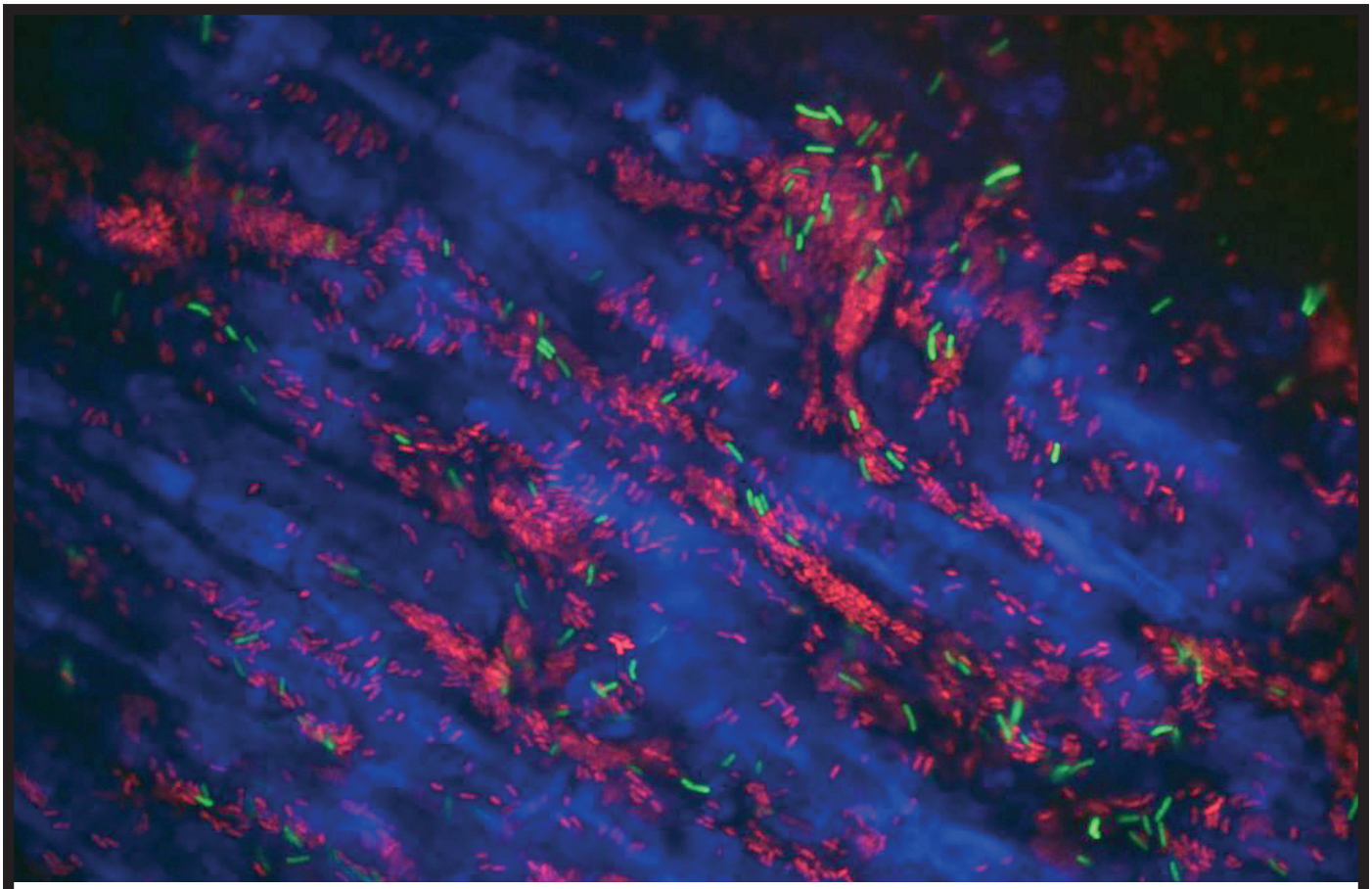

PLANT-ASSOCIATED BACTERIA

SMALLEST CREATURES … BIGGEST HEROES

INTRODUCTION

Each plant is colonized by millions of bacteria. They are present all over the plant, inside and outside, going from the roots, to the stem to the leaves. Plant-associated bacteria are known to assist their host during growth and development. They use direct as well as indirect mechanisms to promote plant growth. Some bacteria for example can produce typical plant hormones (e.g. auxins) or nutrient-binding chelators and in this way directly stimulate plant growth. Indirect mechanisms to promote plant growth include the competition with or detoxification of pathogens.

