



# ICI-Project “Enhancing Development of Water Use Efficient Crops and Production Methods to Dry and Saline Conditions”

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**<sup>1</sup>Egyptian Coordinator and Project PI, ARC, Egypt**

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## *Objective of the Finland-Egypt-Cooperation*

The overall objective of our project that: develop capacity of agricultural sector to improve water use efficiency in crop production on the newly reclaimed lands in Egypt.



# Plant Breeding and Genetics Program

## Program Objectives:

1. **Selecting genotypes and developing mapping populations.**
2. **Screening of the key characteristics in the field.**
3. **Screening of the DNA-markers in the alfalfa and faba bean breeding material.**
4. **Genetic analyses.**



## *Evaluation of 180 fababean families and two Parents at Harvest Stage at Ismailia-Governorate, Egypt (2014-2015)*





*Evaluation of 180 fababean families and two Parents under Sandy Soil and Saline Water at North Sinai-Governorate, Egypt (2015-2016)*





## *Evaluation of 180-families and its Parents under Sandy Soil, and Fresh Water at Ismailia-Governorate, Egypt (2015-2016)*





## *Evaluation of 6-Faba Bean Varieties under Sandy Soil and Saline Water at North Sinai-Governorate, Egypt (2014-2016)*

### Faba Bean Varieties:

1. **Misr-1**
2. **Sakha-1**
3. **Sakha-2**
4. **Sakha-3**
5. **Sakha-4**
6. **Kontu**

### No. Of Locations:

**6-Locations**



## *Distribution of Seeds on the Sites*







## *Evaluation of 6-Faba Bean Varieties under Sandy Soil and Saline Water at North Sinai-Governorate, Egypt (2014-2016)*





## *Evaluation of 200-Individual Plants of Alfalfa and its Parents*



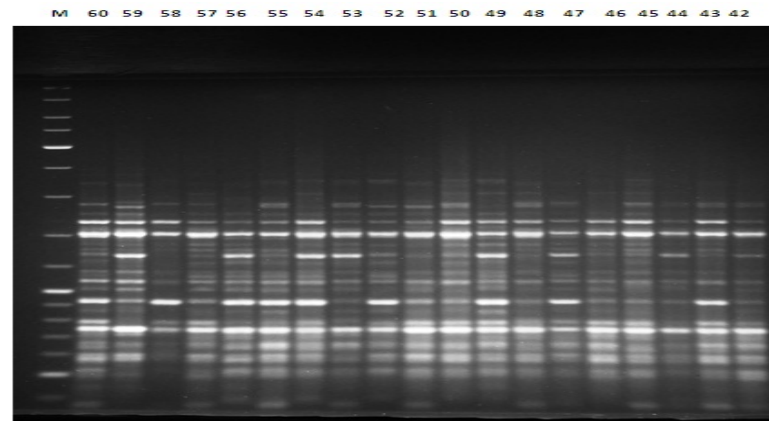


## *Evaluation of 200-Individual Plants of Alfalfa and its Parents*

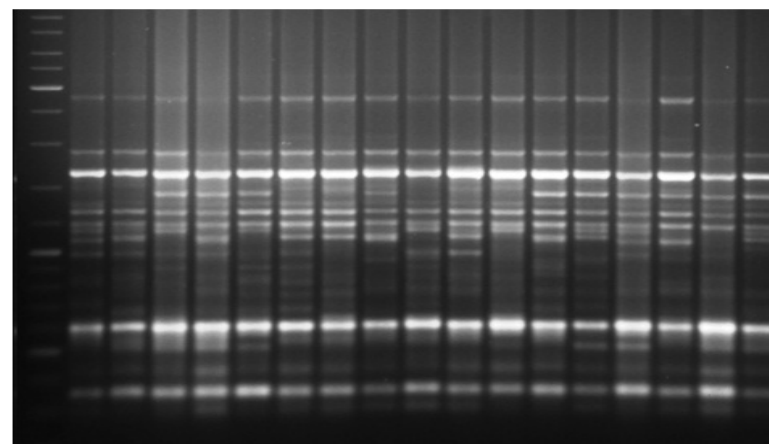




*PhD. Student: Marwa Ghonaim*  
*Extracting DNA and Doing PCR of Faba Bean*  
*(211 + 2 = 213 x 23-Primers = 4899 PCR Products). More than 234-Gels*



