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CMI World Water Day Regional Youth Workshop on Water and Migration 2019



25-28 March 2019
Terres d'Amanar Resort,
Marrakesh, Morocco



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الكفاءة العملية في الإدارة المستدامة للمياه والصرف الصحي
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PGPRs and Phytoremediation Introduce New NEXUS Approach

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❖ I earned MERDC innovation project fellowships in 2014 , 2018 alternatively for :

• **2014- Innovation Initiative MSc. Thesis entitled:**

“Phytoremediation for treatment of brackish water in ground wells exist in Jericho districts”.

• **2018- Innovation Initiative Research Project entitled:**

“Phytoremediation & PGPRs for treatment of brackish water to mitigate climate change effect”.

Under processing

OUTLINE OF PRESENTATION:

1. RESEARCH BACKGROUND & PROBLEM
2. METHODOLOGY
3. RESULT AND DISCUSSION
4. CONCLUSION

1. RESEARCH PROBLEM:

- **WATER** : Already water is a scarce resource in many places » » » So it has to be managed or adapt new methods or addresses new legislation, or introducing new alternative water resources, or improved existing techniques.

DO YOU KNOW the Existing amount of brackish water In West Bank/ Jericho groundwater wells ranged from (12-18) million m³, **This is the key of the solution.... to utilize it**
BUT How???

- **FOOD**: Food scarcity issue , no adequate quantity livestock fodder, agriculture is already the biggest user of fresh water resources , limitation of Climate change techniques adaptation , absence of addressing new plant species RESIELANCE with climate change issues, Phytoremediation a method used to remediate water and land salt using tolerant plants. But **WHEN IT COMES TO HIGH SALINITY.. IT INHIBIT ITS ROLE???**

ENERGY : global challenges, desalination plants un sustainable solution, ---high cost , high energy water issues is having the energy needed to transport, treat or desalinate water resources



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2. METHODOLOGY

The research initiative implement **NEXUS** methodology, introducing

WATER, FOOD, ENERGY
pillars

Addressing non- conventional technique among

SUSTAINABLE DEVELOPEMNT
context.



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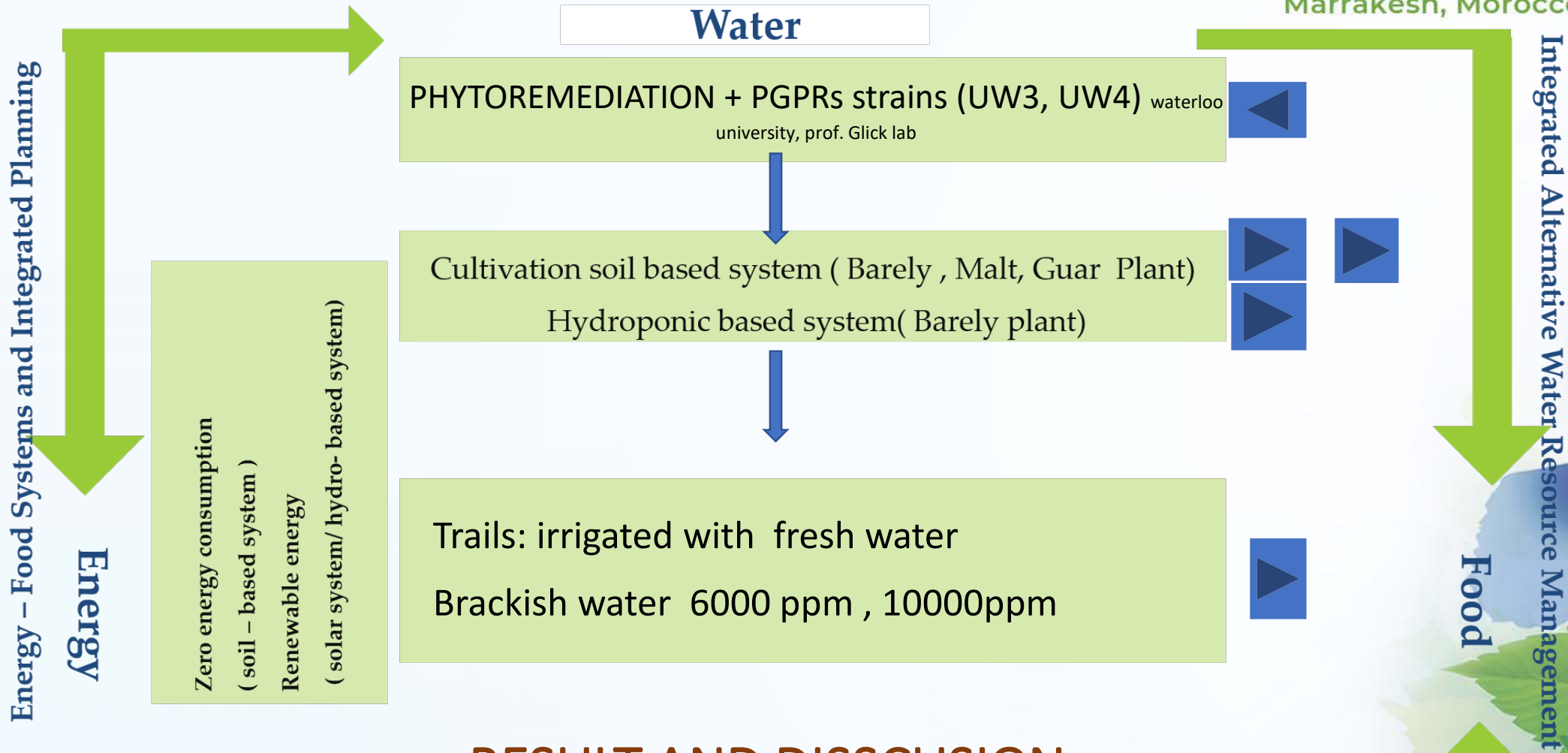