When plants are growing on marginal land, including extremely dry, nutrient poor as well as contaminated land, plant-associated bacteria can even play a bigger role. On top of the regular plant-growth promoting actions, they can also moderate the plant's ethylene levels, a general plant stress hormone that is elevated when plants are growing under marginal conditions. Moreover, some plant-associated bacteria can detoxify and/or degrade contaminants, resulting in an enhanced plant growth, but also in an increased remediation efficiency.

Despite the natural presence of these bacteria in association with plants, their beneficial effects can be further exploited by enriching the most promising bacteria by means of inoculation. For a successful inoculation, a large number of the appropriate bacteria are typically added to plant seeds or developing roots.

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KNOWLEDGE IN ACTION

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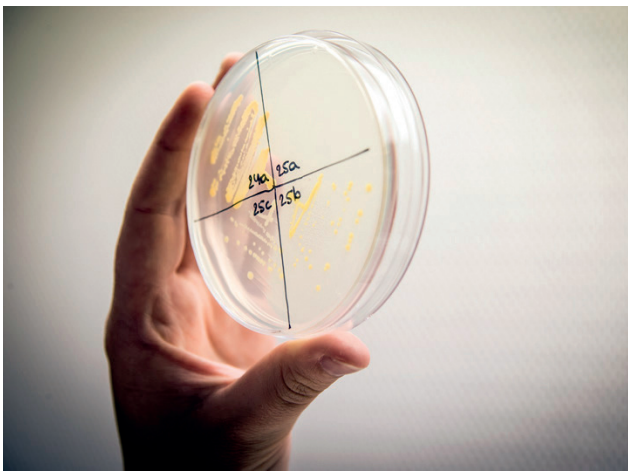
OUR RESEARCH AND DEVELOPMENT

The Centre for Environmental Sciences (CMK) at Hasselt University has a long tradition (from 1976) in the study of the physiological, biochemical and molecular aspects of abiotic stress in plants. From 1996, expertise has been built up on the role of plant-associated bacteria in plant growth and development and the exploitation of these partnerships to improve biomass production and bio(-phyto)remediation of contaminated soils. Studies are performed both at laboratory (from molecular to physiological) and field scale.

Bacteria are isolated from a broad range of plants (e.g. poplar, willow, rapeseed, maize, grasses, tomato, yellow lupine, zucchini,…) growing on different types of soil including very dry, nutrient poor, contaminated (metals and/or organic contaminants) as well as average agricultural soil. We developed a high-throughput *in vitro* screening assay to test the isolated strains for their capacity to promote plant growth (production of IAA, acetoin, organic acids, siderophores, ACC-deaminase, N fixation, P solubilization), to degrade organic contaminants (mineral oil, BTEX, TCE, DDT, TNT); and for their metal resistance (Cd, Zn, Pb, Ni, As).

In a next phase, a first selection of bacteria is tested *in planta* by means of lab-scale inoculation experiments where their effect on plant growth and development and on remediation efficiency is evaluated. Ultimately, the most promising strain(s) is full-genome sequenced and tested in the field.



OUR UNIQUE OFFER FOR YOU

BACTERIA COLLECTION

(Exclusive) access to

> 5000 bacterial strains

that are

identified based on the 16SrDNA
fully in vitro characterized

including

Plant growth promoting bacteria
Metal resistant bacteria
Organic degrading/detoxifying bacteria

originating from

soil / rhizosphere
root / stem / leaves

EXPERTISE

Phenotyping

High-throughput in vitro characterization
In planta characterization by inoculation experiments
PICRUSt, Ecoplates approach for whole community characterization

Genotyping

16SrDNA identification
Whole genome sequencing
Omics approach for whole community characterization

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