WAGENINGEN WORLD
MAGAZINE OF WAGENINGEN UNIVERSITY & RESEARCH ABOUT CONTRIBUTING TO THE QUALITY OF LIFE
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‘Every extra mouthful of vegetables is progress’

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Mangrove forest restoration with a mediaeval technique

Fighting off rice vampires
Devastating parasitic weeds cause great damage to rice farming

Saving corals
Corals are under pressure worldwide. Replanting provides a road to recovery

WAGENINGEN UNIVERSITY & RESEARCH

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The mission of Wageningen University and Research is ‘To explore the potential of nature to improve the quality of life’. Under the banner Wageningen University & Research, Wageningen University and the specialised research institutes of the Wageningen Research Foundation have joined forces in contributing to finding solutions to important questions in the domain of healthy food and living environment. With its roughly 30 branches, 5,000 employees and 10,000 students, Wageningen University & Research is one of the leading organisations in its domain. The unique Wageningen approach lies in its integrated approach to issues and the collaboration between different disciplines.

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FEATURES

Global One Health

'Global One Health was the theme of the *dies natalis* (Founders' Day) celebration on 9 March because it is becoming an increasingly important topic for Wageningen. It is a fairly new theme which aims to blend together two hitherto distinct research fields. On the one hand there is the natural sciences-oriented One Health approach to infections diseases: medics, vets and biologists are aware that they need to focus not just on people but also on the natural world around us. Mosquitoes, for instance, spread malaria or dengue fever. We are also facing kingdom hoppers such as SARS and Ebola: pathogens which make the jump from animals to humans.

This One Health approach is gaining an increasingly global dimension. Not only through movement of people and goods around the world, but also due to climate change. Take the rapid advance of the Zika-carrying mosquito, for instance.

And then there is the more social sciences-oriented Global Health approach, which focuses on major global health issues such as undernutrition, the obesity epidemic, and the spreading of contagious diseases. Here there is a much more explicit role for nutrition, demographics and socio-economic aspects of globalization.

In practice it is obvious that there is a lot of overlap between One Health and Global Health. A person who suffers from undernutrition – or indeed from obesity and diabetes – is more vulnerable to new infectious diseases. And then there is antibiotic resistance, or a societal phenomenon such as urbanization. This can pose new dangers: cities in which people and animals live in close proximity are breeding grounds for new and potentially dangerous strains of flu. Especially with the added factor of unhealthy eating habits.

We have a great deal of expertise in numerous relevant disciplines here in Wageningen. And we can make more effective use of it if we join forces across disciplines and arrive at a more integrated Global One Health approach.'

Martin Scholten, general director of the Animal Sciences Group in Wageningen

AGRICULTURAL ECONOMICS

Good year for pig farming and ornamental plants

Average incomes in Dutch farms and market garden businesses rose by 15 percent in 2016, according to figures produced by Wageningen Economic Research. The rise was mainly due to falling costs, in particular for fertilizers and energy. However there are substantial differences between the sectors. The ornamental plant sector (cut flowers and plants) and pig farming finally saw another good year due to higher selling prices. But incomes fell in arable farming, outdoor vegetable cultivation, dairy farming and the poultry sector.
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NUTRITION

Fall in Dutch meat consumption

The Dutch have been cutting down on meat over the past five years. Consumption has fallen since 2010 from 80.9 kilos per person per year to 75.4. This is the consumption based on the carcass weight, i.e. including the bone. About half of this becomes meat and processed meat products.
People are consuming less pork and beef in particular. Pork still accounts for almost half of all the meat eaten in the Netherlands. Wageningen Economic Research collated these figures on behalf of the animal rights society Wakker Dier.
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PHOTO SHUTTERSTOCK

ARABLE PRODUCTION

PHOTO HOLLANDSE HOOGTE

Cereal production in Africa needs to increase fast

By 2050, there will be two and a half times as many people living in sub-Saharan Africa as now. Agricultural production will have to increase faster if they are all to have enough food. Otherwise expensive food imports will be unavoidable.

Current production levels for the five main cereals (maize, millet, rice, sorghum and wheat) in sub-Saharan Africa are far below their potential levels. However demand is set to grow by a factor of 3.4 due to population growth combined with a modest rise in living standards.
Such a substantial increase in production will be difficult without investment in agricultural research, complementary policies on food, and improvements to transport, credit, insurance and land rights, according to a research team from Wageningen University & Research, African institutes and the University of Nebraska (USA). 'The current low annual production growth rate will have to really accelerate,' says the principal researcher Martin van Ittersum, professor of Plant Production Systems at Wageningen. That will be a huge challenge due to the difficult and, in particular, variable natural conditions and the political and economic instability. Van Ittersum: 'Cereals account for half of the calorie intake but I've seen no signs that things are better for crops such as cassava, beans and yams.'
The researcher stresses that it is essential for Africa to be largely self-supporting because many countries do not have enough money to buy in food from elsewhere. 'That is only possible if there is enough progress in economic development in sub-Saharan Africa. But the key to economic development is strong development in agriculture; history shows us that has been the case in nearly all countries.' Intensification of agricultural production is crucial to this as that allows food production to increase without taking up more land, which would be at the expense of nature and lead to higher greenhouse gas emissions. The study appeared in December in PNAS.
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CROP CULTIVATION

Potential for Nethervanilla investigated

Could it make commercial sense to grow vanilla in Dutch greenhouses? A consortium headed by Wageningen is hoping to answer that question.

Vanilla is one of the world's most expensive spices. However, the price, quality and supply of this tropical product are all very volatile. That is because most vanilla comes from the African island of Madagascar, where cultivation has to combat water shortages and climate change. Consequently the aroma is often produced artificially. But there is a growing demand among consumers for natural ingredients.
Wageningen researchers therefore started experimenting a couple of years ago with cultivating vanilla orchids in greenhouses. Cultivating vanilla is labour intensive and requires a great deal of expertise, says researcher Filip van Noort. 'Vanilla is a climbing orchid. It's not difficult to get it to grow but getting the plant to flower is tricky. You have to pollinate the orchid by hand to get the pods, which you then have to dry and ferment.'
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PHOTO KOEN VERHEIJDEN

NUTRITION AND HEALTH

Research on ADHD and diet

Wageningen scientists will be working with fellow researchers to figure out why diet can affect ADHD. A restricted elimination diet (RED) leads to behavioural improvements in 60 percent of children with ADHD, as the INCA study showed in 2011. This customized, five-week diet contains at least rice, lamb, turkey, vegetables and fruit. However, it has no effect on the other children. The new study will focus on what happens during the diet to microorganisms in the intestines, the metabolism, the immune system and the children's brains.
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EDUCATION

Top three greenest universities

Wageningen has risen from 32nd position to third in the GreenMetric Ranking by the University of Indonesia. The researchers assessed 516 universities from 74 countries according to how environmentally friendly the campus is, in terms of energy and water consumption, waste management, transport and the number of courses and publications relating to sustainability. The ranking started in 2010 and is compiled on the basis of data supplied by the universities themselves.
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WAGENINGEN ACADEMY

European Food & Agribusiness Seminar (EFAS)

Wageningen University & Research has been organizing the biennial European Food & Agribusiness Seminar (EFAS) ever since 2005. This has resulted in a worldwide network of more than 300 experienced leaders in food and agribusiness. As of this year, the seminar is being organized in collaboration with the Zurich Institute of Business Education, part of the China Europe International Business School (CEIBS). The setup for EFAS will remain the same, with the focus still on discussing key issues in food and agribusiness together. The seminar is designed for and restricted to CEOs and senior executives. The next seminar is scheduled for 18-20 June 2017 at the CEIBS Zurich Campus in Horgen.
For more information, see the Wageningen Academy website: www.wur.nl/academy

MARINE ECOLOGY

PHOTO WUR

Less plastic in fulmar stomachs

Almost all Northern fulmars have plastic in their stomachs. Analysis of the figures for 2015 shows a very modest but statistically significant decrease, for the first time in ten years, in the amount of plastic. These results come from the Northern fulmar monitoring programme. This bird, which forages in the North Sea, is an indicator species for the amount of plastic floating in the open sea. At present, the researchers can only guess at the reasons behind the small decrease.
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NUTRITION AND HEALTH

Does bread cause irritable bowel?

Bread is becoming less popular while gluten-free is the in thing. Some of the people rejecting bread and other products containing gluten claim that they suffer less from stomach complaints as a result, even though they have not been diagnosed with gluten intolerance. Wageningen Plant Research and Maastricht University will be working with a number of companies and other organizations on the relationship between wheat in the diet and irritable bowel syndrome. It is possible that the problems are being caused by proteins other than gluten or by sugars.
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MICROBIOLOGY

Bacterial protein helps to keep mice slim

Giving mice the intestinal bacterium *Akkermansia* inhibits the development of obesity and diabetes. New research has shown how the bacterium can safely be tested on humans.

The Wageningen professor of Microbiology Willem de Vos has been working with an international team on *Akkermansia muciniphila* for a while. This bacterium lives in the mucosa that protect the intestinal walls. The researchers showed that in obese mice, this intestinal bacterium can curb the inflammation in the intestines that occurs with obesity and type 2 diabetes. However, treating humans in this way was a problem as the bacterium is adversely affected by oxygen and is cultivated in a medium containing animal components.
It turns out that the inflammation inhibition effect survives pasteurization of the cells (a mild heat treatment). The researchers explain why in their study, published in January in *Nature Medicine*. Pasteurization kills the bacterial cell but a protein on the outer membrane remains intact. Mice with a diet rich in fats that were given this Amuc_1100 protein in their food remained just as slim. The researchers were also able to develop a synthetic medium for growing the bacterium.
The Université Catholique de Louvain in Belgium, a partner in the research, is now carrying out an initial study of the effect of the bacterium on intestinal inflammation in humans. The researchers have also submitted patent applications for the findings. De Vos has started up the spin-off A-Mansia Biotech with Wageningen University & Research and the Belgian university in order to scale up production of *Akkermansia* and the membrane protein for possible use as a nutritional supplement or medicine. 'That's the best way of making sure that your knowledge gets used,' says De Vos.
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PHOTO ANP PHOTO

HYDROLOGY

PHOTO SHUTTERSTOCK

More clouds over forests

In the summer there are clouds over woodlands about 10 percent more often than over the surrounding open area.

This conclusion comes from Wageningen University & Research and the Royal Netherlands Meteorological Institute, together with international colleagues, after studying ten years of satellite images from two large French woodland areas. These areas are fairly flat, which rules out height differences as a cause of cloud formation and precipitation.
'This cloud formation could lead to more precipitation in some cases, but generally the effect will be limited to cooling,' says the Wageningen hydrologist Ryan Teuling.

