Sultanate of Oman

Ministry of Education

Umm Al Hakam bint Al Zubair School for Basic Education (1-10)



White Algae Causes & Effects on The Properties of Quraiyat Falajes



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Table of Contents

Page No.	Subject			
3	Abstract			
4	Scientific Terms			
4	Research Questions			
4	Introduction & Review of Literature			
4-5	Methodology			
6	Study Site			
7	Data collection & Analysis			
8-17	Results			
17	Discussion			
18	Conclusion			
19	Acknowledgment			
19	References			

Abstract:

This research aims to study white algae causes & effects on the properties of Quraiyat falajes in order to answer the following questions:

Research Questions:

- 1. What are the reasons of the emergence of white algae in Al-Saih and Al-Jezeer falajes in Quraiyat?
- 2. What are the properties of water before and after treating white algae in the affected flajes?

This study was implemented in Quraiyat. Measurements of the coordinates from the site were taken and examinations of samples of the falajes. Examiners compared the properties of water before and after treating white algae by applying water protocol. Results showed that the salinity, acidity and conductivity ratio are high before treatment.

Coordination was done with the specialists of Center for Marine Research and Fisheries to visit the site of the affected falajes. Samples of algae were taken and tested. Results showed that the type of the affected algae is chlorophyte. In addition, it showed presence of blue-green algae from anabena type in very large quantities. It is worth mentioning that this type is considered to be toxic and harms living organisms, which explains the reason behind algae being stained white (Appendix 1).

An interview was done with Abdullah Al-Furi, to identify the reasons of such type of algae emergence. Due to the contamination of water with the remains of dead animals, and the dam has not been opened for almost a year, the water has become stagnat.

The recommendations that has been reached are the necessity of conducting a periodic examination of water falajes, addressing the competent authorities to treat this type of toxic algae, and educating the citizens not to drink and get shower in the affected falajes due to the high percentage of salts in them which affect their health.

Scientific Terms:

Algae: primitive plants that live in soil, water and swamps, and are considered to be among the oldest plants. (Haddad, Khaled. 2006)

Blue-green algae: prokaryotic bacterial organisms capable of fixing nitrogen. (Bonnie. 1998)

Anabena: A type of bacterium that converts nitrogen to ammonia and turns green

algae to white (Mahmoud, Mohamed, and Fahmy. 2009)

Research Questions:

- 1. What are the reasons of the emergence of white algae in Al-Saih and Al-Jezeer falajes in Quraiyat?
- 2. What are the properties of water before and after treating white algae in the affected flajes?

Introduction & Review of Literature:

Flajes in the Sultanate of Oman were considered as a main source for crops irrigation in the past. This unique water system has achieved the prosperity of agriculture; Therefore, Royal Decree No. 39/2007 has been issued specially for regulating and protecting falajes.

It was necessary to search and investigate to find out the reasons of the algae being stained white. Interviews with specialists were done regarding this field and it has been pointed out that the reason of such algae presence is the dead organisms fallen in the dam water. Gases in the water decay these animals' bodies. Therefore, Wadi Deiqa is a nutrition source for Al-Seih and Al-Jazeea falajes which, as a result, leads to the formation of blue-green algae of the anabena, a type of cyanobacteria that abound in fresh water. This causes algae being stained white.

We concluded that water can be classified based on the presence of algae in it. When the blue-green algae become prevalent, this indicates the saturation of water with organics. One of the factors that contribute to the prosperity of this type of algae in the water is the availability of nutrients such as phosphorous and nitrogen (Gudrun.2010).

Methodology:

First: The research plan:

- 1. Selecting a research problem.
- 2. Coordinating with Center for Marine Research and Fisheries of Muscat.
- 3. Interviewing Abdullah Al-Furi.
- 4. Applying water protocol and take measurements
- 5. Comparing the results, analyzing them graphically using Excel program and writing recommendations.

