NO. 1 • JUNE '20

SOILHUB Magazine

Introducing SoilHub

Together towards healthy soils throughout Europe!

BOOTS-ON INTERVIEWS

Jacco – Wilco – Remco – Anne Marit & Elias

"Combining nature's force with agriculture's simplicity"

SCIENTIST ON THE ROCKS

Guusje: "Breeding for soil quality"

POLICY MAKER IN THE FIELD

Jeroen: "I finally convinced my mother to get a compost heap at the age of 85!"

CONTENTS

WELCOME TO THE FIRST SOILHUB MAGAZINE

You are reading the very first edition of SoilHub Magazine. For this magazine, we spoke to many people that are strongly involved in soil health: Farmers, scientists, policy makers and citizens. These conversations have resulted in the concept of SoilHub, which will be presented to you in this edition.

We really enjoyed working on this challenge and hope to plant the seed for a new movement realizing healthy soils throughout Europe and the world.

SoilHub: Let's make all soils healthy again! Shall we?

SOILHUB EUROPE

MISSION AND VISION

To stimulate connection, cooperation and innovation among farmers, policy makers, scientists and citizen to realize a future of healthy soils throughout Europe and the rest of the world.

WHAT IS A HEALTHY SOIL?

As team HupSoilHub, we strongly believe in the strength of healthy soils. One definition of soil health that really striked us was provided by farmer Anne. During a virtual Q&A, we asked him what he sees as a healthy soil. His answer was: *"A soil that I can work on and provides a good productivity for now, but also for my grandchildren".* Anne also mentions that soil health and biodiversity are strongly related.

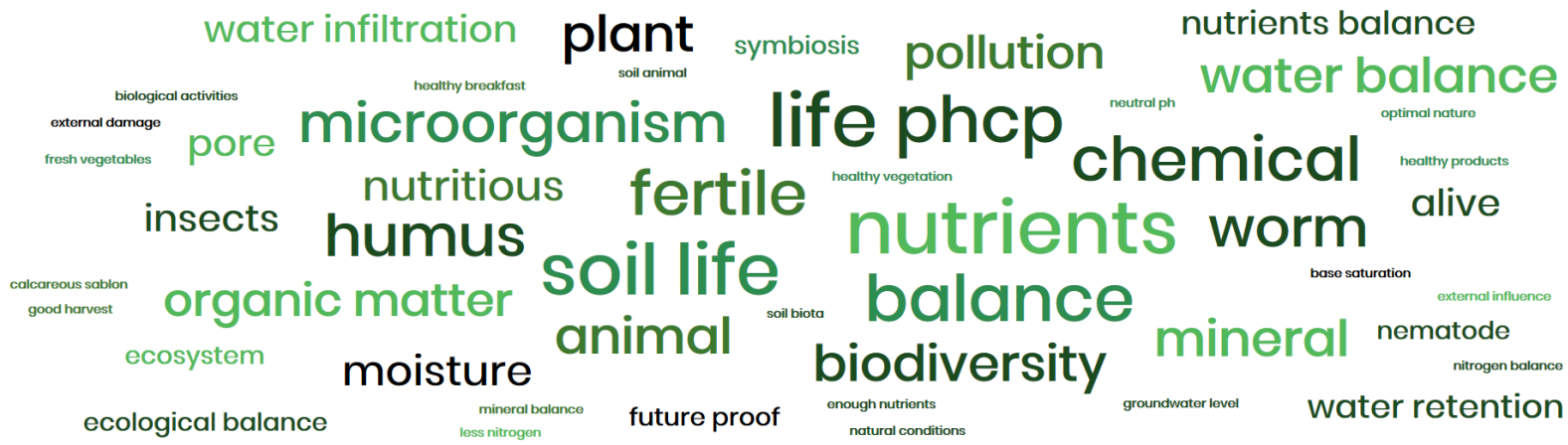
> *A soil that I can work on and provides a good productivity for now, but also for my grandchildren*

Therefore, we are convinced that soil health must be achieved by sustainable soil management, with attention for biodiversity and organic matter. As every region has its' own soils, climate and culture, what a healthy soil comprises strongly differs with space. Therefore, SoilHub is a bottom-up approach.

For this challenge, we have spoken to multiple farmers, scientists, policy makers and "normal" citizens about their views on healthy soils. We spoke with so many sectors, as we believe that a movement towards healthy soils throughout Europe requires support and participation among everyone: We must do this together!

From these conversations, we have noticed a couple of common needs and interests, shared by multiple groups of stakeholders.

In a questionnaire we asked about 260 people to the first words that pops up when they think about a healthy soil. The results can be observed in the word cloud below.



WHY SOILHUB?

1. FARMERS' DEMAND FOR KNOWLEDGE SHARING

> *When I Google for ways of intercropping in the Frisian clay, I end up with a scientific report on intercropping in sandy soils in South Africa!*

Farmers often mentioned their struggle in obtaining on-point knowledge about sustainable soil management, specific for their soil type and crops. All of the farmers mentioned their ambition to gain more knowledge on soil-related topics such as intercropping, breeding for soil quality and soil-quality enhancing compost. However, farmers Remco and Elias both mention that this ambition often results in reading 200 pages academic reports, containing information which is directly applicable on their lands. Thereby, we noticed that organised knowledge-sharing platforms were desired by all farmers, scientists and policy makers we spoke with. For farmers, a positive and dynamical vibe of cooperation was sometimes missing. Remco, a young organic farmer from Goeree-Overflakkee, really enjoyed organised meetings on soil-related topics which he attended during his time in New-Zealand. According to him and other farmers we spoke, a more cooperative approach of farming would make innovative farming more attractive for all generations of farmers.

Scientists' involvement and innovation

Apart from farmers, scientists also express their desire for more collaboration with farmers. The scientists we spoke with believe that more research on farmland of actual farmers would improve the credibility and utility of scientific research. More credibility and utility are not to be underestimated, especially for soil research that aims to supply information that farmers can use to increase their soil health. Besides an improved connection between farmers and scientists, farmers need to gain knowledge from on-farm success stories. This point was stressed by all farmers we interviewed, and also came up when talking to scientists. Farmers look at their neighbours! This underlines the importance of scientific research that is conducted on real farmlands.

SoilHub's efforts to connect farmers and scientists

SoilHub applies multiple measures to tackle the current problems related to the connection among farmers and between scientists and farmers. Knowledge holders can place easily understandable and applicable knowledge on the knowledge sharing platform SoilHub connect, specified per region and soil type. On selected "lighthouse farms" per SoilHub region, meetings will be organised regularly, where farmers can exchange knowledge among each other. Thereby, farmers can speak to scientist and "soil brokers", who take care of cross-pollination between multiple SoilHubs and science. SoilHub Magazine will be produced regularly to inform farmers and others about innovations in soil health. An example of more easily understandable and applicable scientific knowledge is presented in each edition's "Scientist on the rocks". In this edition, we interview the famous plant breeding scientist Guusje Bonnema about developments in breeding for soil quality! Additionally, the "PodSoilCast" will provide more in-depth background information and entire interviews. All these advantages of SoilHub will be discussed in more detail in section "SoilHub explained".

2. NEED FOR SUPPORT TO INNOVATE

Many of the farmers that we spoke for this edition of SoilHub magazine are open for scientific research on their lands. However, Anne Marit and Elias stress that the financial risk of innovative research projects largely lie at the well-willing farmers now. Often, they hear that the research will contribute to soil science and thus, indirectly, to their own business. However, this promise does not remove the direct financial risk of leaving one piece of the land for experimental research. They notice that this drawback of research reduces the willingness and ability of farmers to cooperate with farmers. In Jacco's words: "What's in it for us?" In section "SoilHub explained", we describe SoilHub's methods to apply policies to stimulate innovation in soil health.

