



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

## Summary period: 28 Feb - 05 Mar 2024

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### Overall risk level:

Caution

### Key messages

Surveys are on-going with extensive coverage of Sindh and Punjab. 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 / northern Sindh. Forecast leaf rust spore deposition is occurring more widely across Pakistan. The Akber-19 and Dilkash are the dominant wheat varieties in Punjab while AS-2002, TD-1, Akber-19 and Dilkash are present in the larger areas of the Sindh province

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

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

During the period 29 Feb – 8Mar, heavy rain is forecast for northern Pakistan, and moderate rain in other areas especially western areas. During the period 8 – 16 Mar, rain may persist in northern Pakistan but conditions are forecast to be dry in other areas. With the rain temperatures are forecast to cool (29 Feb-8 Mar), then rise rapidly, especially in southern areas during 8-16 Mar.

These forecast weather conditions are likely to be favorable for the development of rusts. In cooler wetter conditions stripe may develop and in warmer wetter conditions leaf rust may develop. Monitoring for any appearance of stem rust is advisable.

### Recommendations

**Suitable conditions for leaf rust and stripe rust are likely to develop due to forecast rain and temperatures over the next 1-2 weeks. Scouting should be undertaken and farmers informed to be vigilant for the emergence of rust. If rust starts to appear 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.**

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- 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 26 2024. A total of 140 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 29 out of 140 fields surveyed (21%). Moderate to high incidence of leaf rust has been seen in 10 fields (34% of infected fields). Moderate to high severity of leaf rust has been seen in 12 fields (41% of infected fields).

Stripe Rust reported from 16 out of 140 fields surveyed (11%). Moderate to high incidence of stripe rust has been seen in 1 fields (6% of infected fields). Moderate to high severity of stripe rust has been seen in 6 fields (38% of infected fields).

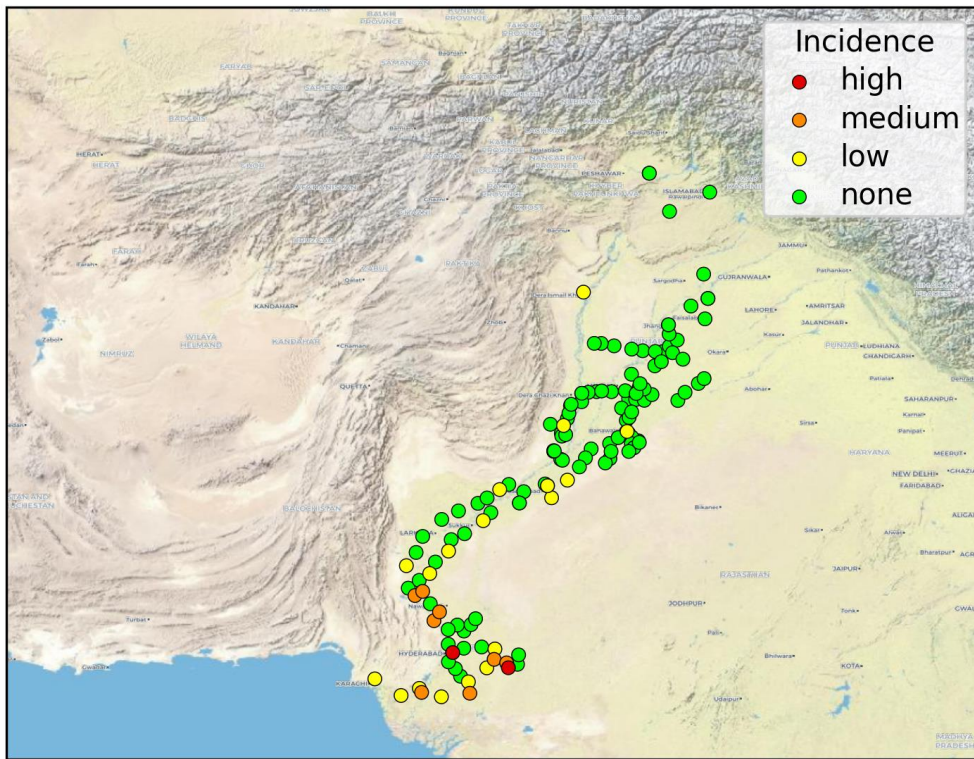
Table 1: Variety analysis of surveys.

Variety	Number of surveys	Number of surveys reporting infection of		
		stem rust	stripe rust	leaf rust
AKBAR 19	1	n/a	0	0
Akbar-2019	3	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	1	n/a	0	0
Subhani 21	1	n/a	0	0
Unknown	130	n/a	16	29

