



GLOBE OMAN



A comparative study

Studying the causes of The Maltese mushroom (Tartuth) growth in the Al-Abeila area and its growth in the Al-Nafahat neighborhood area in Al-Buraimi Governorate

/ Done by

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mascara dear

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(Mother Al Ghafari School for Basic Education (1-12)) March 2022

table of contents (index)

Topic	page number
Summary	1
basic terms	3-2
Research questions	3
Introduction	4
Research Methods (Research Plan)	6-5
study site	8-7
Data collection and analysis	16-9
Results	26-17
Discuss the results	27-26
Conclusion	27
Thanks and appreciation	28
the reviewer	31

table index

page number	table address	table number
6	Time plan and assignment of roles to carry out the research	1
17	The temperature in the Al-Abilah area and Al-Nafhat neighborhood	2
19	Average cloud rates in the Al-Abeila area and Al- Nafhat neighborhood	3
21	The amount of rain in the Al-Abilah region from November 2021 to the end of February 2022	4
21	The amount of rain in Ahi Al-Nafhat area from November 2021 to the end of February 2022	5
23	Tree cover in Al-Abilah area	6
24	Tree cover in the area of Ahi Al-Nafhat	7
25	Measurement of the length and circumference of the uterus	8
25	Soil sample in Al-Obeila and Al-Nafhat neighborhood	9
26	Total antioxidant capacity of aqueous and methanolic extracts from <i>C. coccineum</i> .	10
26	Table 11. Phenolic composition of <i>C.</i> <i>coccineum</i> extracts (mg/g *).	11

Index of charts

page number	Graphic title	Figure number
18	The temperature in Abela	1
18	The temperature in Al-Nafhat neighborhood	2
19	Percentage of daily clouds in Al-Abeela from November 2021 to the end of February 2022	3
19	Average monthly clouds in Al-Abeelah	4
20	Percentage of daily clouds in Al-Nafhat neighborhood from November 2021 to the end of February 2022	5
20	Average monthly clouds in Al-Nafhat neighborhood	6
22	The amount of rain in Al-Abaila from November 2021 to the end of February 2022	7
	The amount of rain in Al-Nafhat neighborhood from November 2021 to the end of February 2022	8

A comparative study entitled/

Reasons for the growth of the Maltese mushroom (Tartuth) in the Al-Abeelah area and its non-growth in the Al-Ghuraifa area in Al-Buraimi Governorate

Prepared by the student: Rawan Al-Rashidi, Al-Ghalia Al-Maskari, and Shahd Al-Rashidiya

Supervised by Ms. Nawal bint Ali Al Shamsi

Umm Zr Al Ghafari School for Basic Education(12-1)

Sultanate of Oman - Al Buraimi Governorate

Summary :

The current study aimed to investigate the reasons for the growth of the Maltese fungus (Tarthuth) in the Al-Abeelah area and its non-growth in the Al-Ghuraifa area in Al-Buraimi Governorate, by answering the following questions:

- 1- What are the characteristics of the Tartuth plant (the Maltese mushroom) in the Al-Abilah region and the appropriate conditions for its growth?
- 2- What are the reasons that led to the growth of Tartuth (the Maltese mushroom) in the eastern mountainous areas (Al-Abeelah region) and its failure to grow in the western desert areas (Al-Nafhat neighborhood) in Al Buraimi Governorate?
- 3- How can the Maltese mushroom be preserved and benefit from it economically?

The research was applied as a comparative study between the Al-Abeila mountainous area and the Al-Ghuraifa desert area in Al-Buraimi governorate in the winter months (November, December, January, February), where the appropriate conditions for the growth of the Maltese mushroom were studied and the reasons for its growth were compared in the Al-Obaila and Al-Gharefa areas using the land cover protocol (Existing plants were studied, their height,

width and density), atmospheric protocol (temperature, rainfall, humidity, cloudiness), and soil protocol (acidity, conductivity, salinity, soil color).

The results of the study indicated that the appropriate conditions for the growth of the tartuth plant are the availability of rain, the medium-saline soil with the availability of breadwinner plants and shade trees, and it was found that the Al-Abilah area has the appropriate conditions for the growth of the tartuth plant (soil salinity, many pyramids and shade plants, low temperature and a lot of rain And the percentage of clouds) in contrast to the Al-Nafahat neighborhood area, as it was found through the analysis of the components at Sultan Qaboos University of the tartuth plant that it can feed on the human being and may contribute to the treatment of diseases and the manufacture of foodstuffs from it such as oils and some cosmetic materials. In a more appropriate place, in cooperation with the Agriculture Authority, the Department of Agriculture and the Omani Women's Association, the recommendations of the research are to conduct studies to find out the impact of the chicken on the nutritional, health and cosmetic aspect.

Key terms:

1 -Tartus: The scientific name for Tartus is *Cynomorium coccineum*, and it belongs to the family *Cynomoriaceae* and its floral plants are parasitic on the roots of other flowering plants. The plant does not contain chlorophyll and is unable to photosynthesise. It is a geophyte that spends most of its life underground in the form of a rhizome attached to the roots of its host plant (eg pyramid and ram); It is a holobary parasite, i.e. completely dependent on its host. If it consists of the root (the root remains under the soil and grows when the right conditions are available), the stem (which is the part below the soil of a reddish-white color that people used in ancient times for treatment and eating) and the spike (the nectar) that is on top of the soil and contains dyes and flowers that turn into seeds (Dharmananda, 2013).



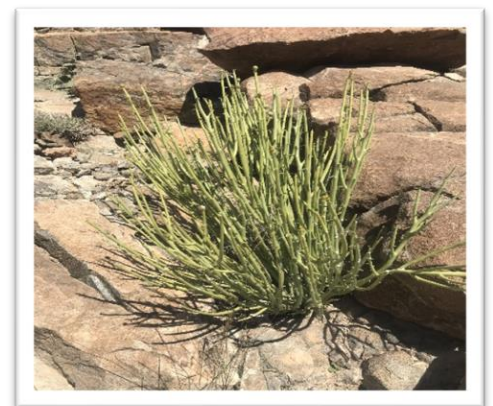
2 -1Pyramid plant: (Scientific name: *Zygophyllum coccineum*) is a small shrubby plant that grows to a height of 50 to 75 cm. It is a succulent plant and appears in the form of a dwarf shrub, scattered and irregular in shape. The pyramid plant has wedge roots, and it grows in sandy and silty soils or rocky soils. It is a plant that is highly tolerant of salinity.



3- The alliance (*Imperata cylindrica*): a perennial herbaceous plant, standing thickly with feathers, and it is a plant that is resistant to environmental conditions, especially seeds. It is a plant that grows on moisture and sandy soil on the banks of rivers and bears water stress by increasing the mass of roots and reducing vegetative growth. It is a good fodder for livestock.



4- Al-Absaq (Boiss IARICA EUPHORBIA): a perennial, many-branched tree that has no leaves, and if there are leaves, they are very small, and the height of the birch tree is between one and two meters approximately, and the radius is approximately one and a half meters. The stem and branches are very strong in the case of a leg injury or Kasra secretes a very sticky brown substance.



5- The bramble (*Lycium shawii*): a type of spiny plant, adapted to dry and hot (desert) environments. It is a plant with woody stems, white flowers, and red berries. It has several uses by humans, and also constitutes A type of animal feed, but it is toxic to animals if eaten in large quantities.



Research questions:

- 1- What are the characteristics of the Tartuth plant (the Maltese mushroom) in the Al-Abilah region and the appropriate conditions for its growth?
- 2- What are the reasons that led to the growth of Tartuth (the Maltese mushroom) in the eastern mountainous areas (Al-Abeelah region) and its failure to grow in the western desert areas (Al-Nafhat neighborhood) in Al Buraimi Governorate?
- 3- How can the Maltese mushroom be preserved and benefit from it economically?

Introduction:

The climate in the Sultanate of Oman varies due to its astronomical and geographical location (north and south of the Cancer Line), to be hot and humid on its coasts extending for a distance of 3165 km from the Strait of Hormuz to the borders of Yemen, hot and dry in the areas of the Empty Quarter desert, and moderate and rainy in the Hajar Mountains extending from the northeast to its southwest. For this reason, the Sultanate is distinguished by the diversity of its plant and animal organisms. Omanis also depend on perennial plants that are spread in mountainous and sandy areas for food, medicine and fuel. These perennial plants symbolize the various customs and traditions of Omani .life

The Globe Environmental Program team at Umm Dhar Al Ghafari School in Al Buraimi Governorate applies the GLOBE protocols (air, soil, land cover, and water) in several locations in Al Buraimi Governorate, which are mountainous on the eastern side, and desert on the western side, so the growth of a strange-shaped organism was observed for the first time In the Al-Abilah area, it has not appeared for a long time, according to the testimony of some of the people of the area.

