Department of Soil Quality

SOQ Newsletter 10, June 2016

Welcome to the 10th edition of the SOQ newsletter. The next release is scheduled for October, so please send in contributions before September 15, to Marnella van der Tol

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Introducing MSc students

Hello! My name is **Andreas Altinalmazis – Kondylis**, and I am from Athens, Greece! Being a creative person myself, I was always fascinated by nature and was intrigued to learn more as I became older. I find the components of making a productive and sustainable ecosystem exciting, therefore leading me to study at the Department of Natural Resources Management and Agricultural Engineering at the Agricultural University of Athens. I continued my studies with an MSc in Organic Agriculture at the University of Wageningen. Currently, I do my thesis on the impact of agricultural management and plant domestication on the level of colonization with arbuscural mycorrhizal fungi and the specific root length of plants. I am curious to see the implication of agricultural management on the mycorrhiza. I like to play piano, guitar and enjoy life! In the future, I would like to go back to Greece and help farmers improve their production.

Olá!
I'm **Ana Mota** and I'm from Portugal. I have a bachelor in Biology and Geology and I'm currently a MSc student for Agronomic Engineering. I'm here for my thesis research. I'm working with Thom and Abebe on the effect of the delayed application of N-rich substrate on N-losses and GHG emissions during compost.
In my free time I like to go hiking and I really enjoy the 'Geocaching' challenges. One of my interests is to give a new purpose to objects/materials that would end up in the trash. I love being outside, feeling the sun & nature and if there's music, perfect!
After my studies I hope I can make the world a slightly better place to live.

See you around!!

Hello, my name is **Joep van Haeff** and I grew up in Neer, a small village in the south of the Netherlands. A few year ago I moved to Wageningen to start my bachelor Soil, Water and Atmosphere. At this moment I am doing the master Earth and Environment and starting my thesis. I will work on the research in the micronutrient selenium project of Supriatin Supriatin. Beside my study I am an active member of our study association Pyrus and at the student association K.S.V. Sint Franciscus Xaverius, where I often can be found. At my parents' I like to mountainbike in the tiny mountains of the Netherlands. After I finish my thesis I plan to do an exchange semester in Chili and finishing my master. So I hope to see you around.

My name is **Joshi Lenferink** and I'm 25 years old. My name might not suggest it, but I'm 100% Dutch. I love travelling, listening to music and reading fantasy books in my free time. My bachelor is Aquatic Ecotechnology, which I did in the Netherlands and now I'm studying Earth and Environment here in Wageningen. My Msc thesis will focus on adapting and hopefully improving the procedure to measure low Zn concentrations in soils. I'm looking forward to working in the laboratory and developing the new procedure. After my master I'm hoping to keep learning by doing a PhD, here or abroad.

Hi! My name is **Elise Van Eynde**. Before I came to Wageningen, I studied Bioscience Engineering at the KU Leuven in Belgium, which is also my home country. I was already very enthusiastic about soil science in Leuven, but since Wageningen offers more possibilities to specialize I started the master in Earth and Environment in September last year. At the moment, I am writing my MSc thesis proposal about the use of partition functions to predict Zn availability and to link this with Zn uptake, with a focus on low Zn soils from Sub Saharan Africa. Besides my studies, I love to travel! However, as there are financial and temporal constraints to do this the whole year, I try to compensate this by discovering music from all over the world. Next, I like doing sports as climbing, running and playing squash and I love preparing and consuming nice dinners, sometimes accompanied by a good (Belgian) beer!

I am **Kalima Kabanda** from Zambia. I studied Land and Water Resources Management for my bachelors in Zambia. Out of all the courses I did, I got interested in soil science related-courses so I am now studying MSc in Earth and Environment. My specializing is soil and water chemistry and I just started my thesis about zinc and chelate fertilizers. I am really excited about the topic as it offers me an opportunity to research and broaden my understanding about an important micronutrient deficient on most African soils.

I enjoy reading, singing and cooking in my free time. My career plans are to secure a PhD position after my MSc and continue with research in my home country.

