Saudi Arabia

Ministry of Education / Sabya Education Department

search title

The effect of weather and soil on the reproduction of pomegranate fruits in the city of Sabya.

Students names /

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Grade / Second secondary and third intermediate

School / Al-Mattan Intermediate and Secondary Girls School at Sabya

Research Supervisor, Teacher / Faizah Ibrahim Musa Bahry

Date / 2023 AD

Abstract:

The research aims to study the effect of weather and soil on the multiplication of pomegranate fruits in the city of Sabya, because it is grown there for a limited period and with very small, non-productive fruits. We began to suggest the following:

research question:

• Is there a correlation or relationship between weather factors and the multiplication of pomegranate fruits?

• Is there a relationship between soil pH and the growth of pomegranate fruits?

Hypothesis:

- There is a relationship between weather factors and the multiplication of pomegranate fruits.
- There is a relationship between soil pH and the growth of pomegranate fruits.

Actions: Using the (Mixed Methods Approach) the Experimental Approach and the Interview:

- A pomegranate seedling was taken and planted in al-mattan - Sabya, and we planted its seeds and followed the continuation of the growth of the seedlings and seeds. Experimentation was carried out on several seeds and in different types of soil, then the soil was described in terms of acidity, color and structure. And we took measurements at different times for the length of the tree and its leaves.
- Conducting an interview with farmers, one of them from the city of Al-Baha, and the other with a farmer in the city of Sabya.

Results:

There is a relationship between weather factors and soil pH on the multiplication of pomegranate fruits. Choosing the right time to plant it, and the soil of Sabya is suitable for cultivation. When planting pomegranates, you need to fertilize, in addition to using methods that help increase its abundance and increase production.

Conclusions:

Weather and soil are among the factors affecting pomegranate cultivation, in addition to the appropriate time and methods used.

Recommendations:

1-Uses that help the production of pomegranate in abundance, such as choosing the appropriate time and season for planting and using sticks instead of sowing.
2-Continuous fertilization of the soil and its treatment with advanced machines.

content list :

Abstract :

The research aims to study the effect of weather and soil on the multiplication of pomegranate fruits and the city of Sabya, where it is grown for a limited period and with very small non-productive fruits. We noticed that when we took pomegranate seedlings and planted them in our house, which is located in the town of Sabya, it grew, but its leaves were small, and we planted its seeds, and they did not appear, although we planted other seeds in the same place, and they appeared quickly, and from here we emerged: Research questions and hypotheses:

research question:

- Is there a relationship between weather factors and the multiplication of pomegranate fruits?

Is there a relationship between soil pH and the growth of pomegranate fruits?

Hypothesis:

1- There is a relationship between weather factors and the reproduction of pomegranate fruits.

2- There is a relationship between soil pH and the growth of pomegranate fruits.

Variables:

The Independent: Weather and Soil.

Follower: pomegranate fruits.

research aims:

Identifying the relationship between weather factors and soil pH and their impact on the multiplication of pomegranate fruits in the city of Sabya.

research importance:

.- Knowing the factors that affect the cultivation of a pomegranate plant in Sabya
-It helps to know the impact of weather and climatic conditions on planting pomegranates in Sabya.

Contributes to know the type of soil suitable for growing pomegranate.-

Search terms:

Soil: It is a mixture of organic and inorganic matter that covers the surface of the globe.

Pomegranate: It is a fruitful tree, its fruit is in the form of a small ball with a crown, and its peel is between green and yellow, dense, inside it is pink grains, with a sweet or sour liquid.

Weather: The average temperature, humidity, snow, and rain measured at a location over a short period of time.

Research introduction:

Pomegranate is one of the most beneficial fruits for human health, as it contains antioxidant, antiviral, antitumor properties, fights heart disease and prostate cancer, lowers blood pressure, and treats bone pain.
As for the skin of pomegranate peels, they contain a colored tanning substance that has been used for dyeing for hundreds of years, because it contains a dark colored substance used in tanning leather, as well as in dyeing silk. Pomegranate peel is characterized by being free of saturated fats and cholesterol, and contains a low percentage of calories and helps in losing weight. Its cultivation and production quantities differ from one region to another, depending on several natural factors that affect it. In the city of Sabya, it is grown for a limited period and with very small, non-productive fruits.

