Sultan Saeed Bin Taymour Primary School (5-9)

THE GLOBE PROGRAM

Sultanate of Oman

Effect of date kernel solution on soil fertility

Preparation of the students:

1 - Mohammed bin Abdul Nasser bin Jumaa Al-Alawi

2 - Abdul Rahman bin Khalid bin Abdullah Al-Alawi

Sultan Saeed Bin Taymour Primary School (5-9)

Supervised by Mr. Imad bin Abdullah bin Salem Al Hitroushi

Sultanate of Oman - State of Sur

March 2019

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Summary:

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The aim of this study is to study the effectiveness of using the nucleus of dates on soil fertility to answer the following questions:

1-hat is the effect of adding the nucleus of dates in the growth of the ring plant?

2. How does the nucleus of dates help to multiply beneficial bacteria that make them more fertile?

3 - What is the importance of interest in the nucleus of the process to get benefils from it as a useful product in the Sultanate of Oman?

The kernel of dates was milled and converted to powder and mix with water. The nucleus of the dates and its use in the irrigation of the ring plant, which was selected for this study, was makes for easy access to the results and its rapid growth in days, and compared its growth rates with the growth rate of another plant of the same type.

Applicable protocols in search:
1- Protocol of acidity.
2. Salinity Protocol.

3. Dissolved oxygen protocol

The results of the effectiveness of the use of the nucleus of the pathogens showed the growth of the ring plant, with growth rates reaching (cm5.1) compared to the growth rate (cm3.6) of the other sample, which used water only in irrigation within nine days, and grown by of seeds that The number of seeds grown by 10 seeds increased on the fourth day, while only two of the fry plants in the sample were irrigated with water, out of 10 seeds in each sample.

The salinity of the solution (date nuclei) was 445PPm and its acidity was 6.6 compared to salinity of 624ppm and acidity 8.5 in the water used to irrigate the other sample.

And salinity of the solution (date nuclei) with the soil when they were mixed together were 691ppm, and acidity 7.5 while salinity when mixing the water with the soil reached 878ppm and acidity 9.2, which confirms that the solution (date nuclei) contributes to reducing the salinity of the soil, The pH level is suitable for the growth of most plants from 5.5 to 9 (Wikipedia).

The analysis also showed that the dissolved oxygen ratio in the sample of the solution (date nuclei) was 6 PPM (mg / L) compared to1 PPM (mg / L) in the water sample.

When mixing the nucleus of dates with the soil to determine the effect of the solution, it was found that the ratio of dissolved oxygen was 12 PPM (mg / L) compared to 8PPM (mg / L) when mixing water with soil.

Indicating the dissolved oxygen ratio in the sample of the nucleus of the date nucleus, which helps to multiply the bacteria that grow in the soil and help to stabilize the nitrogen.

Based on the results of the research, the researchers recommend the community to exploit the nucleus of the help to use it as a product that contributes to accelerating the growth of plants.

Key terms:

Dates: Scientific name (Phoenixdacty Lifera), is the fruit of the palm tree and characterized by high nutritional value (Wikipedia).

Dates nuclei: A solid part in the fruit of dates, wrapped in a papercloth called katmir, separating the nucleus from the meat section eaten (Wikipedia).

The plant of the ring: It is a grass between the height of 20 - 60 cm, has a hollow leg and branched out of small branches each carrying at the end of three long serrated leaves and his scientific name (Trigonella foenum-graecum) (Wikipedia).

Research Question:

The search sought to answer the following questions:

1- What is the effect of adding the nucleus of dates in the growth of the ring plant?

2 - How does the solution (nuclei dates) aim to multiply the beneficial bacteria of the soil and make them more fertile?

3 - What is the importance of interest in the nucleus of dates and use it as a useful product in the Sultanate of Oman?

Introduction and literature review:

The nucleus of dates is a component of dates. It is solid and is surrounded by a papyrus called katmir. It separates the nucleus from the meat section, which is eaten. The palm tree is the source of this fruit in the Sultanate of Oman, estimated at about 8 million palm trees, the Ministry of Agriculture and Fisheries (2017).

It was observed that the dates of the dates were not used and that previous studies indicate the importance of date nuclei, as indicated by Musallat, Muwafaq, Saleh, and Saad (2017) on the components of powder (date nuclei) containing 1.96% N, 0.63% phosphorus P, 0.63% potassium K, 54% carbon C, and 31.12% cellulose, as these ingredients help to accelerate plant growth, all the above is the importance of this research environmentally and economically.

search methods:

1. Research Plan:

Plan your search plan timeline:

Table (1) Search Plan Timeline:

the month	work plan
October 2018	Formulation of research problem, identification of tools
November 2018	Data collection and analysis
February 2019	Conclusions and research writing
March 2019	Submission of research

- Define the roles of the working group on the subject of research study (preparation of tools and field application).