The researchers do not yet know what processes are responsible for the additional cloud formation. They suspect an interaction between rising temperatures, evaporation and turbulence, but natural aerosols could also play a role. The findings are relevant for example in determining the location of new forests, says Teuling. 'Because they will affect the regional climate.' The study appeared in January online in *Nature Communications.*
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FOOD SAFETY

Chip detects fungal toxin in beer

Wageningen researchers have developed a sensor with a nanochip that can detect mycotoxins in beer. Mycotoxins are found on grains attacked by fungi. The test is an extra safety check on top of the check of the actual brewing grains. The mycotoxin sticks to the nanochip (which is reusable). An antibody is added to the beer sample. If the sample is clear, the antibody binds to the nanochip, but it does not do so (or not to the same extent) if the sample is contaminated. 'In principle, this could work for other substances for which antibodies are available,' says chemist Teris van Beek at Wageningen University & Research.
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PHOTO SHUTTERSTOCK

BIOBASED MATERIALS

Students develop new bioplastic

A team of Bachelor's students doing the Honours Programme at Wageningen University & Research improved the properties of a bioplastic by incorporating nanoparticles of chitin, a water-repellent, hard polymer from the exoskeletons of arthropods.
The team won the NWO Top Sector Chemistry Student Competition for Master's students with their innovation. Bioplastics are usually made from polylactic acids but are often brittle and permeable. The multidisciplinary team started with an extensive literature survey and talks with WUR researchers. Based on this, the students then developed a way of inserting chitin between the polylactic acid particles. That makes the bioplastic more stable and stronger, and therefore more on a par with standard petroleum-based plastics such as polyethylene. NWO, the Netherlands Organization for Scientific Research, had given the team 27,000 euros to flesh out its research proposal. The market has already shown signs of interest in the results. The students are also working on a scientific publication. *Info: karin.schroen@wur.nl*

PHOTO AKZO NOBEL

NUTRITION AND BEHAVIOUR

Bequest for nutrition research

Former assistant professor, the late Johanna Edema of the Human Nutrition department in Wageningen has left her former colleagues two million euros for nutrition research. The Edema-Steernberg Foundation, named after the benefactor's parents, will invest this bequest in five PhD research projects centred on the issue that was close to her heart: why people eat what they do. The aim is to encourage collaboration between the social sciences and the natural sciences in the field of nutrition and create a basis for new developments. On 11 May the projects will be presented to family members and others who are interested. The foundation is also supporting four Master's students in Nutrition from developing countries via the Anne van den Ban Fund. Edema passed away at the end of 2015 at the age of 92.
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Former assistant professor, the late Johanna Edema

EXTRA

Top MSc programmes

Of Wageningen University's 27 MSc programmes, 23 have been described as 'top programmes' in the Dutch Master's guide the Keuzegids of 2017. That is seven more than last year. The keuzegids considers a degree programme 'top' if it scores at least 76 out of 100, based on student evaluations in the National Student Survey and the evaluations of experts on the national visitation committee NVAO. The guide is published annually by the Centre for Higher Education Information.
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FOREST MANAGEMENT

PHOTO SHUTTERSTOCK

Diverse forest is more productive

Biodiversity is good for the economy. Productivity decreases faster if the range of different species in a forest declines. These findings come from an international group of scientists.

High biodiversity has a positive effect on a forest's productivity. Different species do not compete directly for space and nutrients, and as a result they can all grow more. But the less mixed a forest is, the less wood there is to be harvested.
The survival of about half of all tree species around the world is under threat due to factors such as deforestation, forest degradation and climate change. That loss of biodiversity could lead to a global economic loss of between 166 and 490 billion dollars per annum, according to figures given by the researchers in their paper in *Science*.
The group, working at more than 90 institutions around the world, used data from over 770,000 forest plots for this project. The plots have more than 30 million trees of at least 8,700 species. The study includes all the main forest ecosystems in 44 countries.
The economic benefit from maintaining biodiversity for tree felling is a factor of two to six times greater than the cost of properly protecting forests worldwide. High biodiversity also has substantial social, ecological and environmental benefits for the climate, habitats and water quality and through a reduction in erosion.
'This research gives clear-cut evidence of the huge importance of high biodiversity in our forests,' says Gert-Jan Nabuurs, professor of European Forest Resources in Wageningen and one of the project coordinators. 'The results highlight the importance of an integrated approach to forest management and conservation, as sustainable forest management improves the diversity in those forests.'
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AQUATIC ECOLOGY

Return of the flat oyster

The flat oyster is back in the Dutch North Sea. Last autumn, divers came across an oyster bed with wild flat oysters covering 13 hectares, close to the Brouwersdam off the coast of Zeeland.

'That was a surprise,' says Aad Smaal at Wageningen Marine Research, who studies how and where oyster beds could be re-established in the North Sea. The beds, which are biodiversity hot spots, disappeared due to a combination of overfishing and fishing boats disturbing the sea bed. 'Now we can focus our research on the conditions for natural recovery and on monitoring the development of the oyster beds.' Smaal suspects that the oyster bed was formed by larvae from Grevelingenmeer, a lake where the indigenous oysters are farmed on a large scale. The reef is now self-supporting.
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PHOTO BUITEN BEELD

LIVESTOCK FARMING

PHOTO SHUTTERSTOCK

Sensor for calving

The chip in a cow's electronic ear tag can help give a better prediction of when the cow will calve. This is important for the health of the cow and the calf. The insemination date only gives an accurate prediction of the calving date in one out of ten cows. Research shows this can be increased to nearly four out of ten cows when combined with the sensor data. Farmers already use the chip to assess whether a cow is in heat. This works with hourly recordings from a sensor of the cow's activity, feeding behaviour, ruminating and temperature.
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ENVIRONMENTAL ECONOMICS

List of plus and minus points of foods

Researchers at Wageningen University & Research, working with the company True Price, have developed a method for showing all the benefits and downsides of a food product.

The model calculates the impact of a food product in 37 areas. It shows the positive and negative effects on the environment, economy and people, for example animal welfare, employment and health.

The new method will let companies, public authorities, NGOs and consumers compare products and see what the pros and cons are. Potatoes, French beans, milk and mince were assessed in an initial analysis. Potatoes and French beans make an average contribution to the economy, have little influence on the environment and are healthy. Milk scores much worse on the environment (water, air, climate) and has a lower score for social aspects because of the low prices and consequent underpayment of farmers. The health effects of milk are both positive (nutritional value) and negative (fats). Minced beef has a similar score to milk.
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ECONOMY

Grow market share sustainable food

The market share of relatively sustainable food in the Netherlands grew by 8 percent in 2015. Sales increased mainly in supermarkets (+16 percent) and restaurants, catering and the healthcare sector (+10 percent). The Biologisch and UTZ Certified labels account for the biggest share of expenditure, while ASC (for farmed fish) and Beter Leven (for meat) are the fastest risers. Of all products, the sustainable market share is greatest for eggs (39 percent). The figures come from the Sustainable Food Monitor that Wageningen Economic Research produces every year for the Ministry of Economic Affairs.
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A tomato with your coffee?

People who eat vegetables with their main meal only don't get enough of them. So researchers are looking for new ways to get vegetables into people. And it's working. At meetings, people are quite happy to swap their coffee-time cookie for some cherry tomatoes. 'If vegetables are offered, people eat them with pleasure.'

TEXT KORNÉ VERSLUIS **PHOTO** HOLLANDSE HOOGTE

The Dutch do not eat enough vegetables. On average, we eat about 130 grams a day, which is about half the 250 grams recommended by the Nutrition Centre. At the end of last year the centre raised the recommended daily intake of vegetables from 200 to 250 grams. Nutritionists are going against the tide here, as the Dutch have actually been eating smaller and smaller quantities of vegetables since the 1980s.
Most Dutch people did not even manage the previous norm of 200 grams of vegetables a day. Only 28 percent of adults eat this much, and only 5 percent of the Dutch manage the 250 grams recommended by the new guidelines. Young people and children consume the amounts suggested for their age groups even less often.
This is worrying because we all know that vegetables are good for you. 'We know that but we don't eat them,' says Renger Witkamp, professor of Nutrition and Pharmacology in Wageningen. Yet Witkamp has colleagues who are not concerned about this. More precisely, he has one distinguished colleague who likes to explain why the hallowed status given to fruit and vegetables is unjustified. An apple is no more than sugar water in a skin, and vegetables are really only healthy for what they lack: calories. So says the ex-Wageningen professor Martijn Katan (now at VU University Amsterdam) in his books and in interviews. It is true that people who eat a lot of fruit and vegetables fall ill less often and live longer. But, says Katan, that is not in itself proof that there are health-giving substances in fruit and vegetables. Many of the people who eat a lot of fruit and vegetables are highly educated and have healthier lifestyles. It cannot be proven that their health is due to the vegetables they eat.

RICH IN VITAMINS

No direct answer to Katan's critique can be found in the scientific literature, Witkamp admits. 'No double-blind controlled studies have proven that it is substances in vegetables that cause you to live longer. You cannot carry out such studies because people are not willing to eat a controlled diet for years on end. But we do have a lot of indications. Katan likes to shoot down sacred cows, but the vast majority of nutrition researchers in the world think vegetables are not just healthy because they are low-calorie, but also because they are rich in vitamins, minerals and other micronutrients.'
There are fruits with a high 'Katan factor', says Witkamp. It is true, for instance, that apples are not as healthy as their image would suggest. Apart from a bit of fibre in the skins, apples consist largely of sugar water. But there really are substances in vegetables which keep people healthy. Various studies have shown, for instance, that polyphenols in cabbage have an anti-inflammatory effect. That is healthy, since inflammation is the cause of many of the negative consequences of overweight. Other vegetables contain substances which are converted in the gut into short-chain fatty acids such as butyric acid or propionic acid, which keep the lining of the gut healthy. Or there's the example of beetroot, which contains nitrate and lowers blood pressure. And almost all vegetables are high in fibre.

HIGHER STANDARDS

The Health Council, which laid down new dietary guidelines last year, now being recommended by the Nutrition Centre, studied the evidence for a number of health effects of eating vegetables and concluded that there is strong evidence that eating plenty of vegetables is good for blood pressure, and helps against cardiovascular diseases and bowel cancer.
Green leafy vegetables reduce the risk of diabetes. 'So I am sticking to the dietary guideline of: vegetables, vegetables, vegetables and fruit,' says Witkamp.
But the average Dutch person does not follow this guideline. Since the nineteen eighties, say researchers, we have been eating less and less vegetables. Whether raising the bar will help to reverse this trend is very doubtful, says Emely de Vet, professor of Health Communication and Behaviour Change at Wageningen. 'Of course you hope people will raise the bar for themselves but I think it's more likely that a higher norm will discourage people. If you don't achieve the target, you just give up. Whereas every extra mouthful of vegetables is progress.'
People with traditional Dutch eating habits will have great difficulty eating the recommended 250 grams of

> ‘Every extra mouthful of vegetables is progress’

vegetables. In the Netherlands, vegetables go with the evening meal. And hardly anyone can eat 250 grams of vegetables at that meal. You will only manage it if you also eat vegetables with lunch, breakfast or as a snack.

