

PATBIOCON: Development of a biocontrol product effectively suppressing bacterial soft rot on potato tubers in storage



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Rationale

Bacterial **soft rot** is a plant disease causing significant losses in the storage of vegetables worldwide. The **affected plants include potato (*Solanum tuberosum* L.)** – an important staple food crop. Depending on the region, the disease is caused by different species belonging to ***Pectobacterium*** or ***Dickeya*** genera (formerly pectinolytic *Erwinia* spp.). The means to fight these pathogens are scarce.



Fig. 1 Tuber tissue maceration due to bacterial soft rot.

Aim

The aim of **PATBIOCON** is to develop a prototype of a microbe-based biocontrol product, effective against soft rot during storage of potato tubers

Selection of candidate strains (stage I)

START

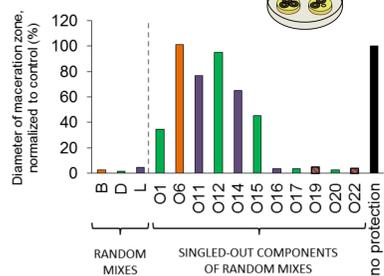
Twenty-two bacterial strains of different species, all known to show antagonism towards *Pectobacterium* and/or *Dickeya*

Composition of multiple random mixtures comprising 4-5 microorganisms

Screening of random mixtures for biocontrol potential on potato tubers, infected with a blend of six species of soft-rot strains

Random mixtures showing any reduction of soft rot were split into individual strains, and the effective components of the mixtures were identified in assays on wounded tuber tissue

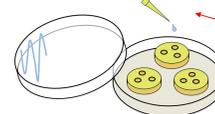
Incubation in **disease-conductive conditions** 28°C, high humidity



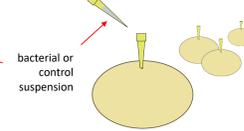
Five strains were selected (O16, O17, O19, O20, O22), showing up to 97% reduction of soft rot symptoms in tuber slices assay and up to 87% reduction in tuber spiking experiment

Fig. 2 Reduction of soft rot symptoms on potato tuber slices obtained due to application of random microbial mixtures and their individual components (strains). Each result is a mean of 18 tech replicates.

tuber slices assay



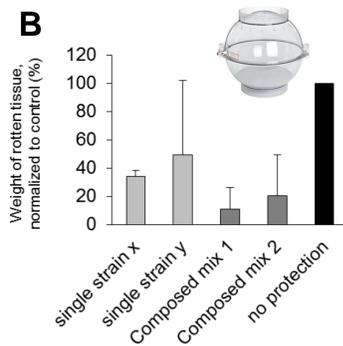
tuber spiking assay



Biocontrol potential of the five promising strains was further evaluated on intact, vacuum-infiltrated seed tubers – an assay more faithfully reflecting the real-life situation. Best results were obtained for mixed-strain inoculants, comprising one or more of the five promising antagonists.



Fig. 3 Soft rot symptoms (A) on whole vacuum-infiltrated seed tubers and symptoms reduction due to application of bacterial preparations (B).



Ongoing and future tasks

Currently, we evaluate the stability of various formulations of the five promising strains. The biocontrol efficiency of the formulations will be tested on seed tubers in provocative conditions (laboratory scale) and in mimicking commercial tuber storage conditions (semi-technical scale). Other qualities of the strains, important for their commercialization (i.e. potential pathogenicity to eukaryotes) are also investigated.

Developed solutions will be covered by patent protection.