Table (2) Distribution of roles to the research team:

work tasks	Students performing
Identify your search problem, and select the tools you need.	Mohammed Al - Alawi / Abdul Rahman Al – Alawi
Collect data from implementing protocols, technical interviews, and collect information from references associated with research.	Mohammed Al - Alawi / Abdul Rahman Al – Alawi
Reach conclusions by the means of data, access to abstract form and write research.	Mohammed Al - Alawi / Abdul Rahman Al – Alawi

Identifying and reviewing relevant sources such as collecting information from scientific books, using and documenting the Internet, in addition to technical interviews with specialists, and data from the application of GLOBE protocols.

Selecting and identifying the different locations of the study, and specifying them accurately in preparation for data collection.

Table (3) Search Plan Application Locations:

Implementation site	the work
School	Study the properties of water and the nucleus of dates used in the study.
School	Cultivation of the ring plant and observation of the effect of the nucleus of dates on its growth rate.
School	Cultivation of the ring plant and observation of water efficiency on its growth rate compared to the first sample.

- Identify (protocols) appropriate to collect study data.

Table (4) Applicable protocols in search:

Work port	Protocol performing data collection
Study acidity of the nucleus of dates and water.	Protocol of acidity.
Study the salinity of the nucleus of dates and water.	Salinity Protocol.
Study of dissolved oxygen content in the date and water nucleus solution.	Dissolved oxygen protocol.

- Determination of appropriate instruments and tools for data collection: (pH meter - thermometer - GBS - ruler - metric bar - plastic cups - electric mill - moving leg - data collection form - pens).

- Start the application of the research study through the application of protocols on the samples.

The research question.	Applicable protocols.	Application method
The first question.	- Protocol of acidity. - Protocol Salinity.	Collect a sample of the dates nuclei and turn it into powder. Then put it in a 330 mL plastic bottle and mix with the water (the percentage of powder is one-quarter of the water) in any pot placed in it. Two cups of soil (10 seeds per cup). - The first sample is irrigated daily with 25 ml of the solution (date nuclei), the second sample is irrigated with the same amount of water, and at the same time daily. - Note the growth of the ring plant in both samples within days. - Considering the same conditions for both samples. - Determination of characteristics of the two samples (acidity - salinity).
second question.	- dissolved oxygen protocol.	- Study the percentage of dissolved oxygen in the sample of the nucleus of dates, and its proportion in water only.
The third question.	- Technical interview.	- By collecting data on palm trees, types and conditions suitable for their growth through a technical interview with the Engineer (Head of Agricultural Development Department, State of Sur).

Table (5) Method of application of the protocols for research study (data collection):

- Agricultural soil samples are collected from a farm in the state of Tire so that they are suitable for the subject of the study.

- Design of data collection tools - forms - (Appendix), where the growth rate of the ring plant is recorded in both samples, so that the two samples are irrigated in equal quantities and at the same time.

-Collect and insert data into Excel.

-Enter the data collected at the GLOBE site, (www.GLOBE.gov).

- Data analysis and representation.

- Technical interview with the Engineer (Head of Agricultural Development Department, State of Tire).

- To reach the results of the research study and write recommendations.

Study site:

Location of the study: Sultanate of Oman, Surat province, March, cold weather, acidity, salinity and dissolved oxygen protocols were used.

Study site Sultanate of Oman / State of Sur

A geographical map of the study site

A geographical map of the school site

Data collection and analysis:

-In order to answer the first question, the data was collected by determining the growth rate of the fenugreek plant. Two samples of the seeds of the fenugreek seed were identified, so that 10 seeds were put in each sample. To compare the number of seeds growing in both samples, The same quality of agricultural soil, so that the exposure of the two samples for the same weather conditions of temperature and ventilation and sunlight, and then took measurements of growth rate of the ring plant in both samples.

- To answer the second question: The dissolved oxygen protocol was used to determine the percentage of dissolved oxygen in:

1 - water only, 2 - solution (dates nuclei), 3 - soil and water only 4 - soil and solution (dates nuclei), to determine the availability of dissolved oxygen in these samples, which helps the growth of bacteria that help to stabilize nitrogen in the soil Helps to accelerate plant growth.

Results:

After the data were collected, the data shown in the following table showing the growth rate of the ring plant using the nucleus of dates were compared to the growth rate of the same plant using water only.