> *What's in it for us?*

Connection between farmers and policy makers

Another topic we discussed with farmers, was their relationship with policy makers. As you may recall, intense debates followed after the Dutch parliament announced measures to reduce nitrogen emissions from farms and to make farms more climate-friendly. Large groups of Dutch farmers protested for weeks, blocking several highways with their tractors. As a result, some of the measures were postponed and the relation between farmers and policy makers drastically reduced. In the virtual Q&A, farmer Anne seemed astonished in his reaction to recent regulations on manure-application that were presented by politics: *"How on earth did they come up with this measure?"*. He mentions his desire for trustworthy politicians and regulations that make sense in farmers' eyes. This strongly underlines the lack of trust farmers have in policy makers. All these developments are not in favour for healthy soils throughout Europe. As farmer Remco said, *"we must do this together, not alone"*. Or, in Anne's words: *"We need to talk with each other, not about each other"*. Therefore, a better relation between policy makers and farmers is an essential requirement for our mission: Make all soils healthy again!

Farmers Anne, Jacco and Remco all mention that they would appreciate it if policy makers (and scientists) would sometimes put on their boots and come and take a look at real farm life. In their eyes, this would improve the connection between policy makers and farmers. Expectedly, this will also result in more effective policy with large support base among the actual land users: the farmers. We decided to put this suggestion into action. In each edition of SoilHub Magazine, we will interview a prominent policy maker about his or her connection to soils and view on soil management. Later in this magazine, you can read the interview with the very first "policy maker in the field": Jeroen Dijsselbloem!

> *We need to talk with each other, not about each other*

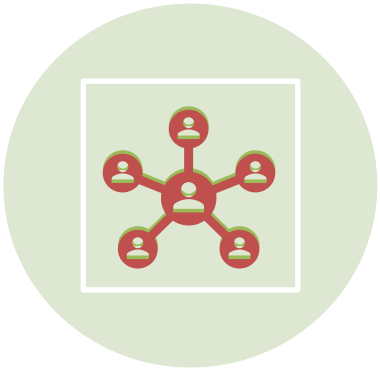
3. IMPROVED CITIZEN INVOLVEMENT

The last stakeholders that farmers often mentioned as an essential step in the quest towards soil health, were the consumers. As farmer Jacco said: *"When consumers demand a transition in soil management, farmers will definitely follow."* From the questionnaire that was answered by 260 persons, we noticed that many citizens do want to contribute to soil health through their shopping behaviour, but don't know how to do that. To inform citizens about soil health and their options to stimulate healthy soils, SoilHub will have a strong

about soil health and their options to stimulate healthy soils, SoilHub will have a strong focus on consumer and citizen involvement. In this respect, we propose "SoilHub Stories" labels on products, the use of social media and instagram (e.g. "Soil Unboxing videos") and more attention to local soils in education and media. More on this in the next section, SoilHub explained.

> *When consumers demand a transition in soil management, farmers will definitely follow.*

SOILHUB EXPLAINED



GOAL 1: IMPROVE KNOWLEDGE SHARING

To improve knowledge sharing, SoilHub connect will be set up. This is a platform where farmers and scientists can share knowledge, ask questions, and work together to innovate. Online there will be factsheets summarizing scientific knowledge in an understandable way for farmers. Connected to the factsheets, discussion fora will be set up, where farmers and scientists can discuss specific questions. Offline, meetings and farmer-to-farmer or science-to-farmer workshops will be organised in the SoilHubs. By organising these meetings and workshops, connection and cooperation in the SoilHubs will be enhanced, while knowledge will be shared simultaneously!

GOAL 2: ENHANCE INNOVATION

Actively involving farmers in soil research and also rewarding them for innovating in terms of subsidies, will be a tool for policy makers to ensure continuous innovation in soil quality. As SoilHub, we connected with multiple farmers and policy makers, and thought of two types of new subsidies: A subsidy for farming practices that benefit soil health, and a subsidy to stimulate on-farm research for soil health. This would provide for on-farm examples to be copied by other farmers in the area.

GOAL 3: INVOLVE CITIZENS

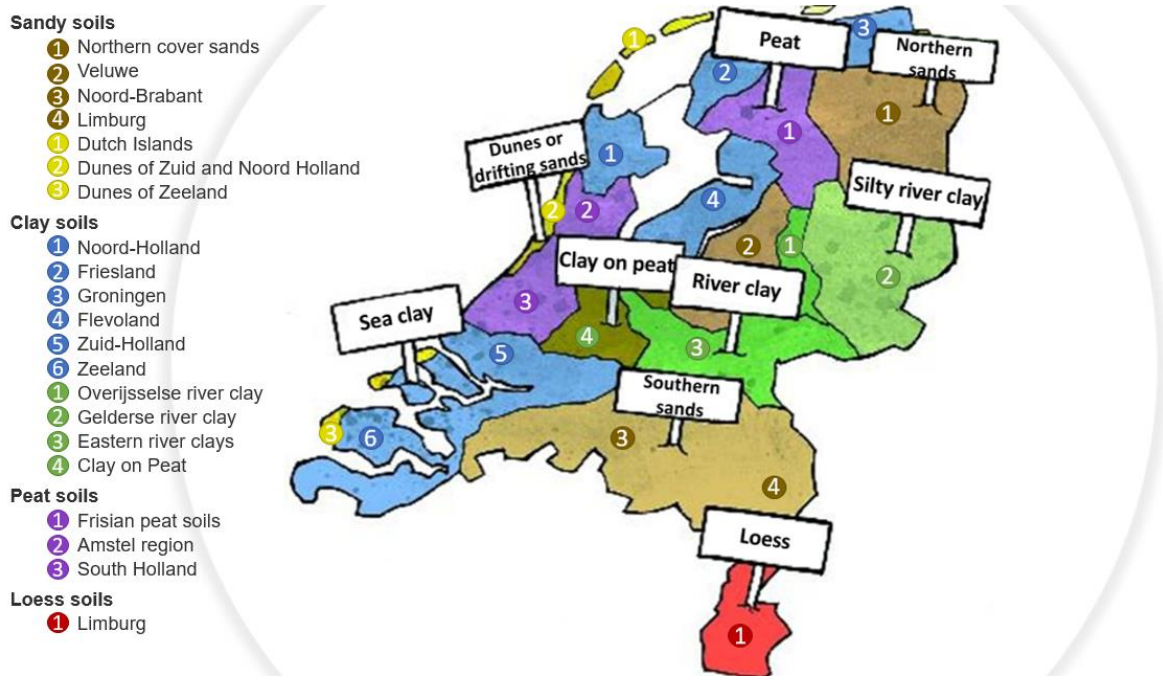
SoilHub will involve citizens in numerous ways. An important pillar will be education: by teaching children about soil health, they will be more aware of the importance of healthy soils and sustainable land management. By educating children about soils at a young age, they will expectedly grow up as adults that are more aware of the importance of healthy soils. By organising excursions to farms in SoilHubs, children (but also adults!) will get a more hands-on experience and have more feeling for their environment.

SOILHUB EXPLAINED

SoilHub is a platform for knowledge sharing and cooperation between farmers, scientists, policy makers and citizens. By putting the soil in the center of this platform, soil will always be the basis (literally and figurative) for cooperation. SoilHubs can be based on soil type or agro-ecological zone, but a local set up is key for the creation of SoilHubs. By making use of existing local (agricultural) organisations, structures and platforms, the design of SoilHubs will be bottom-up. With the EU-wide thinking behind the whole organisation and the local set up, SoilHubs are a perfect example for the adagium: “Think global, act local”.

By first investigating local structures and the organisation of agriculture in a region, we expect that the contours for SoilHubs will become apparent in a natural way. If we look at the Netherlands, examples of a SoilHub could be: “De Betuwe” or “Het Groene Hart”. These regions have mainly the same soil type and type of agriculture. Other set ups are possible as well; for example if we look at local language, maybe the province of Friesland (Fryslân) would be a SoilHub on it’s own, because the majority of the farmers there communicate in Frisian. The main hub ‘Friesland’ could still be divided in smaller hubs per soil type.