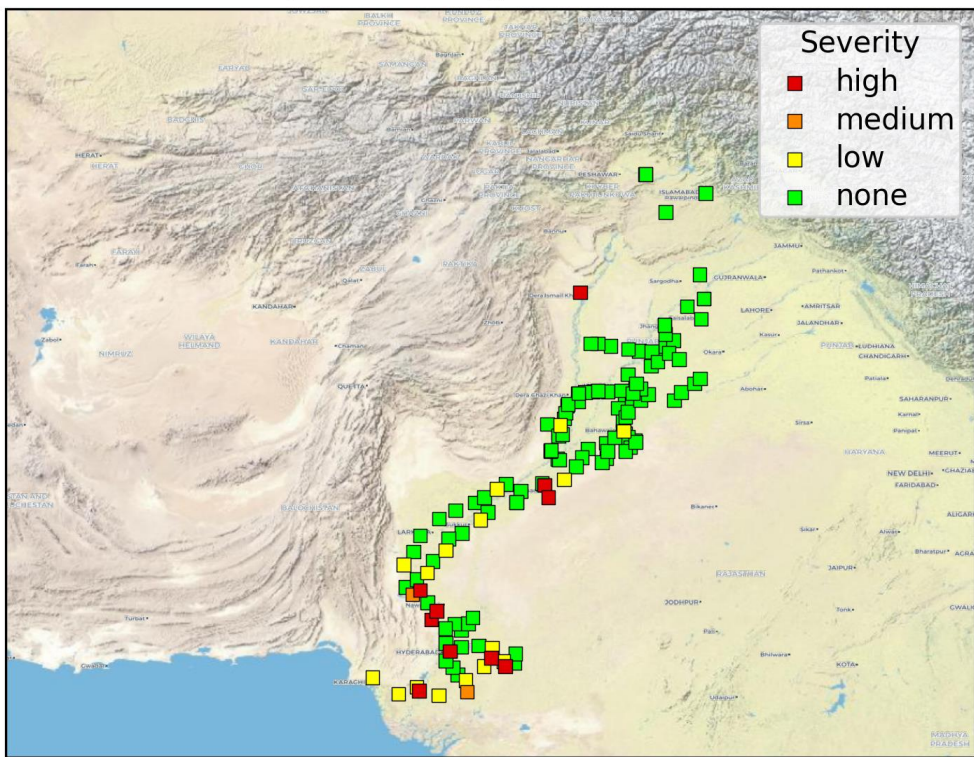
Table 2: Growth stage analysis of surveys conducted in the last week (since Feb 21 2024).

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	2	8	25	7	3	0	0	0	0	0

### Leaf rust surveys Pakistan Jan 02 2024 - Feb 27 2024



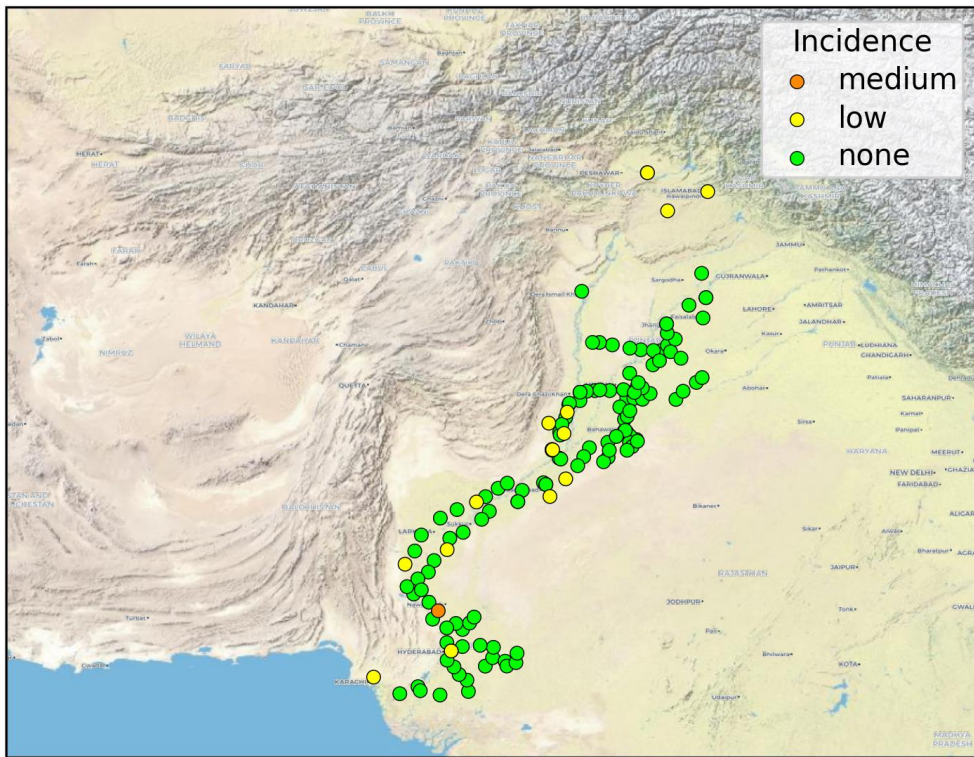
### Leaf rust surveys Pakistan Jan 02 2024 - Feb 27 2024



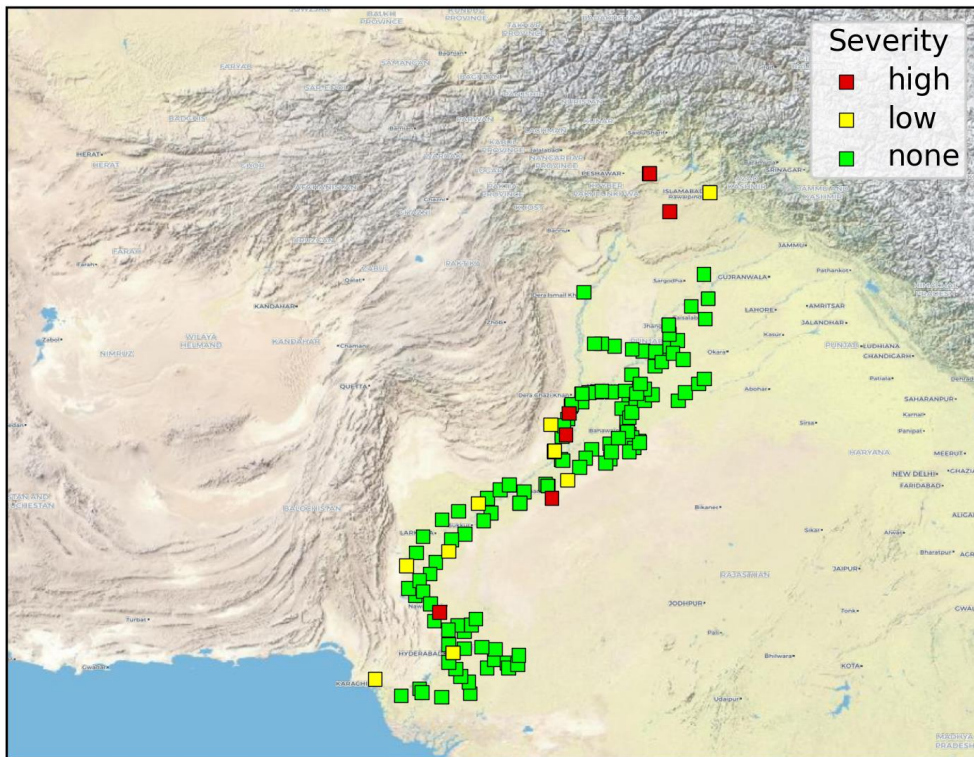
Map 1: Leaf Rust incidence (top) and severity (bottom) in Pakistan field surveys Jan 02 2024 - Feb 27 2024



