



INTEGRATED SOIL CONDITIONING

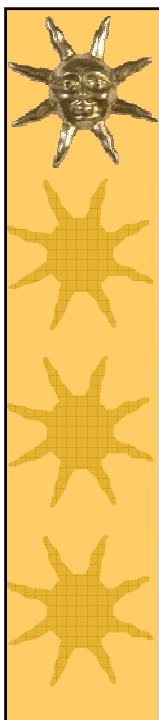
Willem VAN COTTHEM - University of Ghent (Belgium)
and TC-DIALOGUE Foundation

Douglas PATTIE - United Nations Convention to Combat Desertification
(Secretariat - Bonn, Germany)

A tool to improve :

- ★ **agro-productivity,**
- ★ **food security**
- ★ **and poverty alleviation**

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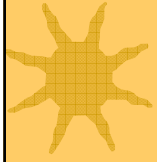
★ **INTRODUCTION**

All sciences became highly specialized.
All experts need to focus on their own
field of expertise to keep track of
development.

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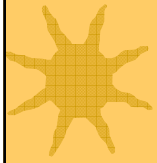


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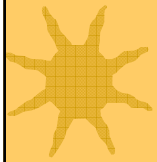


★ **CONCLUSION:**

We loose contacts with other disciplines, even within our own major field of expertise (botany, agronomy, chemistry, genetics, ...).



We become experts, e.g. in soil physics, soil chemistry, fertilizers, microbiologists, hydrologists etc.



We forget how to talk to one another.

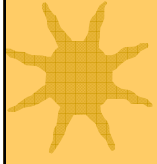
We are heading for splendid isolation.

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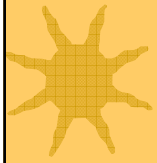
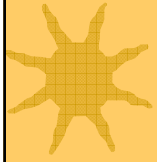


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HOW TO SOLVE THAT PROBLEM?

Integration of knowledge and expertise by constituting multidisciplinary teams or networks of experts for mutual consultation and/or cooperation in related fields of science.



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★ My example for today:

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for combined solving of soil problems:
physics, chemistry and biology, water,
fertility, organic content, microbiology
etc.

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★ As an example of such an integration:

THE TERRACOTTEM-METHOD (TC)

Drought problems: Hydroabsorbent polymers

Infiltration rate: Agglomeration of particles

Fertility problems: Macro- + micronutrients

Root growth: Activators for cell elongation

Microbiology: Appropriate organic substances

Homogeneity + Aeration: Volcanic rock (lava)

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TC COMPOSITION

Blend with more than 20 components:

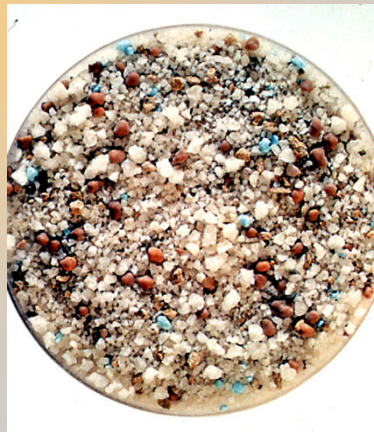
- ★ Natural and synthetic organic **water absorbing substances (hydrogels)**
- ★ **Mineral fertilizers:** macro- + micro-nutrients (soluble + slow release)
- ★ **Organic substances** : biodegradable
- ★ **Root growth activators**
- ★ **Volcanic rock (lava)**

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TC IS A GRANULAR COMPOUND



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WHAT IS TC DOING ?

- 1. It stocks *water and nutrients* in water absorbent polymers by exchanging cations and anions with the soil, resulting in higher water use efficiency and less leaching**

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*Left = dry, right + water
up to 100 times own mass*