My name is **Jordy Brinks** and I come from the Netherlands. I am a Master student Environmental Sciences with a major in soil chemistry and a minor in Environmental Technology. My hobbies are the great outdoors, especially mountain hiking, playing tennis and football and I enjoy to follow the latest developments in green innovation. Although I have always studied at Wageningen, I still managed to cross the world for my Erasmus in Lancaster (UK) and my participation in a start-up summer School that lead me on a journey throughout Europe. I came to the Soil Chemistry Group to do my Master Thesis on the effects of root exudation on phosphorus availability in the Amazon forest. In Brazil it was beautiful to experience the lush forests, climbing to the top of the canopy and having an endless view with only forest. The traffic, violence, language, culture and environment makes for an adventure but also helps to appreciate the great facilities in Wageningen. After my studies I want to continue to contribute to a cleaner environment via soil and water remediation technologies in research or a specialised company.

I am **Elena Isaakidou** and I come from Greece. I did my bachelor for 5 years in agricultural University of Athens and my specialization was in soil science. Then, I decided to continue my studies and do my master here in WUR because it is one of the best ranking UR in the world for agricultural topics. Now, I am doing my thesis in soil chemistry in the Soil Quality department and I am searching the interaction between Phosphorus and organic matter (fulvic acid) in soils. My future plans are to work either for an international company or an institute and combine the soil with the environmental part. My hobbies are singing, dancing, travelling and photography.

Introducing guests

Hello!!! I am **Fernando Cesário** and I come from Brazil. For my bachelor I studied Geography in Federal University of Rio de Janeiro. I came to Wageningen to study as part of my PhD for three months. My specialization is environmental sciences and my project is about nutrient cycling in tropical forests, specially carbon uptake. I am really enjoying my time in Wageningen specially in sunshiny days, the University is really great and beautiful. I am very passionate about photography, nature and travelling. I hope to go back Brazil and be a researcher in natural sciences and spend my free time traveling and knowing new cultures.

Introducing PhD candidates

My name is **Juan Carlos Méndez** and I come from Cartago, Costa Rica. In 2012 I got my bachelor degree in Agronomy in the University of Costa Rica. After my graduation, I participated in research projects focused on the identification of the most limiting nutrients for crop production in the agricultural soils of Costa Rica. In 2014 I got a scholarship from the University of Costa Rica to follow the MSc program of Environmental Sciences in Wageningen University. For my MSc thesis (August 2015- January 2016) I started working, under the supervision of Tjisse Hiemstra, on the topic of soil phosphate availability in the Soil Chemistry group. That's why, maybe, many of you have seen me around for a while! Now, I just started my PhD project, also with the supervision of Tjisse Hiemstra, and with Rob Comans as my promotor. In the next 4 years, I will apply surface complexation modelling to study how the most relevant chemical processes in the solid-solution interface affect the soil phosphate extractability. I will give emphasis to the role of the content and type of the mineral oxide fraction in soils, the content of natural organic matter, and the concentration of other relevant ions in the soil solution (e.g. calcium). The project will be mostly performed in the Netherlands, although I am also planning to include in my study oxide-rich tropical soils from Costa Rica. Hopefully, our results will contribute to a better understanding about how the above-mentioned factors affect the outcome of different STP, and if such processes can be similarly described in oxide-rich tropical soils, as done in soil samples from the Netherlands. I will be working from Monday to Friday and you can find me in the office D.315. So far, I have enjoyed a lot my staying in the Netherlands, and I am looking forward to share many experiences with you.

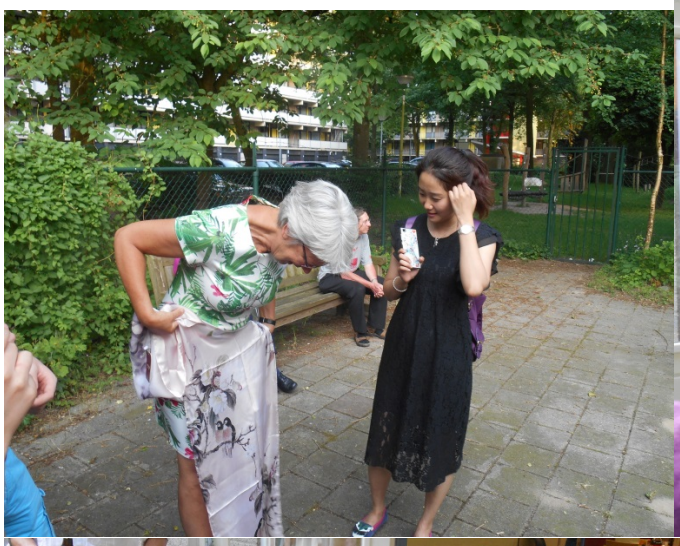
New arrival at Marnella's place

Early morning of April 22, a colt foal was born. Mother and child are doing just fine. The foal will be registered as **Jerommeke** in the Dutch Harness Race horse pedigree.

