

Biocontrol proteomics:

Role of the pentose phosphate pathway in the antagonist effect of *Pichia anomala*.

A. Kwasiborski¹, P. Delaplace², J. Renaut³, P. Lepoivre¹ and M. H. Jijakli¹

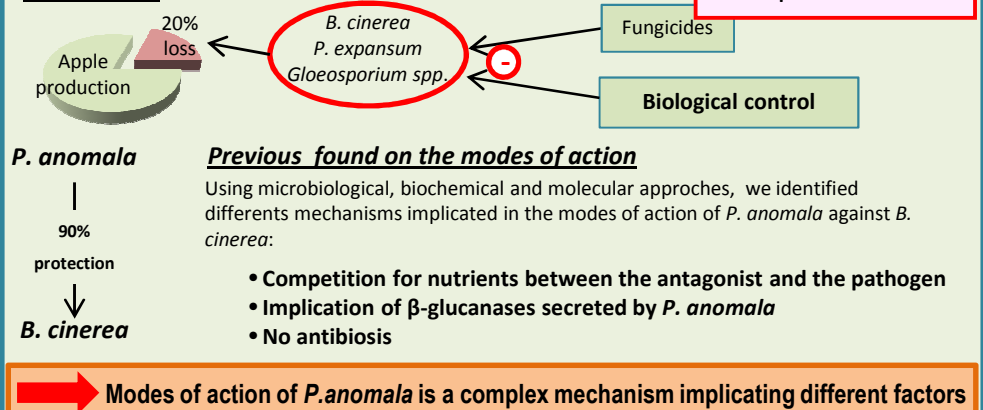
¹ Plant Pathology Unit, GxABT, ULg, Gembloux, Belgium. ² Plant Biology Unit, GxABT, ULg, Gembloux, Belgium. ³ Proteomic platform, CRPGL, Belval, Luxembourg.

Objective

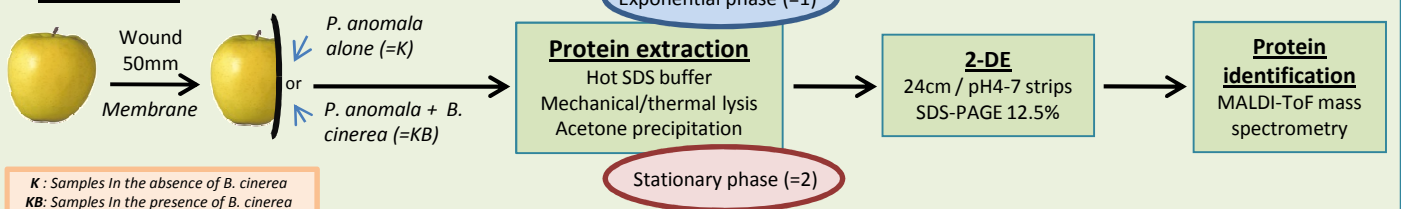
This work aims to study the modes of action of *Pichia anomala* strain Kh6 with proteomic tools. *P. anomala* is an antagonistic yeast on post-harvest apples against *Botrytis cinerea*.

The proteomic is a method without *a priori* able to offer a global view of the host/antagonist/pathogen interactions. The proteins being the metabolic actors, the application of that method will lead to the identification of the implicated metabolic pathways under *in situ* conditions.

Context



Method



Results

Number of proteins influenced by the absence (K1) or presence (KB1) of *B. cinerea*

In the exponential phase

Protein function	K1	KB1
Proteins synthesis		
Nucleotide synthesis	1	2
Transcription	0	2
Amino acid synthesis	5	5
Ribosome synthesis	3	1
Translation	4	7
Cell division		
Glycolysis	0	3
Energetic metabolism		
Citric acid cycle	3	4
Oxidative phosphorylation	2	2
Pentose phosphate pathway	1	7
	0	5

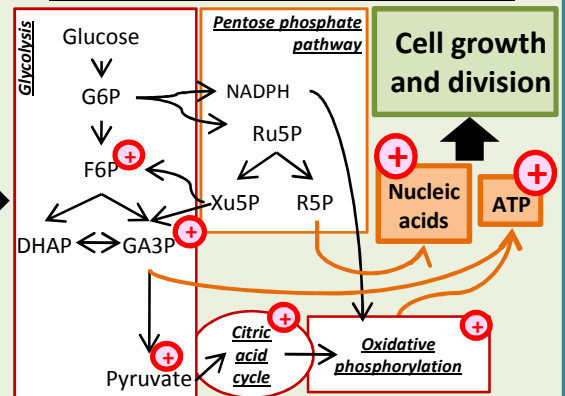
New orientation of the genome expression

Increase of cell division

Orientation from glycolysis to oxidative phosphorylation

Set up of the pentose phosphate pathway

Implication of the Pentose Phosphate Pathway



P. anomala needs nucleic acids and energy to stimulate a novel genome expression in presence of *B. cinerea*. These novel orientations lead to use oxidative phosphorylation and set up the pentose phosphate pathway and allow *P. anomala* to colonize efficiently the wound and to prevent the growth of *B. cinerea*.

In the stationary phase

Number of proteins influenced by the absence (K2) or presence (KB2) of *B. cinerea*

Protein function	K2	KB2
Energetic metabolism		
Glycolysis	3	5
Alcoholic fermentation	3	2
Protein synthesis		
Nucleotide synthesis	0	1
Amino acid synthesis	0	3
Ribosome synthesis	0	1
Traduction	0	1

Orientation to the alcoholic fermentation

Metabolic delay due to the introduction of *B. cinerea*

P. anomala in absence and presence of *B. cinerea* uses the alcoholic fermentation to face the nutrients impoverishment. However, a metabolic delay due to the introduction of *B. cinerea* is observed.

Conclusion

This proteomic study strengthens the hypothesis of competition for nutrients as one of the modes of action of *P. anomala* against *B. cinerea*.

The novel orientation of *P. anomala* metabolism to pentose phosphate pathway during the exponential phase might allowing the yeast to be an efficient nutrient competitor against *B. cinerea*. When the wound is colonized, *P. anomala* uses the alcoholic fermentation which might help the yeast to face the nutrient impoverishment and to maintain its competition against *B. cinerea*.