



Sultanate of Oman

Ministry of Education

Directorate General of Education for North Al Batinah Governorate

School : Thee Qar Basic Education (Grades 5-9)

Research Title:

**A Comparative Study of the Effect of
Temperature on Soil Properties in
November of 2024 and 2025 in the
Wilayat of Shinas**

Research supervision: zalikha alsaadi

Preparation and implementation by students:

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Summary:

The climate in the Wilayat of Shinas is characterized by hot and dry weather, especially in the summer, with temperatures rising significantly and rainfall being scarce for most of the year. Heat also affects soil moisture; high temperatures lead to increased water evaporation from the soil and decreased soil moisture, making it less able to supply plants with water or affects soil fertility; high temperatures reduce the biological activity of microorganisms in the soil. This leads to impaired decomposition of organic matter, and consequently, decreased soil fertility.

Temperature also affects soil structure. Extreme heat can cause the topsoil to dry out, making the soil less cohesive and more susceptible to wind erosion. With intense heat and low rainfall, salts accumulate on the soil surface, increasing soil salinity and negatively impacting plant growth and crop production. Soil temperature varies seasonally and daily, and this variation may result from changes in radiant energy and energy changes occurring across the soil surface. Temperature controls the physical, chemical, and biological processes of the soil, and also affects gas exchange between the atmosphere and the soil.

Environmental factors affect soil temperature by controlling the amount of heat that reaches the soil surface and the amount of heat that is lost from the soil surface to the bottom of its section. Soil temperature affects the rate of decomposition and mineralization of organic matter. It also influences soil water content, conductivity, and availability to plants. This research paper presents soil temperature as a key factor in determining soil processes essential for soil growth.

Literature Review:

Climate: The average weather conditions in a specific area over a long period of time.

Weather: The atmospheric conditions over a short period, such as a day or several days.

Temperature: The degree of heat or cold of the air.

Humidity: The amount of water vapor present in the air.

Drought: A prolonged period of insufficient rainfall that affects water resources and agriculture.

Evaporation: The change of water from a liquid state to vapor due to heat.

Climate change: Long-term changes in climate elements such as temperature and rainfall.

Salinity: The accumulation of salts in soil or water.

Soil: The surface layer of the earth in which plants grow

Research Questions:

1. How does temperature affect environmental change in the Wilayat of Shinas?
2. How does temperature change affect soil and water content in the Wilayat of Shinas?
3. What are the proposed solutions to enhance positive environmental impacts on the soil?
4. Investigate seasonal changes in plants by measuring and comparing vegetation.

Research methods (methodology and tools):

Research methods (methodology and tools):

The study is based on a comparison of temperatures in November of the years 2024-2025 AD, where the data were collected from the meteorological station in the state of Shinas.

Study tools:

