



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

Summary period: 04 May - 10 May 2025

Overall risk level:

Moderate (late crops) / Caution

Key messages

No new surveys, but leaf and stripe rust are present, with the possibility of stripe rust remaining in some fields in Punakha valley. Low levels of disease were detected in the east. Low levels of stripe rust in west, with crops at young growth stages (probably boot- heading). Given continued very high suitability and presence of susceptible cultivars, stripe rust is likely to increase on these crops e.g., in western areas.

Suitability forecast (4 – 9 May) for leaf, stripe and stem rust indicates increased and high infection efficiency across wheat growing areas. During the period 4 – 12 May, continued rain is forecast across Bhutan and this is likely to persist 12 - 20 May. Temperatures (4 – 12 May) are forecast to be mainly cooler than normal, but the Punakha/Wangdue valley and southern areas may be warmer.

Given the short term forecasts with continuing rain, conditions are likely to be increasingly suitable for continued disease development. Further development of stripe rust is considered likely. Monitoring for any appearance of stem rust is strongly advised.

Recommendations

Very close monitoring of fields, particularly for susceptible varieties at early growth stages, is recommended. Forecast weather conditions, indicate that disease development is increasingly likely. Stripe rust is likely to increase on early growth stage crops and care should be taken to monitor for any possible appearance of stem rust.

Scouting should be undertaken, especially in early stage crops, and farmers informed to be vigilant for the emergence of rust.

- 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 Feb 10 2025 - Apr 15 2025. A total of 178 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 38 out of 178 fields surveyed (21%). Moderate to high incidence of leaf rust has been seen in 12 fields (32% of infected fields). Moderate to high severity of leaf rust has been seen in 1 fields (3% of infected fields).

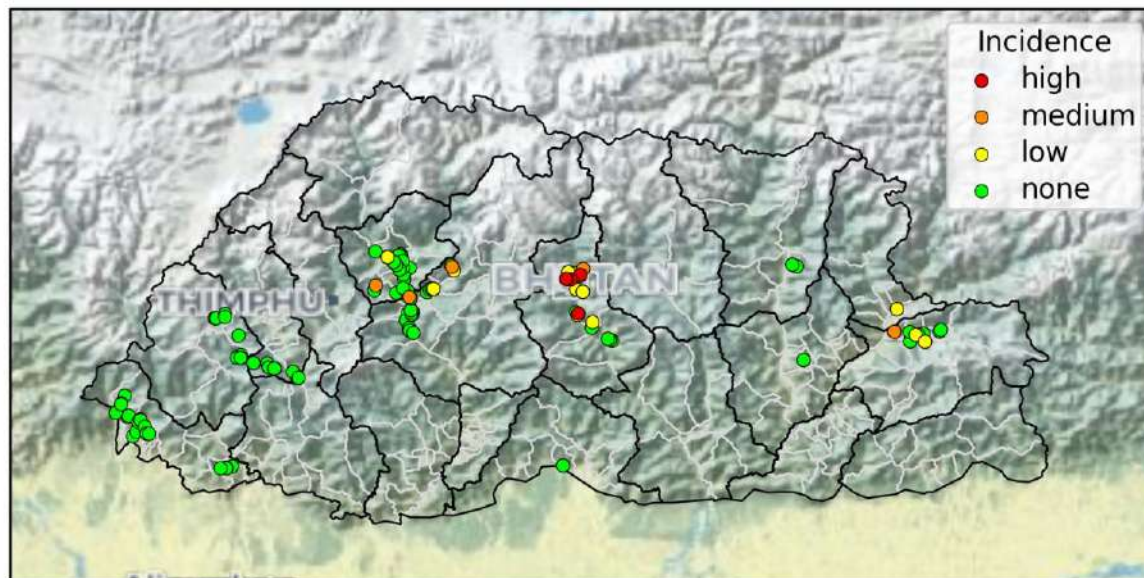
Stripe Rust reported from 83 out of 178 fields surveyed (47%). Moderate to high incidence of stripe rust has been seen in 51 fields (61% of infected fields). Moderate to high severity of stripe rust has been seen in 25 fields (30% of infected fields).

Table 1: Variety analysis of surveys.

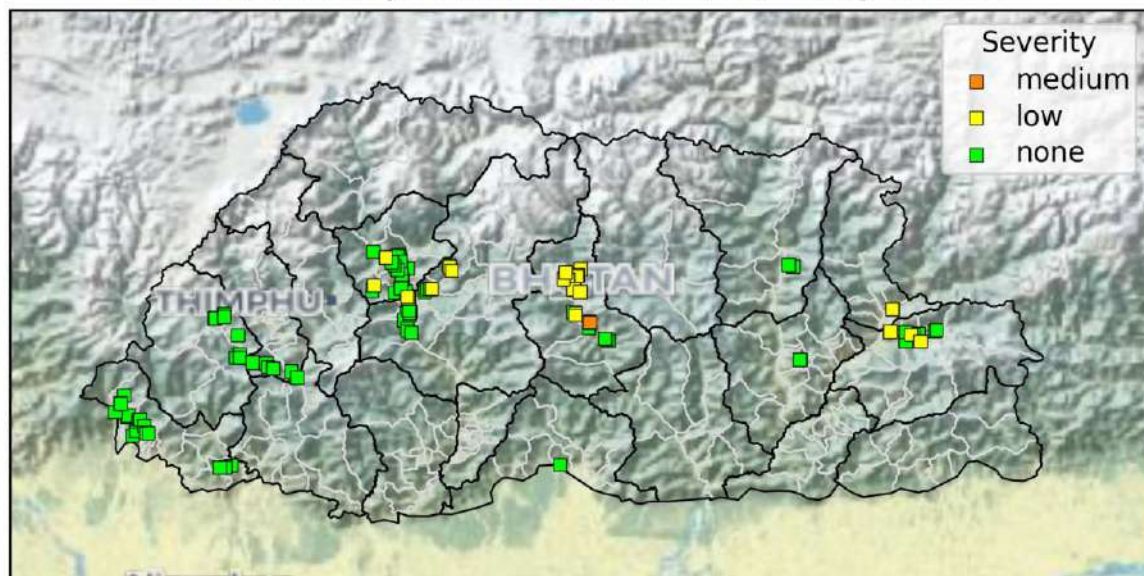
Variety	Number of surveys	Number of surveys reporting infection of		
		stem rust	stripe rust	leaf rust
Bajosokha	1	n/a	1	1
Guma Sokha	8	n/a	0	0
Indian Durum	2	n/a	2	0
Local	7	n/a	3	2
Local barley	1	n/a	0	0
Semolina	1	n/a	0	0
Unknown	158	n/a	77	35

Growth stage analysis of surveys unavailable because no surveys available from the last week (since Apr 27 2025).