Oral defences

On June 7, **Xinxin Wang** successfully defended his thesis on “Variation in Phosphorus Acquisition Efficiency among Maize Varieties as Related to Mycorrhizal Functioning”, promotors Ellis Hoffland and Thom Kuyper. His co-promotor, prof. Guo Feng and fiancée Chi Zhang came over from China to attend the defence. Mart Ros and Mingtian You were the *paranimfs*.

In the evening we were all invited for a dinner party, we enjoyed the good food and after that presents were exchanged. Well done Xinxin, good luck with your new job in China.



On June 24, **Pelin Kocatürk** conducted her oral defence on “Recovery of nutrients from biogas digestate with biochar and clinoptilolite”. After the defence we were invited for a celebration lunch at the Herenstraat cinema. Pelin and her fiancé have planned their wedding ceremony coming July in Istanbul, Turkey. Their domicile will be in Freiburg, Germany.

Farewell party of Eef Velthorst

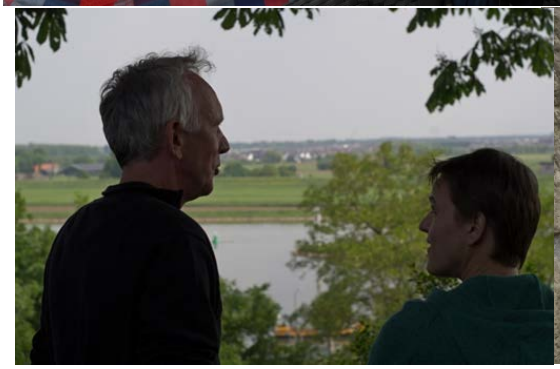
Tuesday April 26th 2016 we celebrated the farewell of **Eef Velthorst** with a party in the gardens of the Lumen building. Eef's plan was to keep it very informal (please no speeches), but enjoyed the speech of Eddy Moors referring to Eef's hobby of airplane spotting.

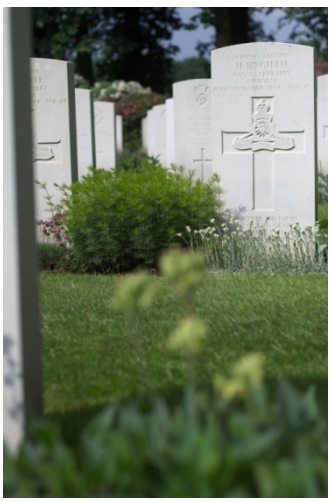
SOQ Fieldtrip in Spain

The students of the course Field Training Land-Atmosphere Interactions (**Marcel Hoosbeek**) went to Spain, near Madrid. Below some pictures of the 2nd day, working with the soil kit.

SOQ outing

Our group outing this year went to surroundings of Arnhem.
After lunch we stepped in the bus for a guided tour. Our host Dirk Hoekendijk of the Battlefield tours Arnhem 1944 foundation, explained about the battle in the second World War around Arnhem and Oosterbeek and about the consequences these actions had for the liberation of the Netherlands. We visited the Airborne museum and cemetery and the landing zones.





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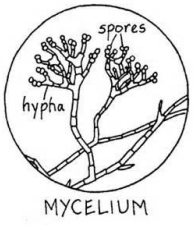

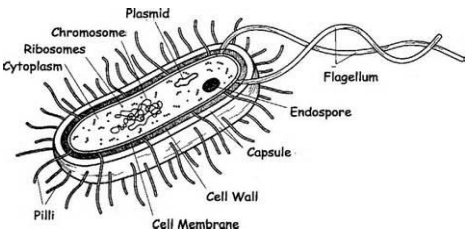

FUNGI or BACTERIA?

