



WEATHER DATA COLLECTED DURING THE 2024 SPRING
SEASON AT GITEGA AGROSYNOPTIC WEATHER STATION.

FIRST MONTH: 1-31, MARCH 2024.



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CHAPTER 1: WEATHER DATA FOR THE MONTH OF MARCH

This chapter provides an overview of the observed data, emphasizes the key findings, and illustrates the weather patterns for the month of March.

1.1. MAXIMUM AND MINIMUM TEMPERATURE AND RAINFALL.

Maximum and Minimum temperature and total rainfall of March are summarized in Table 1.1.

Maximum temperature	Minimum temperature	Total rainfall
31.8 ⁰ C	15.3 ⁰ C	99.8 mm

Table 1.1: Temperature and Total Rainfall.

1.2. OTHER SIGNIFICANT DATA

PARAMETER	VALUE	DAY
Highest Maximum temperature	31.8 ⁰ C	On 19 th ,03,2024
Lowest Maximum temperature	23.2 ⁰ C	On 31 st ,03,2024
Highest Minimum temperature	20 ⁰ C	On 19 th and 20 th 03,2024
Lowest Minimum temperature	15.3 ⁰ C	On 6 th ,03,2024
Highest Rainfall	25.8mm	31 st ,03,2024
Highest Minimum Grass temperature	17.9 ⁰ C	On 19 th ,03,2024
Lowest Minimum Grass temperature	14.4 ⁰ C	On 7 th and 8 th ,03,2024
Highest Insolation	9 hours 12min	17 th ,03,2024
Lowest Insolation	1 hour 24 min	5 th ,03,2024
Highest Piche evaporation	5.6 mm	17 th ,03,2024
Lowest Piche evaporation	1.4 mm	29 th ,03,2024
Highest BAC evaporation	4.6 mm	20 th ,03,2024
Lowest BAC evaporation	1.4 mm	9 th ,03,2024

Table 1.2:Summary of Maximum and Minimum Observed Data.

1.3. SOIL TEMPERATURES

Table 1.3 summarizes the average temperatures recorded by various soil thermometers at 6:00 AM, 12:00 PM, and 6:00 PM.

HEIGHT	06:00	12:00	18:00
10Cm	23.58 ⁰ C	24.49 ⁰ C	25.47 ⁰ C
20Cm	24.21 ⁰ C	24.19 ⁰ C	25.01 ⁰ C
50Cm	24.83 ⁰ C	24.83 ⁰ C	24.85 ⁰ C
100Cm	24.8 ⁰ C	24.82 ⁰ C	24.8 ⁰ C

Table 1.3:The Mean temperature of Soil thermometers.

As depicted in Figure 1.1, at 6:00 AM, the soil at a depth of 10 cm is cooler than other depths, and the temperature gradually rises with increasing depth. Conversely, there is a noticeable temperature variation during the day near the surface thermometers.

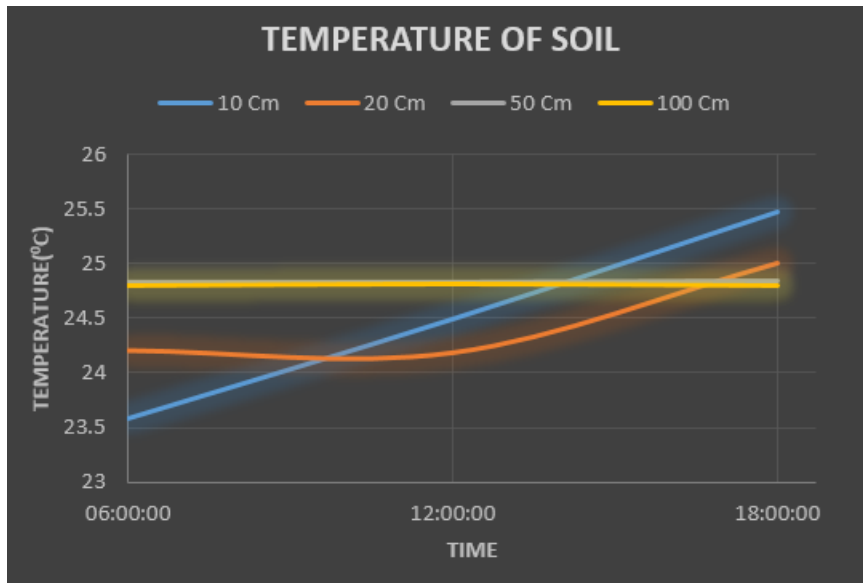


Figure 1.1: Variation of Soil temperature during a day.