: Previous studies

Al-Nuaimi. Jabbar (1980) book (Oil Fruit Production) The pomegranate tree grows at heights ranging from sea level to 4,000 feet (1,200 meters) above it. In fact, the pomegranate tree grows well in temperate and hot regions, and it grows in arid regions such as the Arabian Peninsula. The cold summer and humid weather in general are not suitable for growing pomegranates. The pomegranate tree tolerates temperatures close to zero degrees Celsius during its dormant period in the winter.
Pomegranate grows in many different types of soils, such as sandy and clayey .. However, trees planted in sandy soil do not give enough abundance in the crop and the fruits do not reach their maximum size even if fertilizer and irrigation are available. Pomegranate is rarely abundant by seed, but it is mainly abundant in

one of the following ways - which can be applied in the propagation of many other trees: cuttings, grafting, cancers, and laying.

The pomegranate tree can tolerate soil salinity, and it can grow in heavy and poorly drained soil to some extent. In general, deep, well-drained sedimentary soil is considered the best type of soil suitable for growing pomegranate trees.

-Sharaf. Abdel Azeez. (2000) (pp. 501-530) in (Climatic and Botanical Geography with application to the climate of Africa and the climate of the Arab world), I found that all plants do not agree in the appropriate temperature for growth, their differences and their influence in all stages of their growth, even for the same type of plant. It has been observed that the temperature at which the maximum growth velocity is reached is not the same for all plants.

-The Al hmamda. Faraj. (2003) study entitled (The effect of climate and surface on natural plants), where the study proved that the climate and the surface have an effect on the natural plant and its different types.

-In a report to our school when we prepared a research entitled (The effect of temperature and soil acidity on the sun flower plant at Al Matan School), where the study proved that temperature and soil are among the factors affecting agriculture.

search limits:

Objectivity: The effect of weather and soil on the reproduction of pomegranate fruits in the city of Sabya.

Temporal: 2021- 2023

. Spatial: The Contested Study Site - Sabya

Which is located at latitude 17.42996, longitude 42.549651 .

Material and method (procedures):

Tools: GLOBE devices (ph protocol device - digital thermometer - soil color book - vinegar - soil sample - sand shovel - soil sifting cans - pen - paper - computer - gloves - seeds – seedlings- meter scale).

Procedures : The experimental method and the interview were used (mixed methods approach):

1) Experience:

-A pomegranate seedling was taken and planted in the garden of the house in Figure 1 in January 2021, and at the same time we planted its seeds (Figure 2), and after two months we noticed the continuous growth of the seedling, but its seeds were not planted.

-Then we took seeds of other plants and planted them in the same soil to identify the quality of the soil for cultivation, and we noticed that they grow rapidly within two days, as in (Figure 3).

Pomegranate seedlings (Figure 1)

Growing pomegranate seeds figure (2)

Planting the seeds of other plants in the same soil and their emergence in two days (Figure 3).

- After our participation in the Global Symposium on Virtual Science 2021, we benefited from the comments of the judge that he mentioned to us, including that the cold climate in winter does not allow the cultivation of pomegranate. Among what he mentioned is that pomegranate seeds are a very light plant, and

in fact this is what we have noticed. They must be placed on the surface of the soil and must be soaked before planting. And in our first cultivation, the cultivation was in relatively deeper soil and the seeds were not soaked, and our teacher A. Fawzia Al-Zahrani, who lives in the city of Al-Baha, brought two types of soil and two pomegranate seedlings from two different farms from Al-Baha, then we planted them A week after planting it, we noticed the difference, after it was bare sticks, which turned into a leafy tree, as in (Fig. 4)

Pomegranate seedlings from Al-Baha city (Fig. 4)

So we conducted another experiment and soaked the seeds and then planted them in several types of soil. Each soil has special specifications. We used different seeds and many repetitions, and we added fertilizers to the soil. shape (5)

