panjgur	46
West Karachi	43
Awaran	42
Nushki	37
Kharan	36
South Karachi	36
Lasbela	33
Sibi	31
Karak	30
Washuk	28
Malir Karachi	28
Shaheed Sikandarabad	27
Mianwali	26
Barkhan	25
Harnai	25
Mastung	25
Sujawal	25
Loralai	24

Stripe rust

Dispersal: Current forecast (06 Mar - 12 Mar) indicates dispersal in a south easterly direction from infected sites in the north and more southerly dispersal from infected sites in central / southern areas. Highest forecast spore deposition for Punjab.

NAME dispersion forecast for the number of wheat **Stripe rust** spores deposited
2024-03-06-03:00 - 2024-03-13-00:00 (UTC)



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Map 5: Stripe rust spore deposition forecast Pakistan 06 Mar - 12 Mar 2024

The 20 most impacted districts (spore deposition) are presented in the table below.

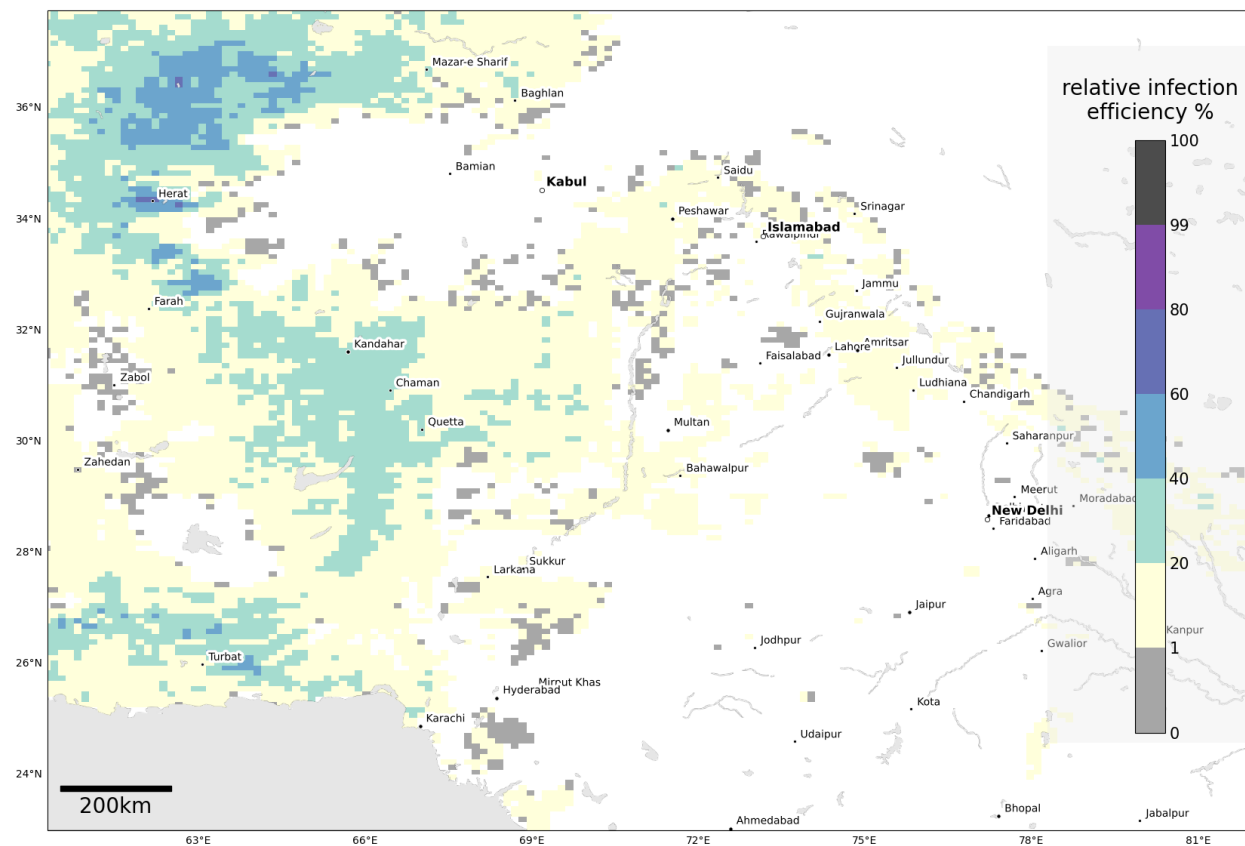
admin2Name	Stripe rust spores per m ² per week
Attock	3300000
Chakwal	2300000
Rajanpur	620000
Muzaffargarh	560000
Jhelum	390000
Mandi Bahauddin	330000
Rawalpindi	320000
Rahim Yar Khan	300000