1.4. PICHE AND BAC EVAPORATION

Table 1.4 displays the average evaporation rates at Piche and BAC. The data indicates that BAC experiences higher evaporation rates during the night compared to Piche, whereas Piche exhibits greater evaporation during the daytime than BAC.

EVAPORATION TIME	PICHE	BAC	DIFF
18H00-06H00	1.08mm	1.23mm	0.15mm
08H00-08H00	3.18mm	2.92mm	0.26mm
06H00-18H00	1.96mm	1.71mm	0.25mm

Table 1.4: BAC and Piche Evaporation.

1.5. MINIMUM GRASS AND MINIMUM DAILY TEMPERATURE.

The data indicates that the mean average temperature of the glass is 1.55°C lower than the daily minimum temperature, as presented in Table 1.5.

MINIMUM GLASS TEMPERATURE	MINIMUM DAILY TEMPERATURE
16.16°C	17.71°C

Table 1.5: Grass and Daily Minimum temperatures.

1.6. INSOLATION

Table 1.6 summarizes the recorded insolation for the month of March. The data for the first three days is missing. It is observed that before midday, there is higher sunshine compared to the afternoon period.

	AM	PM	TOTAL
TOTAL	77h 54 min	73 hours 36 min	151h 30 min
AVERAGE	2h 46min48sec	2hours 37min48sec	5 hours24min 36sec

Table 1.6: Insolation.

1.7. CLOUDS

In March mostly days were characterized by abundant clouds 57% of the days have clouds cover than average clouds cover of 70% covering a sky.

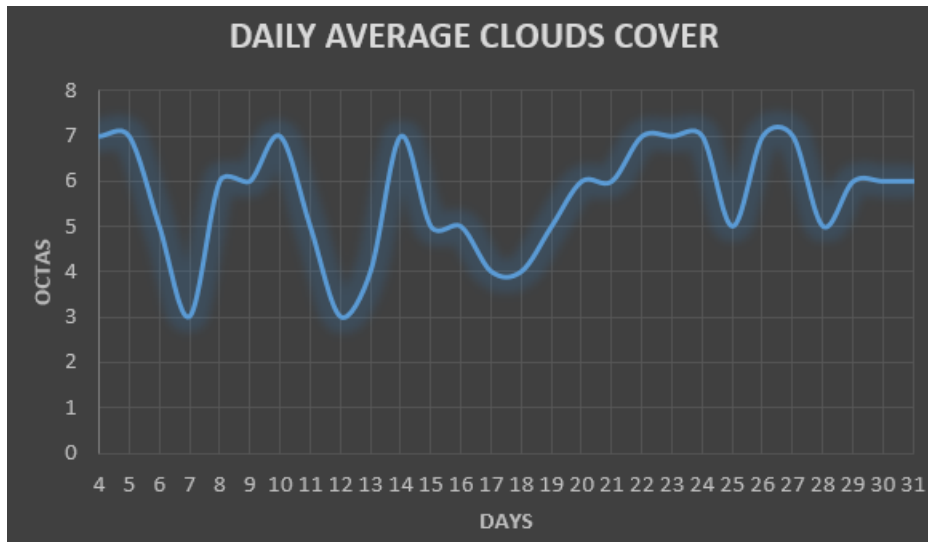


Figure 1.2: Daily Average Clouds cover.

1.8. CLOUDS DEVELOPMENT

Throughout the observation period, data indicates that there is a higher prevalence of clouds between 11:00 and 14:00, with more abundant cloud cover in the afternoon compared to the morning.