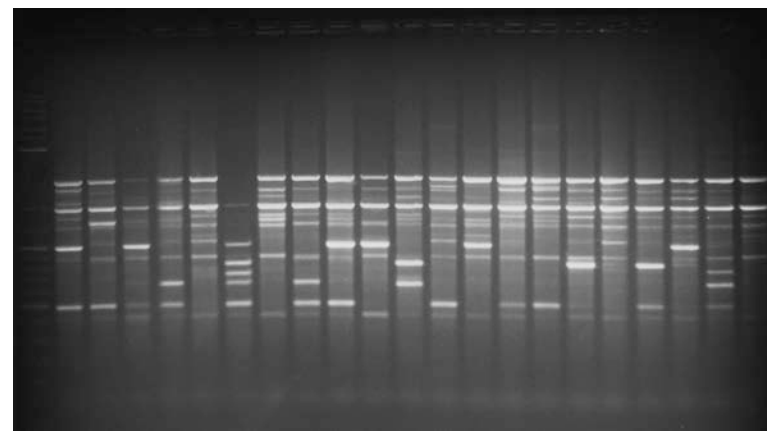
**iPBS-22229 Faba Bean**



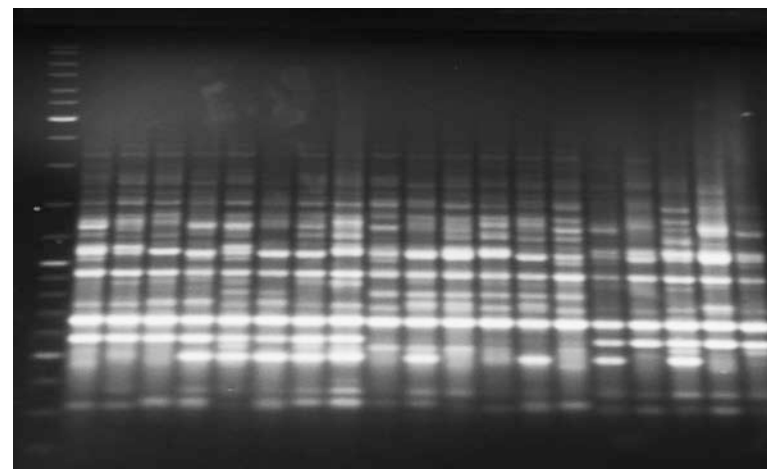
**iPBS-22224 Faba Bean**



*M.Sc. Student: Asmaa Abdel Ghany*  
*Extracting DNA of Alfalfa and Doing PCR of Alfalfa*  
*(200 + 2 = 202 x 11-Primers = 2222 PCR Products). More Than 101 Gels*



**IRAP-4366 Alfalfa**



**IPBS-2394 Alfalfa**



## *Summary of Plant Breeding and Genetics Program*

- 1. Established of 9-Field Experiments.**
- 2. Implementation of 7-Scientific Missions in Finland.**
- 3. Selecting genotypes and developing mapping populations.**
- 4. Screening of the key characteristics in the field.**
- 5. Screening of the DNA-markers.**
- 6. Genetic analyses.**
- 7. Implementation of 2-Seminars in Egypt.**
- 8. Implementation of 3-Workshops.**



## *Pyrolysis and Bio-char Systems Program*





## *46-Slow Pyrolysis Cycles were Done using Retort Machine*

Months	No. of Cycles	Months	No. of Cycles	Months	No. of Cycles	Months	No. of Cycles
01.2014	3	07.2014	4	01.2015	3	07.2015	1
02.2014	3	08.2014	1	02.2015	2	08.2015	1
03.2014	3	09.2014	1	03.2015	2	09.2015	1
04.2014	2	10.2014	1	04.2015	2	10.2015	1
05.2014	3	11.2014	2	05.2015	1	11.2015	1
06.2014	4	12.2014	2	06.2015	1	12.2015	1
<b>29-Cycles; 2014</b>				<b>17-Cycles; 2015</b>			