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Nankana Sahib	210000
Sialkot	210000
Hafizabad	190000
Dera Ghazi Khan	190000
Sargodha	180000
Nowshera	150000
Faisalabad	130000
Ghotki	130000
Swabi	120000
Gujranwala	110000
Sheikhupura	110000
Lahore	93000

Risk of infection: Current forecast (6 – 11 Mar) indicates decreased risk of infection, with low or no infection efficiency forecast.

Infection efficiency of Wheat **Stripe rust** spores 2024-03-06-00:00 - 2024-03-12-00:00 (UTC)



Issued 06 Mar 2024 with Met Office Unified Model meteorological input data



Map 6: Stripe rust suitability for infection forecast Pakistan 06 Mar - 11 Mar 2024

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The 20 most impacted districts (infection efficiency) are presented in the table below. The information however should be considered along with presence of wheat, the growth stage and resistance level of the host.

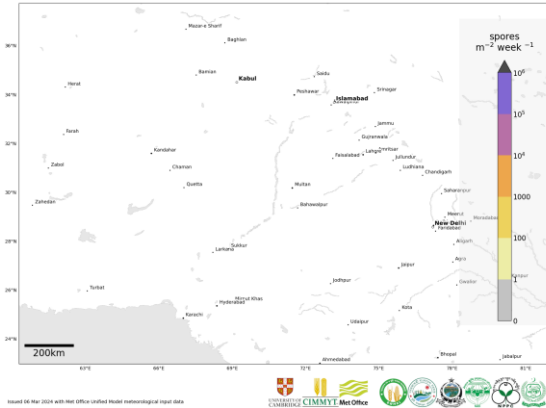
admin2Name	RIE_stripe_rust_%
Mastung	23
Quetta	23
Nushki	23
Shaheed Sikandarabad	22
Kech	21
Panjgur	21
Kharan	21
Chaman	21
Kalat	19
Killa Abdullah	19
Harnai	17
Loralai	16
Pishin	16
Zhob	15
Killa Saifullah	15
Musakhel	15
Ziarat	14
Barkhan	13
Duki	13
Awaran	12

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Stem rust

Dispersal: Current forecast (06 Mar - 12 Mar) indicates no dispersal as no reports of stem rust.