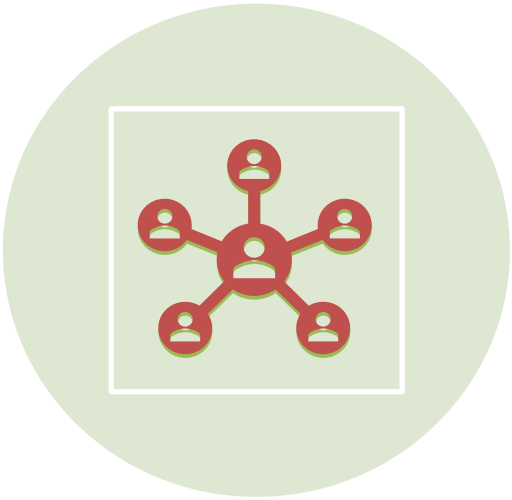
Of course, these are only examples. When SoilHubs will get implemented all over Europe, we will make sure that all SoilHubs will be set up by involving people who are integrated in the local agricultural organisation. Therefore it’s very important to first investigate these structures before starting to implement the concept of SoilHubs. The ideal would be that SoilHubs can be almost completely integrated with existing local structures. When these structures are less present or less effective, additional assistance from more centralised SoilHub boards can be useful.



GOAL 1: IMPROVE KNOWLEDGE SHARING

In every SoilHub, one or more "lighthouse farms" will be selected, based on how well the farm includes soil health in its management. Farms that are taking good care of their soil health, but are also profitable and preferably well connected with the region; being represented in (local) agricultural organisations and/or selling products locally are perfect "lighthouse farms". These farms will serve as an example for the rest of the region, so that certain "best practices" can be adopted. Of course a practice does not have to be copied one on one, but can be adjusted to the local circumstances and business operations of the adopting farm.

All hubs will be connected with each other to enable knowledge sharing on a larger scale. Again, SoilHub tries to make use of existing structures for this connection. For example, regions within a country can serve as a web of connected hubs. The next level of organisation would be national. Lastly, the central organ of SoilHub can be situated at the EU in Brussels. By connecting SoilHubs across regional and national borders, knowledge sharing and cooperation can be achieved on a larger scale as well. For example, if a SoilHub wants to try a new form of cooperation between scientists, policy makers and farmers, it can check if another SoilHub is already using a similar structure. This does not mean that they have to copy this structure, but they can apply it, adjusted to their local situation. For these kinds of cooperation and knowledge sharing, we introduce the platform: "SoilHub Connect".



KEY ASPECTS

- *SoilHub Connect*
  - *Fact sheets*
  - *Discussion fora*
- *Meetings*
- *Workshops*
- *SoilHub Magazine*
- *PodSoilCast*

1. SOILHUB CONNECT

SoilHub Connect will be an important tool to enhance knowledge sharing. This is a platform where farmers and scientists can share knowledge, ask questions, and work together to innovate. Online there will be factsheets summarizing scientific knowledge in an understandable way for farmers. Using tags and categories, it will become clear what information applies to a farmer's local circumstances and demands. This will enable farmers to search information more effectively. Connected to the factsheets, discussion fora will be set up, where farmers and scientists can discuss specific questions about topics that are, for example, too superficially covered in the factsheet. By regularly updating the factsheets and discussion fora, SoilHub connect will make sure that the latest knowledge and insights that are best suitable for specific SoilHubs are available for the farmers.

2. MEETINGS AND WORKSHOPS

Offline, meetings and farmer-to-farmer or science-to-farmer workshops will be organised in the SoilHubs. By organising these meetings and workshops, connection and cooperation in the SoilHubs will be enhanced, while knowledge will be shared simultaneously! For the organisation of these meetings and workshops, we aim to build on existing local agricultural organisations, if these exist. If there are currently no local organisations active, cooperation will be encouraged through campaigns that actively involve farmers in the SoilHub. Preferably, meetings and workshops will be organised by people that are living in the SoilHub themselves and have a strong connection with the local agriculture.

3. SOILHUB MAGAZINE AND PODSOILCAST

Furthermore, a beautiful magazine will be produced to enhance knowledge sharing and cooperation: SoilHub Magazine! You are now reading the very first edition! The magazine will be a monthly update of things going on in the SoilHub, including innovations, updates on seasonal circumstances, interviews with farmers, scientists and policy makers, and much more! The content will be different per SoilHub, with some regional, national or international articles that can be interesting for everyone shared in all SoilHub Magazines. As all modern magazines, SoilHub Magazine will also produce podcasts, the so-called "PodSoilCasts". In PodSoilCasts, people can listen to entire interviews and background stories of topics that were discussed in the magazine. By providing PodSoilCasts, we hope to reach farmers and others that do not have time for reading a magazine. Imagine a farmer, learning about soil management by listening to a PodSoilCast while harvesting wheat in his tractor.

GOAL 2: ENHANCE INNOVATION & RESEARCH

SoilHub aims to enhance innovation and research in sustainable soil management. Besides the introduction of SoilHub Connect to increase knowledge sharing, we propose to move to more effective policies. SoilHub aims to alter policies in a bottom-up manner: by enabling groups of farmers and by improving the connection between farmers and policy makers.

As SoilHub, we connected with multiple farmers and policy makers, and already thought of two types of new subsidies:

Subsidies that effectively reward farmers that take care of soil health and subsidies that stimulate farmers to innovate in healthy soil management. Nowadays, subsidies are focused on (among others) the amount of land that a farmer has. When we change the conditions on which the subsidies are provided, for example by giving subsidy for farming practices that benefit soil health, this will be an opportunity for all farmers to bridge the financial gap in the transition to a more sustainable type of farming.

KEY ASPECTS

- *Reward healthy soil management*
- *Stimulate on-farm research*

1. REWARD HEALTHY SOIL MANAGEMENT

We propose a subsidy to reward farmers that farm in a soil-conscious way. This subsidy will be more effective than the currently applied subsidies allow for. For example, a farmer would only receive subsidies when he or she applies sustainable soil management on his entire plot. This will make sure that farmers are forced to implement strategies that lead to healthy soils, such as mulching or intercropping, besides the biodiversity edges which are subsidized nowadays.

2. STIMULATE ON-FARM RESEARCH

Another subsidy that we propose aims to actively involve farmers in soil research by rewarding them for innovation. As a tool for policy makers to ensure continuous innovation in soil quality, subsidies should become available to stimulate on-farm research for soil health. Not only would this increase the possibilities for scientific research, it would also largely improve the connection between science and farmers and would provide for on-farm examples to be copied by other farmers in the area. These are all key requirement when trying to apply scientific research for the benefiting of soil health.

GOAL 3: INVOLVE CITIZENS

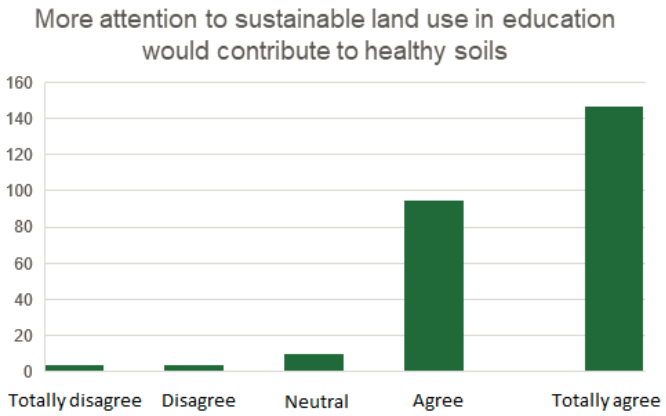
In SoilHubs, multiple tools will be applied to connect citizens with local soils. We conducted a study among citizens, to let them tell us how they would like to be involved with soil health. For this small research project, we conducted a survey to study the knowledge about the benefits of soil health and possible solutions for improvement of soil health among the general public. A total of 260 people took the time to fill in this survey! From this survey, a focus on education, the use of social media and the provision of stories behind SoilHub products emerged as most promising.

