

# Pyrolysis and biochar systems for sustainable agriculture development in Egypt: Challenges and Opportunities

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- ARC Agricultural Research Centre of Egypt
- Desert Technology 12<sup>th</sup> International Conference
- Cairo 2015



# Contents

- Background: pyrolysis and use of products
- ICI project: aims
- Pyrolysis technology used in the project
  
- Products: gas, liquids and biochar
- Use of biochar
- Use of liquids
- Use of energy
  
- Economical analysis of the concept
- LCA asesment of the biochar production and use
- Conclusions



# Pyrolysis products: Impact sectors



- Organic high value components
- Health: plant, animal, human
- Plant growth, yields & quality
- nutrient cycling
- waste management
- Bioenergy
- Carbon neutral buildings
- Clean Tech
- Water use efficiency
- Soil Fertility
- Food security
- Carbon sequestration
- Land use
- Climate change mitigation

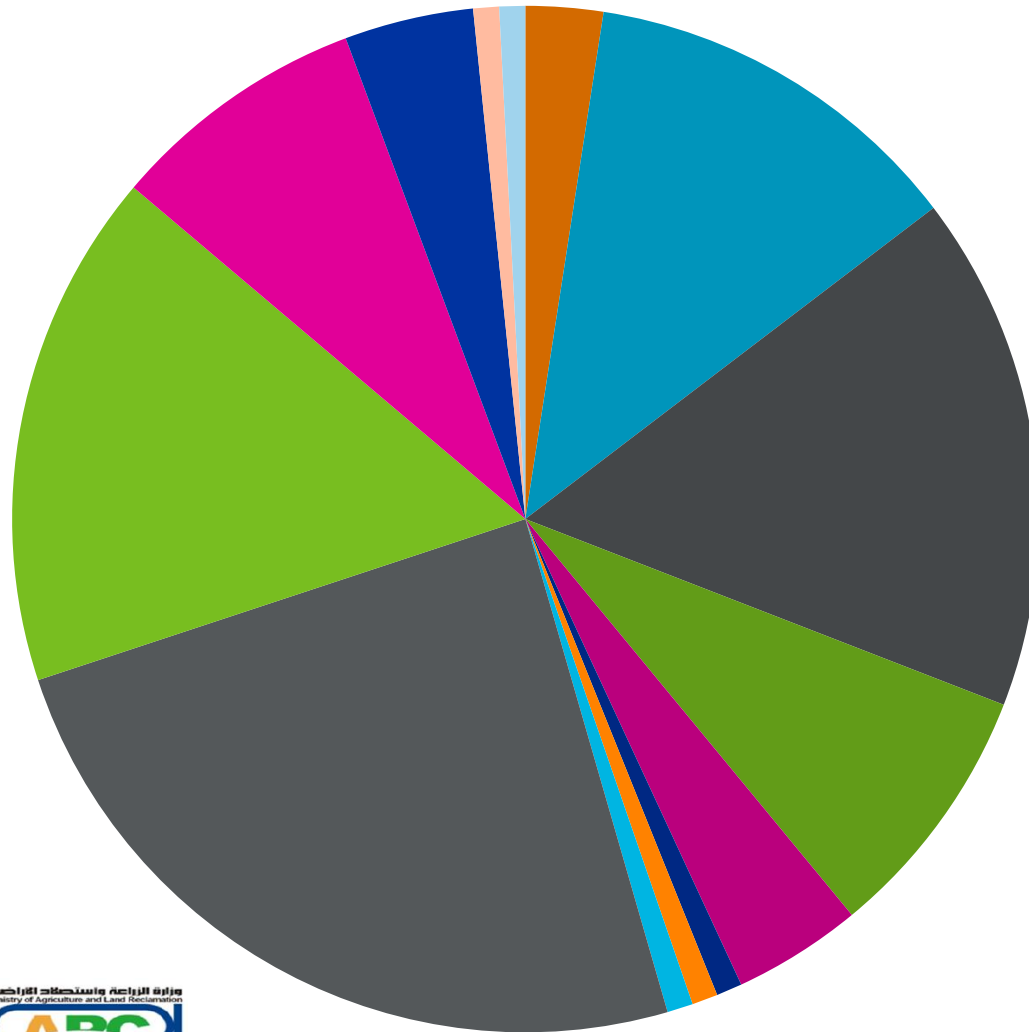
# ”ENHANCING DEVELOPMENT OF WATER USE EFFICIENT CROPS & PRODUCTION METHODS TO DRY AND SALINE CONDITIONS”