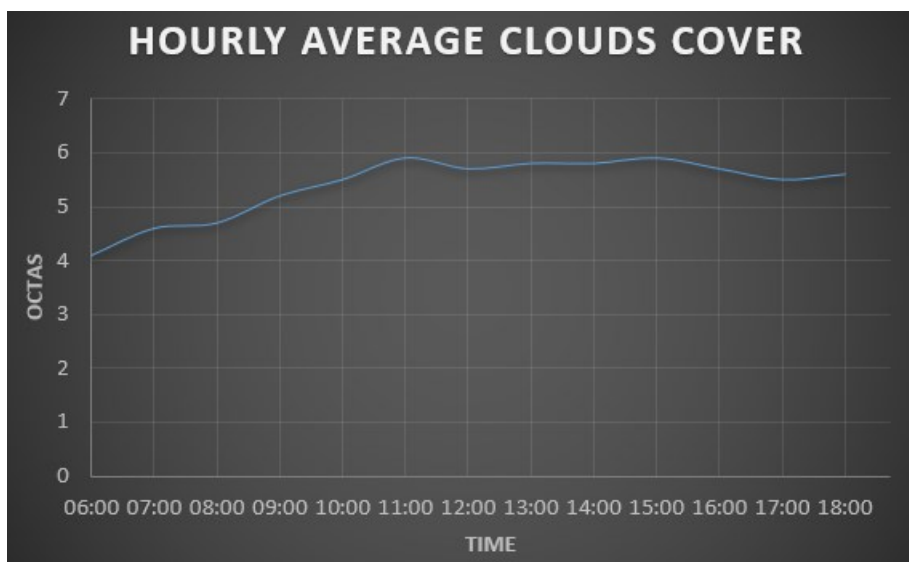


Figure 1.3: Hourly Average Clouds cover

1.9. CLOUDS COVER AND INSOLATION

Cloud coverage is assessed by averaging the observed octas from 6:00 AM to 6:00 PM. The first three days were excluded from the calculation because second and third day fell on the weekend when data collection did not occur. Figure 1.4 displays the average cloud cover alongside recorded insolation. The data indicates an inverse relationship between insolation and cloud cover, with higher sun exposure corresponding to lower cloud coverage.

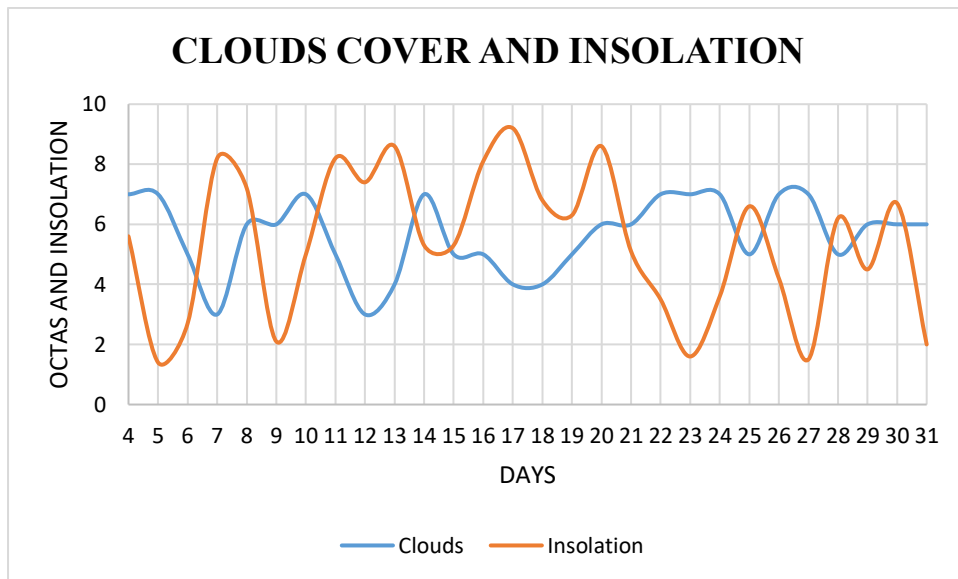


Figure1. 4: Clouds Cover and Insolation

1.10. INSTRUMENTS

1.10.1. DIGITAL THERMOMETER VS THERMOGRAPHY

The digital thermometer and thermography consistently show homogeneity in recorded data, with a maximum difference of 1°C observed. However, a significant maximum difference of 4.1°C occurred on the 16th of March 2024 at 07:00 when the digital thermometer shifted by 1 degree while the thermography increased by 5.9°C , resulting in the higher difference. Another notable difference of 2.3°C was observed on the 5th of March 2024 at 10:00 during rain.

Additionally, differences ranges between 1°C and 1.5°C were noted during specific phenomena like rain of bad weather, such as a 1.5°C difference on the 27th of April 2024 at 17:00.