The tarrul mushroom is red in color and has a thick leg that resembles a tarragon mushroom. It may reach a height of 70 cm. It is filled with watery juice. It has economic benefits and an expensive price. It is used for medical purposes in treating diarrhea and liver and increasing the activity of the body. It also has a high nutritional value, as well as extracting a red dye from it. It is used for cosmetic purposes as well as dyeing leather and fabrics. One of the studies conducted in Iran indicates the effect of honey in lowering blood pressure, as well as the study (Xiangmin; Mouna; Juanjuan, 2020) on the effect of honey in the treatment of colon cancer. After the research and investigation of the Globe Environmental Program team, it was found that the mite is a parasite, not a fungus that feeds on plants such as sorrel and juicy, and it grows in sandy, medium-saline soil after winter rains and blooms in the spring, and all articles and research indicate the presence of the tartus plant in several Countries including (Saudi Arabia, Kuwait, Bahrain, Jordan, Iran, Afghanistan, Tunisia, Algeria, the Canary Islands, Portugal, Spain, southern Italy, Sardinia, Godess and Malta) did not mention any study !!about his presence in the Sultanate of Oman

It was surprising that the tartuth plant grew in mountainous areas such as Al-Abeela and Mahadah (Al-Wadiyin) in the Buraimi Governorate, and did not grow in the western desert areas of the governorate. Hence, the Globe Environmental Program team set out to study the tartus plant (the reasons for its growth, and why it is located in the eastern Buraimi governorate in the mountainous areas, but it did not exist). In the western desert regions

(as the Al-Abilah region was identified from the east and the Al-Nafahat neighborhood from the west was determined because there was no urban structure in it), and how could this plant be preserved and propagated and (benefited from it economically

Search Plan:

-1A sense of the problem: the growth of a rare creature that has not appeared for many years due to the lack of rain, and the ignorance of the people and tourists about the value of this object, as they do not care about its presence, so they uproot it or walk on it by foot or car and destroy the existence of this object.

-2Choosing the research problem: it was identified by the researcher and discussed with the supervisor of the school's environmental program GLOBE (Professor Nawal Al Shamsi).

-3Determining the study tools: applying the water, air and soil protocol, in cooperation with the municipality, the Department of Agriculture and the Ministry of Information to preserve this organism and increase its breeding areas.

-4An official address: to the General Directorate of Regional Municipalities and Water Resources in the governorate, the Department of Agriculture, the Ministry of Information in Al Buraimi Governorate, and the STEM team in the governorate to agree to carry out the research in cooperation with them to find solutions.

-5Implementation of a meeting: with officials with the Department of Agriculture to discuss and analyze the results, a meeting with the people to find out the whereabouts of this organism and its uses, and a media,

press and television meeting to spread the culture of preserving this organism and introduce it to the community.

-6Implementing the GLOBE environmental program in cooperation with the Department of Water Affairs in the governorate, specifically the water protocol (conductivity, density, water temperature, PH) and entering data on the GLOBE website, and applying the soil and land cover protocol in cooperation with the Department of Agriculture and recording the results and entering them on the GLOBE website.

-7Compare the results and write recommendations.

A research plan has been drawn up to implement the steps on time.

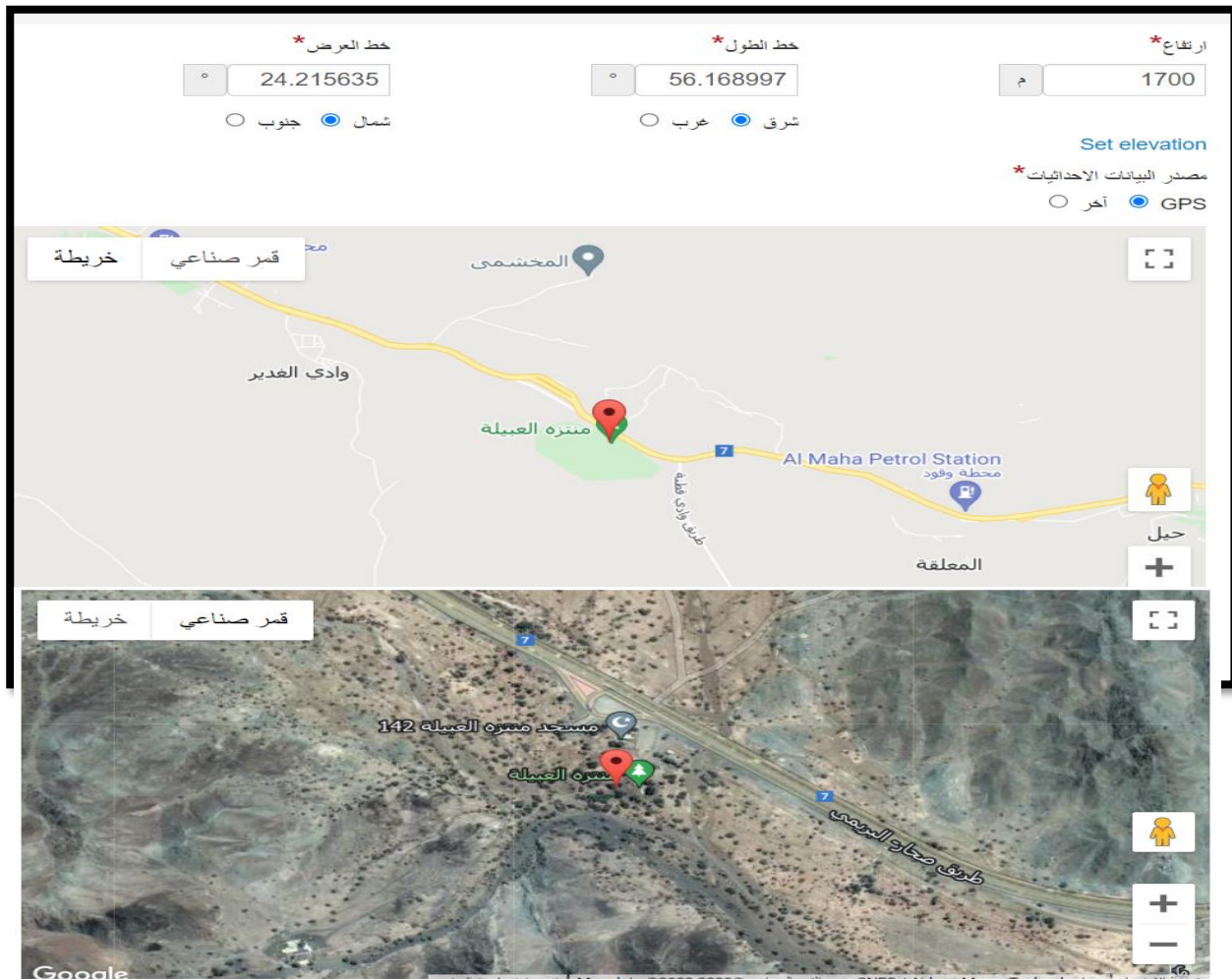
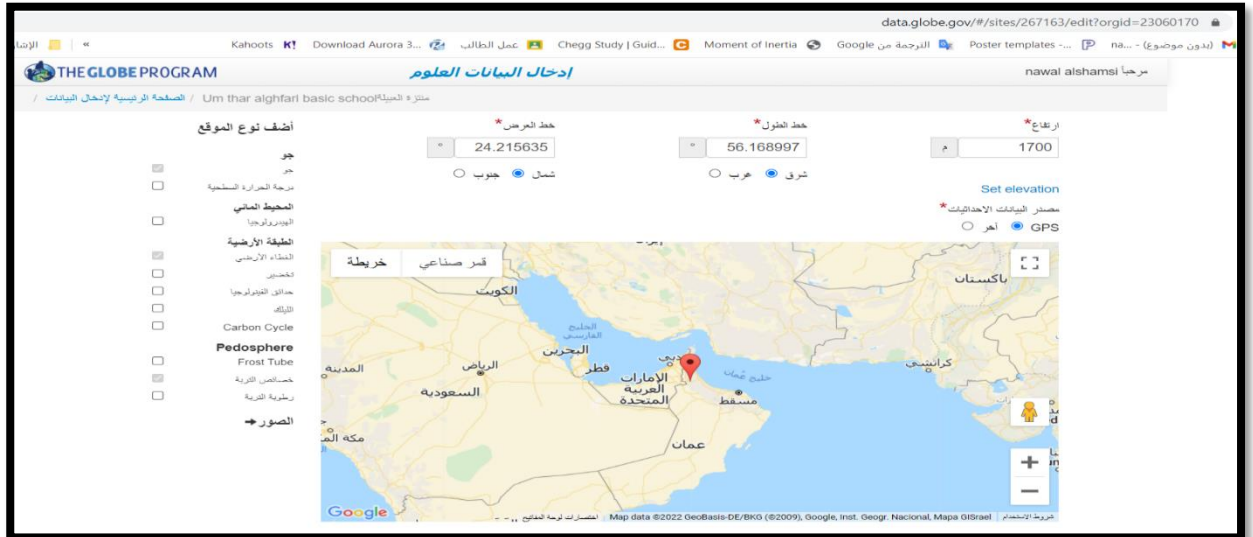
Second: The first study site: (Sultanate of Oman, Al Buraimi Governorate), Al-Obaila region.