funded by

Ministry for Foreign Affairs of Finland

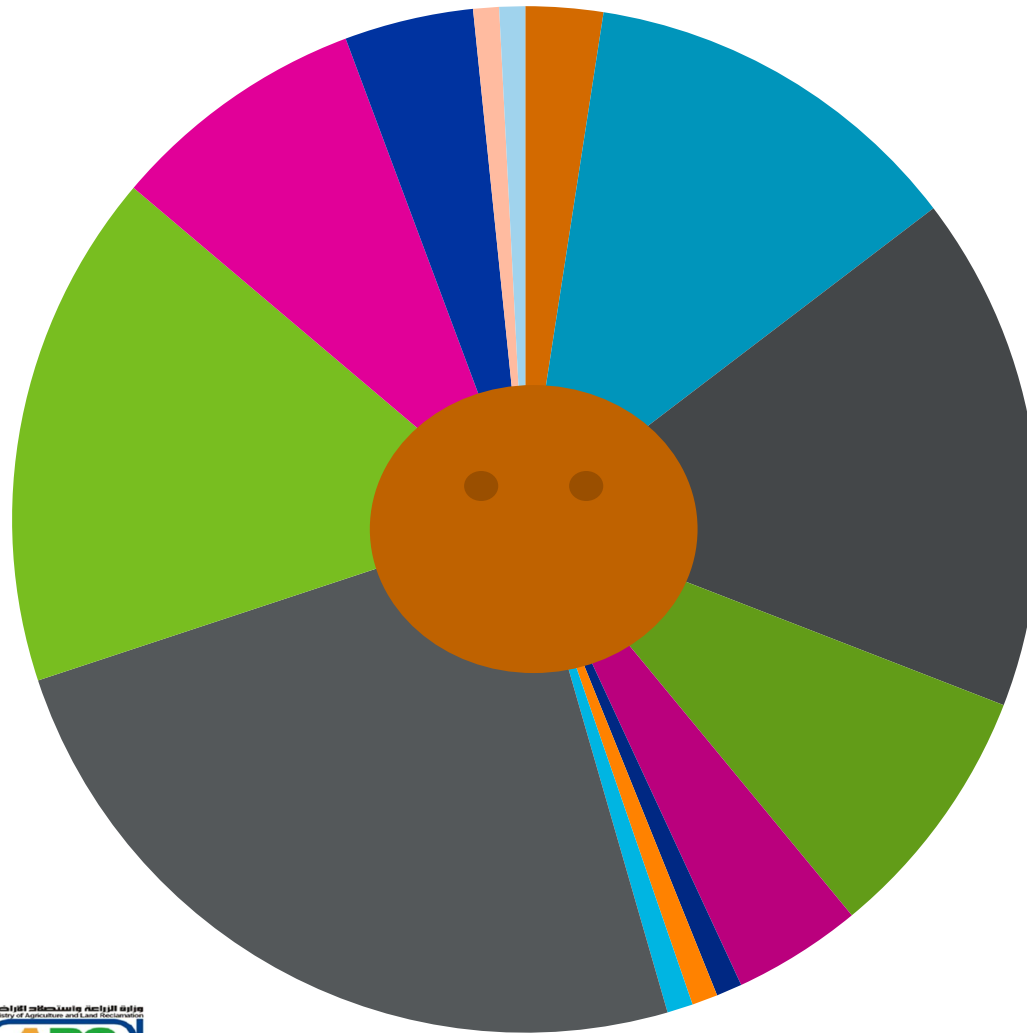
- Led by Dr. Oiva Niemeläinen, Luke Finland
- Project PI Dr Magdy M Mohamed, ARC Egypt
- Aim: Human capacity building !
- Result 4 focusing to:
  - ***New agro-technologies for improvement of water holding capacity of sandy soils developed and adopted in the target area***

