An-Najah National University
Faculty of Agriculture & Veterinary Medicine
Plant Production and Protection

"Growing Beneficial Bacteria on Different Levels of Salinity"

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Introduction

There is several types of micro organisims, ones are can cause harm and others are beneficial as: EM1, Bacillus megaterium(BM) or Pseudomonas fluorescens (PF).

EM1

- Used to correct the balance between the good and the bad microorganisms.
- Have acid enzymes trace elements supplies.
- Brighter flower longer blooms.
- The product have longer shelf life and quality
- Help build stabile soil (Retain moisture reserves and recycle nutrients and less susceptible to erosion and compaction).
- Promote other beneficial microbes and worms which convert OM to usable source to plants.

- Reduces odors and accelerate the decomposition

Bacillus megaterium

- Rod-like, Gram-positive, aerobic spore forming bacterium found in widely diverse habitats.
- Grows at temperatures from 3 °C to 45 °C, with the optimum around 30 °C.
- potential agent for the biocontrol of plant diseases.
- Nitrogen fixation has been demonstrated in some strains.
- used for the production of pyruvate, vitamin B12, drugs with fungicidal and antiviral properties

Pseudomonas fluorescens

- Is a common Gram-negative, rod-shaped bacterium .
- Adapted towards living in the soil. Specifically, around the roots of various.
- They get nutrients and environmental protection from plants.. In exchange, they destroy harmful things to the plants. These things include toxins and pollutants, like TNT, styrene, and polycyclic aromatic hydrocarbons.

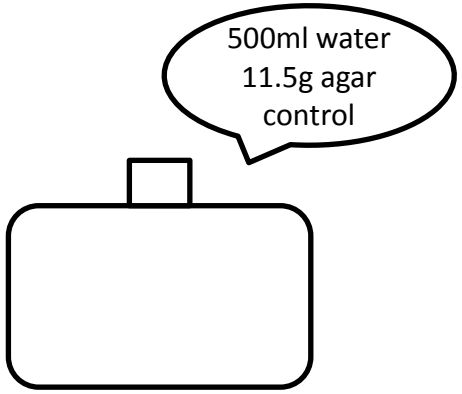
- Protect crops and their seeds and roots from organisms that would infect and destroy the crops.
- It can kill harmful bacteria and fungi by producing substances like antibiotics, which kill bacteria, and hydrogen cyanide, a poison

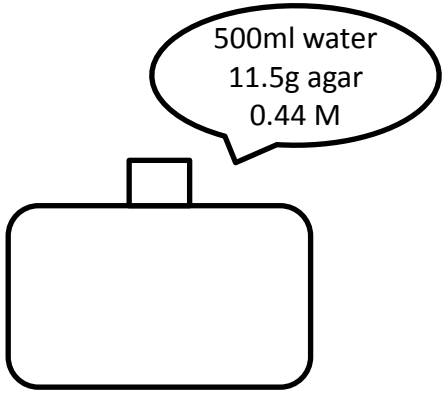
Materials and methods

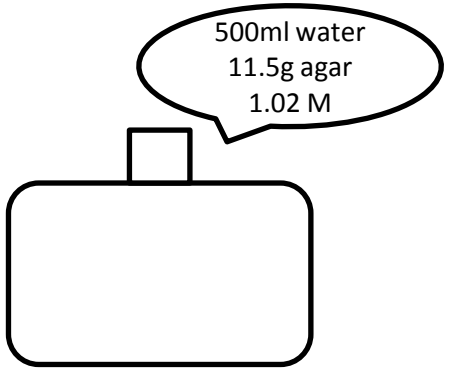
- Materials :

a. Distilled water
b. Nutrient agar,
c. Salts of weights 0 , 12.8 , 29.8 g .
d. Three types of bacteria
e. Three bottles

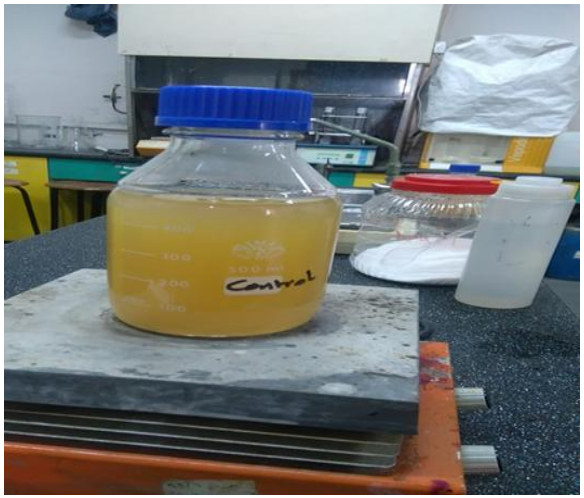
We dissolved the 500 ml of distilled water , 11.5g nutrient agar with three concentrations of salanity (0 , 35 , 70) ds/m in each bottle Sequentially .