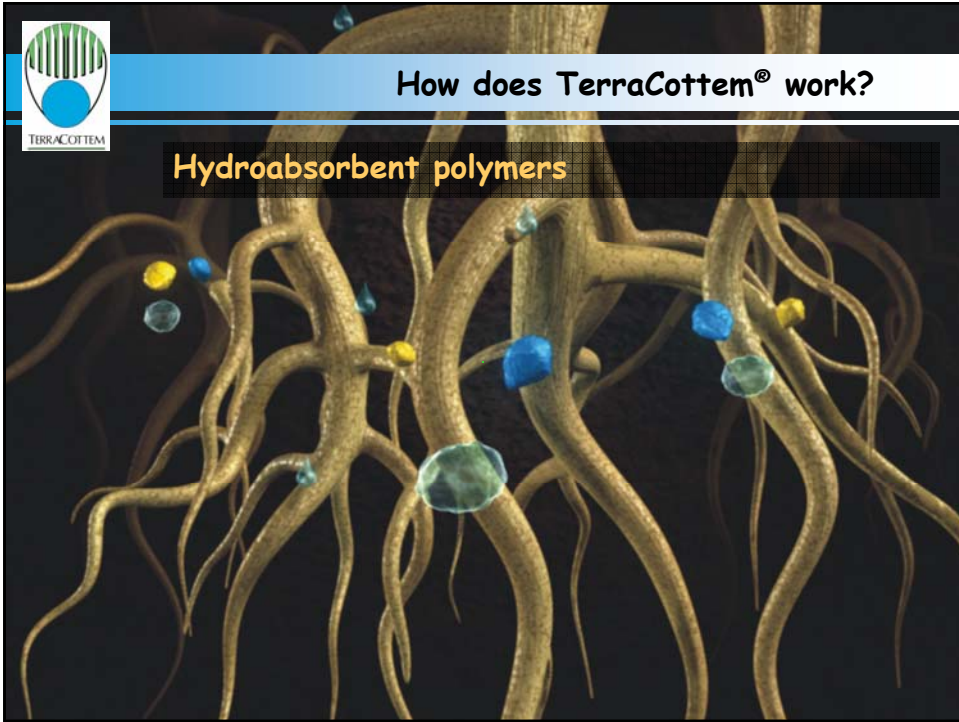
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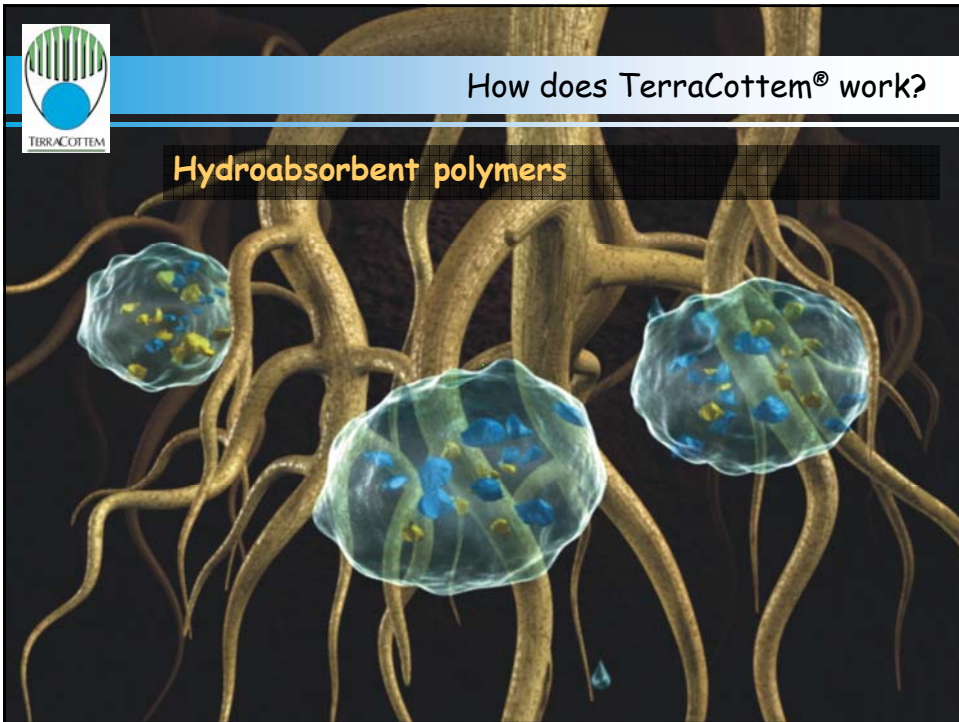
How does TerraCottem® work?

Hydroabsorbent polymers



How does TerraCottem® work?