The timeline for conducting the research was as follows:

Period of Time	Task
September	Selecting a research problem, designing a period of time for the research, dividing the tasks and coordinating with the staff of Center for Marine Research and Fisheries
October	Coordinating with the General Directorate of Regional Municipalities and Water Resources in Muscat Governorate to test the samples from Al-Saih and Al-Jazeer falajes, and the dam's water
September & November	Applying water protocol in the study sites
January	Interviewing Abdullah Al Furi, analyzing data and writing recommendations
February	Writing, proofreading and presenting the reaserch

Table (1): The timeline for conducting the research

Dividing the roles among the research team according to preparing tools and field application:

Students	Task
Noof & Alathra	Writing the research problem clearly, specifying the required tools
	and preparing them
Noof & Ritaj	Data collection and analysis through applying the planned protocols
	inside and outside the school, and entering data in the website
All	Writing results through the collected data, summary and the research
Tak	(2). Dividing the releasement the response toom

Table (2): Dividing the roles among the research team

Study Site:

The research plan was implemented in (Sultanate of Oman – Muscat Governorate), Quraiyat, Al Mazari village, September, hot weather (42 C), by applying water protocol.

September, Hot weather (42 $^{\circ}$ C), and by applying the water protocol.

The maps below show this geographical area:

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Data collection & Analysis:

An official address to Center for Marine Research and Fisheries to visit the site and take samples from the falajes and do an interview with Ms. Ahlam Al Kharousi. Acidity was measured. It was 7.8.



Pictures of the specialists of the Center taking samples from the falajes





An interview with Mr. Abdullah was conducted to coordinate with the General Directorate of Regional Municipalities and Water Resources to examine samples from the falajes and the water's dam and compare between their characteristics.

Results:

Results reached through this research are indicated in the following report:

بناءاً على البلاغ الوارد لمركز العلوم البحرية والسمكية من مدرسة أم الحكم للتعليم الإساسي بقرية المزارع الواقعة بولاية قريات، حول موضوع تضرر بعض القاطنين بالقرية من از دهار الطحالب في بعض الأفلاج بشكل كبير وتصبغ بعضها باللون الأبيض؛ وتعرض بعض الأطفال بالحساسية الجلدية وظهور الحبوب على الجلد وذلك أثناء السباحة في الأفلاج المذكورة أعلاه، على ضوء ذلك تحرك فريق من المركز للمعاينة الميدانية، وتم مقابلة أحد المعلمات القاطنات بالمنطقة وكذلك مع أحد العاملين في تلك الأفلاج، اتضح أن هذه المشكلة قد ظهرت منذ شهر تقريباً، وصاحبها ظهور رائحة شديدة ولكنها بدأت بالإنخفاض تدريجياً. وعند المعاينة، لم يكن للرائحة وجود ، أما بالنسبة لإنتشار الطحالب فقد كان كثيفاً في أفلاج قريتي السيح و الجزير، أما فلج قرية الغبيرة والتي تقع في وسط قريتي السيح والجزير، فلم نلاحظ از دهار لهذه الطحالب فيها . وقد قام الفريق بأخذ عينات من الماء والطحالب، وتم قياس نسبة الحموضة ووجدت أنها متعادلة (7-8). و تم أخذ بعض الصور للأفلاج المتضررة وصور الطحالب . ثم قام الفريق بزيارة سد وادي ضيقة وهو المصدر المغذي لمياه الأفلاج في المنطقة وتم مقابلة أحد العاملين بالسد من أجل السماح لنا بمعاينة السد وأخذ عينة ماء منه ، ولم يلاحظ أى تواجد لهذه الطحالب كذلك وكان معدل الحموضة متعادل (7). وقد قام المختصون بقسم البيئة البحرية وعلوم المحيطات بتحليل عينات الطحالب والتعرف على الأنواع و أوضحت النتائج أن نوع الطحالب المتضررة هي مجموعة كلورفايت، كما أتضح تواجد الطحالب الخضراء المزرقة من نوع Anabaena sp. بكميات كبيرة جدا ، مع العلم أن هذا النوع يعتبر من الأنواع السامة جدا والتي لها أضرار كبيرة على صحة الأنسان و الحيوان، و يرجح هذا النوع كان السبب وراء تصبغ الطحالب باللون الأبيض. أما بالنسبة لتحاليل الماء للكشف عن مستويات العناصر الكيميائية وأنواع البكتيريا و الفطريات فلم يتمكن المختصون بإجراءها نظرا لعدم توفر الأجهزة اللازمة ا

Appendix (1): A report of testing water samples from Center for Marine Research and Fisheries ensures the problem and that drinking and bathing are not allowed

properties of water after	properties of water before	Sample of Al Saih falaj
treating	treating	
25	25	Temperature
6.48	9.49	(PH) Acidity
248ppm	565ppm	Salty
307us	1011us	Conductivity