# ICI project focus /Pyrolysis products:/ sectors



- high value components
- Health: plant, animal, human
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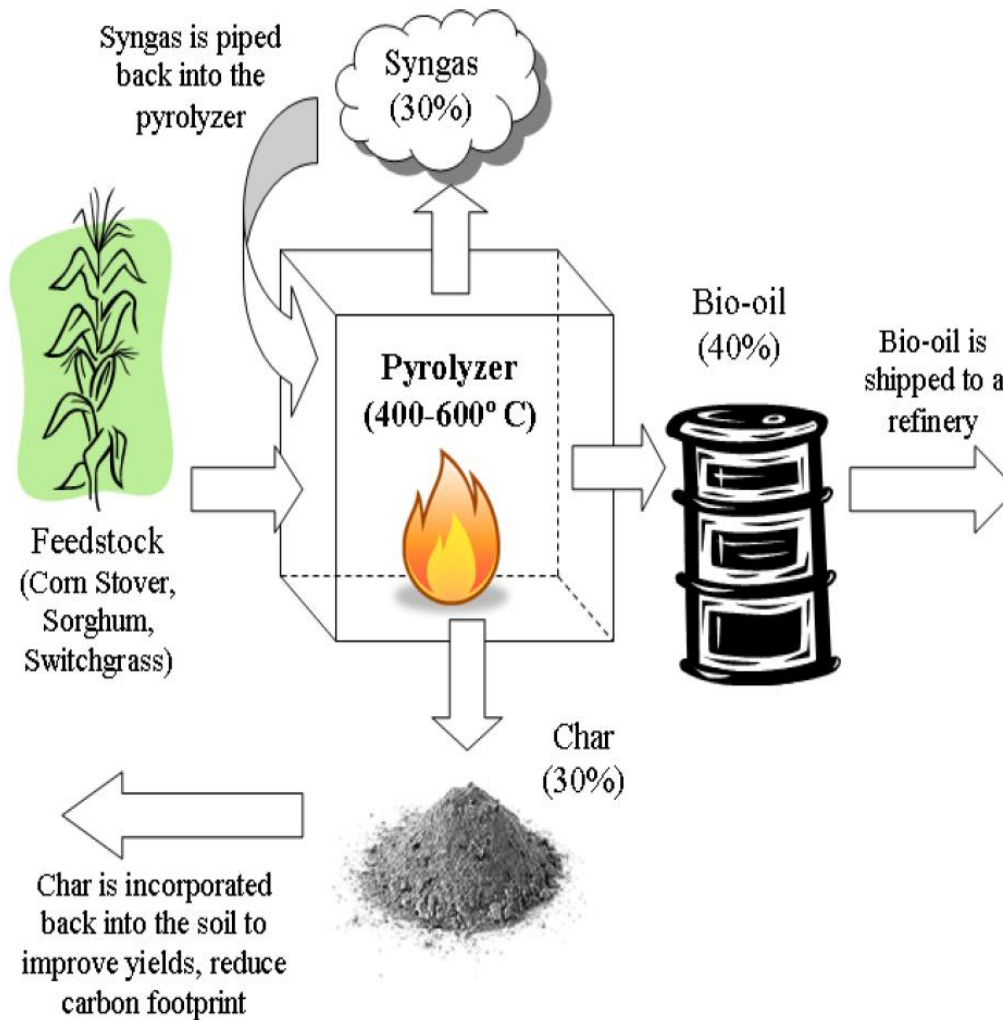
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# WHAT IS SLOW PYROLYSIS