Leaf rust surveys Bhutan Feb 10 2025 - May 03 2025



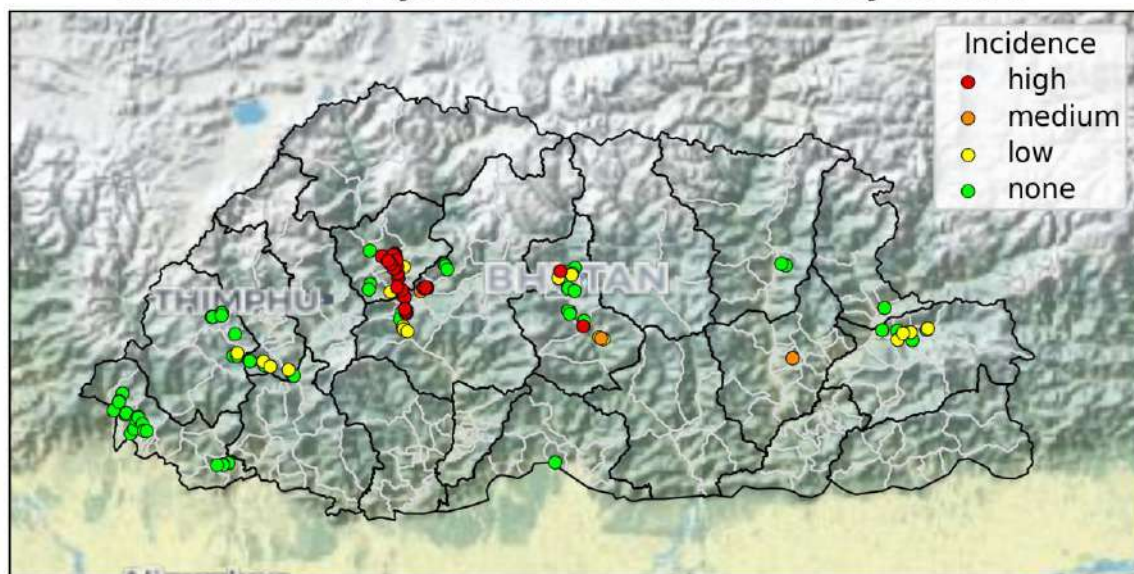
Leaf rust surveys Bhutan Feb 10 2025 - May 03 2025



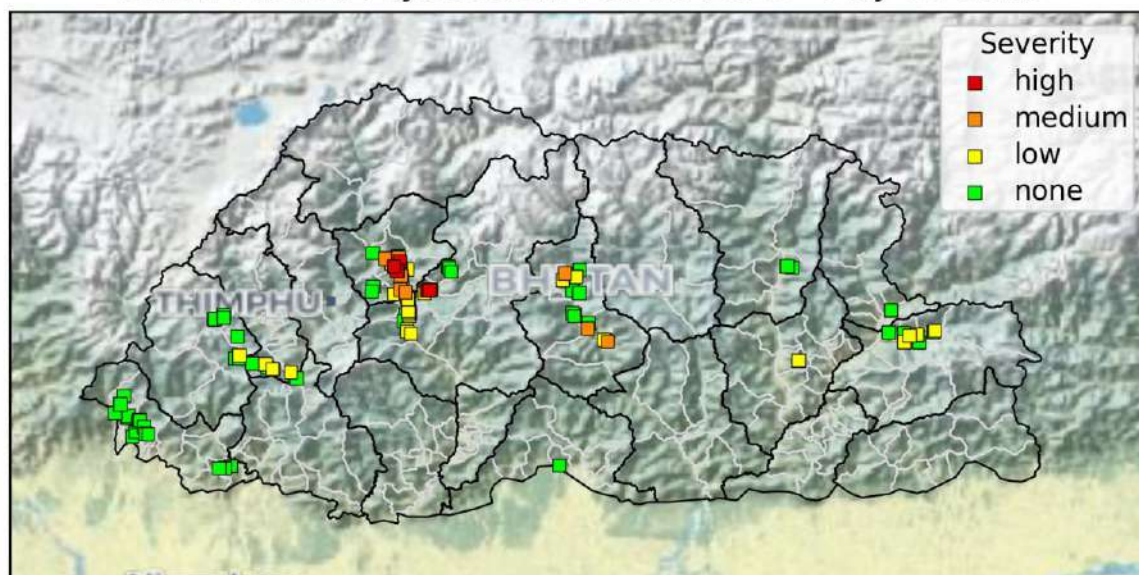
Map 1: Leaf Rust incidence (top) and severity (bottom) in Bhutan field surveys Feb 10 2025 - May 03 2025