First: properties of Al Saih falaj water before and after treating

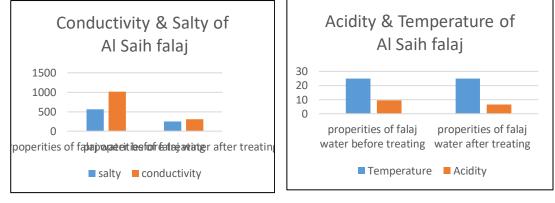


Table (3): Data of Al Saih falaj water

Diagram (1): proprieties of Al Saih falaj water

First: properities of Al Jazeer falaj water before and after treating

properties of water before	Sample of Al jazeer falaj
treating	
25	Temperature
11.2	(PH) Acidity
751ppm	Salty
870us	Conductivity
	treating 25 11.2 751ppm

Table (3): Data of Al Jazeer falaj water

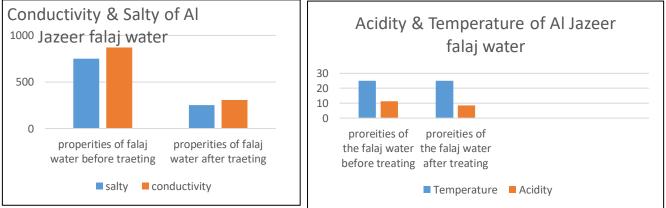


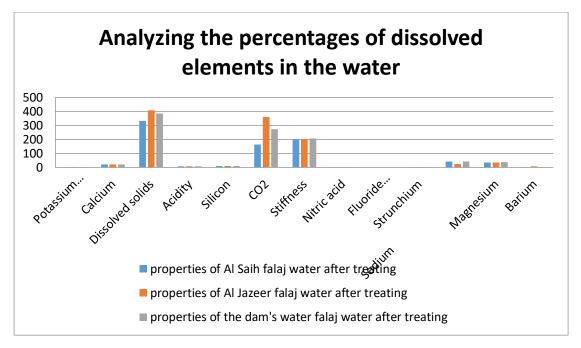
Diagram (2): proprieties of Al Jazeer falaj water

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water falaj water after treatingwater after treatingwater after treatingpercentage of water presence3.14mg/l3.13 mg/l3.07mg/l-21.25mg/l20.86mg/l20.83mg/l-	properties of	properties of	properties of Al	The	elements and
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0.09mg/l 0.08mg/l 0.09mg/l 0.7 Barium 4.34mg/l 4.29mg/l 4.24mg/l 0.7 Barium 224mg/l 134.00mg/l 00 296.00mg/l Alkalinity 60mg/l 62.67mg/l 59.54mg/l 600 Chloride 73.08mg/l 70.82 mg/l 71.07mg/l 400 Sulfate 4.34mg/l 5.50mg/l 4.58mg/l 50 Nitrates	41.84mg/l	42.07mg/l	23.89mg/l	400	Sodium
4.34mg/l 4.29mg/l 4.24mg/l Silicon 224mg/l 134.00mg/l 00 296.00mg/l Alkalinity 60mg/l 62.67mg/l 59.54mg/l 600 Chloride 73.08mg/l 70.82 mg/l 71.07mg/l 400 Sulfate 4.34mg/l 5.50mg/l 4.58mg/l 50 Nitrates	36.78mg/l	35.99mg/l	36.14mg/l	150	Magnesium
224mg/l 134.00mg/l 00 296.00mg/l Alkalinity 60mg/l 62.67mg/l 59.54mg/l 600 Chloride 73.08mg/l 70.82 mg/l 71.07mg/l 400 Sulfate 4.34mg/l 5.50mg/l 4.58mg/l 50 Nitrates	0.09mg/l	0.08mg/l	0.09mg/l	0.7	Barium
60mg/l 62.67mg/l 59.54mg/l 600 Chloride 73.08mg/l 70.82 mg/l 71.07mg/l 400 Sulfate 4.34mg/l 5.50mg/l 4.58mg/l 50 Nitrates	4.34mg/l	4.29mg/l	4.24mg/l		Silicon
73.08mg/l 70.82 mg/l 71.07mg/l 400 Sulfate 4.34mg/l 5.50mg/l 4.58mg/l 50 Nitrates	224mg/l	134.00mg/100	296.00mg/l		Alkalinity
4.34mg/l 5.50mg/l 4.58mg/l 50 Nitrates	60mg/l	62.67mg/l	59.54mg/l	600	Chloride
	73.08mg/l	70.82 mg/l	71.07mg/l	400	Sulfate
574 us/cm 569.00 us/cm 570.00us/cm Conductivity	4.34mg/l	5.50mg/l	4.58mg/l	50	Nitrates
	574 us/cm	569.00 us/cm	570.00us/cm		Conductivity

