

Glass Soil Conditioner Enables Sustainable Agriculture in Arid Regions



Porous Alpha proved effective at this test field in Souss Massa, central Morocco. Courtesy of Tottori Resource Recycling, Inc.

A soil improvement agent based on foamed glass is helping to solve global issues such as water shortages due to climate change and food shortages caused by the increasing population.

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THE soil improvement agent “Porous (POROUS ALPHA)” has been developed through industrial-academic joint collaboration between Tottori Resource Recycling, Inc., based in Tottori prefecture, and the Arid Land Research Center, Tottori University. POROUS ALPHA is a soil conditioner for water conservation in irrigation systems. It achieved excellent results in an experimental project that grew tomatoes and green beans in Morocco, a semi-arid region near the Sahara Desert.

Tottori Resource Recycling, Inc. has ten employees engaged in business to recycle waste glass. Yoshiaki Takeuchi, the company’s president and CEO, describes the development of POROUS ALPHA:

“The beginning of our company was when we developed

our glass foaming technology by burning pulverized glass with additives such as shells and calcium carbonate. The product was initially sold as civil engineering material but sales were poor. Then, the Arid Land Research Center of Tottori University, one of the local research institutions, suggested using the product as a soil conditioner for agriculture.”

Tottori Prefecture, which faces the Sea of Japan, has one of the largest sand dunes in Japan and gave birth to local specialty products grown in the sand dunes. The Faculty of Agriculture of Tottori University has long been engaged in the development of technology to cultivate crops in this sandy area. It has successfully grown Japanese leeks, green onions and Chinese yams. In 1990, the Sand Dune Utilization Research

Institute was reorganized into the Arid Land Research Center, Tottori University. As a joint usage/research center in the field of arid land science, researchers visit from all over the world.

The foamed glass developed by Tottori Resource Recycling, Inc. is a porous material which stores water and soluble fertilizer when mixed in soil. In addition, since the glass is made from silica, which originally exists in the ground, it has a very low environmental impact. Focusing on its advantages, the Arid Land Research Center of Tottori University repeated the test of using foamed glass as a soil conditioner, and after confirmation of the performance and safety, POROUS ALPHA was commercialized.

Mauritania, located in the northwestern part of Africa, was the first location in the POROUS ALPHA verification survey. One of the Mauritanian students from the Arid Land Research Center of Tottori University served as intermediary. Subsequently, Tottori



Yoshiaki Takeuchi, president and CEO of Tottori Resource Recycling, Inc.
Photo: Kumiko Sato

Mise en Valeur Agricole, Souss-Massa, under the Ministry of Agriculture, Maritime Fisheries, Rural Development and Water and Forests of Morocco, Tottori Resource Recycling, Inc. demonstrated a 28% yield increase in

countries for business expansion and it leads to international contributions. In August 2017, the company accepted a foreign student for the first time through the JICE (Japan International Cooperation Center) Internship Program for the United Arab Emirates (UAE). The student is now receiving training as an intern at the company.

Resource Recycling, Inc. carried out verification surveys in Kenya and Senegal. The effectiveness of POROUS ALPHA was highly evaluated in these surveys and the product was registered in the United Nations Industrial Development Organization (UNIDO) environmental technology database. Since 2015, the company has implemented a verification/dissemination project in the Souss Massa region (central Morocco) through “the Verification Survey with the Private Sector for Disseminating Japanese Technologies for Water-Saving Agriculture in Arid Area in Morocco” financed by JICA.

Morocco is an agricultural giant where production on large-scale farms is thriving. It is well equipped with facilities to reduce water consumption, including drip irrigation. The country’s high-quality tomatoes have the fourth largest export value in the world. However, in recent years, the groundwater level has declined, raising concerns about the depletion of water resources.

In the POROUS ALPHA verification survey conducted in collaboration with the Office Régional

tomatoes while conserving 50% of the water supply.

According to Takeuchi, “If water consumption is reduced by half, you might be able to increase the crop acreage. While the Moroccan Government is advancing infrastructure development, such as irrigation for agriculture, you might be able to reduce the infrastructure size. We expect that the introduction of POROUS ALPHA will enable many future discussions.”

The company plans to construct a local production factory if a certain level of demand is foreseen in the future. It is also planning a verification survey in Peru, where large-scale agriculture is practiced in arid regions.

The company is looking ahead to the expansion of its business to the Gulf countries in the future. The acceptance of foreign students plays an important role in reaching mutual understanding with foreign

Says Takeuchi, “It is impossible for small and medium companies like ours to expand overseas on our own. I believe that we owe our current success to encounters with a variety of people, including professors at Tottori University, overseas students, consultants who negotiate overseas and JICA staff.”

Approximately 40% of land in the world is in an arid region. Problems such as drought and desertification due to climate change are becoming more serious. Tottori Resource Recycling, Inc. will continue its research and development in the future, hand in hand with the people working to address these global issues. ▮



Yoshiaki Takeuchi plants tomato seedlings with Office Régional de Mise en Valeur Agricole du Souss Massa Director-General Hro Abrou.
Courtesy of Tottori Resource Recycling, Inc.