VEGGIE SNACKS

The GroentenFruit Huis, the Dutch fruit and vegetable growers’ organization, has financed a few research projects at Wageningen UR in recent years to find out whether there are new ways of getting Dutch people to eat more vegetables. Victor Immink, a marketing researcher at Wageningen Economic Research, and Ellen van Kleef of the Marketing and Consumer Behaviour group placed cherry tomatoes and snack-size cucumbers and peppers on meeting tables in offices. Beforehand they expected that a few vegetables would be eaten during afternoon meetings. But surely morning coffee would call for cookies and not for cucumbers or tomatoes? ‘It turned out that wasn’t the case. People will eat vegetables with their coffee too, if you offer them.’
Immink conducted his trials with vegetable snacks in a total of 320 meetings at six locations, including the Ministry of Economic Affairs, the Gelderse Vallei hospital and Wageningen UR. People at the meetings ate an average of 80 grams of vegetables when they were served in a bowl: almost one third of the recommended amount. And the vegetable consumption did not even go down when there were cookies on the table next to the mini-veggies too. At meetings where everyone had their own bowl of vegetables, the average consumption was as high as 97 grams.
A surprisingly large amount, although the question is whether the civil servants and hospital staff ate the vegetables mainly for their novelty value, or because they really appealed to them. Immink: ‘We would very much like to know that too. So we are going to repeat the experiment and then monitor people for longer.’

RADISHES FOR TODDLERS

Gertrude Zeinstra, a researcher at Wageningen Food & Biobased Research, did an experiment at crèches. Preschool children were repeatedly offered courgette, pumpkin and radishes as an afternoon snack. Vegetables which most toddlers do not eat at home and which therefore did not initially appeal to them.
Zeinstra: ‘We know that children learn to eat vegetables by being offered them repeatedly.’ That was true during her study too. By the end of the study, in which the toddlers were offered each vegetable an average of 12 times, they were eating approximately twice as much pumpkin and radish. There was no change in their consumption of courgettes, though. ‘We think that is because courgette has a neutral flavour, and it is also more familiar to the children than the other vegetables. That makes the learning curve less steep.’
‘For the fruit and vegetable sector, crèches are interesting places for serving vegetables in new ways. They are keen to gain a reputation for healthy food,’ says Zeinstra. Parents who find it hard to get their child to eat vegetables at home like to hear that the crèche is helping them. But there is not much time for cooking, says Zeinstra. ‘Nursery nurses are used to preparing fruit snacks so convenient vegetables such as cherry tomatoes or snack-size cucumbers work well in their system. If you want to get children used to different vegetables which take some preparation, you have to deliver the vegetables in a form that can be served up without a lot of bother.’
In other places too, it seems easy to persuade people to eat some extra vegetables. Wageningen researchers >

PHOTO HOLLANDSE HOOGTE

State Secretary for Economic Affairs Martijn van Dam hands out snack-size vegetables in The Hague in July 2016 at the start of what is known in Dutch as the 'cucumber season' – the summer slow news season. All part of efforts in collaboration with GroenteFruit Huis and the Nutrition Centre to draw attention to the health benefits of eating plenty of vegetables.

did a test together with the 'Variety in the Kitchen' foundation and the Van der Valk restaurant chain, looking at what restaurant diners thought of a meal containing more vegetables and less meat. During a trial period the researchers increased the quantity of vegetables on the plates, at the same time reducing the amount of meat by 12.5 percent. Result: vegetable consumption went up by more than 30 percent, and the restaurant threw out 33 percent less meat. Diners who were asked for their opinion of the meal, gave the vegetable-rich meal the same score as the traditional meal.

So it does not seem to be all that difficult to get people eating more vegetables. And the trick of just putting more vegetables onto your plate can quite easily be done at home too, of course. But it is not as simple as that, thinks Emely de Vet. 'A lot of people think they are already doing fine. They overestimate the amount of vegetables they eat.' Nor does the scientific literature give well-meaning household cooks much hope that they will stick to their resolutions to serve more vegetables and less meat. A lot of studies have been done with the aim of teaching people to adopt healthier eating habits, but review articles which scrutinize the results of these studies note almost unanimously that the effect of an intervention quickly dwindles. A bit like New Year resolutions, which rarely last until March. De Vet: 'If you have to make a big effort every day to achieve something, it is difficult to keep it up.'

This is why De Vet thinks it is sensible to target habit-forming, so that the situation invites certain behaviour without requiring much thought. And here we can learn from the bad habits which are quickly acquired. Eating crisps in front of the TV, for instance. A bag of crisps is emptied in no time. De Vet: 'We know that people are not very capable of moderation when they eat mindlessly. I give my children vegetables when they are watching TV and they eat them without noticing it. I hope that eating vegetables will become a habit.'

'We know what we should eat but we don't eat it'

> ‘Crèches are interesting places to present vegetables in new ways’

De Vet thinks other knowledge about the eating environment can contribute to healthier eating too. The distance to the food can make a difference, for instance. Put a bowl of something tasty at arm’s length and 40 percent fewer people take any of it. But it is important that it is still within reach. People who have to stand up and walk to the other end of the meeting room to get a cookie to have with their coffee may eat more cookies to compensate for the effort invested.

OFFERING CHOICE

Many employers find it hard to take steps to promote health at work, says the researcher. Employees do not like it if the employer takes too much interest in their unhealthy behaviour. They accept it when the employer offers some additional healthy choices, such as a bowl of fruit in the department, but not if the meat croquettes disappear from the lunch menu.

In 2015 De Vet won a VIDI grant from the Dutch research organization NWO for research on the subtle signals which prompt people to make healthier or unhealthier choices. ‘By positioning the croquettes prominently in the canteen, you send a signal that it is socially acceptable to take them. That sets the norm. If you put them further towards the back you will see that fewer people will take them. People are sensitive to those sorts of signals. If there are sweet papers visible in the bin, people are more likely to take a sweet. The papers suggest that it is acceptable.’ So by displaying the salads prominently in the canteen, you could use that subtle signal to prompt employees to eat more vegetables. According to Anne Marie Borgdorff, policymaker at GroentenFruit Huis, which co-finances numerous projects, the various tests have shown that people happily eat more vegetables if they are offered them. ‘The supply is key. If vegetables are on offer, people are keen to eat them.’ In the next few years, the GroentenFruit Huis and the ministry of Economic Affairs are going to jointly finance research among primary school children. ‘How can we make sure they eat more veg? A lot of children still get given cookies to take to school. We want to see whether we can replace those with vegetables.’ ■

TWO PIECES OF FRUIT A DAY

As well as more vegetables, the Nutrition Centre continues to recommend eating two pieces of fruit a day. This norm is not adhered to by the vast majority of Dutch people, either. About one quarter of the Dutch manage it, more women than men and far more elderly people than youngsters.

The basis for the Nutrition Centre’s ‘disc of five’ important food groups is the Health Council’s guidelines. In 2015 the council published new guidelines, incorporating the latest insights on the effects of eating fruit and noting that people who eat plenty of fruit have 10 percent less risk of coronary disease and 30 percent less risk of a stroke. People who eat more than 300 grams of fruit were said to have a lower risk of bowel cancer or diabetes.

The Health Council does note that the evidence for these effects is not watertight. Enthusiastic fruit eaters tend to have generally healthier lifestyles than regular customers at the snack bar. So the council does not claim that fruit ‘causes’ the observed effects, but cautiously goes no further than a ‘link’: a high fruit intake ‘goes together’ with a reduced risk of stroke.

PHOTO ANP

MASSIVE OPEN ONLINE COURSES

Acquiring Wageningen

Hundreds of thousands of people have already signed up for Wageningen's free online courses, the MOOCs. Participants come from all over the world. They want to explore the options or increase their knowledge. 'A MOOC costs nothing, doesn't commit you to anything and I can do it in my own time.'

TEXT ALEXANDRA BRANDERHORST **ILLUSTRATION** YVONNE KROESE

'I have always been interested in international development and sustainability. I think it's important for us to know where our money is going and how our purchases impact the rest of the world, socially and environmentally. I didn't spend much time studying these topics at my university, so I was excited to be able to take this class online,' says Zoë Fowler-Kimsey from the US in her email.

She is 25, has a Bachelor's degree in Modern Languages and Literature and is currently working as a travel guide. In January she started the *Food Security and Sustainability: Food Access* course. This is one of the Massive Open Online Courses (MOOCs) offered by Wageningen University & Research. In the future, Fowler-Kimsey would perhaps like to do a Master's and look for a job in the field of sustainability and food. Because she works as a tour guide, Fowler-Kimsey finds it handy to be able to do the course at her own pace and from any location. More and more universities are offering free online courses that can accommodate vast numbers of students. These MOOCs are making the knowledge available at universities more accessible for large groups of people. The Wageningen MOOCs, which take eight

knowledge worldwide

> ‘It’s been so interesting to see these responses from all over the globe’

weeks on average, provide basic knowledge on specific subjects using short films and presentations lasting three to seven minutes, for example with animations and a voice-over. Course participants are also given assignments and can swap expertise and experience in forums. ‘We have assignments where we take pictures of things like our dinner or nearby marketplaces and share them with the rest of the class,’ writes Fowler-Kimsey. ‘It’s been so interesting to see these responses in the forum from all over the globe! I don’t think that I would see this many different perspectives if I were physically studying at a university.’

EXPENSIVE TO CREATE

Cary Clark, originally from the US and now living in Italy, took the same MOOC. Aged over 50, she has designed and facilitated training programmes and online courses, for example for the World Bank and the UN. She currently works with farming organizations and teachers in East Africa, Pakistan and the Gulf States, teaching them how to take advantage of online learning. Like Fowler-Kimsey, Clark wanted to find out more about food access because of an interest in the subject. >

‘I am very concerned about global environment degradation caused by intensive tillage and the use of agrochemicals. I wanted to see what stance is taken by Wageningen.’ Clark, who has done a lot of MOOCs, thinks that the Wageningen MOOC is well designed from a technical perspective. ‘The structure and delivery is straightforward.’ In terms of the content, she has different views on the subject to the teachers. Even so, she is grateful for the Wageningen MOOCs. Clark: ‘I know that the courses are time-consuming and expensive to create. This is a great service for global education.’
University students also take MOOCs, such as Thalison Bruno Campos Correa who is doing a degree in Forestry at the Universidade Federal Rural da Amazônia in Brazil. Correa did the *Sustainable Soil Management* MOOC to improve his skills in soil management. ‘As a student of Forestry, I am aware that the soil is a fundamental agent to the maintenance of life. Without it there are no trees, no animals, no food, no ecosystem; without soil there is no life.’
He didn’t find the course difficult and all the topics were relevant for him. ‘By the end of the course we understood the importance of soil, and how to manage it in a sustainable way.’ Correa definitely wants to do more MOOCs, although he does not yet know which university he will choose. He sees MOOCs as a good way of enriching his study and broadening his knowledge about his future field of work.

TWO HUNDRED COUNTRIES

The participants in the Wageningen MOOC come from around 200 different countries. The majority of participants are in English-speaking countries. The US heads the list, with India second, followed by the Netherlands, Canada, Germany, the UK and Brazil. Ages range from 15 to 81, with an average age of 30. About one third of the participants have no university education, one third are educated to Bachelor’s degree level and one third to Master’s degree level or higher.