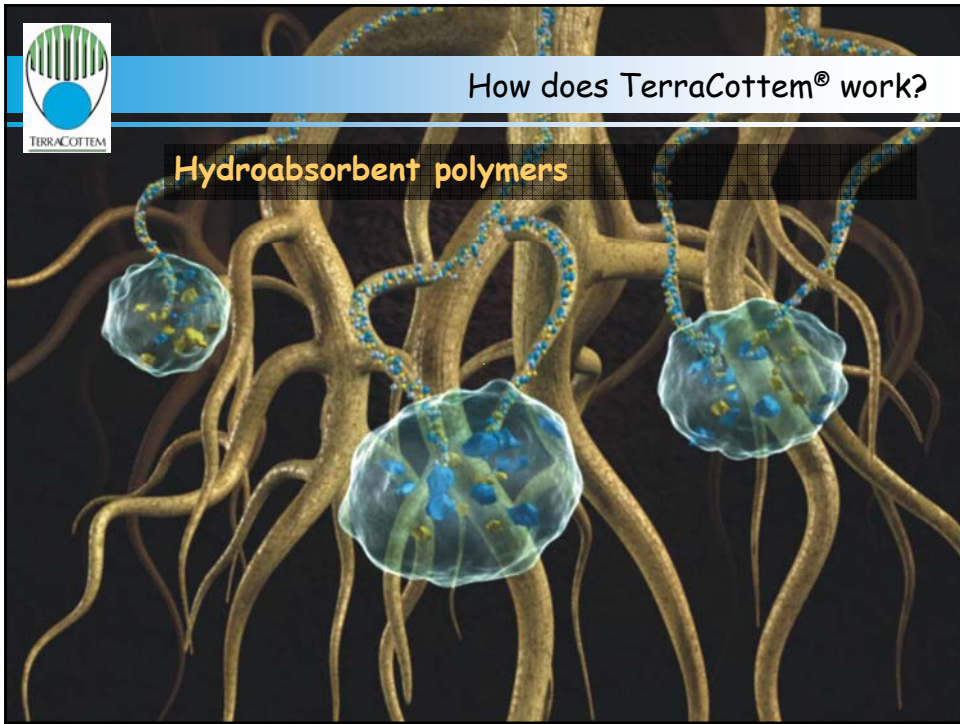
Hydroabsorbent polymers





How does TerraCottem® work?

