

June 14, 2011

Dr. Annette zur Mühlen
Consumer Specialties
CS SU
Phone +49 2151 38-1495
Fax +49 2151 38-1147
Mobile +49 015152655335
annette.zurmuehlen@evonik.com

Application for the European Responsible Care Award 2011

Project:

Use of STOCKOSORB® in Morocco to improve reforestation with Argan tree

Report was summarised by M.R. Chalhoub, A. zur Mühlen with the permission of Prof Dr Cherif Harrouni

General Description

Argan tree:

The Argan tree is endemic to Morocco, where its ecological formation covers an area of about 800,000 ha. The tree has developed assets that enable it to thrive in harsh environments (low rainfall, high temperatures and relatively poor soils). Thus the Argan forest in Morocco can be considered unique at the regional level in this latitude because there are only deserts.

The Argan tree is a multipurpose species: the foliage is grazed by animals, and its fruits are used for the extraction of valuable oil (nutrition and cosmetics) and the by-products are used (pulp, nuts, cake); its thorny branches are used as fences and wood is used for construction but also as fuel (firewood and charcoal). Especially the Argan oil, which has a high content of unsaturated fatty acids, is meanwhile regarded as a high value product and the export of the oil is growing.

The tree is used by the local population for centuries. However the area has shrunk by 50% over the last 100 years. Often Argan trees

Evonik Stockhausen GmbH
Bäkerpfad 25
47805 Krefeld
Germany
Phone +49 2151 38-01
Fax +49 2151 38-1647
www.stockhausen.com

Supervisory Board
Dr. Claus Rettig, Chairman
Board of Management
Peter Petit, Speaker
Willibrord Lampen

Registered Office is Krefeld
Register Court
Krefeld Local Court
Commercial Registry B 5791

plantation disappeared due to more intensive and often more water consuming cultivations like citrus trees.



Fig. 1: Grown up Argan tree



Fig. 2: Argan tree fruit

These ecological and agro-forestry-pastoral and the existence of a population with typical culture led to the erection of the Argan

forest as a Biosphere Reserve (RBA) whose proclamation was made by UNESCO in 1998.

There are 4 main reasons why reforestation with Argan trees should be encouraged:

- Argan oil is meanwhile regarded as a high value oil for food and cosmetics industry.
- the tree can help to decrease soil erosion and can combat desertification
- help to protect an endangered species
- Argan trees are offering preservation of natural resources and ensure the livelihood for the local population in arid climate zones. The tree can be used in many ways by the local population. This is getting more and more important under the view of climate change.

However research projects conducted to date have shown that it is very difficult to grow Argan trees in nurseries and to transplant seedlings. The survival rates are generally very low. This is limiting reforestation activities.

STOCKOSORB® is a hydrogel which is used in agro forestry for e.g. pinus and eucalyptus.

For more sensitive trees like the Argan tree, especially in these arid climatic conditions other techniques and application rates have to be used.

Our Creasorb technical team provided all information on eucalyptus and pinus to increase the survival rate of tree transplants and to decrease the irrigation and thus the water consumption after planting.

We learnt a lot during the project how these more sensitive tree seedlings have to be treated with STOCKOSORB®. In future due to climate change reforestation projects will be setup with endemic trees which in general have far lower survival rates compared to trees which are used in agro forestry. Therefore the new application aspects can also be used in other regions and take on greater significance.

Project:

Therefore the idea was to improve the effectiveness of reforestation with Argan tree in Morocco by the application of STOCKOSORB®.

The investigation was done by the “Institut Agronomique et Vétérinaire Hassan II” under supervision of Dr. C. Harrouni. The trials were done by involving the local people by using the association in these regions.

In 2009 some preliminary tests were done to define the best application rate and the application method.

Before planting, the soil was pre-hydrated and mixed with STOCKOSORB® and then Argan seedlings were planted.



Fig. 4: Application of pre-hydrated Stockosorb during Argan seedling plantation

3 different sites in the region of Agadir were selected. In May and June 2010 1,095 trees were planted. In total on an area of 250 ha Argan trees were planted.

In one group the trees were irrigated once a month with 30 L of water. 92 served as control group that means no STOCKOSORB was applied during planting.

The other group of transplants were not irrigated at all. Here 159 trees were included in the control group.

Survival rates were determined after 2, 3 and 5 months after planting.

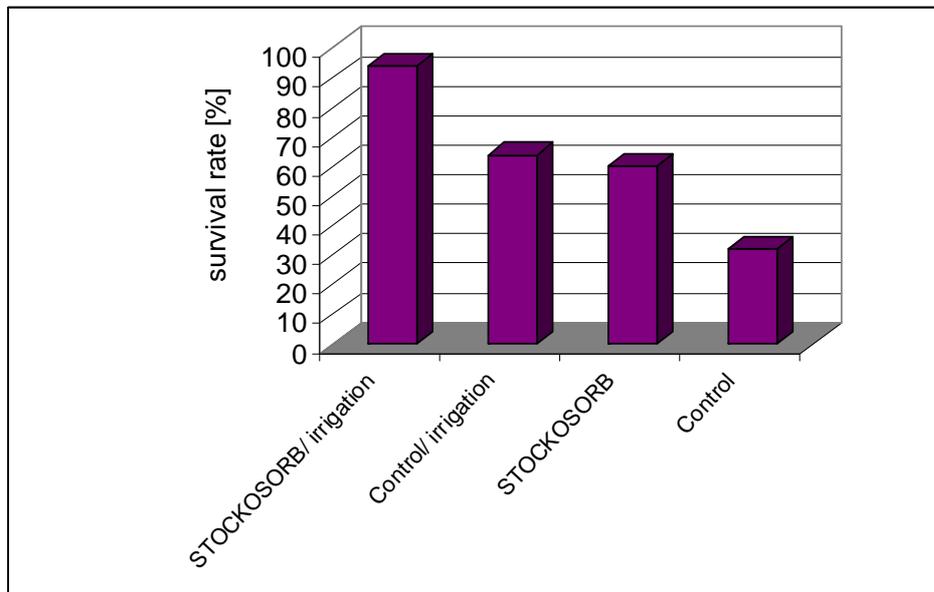


Fig. 5: Survival rates of transplants in % after 5 months of one selected region.

The results demonstrated that by using STOCKOSORB®- even without irrigation- the survival rates were increased in the range of 29 up to 50%. A far more effective reforestation with Argan tree could be achieved with STOCKOSORB®.

In the control group 35-68% of the trees were dying shortly after planting. This means that after a certain period trees will be replanted which is increasing the cost for reforestation.

Even the irrigation, which is often done manually, can be omitted, because Stockosorb treated trees without irrigation showed a very similar or even better survival rate compared to the irrigated control group without STOCKOSORB®. This is very important because in the region water is often short. By omitting the irrigation after planting 360l water per tree per year, the transportation and pumping cost of water and the labor cost can be saved by using STOCKOSORB®.



Fig. 6: Argan tree plantation

These results demonstrate that STOCKOSORB® can help to achieve a successful replanting of Argan trees, save water and subsequently create a far more cost effective reforestation. Findings are very important for future reforestation projects with endemic trees.

Acknowledgements:

- The project was supported by L'Association locale Agro Tech, Souss-Massa-Draa within the program "recherche sur l'Arganier" de l'Agence de Développement Social.
- STOCKOSORB was provided par M. Samir Idrissi Amrani, American Diversified Industries Inc.
- Project was realised by "Institut Agronomique et Vétérinaire Hassan II" under supervision of Dr. C. Harrouni