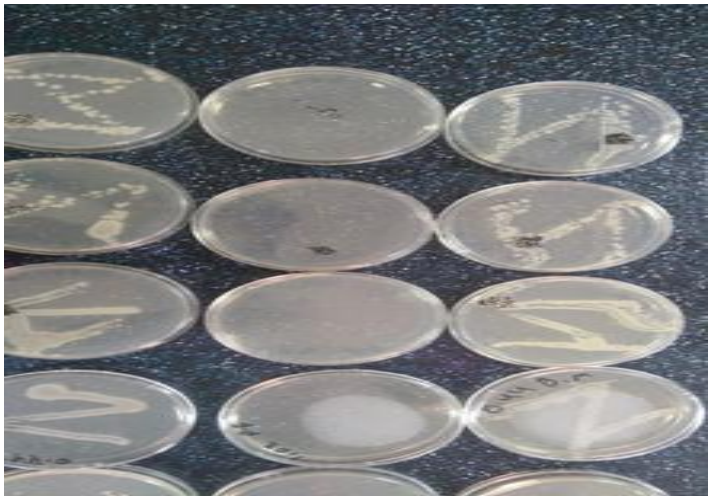






- We put the three samples on the magnatic stirrer for Mix order samples for one hour ,
  We poured the three samples into 63 plates .





- After the samples became solid , We planted the three types of bacteria and put them in incubater at 37C˚ ,
after 24h , we take the samples and count the numbers of colonies by “colony counter “ .

• *Materials and methods'2'*

- Materials :

a. distilled water
b. nutrient agar,
c. Salts of weights 0 , 12.8 , 29.8 g .
d. three types of bacteria
e. three bottles

- we dissolved the 500 ml of distilled water , 6.5 g nutrient agar with three concentrations of salanity (0 , 35 , 70) ds/m in each bottle Sequentially

- We put the three samples on the magnatic stirrer for Mix order samples for one hour ,
- We poured the three samples into 27 plates , , We planted the three types of bacteria and put them in incubater at 37C˚ ,

after 24h , we take the samples and count the numbers of colonies by “spectrophotometer Wave length 600nm”.

• *Results '1'*

Class Level Information		
Class	Levels	Values
treatment	3	0 1 2
bacteria	3	1 2 3
rep	7	1 2 3 4 5 6 7

Number of observations	63

- Analysis of variance for the effect of salinity on bacteria colony number .

Source	DF	Type I SS	Mean Square	F Value	Pr > F
rep	6	36302.222	6050.370	0.90	0.4993
treatment	2	979168.603	489584.302	73.23	<.0001
bacteria	2	1239408.794	619704.397	92.69	<.0001
treatment*bacteria	4	243102.349	60775.587	9.09	<.0001

- Mean separation for the effect of salinity on colony number.

Means with the same letter are not significantly different.			
t Grouping	Mean	N	treatment
A	373.76	21	0
B	245.90	21	1
C	69.67	21	2

Means with the same letter are not significantly different.			
t Grouping	Mean	N	bacteria
A	384.14	21	1
B	260.48	21	2
C	44.71	21	3

treatment	growth LSMEAN	LSMEAN Number
0	373.761905	1
1	245.904762	2
2	69.666667	3

Level of treatment	Level of bacteria	N	growth	
			Mean	Std Dev
0	1	7	591.714286	72.265054
0	2	7	412.571429	141.402330
0	3	7	117.000000	46.786750
1	1	7	387.571429	75.559815
1	2	7	333.285714	131.460659
1	3	7	16.857143	18.179004
2	1	7	173.142857	93.079587
2	2	7	35.571429	11.998016
2	3	7	0.285714	0.755929

- ***Results '2'***

Class Level Information		
Class	Levels	Values
Treatment	3	0 1 2
bacteria	3	1 2 3

Number of observations	27

- Analysis of variance for the effect of salinity on bacteria colony number .

Source	DF	Type I SS	Mean Square	F Value	Pr > F
Treatment	2	0.78010822	0.39005411	133.21	<.0001
bacteria	2	0.25172267	0.12586133	42.98	<.0001
Treatment*bacteria	4	0.43210578	0.10802644	36.89	<.0001

- Mean separation for the effect of salinity on number of colony

Means with the same letter are not significantly different.			
t Grouping	Mean	N	Treatment
A	0.47344	9	0
B	0.11733	9	1
B			
B	0.10856	9	2

Means with the same letter are not significantly different.			
t Grouping	Mean	N	bacteria
A	0.36956	9	1 BM
B	0.16956	9	2 PF
B			
B	0.16022	9	3 EM1

Treatment	bacteria	colony LSMEAN	LSMEAN Number
0	1	0.59500000	1
0	2	0.53466667	2
0	3	0.29066667	3
1	1	0.44533333	4
1	2	-0.11233333	5
1	3	0.01900000	6
2	1	0.06833333	7
2	2	0.08633333	8
2	3	0.17100000	9

Level of Treatment	Level of bacteria	N	colony	
			Mean	Std Dev
0	1	3	0.59500000	0.07979348
0	2	3	0.53466667	0.06678573
0	3	3	0.29066667	0.01350309
1	1	3	0.44533333	0.12297290
1	2	3	0.11233333	0.00404145
1	3	3	0.01900000	0.01039230
2	1	3	0.06833333	0.00208167
2	2	3	0.08633333	0.00416333
2	3	3	0.17100000	0.00871780

Conclusion

- We can use bacteria in salty soils as in Jericho as it.
- Withstand salt and beneficial to plants.
- Through experimentation and analysis, we recommend using Bacillus megaterium in salty soils