Hydroabsorbent polymers

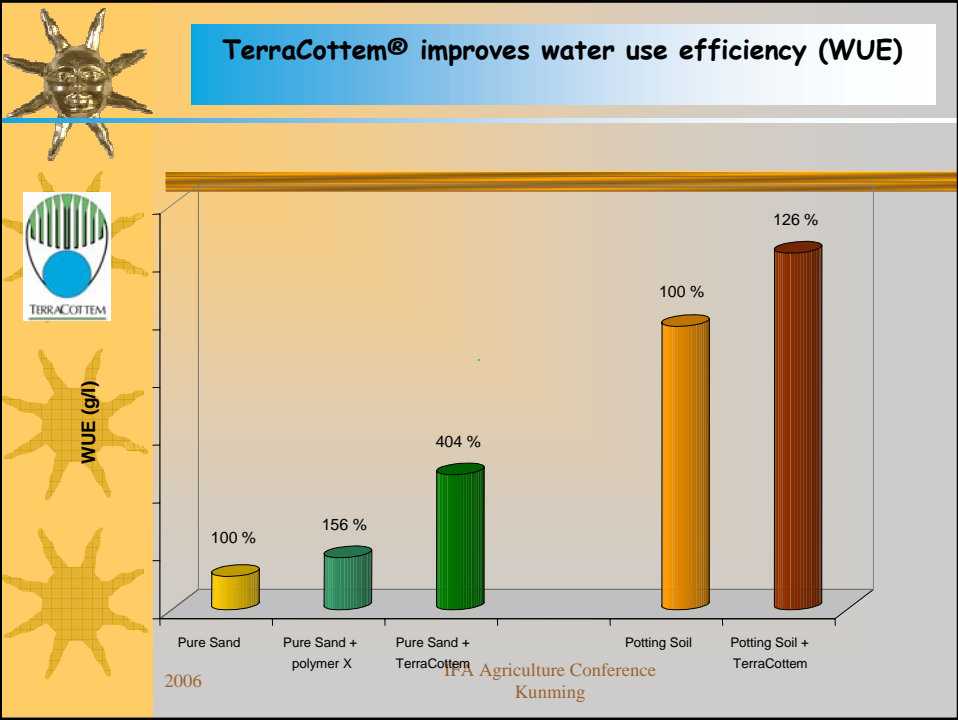


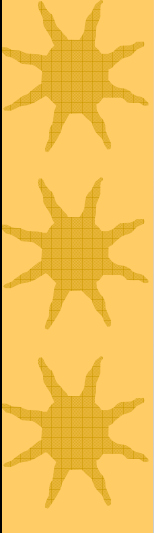

TC IS MORE THAN A PURE POLYMER




Pure polymer on sand

TerraCottem®



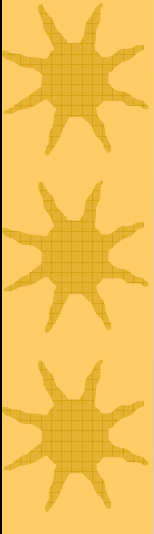



Roots detect TC gels in soil



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WHAT IS TC DOING ?

2. It lowers *infiltration rate*

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Agglomeration of soil particles



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WHAT IS TC DOING ?

3. It activates secondary root formation (more roots = more biomass production)

and cell elongation
(faster root growth)

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Fantastic root development on pure sand of golf green




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The slide features a decorative left margin with a vertical yellow bar containing a silver sun icon at the top and four yellow sun icons below it. The main content area has a grey background with a horizontal gold line separating the title from the image. The image shows a person's hands holding a core sample of a golf green, revealing a dense mat of roots and sand. The text '2006' is located at the bottom left, and 'IFA Agriculture Conference Kunming' is at the bottom right.

Grass roots 40 cm long on pure sand with TC



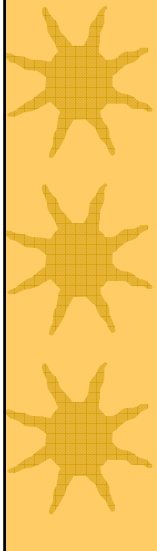
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The slide features a decorative left margin with a vertical yellow bar containing a silver sun icon at the top and four yellow sun icons below it. The main content area has a grey background with a horizontal gold line separating the title from the image. The image shows a hand holding a long, thick root system of grass growing in sand. The text '2006' is located at the bottom left, and 'IFA Agriculture Conference Kunming' is at the bottom right.



Non treated roots of oil palm seedling in Malaysia (control)

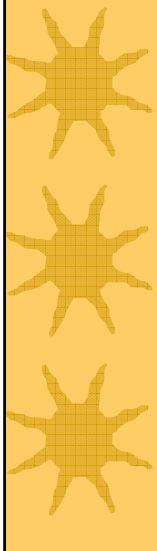


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With TC more absorbing roots, thus better plant growth



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WHAT IS TC DOING ?

4. It enhances **biomass production** (more food, more annual income)

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Left no TC, right 5 g of TC/kg of sand, both same minimal watering



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TC - control - NPK fertilizer



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TC APPLICATIONS

1. PLANTING TREES AND SHRUBS

**AFFORESTATION
REFORESTATION
LANDSCAPING
AGROFORESTRY**

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TREE GROWTH - Parkes Golf Course, NSW Australia






**Without
TerraCottem®**

**With
TerraCottem®**

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REFORESTATION WITH TC ON DRY DEGRADED SOILS (LATERITE)




- ★ **BURKINA FASO - Niou**
- ★ **Friendship wood**
- ★ **Lateritic soil**
- ★ **1988-1997**
- ★ **Reforestation with local species**
- ★ **Only rain, never irrigated**

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REFORESTATION WITH TC ON LOAMY CLAY IN DRYLANDS




- ★ BURKINA FASO - Arbolle
- ★ Loamy clay
- ★ Fraternity wood
- ★ 1988-1997
- ★ Reforestation with African species
- ★ Never irrigated, only rain (350 mm)

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REFORESTATION WITH TC IN CHINA



- ★ CHINA - Badaling area
- ★ Reforestation project in August 2001
- ★ TC-treated pines first suffered from drought (brown needles)
- ★ Soon, new shoots were formed
- ★ All trees show excellent growth without irrigation

