

Date palms picky about bacterial partners

September 10 2019



KAUST scientists wanted to know the factors that determine which bacteria associated with the roots of cultivated date palm trees. Credit: Ramona Marasco

Bacterial DNA sequencing analyses show date palms that are cultivated over a vast stretch of the Tunisian Sahara Desert consistently attract two types of growth-promoting bacteria to their roots, regardless of the location. This finding could help with improving crop cultivation in a warming climate.

Many factors influence which growth-promoting bacteria associate with [plant roots](#), including [plant species](#), plant community diversity,

[agricultural practices](#) applied and [soil type](#). Research conducted on [natural ecosystems](#) shows that different types of wild plants attract different growth-promoting bacteria depending on their needs. Studies on conventional agricultural ecosystems have shown plant-root-bacteria associations vary according to the type of soil and the agricultural practices applied. Another KAUST study recently found that the roots of speargrass growing in the Tunisian desert aren't picky at all: they attract whatever growth-promoting bacteria they can find in the surrounding resource-poor sand.

"But what happens in ecosystems where features of natural and agricultural environments converge, like in desert oases?" asks KAUST graduate Maria Mosqueira. "Under a climate change scenario, it is important to understand the role of microorganisms in arid ecosystems," she explains.

Mosqueira, and colleagues working with Daniele Daffonchio, conducted microbiome analyses to identify the types of bacteria associated with the roots of cultivated Deglet Nour date palms in seven oases distributed over a vast 22,200 kilometer square stretch of the Tunisian Sahara Desert. The oases were located in contrasting environments: on the seacoast, in the mountains, among sand dunes and in the saline soil regions of the northern edge of the Tunisian Sahara Desert. Analyses of the ribosomal RNA gene were also conducted to test for the types of bacteria present in the surrounding sand/soil.



The team found that the Sahara palm tree roots consistently associated with two types of bacteria. Credit: Ramona Marasco

They found that the soil directly attached to the date palm roots was significantly modified compared to the surrounding "bulk" soil. And even though the dominant bacterial species in bulk soil varied from one location to another, date palm roots consistently chose to associate with the same two types of bacteria: Gammaproteobacteria and Alphaproteobacteria. These [bacteria](#) provide important services to the date palms—they promote the secretion of an important plant growth hormone and provide a protective effect against stresses like drought.

"We hope that our study will lead to other microbial ecology studies on desert oasis ecosystems; one of the most productive, yet unique, agroecosystems," says Mosqueira.

The research group has several existing projects investigating [desert plants](#) and their associated microbiomes. A future focus will be to better

understand the molecular interactions between plant roots and microbes as well as find ways to apply this knowledge to provide protective and nutritional services to agricultural crops grown in arid regions.

More information: Maria J. Mosqueira et al. Consistent bacterial selection by date palm root system across heterogeneous desert oasis agroecosystems, *Scientific Reports* (2019). [DOI: 10.1038/s41598-019-40551-4](https://doi.org/10.1038/s41598-019-40551-4)

Provided by King Abdullah University of Science and Technology

Citation: Date palms picky about bacterial partners (2019, September 10) retrieved 25 April 2024 from <https://phys.org/news/2019-09-date-palms-picky-bacterial-partners.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.