### Yellow rust surveys Pakistan Jan 02 2024 - Feb 27 2024



### Yellow rust surveys Pakistan Jan 02 2024 - Feb 27 2024



Map 2: Stripe Rust incidence (top) and severity (bottom) in Pakistan field surveys Jan 02 2024 - Feb 27 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).

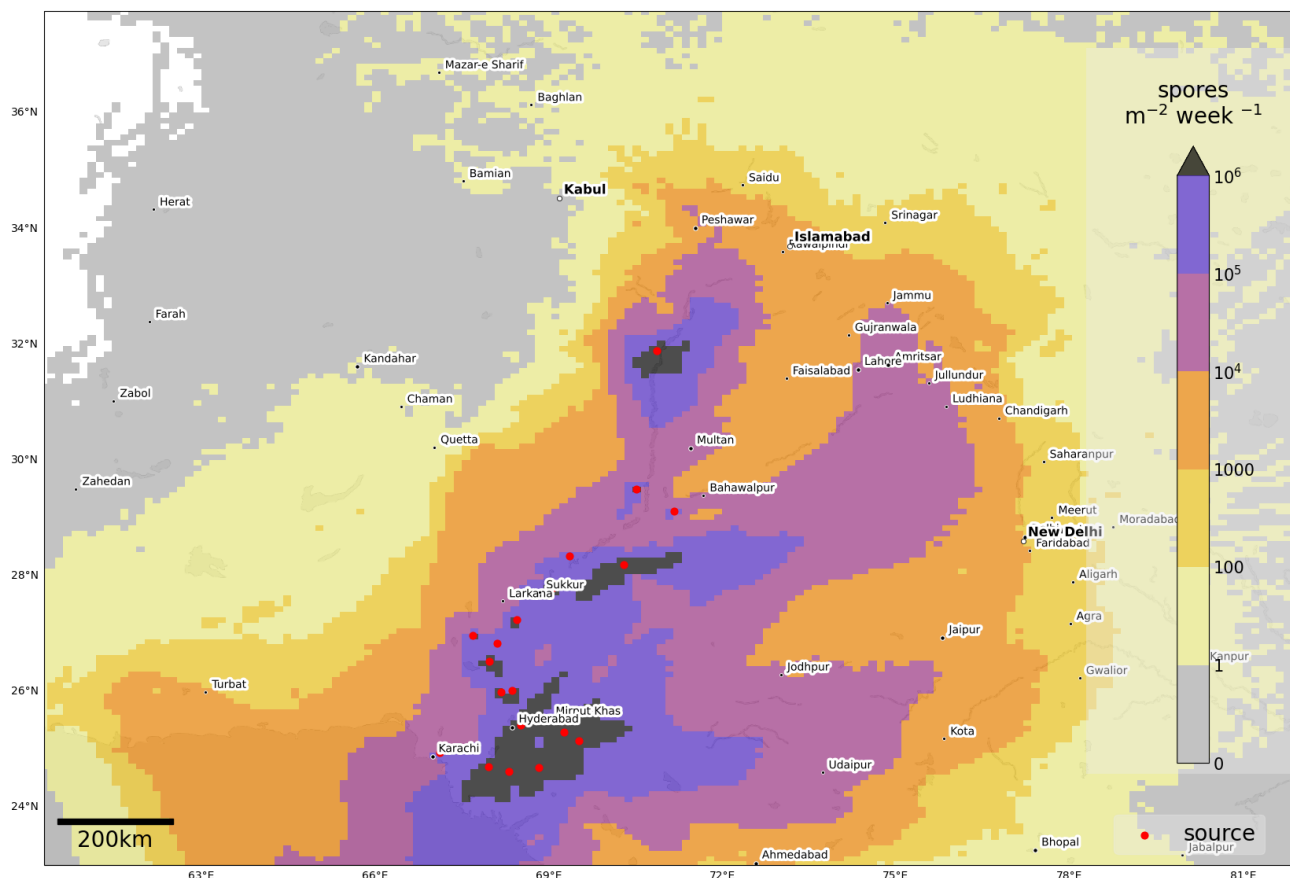
### **Environmental / climatic suitability for infection forecasts**

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.

### Leaf rust

**Dispersal:** Current forecast (28 Feb - 05 Mar) indicates dispersal covering most areas, except the far north. Some easterly dispersal into India. Highest spore deposition forecast for Sindh.