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REFORESTATION WITH TC IN CHINA



- ★ CHINA - Yanqing area
- ★ Reforestation project on former river bed 1998
- ★ Different tree species planted
- ★ Significant differences between TC-treated trees and control plants without TC

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REFORESTATION WITH TC IN CHINA

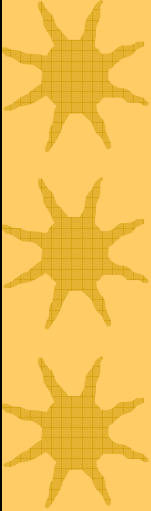



- ★ CHINA - Shanxi province 2001
- ★ Reforestation with TC (no irrigation)
- ★ Different species planted on steep slopes
- ★ Erosion limited

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 *Malaysia: Kuala Lumpur Airport forest trees died after transplanting*

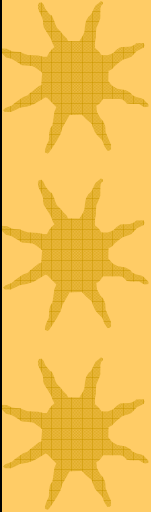





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 *Malaysia: transplanted forest trees survive with TC*



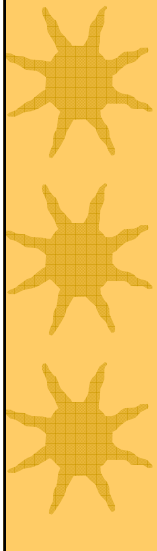


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Landscaping in city - minimal watering (BEIJING 2008 ?)

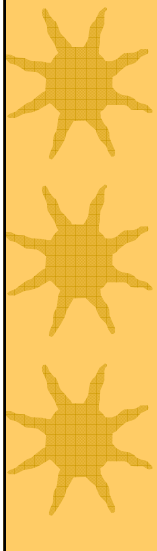


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Living sculptures with TC



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Golf course with TC in Spain



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*Transplanted adult trees with
new leaves (1 kg TC per tree)*



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Ornamental plants + TC in parks

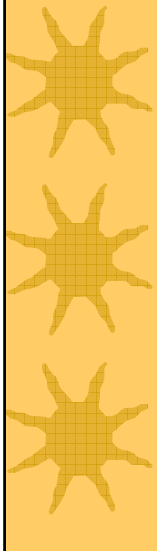


TC IN CONTAINERS - Pforzheim, Germany





Flowering towers *with TC need less watering (Belgium)*

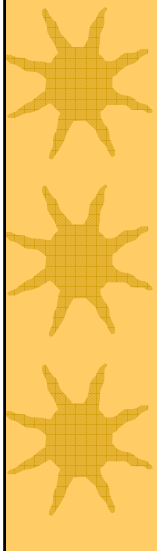


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Hanging baskets



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AGROFORESTRY WITH TC IN AFRICA



- ★ **COTE D'IVOIRE - Ferkessedougou 1993**
- ★ **Agroforestry project**
- ★ **Vegetable garden surrounded with windbreak trees**
- ★ **Application of TC successful for both vegetables and trees**

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TC APPLICATIONS


2. SAND STABILIZATION


DUNES

ROAD PROTECTION (WINDSCREENS)

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Marram grass with TC on sand dunes



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This slide features a decorative vertical bar on the left with a golden sun icon at the top and four stylized sun symbols below. The main title is in green italics. The central photograph shows a sand dune covered in dense, dry Marram grass. A black geotextile fabric (TC) is laid out in a grid pattern across the dune. Three people are visible working on the dune, one kneeling in the foreground. The background shows a line of trees and a fence.


Sand stabilization with TC



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This slide features a decorative vertical bar on the left with a golden sun icon at the top and four stylized sun symbols below. The main title is in green italics. The central photograph shows a sand stabilization project. A black geotextile fabric (TC) is laid out in a grid pattern across a sand dune. The fabric is covered with small, green plants. In the background, there are buildings and a fence.