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

Yellow rust surveys Bhutan Feb 10 2025 - May 03 2025



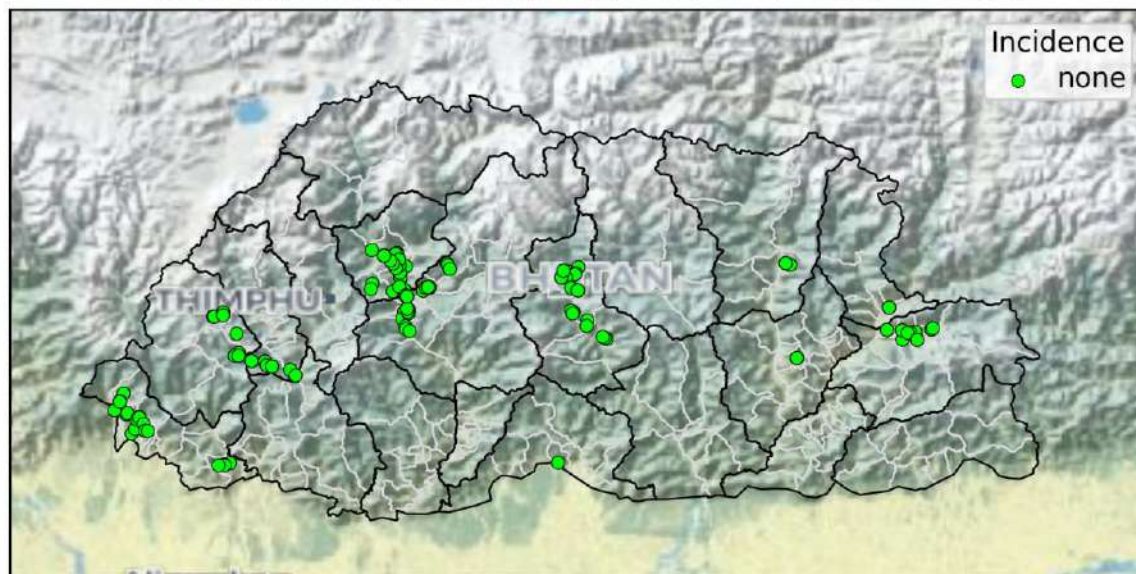
Yellow rust surveys Bhutan Feb 10 2025 - May 03 2025



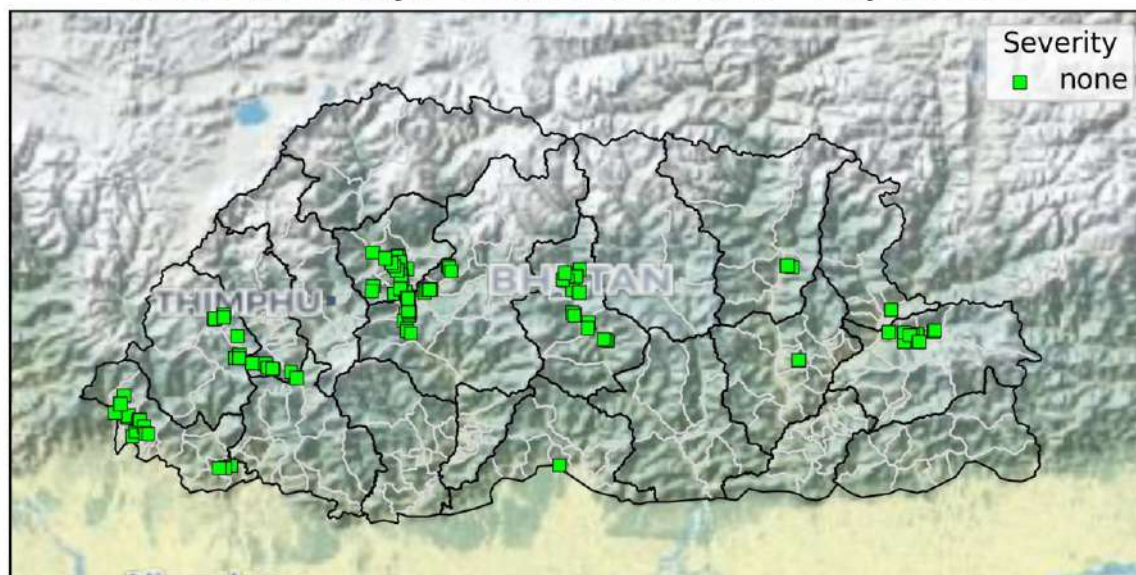
Map 2: Stripe Rust incidence (top) and severity (bottom) in Bhutan field surveys Feb 10 2025 - May 03 2025

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

Stem rust surveys Bhutan Feb 10 2025 - May 03 2025



Stem rust surveys Bhutan Feb 10 2025 - May 03 2025



Map 3: Stem Rust incidence (top) and severity (bottom) in Bhutan field surveys Feb 10 2025 - May 03 2025

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

Spore dispersal forecasts

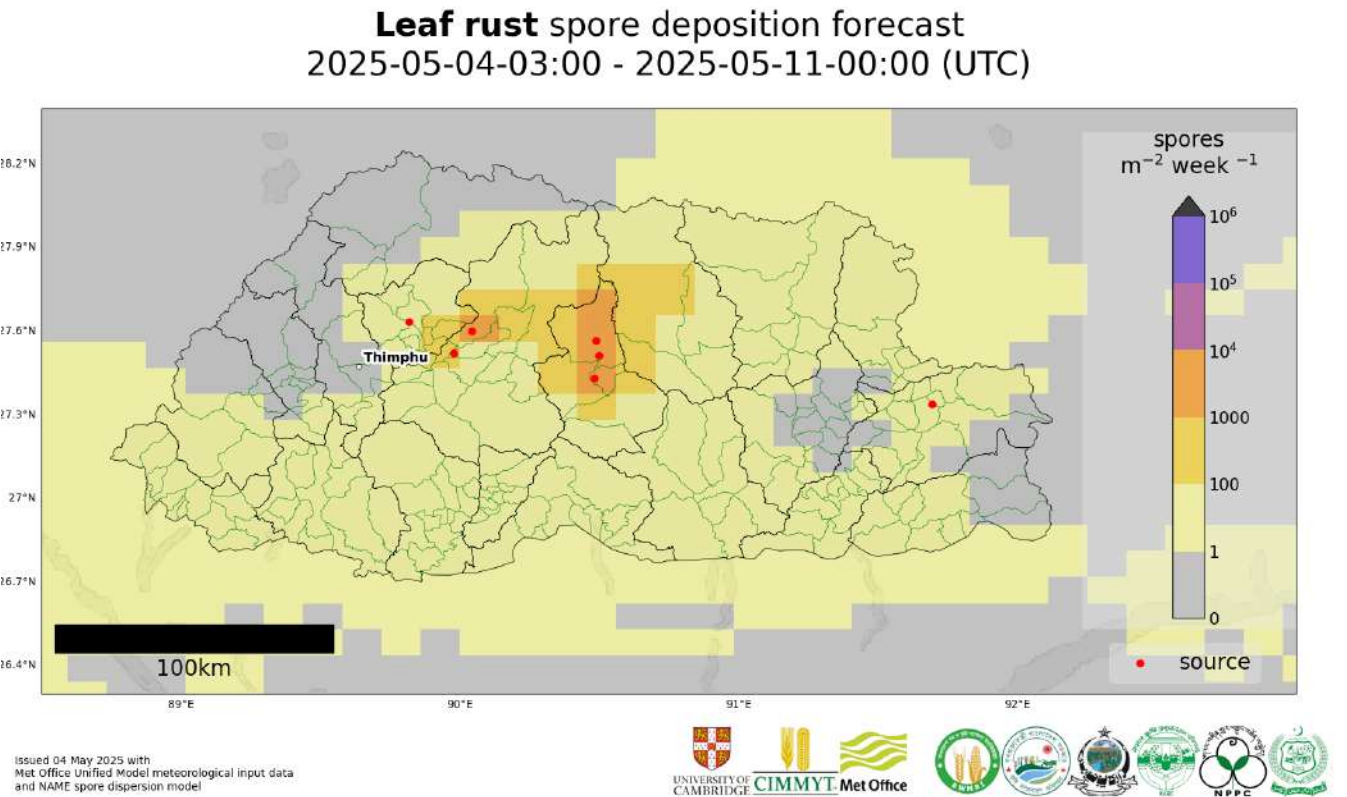
Spore dispersal forecasts run by the UK Met Office and Cambridge University are displayed for stem, stripe and leaf rusts for the forecasted period. Surveys in each district are gathered to provide a single source per administrative area for dispersal forecasts (red dots in figure).