> **‘I can really use that background knowledge in my work’**

More than 260,000 people have enrolled to date since the first MOOCs were introduced in 2015. That does not necessarily mean they took a MOOC. ‘Some never start, others give up half way through or just browse through the course. There are so many different reasons for enrolling,’ explains Ulrike Wild, director of Online Learning at Wageningen University & Research. Only 1.5 percent of the course participants complete the course and purchase the final certificate for 50 dollars.
Wageningen students can also take some of the MOOCs as an optional module. If they then take a MOOC exam on campus, they will be awarded credits for the course. At present, universities are working on the recognition of one another’s MOOCs. ‘We are exploring collaboration with Delft University of Technology and Leiden University, as well as in the wider European context. If students can do MOOCs elsewhere, that will extend their options and facilitate more differentiation in study routes,’ says Wild.

ONLINE MASTER’S

Many universities are experimenting with online education. It is affordable and flexible, and makes the ideal of lifelong learning a step closer. ‘Wageningen is in the vanguard because we also offer one or two Master’s online,’ says Wild. Unlike the open-access, free MOOCs, these are complete Master’s programmes that can take

up to four years depending on the pace of study. The students come to Wageningen for a few weeks for lab work and to prepare their thesis.
In September 2015, the university launched the first two Master's: *Plant Breeding and Nutritional Epidemiology and Public Health*, with about 35 students each. The average age of the students is 31. They come from many different countries, including the Netherlands. 'It is noticeable that these people are generally linking their study to their career, which is quite different to a full-time degree. The dropout rate is higher and personal circumstances play a bigger role.' A new online Master's programme – *Food Technology* – is due to start next September.

CAMERA TRAINING

'I never expected us to build up such a large open-access online portfolio so quickly. Our teachers are really enthusiastic about the possibility of sharing their knowledge worldwide,' says Wild. The teachers are given training in how to perform in front of the camera and there is a production team with technicians and educational specialists.
What is more, the online materials that are developed are also used in the regular teaching programme. This plays a key role in the selection of topics. 'We look at subjects that are taught on campus to see whether it is worthwhile developing them further or revamping them. And we look at whether a MOOC can serve as a review course for students to brush up on their knowledge, like *Food Safety*, which deals with the elementary principles from the Bachelor's degree. The topics also have to fit with Wageningen's profile and to appeal to a broader target group.'
Wageningen offers its open online courses via the American platform EdX. The MOOCs can be done as separate courses or in series clustered around themes such as food security or biobased sciences. 'That can be interesting for the professional learning market,' explains Wild. 'Employees at large companies such as Shell and Friesland Campina can further develop their expertise or acquire new knowledge in their discipline. The same applies to Wageningen alumni.'
The desire to refresh her professional knowledge was precisely why Anja Janssen did the first *Nutrition and Health* MOOC in 2015. She graduated in Food Technology at Wageningen in 1992. She lives in Wageningen and works as a freelance journalist and text writer in the field of nutrition. 'A MOOC costs nothing, doesn't commit you to anything and I could do it in my own time. The lack of commitment is also a downside as no one is keeping tabs on you,' says Janssen.
She did not need a certificate but Janssen still completed the exam questions. The MOOC brought back a lot of knowledge that she had forgotten over the years, she says. 'One part was about how much value to attach to nutritional research, for example that epidemiological research says less than a clinical trial. I can really use that background knowledge in my work.' ■

MOOCS

Wageningen's assortment of MOOCs ranges from *Nutrition and Health* and *Food Security and Sustainability to Biobased Sciences, Animal Behaviour, Soil Management* and *Urban Development*. A list of all the MOOCs can be found at www.wur.eu/moocs

New ideas are welcome for the online portfolio. Send an email to mooc@wur.nl.
The MOOCS can also be found on Facebook: www.facebook.com/MOOCsWUR.

Wageningen also offers other forms of online education, such as online Master's and professional education courses. For a overview of all online courses, see: *www.wur.eu/onlineeducation*

Repairing reefs

Coral is under threat all over the world. Trials are under way to find out whether it is possible to plant out coral to restore afflicted reefs. Researchers are collaborating on this with local organizations in East Africa and the Caribbean Netherlands. 'Our corals have already grown several decimetres.'

TEXT NIENKE BEINTEMA **PHOTO** ERIK MEESTERS **INFOGRAPHIC** WUR/PETRA SIEBELINK

Coral reefs capture our imaginations with their multitude of colours and shapes – from yellow 'brains' to blood-red fans, and from pink tubes to corals which look a bit like neon green footballs. In tropical waters they can grow into reefs thousands of kilometres long, with corals growing all over each other to form underwater cathedrals, bursting with life.

Coral is an amazing life form, says Ronald Osinga, coral researcher and university lecturer at the Marine Animal Ecology chair group in Wageningen. 'It is a symbiosis between polyps and single-cell algae, a community.' The algae, he explains, live in the fibres of the polyps and make use of sunlight to produce sugars, most of which they give to their host. In exchange the polyps supply the algae with nitrogen and carbon dioxide, as well as with a strong calcium skeleton which captures optimal amounts of sunlight.

SKELETONS REMAIN

'But that complex form of community makes corals vulnerable as well,' says Osinga. 'They are deteriorating all around the world due to human activity.' The biggest culprit he identifies is climate change, which is making the oceans warmer and more acid. Corals and their algae cannot cope with that. The corals reject their algae, or the algae die. The result is coral bleaching, whereby the corals lose their bright colours. If the algae populations do not recover fast enough, the polyps die as well and only bare calcium skeletons remain.

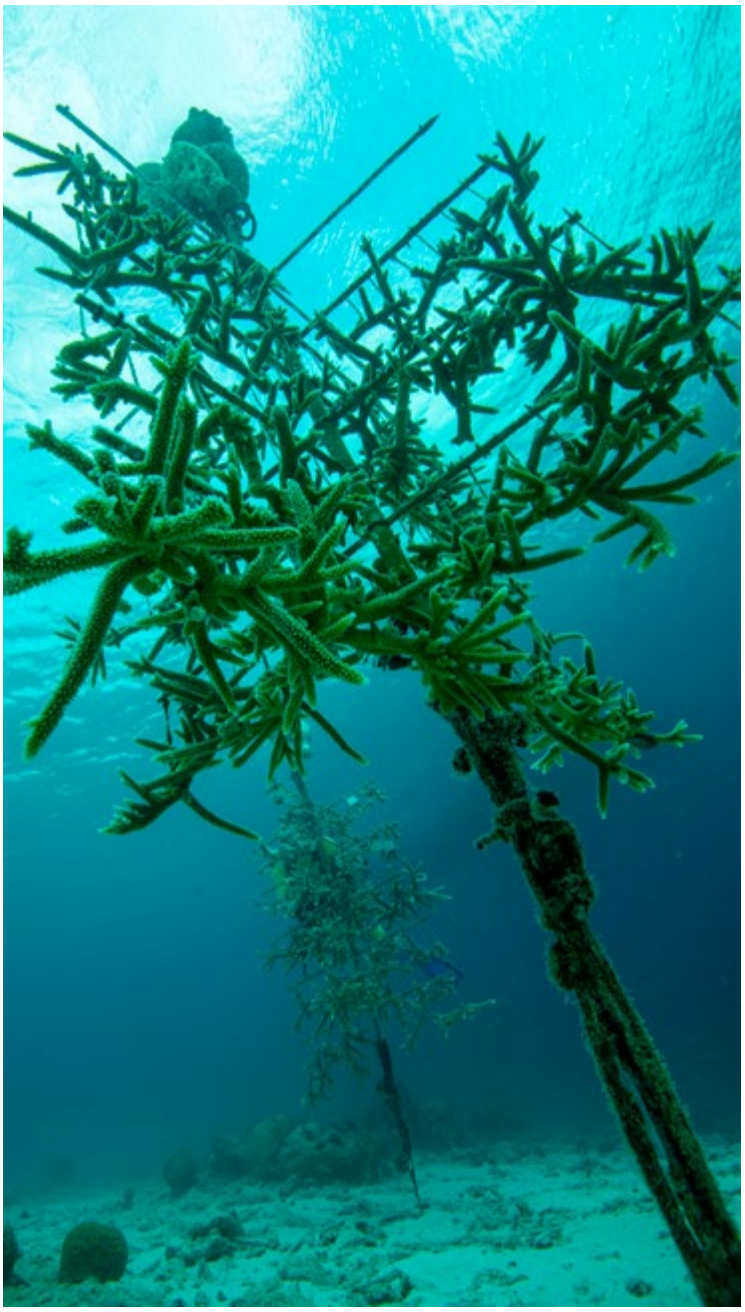
Another threat is pollution, especially along the coast. Waste water makes the sea too nutrient-rich and soil erosion makes the water murky. 'The balance between different species shifts,' says Osinga. 'Some species disappear while others become dominant. Blue-green algae, for instance, and the crown-of-thorns starfish, which preys on living coral.'

And then there is overfishing. 'Corals are dependent on the fish which live among them, and vice versa,' says Osinga. 'All sorts of fish species find food and shelter there. In exchange, the fish prevent seaweed from getting the chance to overrun the coral.'

In some areas fishers use destructive fishing methods, throwing explosives into the water which bring dead fish >

'Many fishers have no idea what lives below the surface of the sea'

PHOTO NANANG SUJANA / WETLANDS INTERNATIONAL



Above: the staghorn coral: the individual polyps it consists of are clearly visible. Each polyp is a clone. Right: coral fragments hang in a ‘coral tree’ where they grow, out of danger from predators. Below: a student weighs coral fragments.

> ‘Corals are dependent on the fish which live among them, and vice versa’

floating to the surface. ‘This blows up large chunks of coral,’ says the researcher. ‘It looks appalling. It’s bad for tourism and for the ecosystem too. Ultimately the fishers are destroying their own livelihoods.’

SIMULATION

Scientists around the world are trying to find out exactly what corals need and how you can protect and even restore them. Some of this research is going on in Wageningen, for instance in the Aquatic Research Facility at the research facility Carus. This is a state-of-the-art aquarium laboratory with tanks of all shapes and sizes in which researchers can simulate the conditions in a coral reef as accurately as possible. ‘For example, we are looking at how oxygen, nutrients and acidity influence the speed at which corals lay down calcium,’ says Osinga, ‘and at the interaction between those factors. And we are studying why certain corals are more vulnerable than others.’

This kind of knowledge – still in its infancy – is needed for the task of restoring coral. Restoration is done by ‘planting out’ living polyps on dead coral skeletons, or on human-made structures such as Christmas tree-like constructions made of PVC or bamboo, shelves at various heights or a kind of rope ladder. ‘We are looking for the ideal combination of factors that create the optimal conditions for breeding coral,’ says Osinga. Under natural conditions it is admittedly difficult to influence those factors, but it is possible to estimate in advance whether a particular area would be a good place to set up a breeding or restoration project. ‘You can identify places with more light or less, with currents or murky water. And if it goes wrong, it is easier to figure out why.’