*Sand fixation with TC successful
(Antwerp docks, Belgium)*



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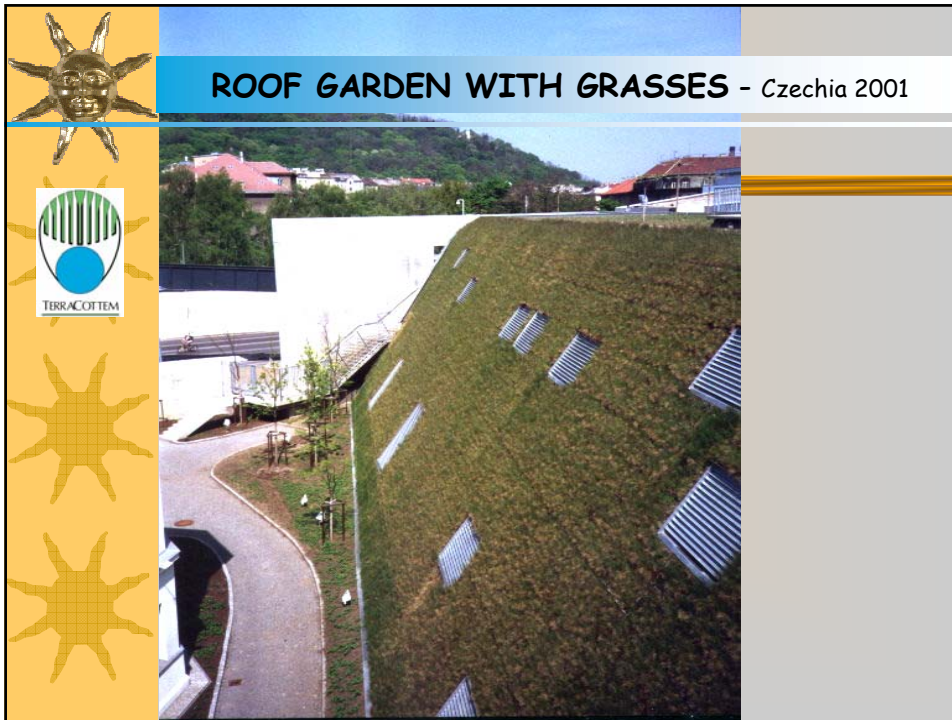


TC APPLICATIONS

3. TC FOR ROOF GARDENS

URBAN LANDSCAPING (Beijing 2008 !)
ISOLATION (Heat and cold)

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TC APPLICATIONS

3. TC AND SOIL SALINITY

SPORTS TURF
REFORESTATION

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 *Seeding sports turf on beach*

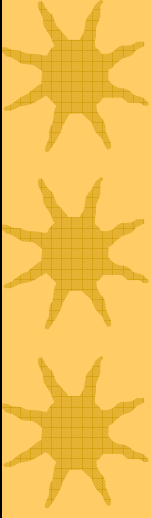


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 *Difference TC-treated and control*



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TC APPLICATIONS

4. AGRICULTURE / HORTICULTURE

**FOOD
CASH CROPS
FRUITS**

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AGRICULTURE WITH TC



- ★ CABO VERDE - Isla do Fogo - Monte Genebra
- ★ Project 2002-2006
- ★ Vegetable production and fruit trees with TC
- ★ **Less water, more plant production**

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Horticulture with TC



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TERRACOTTEM (TC) and the TC-DIALOGUE Foundation

The story of a soil conditioner and its significance for humanity

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 **BURKINA FASO 1988**
Arbolle (Prov. Passore)


**Reforestation project
on clayey soil**
**No irrigation - only 3
months of rain / year**


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 **BURKINA FASO - ARBOLLE July 1988:**
100 g of TC in each plant pit



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*December 1988: Saplings growing without any irrigation (rainfed)*



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*December 1988: Research work (during 9 months dry season)*



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*April 1992: Remarkable outgrowth
only with 300 ml of rain (4 years old)*



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*July 1994: Young wood with
new vegetation cover (6 years)*



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 *July 1994: Young Acacia trees*



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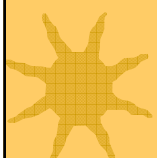
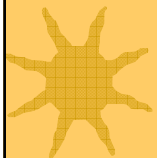
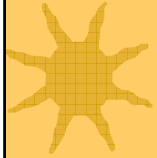
 *July 1997: Nature restoration*



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July 1997: Complete vegetation cover (9 years)