NAME dispersion forecast for the number of wheat **Leaf rust** spores deposited  
2024-02-28-03:00 - 2024-03-06-00:00 (UTC)



Issued 28 Feb 2024 with Met Office Unified Model meteorological input data



**Map 3: Leaf rust spore deposition forecast Pakistan 28 Feb - 05 Mar 2024**

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

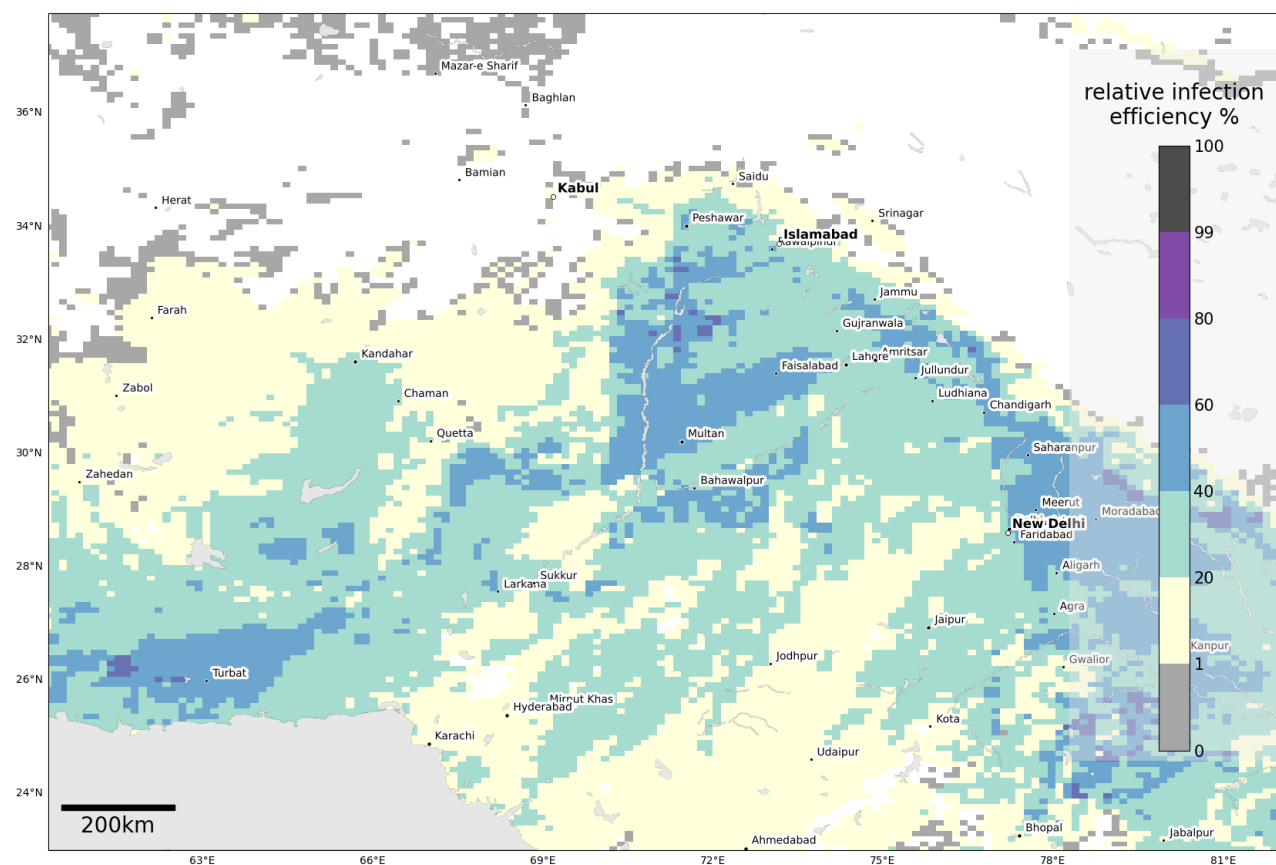
admin2Name	Leaf rust spores per m <sup>2</sup> per week
Hyderabad	1200000
Tando Allahyar	950000
Tando Muhammad Khan	470000
Mirpur Khas	420000
Matiari	380000
Umer Kot	320000
Badin	310000
D. I. Khan	170000
Sujawal	170000

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Thatta	1600000
Rahim Yar Khan	1400000
Bhakkar	1200000
Sanghar	920000
Shaheed Benazir Abad	920000
Ghotki	760000
Tharparkar	690000
Sukkur	430000
Jamshoro	430000
Naushahro Feroze	430000
Khairpur	280000

**Risk of infection:** Current forecast (22 – 27 Feb) indicates increased risk of infection, with moderate to high infection efficiency across most areas, except the far north. Highest infection efficiency forecast for Punjab.

### Infection efficiency of Wheat **Leaf rust** spores 2024-02-28-00:00 - 2024-03-05-00:00 (UTC)



Issued 28 Feb 2024 with Met Office Unified Model meteorological input data



**Map 4: Leaf rust suitability for infection forecast Pakistan 28 Feb - 04 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.