Notes	assigned to work	the plan	the month
Addressing the designated authorities in the school's correspondence system	Shahd Al-Rashidi, Al-Maskari Al-Ghaliya, in collaboration with the GLOBE Program Team and Supervisor	* Defining the problem *Correspondence to the Department of Agriculture in the province *Providing project tools (and providing tools for the land cover, air and soil protocol), providing transportation to the places of research application.	Nov
Project tools provided	<ul style="list-style-type: none"> • The dear, intoxicating student • Student Rawan Rashidieh 	<ul style="list-style-type: none"> • Implementation of the (atmosphere) protocol at the study sites • Implementation of the (soil) protocol in the study sites 	Dec

	<ul style="list-style-type: none"> • • Al Rashidiya witnessed the cooperation of the GLOBE team with the Department of Agriculture and the STEM team 	<ul style="list-style-type: none"> • Implementation of the (ground cover) protocol in the study sites • Analyzing data and finding solutions in cooperation with the competent authorities, making recommendations, writing research and reviewing it. 	
<p>The cost of the poster is approximately (15) riyals</p> <p>Conducting courses and lectures in cooperation with the school's specialist</p>	Student Ghalia Al-Maskari	Data entry on the GLOBE site poster work	January
<p>Shahd Al Rashidiya + Al Ghalia Al Maskaria + Rawan Al Rashidiya</p> <p>Supervised by the GLOBE Supervisor</p> <p>Shahd: Abstract, introduction and research problem (joint application)</p> <p>Student Ghalia: results and analysis</p> <p>Student Ghalia: Conclusion, research format</p>	<p>Shahd Al Rashidiya + Al Ghalia Al Maskaria + Rawan Al Rashidiya</p> <p>Supervised by the supervisor of GLOBE</p>	Writing the research and participating in the research in a competition at the level of the governorate, the Sultanate, and the world	March

Table (1): The time plan and the distribution of roles for the implementation of the research

Second: The first study site: (Sultanate of Oman, Al Buraimi Governorate), Al-Obaila region.



Third: Data collection and analysis:

To answer the first and second question:

First: The Atmospheric Protocol was studied in the Al-Obeila and Al-Nafahat neighborhoods (temperature, humidity, clouds, rain), from November 2021 until the end of February 2022 AD.



Second: The application of the ground cover protocol in the Al-Abilah area and the Al-Nafhat neighborhood by defining an area (90 x 90 m) and its head (the length and circumference of plants, the names of the dominant plants in the place, and the ground cover) in the specified place

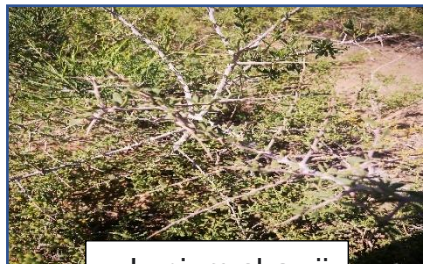


Some samples of plants from the two sites were also collected:

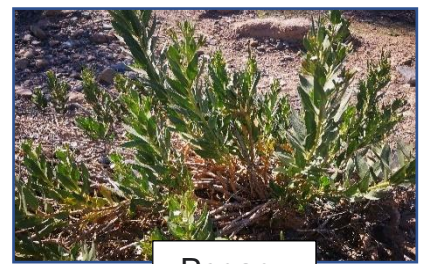
Pictures and names of some plants found in the Al-Abilah area



Cymbopogon commutatus



Lycium shawii



Peganu



Euphorbia larica Boiss



Imperata cylindrica



Rumex vesicarius



Prosopis

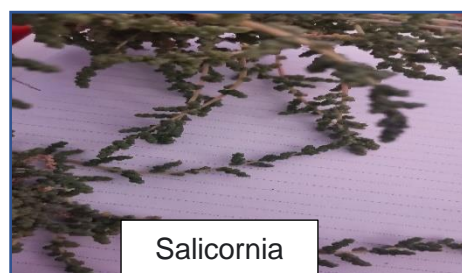


Diploaxis



Zygophyllum coccineum

Pictures of plants located in the Al-Nafhat neighborhood area



Salicornia



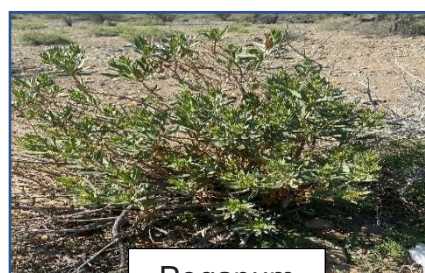
Heliotropium bacciferum



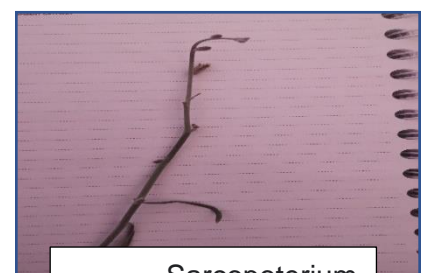
Haloxylon



Calligonum



Peganum



Sarcopoterium

The lengths and perimeters of the tadpoles located in the specified area were also measured:



The plants that grew and fed on the tarragon fungus were investigated and photographed, and they were as follows:



نبات العوسج

نبات العسبِق

نبات الحلف

نبات الهرم

The animals that help in the pollination process of the taartus plant were investigated and photographed, and they were as follows:

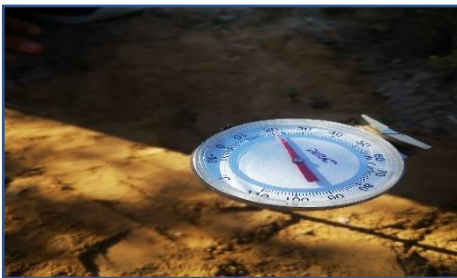


حشرات

النمل

الذباب

Third: The soil protocol was applied to measure (soil temperature, color, type, percentage of carbon and rocks in it, salinity, conductivity and pH).



The spread of iron and manganese rocks was also observed, which is a waste of copper smelting in the third millennium BC, and this indicates the abundance of minerals in the Al-Abilah region.



To answer the third question, the following was done:

1) Cooperating with a team from the Department of Agriculture to increase the propagation of tartus in the Al-Abilah area through the dissemination of tartooth seeds and pyramid plants in Al-Abilah.



2) The awareness of the conservation of the tartus plant has been spread through lectures and awareness leaflets



3) Cooperating with the governorate's media department to make a TV interview to talk about Al-Tarthoth and the Globe team's role in studying and preserving it and raising community awareness.



The link to broadcast on the Sultanate of Oman channel, Morning Coffee Program

<https://www.youtube.com/watch?v=HzFyDFdcGJQ>

- 4) Cooperating with the Environment Agency to preserve the wildlife in the governorate to propagate and preserve the taroth plant and make field visits to the places where the plant is located.

5)



- 5) Cooperation has been made with the Omani Women's Association to make products from the Tartus plant.



- 6) The tenth grade science book was used to conduct an experiment to extract dyes from the flavor of the tartuth plant, in two ways:

7) •The first: The school's laboratory technician was hired to dry and grind the dye material from the taroth spike and keep it for use. Once it is mixed with water or oil, it turns into a dye that can be used in the industrial field or as food coloring. A sample was sent to Sultan Qaboos University to examine the sample.

8) Secondly, by placing two cups of water for boiling in a pot, then placing it on the fire, then placing the tartuth flavor for two minutes, then removing it from the fire and removing the flavor from the pot, then pouring a cup of rubbing alcohol into a tall cup and placing this cup in the middle The hot pot and the introduction of the flavor into the alcohol cup and leave it for an hour, then the flavor comes out and the dye remains in the alcohol.