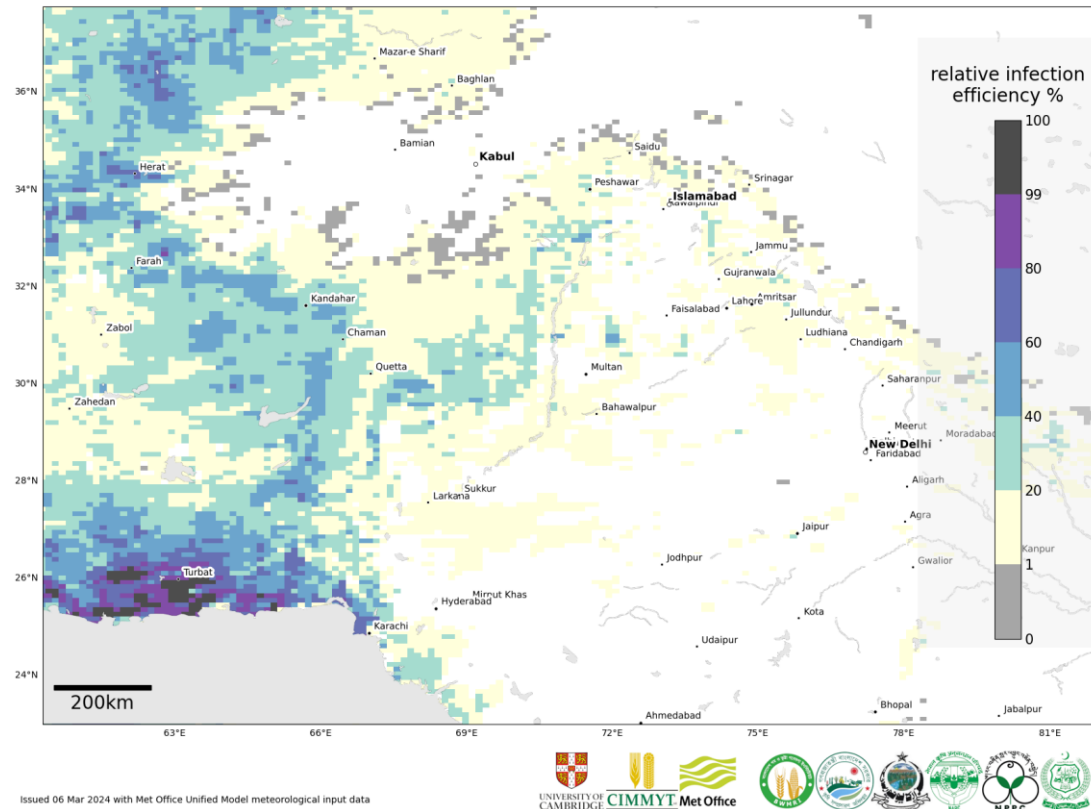
NAME dispersion forecast for the number of wheat **Stem rust** spores deposited
2024-03-06-03:00 - 2024-03-13-00:00 (UTC)



Map 7: Stem rust spore deposition forecast Pakistan 06 Mar - 12 Mar 2024

Risk of infection: Current forecast (6 – 11 Mar) indicates decreased risk of infection, with moderate to high infection efficiency in the far south west and some western areas.

Infection efficiency of Wheat **Stem rust** spores
2024-03-06-00:00 - 2024-03-12-00:00 (UTC)



Map 8: Stem rust suitability for infection forecast Pakistan 06 Mar - 11 Mar 2024

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The 20 most impacted districts (infection efficiency) are presented in the table below. The information however should be considered along with presence of wheat, the growth stage and resistance level of the host.