One new approach is to collect pieces of coral which have survived mass coral death at a certain location. Osinga and his colleagues are investigating whether you can use more resistant colonies from elsewhere as the basis for a new population. That approach is looking promising. ‘But there are limits,’ says Osinga. ‘You lose genetic diversity, and as a result the coral may become more vulnerable to other stress factors such as diseases.’

Coral research is not limited to Osinga’s chair group, Marine Animal Ecology, but is also taking place at the Wageningen Marine Research institute in Den Helder. Erik Meesters has been researching coral here for 30 years, mainly in the Caribbean Netherlands. He too sees the coral deteriorating, but also that it is difficult to do anything about it. There is not much funding available for tangible measures and not everybody sees the urgency of doing so. ‘On Bonaire, sewerage and water purification systems have now been constructed with EU support,’ he says, ‘but that is very expensive because of the rocky ground.’

Meanwhile the coral is still under threat, Meesters explains. ‘The population goes on growing and the coast is getting built-up, causing more erosion during heavy rain. This leads to more mud and sand being dumped in the sea here than along unspoiled coasts, and the coastal waters are very murky. Corals need light, so they suffer.’

Meesters too is interested in why it is that some colonies of a particular coral species are more resistant than others. ‘Together with Lisa Becking of Marine Animal Ecology, we are researching which genes are involved in this. Once you know that, you can more precisely track down populations to use for further breeding. Assisted evolution, we call that.’

Meesters also studied corals which grow in shallows further from the coast, in cleaner water. ‘There’s an area like that near Saba, the Saba Bank,’ he says. ‘It is our largest national park, about 2000 square kilometres. Bigger than the Wadden Sea. One of the things we are studying is the influence of local lobster fishing on the reefs. If it turns out they have been overfished, we can take steps to stop that.’

SEXUAL REPRODUCTION

Meesters and his colleagues are coordinating a three-year EU project, RESCQ (Restoration of Ecosystem Services and Coral Reef Quality), which was launched in the Caribbean last summer. The project’s aim is to restore relatively large tracts of reef - hundreds of square metres – using corals bred in experimental nurseries on the spot. Meesters: ‘We are researching all sorts of aspects of this. Under what conditions do you need to breed them to give them the best chances of survival in the wild? What is the optimal size for the fragments of coral you plant out? And how can you >

> ‘We are studying why certain corals are more vulnerable than others’

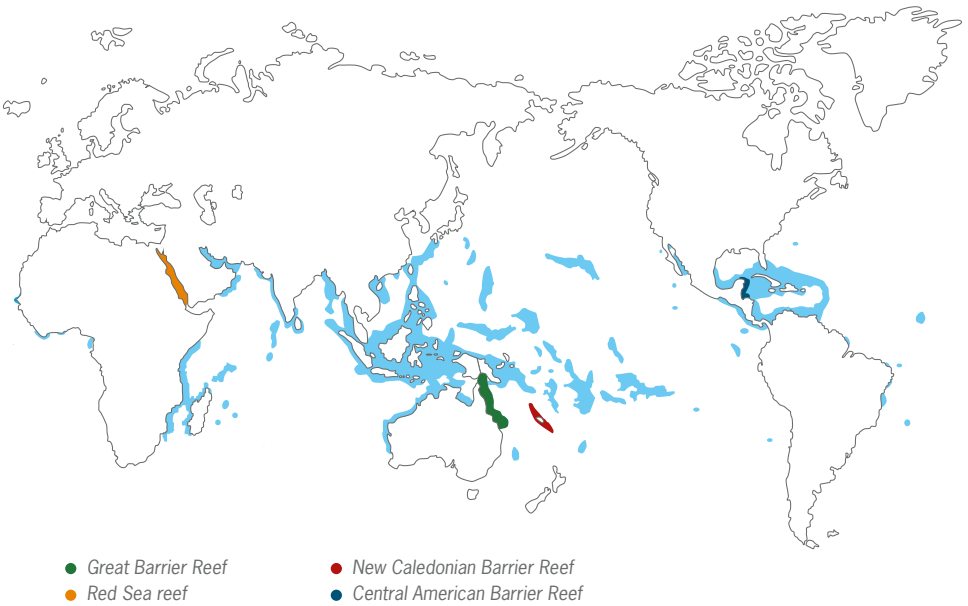
Above left: when the coral fragments are big enough, they are returned to special structures on bare stretches of the coral reef, so they can grow into large colonies (below). Above right: students from Wageningen measure the growth of the returned corals.

CORAL REEFS AROUND THE WORLD

Coral reefs take up only one percent of the ocean's surface. Yet they house one quarter of the marine fish species on earth.

The largest coral reef is the Australian Great Barrier reef, which is made up of almost 3000 underwater reefs and 900 islands, stretching out over 2600 kilometres. Other large reefs are the Red Sea Reef (1900 km), the New Caledonian Barrier Reef (1500 km) and the Central American Barrier Reef (almost 1000 km).

Coral reefs are disappearing fast, due to human activity. Almost one quarter have disappeared in the past 30 years.



ensure that they reproduce sexually as much as possible so that the genetic diversity is as great as possible?' Another important objective of RESCQ is the transfer of knowledge so that local people can take over the work. Ultimately the project should become self-funding when healthier reefs lead to higher incomes from tourism and sustainable fisheries. Clarisse Buma, director of Sint Eustatius National Parks (STENAPA), collaborates closely with Erik Meesters within RESCQ. 'It is about a cross-Caribbean project,' she says. 'Sint Maarten, Saba and the Turks and Caicos islands are taking part as well.'

WEEKLY CHECKS

Coral is very important to the islands, she stresses. Not just as a nursery for fish but also for tourism. So STENAPA willingly collaborates on the coral restoration. 'We now have eight flexible bamboo ladders underwater at a depth of about six metres,' says Buma. 'We have hung little pieces of coral from them and they have already grown a few decimetres. We check on them weekly to see if all goes well. Our rangers are involved in this work, as well as interns from the Netherlands.' Once the fragments of coral in the nursery are big enough, they are transplanted to low bamboo structures 'in the wild' and attached to them. In the course of time the bamboo disintegrates and the growing corals become sturdy enough themselves to grow tall.

Osinga is working on a comparable project off the coast of East Africa, under the auspices of the REEFolution foundation. This foundation was set up by two Dutch people, one of whom owns a diving school on the Kenyan coast. 'He saw the reefs deteriorating and wanted to do something about it,' explains Osinga. 'We were keen to get involved and apply our lab expertise in the field. Local organizations and Kenyatta University in Nairobi are involved too.'

Reef restoration is one component of this project, which also targets local fishers. 'Many fishers cannot swim and have no idea what lives below the surface of the sea. That is why they use dynamite without giving it any thought. The diving school owner is now teaching them to swim and dive so that they can see the wealth of underwater life for themselves.' And that really works, says Osinga. 'When they see those colourful fish and corals they think they are beautiful and they are keen to help conserve them.'

Science is playing the lead role at the moment, conclude Meesters and Osinga. Reef restoration is largely being carried out by scientists. In future that has got to change if this approach is really to achieve anything, concludes Osinga. 'The trick now is to develop methods we can use to upscale this work.' ■

www.wur.eu/coral

Three stars for animal welfare

The Rondeel housing system offers laying hens variety and space. Wageningen provided scientific knowledge and headed the design process. Consumers were involved in the design too.

TEXT AND PHOTOGRAPHY HANS WOLKERS

In 2010, poultry farmer Timon Brandsen from Barneveld became the first person to have a Rondeel building in the Netherlands. 'Sustainability through smart energy savings and responsible feed coupled with animal welfare,' is how Brandsen summarizes the Rondeel concept. 'The birds stay indoors but we bring nature into the barn.' Tree trunks produce height differences while variation in the litter used ensures places for hens to forage, take a dust bath or bask in the sun, or to hide.

The Netherlands has 3.5 million laying hens, over 80 percent of which have free-range facilities – inside the barn. 'But their welfare could be improved substantially,' says Bram Bos, researcher at Wageningen Livestock Research. 'The high hen population density doesn't give them enough room for natural behaviour. That results in stress and aggression. Beak trimming then becomes necessary.

To improve the welfare of hens, Bos and his fellow researchers headed a design process that involved poultry farmers and consumers. This resulted in a new housing concept: the Rondeel barn. It was not easy to sell the new system, which is more labour-intensive and takes up more space, making it more expensive.

ARTIFICIAL GRASS

On the other hand, this is the first housing system that takes account of the needs of farmers, hens and consumers, says Bos. 'Consumers are often right about how you should treat animals.' Many people think hens need straw, for instance. But that's not so convenient for farmers. Behavioural researchers concluded that artificial grass was a good alternative: nice for the hens and a practical solution for farmers. In this way, the Rondeel housing system combines knowledge of animal behaviour, innovative technology, farmers' interests and consumers' perceptions. And the Rondeel barn scores three stars for animal welfare, the same as organic poultry farms.

Conventional free-range barns hold hundreds of thousands of chickens but Brandsen's Rondeel barn only contains ten flocks of 3000 chickens each. That is a manageable number but it is labour-intensive. 'I check to see if the birds are okay twice a day,' says Brandsen. 'The hens' weight, the eggs they have laid and the feed intake are measured automatically. That gives a good picture of their health.'

Rondeel eggs fetch a good price; they cost about 29 cents an egg, over 10 cents more than standard free-range eggs. So Brandsen earns a good living. The firm Rondeel BV takes all the eggs from the five Dutch Rondeel barns for a fixed price. 'That means guaranteed sales and income,' says Brandsen. 'Rondeel is the best for farmers, consumers and poultry. You feel like a proper farmer again; it's a good deal.' ■

www.wur.eu/roundel

'Good for farmers, hens *and* consumers'

BUILDING WITH NATURE ON JAVA

Weaving dams to defend mangroves

On Java alone, 30 million people are at risk from flooding because the mangrove forests along the coast are damaged and no longer hold back the sea. To restore them, researchers are resorting to a mediaeval technique using simple little dams behind which the floating tree seeds can germinate.

TEXT RENÉ DIDDE **PHOTO** NANANG SUJANA / WETLANDS INTERNATIONAL
ILLUSTRATION INFOGRAPHICSLAB

On his laptop, Dolfi Debrot shows photos of a muddy field full of stalks pushing up at random angles. These very young plants are the germinated seed of the api, the local name for the mangrove *Avicennia marina*. Debrot, who works for Wageningen Marine Research, sees this field of seedlings as an indication of the successful comeback of mangrove forest.
Worldwide, and in Indonesia particularly, these forests, which protect coasts, are suffering badly.
Mangrove forests form natural coastal defences. The forests trap sediment both from the sea and from the rivers flowing into it. The forests spread seawards like a resilient wall of sea defences which fends off high winds and big waves. These wet forests also spread inland, providing nurseries for young fish in the many lagoons and creeks.
'Right off the coast of Java here, we are creating a good nutrient base for the large quantities of seed floating around,' says Debrot. On the next photo the mangrove specialist points out a series of disarmingly rickety-looking dams. 'They were woven by local people with bits of wood from pruning within a strong frame of bamboo poles.'
The little dams catch sediment that the waves carry in from the sea. The water streams back through the semi-porous dams, while the sediment stays behind. This leaves a muddy nutrient base for mangrove recovery along the coast. The technique comes from the Netherlands. Not from scientists with high-tech equipment but from mediaeval monks who used similar rickety dams to turn parts of the Dutch delta into slow-growing salt marshes, making the coast habitable.