Environmental / climatic suitability for infection forecasts

These forecasts run by the UK Met Office and Cambridge University 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 (04 May - 10 May) indicates dispersal in an easterly direction. Most deposition close to sources in Bhutan.



Map 4: Leaf rust spore deposition forecast Bhutan 04 May - 10 May 2025

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

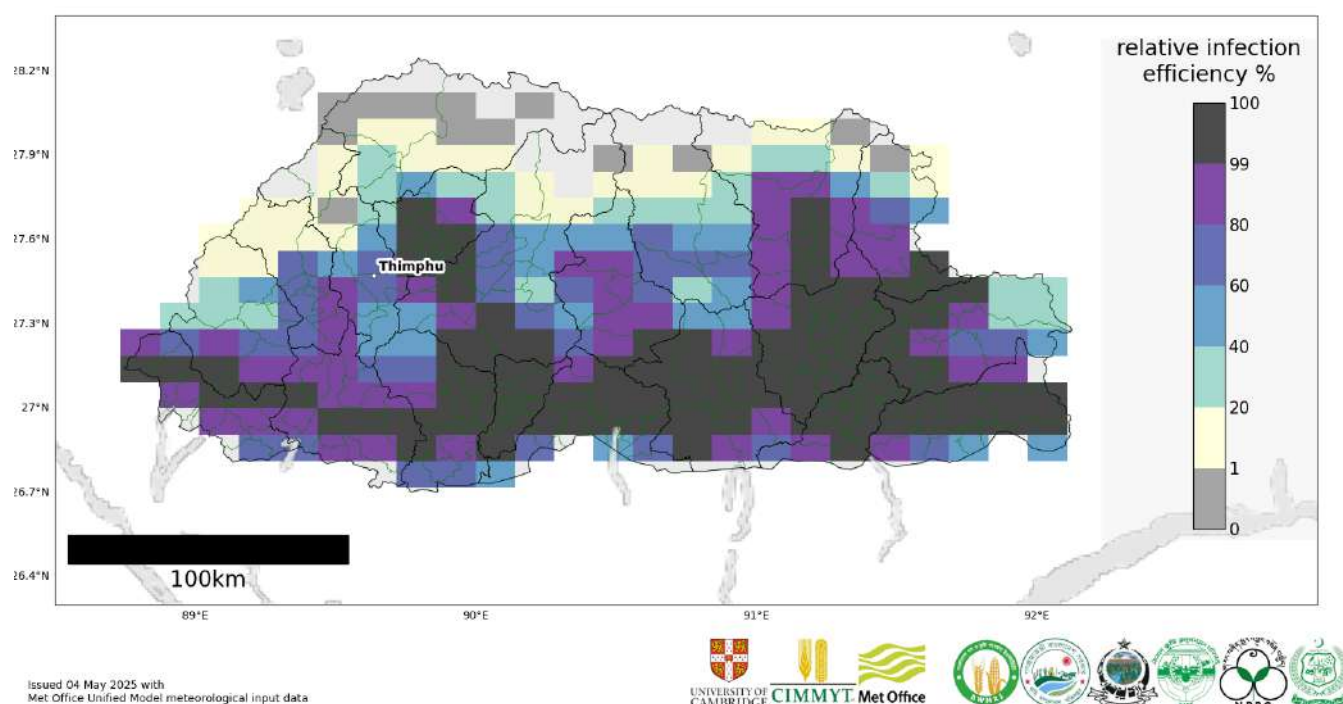
admin2Name	admin1Name	Leaf rust spores per m^2 per week
Dragteng	Trongsa	2500
Nubi	Trongsa	2100
Tangsibji	Trongsa	1600
Shengabjimi	Punakha	1100
Chhoekhor	Bumthang	520
Nyisho	Wangduephodrang	490
Dangchhu	Wangduephodrang	450
Langthil	Trongsa	320
Toewang	Punakha	260
Kazhi	Wangduephodrang	250
Dzoma	Punakha	220
Lingmukha	Punakha	220
Phangyuel	Wangduephodrang	220
Sephu	Wangduephodrang	170
Guma	Punakha	130

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Chhume	Bumthang	120
Chhubu	Punakha	99
Bapisa	Punakha	81
Bjena	Wangduephodrang	63
Tang	Bumthang	58

Risk of infection: Current forecast (4 – 9 May) indicates increased suitability to the last advisory. Very high infection efficiency forecast in southern areas and valleys of central-west and east.

Infection efficiency of Wheat **Leaf rust** spores 2025-05-04-00:00 - 2025-05-10-00:00 (UTC)



Map 5: Leaf rust suitability for infection forecast Bhutan 04 May - 09 May 2025

The 20 most impacted districts (infection efficiency) per country are presented in the table below.