## *Used Materials*

- 1. Tomato Straw (*Solanum lycopersicum* L.) {15-Cycles}.**
- 2. Cantaloupe Straw (*Cucumis melo* L.) {10-Cycles}.**
- 3. Remnants of Date Palms (*Phoenix dactylifera*) {10-Cycles}.**
- 4. Remnants of Olive Trees (*Olea europaea*) {10-Cycles}.**
- 5. Tamarix (*Tamarix nilotica*) {1-Cycle}.**



## *Remnants of Olive Trees-Cycle*





## *Remnants of Date Palms-Cycle*





## *Tamarix-Cycle*





## *Result (4): Application of Bio-char in Field Experiment*



### Crops:

- 1. Alfalfa as a perennial crops**
- 2. Faba Bean as a winter season.**
- 3. Pearl Millet as summer season.**



# Treatments

<b>T1: Bio-char (1-kg/m<sup>2</sup>).</b>	<b>T9: T2 + 50% of T4</b>
<b>T2: Sheep and Goats Manure</b>	<b>T10: T2 + 25% of T4</b>
<b>T3: Bio-Fertilizers (Phosphorin, Potasin-P and Rizobacterin)</b>	<b>T11: T3 + 100% of T4</b>
<b>T4: Chemical Fertilizers (As Recommended Rates)</b>	<b>T12: T3 + 50% of T4</b>
<b>T5: T1 + 100% of T4</b>	<b>T13: T3 + 25% of T4</b>
<b>T6: T1 + 50% of T4</b>	<b>T14: T1 + T2</b>
<b>T7: T1 + 25% of T4</b>	<b>T15: T1 + T3</b>
<b>T8: T2 + 100% of T4</b>	<b>T16: T1 + T2 + T3</b>



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**ARC**  
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# *Field Experiments*





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## *Add of Bio-char (1 kg / m<sup>2</sup>)*







## *Add of Sheep and Goats Manure*





# *Treated the Seed by Bacterial Inoculant*



2013/12/21



# *Planting Seeds*





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# *Chemical Fertilizers*





# Alfalfa Experiment in Rummana





# *Germination Stage -1*





# *Alfalfa Experiment in Rummana*





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# *Alfalfa Experiment in Rummana*







# *Alfalfa Experiment in Rummana*





# *Alfalfa Experiment in Rummana*





## Yield (Forage Fresh Yield/0.42ha) and Ton Cost (preliminary results)

Treat.	FFY (T/f)	Treat.	FFY (T/f)	Treat.	T.C. (L.E)	Treat.	T.C. (L.E)
1	26.600	9	24.900	1	189.85	9	
2	28.200	10	25.200	2	147.16	10	172.62
3	8.900	11	13.600	3	297.75	11	253.68
4	13.800	12	11.800	4	242.75	12	258.47
5	27.200	13	10.700	5	215.07	13	239.50
6	26.500	14	33.500	6	205.66	14	198.51
7	27.000	15	22.400	7	194.44	15	229.91
8	25.600	16	40.200	8	193.36	16	167.91



## Net Profit / Fadden and Profit from Ton Production (preliminary results)

Treat.	N.P.F	Treat.	N.P.F	Treat.	P.T.P	Treat.	P.T.P
1	10.90	9	10.40	1	410.20	9	417.30
2	12.80	10	10.80	2	452.80	10	427.40
3	2.70	11	4.70	3	302.20	11	346.30
4	4.90	12	4.00	4	357.20	12	341.50
5	10.50	13	4.30	5	384.90	13	360.50
6	10.40	14	13.40	6	394.30	14	401.50
7	10.90	15	8.30	7	405.60	15	370.10
8	10.40	16	17.40	8	406.60	16	432.10