SALT MARSH WORKS

Near the city of Semarang on the north coast of Central Java, history is repeating itself 1000 years later, as new salt marsh works get under way. 'We have copied the measurements of the dams directly from the salt marsh works as standardized by the Dutch national water board in 1900,' says Han Winterwerp of research institute Deltares. It is hands-on work, says the water specialist.

PHOTO PT. PROSPEK EMPAT DIMENSI / WITTEVEEN+BOS.

A drone photo of the mangrove restoration project on the north coast of Java near the city of Semarang. The semi-porous dams are visible in the water. They trap sediment, in which mangrove seeds can germinate.

'The technique is simple but we have done a thorough study of the wave patterns, the tides and the sediment balance.'
There were setbacks too. The naval shipworm, a mollusc that bores through wood, had damaged the first set of hardwood poles within seven months. 'We replaced them with bamboo, and now they will last a year but we are keen to find more durable material, because they need to last at least three years. Only then will the young mangrove forest be ready to take over their task,' says Winterwerp. So the driving force here is 'building with nature'. 'We are just giving nature a helping hand by building little dams to trap the sediment,' says Debrot.
Debrot and Winterwerp collaborate on the Java mangrove restoration project, which is costing nine millions euros for five years. Most of this funding comes from the Dutch government, the Netherlands Organization for Scientific Research (NWO) and various research and advisory institutes in Ecoshape, a consortium which propagates 'building with nature' (see text box). The Indonesian government contributes too, to the dam-building among other things.
Mangrove is not a tree family but a collective noun for 50 species including palms such as the Nipa palm, which thrive with their roots in water.
All around the world, mangrove forests along tens of thousands of kilometres of coastline are suffering serious damage or have even disappeared. Sometimes this is due to the demand for firewood and construction wood; more often the forests make way for farming for ever-expanding cities.
The first people to chop down these forests on Java, from 1850, were rice farmers wanting to farm on the fertile river-fed coastal plains. 'When rice-farming became less lucrative from the late 1980s, shrimp farming started to take off,' says Debrot. 'Driven by investors from the cities – wood and shrimp traders – the farmers cut down trees and dug ponds in the forest.'
Shrimp-farming went well for a number of years, until it became impossible to clean the ponds, which were full of manure, pesticides and antibiotics. 'The farmers lacked knowledge and capital to make improvements, and the aquaculture moved on to another part of Java.' The farmers who stayed behind struggled on and got themselves into a negative spiral, says Debrot.
To make matters worse, canalization of rivers inland caused their sediment to be dumped out at sea rather than along the coast. This meant less of a nutrient base for mangrove.

'In one and a half years the coastal strip has been raised 40 to 50 centimetres'

SWALLOWED UP

Rising sea levels and severe storms are taking their toll as well. Several villages have been swallowed up by the sea because the mangrove forests no longer hold back the water. On Java alone, where the coast has sometimes been eroded up to several kilometres inland, 30 million people are in danger, says Femke Tonneijck of the Netherlands-based NGO Wetlands International.
The dam project on Java, which started in the autumn of 2013, aims to prove on a small scale that it is possible to turn the tide, says Tonneijck. Already, four kilometres of >

BUILDING WITH NATURE

In the first decade of this century a working method was developed in the Netherlands for enlisting the help of nature in defending coasts against the sea. One of the first projects was the construction of a reef in the Oosterschelde estuary in the south of the Netherlands. This was made of oyster waste, which new oysters clamped onto, says Fokko van der Goot of Ecoshape, a consortium of dredging companies, NGOs, consultancy firms and research institutes – including Wageningen University & Research. 'The reef prevented the coast from eroding and sandbanks from disappearing,' says Van der Goot. The same concept was applied in Bangladesh in 2012. And projects have been started recently in Surinam and Vietnam in which porous dams are used in efforts to protect the coast and restore mangrove forest.
Another success story is the Sand Motor: in 2011, instead of replenishing sand to protect the coast every five years as usual, a huge amount of sand was deposited in one go to form a hook-shaped sandbar along the coast near The Hague. 'The sand is slowly moved northwards along 20 kilometres of coast by waves, tidal currents and the wind. The concept has benefits not just for coastal reinforcement but also for recreation and nature. And it costs less that the total cost of all the repeated deposits of sand.' A similar approach has now been adopted in Friesland. 'When sludge from Harlingen harbour is dumped at a strategic spot in the Wadden Sea, currents carry it off and the salt marshes get reinforced.'


PHOTO LINEAIR


PHOTO WUR/DOLFI DEBROT


PHOTO SHUTTERSTOCK

Clockwise from left: fishing in the mangroves, germinated seeds of the mangrove Avicennia marina, and the roots of the mangrove Rhizophora mucronata.

dams have been constructed, each of them 100 metres long. The first results are impressive, according to the water expert. 'Within one and a half years the most badly damaged strip of coast has been raised 40 to 50 centimetres,' says Tonneijck, who coordinates the collaboration between Dutch and Indonesian partners.

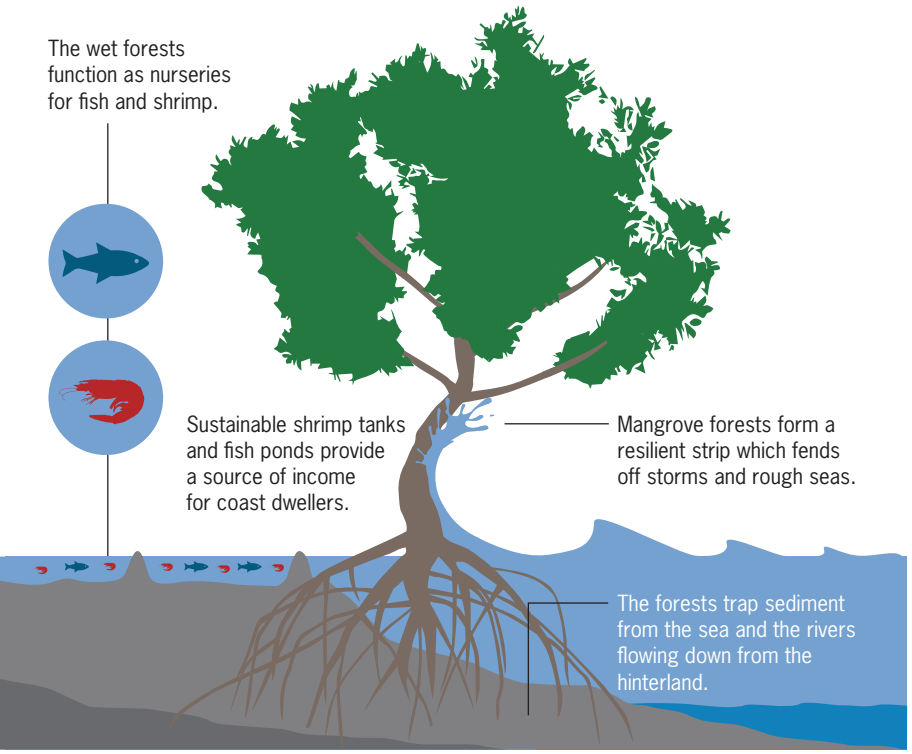
While elsewhere in the world governments and local people set to work to plant out cuttings and seedlings, those taking part in the Java project are waiting until the naturally floating seeds germinate of their own accord on the newly formed soil. 'The means that the first to get established is the api api mangrove, and that is the best one,' says Tonneijck. 'It forms a mat with its root system, trapping even more sediment. As a result, the bakau mangrove (*Rhizophora mucronata*) gets the chance to establish itself closer to land, and then things can change fast,' she explains.

In many mangrove restoration programmes species are planted in the wrong places, Tonneijck has concluded. 'Thanks to a well-intentioned "tree-planting day feeling" they start randomly planting out the bakau mangrove. However, without a protective front-line of api api mangroves seawards, restoration will not be very successful, as comparative studies have shown.'

The project's objectives include not just restoring the mangrove forest but also making aquaculture more sustainable. Interested owners of the remaining shrimp ponds are

'Mussels in the tanks help with purifying the water'

MANGROVE FOREST PROVIDES COASTAL DEFENCE AND SHRIMP FARMING



being encouraged to adopt sustainable shrimp-farming practices and better management of the ponds, says Roel Bosma of the Aquaculture and Fisheries chair group in Wageningen. 'Nowadays the farmers fertilize the ponds with homemade compost. Previously they would also throw leftover food into the tanks, but breaking that down took a lot of oxygen. That is not a good idea in aquaculture,' says Bosma. 'Now they are learning to drain their ponds once a year, and clean them out.'

Bosma works with Diponegoro University on an integrated fish farming system with species such as milkfish, as well as shrimps. Mussels and oysters could be of interest for boosting the farmers' incomes too, says Bosma. 'Mussels in the tanks also help with purifying the water. And if the soil is suitable, oyster banks can promote the recovery of mangrove, in combination with the dams.'

There is still a need to develop a market in Indonesia for new products such as mussels and oysters. 'With a city like Semarang nearby, that can't be a big problem,' expects Bosma. A trickier issue is that the shrimp farmers are expected to give up 15 to 20 percent of their production area in the form of ponds for the restoration of mangrove forests, along both the coast and the rivers. 'Mangrove restoration is needed along the riverbeds as well. The Indonesian government needs to supervise mangrove felling more strictly, too, and enforce existing laws better,' says Bosma.

NEW SYSTEM

There are a total of ten partners involved in the project. 'One of them is the Blue Forest group, a young Indonesian NGO which is trying to establish the new approach to coastal conservation and sustainable aquaculture through a practice-based teaching method called the coastal field school,' says Femke Tonneijck. 'Training is now going on in ten villages, with 20 people in each village. Afterwards they can take part in the Biorights mechanism, in which they get money to invest in sustainable aquaculture and fisheries, in exchange for protecting and restoring mangrove.'

The aim is to demonstrate on 300 of the 6000 hectares of aquaculture in the district that the land can be protected while at the same time doubling earnings from aquaculture. After one year, improvements have already been made on 116 hectares, says Tonneijck.

According to mangrove specialist Debrot, building with nature is the big new business model for coastal protection. 'When the forests are a bit more mature, they will also offer opportunities for beekeeping and farmers can keep goats in the higher areas.' Debrot expects ecotourism to provide another source of income. 'Already city people from Semarang are coming to walk on boardwalks in the area. And if predatory fish return to the mangrove forests, perhaps there will be new opportunities for sports fishing.' ■

www.wur.eu/buildingwithnature

CDI COURSE

Wageningen Centre for Development Innovation will be running a course in June called Wetlands, integrated water resources management and food security.
www.wur.eu/cdi/shortcourses2017

PARASITIC WEEDS THREATEN FOOD SECURITY IN AFRICA

Fighting off rice vampires

A germinating seed (orange) of the parasitic plant Striga penetrates the stalk of its host. An electron microscope image.