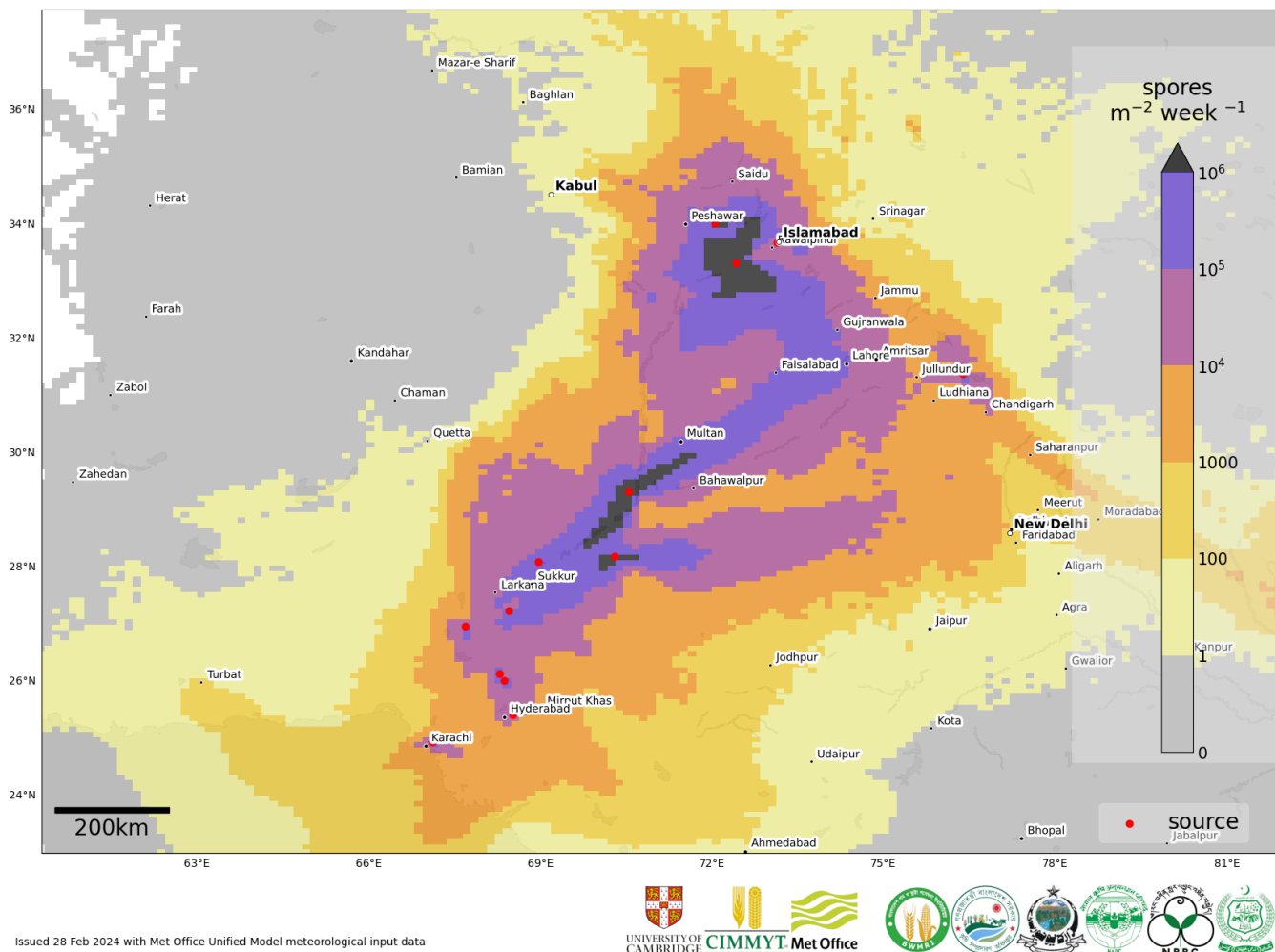
admin2Name	RIE_leaf_rust_%
Multan	47
Nankana Sahib	47
Sheikhupura	47
Leiah	47
Faisalabad	45
Bhakkar	45
Mianwali	45
Toba Tek Singh	44
Chiniot	44
Kech	44
Muzaffargarh	43
Narowal	43
Jhang	43
Lahore	42
Hafizabad	42
Karak	42
Jhal Magsi	42
Sialkot	41
Panjgur	41
Khushab	41

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### Stripe rust

Current forecast (28 Feb - 05 Mar) indicates contrasting dispersal patterns. From northern infected sites dispersal is in a predominantly south easterly direction. Whereas, from central/southern sites dispersal is predominantly in a northeasterly direction. Highest spore deposition is forecast for Punjab. Some spore dispersal from Pakistan / reported infected sites in India, is reaching Nepal.

### NAME dispersion forecast for the number of wheat **Stripe rust** spores deposited 2024-02-28-03:00 - 2024-03-06-00:00 (UTC)