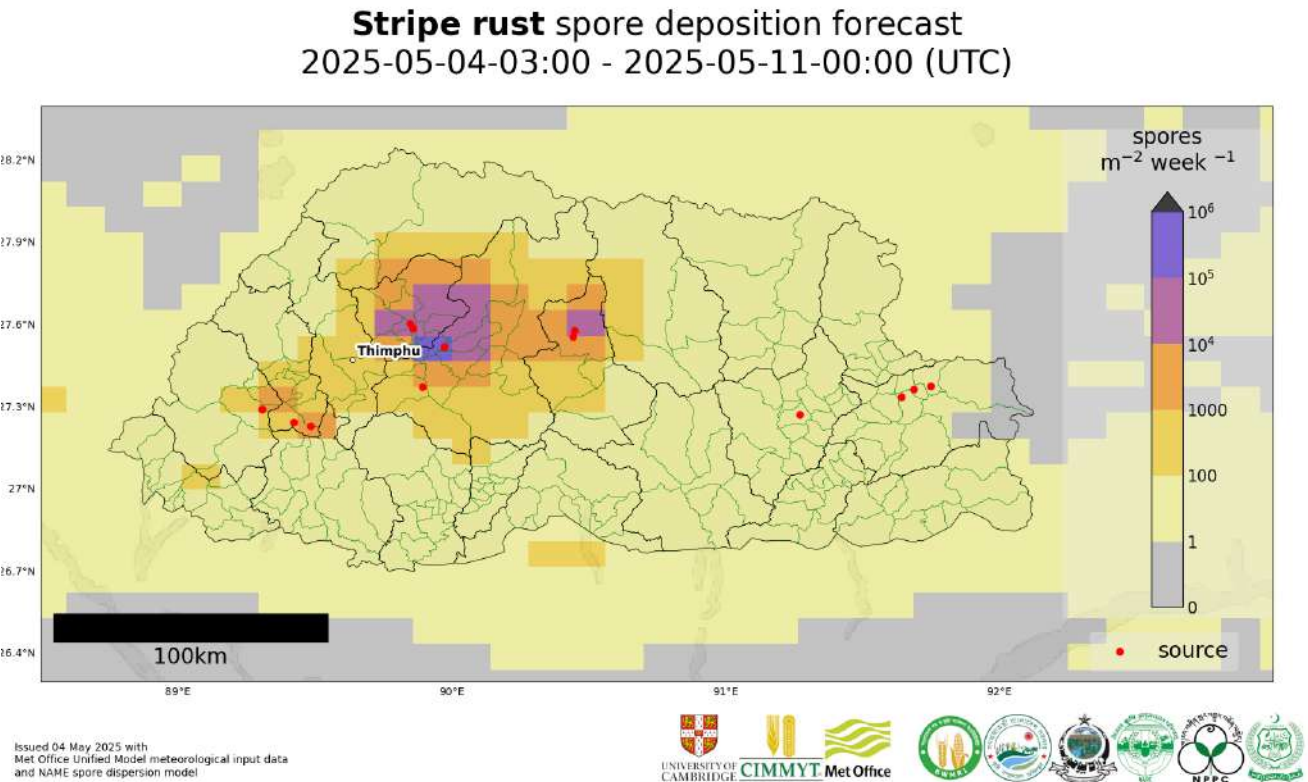
admin2Name	admin1Name	RIE_leaf_rust_%
Zobel	Pemagatshel	100
Thrimshing	Trashigang	100
Thangrong	Monggar	100
Jurmey	Monggar	100
Theedtsho	Wangduephodrang	100
Jamkhar	Yangtse	100
Guma	Punakha	100
Gosarling	Tsirang	100
Gomdar	Samdrupjongkhar	100
Toetsho	Yangtse	100
Kengkhar	Monggar	100

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Tsakaling	Monggar	100
Dzoma	Punakha	100
Dungtoe	Samtse	100
Dungmin	Pemagatshel	100
Dunglegang	Tsirang	100
Drugyelgang	Dagana	100
Drepung	Monggar	100
Talo	Punakha	100
Khipisa	Dagana	100

Stripe rust

Dispersal: Current forecast (04 May - 10 May) indicates dispersal in an easterly direction. Highest spore deposition close to sources.



Map 6: Stripe rust spore deposition forecast Bhutan 04 May - 10 May 2025

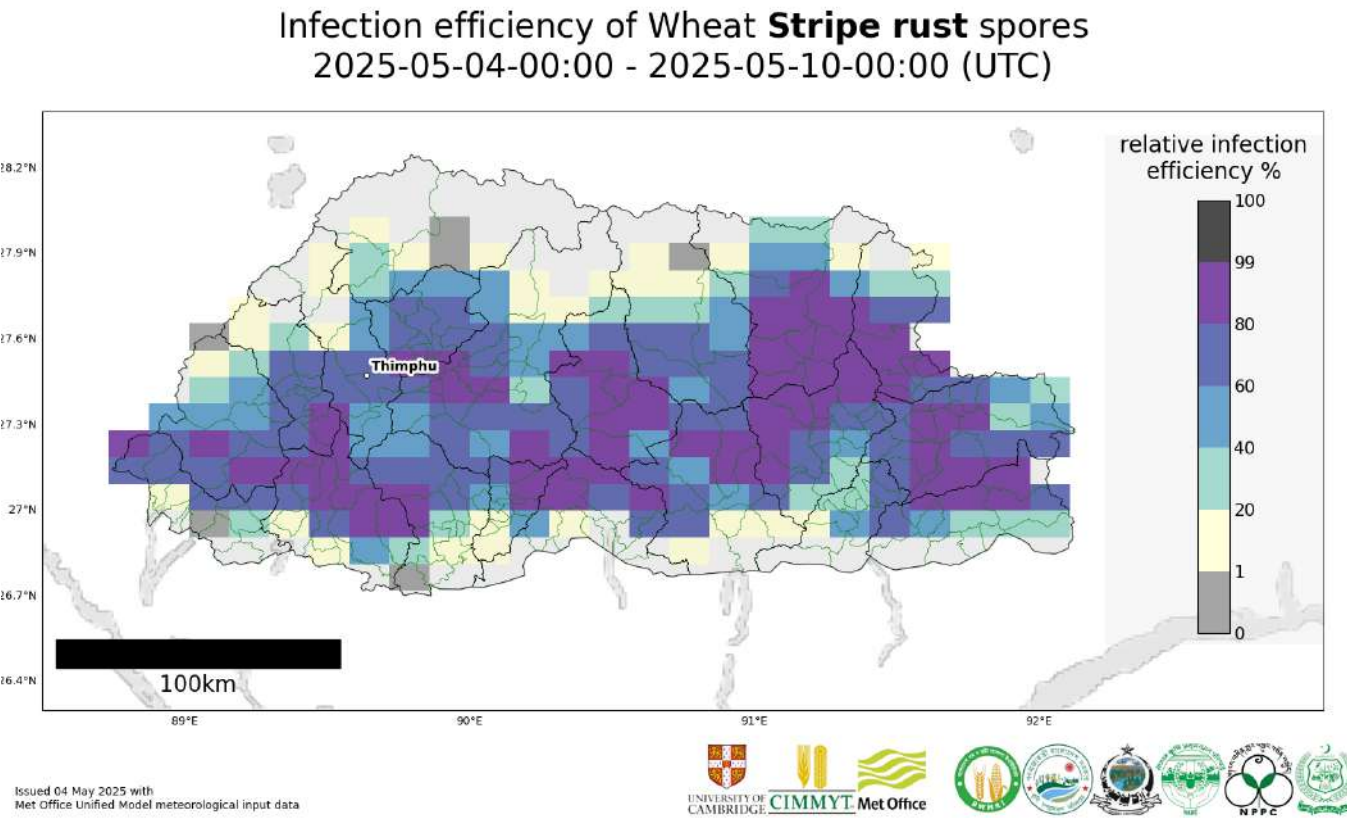
The 20 most impacted districts (spore deposition) per country are presented in the table below.