KEY ASPECTS

- *Education*
- *Excursions*
- *SoilHub Stories*
- *SoilHub Restaurants*
- *Instagram*
- *Local influencers*

1. EDUCATION

In the questionnaire, we posed the question: *"Which of the functions that a healthy soil can contribute to (according to the Food and Agricultural Organization) do you know?"* A lot of functions were well-known, for example: Provision of food, fibres and fuels (87%), water purification and reduction of soil pollution (88%) and habitat for organisms (83%). Less known were functions like storage of CO2 (61%) and cultural heritage (38%). Moreover, many of the respondents mentioned that they felt relatively unaware of soils. 93% Sees more attention to sustainable land use in education as a promising way to stimulate people to give more attention to soil health in daily life.



Therefore, an important pillar will be education: by teaching young children about soil health and sustainable land management, children will be more aware of the importance of healthy soils and sustainable land management. By educating children about soils at a young age, they will expectedly grow up as adults that are more aware of soil management.

We expect that this will be beneficial for healthy soils throughout Europe, because the results of our consumers' questionnaire showed that many citizens want to take care of better soils, but don't know how to. Lessons about soils can be implemented in biology and geography courses. At SoilHub, we believe that these lessons should have a strong focus on the local soils and agricultural and natural lands. A local focus will stimulate children's the understanding of and the connection with soils in their environment. This strong focus can very well be implemented by involving (lighthouse) farms in local SoilHubs.

2. EXCURSIONS

By organising excursions to farms in SoilHubs, children (but also adults!) will get a more hands-on experience and have more feeling for their environment. By visiting local farms, they will understand better how and where their food is produced. This will provide valuable insights in the interaction between humans and the environment in food production. Possibilities are endless; for example a school could have their own field on a farm, children can grow their own vegetables and bring home parts of the harvest! Or "Working days" can be organized, where (older) children will help on the farm for a day. These excursions will be organised by SoilHub and can work as a bridge between the school and the farmer. In this way the farmer will only benefit from this and not have much extra work.

COLUMN PETER KRUYSSEN

NATIONAL EXAM SPECIALIST "SCIENCE"

In the Netherlands, almost all children fulfil primary school in eight years. There, you can guess it, children obtain the primary aspects of all knowledge and skills which they will need for the rest of their lives. At least, that's the goal. What we all think children should learn is written down in the Dutch primary curriculum ("Kerndoelen"). Of course, a lot of attention is given to basic skills in language and mathematics. However, other goals in the curriculum focus on understanding the world around us. Children learn about the functioning of plants and animals, about the climate, about light, sound and forces, about the weather, the seasons, the universe, culture, economy, dykes, volcanoes, rainforests and maps, about farmers and hunters, wigs (*Dutch:"pruikentijd"*) and revolutions, important religions and historical persons. All that's is beautiful, useful and important, but one thing is missing in curriculum goal "Orientation on yourself and the world". The thing we stand, lie and live on: The earth beneath our feet, the soil, the basis of all living and death nature. A long time ago, the primary school course Geography, where the soil types sand , peat, sea clay and loess were once connected to local agricultural production and craftsmanship, has become a course where human migration, globalisation and economy must be discussed and where children imitate volcanoes with baking soda and red colorant. Not unimportant, but the development psychology says that children learn best by doing and observing at a young age. So go outside, put a shovel in the soil and see what's underneath your feet: small creatures, roots, rocks and dust. Let water flow through it, start sieving and filtering, do experiments with plants on different soil types, bake clay and build sand castles from different types of sand grains, apply pesticides on the soil and see its' effects and breed something good on rock wool or on earth mixed with compost and horse shit. The earth, the soil and dirt are the basis of everything, so do something with it!

3. SOILHUB STORIES

In the questionnaire, we made a few suggestions on what would motivate people to take soil health into account when doing groceries. We provided a scale from 1 to 5, with 1 indicating "Totally disagree" and 5 indicating "Totally agree". This question resulted in interesting insights, which we used to shape our ideas for SoilHub to involve citizens. 74% of the respondents agreed that a label with stories on soil management would motivate them to think of soil health during shopping. 80% of the respondents saw a larger supply of locally produced products as another promising option.

For SoilHub, consumers will be informed on soil management practices by including information on products about the SoilHub region it originates from, so-called "SoilHub Stories". If possible, the offer of local products will be stimulated. However, oranges could be sold from SoilHubs in Spain. On the front of the product, a label will indicate in which SoilHub the product is produced. On the back side, there will be a small story about the SoilHub or farm where the product was produced, including a QR code or link to a video where people can see how the product was produced through an interview with the farmer. This interview will focus on the product and on innovations in soil management. We're glad to inform you that the first video samples are on their way to the web!

These products will also be highlighted in local restaurants. SoilHub will help and stimulate restaurants to use products of local farmers that apply sustainable soil management or innovate in healthy soils. Besides serving local and non-local SoilHub products, these SoilHub-certified restaurants will serve SoilHub Stories. By doing this, SoilHub restaurants will enhance the connection and value that guests feel for the soil.

4. SOCIAL MEDIA & INFLUENCERS

Other ways to involve citizens that will be applied in SoilHubs are the use of social media and influencers. We believe that social media are a very promising tool to reach young people, who will become the farmers, policy makers, scientists and consumers of the future. Every SoilHub will get an Instagram account which will be promoted to citizens in and near that SoilHub. Here, pictures and stories of different aspects and farmers of the SoilHub will be shared. Instagram posts about the sowing and growing of crops, local nature areas and pictures of local farmers sharing their story can help in connecting people more to their local SoilHub.

At SoilHub, we will attract influencers to make vlogs about their local or favourite SoilHub, for example the one they grew up in. Also here there are a lot of possibilities: they can interview a farmer, go and help on a farm for a few days, or do a "Soil Unboxing" video. "Soil unboxing" videos are based on the same principle as the popular online genre of unboxing videos. They will aim to present information on soil health in an easy and fun way. For example, such a video can discuss the look of a piece of soil or ways that citizens can use to improve soil quality at home or stimulate healthy soils through their shopping behaviour. Soil unboxing videos will be regularly added to SoilHub channels. Online, you can soon watch the very first video.

SCAN ME

BOOTS-ON INTERVIEW

"KEUTERBOEREN" ANNE MARIT POPMA & ELIAS DEN OTTER

To find out what drives young people to put on their boots and start farming in an innovative way, we spoke with the two inspirational farmers-to-become Anne Marit and Elias. Also known as "De Keuterboeren" (Dutch for "The Peasants") (https://keuterboeren.nl/), the two have committed themselves to explore the world of sustainable farming. Travelling from farm to farm across Europe, they aim to unravel the plethora of innovative soil-conscious farming options. On their journeys, the two already visited regenerative farms in Spain, organic farms in Denmark, food forests in the Netherlands, permaculture farms in Portugal and more! Besides learning for themselves, they share most of their experiences on the website and Instagram (https://www.instagram.com/keuterboeren/).

Anne Marit and Elias immediately explain why they feel so energetic when learning everything about soil-conscious farming. The two feel the need for a transition in farming to deal with the effects of urbanisation, land degradation, climate change and biodiversity losses. They experience this urge so strongly, that they both decided to quit their office-jobs and started their journey to perform this transition themselves, by sharing knowledge and becoming farmers themselves! However, as new kids on the block they soon came across some difficulties: a lack of available land, time and knowledge. In this boots-on interview for SoilHub Magazine, we discussed these and other difficulties that the two "Keuterboeren" encountered in their efforts. Fortunately Anne Marit and Elias also brought up many solutions to pave the road towards the transition to healthy soil management in farming.

> *When I Google for ways of intercropping in the Frisian clay, I end up with a scientific report on intercropping in sandy soils in South Africa!*

Anne Marit and Elias mention the many struggles they face when looking for information about innovative ways of farming. Elias: *"When I Google for ways of intercropping in the Frisian clay, I end up with a scientific report on intercropping in sandy soils in South Africa!"*. As academically educated farmers, they are hardly able to translate such information to applicable pieces of knowledge. For farmers with another education, this could be even more challenging. In their conversations with fellow farmers, they notice a widely shared need for useful, practically-oriented information in books and websites. *"Farmers need applicable and understandable bits of scientific information."* In their view, such information should become available for everyone.