Third: A comparison of the results of Al Saih and Al Jazeer falajes, and the dam's water

 Table (5): properties of water samples in dams' laboratories





Parameter	Result	Specification	Parameter	Result	Constantion
Pottasium	3.07 mg/l		Sodium	23.89 mg/l	Specification Max. 400
Calcium	20.83 mg/l		Megnasium	36.14 mg/l	Max. 150
Theoretical TDS	407.82 mg/l	Max. 1000	Barium	0.09 mg/l	Max. 0.7
pH	8.69	Min. 6.5 Max. 9.0	Silicon	4.24 mg/l	Max. U.7
Silicon as SIO2	8.92 mg/l		Total Alkalinity	296.00 mg/l	
Bicarbonate	361.12 mg/l		Chloride	59.54 mg/l	
Total hardness as	202.65 mg/l	Max. 500	Sulphate	the second s	Max. 600
Nitrate (N)	1.03 mg/l	Max. 11.29	Nitrate as NO3	71.07 mg/l	Max. 400
Fluoride	0.00 mg/l	Max. 1.5	Conductivity	4.58 mg/l	Max. 50
Strontium (Sr)	0.49 mg/l		Conductivity	570.00 µS/cm	

Appendix (2): A report of properties of Al Jazeer falaj water

Water Assessment Department

Customer email Specifications

Max_levelDrinkWater

ANALYTICAL RESULTS

Parameter	Result	Specification	Parameter	41.84 mg/l	Max. 400
Pottasium	3.14 mg/l		Magnasium	36.78 mg/l	Max. 150
Calcium	21.25 mg/l		Barium	Ngm 00.0	Max. 0.7
	385.23 mg/	Max. 1000		4.34 mg/l	
pH	8.65	Min. 6.5 Max. 9.0	Silicon Total Alkalinity	224.00 mg/l	
Silicon as SiO2	9.13 mg/l			60.04 mg/l	Max. 600
Bicarbonate	273.28 mg/l		Chloride	73.08 mg/l	Max. 400
Total hardness as	206.38 mg/l	Max. 500	Sulphate	4.34 mg/l	Max. 50
Nitrate (N)	0.98 mg/l	Max. 11.29	Nitrate as NO3	574.00 µS/cm	
Fluoride	0.00 mg/l	Max. 1.5	Conductivity	1 or more participant	
Strontium (Sr)	0.51 mg/l		_		
			dard 8/ 2012 (for M S.)	in an I mark O	CI LIA

Appendix (2): A report of properties of the dam's water

			ICAL RESULT	×	
Parameter	Result	Specification	Parameter	Result	Specification
Pottasium	3.13 mg/l		Sodium	42.07 mg/l	Max. 400
Calcium	20.86 mgA		Magnasium	35.99 mg/l	Мак. 150
Theoretical TDS	332.69 mg/l	Max. 1000	Barium	0.08 mg/l	Max. 0.7
pH	8.72	Min. 6.5 Max. 9.0	Silicon	4.29 mg/l	
Silicon as SiO2	9.02 mg/l		Total Alkalinity	134.00 mg/l	1
Bicarbonate	163.48 mg/l		Chloride	62.67 mg/l	Max. 600
Total hardness as	202.11 mg/l	Max. 500	Sulphate	70.82 mg/l	Max. 400
Nitrate (N)	1.24 mg/l	Max. 11.29	Nitrate as NO3	5.50 mg/l	Max. 50
Fluoride	0.00 mg/l	Max. 1.5	Conductivity	569.00 µS/cm	
Strontium (Sr)	0.49 mg/l				-