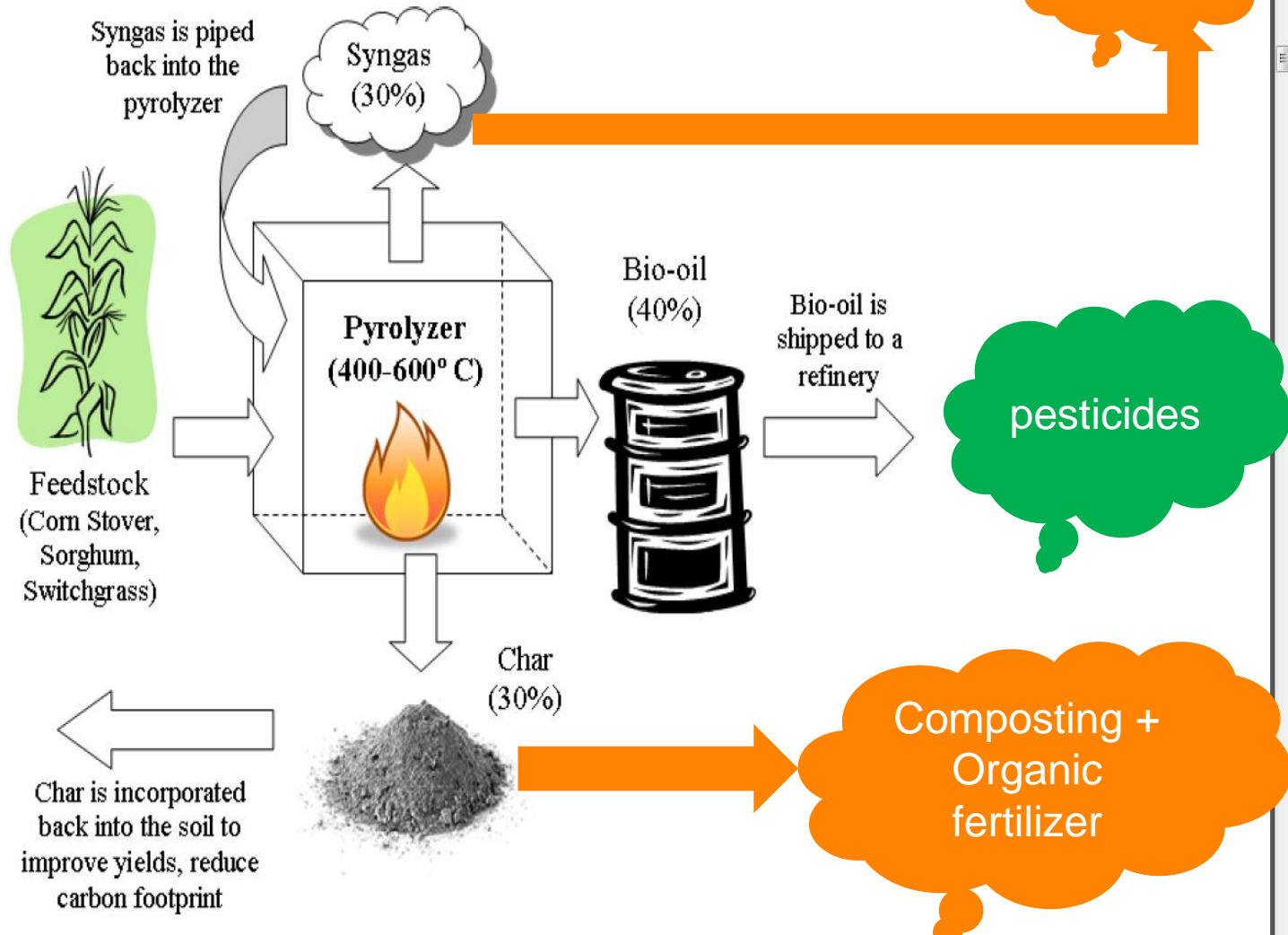
*Palma et al. / International Food and Agribusiness Management Review / Volume 14, Issue 3, 2011*