They also mention that farmers already use modern technologies as WhatsApp and Instagram to exchange sources of information and share experiences with each other. Anne Marit and Elias are a member of such groups themselves and have a lot of contact with others on social media. However, they know a lot more app groups exist and sometimes experience difficulties in joining such information platforms as farming-rookies. For less outgoing people who want to know more on sustainable farming, this might form an irreconcilable burden. Therefore, Anne Marit

> *Farmers look at their neighbours*

and Elias think a more open community of knowledge sharing may stimulate cooperation among farmers.
The two stress that involvement of all sorts of farmers, from conventional to permaculture, is essential to realise innovations in sustainable soil management. They agree that easily approachable local groups will definitely enhance knowledge sharing. The two expect that this will make farming a more dynamical sector and stimulate innovation among all generations of farmers

In their experience, the availability of real-life success stories on proven concepts in sustainable soil management will definitely stimulate involvement of local farmers. After all, Elias mentions, *"farmers look at their neighbours"*. Therefore, the two mention the opportunity of spreading the word about innovative farmers among rural communities. This could be achieved through multiple ways, such as assigning so-called lighthouse farms: Innovative farms that could serve as examples for local farmers.
Besides the connection among farmers, Anne Marit and Elias bring up the importance of an enhanced connection between farmers and scientists. *"I expect scientific research could become more applicable if farmers' questions would be collected and presented as inputs for scientists."*

The two also mention the opportunity of participatory research. They expect the support base for science among farmers will

> *I expect scientific research could become more applicable if farmers' questions would be collected and presented as inputs for scientists*

grow when the two sectors visibly work together. However, farmers bare most financial risks of on-farm research nowadays, limiting the possibilities for farmers to contribute to scientific research. The two see more financial support for farmers that cooperate with universities as a way to lower this barrier. The Keuterboeren: *"Such subsidies would indeed enable university students to conduct more research on real farmland. This will improve the applicability of scientific research, and so enhance innovation among the entire farmers' community."*

Last, Anne Marit and Elias think the soil will benefit from more involvement of citizens. They underline: In the end, consumers should realise that their choices affect the soil. Anne Marit believes that more involvement among the public would also make farming a more attractive option for especially young people, who generally realise most innovations. For this purpose, the two propose excursions, the application of social media and working holidays at local farms.

As SoilHub Magazine, we are very curious about the next steps of the "Keuterboeren" in their journey to a transition in farming. With so much energy and ideas, we will definitely hear more about Anne Marit and Elias in the future!

BOOTS-ON INTERVIEW

"BOER-IN-NATUUR " WILCO DE ZEEUW

"Using old knowledge to innovate" is the way to describe Wilco and his farming company "Boer-In-Natuur" (Eng: "Farmer-In-Nature") (https://www.facebook.com/Boer.In.Natuur/)! He is very modest about what he does, especially since he is not (yet) very satisfied with his soil quality on the poor sandy soils of Brabant. However, we are really impressed by Wilco's farm. His goal is to connect consumers, nature, agriculture and animal welfare. To achieve this he started planting a food forest and farming organic livestock.

Wilco started farming on the farm of his parents, a conventional farm. Because of his passion for nature he immediately decided to switch to a more nature-inclusive form of farming. He worked at organic farm "Veld en Beek" in Doorwerth for a few years, where he gained a lot of experience in setting up an innovative combined production system for dairy products and vegetables. Three years ago, he got the chance to take over an old farm in Uden (Noord-Brabant) and soon introduced organic farming and agroforestry there!

> *When I started farming here, I planted several hazel trees. During this planting I only encountered three worms!*

"*When I started farming here, I planted several hazel trees. During this planting I only encountered three worms!*". He included clover and herbs in his meadow and in the past three years he experienced that the soil improved through the increase in biodiversity. After 1,5 years he saw badgers walking at the sides of his fields. Not long after this, they also walked through his fields. "Now I am not the biggest fan of badgers, however, this does show that there is food available for them, indicating an improvement in soil life!"

By integrating agroforestry on his farm, Wilco aims to eventually achieve higher yields than normal organic farming. Furthermore, agroforestry enables him to achieve a higher nature value on his farmland than normal forests. The available food and shelters in his agroforestry fields, create the perfect place for animals to live. Wilco is confident: *"My farm has a higher nature-value than the surrounding nature reserves. That, I know for sure!"* . Besides an increase in biodiversity, agroforestry provides more benefits. Trees can contribute to the capture of CO2, a decrease in fine dust and noise, and trees need less inputs than annual crops.

Wilco's ultimate goal is *"to combine the force of nature with the simplicity of agriculture"*. In this respect, he foresees an important role for "agriculture-inclusive nature". Wilco explains this concept as valuable natural areas in which extensive agricultural production is allowed. For this development, both agricultural plots and natural areas could be transformed to agriculture-inclusive nature. According to Wilco, the inclusion of extensive production in natural areas will inject these areas with life by providing more food and shelter for both wildlife and humans. Apart from the benefits for nature and food production, Wilco notes that the inclusion of extensive agricultural production in natural areas will help young and innovative farmers to implement agriculture-inclusive natural production systems. Nowadays, high prices of agricultural plots limit the possibilities for young people. Because land prices in nature areas are substantially lower, cheap agriculture-inclusive natural plots will become available when extensive farming practices would be allowed in nature areas. This would allow many young and innovative farmers to start farming themselves. In Wilco's words: *"A win-win!"*. However, nature organisations do not seem to be very keen on agriculture-inclusive nature. Wilco sees a clear explanation of this effect: Since the concept of "agriculture-inclusive nature" includes the transformation of agricultural plots to natural areas, the total coverage of natural areas would increase. Because a fixed amount of money is assigned to each squared meter of nature, this will decrease the amount of subsidies nature organisations receive. In a next edition of SoilHub magazine, we will talk to nature organisations and find out about their opinion on "agriculture-inclusive nature".

> *My goal is to combine the force of nature with the simplicity of agriculture*

Wilco sees an important role of science in finding innovative ways of farming. Currently he sometimes experiences difficulties in obtaining knowledge. *"Internet is great to find information, however, often it is not suitable for the soil type and climate you are farming yourself."* He explains: *"If I want to plant sweet chestnut, should I use seedlings or grafted trees?"*. Wilco himself conducts

many experiments on his land to gain useful knowledge. This exploratory mindset has hugely helped him in innovating. Nevertheless, experiments sometimes do not work out exactly the way he had foreseen. However, this is not a major problem for Wilco. Namely, he is financed by a group of stakeholders who like to invest in innovative farming ideas, resulting in no direct need for financial returns. This enables him to do these experiments and innovate continuously. Wilco hopes that other farmers copy a small part of the experiments he does and become even better in these parts than he is! This way he can contribute to innovation at a larger scale.

Wilco sees a larger role for science in sharing knowledge as well. An example he gives is the "Drenthse Krentenboom" (Eng: "Currant tree from Drenthe, The Netherlands). In Canada, breeders did experiments with this tree and eventually bred a species with a better taste. *"Why don't we have experiments with this typically Dutch tree in the Netherlands?"* Wilco now wants to try experimenting with new varieties grafted on rowan and mulberry trees, which are especially adjusted to soil type at his farm. It would help if science participates in these kind of experiments. Currently, Wilco is cooperating with a research program on walnuts in Belgium. This is a real win-win situation: Wilco gets the walnut trees for a friendly price and can have all of the yields, while the scientists can do their jobs and create new, practical knowledge on which type of trees perform best. The researchers focus on types of walnuts that flourish later in the year. This way the yields are better able to cope with late frosts, an expected effect of climate change.

> *Why don't we have experiments with this typically Dutch tree in the Netherlands?*

A final advice Wilco has for all readers: go plant trees! If more people plant trees and experiment, we will gain more practical knowledge. You do not have to have a lighthouse farm, just by doing it you can be an example for others as well!