admin2Name	admin1Name	Stripe rust spores per m ² per week
Dzoma	Punakha	150000
Phangyuel	Wangduephodrang	150000
Lingmukha	Punakha	150000
Bapisa	Punakha	110000
Guma	Punakha	85000
Thedtsho	Wangduephodrang	72000
Shengabjimi	Punakha	61000
Bjena	Wangduephodrang	59000
Nahi	Wangduephodrang	54000
Nyisho	Wangduephodrang	54000
Ruepisa	Wangduephodrang	43000
Chhubu	Punakha	36000
Kazhi	Wangduephodrang	32000
Talo	Punakha	23000
Toewang	Punakha	16000
Dangchhu	Wangduephodrang	13000

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Toepisa	Punakha	12000
Kabjisa	Punakha	9000
Gangte	Wangduephodrang	6100
Goenshari	Punakha	2800

Risk of infection: Current forecast (4 – 9 May) indicates increased suitability since the last advisory. High infection efficiency across most/all of the wheat growing areas.



Map 7: Stripe rust suitability for infection forecast Bhutan 04 May - 09 May 2025

The 20 most impacted districts (infection efficiency) per country are presented in the table below.

admin2Name	admin1Name	RIE_stripe_rust_%
Tsenkhar	Lhuentse	89
Menbi	Lhuentse	88
Minjay	Lhuentse	88
Tsamang	Monggar	87
Kangpara	Trashigang	87
Tsakaling	Monggar	86
Shermung	Monggar	86
Trashiyangtse	Yangtse	86
Thedtsho	Wangduephodrang	85
Bapisa	Punakha	85
Drametse	Monggar	85

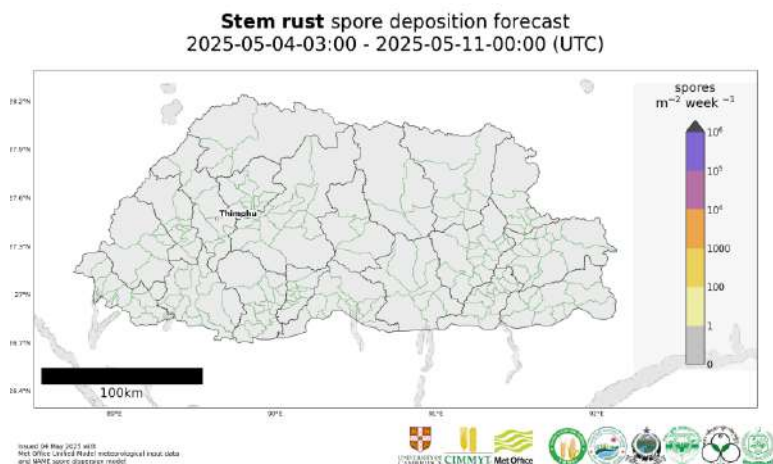
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Thrimshing	Trashigang	84
Shongphu	Trashigang	84
Nahi	Wangduephodrang	84
Samkhar	Trashigang	84
Khaling	Trashigang	83
Jaray	Lhuentse	83
Balam	Monggar	83
Gasetsho Gom	Wangduephodrang	83
Dragteng	Trongsa	83