# WHAT IS SLOW PYROLYSIS

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Palma et al. / International Food and Agribusiness Management Review / Volume 14, Issue 3, 2011



# WHAT IS SLOW PYROLYSIS



# Feedstock used in North Sinai



- 1 **Tomato Straw** {14-Cycles}.
- 2 **Cantaloupe Straw** {10-Cycles}.
- 3 **Remnants of Date Palms** {09-Cycles}.
- 4 **Remnants of Olive Trees** {10-Cycles}.
- 5 **Tamarix (Tamarix nilotica)** {1-Cycle}.





# Slow Pyrolysis, RAUSSI mobile batch retort to demonstrate new technology in practice





# Feedstock inside



# Closing doors tightly





# Heating up: wood and pyrogas



# Condensing pyrolysis liquids





# Opening the retort after cooling (<80 C degrees !)





# Products: gas, liquids, char





## Large scale pyrolysis units for regional use

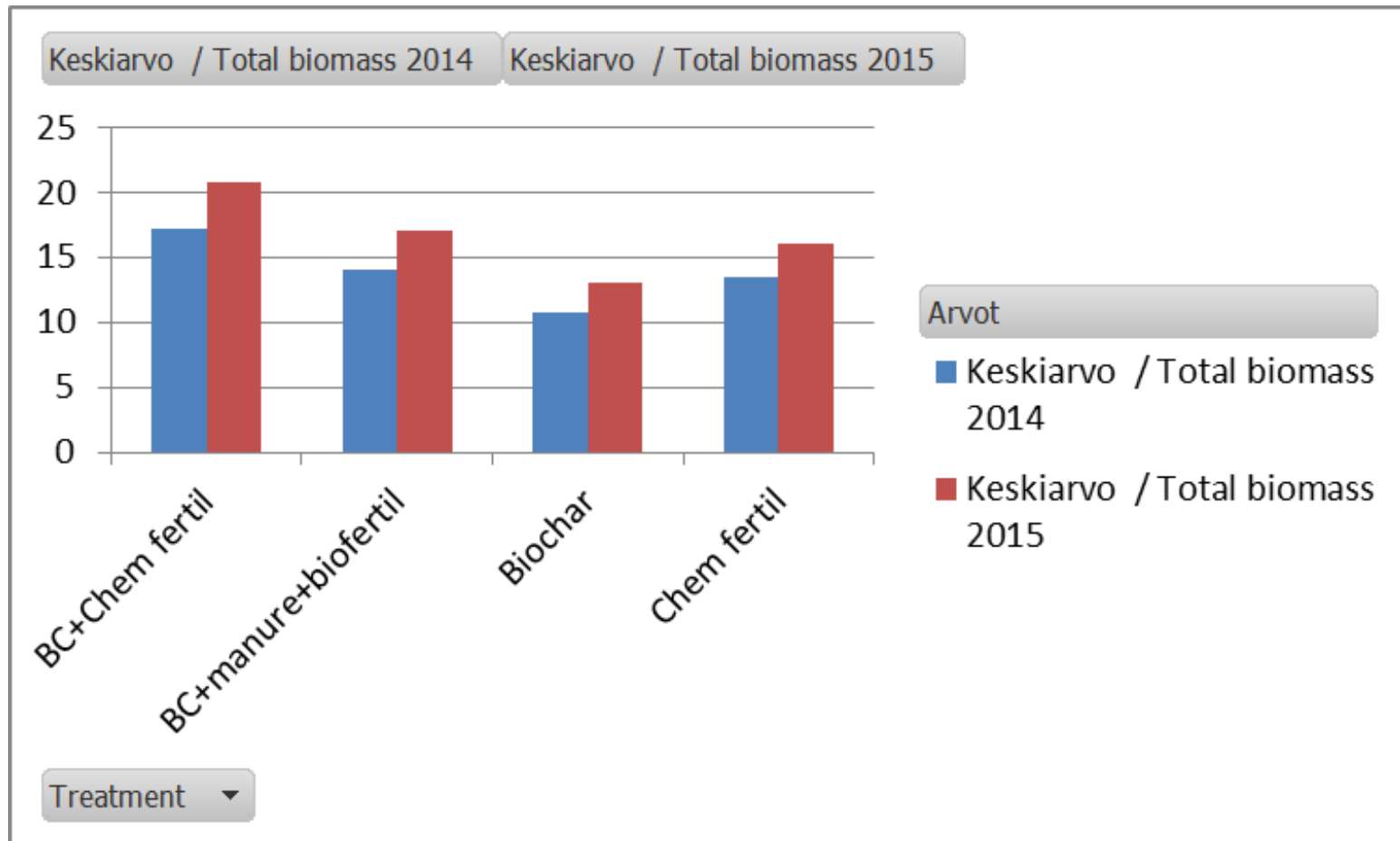


# Biochar for improvement of water holding, nutrient cycling and soil improvement

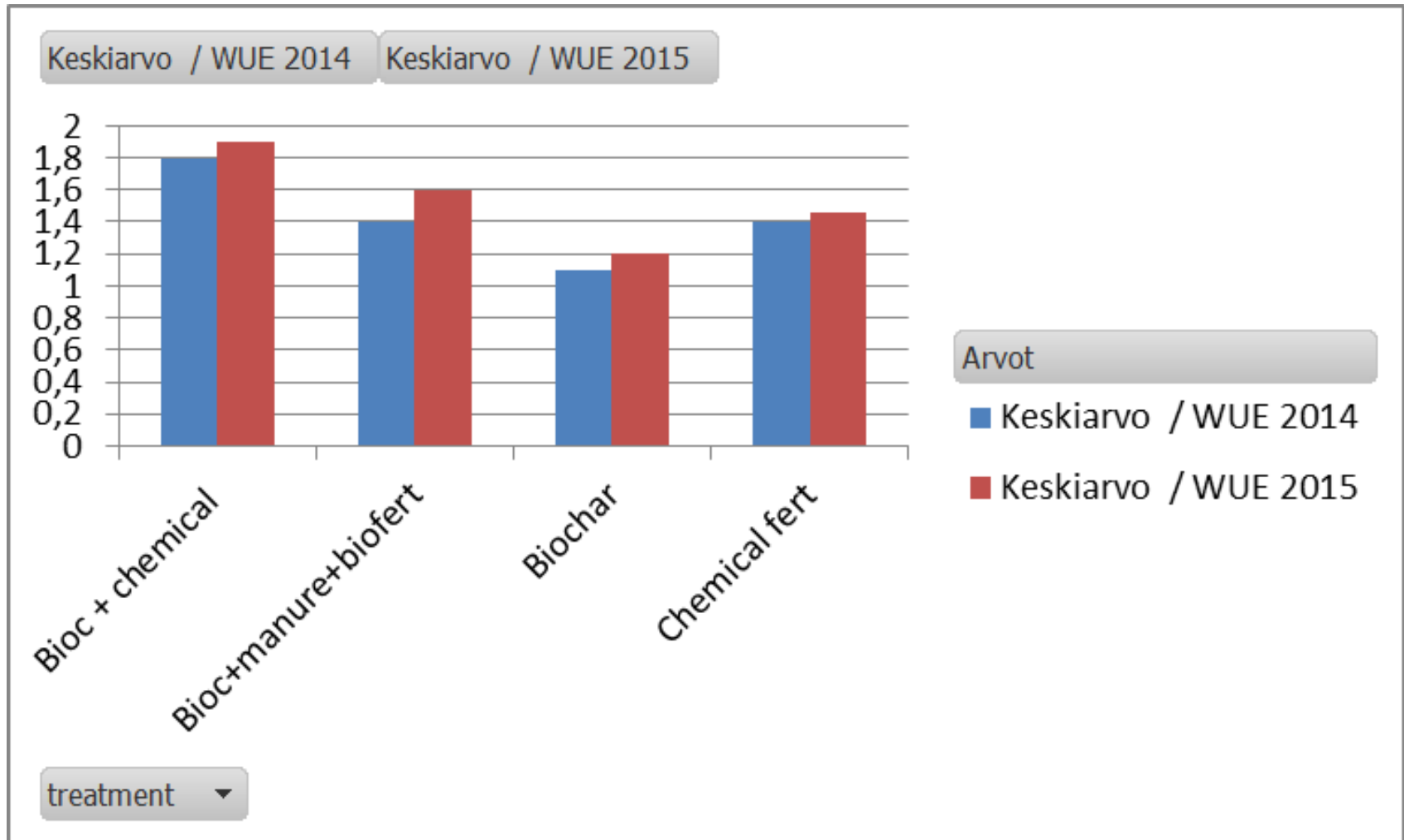


Mixture of  
manure  
and  
**BIOLAN**  
wood  
based  
biochar

# Yield increase recorded: Fababean 2014 and 2015



# Water use efficiency improved





# Liquids as botanical pesticides





# Energy use options and innovative technologies ?



**Human health aspect :**  
no smoke with high quality char +  