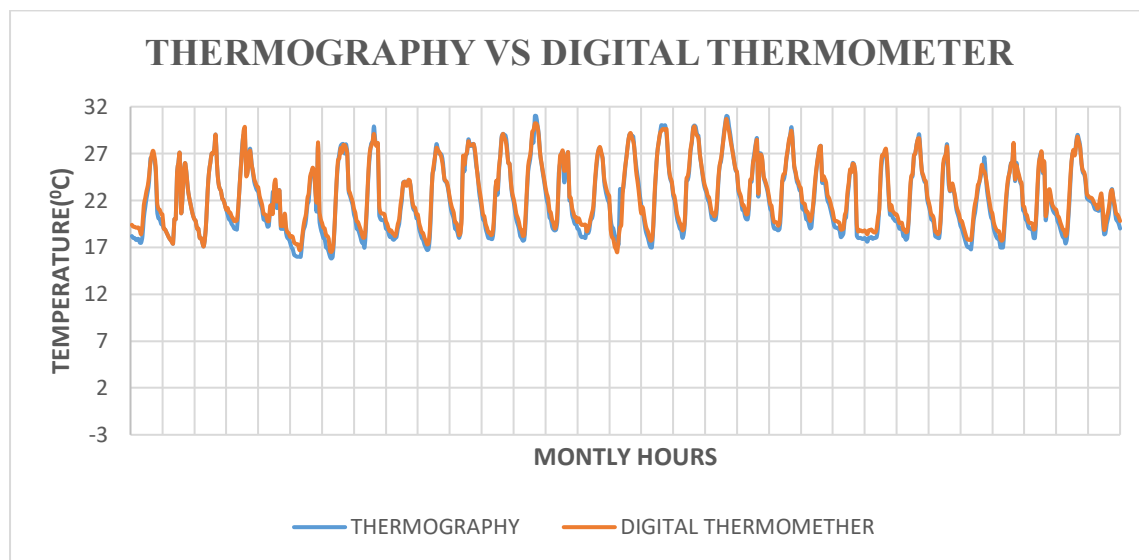


Figure 1. 5:Thermography and Digital Thermometer

- Temperature distribution around mean temperature.

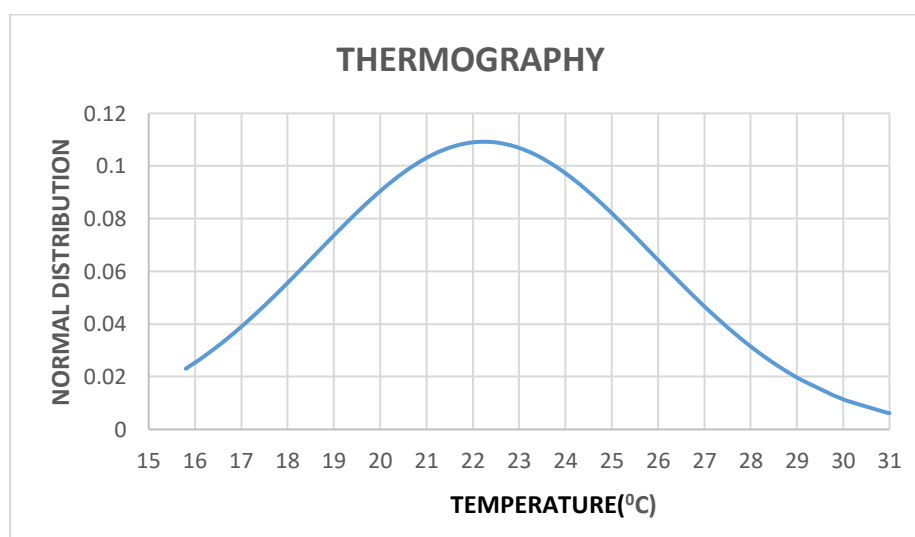


Figure 1.6:Temperature distribution around mean temperature of thermography.