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## *Faba Bean Experiment in Rummana*





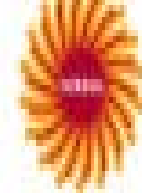
## *Pearl Millet Experiment in Rummana*





*The Product Liquid from Tomato Straw Is Best One as Herbicide, especially, on Field Bindweed (*Convolvulus arvensis*)*





# *Field Tests and Demonstrations with the SE Biodegradable Paper Mulch in Egypt-2013*







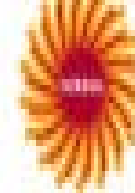
# *Field Tests and Demonstrations with the 3-Types of SE-Biodegradable Paper Mulch in Egypt-2013*



**Finland**

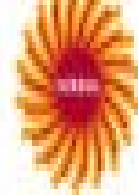


**Egypt**



# *Field Tests and Demonstrations with the SE Biodegradable Paper Mulch in Egypt-2013*





# *Field Tests and Demonstrations with the SE Biodegradable Paper Mulch in Egypt-2013*





# 3400-Fain Greenfain-Program

## GREENFAIN

**A BIODEGRADABLE WATER AGENT THAT REDUCES THE SURFACE TENSION OF IRRIGATION WATER. GREENFAIN IS A SAFE & ECO-FRIENDLY WAY TO SIGNIFICANTLY REDUCE WATER & ELECTRICITY CONSUMPTION, SAVING BOTH TIME & MONEY.**



### Benefits of GREENFAIN

- Irrigation water that has been treated with GREENFAIN is absorbed more rapidly and evenly into the soil. After the initial treatment, also untreated irrigation water and rainwater will penetrate the soil more efficiently, as the soil already contains active GREENFAIN molecules.
- Reduces the amount of required irrigation water by **30-65%**.
- Reduces the amount of required fertilizers and pesticides by **30-60%**.
- Increases the interval between required irrigation - saving water, time and energy.
- *GREENFAIN prevents erosion of the soil and helps the plants to protect themselves against the exposure to salty water.*
- *GREENFAIN is a biodegradable, fully recyclable additive, that prevents eutrophication.*
- *GREENFAIN doesn't harm or irritate the skin and is not harmful to any kind of micro-organism, plant or animal.*



### WHAT IS GREENFAIN?

GREENFAIN is an organic, fully biodegradable additive that eliminates the surface tension of water.

GREENFAIN saves irrigation water by at least 30% and up to 65% and can be used in any kind of area where water is needed and used in large quantities.

It is classified according to Euregulations (REACH) and global regulations (GHS).

GREENFAIN has been used and tested since 2001 with scientific backing from The University of Tampere in Finland, and it has also been successfully proven on the fields in such diverse climates as Scandinavia, Kenya, Indonesia, United Arab Emirates, among others.



### WHERE TO USE GREENFAIN?

- Plantations, greenhouses, agricultural institutions and fields
- Golf courses, football fields, sports arenas and any grass fields including transfer grass
- Road ramps, parks, road side trees and plants
- Hotels, business parks, recreational fields and homegardens
- GREENFAIN can also be used together with liquid fertilizers, which it helps to deliver straight to the roots efficiently.



*GREENFAIN reduces the required amount of irrigation water by 30% to 65%. The amount of product needed for this is exceptionally small, thus the burden to the environment is minimal.*

### SATISFIED CLIENTS RECOMMEND GREENFAIN

#### Distributor

"We are distributors of agricultural products, and GREENFAIN has been used by our customers for more than 7 years, mainly with tomato, cucumber and salad farming. After the farmers started using GREENFAIN, the wellbeing of their crops increased significantly. The growth became faster and the quality of the vegetables went up. The cucumber growers have sprayed GREENFAIN on the leaves as well, and this has resulted in getting rid of some problematic fungi and other diseases. It has generally helped to diminish some troublesome pests too. We highly recommend GREENFAIN to all of our customers."  
CEO, Nutriforte Ltd. Finland