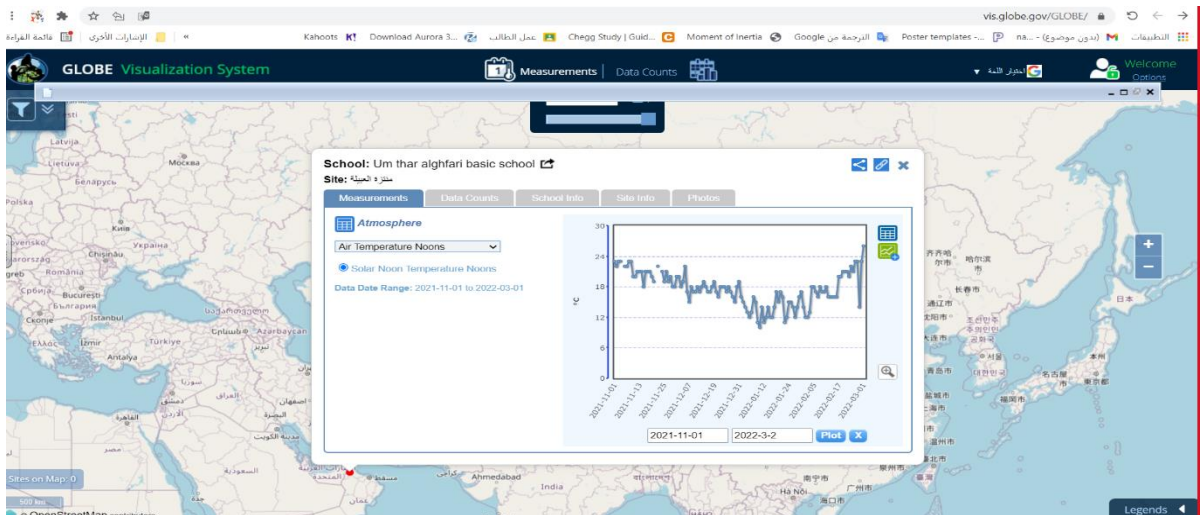


9) The stem of the tartuth plant was taken and dried with the help of the Department of Agriculture, then ground it and put it in cans to benefit from it in the field of health and food, and a sample was sent for laboratory analysis to Sultan Qaboos University, College of Agriculture, for analysis and study of the nutrients and materials in it.

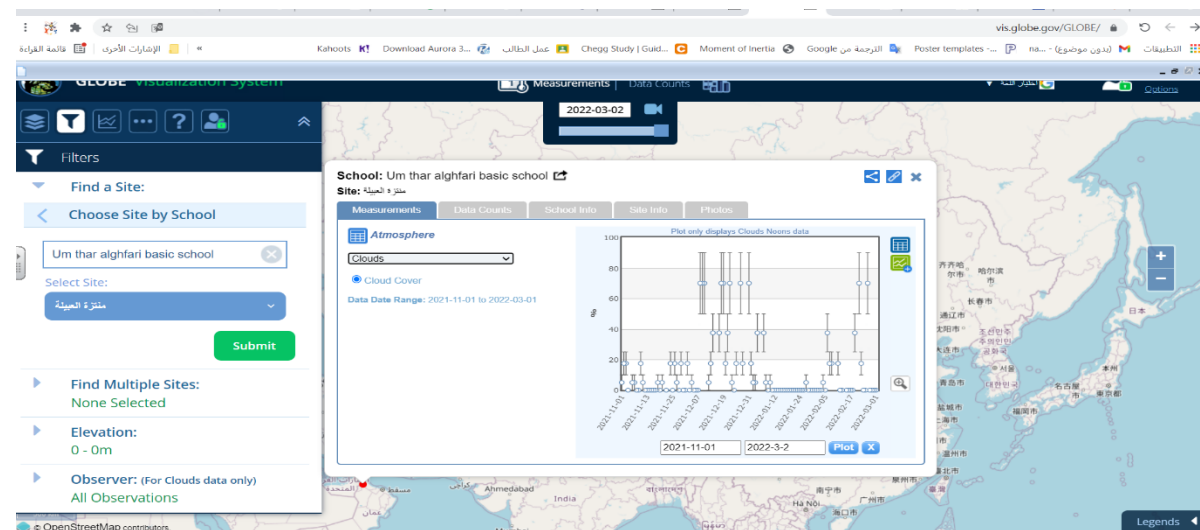


Data entry at the GLOBE Ecological website, at WWW.GLOBE.GOV

By entering the data entry, creating a new site, choosing the protocol for the atmosphere, land cover and soil, and entering the data.



School Name	Site Name	Userid	Latitude	Longitude	Elevation	Measured AT	Solar Measured AT	Solar Noon AT	Current Temp C
Um thar alghafri basic school	مقترزة العيينة	23336091	24.21564	56.169	1700	2022-03-01 08:00:00	2022-03-01 11:30:00	2022-03-01 08:27:38	26
Um thar alghafri basic school	مقترزة العيينة	23336091	24.21564	56.169	1700	2022-02-28 08:00:00	2022-02-28 11:29:00	2022-02-28 08:27:50	23
Um thar alghafri basic school	مقترزة العيينة	23336091	24.21564	56.169	1700	2022-02-27 08:00:00	2022-02-27 11:29:00	2022-02-27 08:28:01	14
Um thar alghafri basic school	مقترزة العيينة	23336091	24.21564	56.169	1700	2022-02-26 08:00:00	2022-02-26 11:29:00	2022-02-26 08:28:11	23
Um thar alghafri basic school	مقترزة العيينة	23336091	24.21564	56.169	1700	2022-02-25 08:00:00	2022-02-25 11:29:00	2022-02-25 08:28:21	28
Um thar alghafri basic school	مقترزة العيينة	23336091	24.21564	56.169	1700	2022-02-24 08:00:00	2022-02-24 11:29:00	2022-02-24 08:28:31	21
Um thar alghafri basic school	مقترزة العيينة	23336091	24.21564	56.169	1700	2022-02-22 08:00:00	2022-02-22 11:29:00	2022-02-22 08:28:49	20
Um thar alghafri basic school	مقترزة العيينة	23336091	24.21564	56.169	1700	2022-02-21 08:00:00	2022-02-21 11:29:00	2022-02-21 08:28:56	23
Um thar alghafri basic school	مقترزة العيينة	23336091	24.21564	56.169	1700	2022-02-20 08:00:00	2022-02-20 11:29:00	2022-02-20 08:29:02	21
Um thar alghafri basic school	مقترزة العيينة	23336091	24.21564	56.169	1700	2022-02-19 08:00:00	2022-02-19 11:28:00	2022-02-19 08:29:08	21
Um thar alghafri basic school	مقترزة العيينة	23336091	24.21564	56.169	1700	2022-02-18 08:00:00	2022-02-18 11:28:00	2022-02-18 08:29:11	20
Um thar alghafri basic school	مقترزة العيينة	23336091	24.21564	56.169	1700	2022-02-17 08:00:00	2022-02-17 11:28:00	2022-02-17 08:29:19	20
Um thar alghafri basic school	مقترزة العيينة	23336091	24.21564	56.169	1700	2022-02-16 08:00:00	2022-02-16 11:28:00	2022-02-16 08:29:23	16
Um thar alghafri basic school	مقترزة العيينة	23336091	24.21564	56.169	1700	2022-02-15 08:00:00	2022-02-15 11:28:00	2022-02-15 08:29:27	16
Um thar alghafri basic school	مقترزة العيينة	23336091	24.21564	56.169	1700	2022-02-14 08:00:00	2022-02-14 11:28:00	2022-02-14 08:29:29	16
Um thar alghafri basic school	مقترزة العيينة	23336091	24.21564	56.169	1700	2022-02-13 08:00:00	2022-02-13 11:28:00	2022-02-13 08:29:31	16
Um thar alghafri basic school	مقترزة العيينة	23336091	24.21564	56.169	1700	2022-02-12 08:00:00	2022-02-12 11:28:00	2022-02-12 08:29:32	16
Um thar alghafri basic school	مقترزة العيينة	23336091	24.21564	56.169	1700	2022-02-11 08:00:00	2022-02-11 11:28:00	2022-02-11 08:29:33	18
Um thar alghafri basic school	مقترزة العيينة	23336091	24.21564	56.169	1700	2022-02-10 08:00:00	2022-02-10 11:28:00	2022-02-10 08:29:33	17
Um thar alghafri basic school	مقترزة العيينة	23336091	24.21564	56.169	1700	2022-02-09 08:00:00	2022-02-09 11:28:00	2022-02-09 08:29:32	17
Um thar alghafri basic school	مقترزة العيينة	23336091	24.21564	56.169	1700	2022-02-08 08:00:00	2022-02-08 11:28:00	2022-02-08 08:29:30	18
Um thar alghafri basic school	مقترزة العيينة	23336091	24.21564	56.169	1700	2022-02-07 08:00:00	2022-02-07 11:28:00	2022-02-07 08:29:27	16
Um thar alghafri basic school	مقترزة العيينة	23336091	24.21564	56.169	1700	2022-02-06 08:00:00	2022-02-06 11:28:00	2022-02-06 08:29:24	17
Um thar alghafri basic school	مقترزة العيينة	23336091	24.21564	56.169	1700	2022-02-05 08:00:00	2022-02-05 11:28:00	2022-02-05 08:29:19	18
Um thar alghafri basic school	مقترزة العيينة	23336091	24.21564	56.169	1700	2022-02-04 08:00:00	2022-02-04 11:29:00	2022-02-04 08:29:14	18
Um thar alghafri basic school	مقترزة العيينة	23336091	24.21564	56.169	1700	2022-02-03 08:00:00	2022-02-03 11:29:00	2022-02-03 08:29:08	18



:Results

To answer the first question and the second question:

