

Revitalising oases through agroforestry and biochar

Agroecological techniques make the development of oases possible

In Algeria, an oasis revitalisation initiative was launched in 2019 by Dr. Mohamed Bouchentouf. This former executive of the Algerian Ministry of Agriculture and former director of innovation and development programmes of Pro-Natura International, is putting his great agroecological experience in Africa at the service of an ambitious project.

The initiative began with the creation of an ecological and innovative micro-farm called “La Clé des Oasis” (www.la-cle-des-oasis.fr), located in Timimoun, a town of the Gourara natural region in southern Algeria. The city was chosen for its representativeness of the Sahara on a socio-economic level.



Introducing biochar in soil



Gathering around Dr. Bouchentouf

The objective of the project is to build, from the current oasis production system, an agronomic system that makes it possible to anticipate climate change and overcome food crises. To do so, Dr. Bouchentouf relies on advanced agroecological practices and the use of biochar, which improve the quality and quantity of production.

The aim is to demonstrate, on an agricultural plot of one hectare, that a system of crops spread over five floors promotes synergies, allows the protection of water resources and promotes the diversification of production. Dr. Bouchentouf is supported in his initiative by the French company Sylva Fertilis, of the SLB International Group, which has provided him with a high-quality biochar, Crescilis (www.terrafertilis.com), allowing yields to increase dramatically.

The proposed model is extremely relevant in the context of climate change because it saves water, land, energy, inputs and working time, as well as reducing hardship. It also allows the sequestration of carbon in the soil permanently.

If this extremely profitable agroecological model were extended to all the oases of Algeria, it is estimated that it could create some 600,000 direct jobs, while enhancing the oases.

Principles of the multi-storey cropping system around the date palm

- Enhancement and optimal use of the cultivation space
- Creation of a dynamic complementarity of crops for better plant protection by promoting synergies and limiting competition between species
- Use of a range of 100% organic and natural agricultural inputs such as biochar
- Control of irrigation times and maintenance of the moisture level in the soil, with savings of 80% on water consumption
- Creation of an ecosystem conducive to biological interactions between plants, animals, insects, bacteria and fungi

First results of the micro-farm in Timimoun

The operation was launched in January 2019 on crop beds for vegetables in layers and with basins under date palms for vegetables and fruit trees.

The introduction of biochar into the soil for this model of multi-stage crops allowed:

- Very good conservation of moisture in the soil between two irrigations thanks to the high water-retention capacity of biochar, leading to savings of 80% of water;
- Improved resistance of crops to sandstorms and high temperatures;
- A spectacular increase in the yields of the main crops, between 50% and 200%.

Biochar is of particular interest as it retains its fertilising effect for hundreds of years.

Biochar testing on palm trees



*Young Takerbucht palm tree
planted in april 2019 with 3kg of biochar*



*15-year-old Hmira palm tree
with 2kg of biochar*

- For the young palm tree, 3kg of biochar added, distributed in a pit 60cm deep and 50cm wide.
- For the adult palm, 2kg of biochar added, distributed over the entire basin and buried at 5cm so as not to damage the superficial roots.
- Very good vegetative development is observed for the young planted palm, with very good resistance to high temperatures and sandstorms.
- Estimated yields per adult palm tree are 200kg thanks to biochar, compared to an average of 70kg without any organic amendment and 30kg in poor conditions.
- In terms of health, reduction of the infestation rate of parasites or diseases.
- No addition of chemical fertilisers or pesticides

Biochar tests on other trees important for the oasis



Moringa Oleifera without biochar



With biochar



The tests on “the miracle tree” *Moringa oleifera* have been successful and its adaptation in arid ecosystems has been done perfectly. The young pods and leaves are used as very nutritious vegetables, and the seeds are also used to purify water, as a detergent or as a medicinal plant.



Pear tree without biochar



With biochar

- Very good resistance to high temperatures and sandstorms
- Biochar dose: 150g per plant, depth of 20cm
- Supply of organic fertiliser (cattle manure): 1kg per plant
- No chemical fertiliser



100m-long Casuarinas used as a wind-breaker, seen here 14 months after plantation

Comparative yields on some annual crops with and without biochar

- | | |
|--------------------------------------|-------------------|
| • Potato: +102% | • Lettuce : +34% |
| • Barley (local variety): +140% | • Celery: +140% |
| • Durum wheat (local variety): +125% | • Okra: +25% |
| • Beans: +99% | • Courgette: +46% |
| • Turnip: +186% | |

Upcoming developments

The first priority for the year 2021 is to set up local production of biochar with a CarboChar-1. The raw material used will be a mixture of dry palms, date pedicels, palm leaflets, date scraps, stems and false palm trunks.

Within two years, the creation of a training centre specialising in agroecological innovation adapted to Saharan regions is planned.

After three years, the objective is to be able to disseminate the experience to 10 other oases in the Algerian Sahara. Subsequently, the same dissemination process could be implemented in the other Sahelian countries.



The CarboChar-1, a pyrolysis machine for biochar production

This initiative is supported by the main Algerian public bodies

Agence thématique de recherche en biotechnologies et en sciences agro-alimentaires
Commissariat au développement de l'agriculture des régions sahariennes
Institut technique du développement de l'agriculture saharienne
Institut de technologie moyen de l'agriculture saharienne

Contact

Dr. Mohamed Bouchentouf
Project director
groupe.africatech@gmail.com
+213 6 69 06 41 96

Mr. Guy Reinaud
President of Pro-Natura International
guy.reinaud@pronatura.org
+33 6 80 61 09 36

Pro-Natura International UK • 29 Downside Crescent, London NW3 2AN



Innovation towards sustainable development

www.pronatura.org