Map 5: Stripe rust spore deposition forecast Pakistan 28 Feb - 05 Mar 2024

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

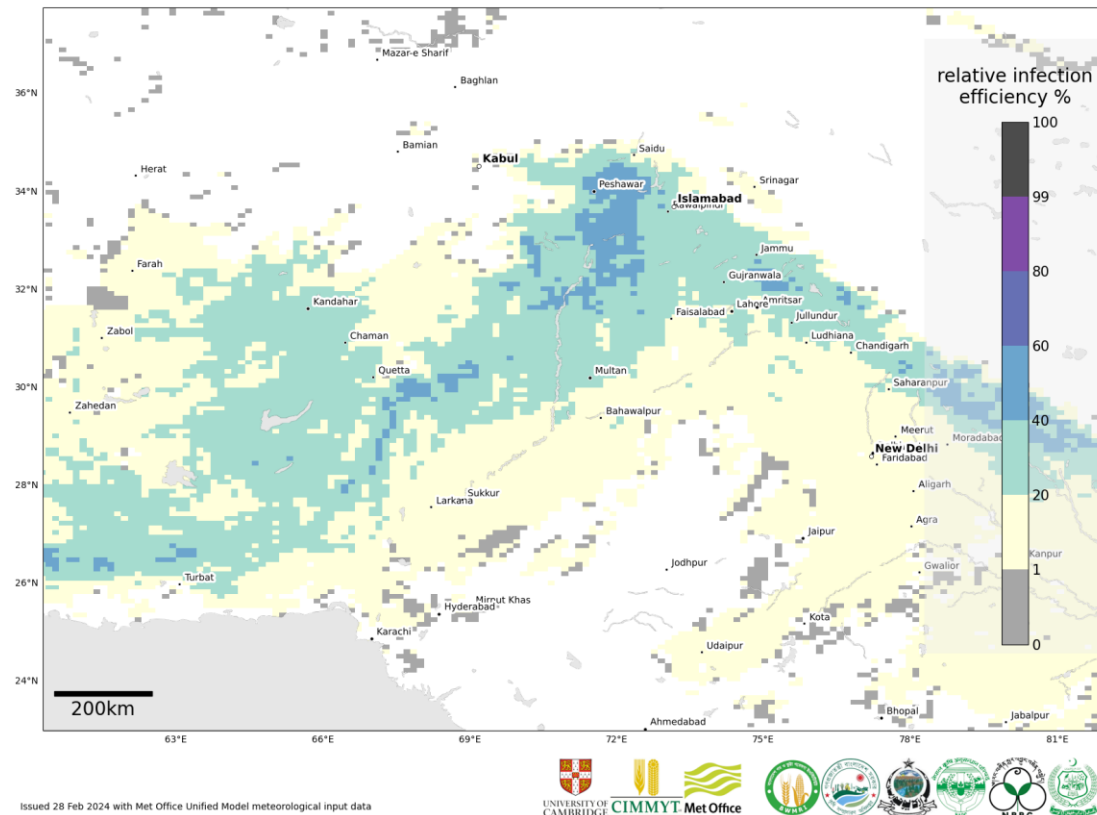
admin2Name	Stripe rust spores per $m^2$ per week
Attock	4800000
Chakwal	2000000
Rajanpur	1500000
Muzaffargarh	1400000
Multan	770000

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Nowshera	670000
Rahim Yar Khan	670000
Haripur	630000
Swabi	570000
Rawalpindi	460000
Kohat	450000
Ghotki	420000
Lodhran	400000
Jhelum	380000
Khanewal	350000
Kashmore	320000
Mandi Bahauddin	290000
Peshawar	250000
Khushab	240000
Vehari	190000

**Risk of infection:** Current forecast (22 – 27 Feb) indicates increased risk of infection, with moderate to high infection efficiency across most areas, except the far north and low infection efficiency in southern areas. Highest infection efficiency forecast for Punjab.

Infection efficiency of Wheat **Stripe rust** spores  
2024-02-28-00:00 - 2024-03-05-00:00 (UTC)



Map 6: Stripe rust suitability for infection forecast Pakistan 28 Feb - 04 Mar 2024

## Wheat rust advisory #4 2024

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.

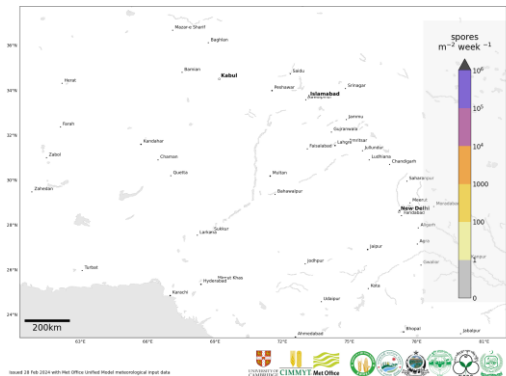
admin2Name	RIE_stripe_rust_%
Charsadda	46
Mardan	45
Swabi	43
Nowshera	43
Peshawar	42
Attock	41
Kohat	41
Mianwali	40
Karak	40
Malakand	39
Bannu	38
Narowal	37
Khushab	35
Chakwal	35
Sibi	35
Lakki Marwat	34
Haripur	34
Tank	34
D. I. Khan	34
Bhakkar	33

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## Stem rust

Current forecast (28 Feb - 05 Mar) indicates no dispersal as no reports of stem rust.