Appendix (4): Properties of Al Saih falaj water

First: Data of Al Saih falaj water before treating

The GLOBE Program Science Data Entry	The GLOBE Program Science Data Entry	The GLOBE Program Science Data Entry
Water - Expand/Collapse X Remove	Um alhaliam bint alzubair patiic school / alceeh talaj / Integrated Hydrology	Salinity methods
Tansparency	Integrated Hydrology	Hydrometer Samples
Secchi Disk Test 1	Measured at date and time (24hr)	Hydrometer Samples
Secchi Disk reaches the bottom and does not disappear.	2019-09-23 I 04:00 O	1
to water surface	OUTC Get Current UTC Time	Temp. of water sample in 500mL tube
depth to the bottom of the water site *	Your UTC time converted to Local (+04) time is 2019-09-23 08:00	35 °C
0.50 m	Water body state	Specific Gravity
Add	Normal State	Salinity 0.565 ppt
Transparency Tube Test 1		
120 cm		Add
		n 🧉 : 👻

The GLOBE Program Science Data Entry	C XYT B O GOTTA OMANTEL II. The GLOBE Program Science Data Entry	The GLOBE Program Science Data Entry
* indicates required sections or fields	pH - Expand/Collapse X Remove	Conductivity of standard
U Air - Expand/Collapse X Remove	Measured with: pH Meter *	1011 µ8/om
Temperature	pH Paper	1*
Current Temperature	pH Meter	Conductivity
39.2 °C	1	1011 µS/om
Comments	pH 9.49	Commenta
- Expand/Collapse X Remove Relative Humidity	Add Value of buffers used © pH 4	- Expand/Collepse ¥ Remove Salinity
↑ ₺ ? ⊕	♠ & ? ⊕	A & ? (0)

Second: Data of Al Saih falaj water after treating

The GLC	DBE Program Data Entry		(m) 291 b (p)	The GLOBE Pr Science Data	ogram	OMANTEL IN	Con XVE D		The GLOBE Science Da	Program	
Data Entry Home / Um alhakam bint alzubi alceeh falaj / Integrate		1.7	• Wate Transpa	er - Expand/C arency	ollapse	X Remove	manu mode		er		
Integrate	d Hydro	logy					Salinit	y met	hods		
Measured at da	te and time	2	Secchi Di	sk Test 1)	lydromete	r Sample	s
(24hr)	1.00	•	Distance f	rom observer to	····				Titration S	Samples	
2019-11-17			Sec	chi Disk reache	s the bo	ttom and	Hydro	mete	r Samples		
04:00	O		does n	ot disappear.			y an a				
O UTC Get	Current UTC	2 Time	to water s	urface			1				
Your UTC time of	converted to	Local	0.20		m	1.00					
(+04) time is 201			depth to th	ne bottom of th	e water s	site *			f water san		
Water body stat	te		0.50		m		2	5		°C	
Normal State	9						Sp	ecific	Gravity		
	5. 					Add	Sa	linity	0.248		ppt
	0000	000	Transpare	ncy Tube Test	1						Remove
A 4	?		A	4	?	•	1 1	A	8	?	۲

XVY B & ANY	The GLOBE Program Science Data Entry	C XVI B @ Alini The GLOBE Program Science Data Entry
😔 pH - Expand/Collapse 🗙 Remove	\Lambda Alkalinity 🚯 Nitrate	Expand/Collapse X Remove
Measured with: pH Meter *	*	Electrical Conductivity
pH Paper	* indicates required sections or fields	Temperature of water sample being
pH Meter	U Air - Expand/Collapse X Remove	tested
*	Temperature	25 °C
If salt added, conductivity	Current Temperature	Conductivity of standard
μS/cm	25 °C	307 μS/cm
Add Add	Comments	Conductivity 307 µS/cm
Ø pH 4 Ø pH 7 Ø pH 10 Comments		Add
♠ ቆ ? ⊕		🔒 🕯 ? ⊕

Third: Data of Al Jazeer falaj water before treating

Measured with: pH Meter	e GLOBE Program ience Data Entry
Measured with: pH Meter * pH Paper pH Paper secchi Disk Test 1 Distance from observer to secchi Disk reaches the bottom and does not disappear. If salt added, conductivity 0.20 m pH 11.2 0.50 m	alinity 🛞 Nitrate
pH Paper Secchi Disk Test 1 I Air 1* Distance from observer to Secchi Disk reaches the bottom and does not disappear. Image: Current Temperature If salt added, conductivity 0.20 m 25 PH 11.2 Add Add Comments	
pH Meter Distance from observer to Temperature 1* If salt added, conductivity If salt salt salt salt salt salt salt salt	quired sections or fields
1* If salt added, conductivity If s	Expand/Collapse X Remove
pH 11.2 0.20 m 25 Add Add Comments	ure
pH 11.2 depth to the bottom of the water site * 0.50 m Add Comments	rature
Add Add Comments	°C
0.50 m Add Comments	
Add	
PH 4 PH 7 PH 10 Transparency Tube Test 1	
Comments 120 cm	