A picture showing the experience of soaking seeds and planting more than one type of seeds and in different types of soil Figure (5)

−Note that we were measuring the temperature with (digital thermometer) at 12 to 12:30 local time in those periods, which was recorded as in Table (1) and the air pressure was between (1009−1016)

-Then the soil was characterized in terms of acidity using a device (ph protocol) and color using the soil and structure color book, and we added vinegar to identify the percentage of carbonate and the soil was sifted to find out the amount of roots and rocks (Figure 6) So we noticed that the soil is alkaline, and there is no bicarbonate. And it contains few roots and rocks. Then we studied the soil of the city of Al-Baha and noticed the difference between them. We found that the percentage of bicarbonate is medium and it contains a high percentage of roots.

Soil characterization in terms of acidity, bicarbonate, and color, and a comparison between Al-Mattan and Al-Baha soils Figure (6)

2)-The interview:

An interview with one of the farmers, who is the father of Mrs. Fawzia Qaleel Al-Zahrani, who owns a large farm of pomegranate fruit and is a resident of Al-Baha region, which is located in southwestern Saudi Arabia, at longitude 41.4712733 and width - 20.0217407. Height: 2,270 meters

They were asked several questions:

Q: Is pomegranate plant grown in Al-Baha and when?

Yes, it is planted in abundance from mid-January to the end of February, and this is the best time for planting.

Q: When will its fruits appear? How long does his tree live?

Fruits appear in mid-March and last for one and a half months. and the tree lives for more than fifty years But it is better for the quality of the production to not exceed twenty-five years

Q: How tall is the tree in a month, six months, and after a year?

per month from 5 to 10 cm approximately

In the six months from 30 to 40 cm approximately

The year is from 70 cm to 80 cm approximately

Flowers appear at the beginning of March, and the fruit becomes ripe at the end of August and the beginning of September

Q : What is the nature of the lands and weather conditions in the city of Al Baha?

Al-Baha region is a mountainous region and its soil is fertile and clay, and natural and organic fertilizers are added when planting, and the best areas for growing pomegranates are located at an altitude of 450 to 500 meters above sea level in Al-Baha region and valleys such as Valley Baida, where the largest pomegranate farms are located. The weather is generally cold, and the temperature in winter ranges between 9 ° -19 °. And the summer is warm, the temperature ranges between 20 ° -30°.

As for the rains, they are uneven and seasonal, and they fall in some seasons and are interrupted in other seasons. Spring is the rainiest season of the year, but in winter in general, the average rain is less, and most of the rain falls on the region as a result of cumulus clouds, and Al-Baha region, especially the slopes, is characterized by low relative humidity on most days the year. And the southwest monsoon blows on it.

Q: Describe how it is grown?

He does not plant seeds, it is preferable to plant sticks cut from the mother tree and planted in the ground in the planting season from mid-January to the end of February and remains for a year and then transferred in the planting season in the following year to its dime place and the tree takes three to four years to become a fruitful tree There are three types of pomegranate, Figure (6), which is a pomegranate with a red crust and starts at the beginning of the pomegranate season, followed by green pomegranate, which is the best in color and taste, and

there is a third type, which is sour pomegranate, and the price of pomegranate seedlings ranges from 40 to 100 riyals per seedling. The season to its end, from 70 riyals per carton to 1,000 riyals

At the conclusion of the interview, she provided us with vivid pictures of their farm in the yard and sold it in shops and markets, Figure No. (8). Pictures of pomegranate plants in autumn and winter (Fig.9)

Types of pomegranate (7)

A farm for growing and producing pomegranate fruit in Al-Bahah in Valley Bidah Figure (8)

Pomegranate tree in autumn and winter Figure (9)

- Then another interview was conducted with the farmer, Muhammad Ali, who is a farmer and a resident of the Sabya region, which is located in the southwest of the Kingdom of Saudi Arabia. Several questions were asked to him:

Q: Is the pomegranate plant grown in the city of Sabya?

Yes, it is grown, but in small quantities, because we are interested in cultivating other fruits that the city of Sabya is famous for, and in large quantities, such as mangoes, sorghum, millet, and other agricultural crops with high productivity.