#### Röding's Farm and Greenhouses

"We have been using GREENFAIN in our farm for many years, mainly in the nursery, but also significantly among the cabbage plantations outside. We noticed that the growth became faster and the amount of low quality vegetables went down. In our business GREENFAIN is a must. The results can be seen very clearly. Now that GREENFAIN is used in our greenhouse, watering once a day is more than enough, and this saves us a lot of time and water. GREENFAIN is very economical, considering the results you get, and we have many positive reasons to use it." Owner, Röding's Farm & Greenhouses

GREENFAIN is a unique, patented solution for saving and minimizing the use of required irrigation water. When using Greenfain, the irrigated water goes efficiently into the roots and maintains the soil humid for longer, even during the hot hours of the day. GREENFAIN is a biodegradable, safe and eco-friendly way to keep the landscape or cultivation beautiful, healthy and productive.

### HOW DOES IT WORK?

When added into the water that is used for irrigation, GREENFAIN increases the well-being of the plants.

It reduces the surface tension of water, allowing the water to penetrate the soil all the way to the root level, fast and efficiently.

It increases the soil's capacity to absorb water and fertilizers and keeps the soil humid for a longer period of time.

Water evaporation is also remarkably reduced, as GREENFAIN binds the irrigation water to the soil. It also reduces the harmful effects of salt water.





# *Effect of GreenFain Product on Forage and Seeds Productions*

## **+ Treatments:**

### **1. Main Plots: Organic and Chemical-Fertilizers and Bio-char:**

- A. Bio-char.**
- B. Sheep and Goats-Manure.**
- C. Chemical Fertilizer.**

### **2. Sub-Plots: Irrigation Levels:**

- A. 100% (Normal Irrigation; 60 min/day)**
- B. 75% (45 min / day)**
- C. 50% (30 min / day)**

### **3. Sub-Sub-Plots: GreenFain Product:**

- A. Control (Without)**
- B. Applied as Recommended (0.4%) ; Sandy Soils and Saline Water.**



## *Crops and Locations*

### Crops:

1. Alfalfa (*Medicago sativa* L.)
2. Egyptian Clover (*Trifolium alexandrinum* L.)
3. Barley (*Hordeum vulgare* L.)
4. Oats (*Avena sativa*)
5. Faba Bean (*Vicia faba* L.)
6. Fodder Beet (*Beta vulgaris* subsp. *vulgaris* L.)

### No. of Locations:

**Five Locations (differed from water saline levels:  
3500-5400ppm)**



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## *Greenfain-Program Treating (0.4%)*