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On the occasion of the SOQ Team outing - "Two things" is about FUNGI or BACTERIA

Even though there was hardly a moment to spare during the historically inspired SOQ team outing, 38 responses to the question “Fungi or Bacteria?” were collected on that day. Our main result could not have been clearer: an overwhelming 82% was in favour of FUNGI (Fig. 1). Now, what can this possibly mean? A thorough introduction into the subject matter is first needed before this exciting result can be explained.

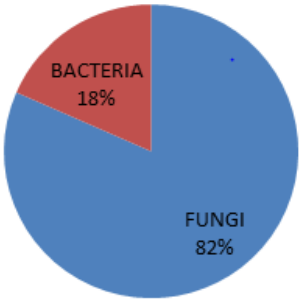


Fig. 1 | Percentage of people who preferred “FUNGI” or “BACTERIA” for the 38 responses from the SOQ employees

During our visit to the Oosterbeek war cemetery Lijbert was interviewed just before embarking the bus again, and after pondering the question for a couple of seconds he answered a very determinate “FUNGI”. It was very clear to the keen observer that this answer did not just come out of the blue and that some further inquiry as to the reason of this choice could be fruitful. Indeed, Lijbert explained his choice by a preference for the ‘fungal energy channel of decomposition’. This view then, exquisitely matching our united area of expertise ‘Soil Quality’, became the principle underpinning of the interpretation of our results.

In the beginning soil decomposition was only ‘fast’ versus ‘slow’. Later these decomposition pathways were (more or less respectively) identified as the bacterial versus fungal energy channels. Nowadays an extensive body of scientific literature reveals how these energy channels really work. In essence, it boils down to this: bacterial pathways are associated with

r-strategists and rapid turnover rates for carbon and nutrient use. Fungal pathways, conversely, are associated with K-strategists and much slower turnover rates for carbon and nutrient use. From the perspective of 'soil quality', a high F/B ratio (> 1, so more fungal biomass than bacterial biomass) is indicative of less disturbance, more sustainability, higher pest tolerance levels, optimal oxygen supply and water infiltration, and minimal losses of nutrients by leaching or gaseous losses.

Extrapolating these findings from the realm of soil quality to that of the soil quality group, we can confidently say that the SOQ community with a whopping F/B ratio of 4.4 is resistant against disturbances, reaches high sustainability, tolerates no pests, breathes fresh air (climate controlled offices?) and is on the whole a very efficient and effective community.

Interestingly, the older members of SOQ were already fully aware of this since they all favoured FUNGI (Fig. 2). Apparently it's all about experience. The young males in our group still show a bit more vigour and opportunism, but in the course of years their experience will make them as responsible and economical/productive/competent as our older population. From these results we can also infer that the older males in our group are more K-strategists than the young men, and must thus be presumed to produce fewer gaseous emissions.

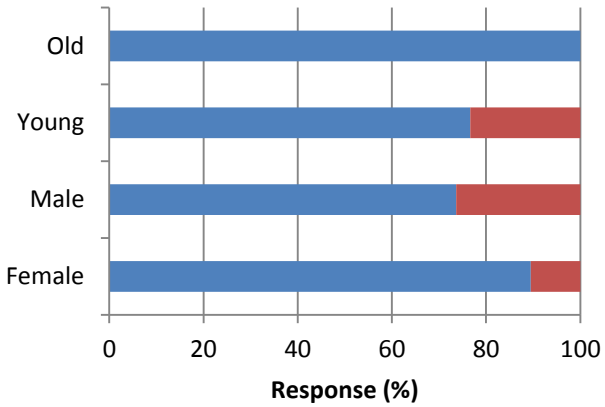
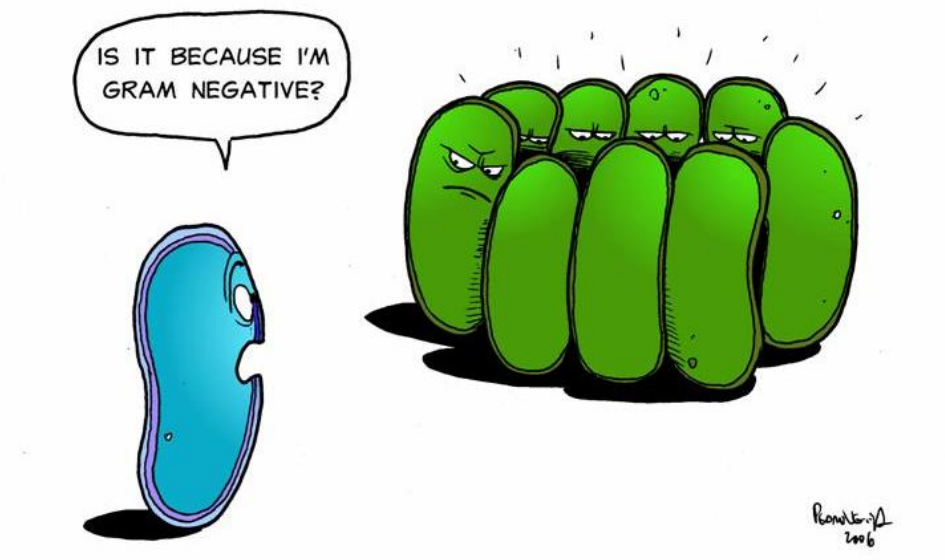