Q: What is the nature of lands and weather conditions in the city of Sabya?

The city of Sabya has a variety of lands, including plains, mountains, and valleys, and its soil is fertile and suitable for many agricultural plants. Natural and organic fertilizers are added for cultivation when needed, and the weather is generally hot to moderate, and the temperature in winter ranges between 25°-32°, and summer is hot, and the temperature ranges between 37°-44°.

As for the rains, they are uneven and seasonal. They fall in some seasons and stop in other seasons. Most of the rain falls in the region as a result of the formation of cumulus clouds, and it is characterized by high relative humidity in most days of the year. It is blown by the southwest monsoon.

Q: Describe for us the method of cultivating it if we want to grow it in the home farm?

It is preferable to plant seedlings or sticks that are cut from the mother tree and planted in the ground during the planting season. You can also soak the seeds and wrap them for a period of time ranging between 3-5 days, then plant them in soil that has been fertilized and suitable for cultivation so that the seeds are close to the surface and not in deep soil.

- Then we measured the length of the seedlings that we planted, and it was 50 cm long, and after 6 months it became 75 cm long, and after a year it became 140 cm long, as in Figure (10), and it usually reaches a height between 5 to 7 meters.

- And we measured its leaves, as they were small and medium, ranging between 2-4 cm, as in Figure (11), and it is characterized by its green oval leaves, which are approximately 7.5 cm long.

A picture of taking measurements of the length of a pomegranate tree, Figure (10)

A picture of taking measurements of the length of pomegranate tree leaves, Figure (11)

A picture showing tracking the stages of pomegranate fruits appearing in the city of Al-Baha, Figure No. (12)

Data summary: analysis of tables and charts taken from Globe schools.

Table No. (1) Measuring the air temperature for a year in Al Mattan – Sabya.

the classroom	temperature
winter	Ranging between 25 ° -32 °
the summer	It ranges between 37 ° - 44 °

Diagram No. (1) measuring the temperature in the winter and summer seasons in Al Mattan – Sabya.

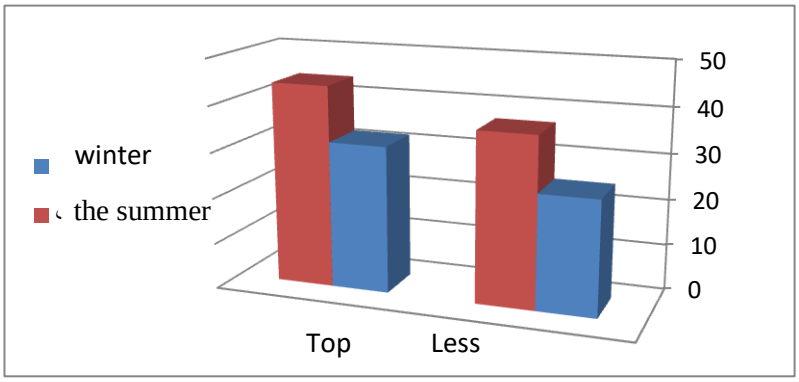


Diagram No. 2 illustrating the visualization of air temperature data

For the year from 1/1/2020 AD -2/3/2021 AD Al Mattan – Sabya.

