

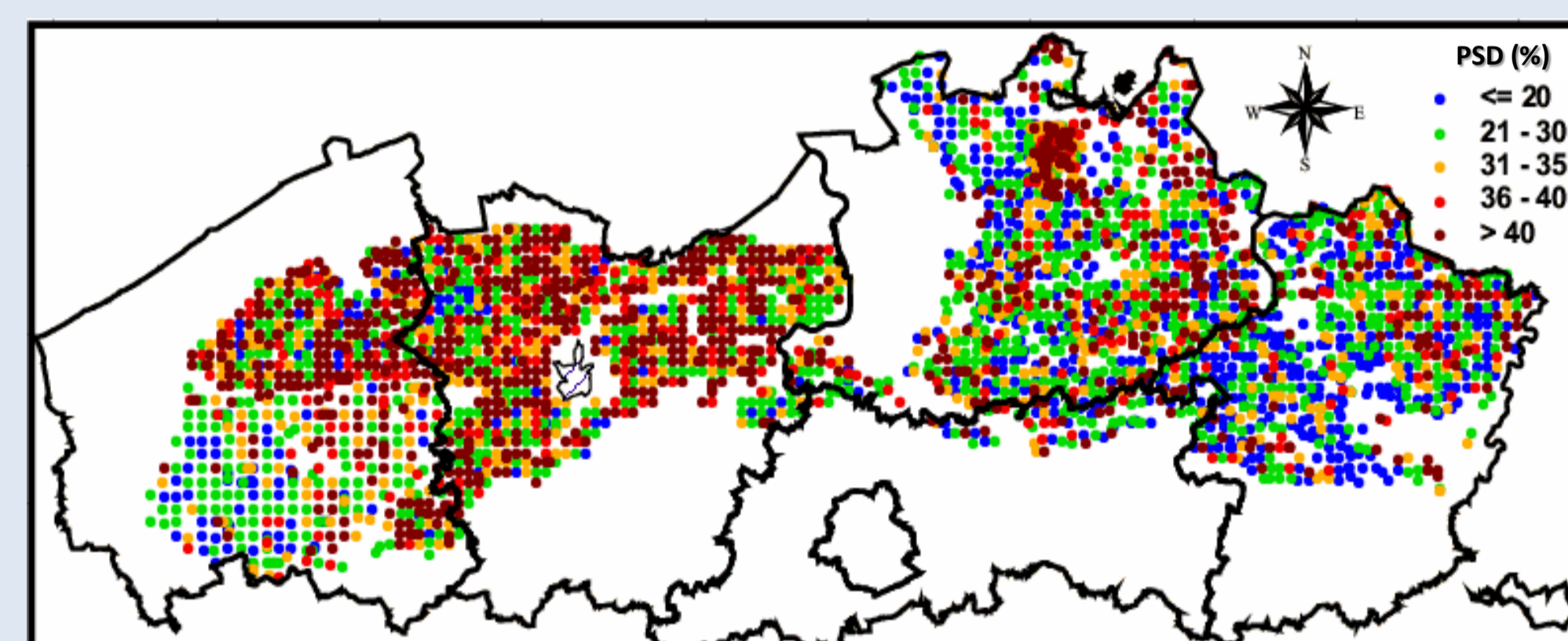
A large part of acid sandy soils in Flanders are P saturated

Due to decades of excess phosphorus fertilization and manuring in Flanders, a P accumulation occurred, especially in the acid sandy soils.

To keep the risk of eutrophication to a minimum the government enforced following criteria to characterise zones, with a certain phosphate saturation degree (PSD), where special attention to phosphorus is necessary :

P critical → PSD > 25%

P saturated → PSD > 35%



In both areas farmers are bound to very strict P fertilization rules. In initial stages of plant growth, P fertilization may be needed even in P saturated soils, since most of the P is strongly adsorbed and not available for plant uptake.

PSB are able to solubilise fixed phosphorus

The **phosphate solubilising bacteria (PSB)** used in the experiment **survived** and **developed** in conditions of **high insoluble phosphate concentrations**.