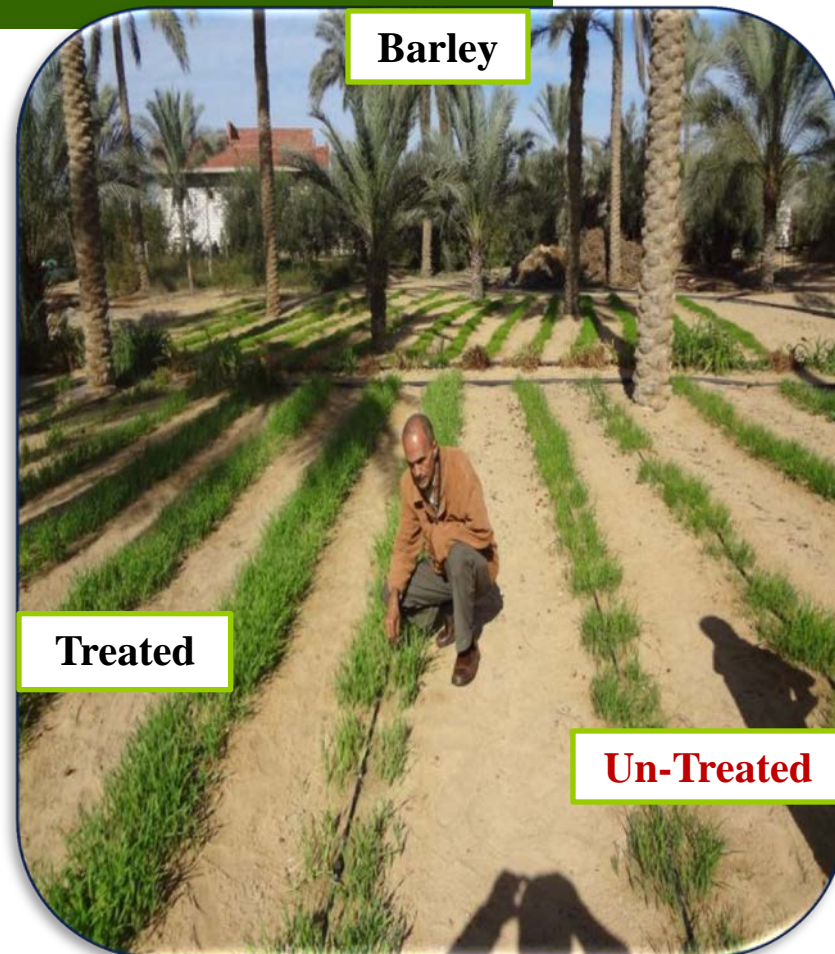
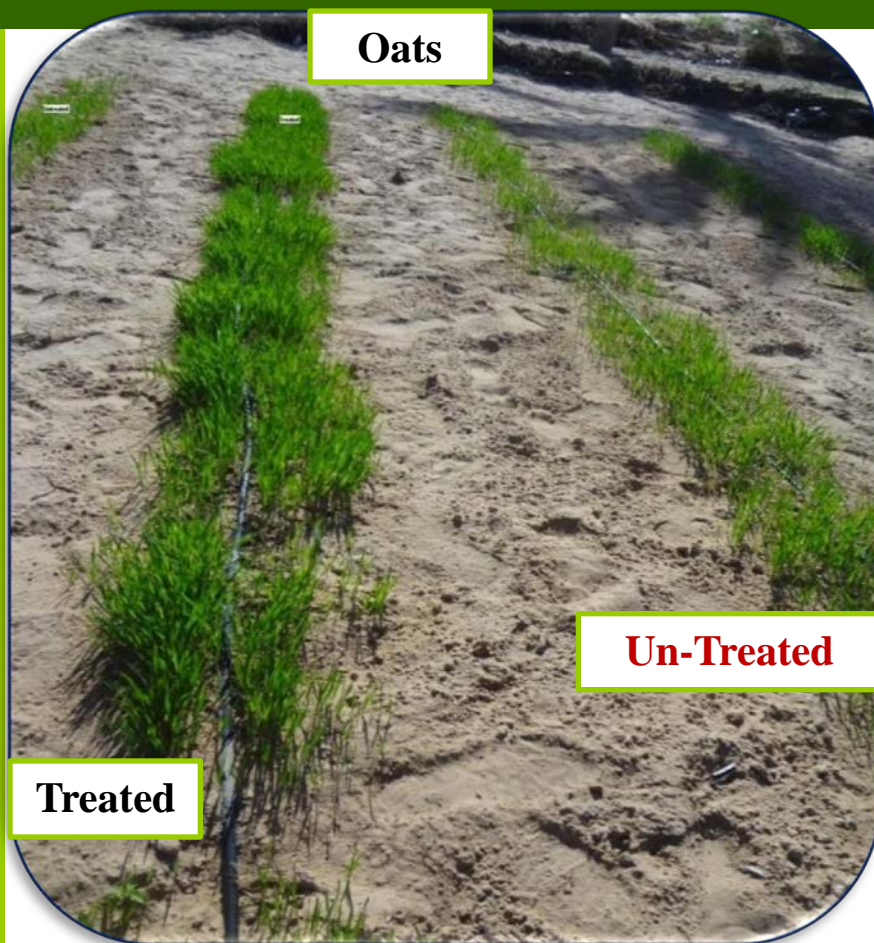
## *Greenfain-Program Treating (0.40%)*