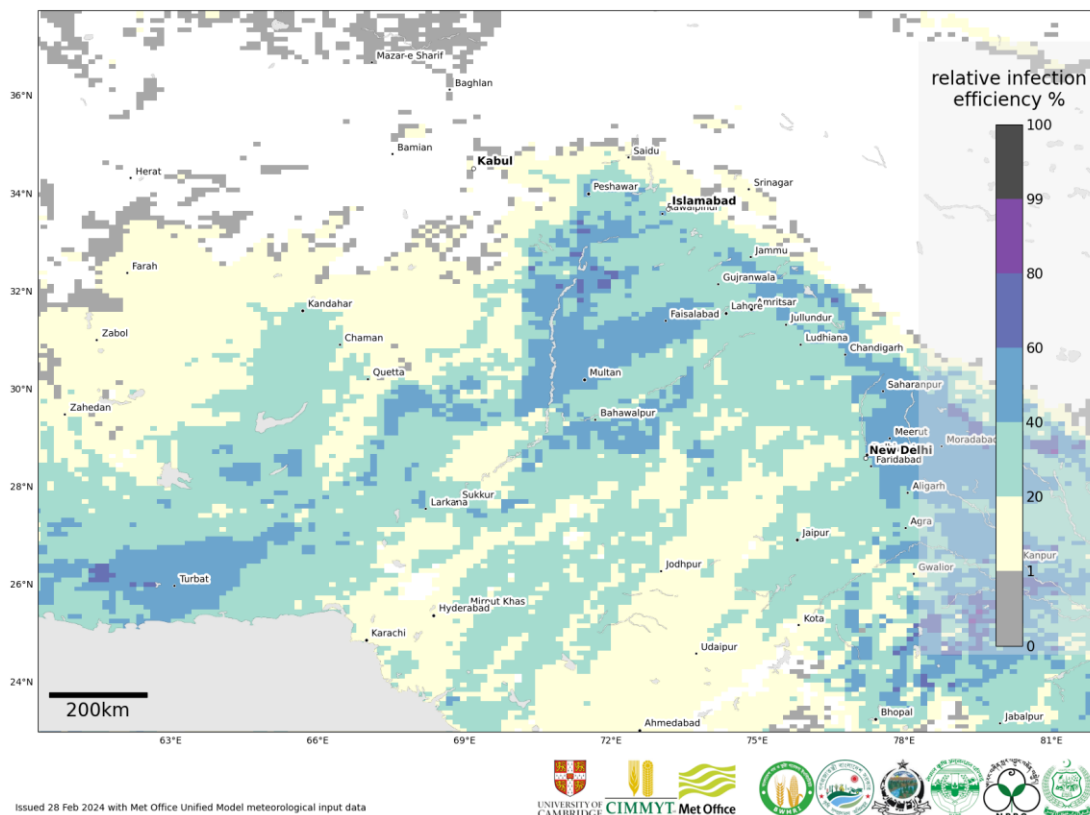
NAME dispersion forecast for the number of wheat **Stem rust** spores deposited  
2024-02-28-03:00 - 2024-03-06-00:00 (UTC)



Map 7: Stem rust spore deposition forecast Pakistan 28 Feb - 05 Mar 2024

**Risk of infection:** Current forecast (22 – 27 Feb) indicates increased risk of infection, with moderate to high infection efficiency across most areas, except the far north. Highest infection efficiency forecast for Punjab.

Infection efficiency of Wheat **Stem rust** spores  
2024-02-28-00:00 - 2024-03-05-00:00 (UTC)



Map 8: Stem rust suitability for infection forecast Pakistan 28 Feb - 04 Mar 2024



## Wheat rust advisory #4 2024

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_%
Kech	49
Nankana Sahib	48
Leiah	47
Multan	47
Sheikhupura	47
Faisalabad	46
Mianwali	45
Bhakkar	45
Toba Tek Singh	44
Chiniot	44
Muzaffargarh	43
Narowal	43
Jhang	43
Pakpattan	42
Hafizabad	42
Jhal Magsi	42
Karak	42
Lahore	42
Khushab	41
Nasirabad	41

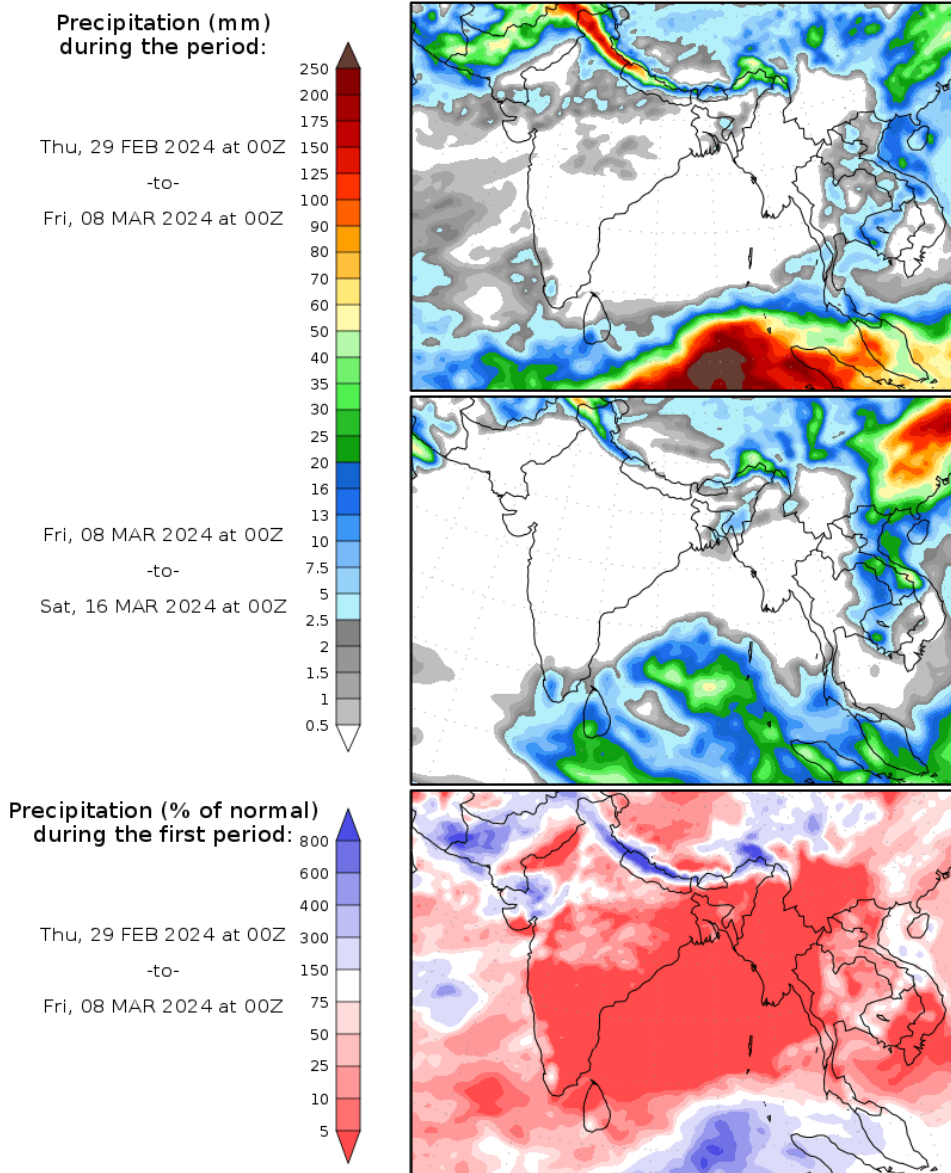
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## Regional Forecasts – Precipitation & Temperature