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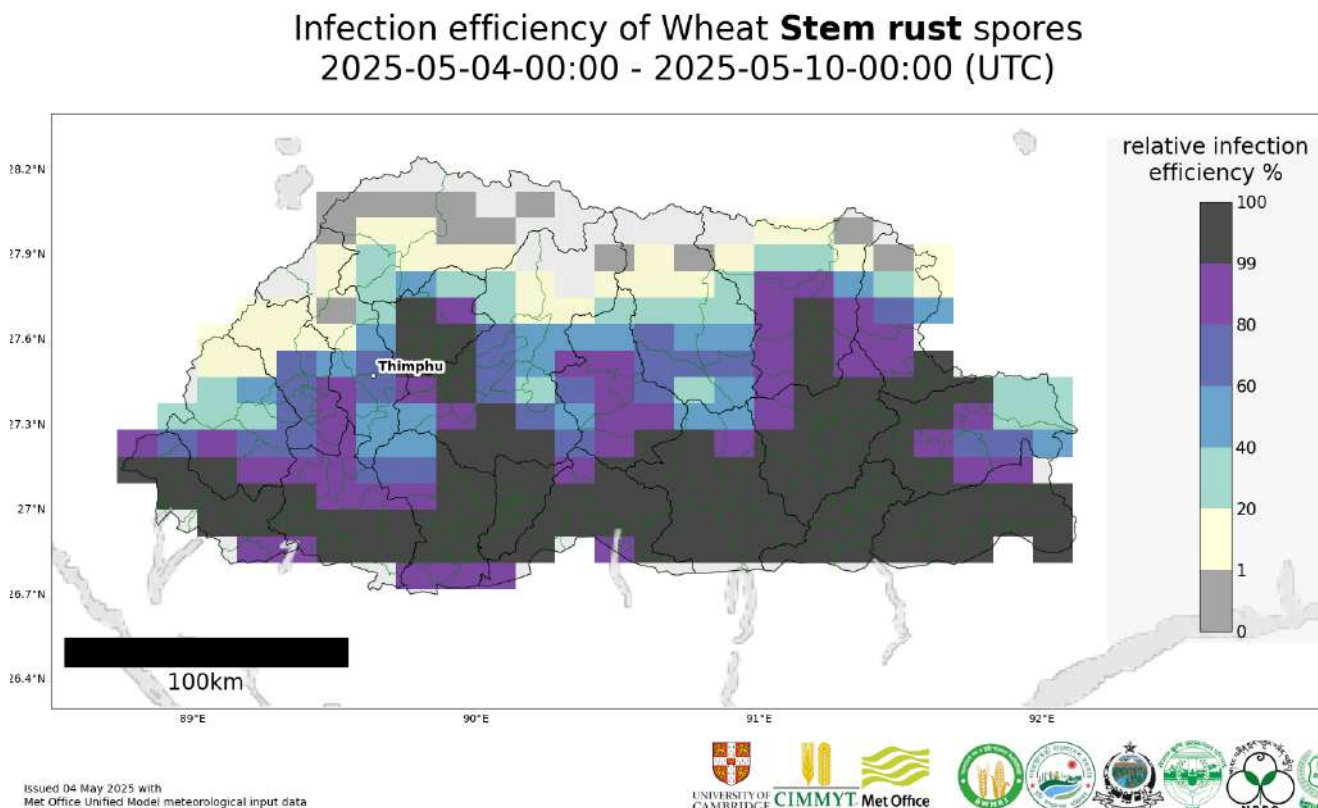
Stem rust

Dispersal: Current forecast (04 May - 10 May) indicates no dispersal as no reports of stem rust.



Map 8: Stem rust spore deposition forecast Bhutan 04 May - 10 May 2025

Risk of infection: Current forecast (4 - 9 May) indicates increased suitability to the last advisory. Very high infection efficiency across southern areas, and the main valleys.



Map 9: Stem rust suitability for infection forecast Bhutan 04 May - 09 May 2025

The 20 most impacted districts (infection efficiency) per country are presented in the table below.

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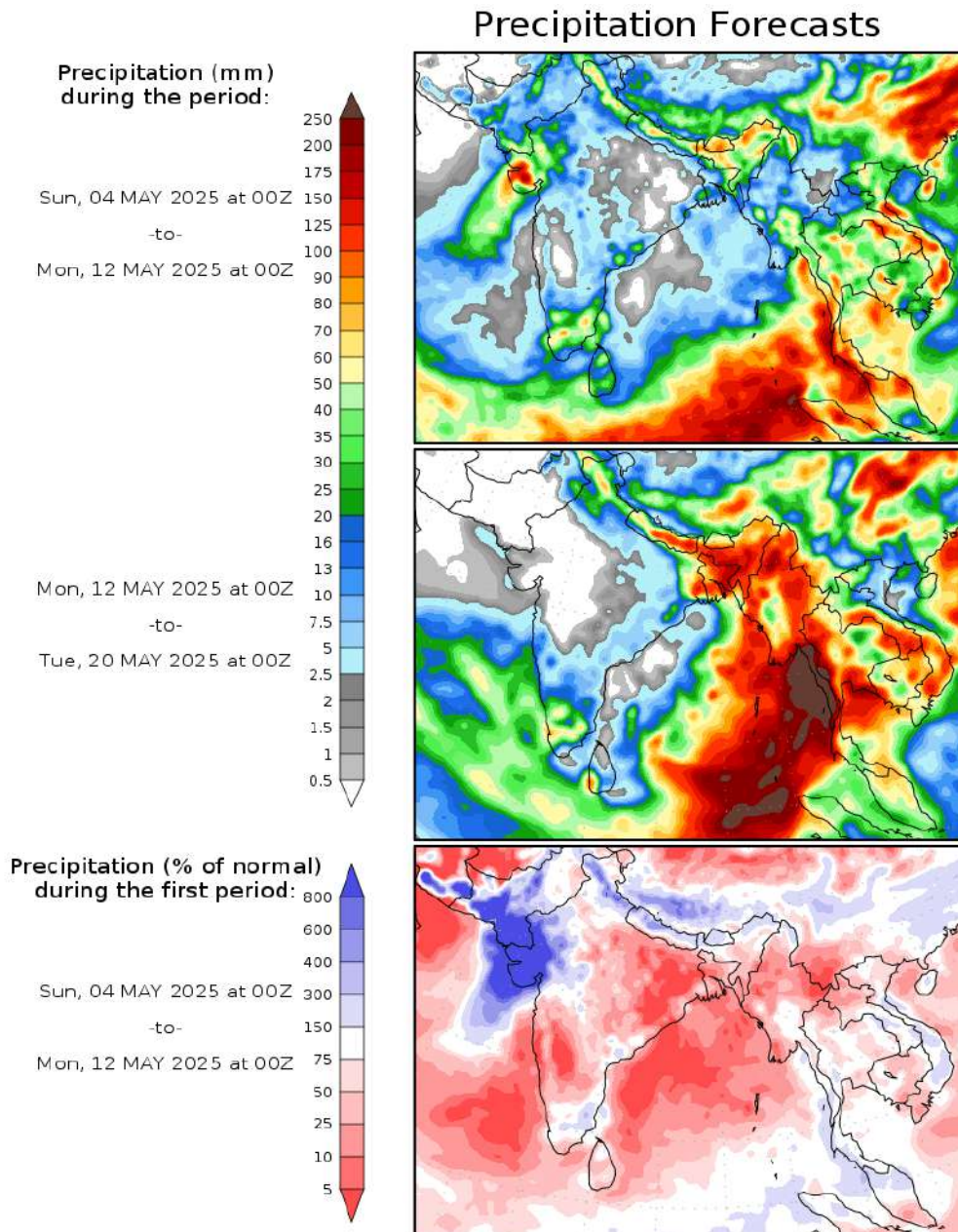
admin2Name	admin1Name	RIE_stem_rust_%
Zobel	Pemagatshel	100
Gosarling	Tsirang	100
Samrang	Samdrupjongkhar	100
Jurmey	Monggar	100
Serthig	Samdrupjongkhar	100
Jangchhubling	Samdrupjongkhar	100
Jamkhar	Yangtse	100
Shemjong	Tsirang	100
Hiley	Sarpang	100
Guma	Punakha	100
Gozhing	Zhemgang	100
Gozhi	Dagana	100
Gongdue	Monggar	100
Thrimshing	Trashigang	100
Gomdar	Samdrupjongkhar	100
Shompangkha	Sarpang	100
Gesarling	Dagana	100
Shumer	Pemagatshel	100
Silambi	Monggar	100
Sipsu	Samtse	100