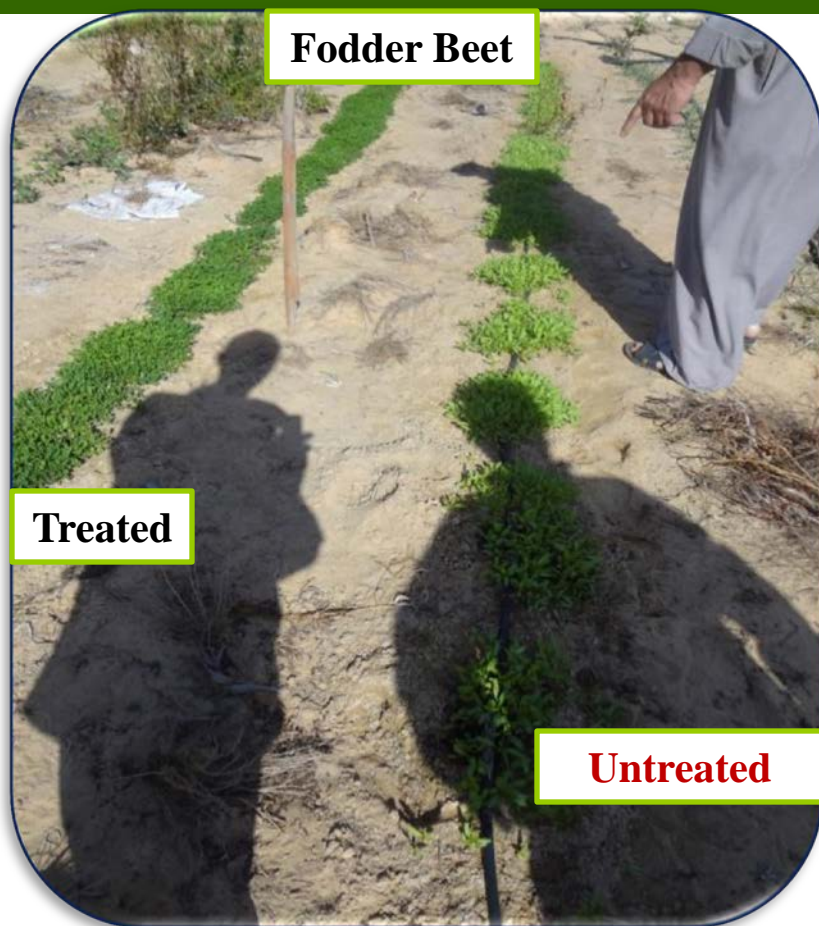


## *Effect of GreenFain at Germination Stage (20-Days)*





## *Effect of GreenFain at Germination Stage (20-Days)*





## Results (5): Presentations in International Scientific Events

### 12<sup>th</sup> Desert Technology International Conference: Giza-2015 (DT12)

**المؤتمر الدولي الثاني عشر لتكنولوجيا الصحراء**

Conference language: English  
 Closing date:  
 Abstract Submission:  
 Deadline: 31 August 2015  
 Manuscript Submission : 15 September - 15 October 2015

Title, author name(s) in full spelling with affiliation(s), 300 - 400 words abstract in English & contact person's name & email address .

A poster session will be a part of the conference. After critical peer reviewing, presented paper will be published in either  
 1.Journal of Arid Land Studies, Japan (special issue).  
 2.Journal of Advanced Research, JAR, Elsevier, Cairo University (special issue).

All correspondence should be addressed to:  
 Prof. Dr. Ahmed AboulEnein      Mobile: +2 0100 61.51 121( Egypt)  
 Email: Ahmed\_DT12@agr.cu.edu.eg      Fax:+202 35 71 73 55

Post - Conference Optional Tours:  
 After the end of the conference, attractive tours for participants who are interested to visit historical and cultural sites in Egypt will be available. Full details and timetable will be announced later.

