



Accademia Nazionale dei Lincei

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# **The Great Green Wall of Chad between Agro-Forestry and Nutraceutical production**

**Vittorio Colizzi, Mahamat Hassane Idriss, Thomas Kukovec**

**National Agency for the Great Green Wall of Chad, Ministry of Environment of Chad,  
Italian Geographical Society, Tor Vergata Foundation, MAGIS Foundation**

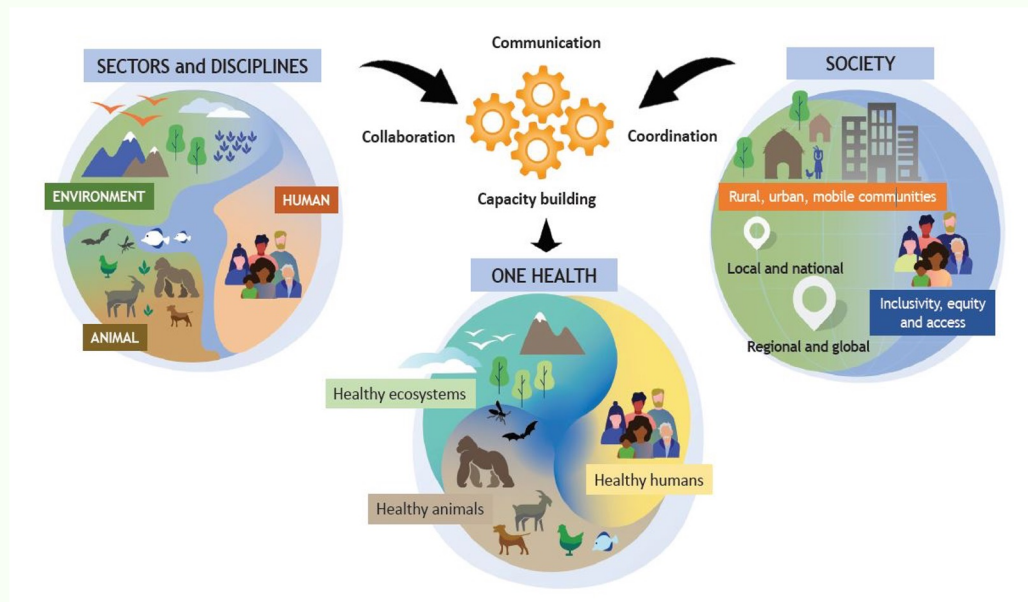


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per lo sviluppo



# One Health Approach

In the context of the GGW-Chad



A collaborative, multisectoral, and transdisciplinary approach — working at all levels — with the goal of achieving optimal health outcomes recognizing the interconnection between people, animals, plants, and their shared environment



# Nutra ceuticals



Nutraceuticals are products derived from food sources that are thought to provide additional health benefits beyond the basic nutritional value found in food.

Depending on the health system, products may assert to prevent chronic diseases, improve health, delay ageing, increase life expectancy or support the structure or function of the body.

# Nutraceutical Market



- The modern nutraceutical market began to develop in Japan during the 1980s. In contrast to the natural herbs and spices used as folk medicine for centuries throughout Asia and Africa, the nutraceutical industry has grown alongside the expansion and exploration of modern technology
- Production of nutraceutical is a multibillion dollar enterprise and Nanoparticle-based delivery system is one of the promising encapsulation technologies for the nutraceutical industry. Africa is a neglected continent for Nutraceutical market, but still 80% of Africans use traditional medicine



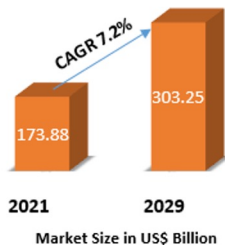
# Economical Feasibility and durability of CGW follow up

## Nutraceutical Market

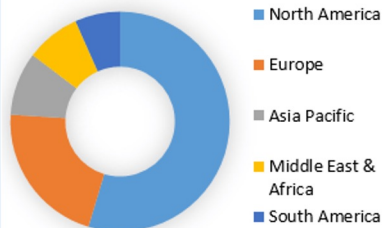


### Key Players

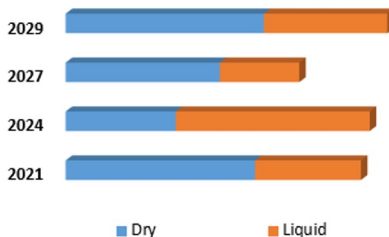
Cargill	Amway Corporation
Archer Daniels Midland Company	AOR Canada
DuPont	Arkopharma
Nestle S.A.	Laboratories S.A.
Danone	Bactolac
Royal DSM N.V.	Pharmaceuticals, Inc.
General Mills	E.I.D Parry Ltd.
Innophos	Valensa International
WR Grace	Matsun Nutrition