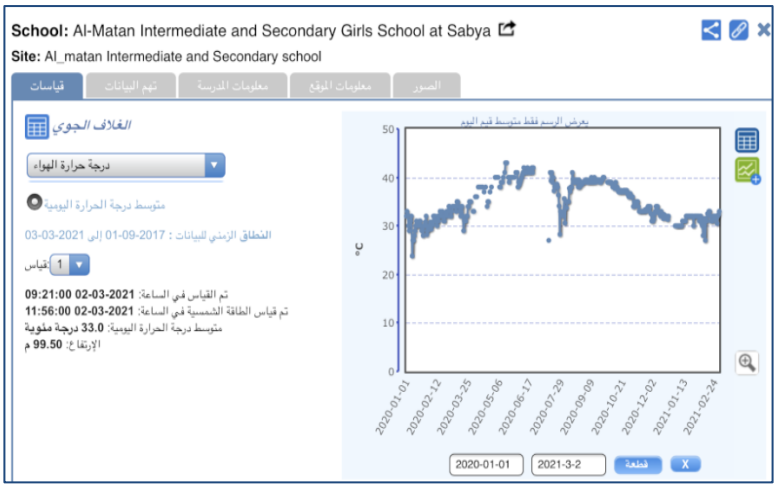
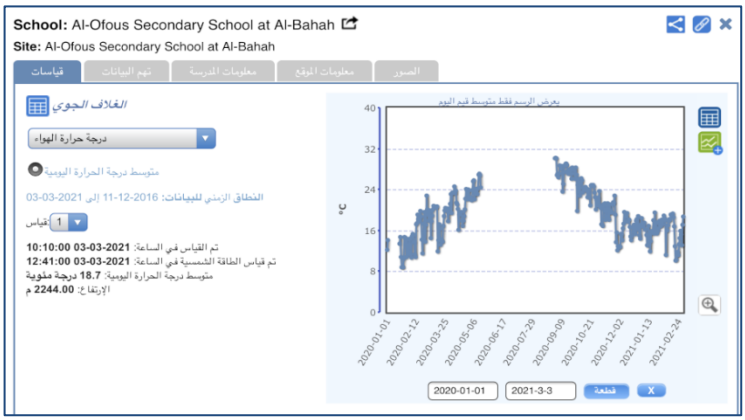


Table No. (2) Measuring the air temperature for the year from (1/1/2020 m 3/3/2021) from the Globe High School Al-Baha website.

the classroom	temperature
the summer	It ranges from 20 ° -30°
winter	It ranges between 9 ° - 19 °

Diagram No. (3) showing the temperature for the year from (1/1/2020 m 3 3/3/2021) from the Globe site of Al-Baha High School.



Graph No. (4) showing the relative humidity for the months of January and February 2021 from the Globe Al-Baha High School site .

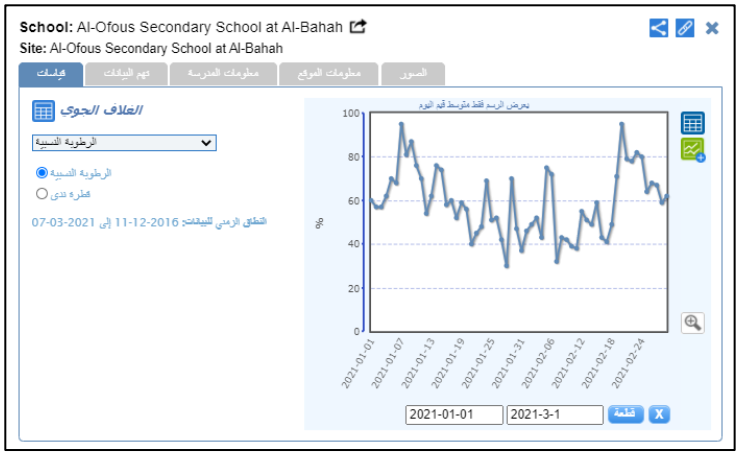


Table No. (3) Characterization of the soil of Al-Mata'an - Sabya and the soil of the pomegranate farm in the city of Al-Baha in terms of acidity, color and bicarbonate

Location	rocks	Rocks	pH	Soil color	Bicarbonate
Al-Mattan soil	Little	Little	8.1	10YR6/4	Not found
Al-Baha soil	Little	Little	8.7	10YR4/3	Average

Analysis and results:

From the tables, experiments, observations, and interviews, we conclude that there is a relationship between weather factors, soil pH, and the growth and reproduction of pomegranate fruits in the city of Sabya. Also, through the daily entries and recording the environmental data of the Globe at Al-Mattan School from (January 2020 to the end of February 2021), we noticed that the air temperature is high in the summer, ranging between

37 ° -44 °, and in the winter it ranges between 25 ° -32 ° .