Fig. 2 | Percentage of people in favour of FUNGI or BACTERIA for different groups based on age and sex

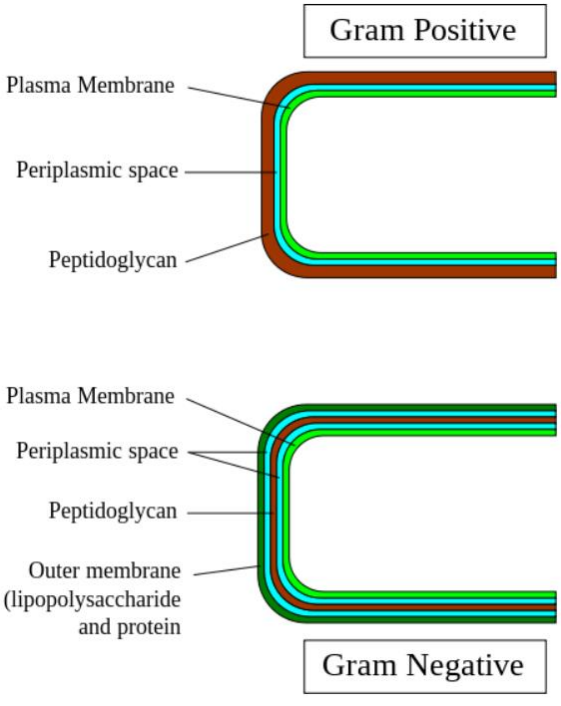
On the scene at the Department of Ecological Microbiology in Bayreuth - "Two things" is about gram POSITIVE or NEGATIVE bacteria [{(questions about FUNGI would be inappropriate as all research is about BACTERIA …)}]



The Microbial Ecology department was unanimously surprised when asked the perfectly unharmful question "gram POSITIVE or gram NEGATIVE bacteria?" and were the least prepared for an answer (at SOQ the 'Two things' question is routine, and some of its employees don't even look up to interrupt their important work while answering casually). Several rather complicated conversations about the pro's and con's started all at once and the German language is not the only reason why these conversations cannot be summarized here. Anyhow, a soothing explanation "it doesn't really mean anything and there is no purpose whatsoever" calmed them down and everybody was willing to respond.

Box 1 | What you need to know about Gram Positive and Gram Negative

Gram-positive and negative bacteria are chiefly differentiated by their cell wall structure. No less than 90-95% of Gram negative bacteria are pathogenic. On the other hand, many Gram-positive bacteria are non-pathogenic.
In soil microbial research most research is about gram negative bacteria since gram positive bacteria are especially tricky to target with the current technology. "They might be the hidden majority and their research needs a boost," said Peter Depkat-Jakob, from the Department of Ecological Microbiology.