### Regional Analysis in 2021 (%)



### Form Segment Overview



The Nutraceutical Market in Africa is Segmented by Product Type (Functional Food, Functional Beverages, and Dietary Supplements), Distribution Channel (Drug Stores/Pharmacies, Online Retail Stores, and Other Distribution Channels), and Geography (South Africa, Nigeria, Egypt, and Rest of Africa)

# A new Nutraceutical Laboratory in Bafoussam, Cameroon

in partnership with CIPCRE, UEC, CNR,  
Camerino and Rome Tor Vergata Universities

The nutraceutical products will be initially processed locally by the GGW-Chad, then further processed in Bafoussam (Cameroon), where quality control, external certification, and commercial authorisation will take place. The final product will be marketed worldwide under the following protected global brand name:

***GGW-Nutraceuticals/Nutraceutiques***  
***GMV/Nutraceuticals GMV***

For over 5 years, UEC and the Universities of Camerino and Rome Tor Vergata have been training students (Masters and PhD) with specific joint courses with the staff of the Bafoussam Nutraceutical Laboratory.



**Nutraceutical Laboratory in Bafoussam, Cameroon**

# Seedling production of GGW-Chad



Six different large-capacity central nurseries provided with all the necessary equipment and infrastructure, have been created in five pilot regions. From 2012 to 2017 a total of 1,103,856 seedlings have been produced



The plants are:

***Acacia spp.***

***A. (Senegalia) senegal***

***A. mellifera***

***A. tortilis***

***Zizyphus spp.***

***Z. mauritiana***

***Prosopis spp. (neophyte)***

***Balanites spp.***

***(B. aegyptiaca)***

***(B. glabra e.g.)***





# Reforestation of seedlings

The Sahel region does not always favour the direct seed sowing, the GGW project supports the planting of seedlings previously produced in nurseries

From 2012 to 2016, approximately 994 Ha of perimeters were planted (approximately 618,809 seedlings)

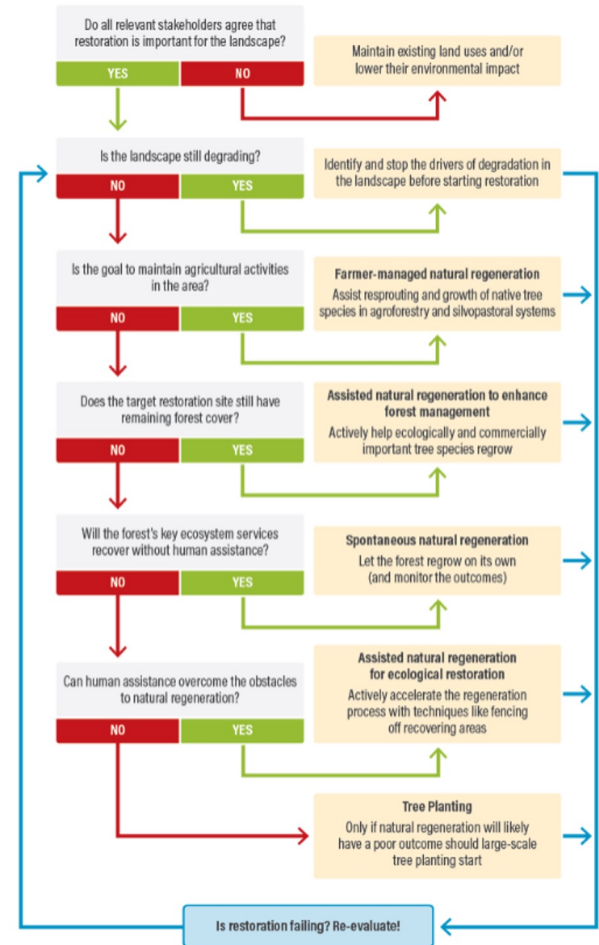
This represents 65% of the total production, in the years considered

# Assisted Natural Regeneration - ANR

ANR is a blend of active planting and passive restoration, where local people intervene and help to naturally recover trees and native vegetation by eliminating barriers and threats to their growth, leaning on their and on their ancestral traditions. (Yacouba Sawadogo in Burkina Faso e.g.)

ANR of ligneous and non-ligneous forest and fodder species in the Chad's area consists of defending a space by installing fences with durable local materials and conventional protection provided by the local communities. From 2012 to 2017 around 1,819 Ha of land were preserved in Chad for ANR projects.



















In Niger, Sahel's driest region, farmers have used ANR to regenerate more than 200 million trees since the 1980s.