POLICY MAKER IN THE FIELD
JEROEN DIJSSELBLOEM

> *I finally convinced my mother to get a compost heap at the age of 85!*

Did you know that many policy makers do have green fingers and a touch for healthy soils behind the scenes? In each edition of SoilHub magazine, we interview a policy maker with a strong connection to healthy soils for the rubric "Policy maker in the field". These policy makers can be known across Europe, but can also be more locally-oriented. For this edition, we spoke with the very first policy maker in the field, Jeroen Dijsselbloem!

After his studies in Agricultural Economics at Wageningen University, Jeroen worked as a policy adviser at the Dutch Ministry of Agriculture, Nature Management and Fisheries. Thereafter, he focused more on other topics, and became well-known throughout Europe for his role as President of the Eurogroup.
Nowadays, Jeroen has returned to his roots and his connection with nature and soil is well represented in his current function as chair of "Natuurmonumenten", the organisation that manages all Dutch natural reserves. Thereby, he is chair of the Wageningen University Advisory board. Now, let's see how Jeroen connects to the soil at home and throughout Europe!

One of the first things that caught the eye when meeting with Jeroen, was the amazing state of his garden. He mentions that his grandfather had inspired him to start gardening when he was young. However, due to the poor soil quality of the soils in Brabant, this was more difficult than expected. This is why he already started his own compost heap when he was 10 years old. Nowadays, he has three compost piles both from plant rests, kitchen waste and manure from cows and horses that graze next to his house. Besides, he was making a nettle soup that will turn into fertilizer for the soil and he even created a compost toilet in his garden. All of these measures have the same goal: to make his soil healthier and make his garden flourish. Noticing the importance of this circular garden management, he also spreads the word: *"I finally convinced my mother to get a compost heap at the age of 85!".* It generally takes him about five years to bring the soil back alive, which he notices by the amount of soil life (especially worms), the well-being of his plants, and the fact that he has to provide his plants with less water. However, with the current droughts it becomes more difficult to keep the soil alive.

The first word that pops up when I think of a healthy soil? Worms!"

When we shift our focus towards larger scale agriculture, Jeroen mentions climate change as one of the reasons for a necessary shift. Before, he never wanted trees in his garden as these would have a negative influence on his vegetable garden and other plants. However, Jeroen recently started planting trees to provide his plants with increasingly important shadow. Jeroen notices the same effect in agriculture, where many trees have been cut down to reduce shadow and increase yields. However, cooling by shadows becomes more and more important in agricultural fields.

Ironically, European agricultural experts have taught such principles for decades to developing countries, while we almost forget to provide shade in our own country, now that the climate is changing. Jeroen mentions how a friend from Nicaragua visited and taught him to create a drip irrigation system. "There is no need to invest in an expensive system, instead, you can use a plastic bottle. Cut the bottom of, turn the bottle upside down and make sure the lit is a little bit loosened. When you regularly fill the bottle with water, this homemade drip irrigation system continuously waters your plant." This is knowledge that we spread to developing countries, and now they have to teach us the same ideas. *"It almost looks like this kind of knowledge gets lost".*

The first word that pops up when I think of a healthy soil? Worms!

When we ask how Jeroen thinks that the shift towards sustainable soil management can be achieved, he has two suggestions. The first suggestion originates from a report publicated at the start of his career. This report is called "Ground for choices: Four Perspectives for the Rural Areas in the European Community", and it shows how agriculture can be optimised. The research included all soil types and climates in Europe, and shows at which places certain crops would grow best. This would lead to a decrease in acreage and inputs needed, while retaining the same yields. Perhaps this could be achieved by providing subsidies for growing crops that are suitable for local characteristics. *"Isn't it weird that a farmer in a mountainous unsuitable area can receive subsidies to start growing maize?"*

The second suggestion he mentions would be to link subsidies to land use practices. Currently farmers can get subsidies for leaving a strip for birds next to a plot, while not altering pesticide applications on the field itself. "Why don't we use this subsidy for a different way of land management?". According to Jeroen, soil life should be embraced more, since healthy soils result in healthier crops. *"Plant resistance is similar to resistance people can build to diseases, provided that they eat healthy, sleep enough etc.".* This resistance is something plant breeding can also help with. Jeroen mentions that he would like to see that farmers embrace knowledge about soil health again. "Why don't we only use pesticides to target a certain pest, instead of using preventive pesticides three times a year?" This way, plants cannot build up resistance to diseases, and a lot of fertilizer input is needed since soil life is destroyed. In this respect, Jeroen suggests to start interviewing the oldest generation of farmers. Certainly, you can expect this in the coming editions of SoilHub Magazine!

Besides, when we mention the idea of Soil Hub connect, Jeroen says that it might be helpful to start a similar concept as "Dienst Landbouw Voorlichting (DLV)". This was a governmental institution that was helping farmers implementing scientific knowledge to their daily practice. *"Translating scientific knowledge towards practical information for farmers might help to detox the soils".* Fortunately, Jeroen believes that today's trend is in favour of soil health. With a lot of attention for the importance of healthy soils to reduce climate change, optimize water use and provide food in a sustainable way, we can make all soils healthy again!

> *Translating scientific knowledge towards practical information for farmers might help to detox the soils*

BOOTS-ON INTERVIEW

REMCO KEIZER, THE MAN BEHIND "KEI NATUURLIJK"

We had a very informative and inspirational talk with Remco Keizer, the man behind "Kei Natuurlijk". This means "Very Natural" in Dutch, using a special word for very: "Kei". The choice of this word resembles Remco's family name, "Keizer". Remco comes from a family of farmers on Goeree-Overflakkee, in Zuid-Holland, the Netherlands. Besides farming many kinds of vegetables, they own and manage a local farmers' supermarket, called "Landwinkel" (*Eng: Land shop*) where their own produce and that of neighbouring farms is sold. After finishing his gardener studies, Remco decided to continue the family's tradition and start as a farmer as well. However, contrary to his father and older brother, Remco decided to become an organic farmer. Looking at the 2 ha large organic farm with many, many kinds of vegetables,

> *It did not feel right to spray poisonous chemicals on land and animals that God created*

Remco successfully fulfilled this decision.

For Remco, the Christian religion was a very strong reason for choosing for the organic way of farming. Working at his family's conventional farm, Remco noticed the effects of the use of chemical herb- and pesticides, on life on the farm and his own health. In Remco's words: *"It did not feel right to spray poisonous chemicals on land and animals that God created"*.

To learn more about organic farming, Remco spent some years in New Zealand, where he learnt a lot about farming with respect to biodiversity and soil health. After returning to the Netherlands, he started his farm on 2 ha of his family's land. The remaining 40 ha are managed by his brother, who farms in a more conventional manner. This is one of the reasons why Remco can not receive the SKAL organic farming label, although he only applies organic methods for pest management and fertilizing on his land. Since Remco has relatively high costs to be able to farm with respect to the soil and life on his farm, he could really use the additional rewards the SKAL label can offer.

However, Remco found a very creative and entrepreneurial solution for this problem: His own label! All of his products are labeled with the label "Kei Natuurlijk". In the "Landwinkel", a poster highlights Remco's organic way of farming. Besides the visibility on the products and in the shop, Remco regularly updates his "Kei Natuurlijk" Instagram account (https://www.instagram.com/tuinderij.kei_natuurlijk/?igshid=h1tl52qva6kt) with stories on his challenges and successes as an organic farmer. Remco specifically underlined that he finds it essential to share both successes and challenges. This way, he hopes to inform consumers about the difficulties organic farmers face, justifying the higher prices of "Kei Natuurlijk" products. Remco really appreciates this more direct contact with the consumer, as his products do not end up in a "large pile" of products. The extra income is a real advantage of Remco's more personal approach. Thereby, this has enabled Remco to sustainably manage his soil without the SKAL certification. However, updating and managing the "Kei Natuurlijk" label and social media accounts does take a lot of Remco's time. Thereby, not all supermarket owners are as keen on stories behind local produce as the "Landwinkel"

> *We must do this together!*

and Remco sometimes experiences difficulties in finding markets for his vegetables.