Table (6) Data for the growth rate of the ring plant studied using the solution (dates nuclei) within nine days:

3-15	3-14	3-13	3-12	3-11	3-10	3-9	3-8	3-7	Date
5.1	4.8	4.3	2.9	2.2	1.4	0.8	0	0	Length Cm

Table (7) Data for the growth rate of the ring plant studied using water only within nine days:

3-15	3-14	3-13	3-12	3-11	3-10	3-9	3-8	3-7	Date
3.6	2.8	2.2	2	1.5	1	0.5	0	0	Length Cm

Table (8): Characteristics of the nucl

eus solution and the water used to irrigate the study sample.

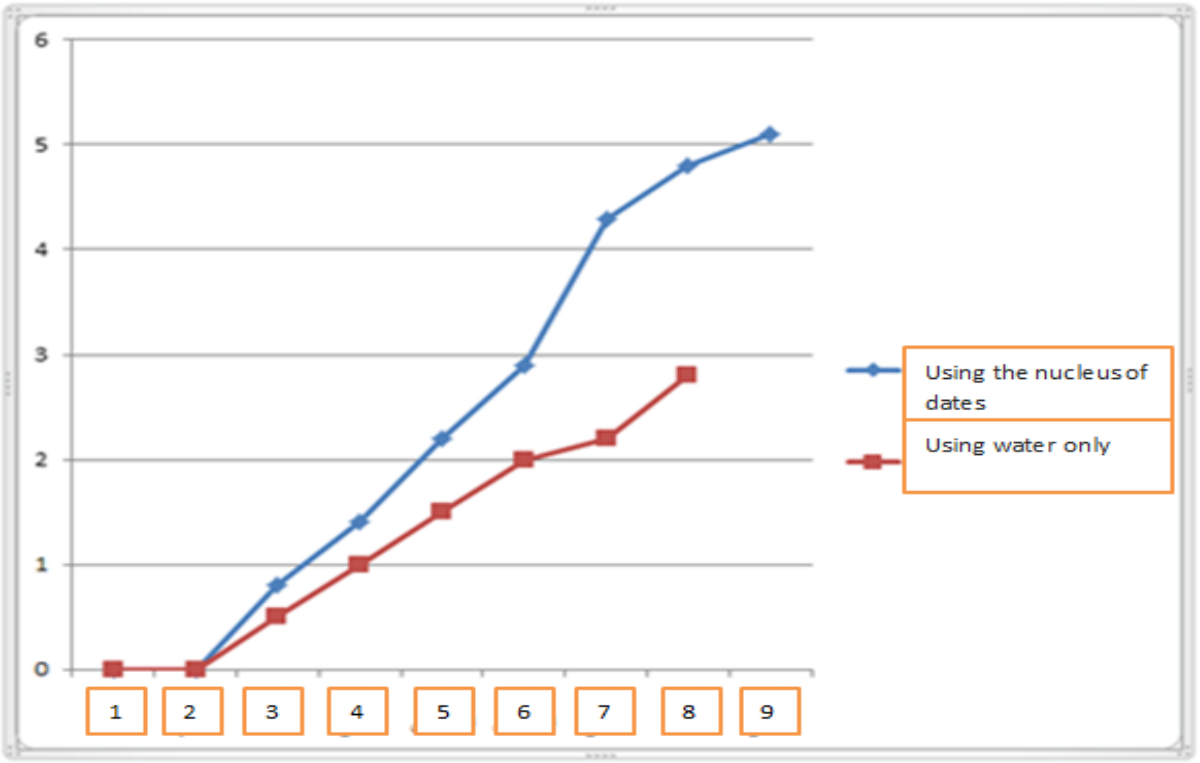
water	The nucleus of dates	Property
8.5 PH	6.6 PH	Acidity
624ppm	445ppm	Salinity
24.3	24.4	temperature
1 PPM(mg/L)	6 PPM(mg/L)	Percentage of dissolved oxygen

Table (9) Data of the properties of the mixture of the nucleus of dates and agricultural soil,

And the water mixture with the agricultural soil used in cultivating the study sample.

Water	The nucleus of dates	Property
9.2 PH	7.5 PH	Acidity
878ppm	691ppm	Salinity
24	23.5	Temperature
8 PPM(mg/L)	12 PPM(mg/L)	Percentage of dissolved oxygen

Figure 1 shows a comparison of the growth rate of the ring plant using the nucleus of the mulmonum using water only within nine days (length of the ring plant cm)



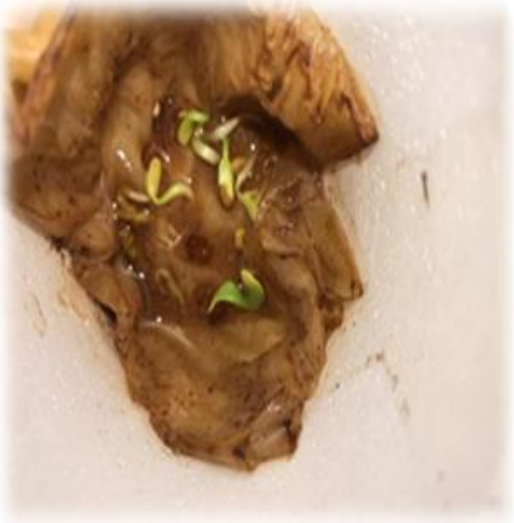


Figure (2) shows a comparison of the number of seeds of the fenugreek plant grown using the date kernel solution and the number of seeds of the fenugreek plant grown using water only.