# What about ANR at the GGW-Chad?

## How we can add social-economic value to local development?

How Do Different Restoration Techniques Bring Value To People And Planet?

	Type	Cost	Biodiversity Benefits	Economic Potential
Natural regeneration	Natural forest regrowth			
	Assisted natural regeneration			
Active restoration	Ecological restoration			
	Small farmer reforestation, e.g. agroforestry, woodlots			
	Commercial, large-scale reforestation			
	Commercial reforestation with safeguards, e.g. certification			

Source: Adapted from Chazdon, R. et al. 2017.

20.02.01



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# Classical Plant and Nutraceutical Production at GGW-Chad



Yadav, P., Kant, R., and Kothiyal, P. (2013). A Review on *Acacia tortilis*. Int. J. Pharm. Phytopharm. Res. 3, 93–96.

***Acacia tortilis***



A Hussein, et al. (2021). Hepatoprotective Effect of *Balanites aegyptiaca* Extract against Paraquat-Induced Liver Toxicity. Acta Sci. Nutr. Heal. 5, 110–119.

***Balanites aegyptiaca***



Prakash, O., et al. (2021). A panoramic view on phytochemical, nutritional, and therapeutic attributes of *Ziziphus mauritiana* Lam.: A comprehensive review. Phyther. Res. 35, 63–77.

***Ziziphus mauritiana***



Jarrar, Amjad H., et al. (2021). The Effect of Gum Arabic on Cardiovascular Risk Factors and Gastrointestinal Symptoms in Adults at Risk of Metabolic Syndrome: A Randomized Clinical Trial

***Acacia Senegal***



# Innovation of GGW-Chad with additional medical Plants: *Moringa oleifera* and *Azadirachta indica* (Neem)



Matic, I., Guidi, A., Kenzo, M., Mattei, M., and Galgani, A. (2018). Investigation of medicinal plants traditionally used as dietary supplements: A review on *Moringa oleifera*. J. Public Health Africa.



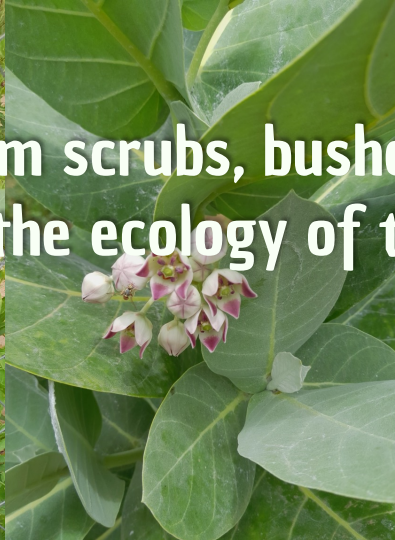
Paul, S., Reyes-Pérez, P., Angulo-Bejarano, P.I., Srivastava, A., Ramalingam, S., and Sharma, A. (2021). Characterization of microRNAs from neem (*Azadirachta indica*) and their tissue-specific expression study in leaves and stem. 3 Biotech 11.



# The importance of random scrubs, bushes and supposed "pest plants" for the ecology of the CGW

## *Calotropis procera*

Citation: Odukoya, J.O.; Odukoya, J.O.; Mmutlane, E.M.; Ndinteh, D.T. Ethnopharmacological Study of Medicinal Plants Used for the Treatment of Cardiovascular Diseases and Their Associated Risk Factors in sub-Saharan Africa. *Plants* 2022, 11, 1387. <https://doi.org/10.3390/plants11101387>



oder Arken genant und ist eine Maerna. Auch die *Calotropis procera* — Oschar arab., Taso ted. — tritt hier in grösserer Menge auf, die Dümpalme wird häufiger gesehen, und unter den Gräsern



Oschar arab. (*Calotropis procera*).

„Sahara und Sudan“ by *Gustav Nachtigal* (1879), original copy at the library of the ***Società Geografica Italiana*** (SGI), Villa Celimontana, Rome

„Also *Calotropis procera* — Oschar arab., Taso ted. — occurs here in larger quantities...”

waltet das hohe, verästelte Knotengras *Panicum turgidum* — Bü



# Importance of Undergrowth (Cover Crop)

*Balanites glabra* with Shorgum,  
Pumpkis and Feuilles d'haricot  
(*Vigna unguiculata*, fam  
*Fabaceae*) as Undergrowth





Minimum tillage, direct seeding or strip-till to reduce soil disturbance

## Importance of Soil Management (machanical)



Subsoiling or Ripping - breaking and roughing of the soil uniformly for a better water penetration











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# Thank you

*Laure Deutou  
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Marina Potestà  
Valentina Roglia*



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