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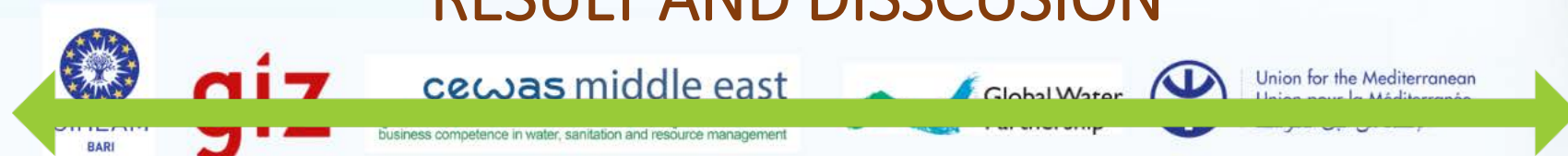


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RESULT AND DISSCUSION



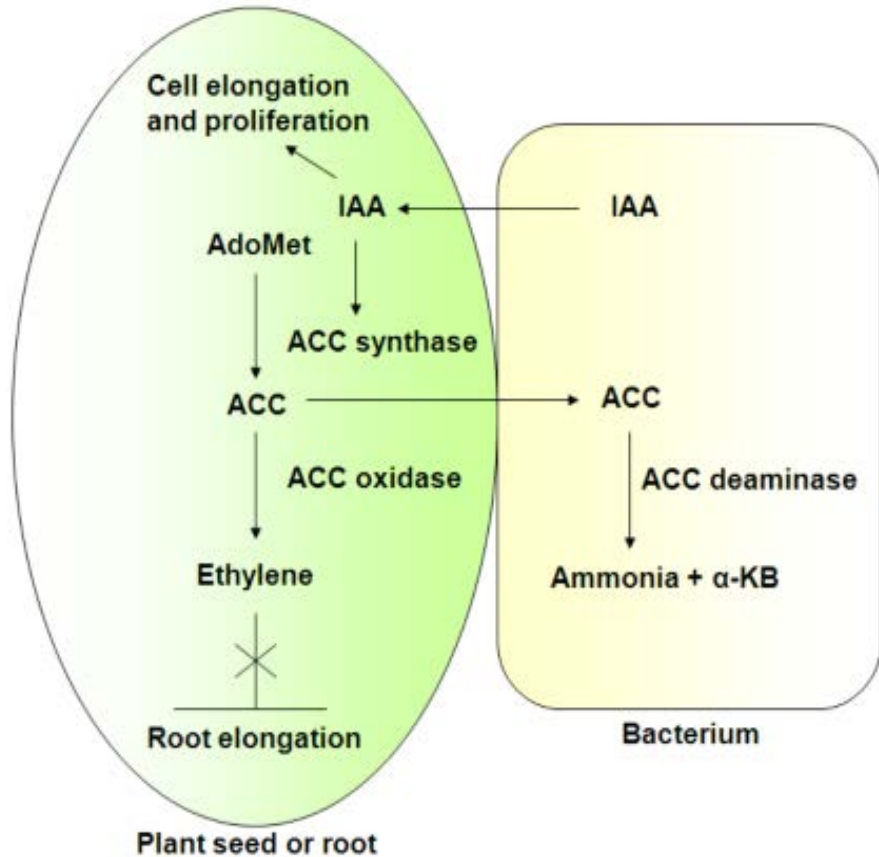
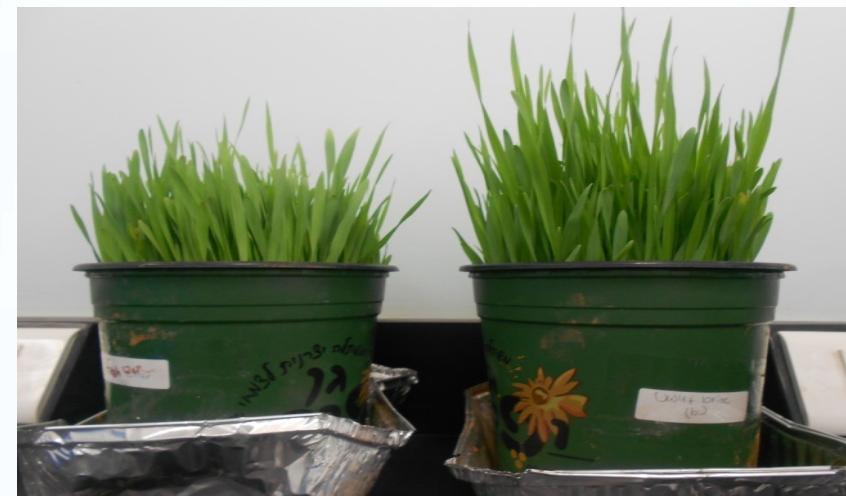
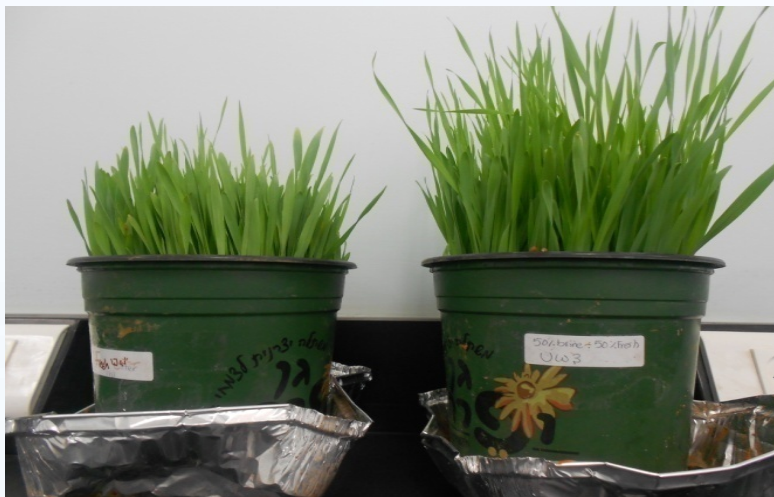