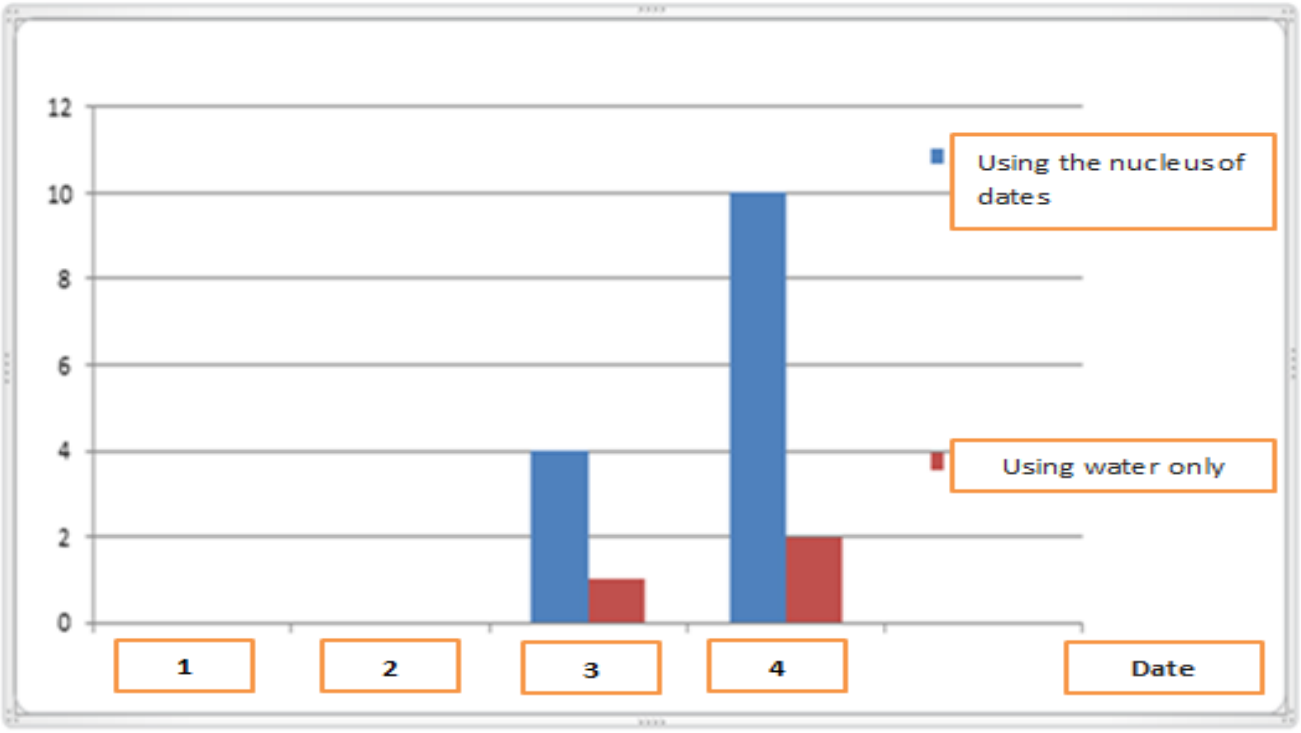
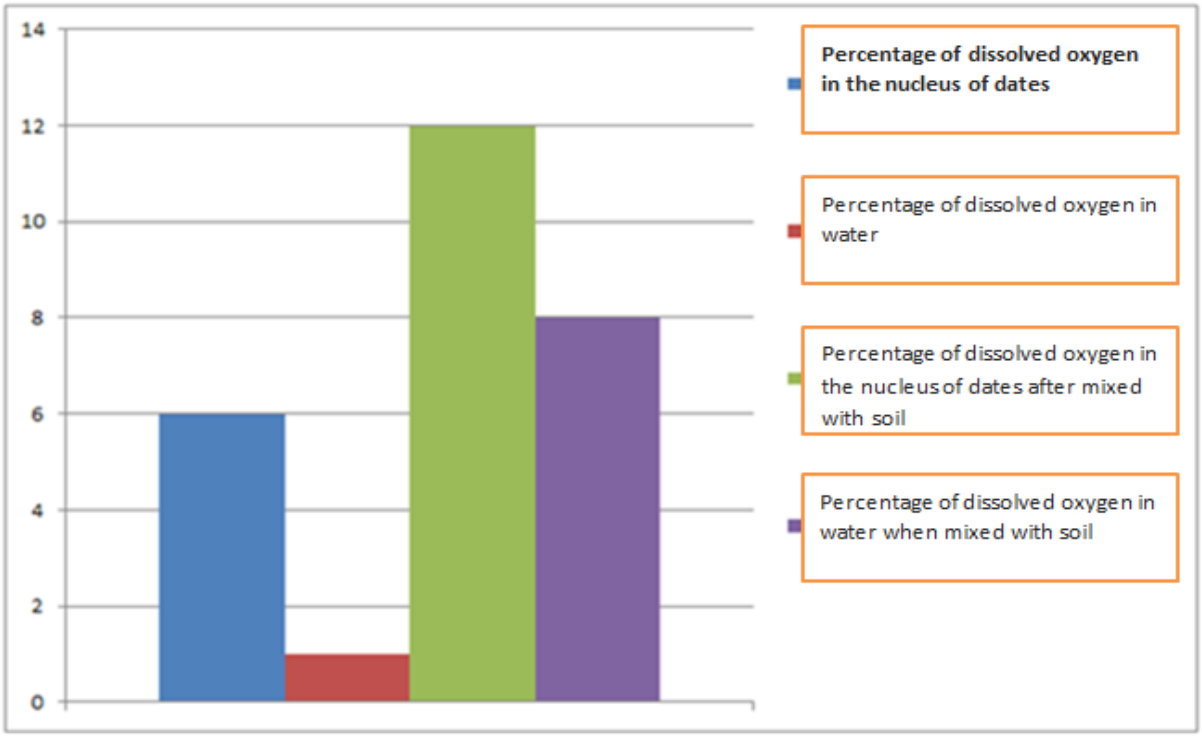
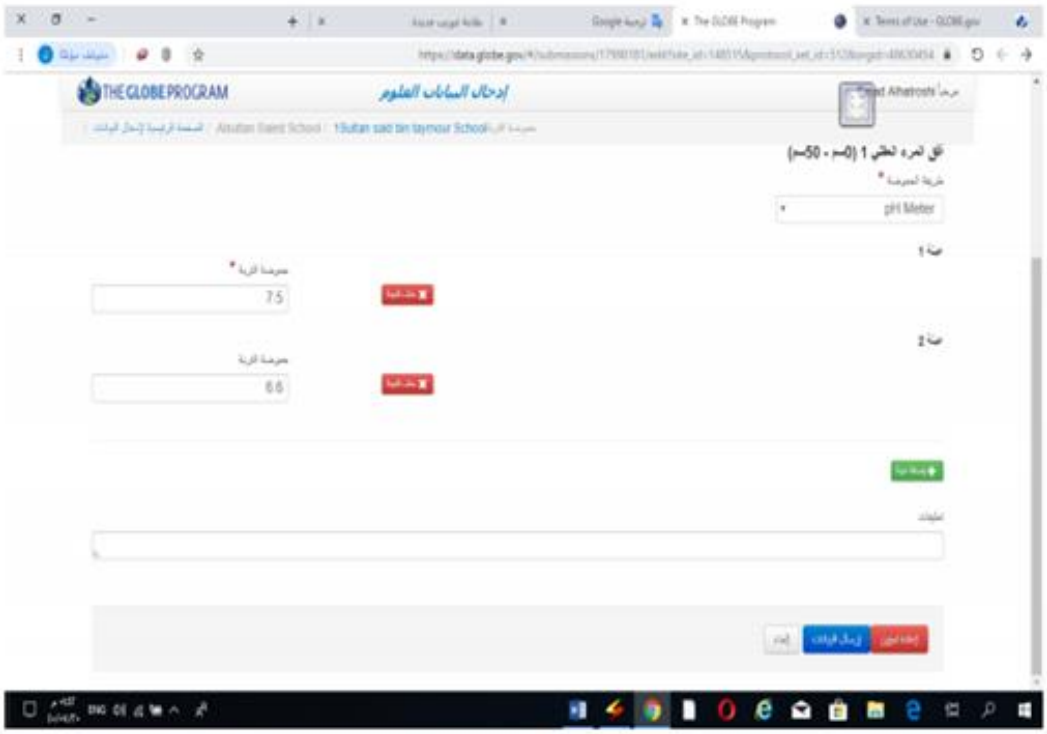