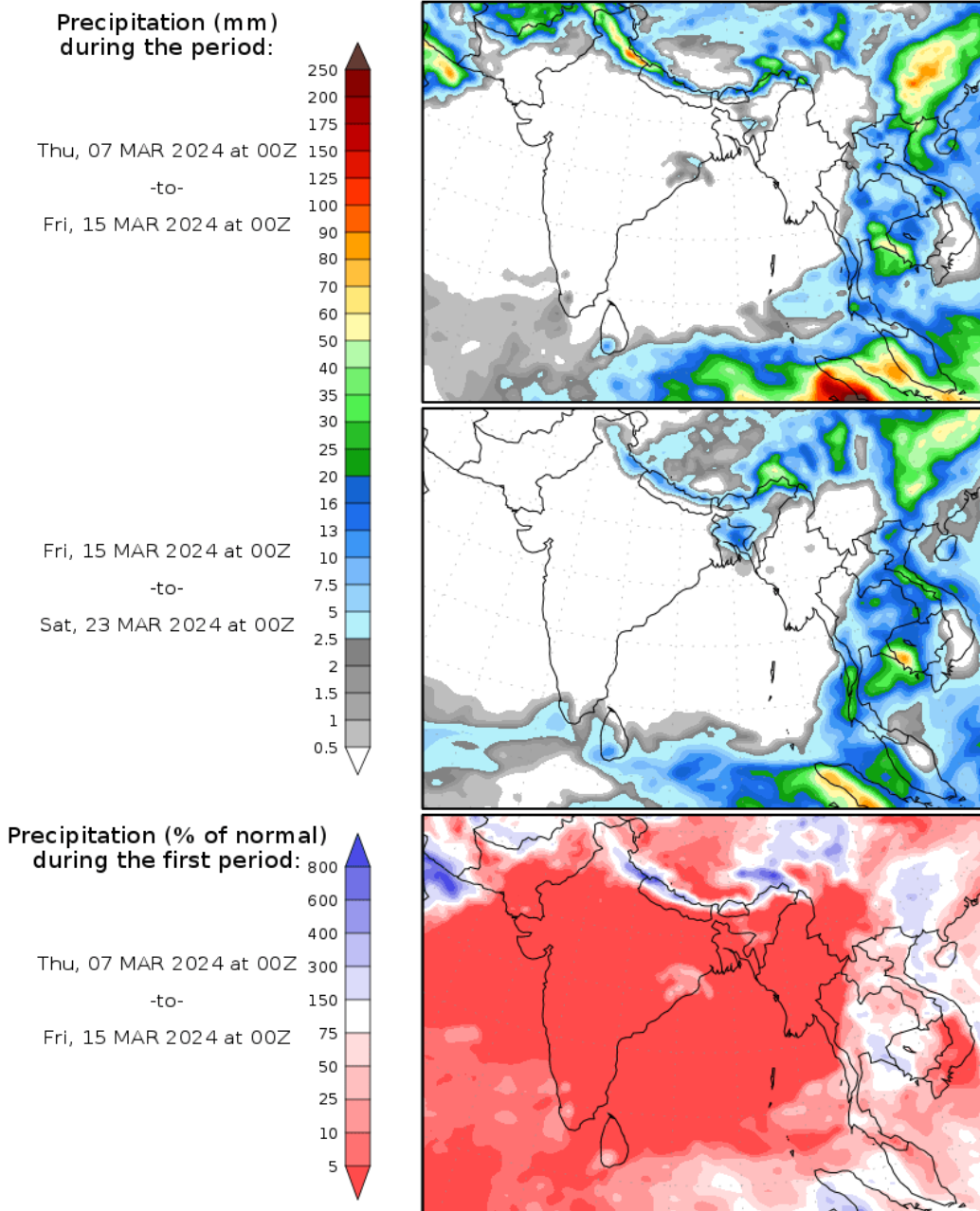
admin2Name	RIE_stem_rust_%
Gwadar	71
Kech	70
West Karachi	55
Panjgur	48
Awaran	48
South Karachi	43
Nushki	37
Kharan	36
Lasbela	35
Sibi	34
Washuk	33
Karak	30
Malir Karachi	30
Kachhi	28
Mianwali	28
Shaheed Sikandarabad	27
Mastung	25
Kohlu	25
Lakki Marwat	25
Barkhan	25

Regional Forecasts – Precipitation & Temperature

Forecasts from the National Centers for Environmental Prediction (NCEP)[<http://wxmaps.org/pix/clim>]
These indicate possible general conditions across South Asia, with likely decreasing prediction accuracy in the second forecast period.

During the period 7– 15 Mar, rain is forecast for northern Pakistan, northwest India, western Nepal. Light rain is forecast for Bhutan. During the period 15 – 23 Mar, there is increased chance of rain in Bangladesh and Bhutan. Some light rain in the higher hills of Nepal and northwest India, but conditions will be dry elsewhere.

Precipitation Forecasts



Precipitation forecasts from the National Centers for Environmental Prediction.
Normal rainfall derived from Xie-Arkin (CMAP) Monthly Climatology for 1979-2003.
Forecast Initialization Time: 00Z07MAR2024

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Temperature: During the period 7 - 15 Mar, warmer than normal conditions are forecast (especially central / eastern lowlands of Nepal). Only northwest India and western areas of Pakistan will remain cooler than normal. Rapidly increasing, warmer temperatures are forecast during the period 15 -23 Mar.