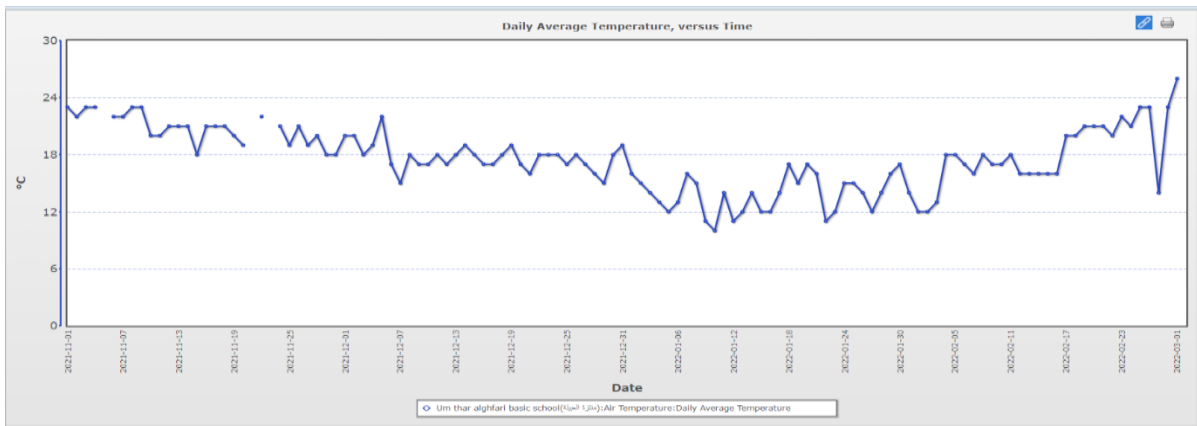
First: The atmospheric protocol was studied in the Al-Obeila and Al-Nafhat neighborhoods (temperature, humidity, clouds, rain), from November 2021 until the end of February 2022 AD.

Table (2): The temperature in the Al-Abilah area and Al-Nafhat neighborhood

Solar Noon At	Current Temp C		Solar Noon At	Current Temp C		Solar Noon At	Current Temp C	
	حي النفحات	العبيلة		حي النفحات	العبيلة		حي النفحات	العبيلة
	01/03/2022 08:27	26		23	17/01/2022 08:25		15	14	03/12/2021 08:05	26	18
28/02/2022 08:27	27	23	16/01/2022 08:25	14	12	02/12/2021 08:04	24	20
27/02/2022 08:28	25	14	15/01/2022 08:24	15	12	01/12/2021 08:04	26	20
26/02/2022 08:28	25	23	14/01/2022 08:24	14	14	23/02/2022 08:28	27	22
25/02/2022 08:28	25	23	13/01/2022 08:24	14	12	30/11/2021 08:04	28	18
24/02/2022 08:28	25	21	12/01/2022 08:23	15	11	29/11/2021 08:03	27	18
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21/02/2022 08:28	24	21	09/01/2022 08:22	17	11	27/11/2021 08:03	25	19
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18/02/2022 08:29	24	20	06/01/2022 08:21	22	13	24/11/2021 08:02	26	21
17/02/2022 08:29	23	20	05/01/2022 08:20	21	12	22/11/2021 08:01	26	22
16/02/2022 08:29	22	16	04/01/2022 08:20	21	13	20/11/2021 08:00	26	19
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14/02/2022 08:29	24	16	02/01/2022 08:19	22	15	18/11/2021 08:00	27	21
13/02/2022 08:29	24	16	01/01/2022 08:18	25	16	17/11/2021 08:00	26	21
12/02/2022 08:29	23	16	31/12/2021 08:18	22	19	16/11/2021 08:00	25	21
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09/02/2022 08:29	16	17	28/12/2021 08:16	23	16	13/11/2021 07:59	27	21
08/02/2022 08:29	17	18	27/12/2021 08:16	22	17	12/11/2021 07:59	28	21
07/02/2022 08:29	16	16	26/12/2021 08:15	22	18	11/11/2021 07:59	28	20
06/02/2022 08:29	14	17	25/12/2021 08:15	22	17	10/11/2021 07:59	28	20
05/02/2022 08:29	13	18	24/12/2021 08:15	23	18	09/11/2021 07:59	29	23
04/02/2022 08:29	14	18	23/12/2021 08:14	22	18	05/12/2021 08:06	29	22
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02/02/2022 08:29	15	12	21/12/2021 08:13	22	16	07/11/2021 07:58	30	22
01/02/2022 08:28	15	12	20/12/2021 08:13	22	17	06/11/2021 07:58	29	22
31/01/2022 08:28	12	14	19/12/2021 08:12	23	19	04/11/2021 07:58	28	23
30/01/2022 08:28	16	17	18/12/2021 08:12	23	18	03/11/2021 07:58	30	23
29/01/2022 08:28	14	16	16/12/2021 08:11	23	17	02/11/2021 07:58	31	22
28/01/2022 08:28	16	14	15/12/2021 08:10	22	18	01/11/2021 07:58	32	23
27/01/2022 08:28	13	12	14/12/2021 08:10	23	19			

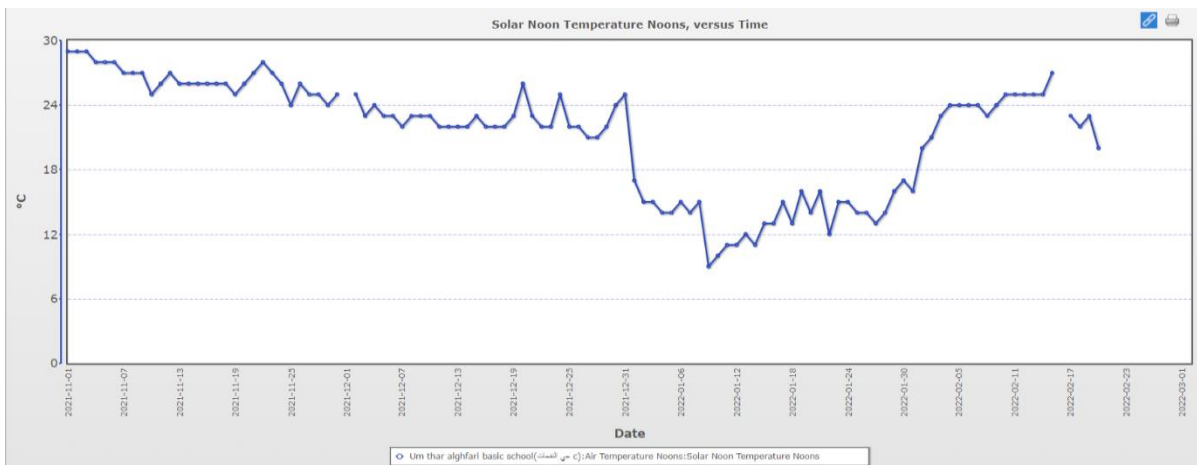
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23/01/2022 08:27	12	11	10/12/2021 08:08	25	17		
22/01/2022 08:26	12	11	09/12/2021 08:07	25	17		
21/01/2022 08:26	16	11	08/12/2021 08:07	24	18		
20/01/2022 08:26	17	11	07/12/2021 08:06	25	15		
19/01/2022 08:26	15	10	06/12/2021 08:06	26	17		
18/01/2022 08:25	17	9	04/12/2021 08:05	25	19		

Graph (1) temperature in Abela



https://vis.globe.gov/GLOBE/timeseries.jsp?map_type=FusionCharts/Column2D&mode=countplot&multiSiteList=267163:dv_sky_conditions:cloud_cov er&chartmodule=FusionCharts&start_datepicker=2021-11-03&end_datepicker=2022-3-11&result_type=month

Chart (2): The temperature in Al-Nafhat district



https://vis.globe.gov/GLOBE/timeseries.jsp?map_type=PowerCharts/MultiAxisLine&mode=multisiteplot&multiSiteList=267165:dv_air_temp_noons:current_temp_c:50:50&chartmodule=PowerCharts&start_datepicker=2021-11-01&end_datepicker=2022-3-11&result_type=true

Table (3): Average cloud rates in Al-Abeela and Al-Nafhat neighborhoods

Al-Nafhat neighborhood	Al-Abeela	Date / Monthly Average Cloud%
30	27	November 2021
30	31	December 2021
31	31	January 2022
19	28	February 2022

Chart (3): Percentage of daily clouds in Al-Abeila from November 2021 to the end of February 2022