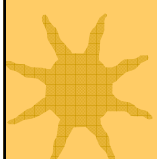
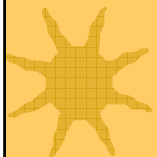
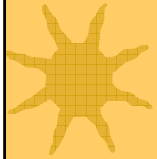


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July 1998: Biodiversity gained



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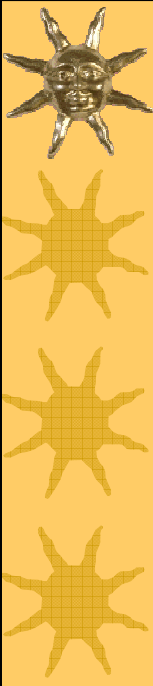


BURKINA FASO 1988
Niou (Prov. Kourweogo)


**Community garden on
lateritic soil**

50% of normal irrigation


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Burkina Faso July 1997:
Training / Capacity building





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 *July 1997: How to apply TC?*



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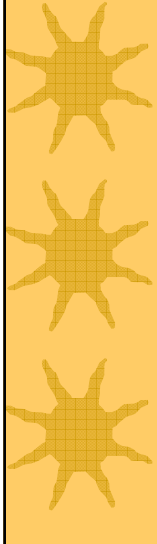
 *November 1997: Fantastic production of different species of vegetables*



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Food and annual income (market)

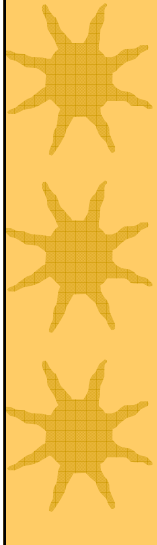


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A happy Prof

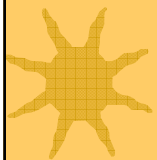
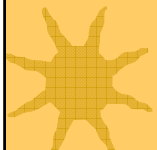


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*Local women have an easier daily task
(less work) and better standards of living*

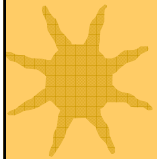
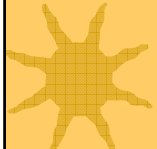


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Non-treated part of the garden



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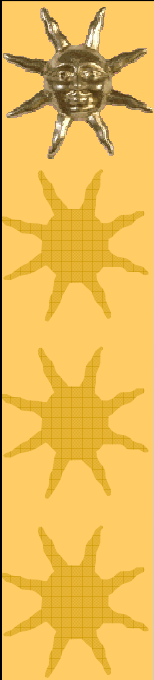
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 **CHINA 1995-1999**
Lanzhou area

Greenhouse project

82 greenhouses in 5 villages

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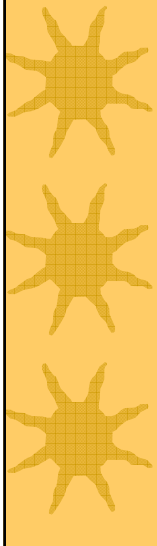
 **Greenhouse construction**



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Vegetables with TC in winter

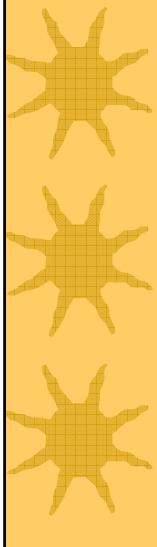


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Planting grafted water melon




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 *Nice tomato production*



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 *Happy farmer
(more food, more income)*



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Project commemoration plate



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*CABO VERDE 2002
Island of Sal*

School garden project

**Vegetables for daily
consumption at school**

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Parts of school yard transformed into small vegetable garden



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Fantastic food and fruit production with minimal watering



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Vitamins and Fe for school children



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Health and happiness



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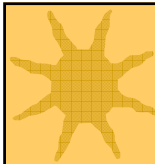


*Small scale projects can create
unforgettable smiles*



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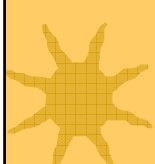
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***LET US EXCHANGE, TRANSFER
AND INTEGRATE OUR
KNOWLEDGE AND EXPERIENCE !***



***FOR THE BENEFIT OF DEVELOPING
COUNTRIES AND THE POOR RURAL
PEOPLE. THE IMPROVEMENT OF
THEIR LIFE IS MORE IMPORTANT
THAN OUR PERSONAL SUCCESS !!!***



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