Devastating parasitic weeds are doing millions of dollars' worth of damage to crops in sub-Saharan Africa. They drain their host plants dry like vampires. Researchers are doing their best to thwart these underground profiteers.

TEXT MARION DE BOO **PHOTO** ANP **INFOGRAPHIC** STEFFIE PADMOS

Striga is a beautiful plant to look at. Bright, purplish flowers, vivid green stalks. But the rice field where this parasitic plant rampages is not such a pretty sight: stunted growth, shrivelled leaves, black spots on the crop... There won't be much of a harvest here.
Every year, African rice farming suffers about 200 million dollars' worth of damage from parasitic plants such as *Striga* and *Rhamphicarpa*, two plant genera of the broomrape family. Already, 1.34 million hectares of rice fields are affected, causing a loss of 15 million portions of rice per day, according to calculations by AfricaRice, the International Rice Research Institute and Wageningen University & Research.
'Without effective measures the economic losses will increase in the next few years by about 30 million dollars per year,' predicts international weed expert Lammert Bastiaans, a member of the Crops Systems Analysis chair group.

SUCKING DRY

So it is not just locust plagues and dust storms that wreak havoc on African agriculture. Parasitic plants are a serious problem too, especially in sub-Saharan Africa. 'They suck their host plants dry like vampires,' says Bastiaans. 'A host plant's growth is stunted, its leaves go yellow and it wilts. The plant thinks it is short of moisture due to drought and sends more and more nutrients to its root system. Parasitic plants cause harvest failures, hunger, poverty and rural depopulation. The pose an ever-increasing threat to food security in Africa.'
Bastiaans is the leader of an NWO-WOTRO research project in which seven Dutch and African research institutes have been collaborating since 2012 for a large international project called PARASITE. They are experimenting with measures to combat the devastating parasitic weeds in rice fields in sub-Saharan Africa.

SMELLING SIGNAL SUBSTANCES

The *Striga* plant genus includes 40 different parasitic plant species, some of which are unique to Africa while others grow in Asia and Australia as well.
Striga naturally grows on infertile soils. The semi-parasite gets its nutrients from the roots of other plants. Not just wild indigenous grasses but also rice, sorghum, millet and maize. It was calculated in 2009 that 40 percent of the land surface under cultivation in central Africa was infested with *Striga*, with damage running to billions of dollars a year.
Just one *Striga* plant produces between tens and hundreds of thousands of little black seeds which are spread effortlessly by water or wind, and which can survive in the soil for over ten years. The parasite needs a living 'host plant' in order to germinate and grow to adulthood. The seed only germinates once it can 'smell' from signal substances that there is a root of a suitable host plant growing nearby. Then a little root starts growing out of the seed towards the host plant root, boring into it with a specially formed suction organ, and sucking it dry.

> 'An infested rice field is soon overgrown'

Striga continues to grow underground for the first four to seven weeks, thereby cleverly escaping notice during the first round of weeding. By the time the parasite is detectable above the ground, the crop is often already lost. It is not called witchweed for nothing.
Bastiaans: 'Our project focuses on rice farming because rice is fast gaining importance as a food crop in Africa. And the problem of parasitic weeds in rice has been neglected for a long time.'
New varieties are being tested for resistance in field trials, says Bastiaans. 'And we are studying whether sowing earlier or later with faster-growing varieties could help. We are also experimenting with applying extra organic fertilizer, such as rice husks. Demo fields have been set up at agricultural research stations, so as to provide agricultural extension agents and farmers with advice.'
A lot of field research is going on in southwest Tanzania, which is plagued by both the main parasitic plant species affecting rice: *Striga* and *Rhamphicarpa*. In interviews, local farmers show they are well aware of the >

> The problem of parasitic weeds in rice has been neglected for a long time'

Striga asiatica, indigenous to Asia and Africa.

problem, says Bastiaans. 'They spend a lot of time on weeding anyway. But the parasitic plants have often already done a lot of damage to the root system by then.'
While *Striga* mainly affects dry rice cultivation on somewhat higher, drier ground, the scourge of the paddy fields in the naturally wet lowlands is another villain of the broomrape family, *Rhamphicarpa fistulosa*, or vampire weed. This is an unsightly little weed which keeps its white flowers closed by day and, unlike *Striga*, germinates spontaneously. The tiny seedling grows very slowly, unless it happens to come across a root of a host plant. Then it goes into action, sucking out the root, growing much faster and producing much more seed than members of the species which lack a 'host'. 'This is known as a facultative parasite,' says Bastiaans. 'It can survive with or without a host plant, but thrives much better with one.'

SPREADING FAST

Throughout central Africa, this infestation is spreading extremely fast. Bastiaans: 'In recent years rice has become an interesting crop for Africa because more and more Africans are moving to the big cities and they prefer to cook rice as a convenient fast food rather than traditional, time-consuming sorghum.' Rice farming in Africa expanded by 33 percent between 2008 and 2014.
In the search for new farmland, many infertile, low-lying valleys, which are flooded in the rainy season and are therefore not suited to other crops, have been planted with rice. And it is precisely in these wet lowlands that *Rhamphicarpa* occurs naturally. 'The crop has been brought to the parasite. This kind of rice field is soon overgrown. And the parasite spreads from there. It is often carried by water, in which case you see the damage in broad bands across the lowest-lying part of the field. And if the farmers harvest their own sowing seed, it can already be infected by the miniscule *Rhamphicarpa* seed.'
The seed of *Rhamphicarpa* does not live as long as that of *Striga*, however. In a climate in which wet and dry conditions alternate, the seed is always swelling up and then drying out again. It stays good for two years at the most. With short-lived seed, the best strategy is an opportunistic one of taking a gamble on germinating and hoping you come across a host plant. You win some, you lose some. *Striga* seeds can afford to be a bit more patient, as they live far longer.

NO HARVEST

'Now that the demand for rice is increasing and farmers are clearing more fields for cultivation, infestations with *Rhamphicarpa* and *Striga* are increasing at an alarming pace,' says Tanzanian researcher Dennis Tippe, who works at the Uyole Agricultural Research Institute in Tanzania and is currently in Wageningen finishing off his PhD thesis. 'It is hugely frustrating for the farmers. Where there are serious infestations they harvest nothing at all. Young farmers in particular give up hope and migrate to the city. All the more so because our climate is changing: rain is coming later and is scarcer. Farmers are running out of options. Our population is growing but food production is not keeping up with it.'
Predominantly illiterate farmers from several different regions were asked at workshops what measures they adopt. This produced long lists, ranging from sowing extra early to crop rotation with potatoes or cassava. 'But the latter doesn't help much,' says Tippe, 'because *Striga* seeds survive for ten years. If you have to wait more than ten years before you can grow rice on the same field again, you won't get very far; rice is the main food crop. Crop rotation doesn't work as a weapon against *Rhamphicarpa* either; in the soggy lowlands there is simply a lack of alternative crops.'
The three most promising options were investigated further. At the research station in Tanzania, Tippe and his colleagues compared five different sowing times, at intervals of two weeks. 'In the case of *Rhamphicarpa* infestation, we see that sowing the rice earlier gives you a head start on the parasite. There seems to be less dam- >

PARASITIC PLANTS IN RICE CULTIVATION IN AFRICA

Parasitic plants pose serious problems for farmers, especially in sub-Saharan Africa. The most destructive of these are *Striga* and *Rhamphicarpa*, two plant genera of the broomrape family.

Striga

Striga naturally grows on infertile soils.

The small seeds of the *Striga* plant can survive in the soil for over ten years. They only germinate once they 'smell' signal substances from the roots of a suitable host plant.

Then a little root starts growing towards the plant's root, boring into it and sucking it dry.

For the first few weeks *Striga* goes on growing underground. By the time the parasite emerges, the crop is often already lost.

Prevention

The parasite is spreading like wildfire south of the Sahara.

Damage

1.34 *m*
hectares of rice fields damaged

$ 200 *m*
annual damage

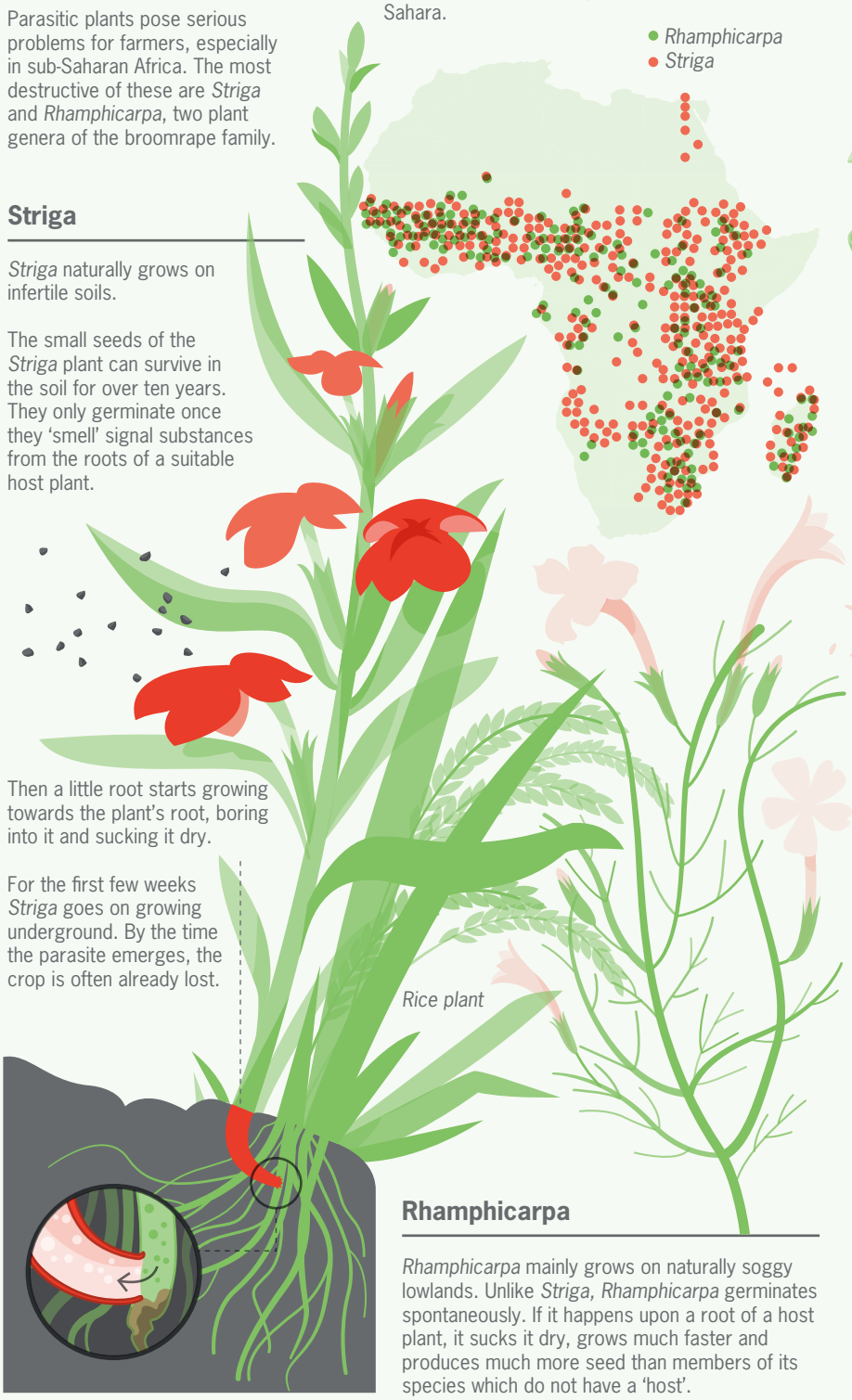
15 *m*
portions of rice lost every day

Approach

For *Rhamphicarpa* infestations, sowing the rice earlier gives the crop a bit of a head start on the parasite, and less damage is done.