Also, the winds are active with dust in the autumn season. As for the rains, they are seasonal, but in the year 2022 the city of Sabya witnessed heavy rains that lasted for nearly two months, namely July and August, where we noticed a change in the pomegranate tree as the green leaves appeared and their growth increased and better than before, but by During the dry seasons, we noticed a change in the color of the leaves, which tended to turn yellow and withered tips.

As for the rains, they are seasonal, and the winds are also active with dust in the autumn.

Through the interview with the father of the teacher, Fawzia Al-Zahrani, and also through visualizing the data of Globe in a school in Al-Baha city, we noticed the difference in the shape and growth of the plant, as it abounds in summer and in the fall and winter its leaves fall off, as in Figure (9).

We noticed a low temperature throughout the year on the highlands as shown to us in Table (2). It rises a little on the slopes, the rain falls wobbly, and the nature of the land is mountainous heights.

The average relative humidity in summer varies in the region in July between 49% in the highlands and 28% in the slopes. In the month of January, which represents winter, the average relative humidity ranges between 75% in the highlands and 53% in the slopes.

Also, by interviewing a farmer in the city of Sabya, we found that pomegranates are grown, but in small quantities, because they are interested in cultivating other

fruits that the city of Sabya is famous for, which are produced in large quantities, such as mangoes and other agricultural crops.

Through soil characterization experiments, we noticed the following:
When conducting a Ph measurement experiment to measure the degree of soil pH, we noticed that the acidity of the soil was recorded at 8.1 in the soil in which the crops were planted in Sabia, while the soil of Al-Baha farm was recorded at 8.7, and when conducting a vinegar experiment to measure the amount of bicarbonate in the soil (bicarbonate quantitative protocol) we noticed that no bubbles appeared in the soil This indicates that there is no bicarbonate. As for the soil of the Al-Baha farm, there is bicarbonate in it. Then we used the Soil Color Book, which is a book to know the soil color numbers.
(Soil Color Protocol) for soil measurements in Al-Mattan, which recorded 10YR6/4, while Al-Baha soil recorded 10YR4/3.

Conclusions:

By using the experimental approach, interview and graph to visualize the environmental Globe data

A - In graphs (1, 2) and Table No. (1) an increase in air temperature was observed in Al mattan- Sabya . While in Chart (3) and Table No. (2) a decrease in air temperature was observed in Al-Baha School, and by determining the location, the city of Al-Baha is from the high areas and has slopes, and the city of Sabya is from the lower areas.

B- Through the experience of characterizing the soil, we conclude that the soil of Al-Mattan- Sabya, in which the soil was cultivated with alkaline soil and bicarbonate, does not exist, and this indicates that it is a neutral soil, and therefore it is arable soil, and when we planted other seeds in it, it grew quickly, but when planting the pomegranate plant it needed fertilization and treatment. .

That is why the weather and soil quality are among the most important factors affecting the cultivation of pomegranate plants, in addition to using good productive agricultural methods and choosing the appropriate times for planting.

C- Among the fees that have been published in the fields in which the farms invest in, which use its cultivation for certain seasons, and that the farms in the yard use its seeds, and transport it from another place suitable for investment, and it shows Figure (9). . Sabya is suitable for cultivation, but the reasons for its non-appearance and lack of abundance in Sabya are due to the use of traditional practices used by farmers in the city of Sabya who are interested in cultivating other high-yielding crops.

D- Through the experience of planting in various types of seeds and soil and soaking pomegranate seeds, we concluded that pomegranate seeds are grown in our city, but after soaking and planting them on the surface of the earth because they are light, after adding fertilizers to the soil, and that they need a longer period to grow, ranging from one month to 6 weeks according to the appropriate conditions.

Discussion:

There are many studies that prove the effect of natural factors and the effect of air and soil protocols on agriculture in agreement with our current study, but the purpose of this study is to develop and improve the cultivation of pomegranate fruit in the city of Sabya and in other areas similar to the same conditions.