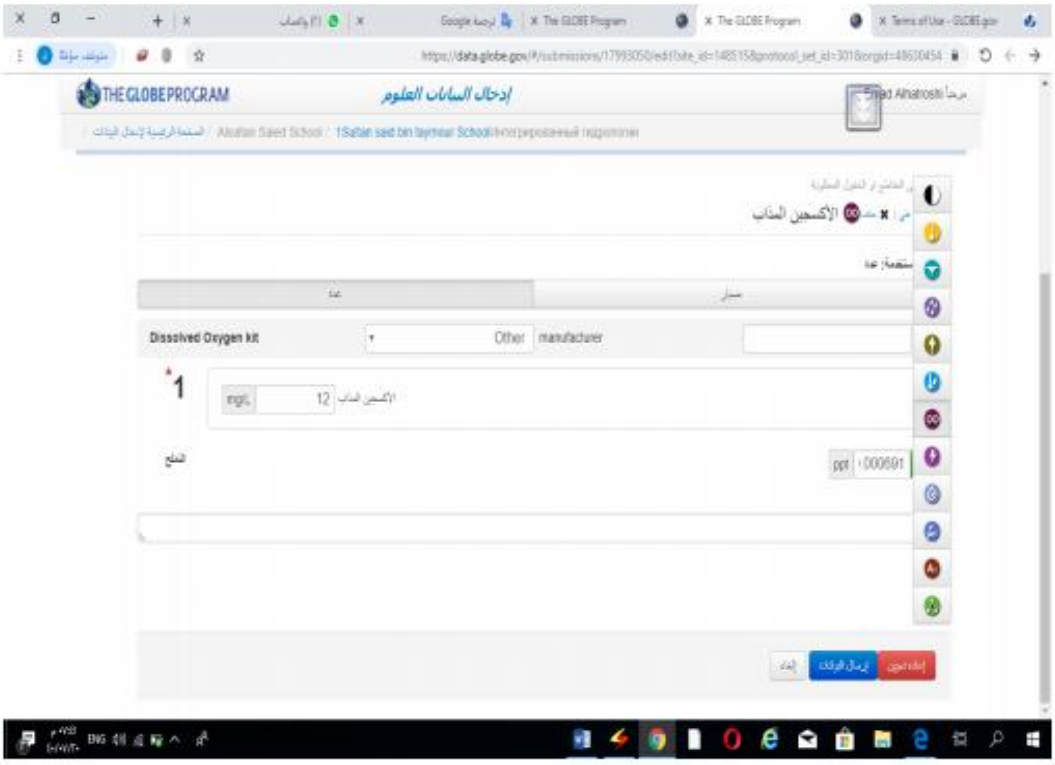
Figure (3) shows a comparison between the ratio of dissolved oxygen in the nucleus of dates and its percentage in water