Region-wide Forecasts

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.

Precipitation: During the period 4 – 12 May, rain forecast across the entire region, heaviest in Bhutan, eastern Bangladesh, Nepal (hills), north west India, southern India and northern Pakistan. During 12 – 20 May, increased and heavier rain forecast for Bangladesh and Eastern/ Central Nepal continued light rain elsewhere except southern / central Pakistan and western India.



Precipitation forecasts from the National Centers for Environmental Prediction.
Normal rainfall derived from Xie-Arkin (CMA) Monthly Climatology for 1979-2003.
Forecast Initialization Time: 00Z04MAY2025

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Temperature: During the period 4 – 12 May temperatures are warming across the entire region (especially India and Pakistan). Warmer than normal across the region, except for northern Pakistan, north west India, high hills of Nepal, Bhutan. Temperatures forecast to rise higher during 12 – 20 May

Temperature Forecasts

Mean Surface Temperature (°C)
during the period:

Sun, 04 MAY 2025 at 00Z

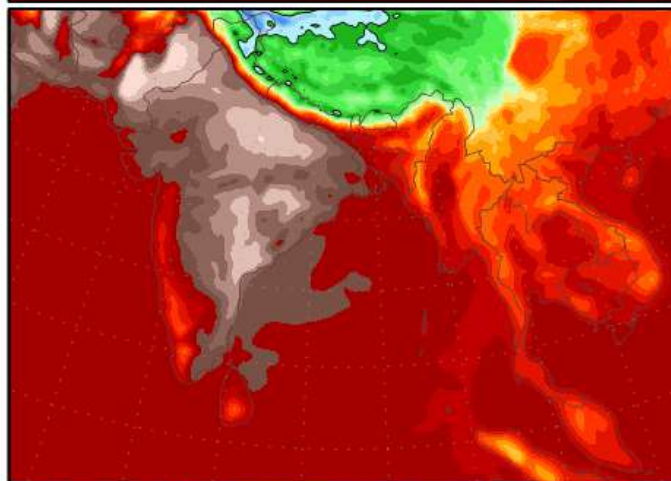
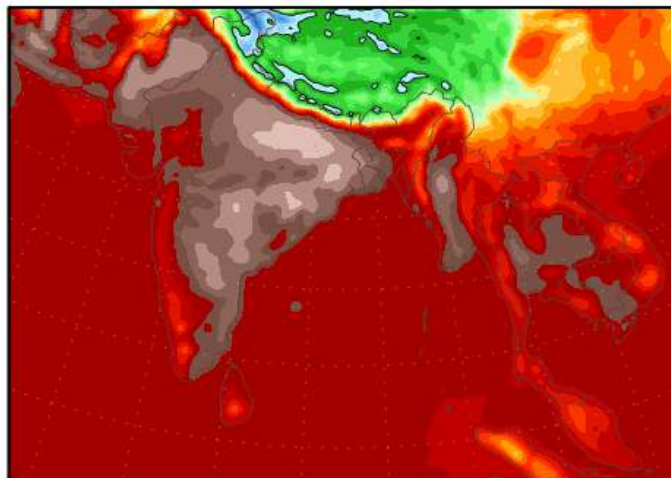
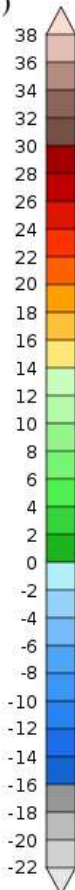
-to-

Mon, 12 MAY 2025 at 00Z

Mon, 12 MAY 2025 at 00Z

-to-

Tue, 20 MAY 2025 at 00Z

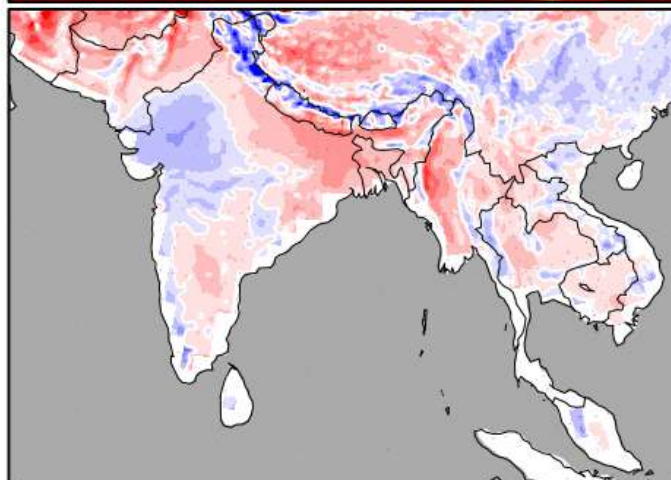
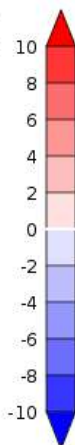


Temperature Anomaly
during the first period:

Sun, 04 MAY 2025 at 00Z

-to-

Mon, 12 MAY 2025 at 00Z



Temperature forecasts from the National Centers for Environmental Prediction.
Normal Temperature derived from CRU monthly climatology for 1901-2000
Forecast Initialization Time: 00Z04MAY2025