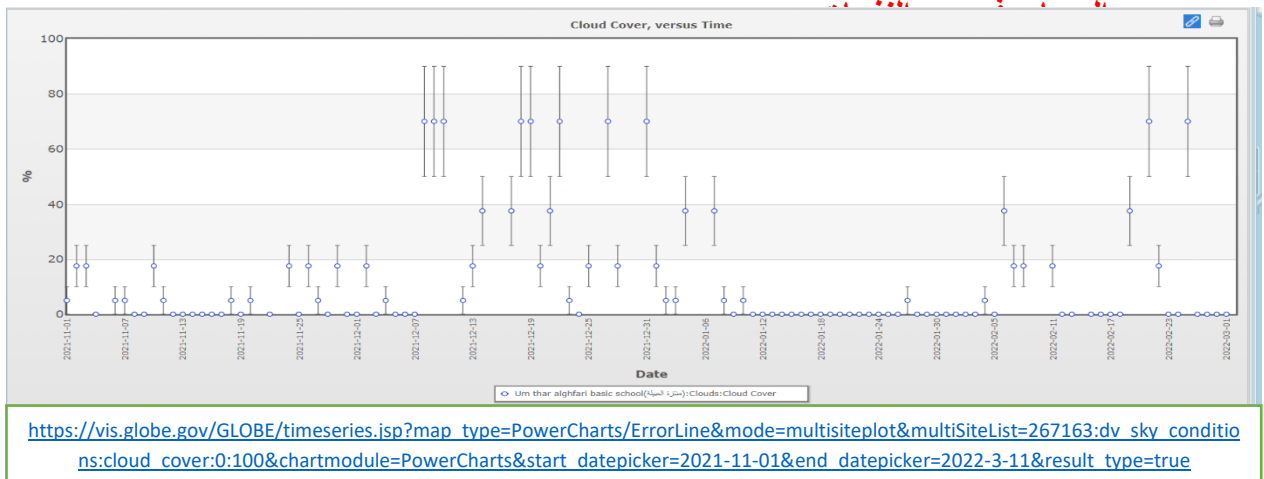
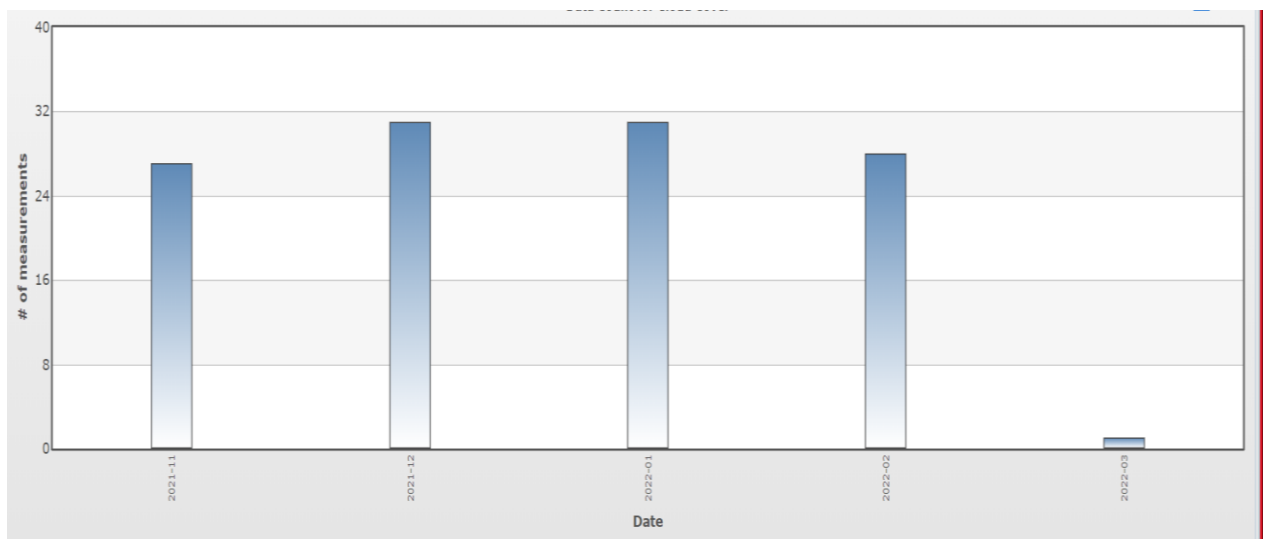
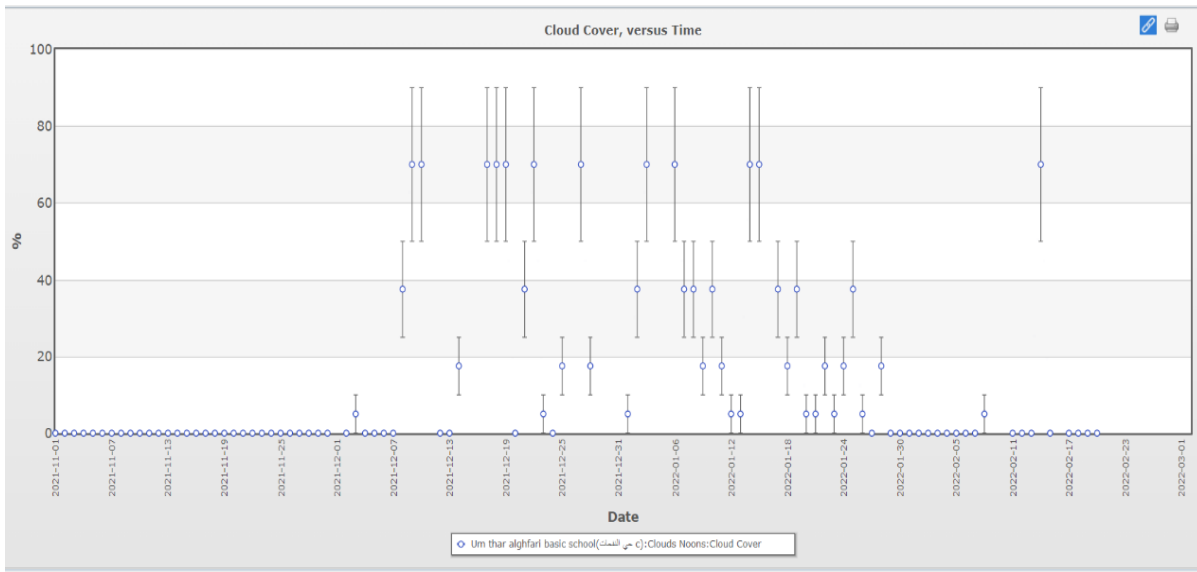


Chart (4): Average monthly clouds in Al-Abeelah



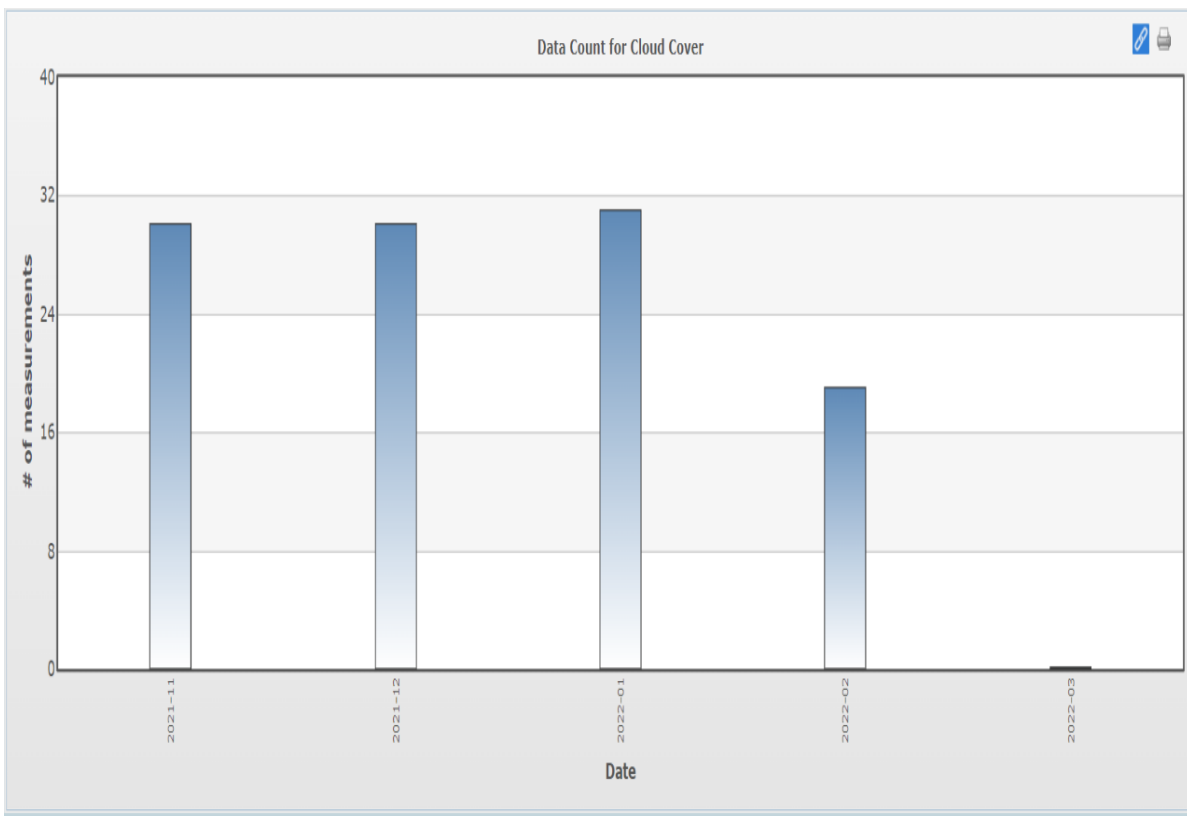
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Chart (5) The daily cloud rise in the Al-Nafhat neighborhood from November 2021 to the end of February 2022



https://vis.globe.gov/GLOBE/timeseries.jsp?map_type=PowerCharts/ErrorLine&mode=multisiteplot&multiSiteList=267165:dv_sky_condition_noons:cloud_cover:0:100&chartmodule=PowerCharts&start_datepicker=2021-11-01&end_datepicker=2022-3-11&result_type=true