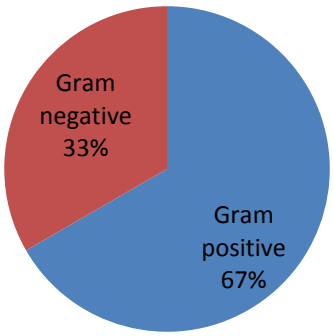


Fig. 3 | Percentage of people who preferred 'Gram positive' or 'Gram negative' for all 'Ömik' employees

The 'Gram positives' clearly outnumber the 'Gram negatives'. The majority of the 'Ömiks' are working on gram negative bacteria and for some of them (25%) this was the reason to choose gram negative. Only one employee let his opinion be influenced by others, who both chose gram positive.

Reasons to favour gram positive were more diverse. The most popular reason was its connotation with something good, something hopeful and nice. Just a positive disposition. Another reason was not to favour the 'bad guys' in the soil, the pathogens, that are mostly gram negative. Still another reason was already mentioned in Box 1: gram positive bacteria are hardly studied because of technical difficulties, yet they might be more numerous in the soil than even gram negative bacteria, and to learn more about them we need to study them.

Looking into the results more closely, we come across a rather astounding detail: half of the female Ömik population favoured negative over positive. How is this possible? Can we deduce that females are more inclined to the negative than the males? Or is this only occurring at Ömik? Most likely this 'negative' result can be strictly attributed to their area of expertise, and in fact the Ömik females could be the most positively inclined persons on earth. Still, without a question every Ömik "contributed to all the fun" (Harold Drake) with a positive disposition.

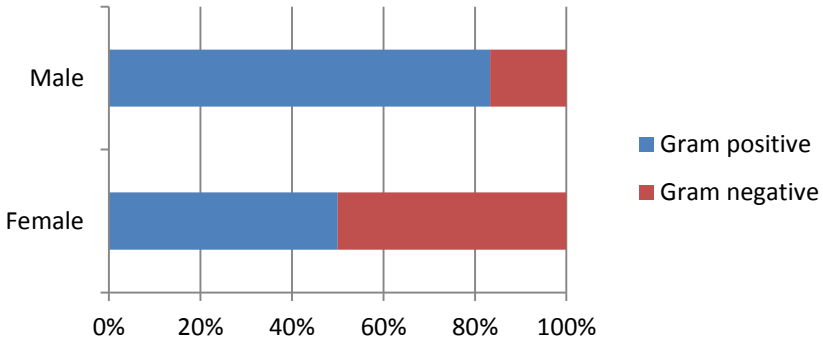


Fig. 4 | Percentage of people in favour of 'Gram positive' or 'Gram negative' for different groups based on sex

Extra's

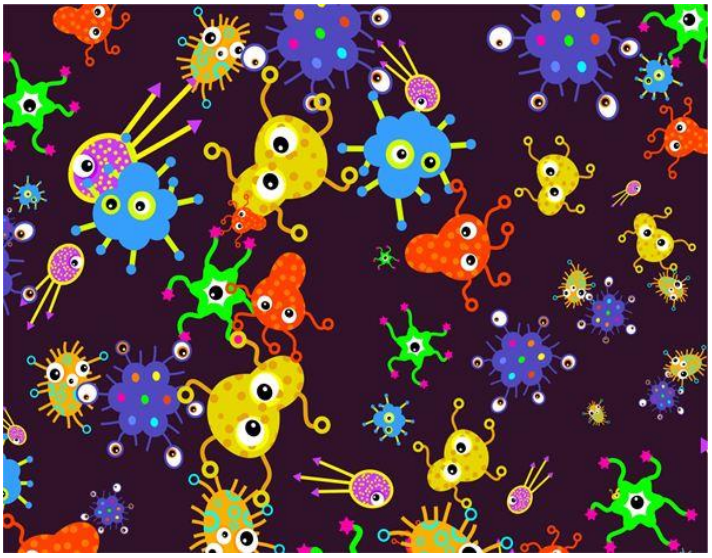
DID YOU KNOW…
- Lijbert prefers FUNGI because the fungal pathway is better for sustainable soils?
- Mart prefers BACTERIA because they represent fertile ecosystems?
- … and thus also represent prosperity, at least in Mart's head?
- Both Marnella and Jaap choose FUNGI because they associate them with white horses? (this comes across better in Dutch…)
- André J. likes FUNGI for purely culinary reasons?
- Our 'pure' microbiologist Wietse refused to give an answer altogether?
- Jan Willem succinctly summarized his choice in two words: "Blue cheese"!?