Temperature Forecasts

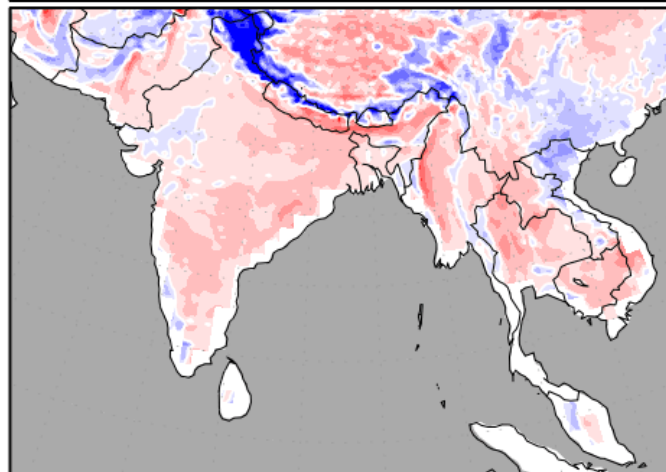
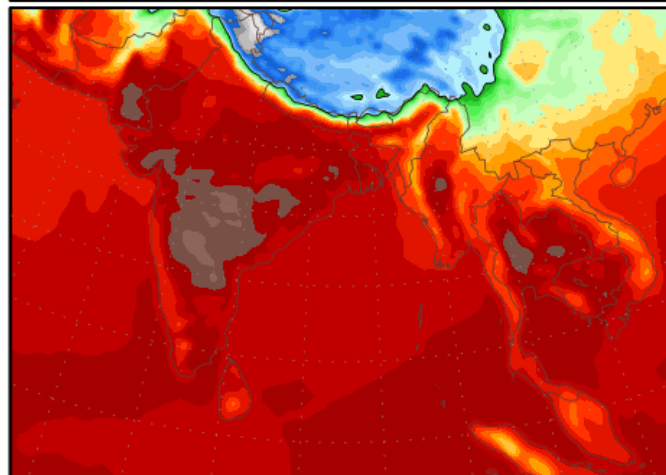
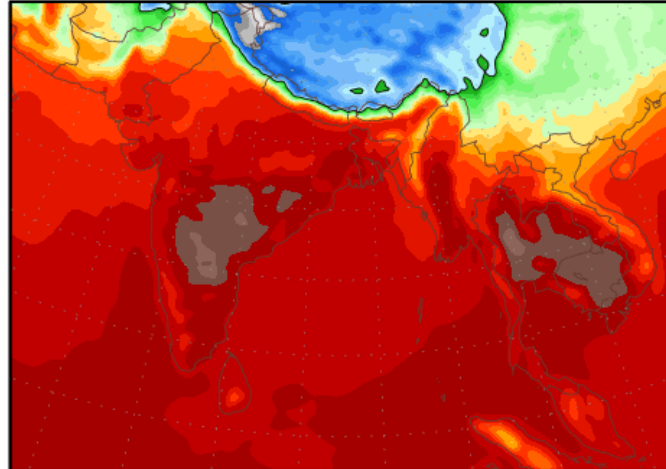
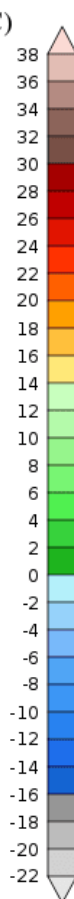
Mean Surface Temperature (°C)
during the period:

Thu, 07 MAR 2024 at 00Z
-to-
Fri, 15 MAR 2024 at 00Z

Fri, 15 MAR 2024 at 00Z
-to-
Sat, 23 MAR 2024 at 00Z

Temperature Anomaly
during the first period:

Thu, 07 MAR 2024 at 00Z
-to-
Fri, 15 MAR 2024 at 00Z



Temperature forecasts from the National Centers for Environmental Prediction.
Normal Temperature derived from CRU monthly climatology for 1901-2000
Forecast Initialization Time: 00Z07MAR2024