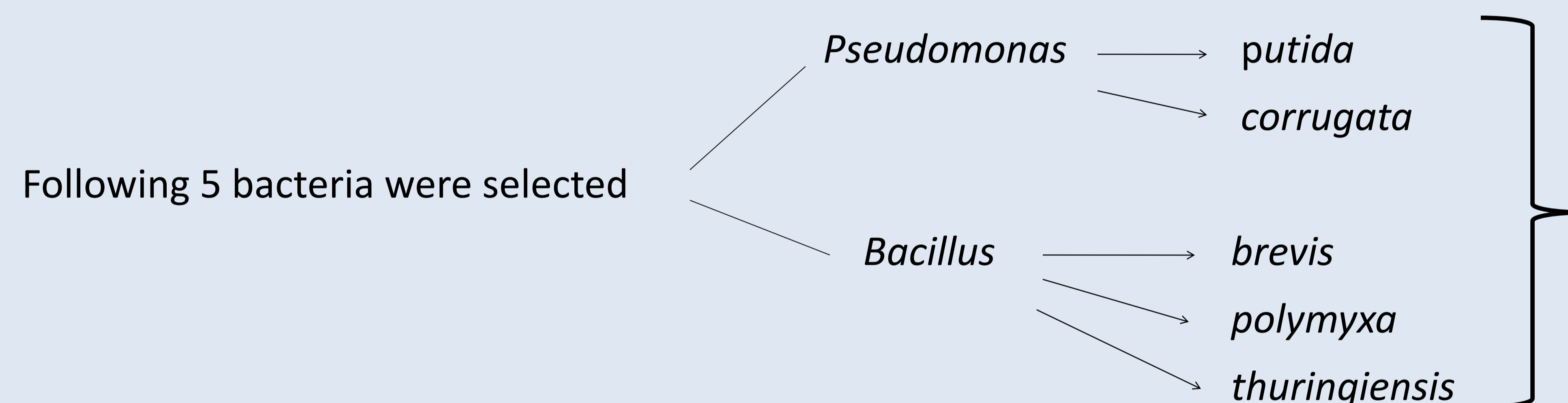
Pseudomonas putida and *Bacillus brevis* were the **most successful PSB** when they were brought into, a more realistic, **sand** environment with high P conditions.

Work in progress

Now we are testing *Pseudomonas putida* and *Bacillus brevis* in real soil with a known phosphate saturation degree. Each PSB is inoculated separately and combined.

These PSB and maybe other PSB need to be tested more intensively to see how they develop under different conditions of PSD.

5 phosphate solubilising bacteria are selected based on a literature search



These bacteria were shown to solubilise phosphorus in P deficient situations.

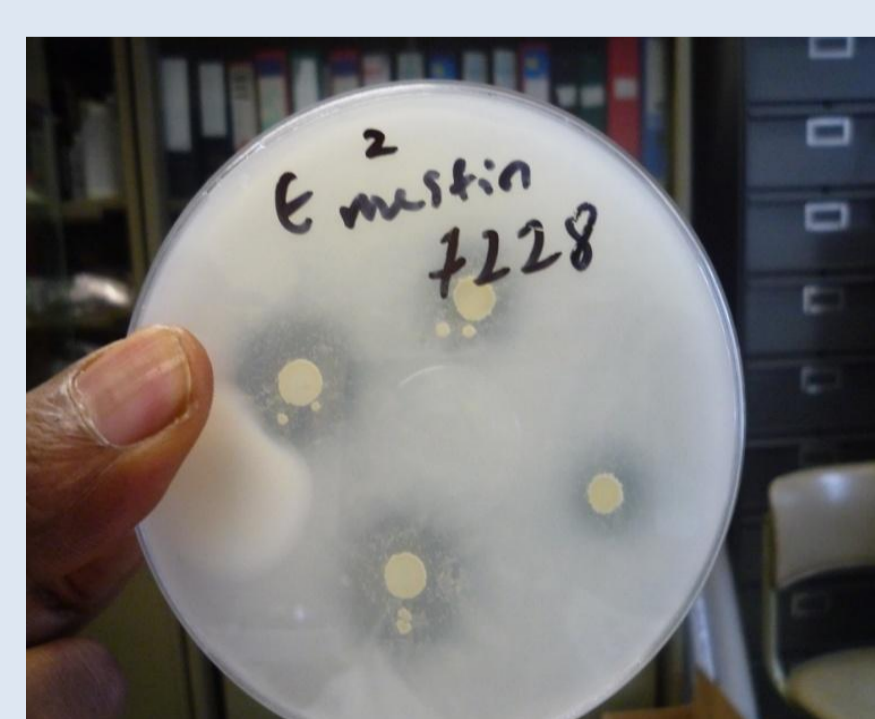
But do they have the ability to solubilise P in soil with an abundant amount of P?

PSB are able to grow on plates with different ratio of N and P

The bacteria were tested on several media with insoluble Ca-P, Al-P & Fe-P sources in different concentrations :

Low P + Low N	} The plates were incubated for 14 days Measuring of the growth + halo zone was done 3 times
Low P + high N	
High P + low N	

Visual observation yielded following results :



Almost all bacteria could survive and grow in these conditions.

Following bacteria had grown significantly better than the other bacteria in the same media:

For **Al-P** : *Bacillus polymyxa* & *Pseudomonas putida*
 For **Fe-P** : *Bacillus thuringiensis* & *Pseudomonas putida*
 For **Ca-P** : *Pseudomonas putida* & *Pseudomonas corrugata*

PSB are able to solubilise fixed P in a sand experiment

40 g of pure acid washed sand → NO nutrients or organic matter

+ known nutrient solution (without P) + insoluble

- Ca-P
- Fe-P
- Al-P



+ inoculation of each bacteria separately

⇒ Incubated for 14 days with a sampling on day 7 and day 14

At each sampling period the pH and $P_{lactate}$ and P_{water} was measured

Following bacteria did significantly better than the control (without bacteria):

For **Al-P** : *Bacillus brevis*, *Pseudomonas putida*
 & *Pseudomonas corrugata*
 For **Fe-P** : *Bacillus brevis*, *Pseudomonas putida*
 & *Pseudomonas corrugata*
 For **Ca-P** : *Pseudomonas putida*