For more information please visit : <http://www.deserttechnology.12-agr.cu.edu.eg/dt12/>





# Participation in network meetings like in the COST Bio-char Meeting in Italy: 06-2015



**Biochar<sup>Plus</sup>** Energy, health, agricultural and environmental benefits from biochar use: building capacities in ACP countries

ACP-EU Cooperation Programme in Science and Technology II  
G.C. FED/2013/330-236

A programme of the ACP Group of States, with the financial assistance of the European Union



Biochar Plus (ACP-EU Cooperation Programme in Science and Technology II G.C. FED/2013/330-236) and COST Action TD1117 at EXPO Milano on "Bio-char and Environment Program in Tropical and Subtropical Countries" (24 to 26 June 2015)

**Egyptian-Finnish-Project**  
In collaboration with:  
Development of Fodder Resources in Sinai-Project

**Use of Pyrolysis and Bio-char for Sustainable Agriculture in Sandy Soils and Saline Water Conditions in Sinai, Egypt**

*Oiva Niemeläinen, Kari Tiilikkala' and Magdy M. Mohamed'*  
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Field Crops Research Institute, ARC, Egypt.  
E-mail: [magdykonecha1@ahotmail.com](mailto:magdykonecha1@ahotmail.com)

ACP-EU Cooperation Programme in Science and Technology II G.C. FED/2013/330-236 and COST Action TD1117 at EXPO Milano on "Bio-char and Environment Program in Tropical and Subtropical Countries" (24 to 26 June 2015)

**Egyptian-Finnish-Project**  
In collaboration with:  
Development of Fodder Resources in Sinai-Project

**From Agricultural Waste Problems into Pyrolysis Benefits in Sinai, Egypt**

*Kari Tiilikkala', Oiva Niemeläinen' and Magdy M. Mohamed'*  
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Field Crops Research Institute, ARC, Egypt.  
E-mail: [magdykonecha1@ahotmail.com](mailto:magdykonecha1@ahotmail.com)

**Different Slow Pyrolysis Cycles (Egypt)**

Sample No. (Sample Type)	Sample No. (Sample Type)	Sample No. (Sample Type)	Sample No. (Sample Type)
1. Local Straw	2. Barley Straw	3. Biogas Residue	4. Hemp Material
5. Local Straw	6. Barley Straw	7. Biogas Residue	8. Hemp Material

**Five Cycles Data (Finland)**

Sample No. (Sample Type)	Sample No. (Sample Type)	Sample No. (Sample Type)	Sample No. (Sample Type)
1. Local Straw	2. Barley Straw	3. Biogas Residue	4. Hemp Material
5. Local Straw	6. Barley Straw	7. Biogas Residue	8. Hemp Material



Milano – 24-26 June, 2015



# *Lectures for a groups of visiting Agricultural Experts from e.g. African countries at Egyptian International Center for Agriculture*



## **Pyrolysis-Retort Machine for Agriculture Development: Conversion of Biomass to Bio-products**

**Dr. Magdy M. M. Mohamed**  
Field Crops Research Institute  
Agriculture Research Center

Egyptian-Finnish-Project  
Project-Egyptian Coordinator &  
Project-Principle Investigator





# *Workshops, Field Days and Seminar*

**9-Workshops.**

**3-Field Days.**

**4-Seminar.**



# *Project Websites*

- **Egyptian Finnish-Project: Enhancing Development of Water Use Efficient**  
**<https://www.facebook.com/EgyptianFinnishProjectMagdyMohamed/?ref=bookmarks>**
- **North Sinai School of Bio-char**  
**<https://www.facebook.com/NORTH.SINAI.SCHOOL.BIOCHAR/?ref=bookmarks>**
- **Watering Power for Drought and Saline Condition**  
**<https://www.facebook.com/Egyptian.Finnish.Project.Drought.Salinity.2015/?ref=bookmarks>**
- **Egyptian-Finnish-Project: Plant Breeding, Genetics and Biotechnology**  
**<https://www.facebook.com/Egyptian.Finnish.Project/?ref=bookmarks>**
- **Web address in Luke may change: search by Google: Luke ICI Egypt**



*Thank You for Your Kind Attention*