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 29 Feb – 8Mar, heavy rain is forecast for northern Pakistan, northwest India, western Nepal. Moderate rain if forecast over Pakistan, especially in western areas. Light rain is forecast for Bhutan. There is possible chance of very light rain in eastern and southern areas of Bangladesh. During the period 8 – 16 Mar, there is increased chance of light rain in eastern / southern Bangladesh. Rain may persist in northern Pakistan and northwest India and some light rain in the hills of Bhutan, 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: 00Z29FEB2024

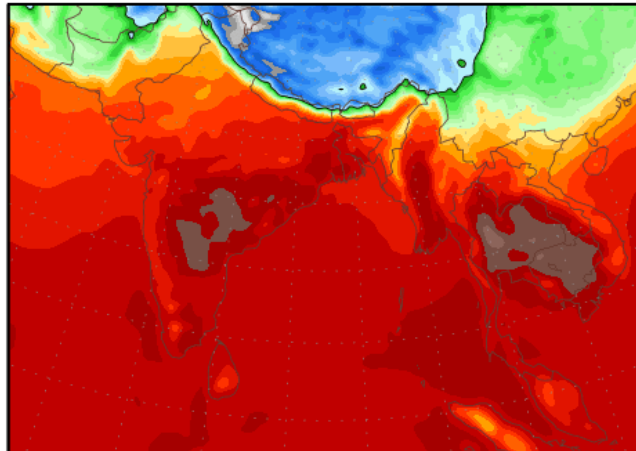
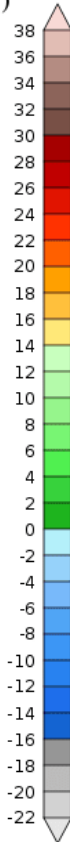
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Temperature: During the period 29 Feb - 8 Mar, cooler than normal conditions are forecast over Pakistan, northwest India and the high hills of Nepal and Bhutan. in the far north of Pakistan, southwest of Pakistan, north west India, the high hills of Nepal and Bhutan. Warmer than normal, notably in central to eastern Nepal and western Bangladesh. Increasing, warmer temperatures are forecast during the period 8 -16 Mar.

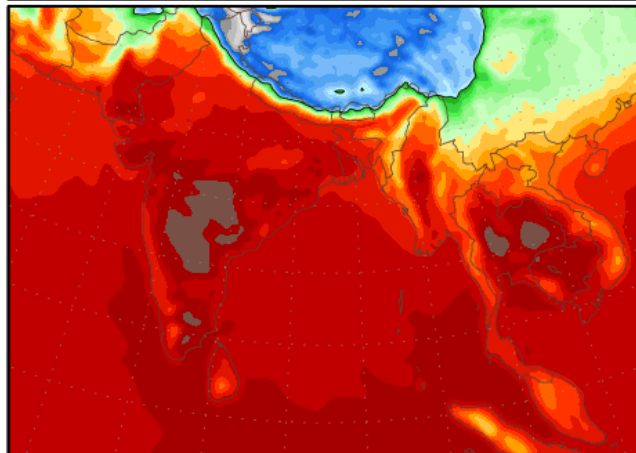
## Temperature Forecasts

Mean Surface Temperature (°C)  
during the period:

Thu, 29 FEB 2024 at 00Z  
-to-  
Fri, 08 MAR 2024 at 00Z

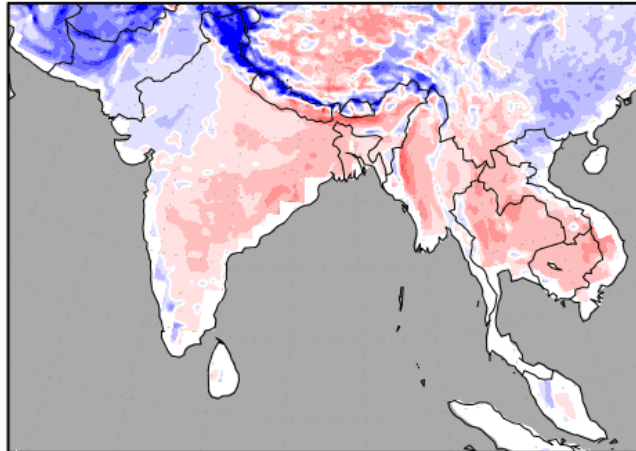
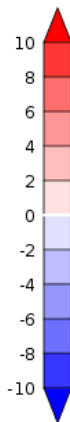


Fri, 08 MAR 2024 at 00Z  
-to-  
Sat, 16 MAR 2024 at 00Z



Temperature Anomaly  
during the first period:

Thu, 29 FEB 2024 at 00Z  
-to-  
Fri, 08 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: 00Z29FEB2024