Chart (6): The average monthly cloud rate in the Al-Nafhat neighborhood



https://vis.globe.gov/GLOBE/timeseries.jsp?map_type=FusionCharts/Column2D&mode=countplot&multiSiteList=267165:dv_sky_condition_noons:cloud_cover&chartmodule=FusionCharts&start_datepicker=2021-11-01&end_datepicker=2022-3-11&result_type=month

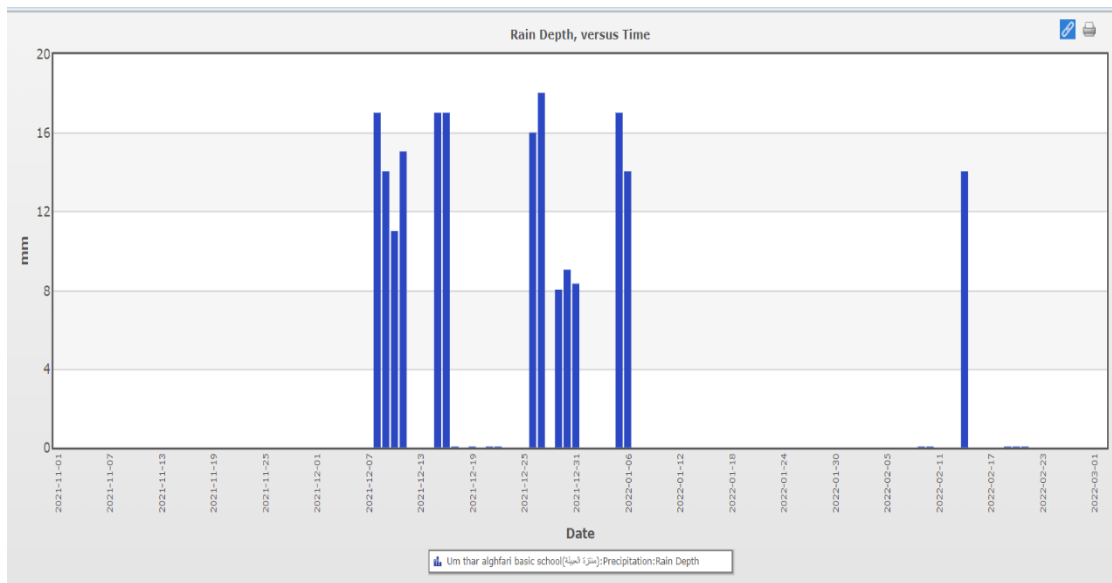
Table (4) the amount of rain in Al-Abeela region from November 2021 to the end of February 2022

Solar Noon At	Occurrence Type	Days Accumulated	Vis Rain Depth	Vis Total Liquid Equivalent	Liquid Accumulation	Liquid Accumulation Flag	Ph	Ph Method
21/02/2022 08:28	rain	1	0.05	0.05	0.05	trace		
20/02/2022 08:29	rain	1	0.05	0.05	0.05	trace		
19/02/2022 08:29	rain	1	0.05	0.05	0.05	trace		
14/02/2022 08:29	rain	1	14	14	14		8.3	meter
10/02/2022 08:29	rain	1	0.05	0.05	0.05	trace		
09/02/2022 08:29	rain	1	0.05	0.05	0.05	trace		
06/01/2022 08:21	rain	1	14	14	14		8.3	meter
05/01/2022 08:20	rain	1	17	17	17		8.3	meter
31/12/2021 08:18	rain	1	8.3	8.3	8.3		8.2	meter
30/12/2021 08:17	rain	1	9	9	9		8.3	meter
29/12/2021 08:17	rain	1	8	8	8		8.4	meter
27/12/2021 08:16	rain	1	18	18	18		8.2	meter
26/12/2021 08:15	rain	1	16	16	16			
22/12/2021 08:14	rain	1	0.05	0.05	0.05	trace		
21/12/2021 08:13	rain	1	0.05	0.05	0.05	trace		
19/12/2021 08:12	rain	1	0.05	0.05	0.05	trace		
17/12/2021 08:11	rain	1	0.05	0.05	0.05	trace		
16/12/2021 08:11	rain	1	17	17	17		7.9	meter
15/12/2021 08:10	rain	1	17	17	17		8.3	meter
11/12/2021 08:08	rain	1	15	15	15		8.4	meter
10/12/2021 08:08	rain	1	11	11	11		8.6	meter
09/12/2021 08:07	rain	1	14	14	14		7.9	meter
08/12/2021 08:07	rain	1	17	17	17		8.2	meter

Table (5) the amount of rain in the Al-Nafhat neighborhood from November 2021 to the end of February 2022

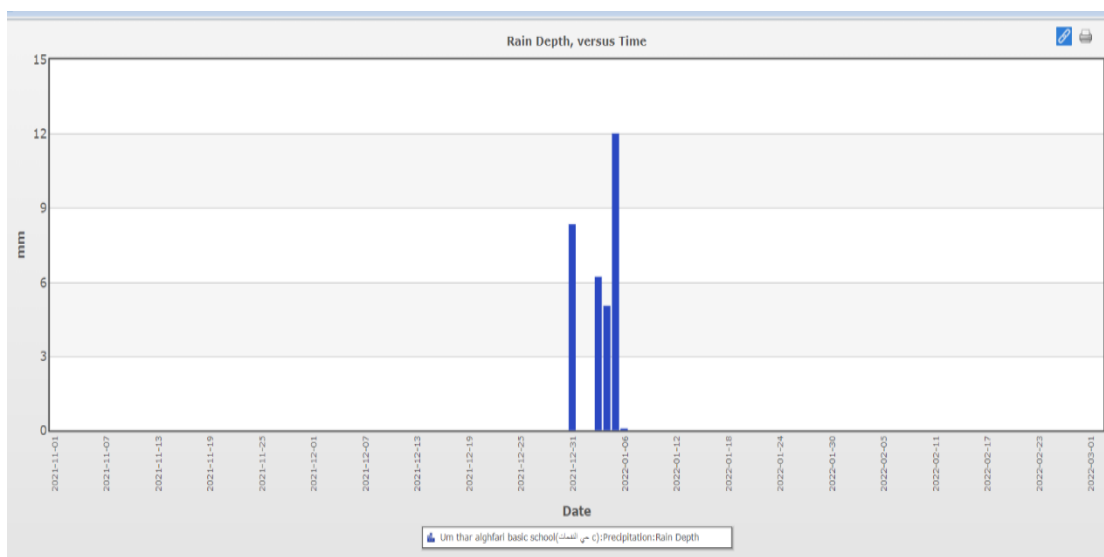
Solar Noon At	Occurrence Type	Days Accumulated	Vis Rain Depth	Vis Total Liquid Equivalent	Liquid Accumulation	Ph	Ph Method
06/01/2022 08:22	rain	1	0.05	0.05	0.05		
05/01/2022 08:21	rain	1	12	12	12	8	meter
04/01/2022 08:21	rain	1	5	5	5	8	paper
03/01/2022 08:20	rain	1	6.2	6.2	6.2	8.1	paper
31/12/2021 08:19	rain	1	8.3	8.3	8.3	8.2	meter

Chart (7) The amount of rain in Al-Abeila from November 2021 to the end of February 2022



https://vis.globe.gov/GLOBE/timeseries.jsp?map_type=FusionCharts/MSColumn2D&mode=multisiteplot&multiSiteList=267163:dv_precipitations:vis_rain_depth:0:300&chartmodule=FusionCharts&start_datepicker=2021-11-01&end_datepicker=2022-3-11&result_type=true

Chart (8) the amount of rain in the Al-Nafhat neighborhood from November 2021 to the end of February 2022



https://vis.globe.gov/GLOBE/timeseries.jsp?map_type=FusionCharts/MSColumn2D&mode=multisiteplot&multiSiteList=267165:dv_precipitations:vis_rain_depth:0:300&chartmodule=FusionCharts&start_datepicker=2021-11-01&end_datepicker=2022-3-11&result_type=true

Second: The application of the ground cover protocol in the Al-Abilah area and the Al-Nafhat neighborhood by defining an area (90 x 90 m) and its head (the length and circumference of plants, the names of the dominant plants in the place, and the ground cover) in the specified place.