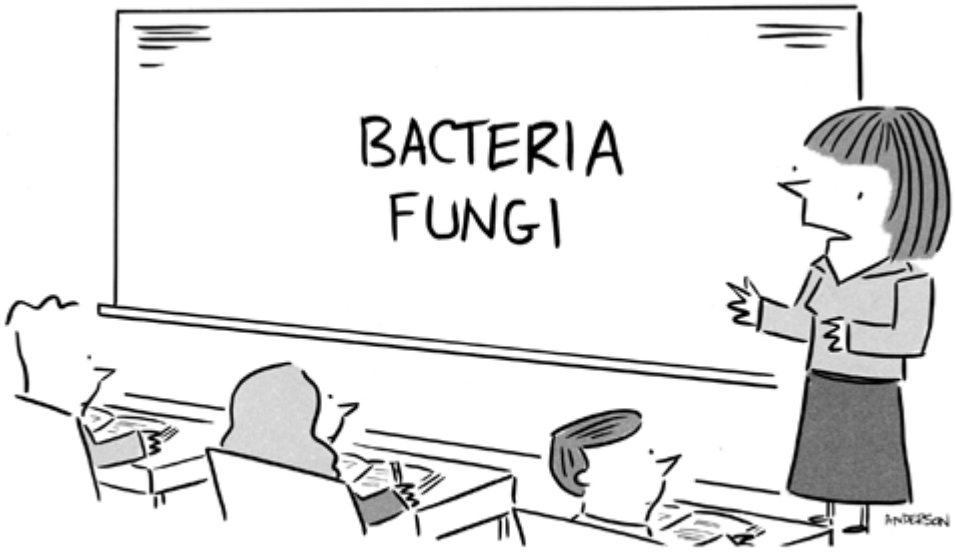
Cartoons about FUNGI vs. BACTERIA

Happy soil!

Unhappy soil…

"I DON'T KNOW WHAT THIS IS, BUT YOU SHOULD SEE HOW FAST IT'S GROWING!"





"OK, now let's all walk single file down to the teachers' lounge refrigerator."

3 questions
for Wietse!

1. WHAT'S YOUR FAVOURITE COLOUR?

.....

"Green."

2. WHAT'S YOUR FAVOURITE DISH?

.....

"Zuurkool."

3. WHAT'S YOUR FAVOURITE BOOK?

.....

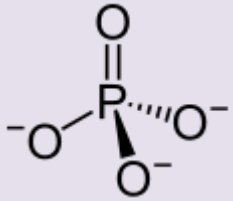
"The world according to Garp by John Irving."

BONUS QUESTION.

What is a better ecosystem service: fungi that eat bacteria or bacteria that eat fungi?

.....

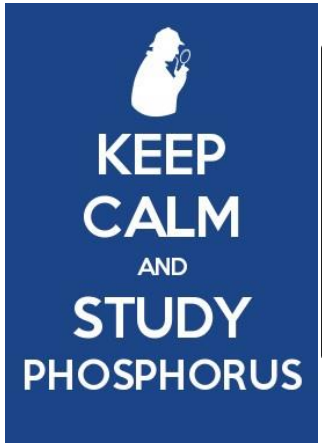
"The second option. At least, thinking about pathogenic fungi."



Mart's favourite SOIL species

Phosphate

Phosphate is the main form of phosphorus in the soil. Its cycling is affected by chemical and biological processes, which means by **EVERYTHING**! Unfortunately, there is usually only very little available for plants and the dwindling world phosphate resources are not distributed equally amongst countries. This might cause some complications or tension in a bit, so it is imperative that this beautiful species is researched!



The Mole

They are black, they are blind, they are bloody annoying! Hated with a passion amongst gardeners and golfers, these velvety black diggers are the perfect indicator of good soil biodiversity. They feed mostly on earthworms, but eat insects and sometimes young rodents too. Multifunctional as they are, they also make a great coat!

Did you know:

- A group of moles is called a Labour?
- There are moles in the UK but not in Ireland?
- Moles got a colour named after them?
- Moles eat up to half their weight (!) in earthworms per day in the field, but befriend just one particularly fat worm in Dutch TV shows?