Other studies also proved that pomegranates are grown even in warm and hot regions, and that the cold summer and humid weather in general are not suitable for growing pomegranates .The pomegranate tree tolerates temperatures close to zero degrees during its dormant period in the winter. Pomegranate grows in many different types of soil, such as sandy and clay, and at a pH of $7.5-8$, hence the importance of this in growing the pomegranate plant when we faced the problem of delayed growth during We followed him after planting it for two months. Where we found the methods and methods used and the appropriate times to cultivate and increase its production in the city of Sabya.

Among the improvements and recommendations:

--Use of methods that help to produce pomegranate in abundance, such as choosing the appropriate time and season for planting and using sticks instead of sowing.

-Providing agricultural reserves for the possibility of planting a pomegranate plant in the city of Sabya.

-Continuous fertilization with organic and natural materials, turning the soil and treating it with advanced machines.

- Studying research on a large scale in different regions and conducting studies and experiments at a high and advanced level about soil and its impact on other agricultural crops of nutritional value.

Difficulties:

- Measurements are missing at sites for several days.

Acknowledgment:

Thank you to our family that pushed us forward, and to our country, and the environmental teacher Ms. Faizah Ibrahim Bahri, specializing in geography for guiding us, and Ms. Fawzia Al-Zahrani and her father, and farmer Muhammad Ali for conducting the interview, and Ms. Kamila Muharraq specializing in English to review the translation of the research, and the science teachers, Ms. Ohood Bahari, MA, and majoring in chemistry, Ms. Awali Attia, a biology major, and Ms. Hanan Kharami, a laboratory attendant, for help and guidance. Ms. Fatima Wafi specializes in chemistry, and is a teacher at Globe Aida Al-Rashdi at Nawan School in Al-Makhwah. And the Globe teacher Fakhriya Al Balushi from Soda Umm Al Momenin School from the Sultanate of Oman, and to our school that gave us support, and to the Globe program for giving us supplies.

Badges

Cooperate	Contact a stem specialist	Communication between schools
The cooperation of the students: Layan Bahri and Bayan Mlehi and Nagham halosh. on the following: 1- Translate the search to English. 2- Writing research paragraphs. 3- Conducting interviews to talk with specialists to support the research hypotheses. 4- Searching and reading about books to help you search. 5- Conducting experiments that show the effect of weather and soil type on pomegranate plants.	Environmental Globe teacher Ms. Faiza Bahri has a BA in geography for guidance, and Ms. Fawzia Al-Zahrani's father is Muhammad Ali for his experience in agriculture and farms. Ms. Kamila Muharraq has a BA in English for translating the research, and science teachers Ms. Ohood Bahari has a MA and a chemistry major, Ms. Awali Attia has a biology major, and Ms. Fatima Wafi has a major in biology Chemistry, and the lab attendant, Ms. Hanan Khorami, for help and guidance.	- Communicating with Ms. Aida Al-Rashdi at Nawan School in Al-Makhwah and Ms. Fakhriya Al-Balushi from Ms. Umm Al-Muminin School from the Sultanate of Oman, where they were asked about some measurements. - Globe's teacher, Huma Hattan , from Bish Third Secondary School, specializing in geography, was also contacted, and she was asked about the impact of natural factors on plants. -To verify the effect of temperature, the secondary school in Al-Baha was used to visualize the Globe data in Al-Baha city.
Community Influence	Data Scientist	STEM storytellers
The research in brief studies is a real problem, including the local community, and it tries to answer the questions to reach the specific results of a specific role, and this is what we recommended at the end of this research and we aspire to. Being able to publish solutions and results on its interface, possibly acceptable in some neighboring countries.	To answer the research questions, we relied entirely on the data we collected, analyzed it, compared it, then extracted conclusions from it, and finally came up with results that can be generalized, as well as developing the future and recommendations.	We shared our experience with many of our colleagues at the school level, as well as doing an interview that tells the story of pomegranate cultivation in the best conditions to find out the reasons and draw conclusions.

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a poster

https://drive.google.com/file/d/1H4HfvbdXwrBZU4EKyr6QlYpJEizVmj7t/view?usp=share_link

Search in Arabic

https://drive.google.com/file/d/1UMyE9vypIvlGZejVnRQW1XQQ0V9RvT5a/view?usp=share_link