Table (6) Tree cover in Al-Abilah area:

Total of tree canopy observation	
Total (+) tree canopy	21
Total (-) sky or chrub	19
Summary of canopy type	
Total (E) evergreen	Prosopis cineraria) 10
Not evergreen Total (D)	Acacia tortilis 12
earth cover summary	
Total (G) green	13
Total (B) brouwn	1
Total Measurement	60
Ground cover type summary	
Total (D) dwarf tree	18

$$100 \times \frac{total(+)}{total\ measurement} = \text{tree or bush cover}$$

$$= 100 \times (40 \div 21) = \text{Cover trees or bushes in the Al-Abilah area}$$

$$\%52.5$$

$$100 \times \frac{(E)total}{(D)total+(E)total} = \text{evergreen cover}$$

$$\%45.5 = 100 \times (22 \div 10) = \text{evergreen cover}$$

$$100 \times \frac{(B)total + (E)total}{total\ measurement} = \text{ground cover}$$

$$\%35 = 100 \times (40 \div 14) = \text{ground cover}$$

$$100 \times \frac{total(+)}{total} = \text{dwarf ratio}$$

$$\%45 = 100 \times (40 \div 18) = \text{نسبة الشجيرات}$$

Table (7) Tree cover in Al-Nafhat neighborhood:

Total of tree canopy observation	
Total (+) tree canopy	4
Total (-) sky or chrub	36
Summary of canopy type	
Total (E)	0
Total (D)	(Acacia tortilis) 4
earth cover summary	
Total (G)	15
Total (B)	10
Total Measurement	40
Ground cover type summary	
Total (FB)	30

$$100 \times \frac{total(+)}{total\ measurement} = \text{tree or bush cover}$$

$$\%10 = 100 \times (40 \div 4) = \text{Covering trees or shrubs in the Al-Nafhat neighborhood area}$$

$$100 \times \frac{(E)total}{(D)total+(E)total} = \text{evergreen cover}$$

$$\%0 = 100 \times (22 \div 0) = \text{evergreen cover}$$

$$100 \times \frac{(B)total + (E)total}{total\ measurement} = \text{ground cover}$$

$$\%62.5 = 100 \times (40 \div 25) = \text{ground cover}$$

$$100 \times \frac{total(+)}{total} = \text{dwarf ratio}$$

$$= 100 \times (40 \div 30) = \text{The proportion of grass without a stem}$$

$$\%75$$

Table (8): Measurement of the length and circumference of the uterus

Insects on the ear of the tatters	grows near a plant	Underground Length (CM)	Length above ground (CM)	circumference (CM)	Tartooth
ants	) BOISS IARICA EUPHORBIA(	30	16	8	1
flies	)zygophyllum coccineum(	35	9	15	2
spiders	)zygophyllum coccineum(	43	25	40	3
insects	)zygophyllum coccineum(	41	19	34	4
	)Imperata cylindrica(	20	7	9	5
	)Lycium shawii(	35	12	18	6

Soil Protocol Application

Soil samples were taken from the Al-Obeila area and the Al-Nafhat neighborhood and their characteristics were studied in terms of (soil color, pH, soil quality, the presence of carbon materials in it, and other properties as shown in the following table:

Table (9): Soil sample in Al-Obeila and Al-Nafhat district

conductivity	PH	salinity	Carbonate	the roots	rocks	fabric	consistency	main color	Structure	the sample
9.66ms	9.05	5.34 ppt	a lot	too many	alot	sandy clay	fragile soil	7.5YR 5/1	granular	Al-Abilah area
612 μ s	8.78	250 ppm	a little	few	medium	sandy	fragile soil	10YR 4/4	granular	Al-Nafhat neighborhood

To answer the third question:

First: Cooperation with community institutions was carried out, and some results of the analysis of the sap of the taroth plant were obtained, and the rest of the analyzes need some time, but the study (Paolo etc, 2013) was used:

Table 10. Total antioxidant capacity of aqueous and methanolic extracts from *C. coccineum*.

Assay	Methanol extract	Water extract
ORAC-PYR (mM TE/g)	0.91 ± 0.04	1.18 ± 0.06
DPPH (mM TE/g)	0.52 ± 0.01	0.50 ± 0.2
DPPH (IC50 µg/mL)	54.20 ± 2.1	51.6 ± 3.2
TEAC (mM TE/g)	0.89 ± 0.05	0.99 ± 0.11
TEAC (IC50 mg/mL)	0.91 ± 0.08	0.89 ± 0.04
FRAP (mM TE/g)	0.58 ± 0.02	0.50 ± 0.01
FRAP (mmol FeII/g)	1.35 ± 0.04	1.10 ± 0.03
Total phenolics (mM GAE/g)	1.02 ± 0.03	0.64 ± 0.02
Total flavonoids (mM CE/g)	0.139 ± 0.002	0.128 ± 0.003

Table 11. Phenolic composition of *C. coccineum* extracts (mg/g *).

Extract	Gallic acid	Cyanidin 3-O-glucoside	Other anthocyanins #
SFE CO ₂ , whole plant	1.184 ± 0.079	0.009 ± 0.002	nd
Solvent, whole plant	4.573 ± 0.226	3.134 ± 0.071	0.042 ± 0.004
Solvent, external layer	3.413 ± 0.135	11.892 ± 0.676	0.507 ± 0.049
Solvent, peeled plant	2.894 ± 0.031	0.028 ± 0.002	tr

Values are means ± SD; n = 6; * Data are referred to g of dry extract; # Dosed as cyanidin 3-O-glucoside; nd = Not detected (<LOD); tr = Traces (<LOQ).

Discuss the results:

Through the measurements and readings that were taken from the table (2,3,4,6,8,9) and the graph (1,3,4,7), the taartus plant ranges in length to (70 cm), which consists of the nakah (the spike) It is covered with small, red, bisexual flowers that are pollinated by ants, flies and insects that are attracted to its meat-like smell. This means that it can feed on different plants that grow near it, as well as its growth under shade trees to reduce the temperature until the formation of seeds. As for the soil, we find that the tartuth plant grows in a fragile sandy sandy gravel environment of medium salinity, winter is at a temperature Ranging from (12-24) degrees Celsius after rain.

In order to answer the second question, "What are the reasons that led to the growth of Tartuth (Malta mushroom) in the eastern mountainous areas (Al-Abeela region) and its failure to grow in the western desert areas (Al-Nafhat neighborhood) in Al-Buraimi Governorate?" Table (2-9) and the graph (Al-Buraimi) were analyzed and compared. 1-8), it was found that the tartuth plant feeds on the pyramid shrub that is widely spread in the Al-Abilah area, and we did not find any trace of it in the Al-Nafhat neighborhood area. The vegetation cover (Sammar, Ghaf and Sidr trees), while only small scattered succulent trees were found in the Al-Nafahat neighborhood. As for the soil of the Al-Abilah area, it is a relatively salty, sandy soil mixed with small rocks, which gave it the fragility that helps the tartus to grow. In contrast, the soil of Al-Nafhat neighborhood is low in salinity, and the soil of the Al-Abeila region can be considered rich in iron, manganese and copper, and evidence of this is the traces of rocks (copper magma residues) from the second century BC. Buraimi.

As for the answer to the third question, "How can the Maltese mushrooms be preserved and benefited economically?" The results of Table (11 and 10) can be used. It needs more analyzes of its succulent substance and conducting experiments to know the extent of its effect in treating diseases, and this is currently being done in cooperation with Sultan Qaboos University. As for the preservation of it, awareness and leaflets have been disseminated through communication sites and lectures for the people, as well as cooperation with Sultanate of Oman TV, the Environment Authority and the Water Department And the Sultanate of Oman to preserve it and spread its seeds in other places suitable for its growth, as well as cooperation with the Omani Women's Association and the STEM team for the manufacture of cosmetics from the earth.

Conclusion :

The Maltese mushroom is found in the Sultanate of Oman, especially in the Buraimi Governorate during the rainy seasons, as it grows in areas with brittle, medium-saline soils rich in minerals, which contain breeding shrubs that will feed on them, such as hay and pyramid, as it is considered a perennial plant because it grows through its roots when available. appropriate conditions. It is necessary to preserve and multiply it and spread its culture to the community.

Preserving plant life is important to maintain ecological balance, and it is also important for society to preserve and learn about plants in its environment and benefit from them in food, treatment and economic aspects.

The researcher relied on the procedural approach in applying the soil, vegetation and air protocol in the areas of Al-Abilah and Al-Nafhat neighborhood, and in cooperation with most community institutions. Awareness was also spread to the people through the Sultanate of Oman TV, social networking sites and lectures, from which the Globe Environmental Team came out with the following recommendations:

- ☒ Documenting the presence of this plant in the Sultanate.
- ☒ Maintaining the locations of this plant and increasing its reproduction in cooperation with the Department of Agriculture.
- ☒ Benefiting from it economically in dyes or satisfactory treatments similar to China and European countries because it carries a great economic value, and continuing research to analyze plant sap and study its impact on the health aspect of Sultan Qaboos University.

Thanks and appreciation

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