Umwelt-Campus Birkenfeld | HOCHSCHULE TRIER

IfaS

SYNLIFT industrial products

SAREP SAHARA RENAISSANCE PROJECT

SAREP | Sahara Renaissance Project

THE TREES

Dr. Gerhard Ohlde

Plant Growth

Input

Desalinated Seawater

Use of renewable energies

Drip Irrigation/Fertigation

Nutrients (N, P, K)

Output

Carbon sequestration

Biomass (biofuel, plant oil, feed and food, timber, wood pellets

Trees‘ functions

- **Protect against wind and sand**

- **Grow**
  - → sequester C (certificates)
  - → provide OM / DM
    - → fuel as pellets
    - → biochar
      - → fuel
      - → soil improver
      - → soil C-stock
  - → material wood (construction, furniture)
  - → seeds (propagation, protein)

- **Reduce evaporation**
- **Reduce temperature**

Quick calculation aid:

$\frac{DM}{2} = C$

C x 3.6 = CO2

TREE CULTIVATION

- Year-round irrigation to utilize genetic plant potential

  → water supply
  → fertigation

- High DM-yields

- Species mix

  → phytosanitary precaution
  → fire lines
  → wind protection in height levels
  → resistant to high temperature
  → resistant to mild frosts

NOT IMPORTANT

→ drought resistance
→ resistance to dry seasons

CHOICE OF TREE SPECIES

- Subject of growth trials in starter plot phase

  → identify the ranking of species under local conditions
  → identify high DM-yield cultivars
  → identify perennial tree crops for the inside of farm perimeter (nuts, fruit, fodder for example)

- Long-term performance counts

  → indigenous species
  → imported species

- Fast growers with increased water requirements excluded, like Pennisetum spp. or bamboo. Target is C-removal combined with wood use-options.

CHALLENGE TO SELECT TREE SPECIES

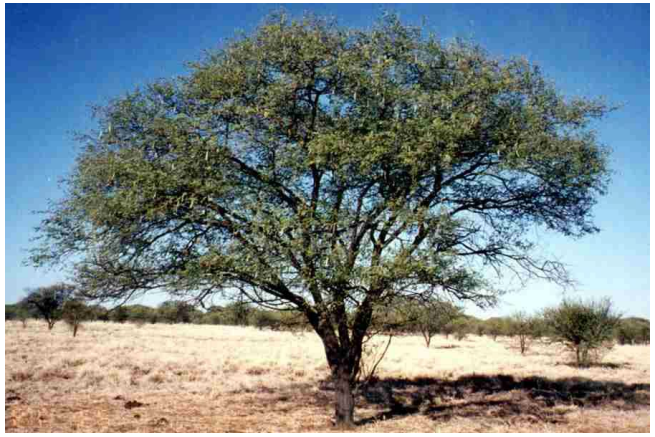
- Comparative trials lack inclusion of the subsoil parts / roots.
- Most trials were conducted under rainfed conditions.
- Important trials focus on adverse soil-pH-tolerance rather than yield.
- Important trials were conducted under 8 months duration of dry season.
- Important trials were conducted using non-specific / wild germplasm.

Tree DM-yields, tDM/ha/a

	Prosopis juliflora	Acacia nilotica	Casuarina equisetifolia	Eucalyptus tereticornis	Eucalyptus gomphocephala	Euc. camaldulensis
Singh, 1995*	77.8	64.6	56.3	44.6		
Singh, 2010**	70.6	63.5	52.6			
Ohlde, 2019***				53.2	70.3	51.1
Maghembe, 1983****	37 - 125 Av. 81.2					

*+ **: North India, 817 map, 8 months dry season, soil pH 8.5, no root-DM measurement.
* Gurbachan Singh, 1995, Practices for raising Prosopis plantations in saline soils https://www.fao.org/3/ad321e/ad321e08.htm Central Soil Salinity Research Institute, Karnal 132001, India
** Y.P. Singh • Gurbachan Singh • D. K. Sharma, 2010, Biomass and bio-energy production of ten multipurpose tree species planted in sodic soils of indo-gangetic plains, Journal of Forestry Research (2010) 21(1): 19−24, DOI 10.1007/s11676-010-0003-5
*** Ohlde et al., 2019, Biomass Production and Carbon Sequestration by Cultivation of Trees under Hyperarid Conditions using Desalinated Seawater (Sewage Water), Journal of Agriculture Food and Development, 2019, 5, 33-42
**** Maghembe et al., 1983, Biomass and nutrient accumulation in young Prosopis]uliflora at Mombasa, Kenya; Agroforestry Systems 1: 313-321; at map 1220, 4 months dry; no roots measurements
*,**,**** : no uninterrupted water supply

Prosopis juliflora Wikipedia.org

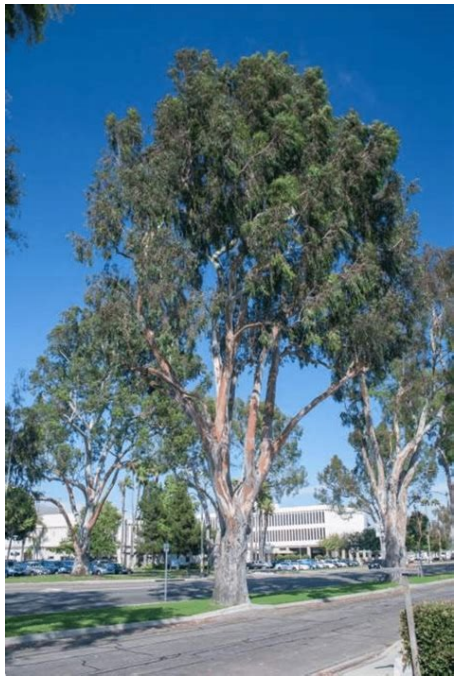


Acacia nilotica https://keyserver.lucidcentral.org/

Casuarina equisetifolia etsy.com

Eucalyptus tereticornis
Pinterest.com

Eucalyptus gomphocephala
australianseed.com



Eucalyptus camaldulensis
researchgate.net

Tamarix aphylla
powo.science.kew.org

Desert greening after 2 – 3 years

Eucalyptus camaldulensis 2 years after planting

Shelterbelt seen from the desert

Thank you for your time and attention!