Dissolved oxygen content after mixing the nucleus of dates with the soil, and dissolved oxygen after water mixing with agricultural soil in PPM (mg / L).



Data entered and sent to the program site: (www.GLOBE.gov) via the application (DATA ENTRY):





Discussion of results:

In order to answer the first question, it is clear from Figure (1) that the rate of the variety of the ring plant used to irrigate the nucleus of the dates nucleus is faster than the growth rate of the sample of the ring plant used for water irrigation only; (Cm5.1), while the length of the water-fed prophecy was only after the ninth day (cm3.6).

The number of seeds of the fennel plant grown on the third day was 4 seeds. On the fourth day, the number of seeds from 10 seeds in the sample was 10, while the number of seeds grown using Water on the third day with one seed only and on the fourth day the number reached only two seeds out of a total of 10 seeds in this sample.

These results give a clear indication of the effectiveness of the use of a nucleus solution to accelerate the growth of the ring plant and this will accelerate the growth of other plants and help make the soil more fertile.

As shown in Table 8, salinity is reduced by the solution (date nuclei) where the reading refers to ppm445 using a salinity measurement device, compared with salinity of 624ppm in the water sample.

Table (9) shows that the solution (date nuclei) contributed to the reduction of salinity of the soil where the reference to

ppm691, after mixing together to determine the effect of the solution on the soil, compared to the salinity ratio reached ppm878 in the water mixture with the soil. This confirms the effective use of the solution (date nuclei) in reducing soil salinity which is a factor affecting the growth of various plants .

To answer the second question, Table (8) shows that the dissolved oxygen in the date nucleus was 6 PPM (mg / L) compared with 1 PPM (mg / L) in water after applying the oxygen protocol melted.

In Table (9), it was found in the mixture of (date nuclei) with the soil PPM (mg / L) 12, compared with PPM (mg / L) 8 in the water mixture with the soil, confirming that the solution (date nuclei) A suitable oxygen that helps the growth of beneficial bacteria that stabilize the nitrogen in the soil, which is very important element of plant growth where nitrogen also enters the synthesis of chlorophyll as well as the formation of amino acids. Musallat, Muwafaq and Saleh, Saad (2017

To answer the third question: official statistics indicate that the number of palm trees in the Sultanate of Oman is about 8 million palm trees, making this tree of economic importance Ministry of Agriculture and Fisheries (2017).