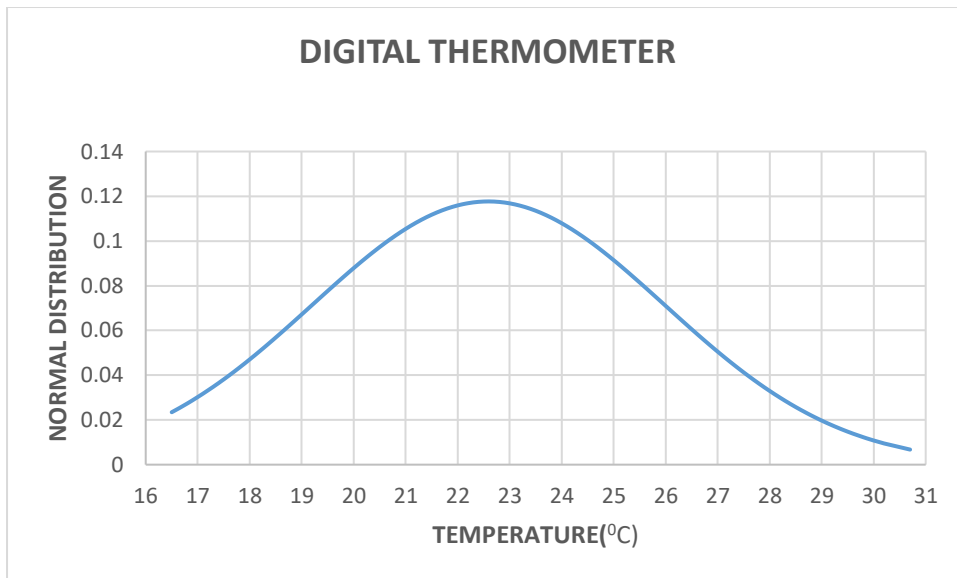


Figure 1.7: Temperature distribution around mean temperature of digital thermometer.

1.10.2. DIGITAL HYGROMETER VS HYGROGRAPHY

The digital hygrometer and hygrography display significant discrepancies in measured values, particularly evident with a notable 42% difference recorded on the 14th of March 2024. This considerable variation is predominantly observed during nighttime hours. Figure 1.8 illustrates the non-uniformity of both the digital hygrometer and hygrography.