Figure 1. Schematic diagram of PGPR containing ACC deaminase lower the ethylene hormone, ACC (Glick et.al.. 1998).

Plant/ Trials Soil based Hydroponic	Control trials	Seeds pots germinated with UW3	Seeds pots germinated with UW4	Seeds pots germinated with UW3+UW4
Barely Plant	Irrigation with :	Irrigation with :	Irrigation with :	Irrigation with :
Malt Plant	-Fresh water	-Fresh water	-Fresh water	-Fresh water
Guar Plant	-6000 mg/L of brackish water	-6000 mg/L of brackish water	-6000 mg/L of brackish water	-6000 mg/L of brackish water
	-10000 mg/L of brackish water	-10000 mg/L of brackish water	-10000 mg/L of brackish water	-10000 mg/L of brackish water
	-10000 mg/L of brackish water	-10000 mg/L of brackish water	-10000 mg/L of brackish water	-10000 mg/L of brackish water

Figure 2. trials schemes

Bio-mass comparison between fresh and other trials :



Control Barely plant
Barely plant with

Trial	Fresh water	6000 mg/L of brackish water .	10000 mg/L of brackish water.
Control Barely plant	100%	8.98 %	150.08%
Barely plant treated with UW3	237.31%	249.40%	156.11%
Barely plant treated with UW4	156.11%	237.31%	288.83%
Barely plant treated with UW3 +UW4	128.12%	267.67%	288.56%

Guar Plant under implementation and analysis



Growth Habits:

Guar is an upright contain 35% of protein, coarse-growing summer annual legume known for its drought resistance. Its deep tap roots reach moisture deep below the soil surface. Most of the improved varieties of guar have glabrous (smooth, not hairy) leaves, stems and pods. Plants have single stems, fine branching or basal branching (depending on the variety) and grow to be 18 to 40 in.



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Conclusions

- Integrated NEXUS-livelihoods framework.
- Combines water–energy–food nexus and sustainable livelihoods approaches (Efficient techniques, climate change mitigation, friendly environmental solution, utilization of alternative water resources)
- Addressing SD goals and indicators in terms of affordable and clean energy, zero hunger, water resources , climate action ,innovation.
- Study the impact of water security on energy, food and environmental security. The effect of water scarcity and variability on these other spheres can be mitigated through social, economic and political actions.
- The implemented framework provides a tool for assessing environmental livelihood security.
- This methods can be carried at multiple spatial scales and institutional levels.
- Technique implemented and designed to enhance policy-making for sustainable development agendas.



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