The GLOBE Program Science Data Entry	COMANTEL III. The GLOBE Program Science Data Entry	The GLOBE Program Science Data Entry
Expand/Collapse X Remove	Salinity methods	Water - Expand/Collapse X Remove
Electrical Conductivity	Hydrometer Samples	Temperature
Temperature of water sample being	Titration Samples	Measured with: Probe *
tested	Hydrometer Samples	Alcohol-filled Thermometer
25 °C	1	Probe
Conductivity of standard	Temp. of water sample in 500mL tube	1*
870 µS/cm	25 °C	
1*	Specific Gravity	25 °C
Conductivity	Salinity 0.751 ppt	
870 µS/cm	Remove	Comments
Comments	Add	
♠ ₺ ? ⊕	A & ? 🐵	A & ? ⊕

Forth: Data of Al Jazeer falaj water after treating

The GLOBE Program Science Data Entry	The GLOBE Program Science Data Entry	The GLOBE Program Science Data Entry
Water - Expand/Collapse X Remove	Expand/Collapse X Remove	Salinity methods
Transparency	Salinity	Hydrometer Samples
	Tide Information	Titration Samples
Secchi Disk Test 1 Distance from observer to	Time of High or Low Tide before Salinity Measurement (24hr)	Hydrometer Samples
Secchi Disk reaches the bottom and does not disappear.	Time	-
to water surface	High Tide	Temp. of water sample in 500mL tube
0.20 m	Low Tide	25 °C
depth to the bottom of the water site *	Time of High or Low Tide after Salinity Measurement (24hr)	Specific Gravity
0.50 m	Time	Salinity 0.250 ppt
Add	High Tide	Remove
	Low Tide	
Transparency Tube Test 1	Location of tide	Add
120 cm		
♠ 🌡 ? 🌐	♠ & ? ◎	🔒 🕯 ? 🕀

Measured with: pH Meter*	The GLOBE Program Science Data Entry	The GLOBE Program Science Data Entry	The GLOBE Program Science Data Entry
Measured with: pr Meter Measured with: Probe* Temperature of water sample being tested 1 Alcohol-filled Thermometer 25 ℃ 1 Probe 1 1 if salt added, conductivity Temperature 25 ℃ pH 8.61 Add 307 µS/cm Value of buffers used Comments Comments 207 µS/cm Comments Add Add 307 µS/cm	pH - Expand/Collapse X Remove	1 Water - Expand/Collapse X Remove	Expand/Collapse X Remove
pH Meter Alcohol-filled Thermometer Temperature of water sample being tested 1* Probe 1* Probe 1* Probe 1* Probe 1* Imperature 1* Imperature 25 °C Add Value of buffers used © pH 4 © pH 7 Q H 4 © pH 7 Q H 4 PH 10 Comments	Measured with: pH Meter *	Temperature	Electrical Conductivity
1 Probe 25 °C If salt added, conductivity μS/cm 1 μB/cm μS/cm 25 °C Add Conductivity of standard 307 µS/cm Value of buffers used Comments Conductivity Op H 4 Op H 7 PH 10 Add Comments Add Comments Add	pH Paper	Measured with: Probe *	Temperature of water sample being
1 Probe If salt added, conductivity I µS/cm I PH 8.61 Image: Solution of the second of t	pH Meter	Alcohol-filled Thermometer	tested
If salt added, conductivity µS/cm µB 8.61 Imperature 25 °C Add Add Value of buffers used Comments ∅ pH 4 № pH 7 № pH 10 Comments Add	*	Probe	25 °C
μS/cm μS/cm μB (d) Temperature 25 *C Add Add Value of buffers used Add ∅ pH 4 ◊ pH 7 ∅ pH 7 ◊ pH 10 Comments Add		1*	Conductivity of standard
PH 8.61 Add Value of buffers used © pH 4 © pH 7 © pH 10 Comments Comments Add Comments	If salt added, conductivity	·	307 µS/cm
Add Value of buffers used © pH 4	μS/cm	Temperature	*
Add Comments Add 307 µS/cm ✓ pH 4 ♥ pH 7 ♥ pH 10 Comments Comments Comments Comments	pH 8.61	25 °C	1
Value of buffers used © pH 4 © pH 7 © pH 10 Comments Comments Comments Comments Comments Comments			Conductivity
Image: Second state Image: Second state Ima	Add	Add	307 µS/cm
Comments Comments	Value of buffers used	Comments	
Comments	🖸 pH 4 🛛 pH 7 💟 pH 10		Add
	Comments		
	A & ? @	🔺 £ ? @	A 1 ? @