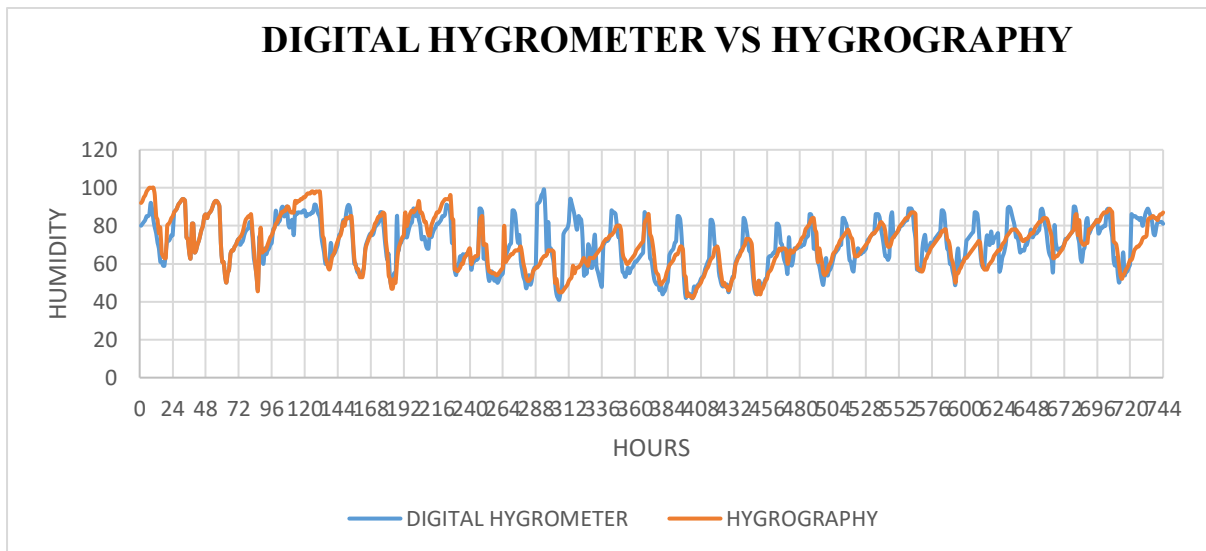


Figure 1.8: Digital Hgrometer and Hygrography

- **Humidity distribution around mean Humidity.**

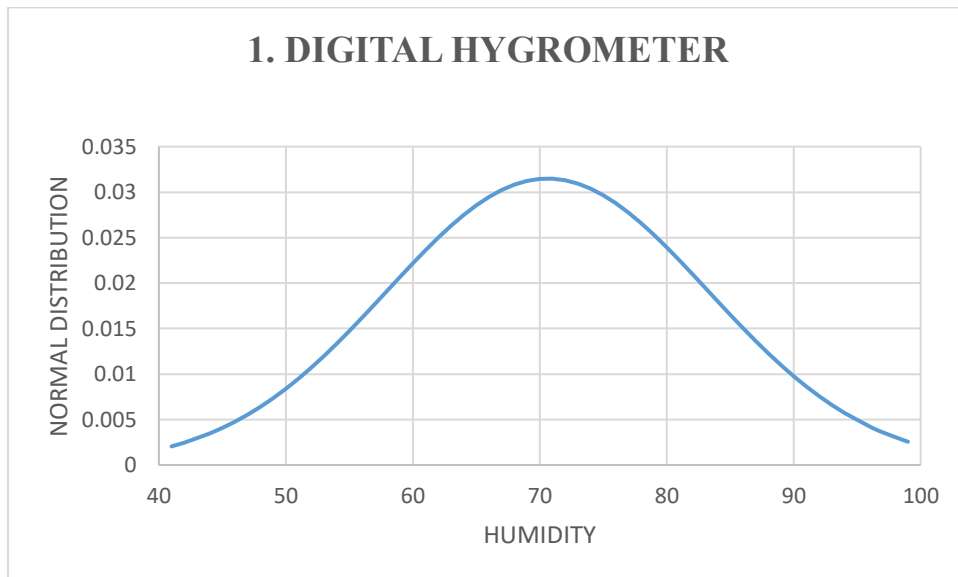


Figure 1.9: Humidity distribution around mean Humidity of Digital Hygrometer.

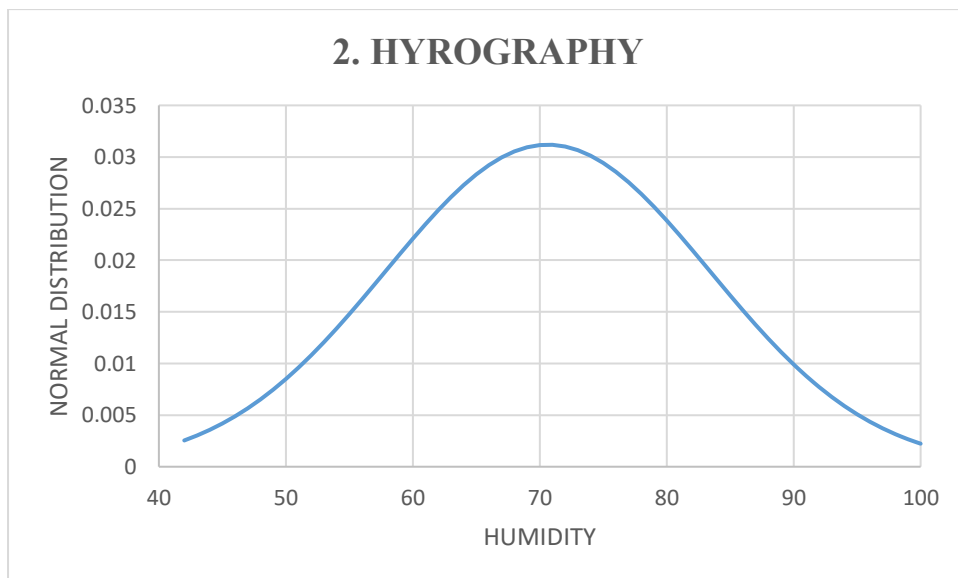


Figure 1.10: Humidity distribution around mean temperature of Hygrography.

1.11. FUTURE PLANS

Based on the insights gained from data analysis, here are the proposed research topics:

- I. Investigate the relationship between relative humidity, dry-bulb temperature, dew-point, wet-bulb temperature, and partial vapor pressure.
- II. Explore the influence of daily temperature on soil temperature at different heights.
- III. Distinguish between the influences of daily pan evaporation and evaporation from a piche.
- IV. Examine the relationship between minimum daily temperature and the minimum temperature of grass.
- V. Understand the phenomenon of why minimum temperature occurs in the early morning hours.
- VI. Investigate the reasons behind the increase in dry air temperature during rainfall, with a case study focusing on the 27th of March 2024.
- VII. Analyze the factors contributing to the abundance of clouds between 11:00 and 14:00.
- VIII. Explore the reasons behind the prevalence of thunderstorms during the afternoon hours.

These topics delve into various aspects of meteorological phenomena and provide opportunities for in-depth research and analysis.