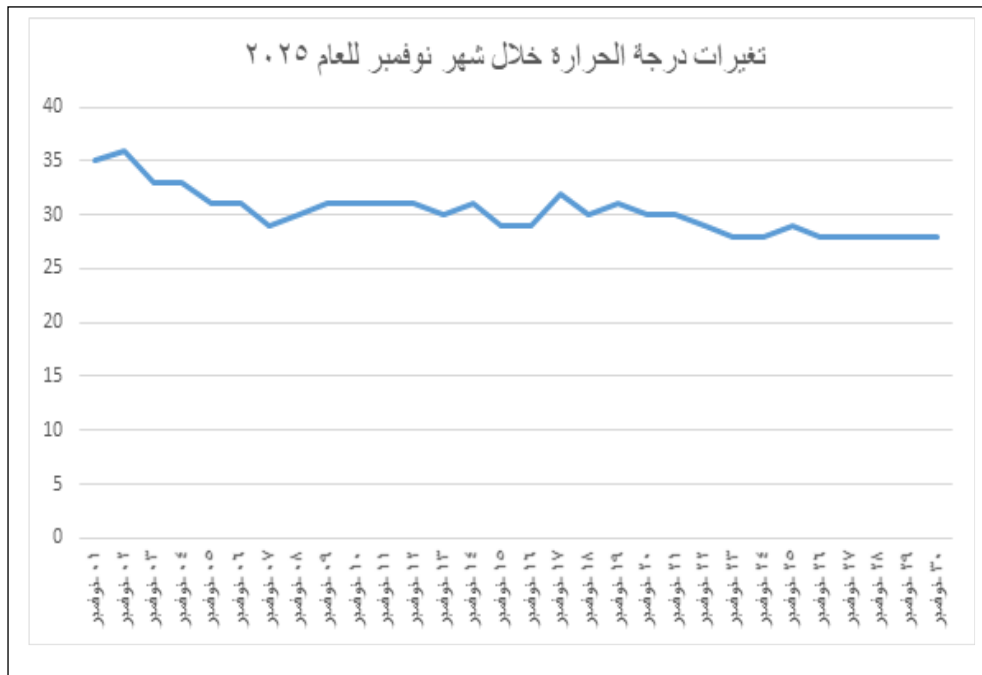
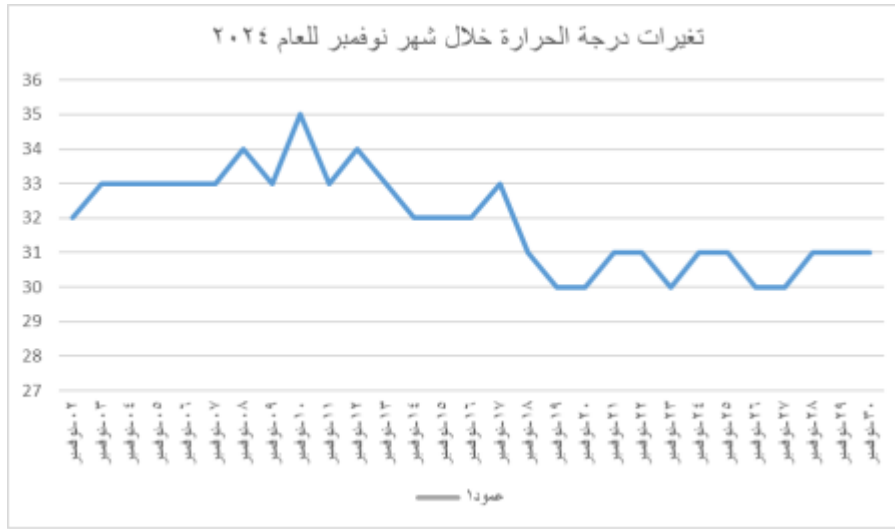
1. Scales.
2. pH meters.
3. GPS device.

Temperatures for November 2024

The date	temperature	The date	temperature
11/1	32	11/16	33
11/2	33	11/17	31
11/3	33	11/18	30
11/4	33	11/19	30
11/5	33	11/20	31
11/6	33	11/21	31
11/7	34	11/22	30
11/8	33	11/23	31
11/9	35	11/24	31
11/10	33	11/25	30
11/11	34	11/26	30
11/12	33	11/27	31
11/13	32	11/28	31
11/14	32	11/29	31
11/15	32	11/30	30

Temperatures for November 2025

The date	temperature	The date	temperature
1 11	35	16 11	29
2 11	36	17 11	32
3 11	33	18 11	30
4 11	33	19 11	31
5 11	31	20 11	30
6 11	31	21 11	30
7 11	29	22 11	29
8 11	30	23 11	28
9 11	31	24 11	28
10 11	31	25 11	29
11 11	31	26 11	28
12 11	31	27 11	28
13 11	30	28 11	28
14 11	31	29 11	28
15 11	29	30 11	28



Discussion of Results:

1. Temperature and Soil Moisture

Increased temperature leads to faster evaporation of water from the soil, especially in arid regions.

In November 2024, because temperatures were above average in many areas, the soil lost moisture more rapidly than usual for that month.

We conclude that high temperatures increase evaporation and accelerate water loss from the soil.

Result: Soil moisture was lower than normal in November 2024 in the Wilayat of Shinas.