The interview:

An interview was done with Head of the operation and maintenance section of Wadi Deiqa Dam. We concluded the following:

- The reasons of the white algae emergence is the interaction of melting the residues of dead animals into the water of the dam.
- The effect is simple. It causes itchy and sensitive skin. Warning has been done not to drink the water or bath in it.



• To solve the problem, a radical solution will be reached to eliminate the white algea. The dam was opened and we got rid of the stagnant water.

Another interview was done with a resident of Al-Saih village, Ali Al-Niri. He indicated that this phenomenon has started first in July at the first time of constructing Al-Saih falaj. He was one of the affected people from the falaj.

He recommended exploiting the dam by making a fountain as an attractive marketplace for tourists to renew the water and not to allow bacteria and parasites accumulate and multiply in it.

Discussion:

The first question was answered:

It was revealed through appendix (1) that Anabena algea was found in very large quantities in the falajes water. It is worth mentioning that it is a toxic species that has great harm to human and animal health.

The second question was answered:

It was found that the value of acidity, conductivity and salinity in the falajes is greater before treatment. This indicates the accumulation of organic materials, which contributed to the spread of more green blue algae of the type of Anabena and water properties were changed as shown in table (3) and (4) and the graph (1) and (2).

Laboratory results from the General Directorate of Regional Municipalities and Water Resources, as stated in table (5), the chart (3) and the appendices (2, 3 and 4) when testing the samples and comparing them: the characteristics of the falajes, and the dam's water were affected by the presence of the Anabena bacteria despite their treatment. This effect is represented in:

First: A decrease in the percentage of some elements and compounds, such as: Dissolved solids, nitric acid, fluoride, sulfate, chloride, sodium, magnesium and

17	

nitrate, which indicates that these elements are food for this type of algae.

Second: An increase in the percentage of some elements and compounds, such as: Alkalinity, acidity, conductivity, salinity and bicarbonate, which increase provided favorable conditions for the growth of this type of algae.

When comparing the three samples, it is concluded that the ratio of salinity, alkalinity, conductivity, elements, and compounds in the sample of Al Jazeera falaj water is greater. This indicates the presence and spread of blue-green algae of the anabena type in Al Jazeera falaj more. This is an evidence that the water in the falaj was saturated with organic materials which is confirmed by our results during applying the water protocol at the study site.

It has been observed that there has been a noticeable decline in the growth pattern with respect to the main isolation, intrinsic parasitism and induced mutations. Also, a decrease in the percentage of nitrogen-fixing vesicles was observed in conditions of saline stress. As for protein, an increase in the amount of protein was observed in conditions of salt stress as it helps the organism to resist salinity, while an increase in the production of beta-creatinoid dye that helps to withstand salinity has been observed along with its role in the absorption of the necessary radiation in the photosynthesis process. As for the pigments of Vicopleoprotein, a slight increase in its production has been observed to help with the tolerance of the salinity organism. Continuing awareness of farmers to monitor falajes cleaning should be done.

Conclusion:

We thank God for completing this research through which we recognized that the reasons of the white algea emergence in the falajes of the anabena type caused algae being stained white. In addition, the water protocol, testing samples in coordination with the General Directorate of Regional Municipalities and Water Resources as well as the laboratory of Center for Marine Research and Fisheries have contributed in conducting the research succefully. Intensive efforts should be made to educate people not to use water because of its drawbacks.

Sources of errors in the results of acidity, conductivity and salinity due to the different devices used in the school and the laboratory center. Strengths were obtaining vital results after examining the water in the laboratories center. Weaknesses were not giving the results of falajes water analysis before treatment and not stating the substances that were added to eliminate white algae. This research can be applied to the possibility of using blue-green algae to make biofuels.

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