waste management





# Economical calculations and LCA assessments need to be done



GHG measurements



# Conclusions

- Water use efficiency improved
- Nutrient cycling to replace fertilizers
- Yield increase
- High quality char as solid energy source
- Biological pesticides
- Waste management
- Food security
- Health improvement
- Carbon sink
- Bioeconomy based on local resources
- Mitigation of climate change

Thank you very much !

Please find more information about our  
ICI activities

Via FaceBook

<https://www.facebook.com/NORTH.SINAI.SCHOOL.BIOCHAR>

[link](#)

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مدرسة شمال سيناء للبيوشار

Kari Etusivu 20+

**Luo sivu**

Viimeaikaiset

2015

2014

Sponsoroitu

**Ladattava otsalamppu 19,99€**  
Verkkokauppa e-ville.com  
\*Hinta laatusuhde hitusen epäilytti. Lampun sitten saavuttua ylätyös oli suuri sillä valot...

**380 henkilöä tykkää tästä**  
Magdy Maher Mosad Mohamed ja 7 muuta kaveria

Kutsu kavereita tykkäämään tästä sivusta

**TIETOJA**

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https://www.facebook.com/NORTH.SINAL.SCHO...

Impressum [?]

**KUVAT**

**Julkaisu** Kuva/video

Kirjoita jotain...

**Julkaise**

**مدرسة شمال سيناء للبيوشار** via **The Biochar Journal**  
17. lokakuuta kello 4:35

**Ithaka Institute - Nepal**

We had built such a close relationship with the biochar farmers participating in our ADB biochar project that we could not simply leave them alone after the devastating earthquake destroyed their homes. Thanks to the generous donations of the friends of Ithaka and a building design as beautiful as i...

ITHAKA-INSTITUTE.ORG

Tykkää Kommentoi Jaa

3 henkilöä tykkää tästä.

Kirjoita kommentti...

Heli Piirainen tykkää henkilön Pirkanmaan liitto julkaisu.

Mukesh Basnet tykkää käyttäjän Rameshwar Nepal albumista Nimetön albumi.

Heli-Hannele Haapaniemi aikoo osallistua

Juha-Matti Pihlava

Tero Tiilikkala 47 min

Magdy Maher Mosad Mo...

Jasse Tiilikkala

Eslam Eid 1 min

Juha-Matti Kyrrä

Mukesh Basnet 1 min

Katriina Eskola

Elli Latva-Hakuni 1 min

Sirpa Kurppa 1 pv

Heli-Hannele Ha... 1 min

Lea-Eiina Nikkilä

Liisa Tiilikkala 21 h

Erkki Pyy

Kati Liikonen 1 h

Andrei Sergejeff 3 min

Haku

18:25  
20.10.2015