Remco is a relatively young farmer and is very keen to learn more about sustainable ways of farming. Therefore, he spends much of his free time reading scientific reports on internet. These reports often cover over 200 pages, which can be quite challenging to read for more practical-oriented farmers, such as Remco. In such long reports, it can be particularly difficult to find information that is specifically suited for Remco's own situation.

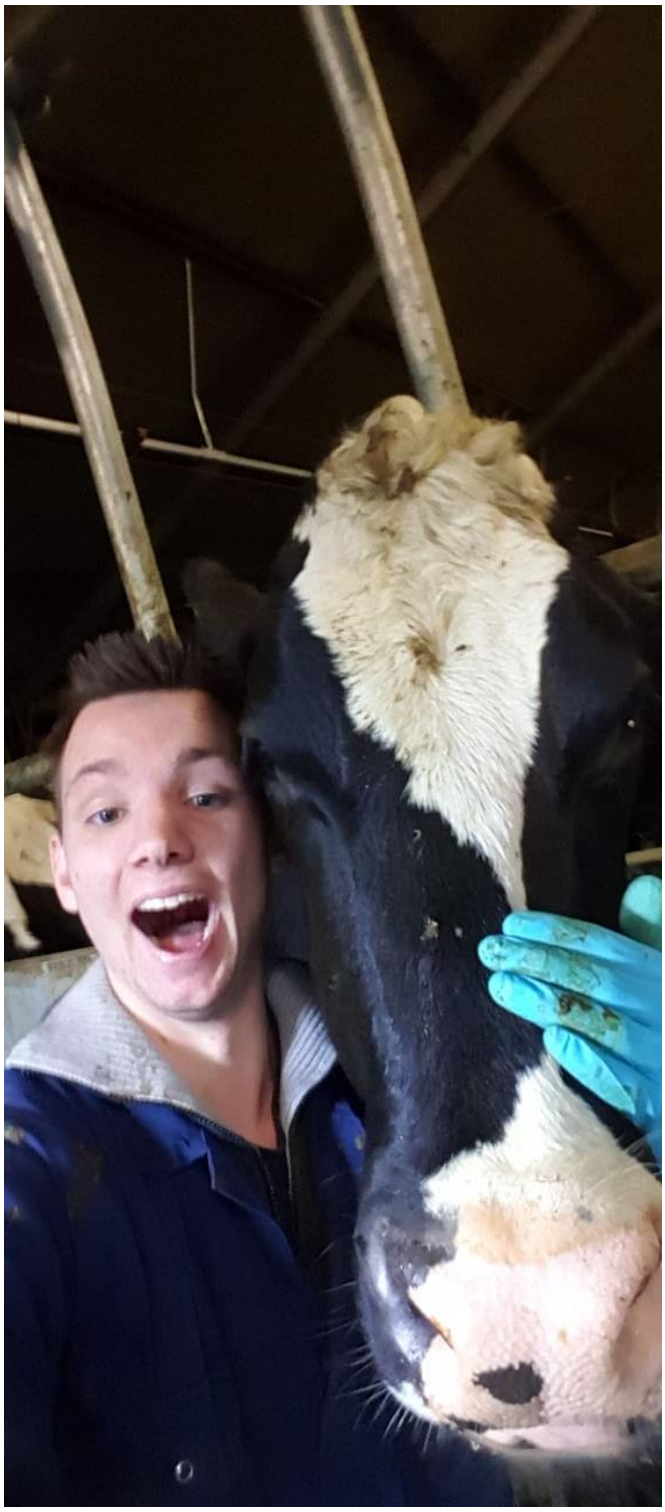
In this respect, Remco misses the positive vibe of knowledge sharing among farmers and other experts in the Netherlands, which he really appreciated during his time in New Zealand. There, organic to conventional farmers, with ages from 20 to 75 years old, regularly gathered to discuss predefined topics, such as biological pest management. The conversations with so many other farmers really gave Remco a sense of cooperation and energy. Rather than be in a competition, farmers in that community work together to innovate and improve soil quality and yield, according to Remco. Such an active community of innovative farmers in the Netherlands would motivate young farmers more to keep innovating in sustainable soil management. Thereby, Remco believes he could learn so much from both young and older colleagues in the country. As for many farmers, Remco learns more by directly applying theoretical concepts in the field. Ideally, Remco would attend regular meetings on theory and practical issues of certain topics. Perhaps,

the government or universities could help with such more practical information sharing. In his view, an independent party should set certain demands for participating farmers, to make sure that they attend the information meetings and aim to implement certain soil-improving strategies. Besides such regulations, Remco thinks that certain rewards could also work very beneficial. After all, many of Remco's friends do want to take care of healthy soils, but only when it can also provide them with a good income. ***"We must do this together!"***

BOOTS-ON INTERVIEW

JACCO KOOISTRA, THE FARMING SCIENTIST

If you look for someone that connects science with farming, it is Jacco. While writing his graduation thesis for his studies on agricultural economics, Jacco takes care of 110 cows and two milking robot in Friesland, in the north of the Netherlands. As a natural networker, Jacco speaks with a lot of farmers and students about issues related to farming and soil management, which resulted in a very fruitful conversation for SoilHub magazine.



Before our interview, Jacco asked around for opinions and experiences of his neighbour farmers. He starts the conversation with an example of a farmer who integrated herbs in his meadow for 12 years. This should make the soil healthier; however, now he turned this meadow back to a conventional grassland for two years and experiences that this "healthy" plot has much less yields than its surrounding plots. Since for many farmers the definition of a healthy soil is correlated to the amount of yield it provides, this healthy soil does not seem so healthy at all! He does mention that *"If consumers demand nature-inclusive farming and are willing to pay a bit extra for it, farmers will definitely follow."*

Although many of Jacco's colleages are keen to gain information and regularly read farmers' trade magazines, Jacco still notices that farmers experience certain knowledge

> *If consumers demand nature-inclusive farming and are willing to pay a bit extra for it, farmers will definitely follow*

gaps. For example, many farmers do not know which material is best to use at the bottom of boxes for cows. Unknowingly, many farmers use wooden chips which has a negative, acidifying effect on the soil. If you'd use straw instead, this will not happen. Another example Jacco brings up is the spreading of fertilizer on hot and windy days. During these days ammonia volatilizes quickly, and much more fertilizer has to be used than actually needed. *"It would be great if this kind of practical knowledge would be spread to all farmers!"* Besides the benefits for nature, this will save farmers a lot some money.

When we speak Jacco about sharing of knowledge between farmers and scientists, Jacco stresses the importance of framing. Keeping the audience in mind is important to take into account when trying to convey a message. If a scientist explains farmers about healthy soils, they will always ask: *"What's in it for us?".* Freely translated, this means that one should describe a measure to improve soil biodiversity as a gain for nature when presenting it to ecologists, but as a gain in income when trying to convince farmers. This is easily understood when realising that farmers fully depend on production for their income. This also explains why farmers sometimes are a bit sceptical against so-called innovative, sustainable policies or scientific reports, after various negative experiences. According to Jacco, there is a need for successful examples of healthy soil management. *"Among farmers, a concept needs to sell itself."*

> *What's in it for us?*

> *By improving subsidy systems, governments can definitely initiate innovations in sustainable agriculture*

Jacco mentions that he believes that subsidies can definitely help if the European Union wishes for a transition to more sustainable soil management, enhancing soil biodiversity and organic matter. There should be a shift from the old CAP (Common Agricultural Policy) "income support subsidies", towards subsidies for sustainability. The traditional income support subsidies are based on the principle of: The more land you own, the more money you get. Jacco stresses that this is not logical anymore, especially when the government aims to move towards a more sustainable, circular systemquality label by FrieslandCampina seem. *"By improving subsidy systems, governments can definitely initiate innovations in sustainable agriculture"*. In Jacco's view, labels like the Planet Proof very promising (https://www.planetproof.nl/). *"By involving conventional farmers, the Planet Proof label is a way to ensure continuous innovation on all soils."*

Another burden towards sustainable farming that Jacco distinguishes is the current way of policy making. To increase their support base, policies should be clear and logically explainable to land users. Sometimes, powerful lobbies seem to be the real policy makers. *"For example, why are farmers forced to use chemical fertilizers as a portion of the nutrients, instead of manure? I, having a strong background in science, can not explain why this would be beneficial for natural or agricultural purposes. Contrary, I suspect this is the result of the strong chemical fertilizer lobby in the Netherlands. This must change, make policy effective, logical and realistic."*

SCIENTIST ON THE ROCKS

GUUSJE BONNEMA, BREEDING FOR SOIL QUALITY

In the rubric “Scientist on the rocks”, in each edition of SoilHub Magazine we highlight a scientist who conducts research that is directly or indirectly relevant to soil managers and thus soil health. This way, we intend to keep you updated on scientific progress and provide you with some practical information. We aim to present all scientific information in an easy-to-read and applicable way. That should not be a problem, since after all, scientists are also just human beings who love to share what they’re up to.