And this is recommended by this study to contribute to the exploitation of all components palm dates and available in a large extent in the Sultanate of Oman.

Conclusion:

The results of this study were investigated to determine the effect of using the nucleus of dates in accelerating the growth of the ring plant. The results of the study confirmed its effectiveness. Higher growth rates were achieved in the plants that were irrigated with the date kernel solution. Which in turn helps to provide the conditions for the growth of beneficial bacteria to stabilize nitrogen in the soil, which helps the plant to accelerate its growth.

And that the solution of the nucleus of dates contributes to reduce the salinity of the soil and provide appropriate values of acidity for the growth of plants, these conclusions lead us to further research and investigation to study the possibility of utilizing the kernel dates and available in our environment in large quantities and converted into a product that contributes to the growth of different plants

and soil reclamation and contribute economically to provide other income income of the Sultanate of Oman.

Thanks and appreciation:

Praise be to Allah. Praise be to Allah. We pray and acknowledge the best of His creation, our master Muhammad and his family and companions.

We would like to thank him, and to extend his appreciation to all those who have had a light that will illuminate our way to complete this research, namely:

1 - Professor Ntrahh Harthiya coordinated national program GLOBE, and Dr. Osman Balushi, head of the local team of the program in the province to allow them to be part of the system of research and investigation in this program purpose.

2 - Management of the school under the leadership of Mr. Al-Fadil Ali Al-Zahab, principal of the school, to provide all the material and moral possibilities to complete the research.

3 - Professors Professors supervising the program in the province, and guidance and guidance and technical guidance.

4 - Professor Imad Al-Hitroushi teacher supervisor of this research, the GLOBE program in the school where we have been good for us in the application of protocols to reach the results of this research.

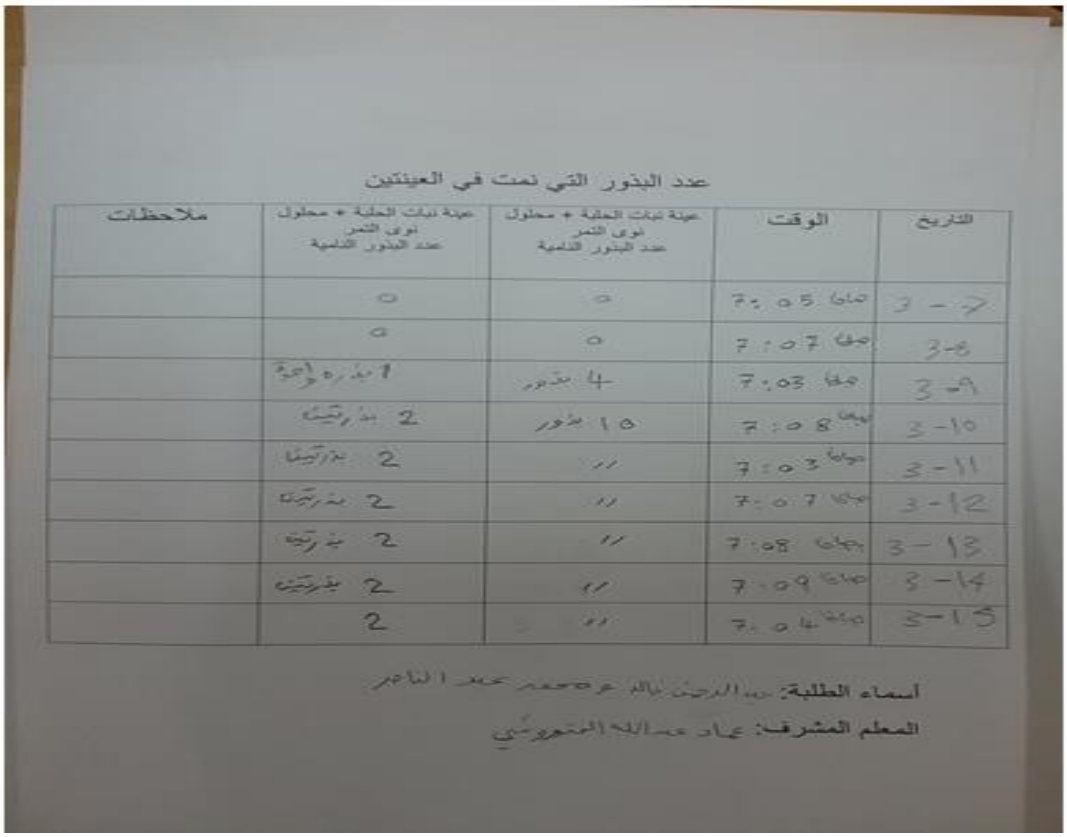
Thank you very much to all of them.