2. Temperature and Soil Structure

When soil is very dry due to high temperatures, its internal structure becomes more fragile. Low humidity causes soil shrinkage, and in clay soils, this leads to cracking in the topsoil.

Conclusion: Higher than usual temperatures in 2024 contributed to soil deterioration, especially in weeks when temperatures were high without sufficient rainfall.

3. Temperature and Soil Cohesion

Soil cohesion depends on moisture; when soil loses water due to heat, the bonding strength between its particles decreases.

With the high temperatures expected in November 2024, soil cohesion likely decreased.

4-Temperature and Soil Acidity (pH)

The effect of temperature on soil pH is not as direct as its effect on moisture and structure, but it is important:

If the soil is dry:

High temperatures can accelerate the decomposition of some organic and inorganic chemical compounds in the soil.

The decomposition of organic matter can release acids that affect the pH (making it more acidic), especially if there is not enough water to dissolve and release nutrients.

If conditions are very dry:

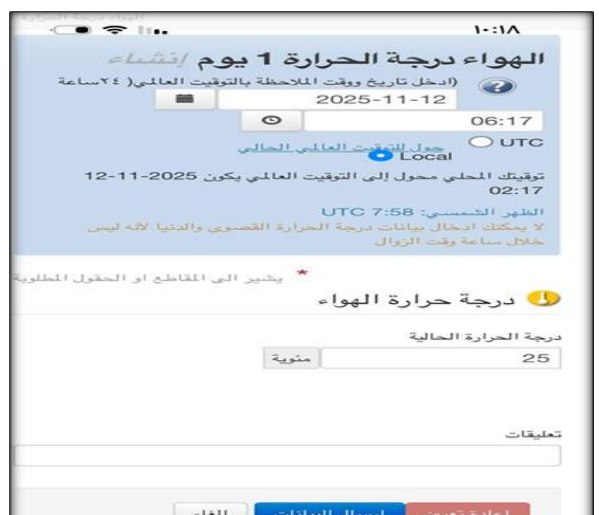
Evaporation can lead to a concentration of salts and ions in the soil with reduced water content, which may raise the pH in some cases (making it more alkaline).

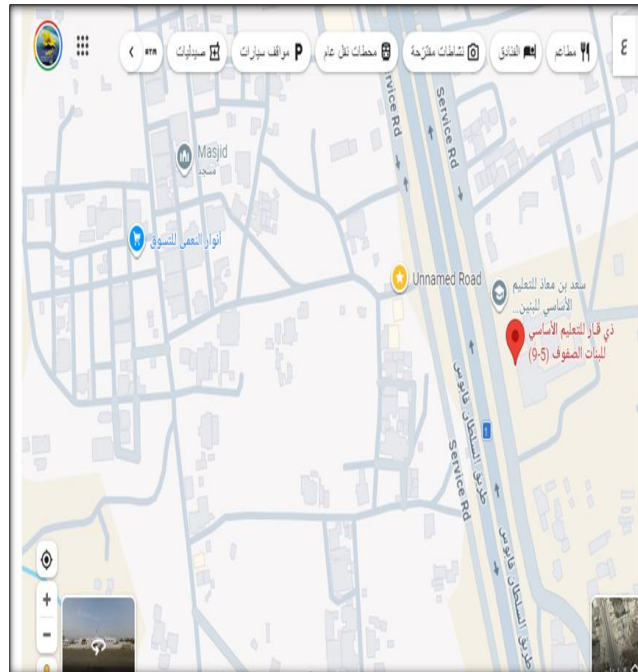
Summary and conclusions:

Comparison Points	Results November 2024	Results November 2025
Temperature	Temperatures above normal levels	Relatively moderate temperatures
Soil Moisture	Due to evaporation, soil moisture decreased and drought prevailed in the study area.	The soil has good moisture content.
Soil Structure	Less stable	It was more stable and less prone to cracking
Soil Cohesion	Less cohesive due to dryness	The soil does not lose moisture quickly, therefore its particles are more cohesive
Soil Acidity (HB)	Soil acidity increased	Moderate soil acidity

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Appendices:





The reviewer:

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