The very first “Scientist on the rocks” is Guusje Bonnema, associate professor and group leader “growth and development” in Plant Breeding , Wageningen University and Research. During her career, Guusje has initiated major innovations in breeding of various vegetable crops, such as tomatoes and cabbage. Through seed companies, university researchers in plant breeding closely connect to farmers. Certainly, some of Guusje’s scientific achievements have reached many of your agricultural fields and dinner tables!

Guusje is an especially interesting scientist for SoilHub Magazine, since she currently focuses on “breeding for soil health”. In short, this means that Guusje and her team conduct research to find out what characteristics make crops grow well in agricultural systems in which soil health is stimulated. To tackle this complex topic, they closely work together with Wageningen scientists from other disciplines, such as ecology, crop modelling and soil science. Besides studying specific plant traits, the

collaborative team also aims to implement them to create crop types that are specifically optimized for healthy soils. Good for you!

Guusje has a clear answer when we ask how this new focus of plant breeding has emerged. *"The international market in seeds for healthy soils is growing enormously!"* Indeed, more and more seed companies are starting to focus on seeds for intercropping or organic farming. But, you may ask, what do the seeds have to do with sustainable agricultural production systems? Good question, Guusje agrees. She explains that nowadays, most innovative farms that experiment with novel concepts such as mixed cropping work with the same seeds as are used in conventional monocropping systems. However, these seeds were all developed after the green revolution. This makes that almost all seeds on today's market are specifically bred for monocropping systems on soils with extraordinary high inputs of chemical fertilizer and pesticides. According to Guusje, this is a very logical development looking at the necessary focus on yield increases of the past decades. *"This saved millions of people worldwide from starvation."*

Effectively, the breeding for high-nutrient monocultures has resulted in crops with relatively minor rooting systems. Guusje clarifies this with the example of Norman Borlaug, an important initiator of the green revolution and sometimes called "the wizard". In the 1960s, he came up with dwarf variations of wheat. This drastically improved wheat yields worldwide, due to lower chances of knocking over by wind and because the plant can put more of its' energy in seeds. Along with the decreased height above ground, the rooting systems of dwarf variations were decreased, too. For Borlaug, this was another advantage: Crops would need to spend less energy on their roots. Moreover, these plants depended on

The international market in seeds for healthy soils is growing enormously!

root systems to a lesser extent than before, due to the high supply of nutrient-rich fertilizers. As a result, most of today's available crop varieties were not bred for an efficient root system.

"For agricultural production systems with a focus on soil health, more efficient rooting systems are essential", Guusje explains the need of breeding for soil health. In experiments on intercropping systems performed by her colleagues at the Farm System Ecology group, higher crop yields are achieved from crop varieties with improved rooting systems, while increasing ecological functions. Likely, one of the causes for this effect are the larger rooting systems that interact between crops and connect to the underground microbes, like symbiotic mycorrhizal fungi. These funghi collaborate with plants in their uptake of minerals. This effect can be logically explained, since larger rooting systems enable plants to reach further for nutrients. Larger roots provide even more advantages to crops and soil-conscious farmers . When intercropping with nitrogen-fixating plants, interacting root systems can benefit from increased uptake of nitrogen from the soil. Moreover, Guusje mentions that plants can work together with both beneficial soil microbes and the above mentioned mycorrhizal fungi that thrive in healthy soils. *"Research indicates that plants can benefit from these underground communities if crops are specifically bred for improved rooting systems."*

Guusje tells that plant breeding is a very complex job. *"Breeding for soil health has made it even more complex!"*. For plant

> *I work together with agricultural production system modellers, ecologists and soil scientists. This way, we can make great leaps towards seeds for healthy soils*

breeders, the soil brings a whole new dimension in research. It can be especially challenging to measure effects of certain crop types below ground. For example, roots can be digged up or sampled using augers. In addition, novel techniques are being developed for this new dimension in plant breeding. High-tech examples of tools that enable plant researchers to look into the soil are X-ray scanning and 2D growing systems, in which plants grow between two glass plates. Thereby, researchers apply innovative DNA technology to identify bacterial and fungal soil communities. Another challenging aspect of breeding for soil health is the high number of crop types that grow together in complex production systems, such as intercropping. *"Different plant characteristics are needed per combination of crops."* To deal with these complex issues, Guusje stresses the importance of scientific collaboration between expertises. For example, if you want to breed for the Mycorrhizal symbiosis, it is essential to understand the fungi. *"I work together with agricultural production system modellers, ecologists and soil scientists. This way, we can make great leaps towards seeds for healthy soils."* Guusje provides us with many more examples of innovative research in plant breeding which are very relevant for soil health. But, you may wonder, how does this research end up on Europe's farms? In this respect, our scientist on the rocks strongly believes in the power of conversations. *"I do not have time nor the expertise to go to farmers and tell them what to do. I do want reach out more and tell about what I do and why I do it."* Guusje also sees a larger role for so-called participatory breeding. This is a way of collaboration in research between scientists and farmers. *"Breeding is a very complex job, but we as scientists are not always aware of what farmers want to achieve."* Through participatory breeding, farmers' expertise could be used to breed more effectively. Questions that could be solved by farmers are abundant. For example, what leave size is optimal? What tractor a farmer uses is another aspect that influences the optimal width of crop lanes in strip cropping.

Concluding, Guusje once more underlines the importance of collaboration in our transition towards healthy soils. As SoilHub Magazine, we share this vision and we are very curious about coming developments in breeding for soil health!

> *Breeding is a very complex job, but we as scientists are not always aware of what farmers want to achieve.*

MEET HUPSOILHUB!

KLAIS BLAAUW

Hi everyone! My name is Klais Blaauw and I'm a Master student Earth and Environment at Wageningen University. In my specialisation Soil Geography and Earth surface dynamics we focus a lot on landscape forming processes on and beneath the surface. My interest for soil health developed during my ACT project about revitalizing agriculture in Kobani (Syria) and when I researched land degradation in Central America for my thesis. The Soil Health challenge is a perfect opportunity to take the knowledge and interests I gained during my studies into practice!

MARISKA RIJK

Dear readers, My name is Mariska Rijk and I recently finished by bachelor 'International Land and Water Management' at Wageningen University. For my internship, I spent four months in the South of Spain to learn about farming in an area where land degradation and a lack of water availability are large problems. During this time, I gained my interest for sustainable land management. When I heard about the soil challenge, I was immediately motivated. Together with my teammates I want to contribute to healthier soils in Europe and throughout the world!

TITUS KRUYSSEN

Hello fellow soil lovers! I would like to share my ambition to improve global soil quality with you. I am intrigued by the competition between nature and food production. During my studies, I experienced that this competition must be converted to a collaboration to ensure a future including both natural areas and good food for everyone. In this respect, I believe healthy soils are key to let both nature and agriculture thrive. Together with my two close friends Mariska and Klais, I aim put this idea into action by enabling soil health and farmers throughout the world. HupSoilHub!