References:

1- Ministry of Education (2018) **Book of Sciences for the eighth grade** (1). Sultanate of Oman: International Printing Press.
2- Ministry of Agriculture and Fisheries (2017). **The annual book of date production in the Sultanate of Oman**. Sultanate of Oman: International Printing Press.
3 - Musallat, Muwafaq, Saleh, Saad (2017). Effect of fertilization on date palm wastes in some growth and cucumber traits under the protected environment. **Anbar Journal of Agricultural Sciences**, 15 (1), 181-190.

4. Wikipedia. Retrieved on 24/2/2019 From **https://ar.w.ikipedia.org**

Supplements:



عدد البذور التي نمت في العينتين

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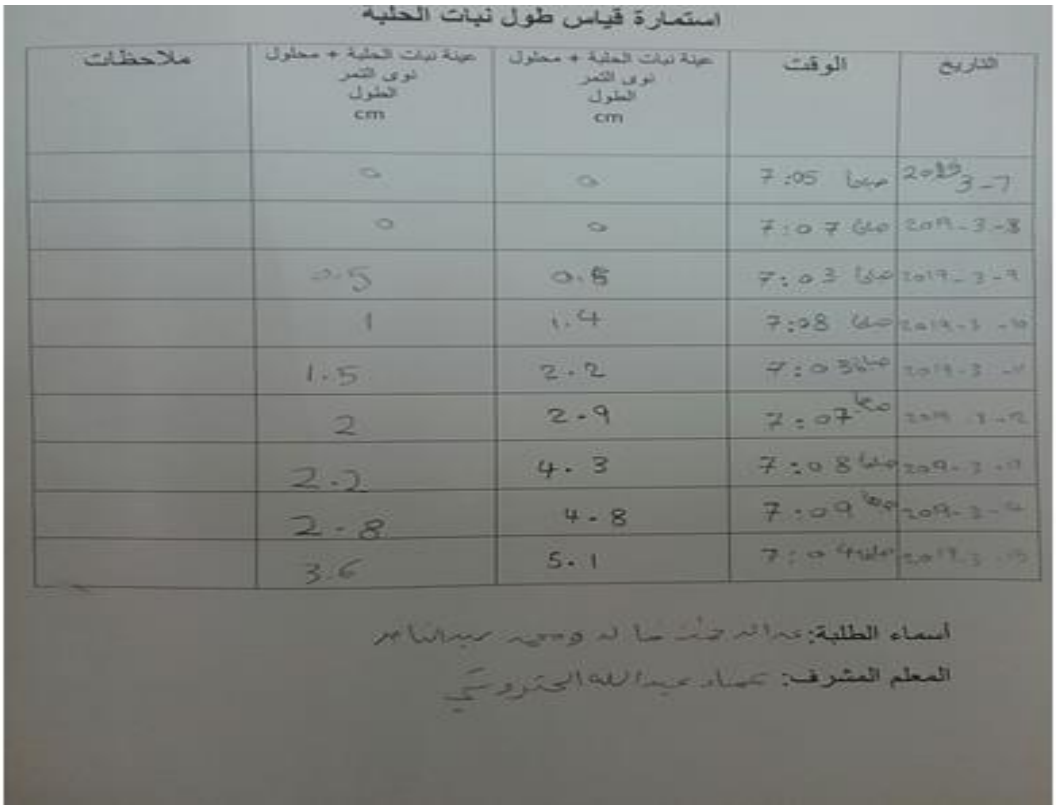
3-8	7:07 صباحا	0	0	
3-9	7:03 صباحا	4 بذور	1 بذرة واحدة	
3-10	7:08 صباحا	10 بذور	2 بذرتين	
3-11	7:03 صباحا	//	2 بذرتين	
3-12	7:07 صباحا	//	2 بذرتين	
3-13	7:08 صباحا	//	2 بذرتين	
3-14	7:09 صباحا	//	2 بذرتين	
3-15	7:04 صباحا	//	2	

أسماء الطلبة: عبد الرحمن نائل عرموش محمد الناصر

المعلم المشرف: عماد عبد الله المتوري



استمارة قياس طول نبات الحلبة

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2019-3-11	7:03 صباحا	2.2	1.5	
2019-3-12	7:07 صباحا	2.9	2	
2019-3-13	7:08 صباحا	4.3	2.2	
2019-3-14	7:09 صباحا	4.8	2.8	
2019-3-15	7:04 صباحا	5.1	3.6	

أسماء الطلبة: عبد الرحمن نائل عرموش محمد الناصر

المعلم المشرف: عماد عبد الله المتوري