For *Striga* infestations, sowing later can help. The *Striga* seeds come out of their dormant period at the beginning of January. If the seeds don't detect any host plant roots in the vicinity, they go back to a dormant state, in which they remain for the rest of the season. Sowing the rice later enables it to escape the clutches of *Striga*. But it does have to be harvested before the end of the rainy season. And for that a faster ripening variety is needed.

New crops are also examined for resistance to *Striga* and *Rhamphicarpa*.



Rhamphicarpa

Rhamphicarpa mainly grows on naturally soggy lowlands. Unlike *Striga*, *Rhamphicarpa* germinates spontaneously. If it happens upon a root of a host plant, it sucks it dry, grows much faster and produces much more seed than members of its species which do not have a 'host'.

PHOTO GEBISA EJETA

A field full of *Striga* in bloom. The plant does a lot of damage to the crop and is almost impossible to eliminate.

age,' says Tippe. 'In *Striga* infestations on slightly higher, drier land, it is sowing later that can help because the *Striga* seeds come out of their dormant period after the first rain at the beginning of January. If they don't detect any host plant roots in the vicinity, they go back to a dormant state, in which they remain for the rest of the season.' So rice that is planted one month later escapes the clutches of *Striga*.

But it is vital to be able to harvest the rice before the end of the rainy season at the end of May, otherwise the crop suffers from drought stress before the grains have ripened. For this reason, a faster-maturing variety is required. Traditional African varieties of rice make a lot of leaves and side shoots, and mature in about 150 days. African consumers like their particular aroma, flavour and grain size, so rice farmers will not readily switch to other varieties. Another major consideration for the farmer is that such a leafy crop keeps the soil well covered, giving weeds less of a chance. Weeds are always a big problem for small-scale African farmers, who don't use chemical herbicides and spend a lot of time on weeding.

NEW VARIETIES

In the Tanzanian field trials, researchers are screening new varieties for resistance to *Striga* and *Rhamphicarpa*. These new varieties have been developed over the past ten years by the international research institute AfricaRice, a collaboration between 26 African countries. The varieties have sprung from cross-breeding highly productive Asian rice *(Oryza sativa)* and the leafy African rice *(Oryza glaberrima)*. They have been given the name NERICA, an acronym for New Rice for Africa, and they produce an excellent yield. Another big advantage for small-scale farmers is that they can produce their own sowing seed, and do not have to buy new sowing seed every year. Commercial plant-breeding companies often produce what are known as hybrid seeds. These are costly but perform very well in productivity terms, but the rice cannot be used as seed for next year's crop.

Because the problem of parasitic plants in rice was neglected for so long, resistance to them was not what the NERICA varieties were selected for, but there are natural differences in resistance between them. The trick now is to identify those differences in field trials under local conditions.

Tippe: 'We experimented with different varieties for three years. In the third year, participating farmers could try them in their own fields too. Precisely in that year there was a serious outbreak of *Striga*. This convinced a lot of farmers to start sowing later using new, resistant and faster-maturing varieties.'

GROUND COVER

The fast-growing, less leafy Asian *Oryza sativa* varieties which mature in 90 days have the disadvantage for African farmers, most of whom do not use herbicides, that they do not sufficiently cover the ground, giving weeds more of a chance. The most promising variety turned out to be one which matures in 120 days, does not leave much room for weeds but still has a head start on *Striga*

because farmers can plant it one month later.
Research has also been done on soil improvement measures such as using artificial fertilizer and livestock manure. In fertile soils parasitic plants are not a problem. Bastiaans: 'In follow-up research we want to find out exactly what the relationship is between better fertilization and improved crop health. If the crop grows better and more crop remains stay in the soil, you get a richer soil life and the parasitic seeds might more easily be attacked by micro-organisms and die off. And it is also possible that a well-fertilized plant's immune system functions better.'
A cheap option is to mix expensive artificial fertilizer with locally available organic material. But farmers do not want anything to do with livestock manure because after harvest the cows graze on the stubble and their manure is full of weed seeds. Another potential source of minerals is the rice husks which are left over after threshing. Using these has led to a slightly better rice harvest but has not had a convincing effect on the parasitic weeds.

LOCATING VICTIMS

It is not just field researchers who are interested in parasitic plants. Plant physiologist Harro Bouwmeester has been doing research for about 20 years in Wageningen on the signal substances with which parasitic plants locate their victims. Two years ago he got an Advanced Grant of 2.5 million euros from the European Research Council (ERC). He had already won an NWO-VICI grant of 1.25 million euros ten years previously.
'The puzzling thing is that host plants excrete signal substances through their roots: strigolactones, which induce the germination of *Striga* seeds,' says Bouwmeester. 'At first we thought, rather naively, that the problem would be solved if you bred crops which no longer excreted strigolactones. But then it turned out that crops with strigolactones mobilize useful mycorrhiza fungi as well.' These fungi help plant roots to absorb water and nutrients in exchange for sugars, which the fungus needs in its turn. The fungal filaments increase the reach of the root system considerably. This makes the biggest difference in poor soils. Bouwmeester: 'It was discovered in 2008 that strigolactones play a very important role in the growth and development of the plant itself. They are plant hormones which suppress the formation of lateral shoots, making the plants less 'bushy'. It turns out that they determine the architecture of the root system too. On poor soils plants make more of these hormones, not just to stimulate the mycorrhiza fungi but also so as to invest less in growth above the ground and more in growth underground, to develop a larger and wider-spreading root system. And that is extremely useful. So breeding crops without strigolactones is not a good idea.'
Bouwmeester's group proved that crops which have access to more phosphate produce fewer strigolactones and are therefore less afflicted by *Striga*. 'But the poor African farmers have to be able to afford that artificial fertilizer.'

> 'Parasitic weeds cause harvest failure, hunger, poverty and rural depopulation'

CROSS-BREEDING FOR RESISTANCE

Over the past couple of decades, plant breeders have been looking for compact, less leafy and highly productive types of rice which do not invest too much energy in extra leaves and shoots but get on with forming grains. But without realizing it the breeders may also have selected for types of plant with high levels of strigolactones, which then also wake up more parasitic weed seeds in the soil.
One of Bouwmeester's PhD students, Mahdere Shimels from Ethiopia, who is hoping to receive her doctorate this autumn in Wageningen, is studying strigolactones in sorghum. She is working with American colleagues who bred a sorghum variety which is resistant to *Striga*, with the support of the Bill & Melinda Gates Foundation. Bouwmeester: 'The Americans are now working on cross-breeding this characteristic into other sorghum varieties too, and meanwhile we are trying to figure out the underlying mechanism. Plants make a great many different kinds of strigolactones. In sorghum, for instance, there are about eight kinds, which are not all equally efficient at triggering the germination of *Striga*. We now think that resistance to *Striga* is not so much a question of smaller quantities of strigolactones as of a particular combination of them.'
Last year, in search of a new challenge, Bouwmeester moved from Wageningen to the University of Amsterdam, where he is now professor of Plant Hormone Biology. His work in Wageningen will be continued by Carolien Ruyter-Spira. 'Together, we are going to find out more about the biological importance of all those different strigolactones,' she says. 'Why are there so many of them? What determines their specific effects? Why does one parasite germinate better with one type of strigolactone, and another with a different one? And what is the genetic basis for this? With such knowledge, Dutch research can help African farmers.' ■

www.wur.eu/parasiticplants

ENVIRONMENTAL TECHNOLOGISTS SET UP A BUSINESS

Plant power

The Wageningen company Plant-e generates electricity from living plants. Environmental technologists David Strik and Marjolein Helder set up the company in 2009. Now Helder heads the growing business; Strik is an assistant professor and works on optimizing waste flows.

TEXT ALEXANDRA BRANDERHORST **PHOTOGRAPHY** HARMEN DE JONG

In the laboratory of the Environmental Technology chair group there is cordgrass growing in a dish full of mud. There are also some transparent pipes sticking out of the mud. They contain the electrodes, says David Strik. The roots of the plants excrete organic substances which bacteria in the soil convert into carbon dioxide, hydrogen ions and electrons. 'The electrodes capture these electrons, generating electricity. No oxygen must get into the system, which is why we work with cordgrass and reed manna grass. They grow in moist, anaerobic soils,' says Strik. Elsewhere in the lab, cordgrass plants grow between flat boards full of electrodes, their green blades sticking out cheerfully.

Since 2006, Strik has been doing research on what is called the plant microbial fuel cell, an idea developed by Bert Hamelers of the Environmental Technology chair group for producing electricity with the aid of bacteria living off plant waste. 'We were looking for a marsh plant to use and it was winter, so it wasn't easy to find something suitable. Then we picked some reed manna grass in the water meadows by the Rhine. We built an installation and it worked.' Bigger projects and sponsorship followed. From 2008, PhD candidate Marjolein Helder and postdoc Strik did research together on increasing the amount of electricity generated. Helder and Strik also set up a spin-off company, Plant-e, to start marketing the technology. During that period, Strik was working four days a week as a researcher at the university, and one day a week for Plant-e.

CONNECTING PLANT TRAYS

Plant-e was launched in 2009 with a rooftop party. 'In August David and I did our first experiment with plants on the roof of the Agrotechnion. We worked on the rooftop installation for a few days. The evening we finished, we carted pizzas and beer up there,' reminisces Helder. 'Everything we did brought us new insights. Even an experiment which didn't work was publishable.' And their cooperation ran smoothly. Helder: 'David is more of a researcher, and I am more of an entrepreneur. We are a fantastic team. We are both extremely headstrong and stubborn but we soon came to appreciate each other's qualities.'

Now, eight years down the line, Helder heads a team of seven as well as a small group of students who are on call to work when needed. 'Things moved very fast. In the first years Plant-e was mainly funded by subsidies, but nowadays it runs largely on its own sales. We broke even for the first time last year,' says Helder. In 2014, Plant-e launched its first product on the market: connecting plant trays which can cover between one and a hundred square metres. 'We mainly sell this modular system in the Netherlands, to municipalities, ministries and companies,' explains Helder. Their other product is a do-it-yourself package for consumers and schools or company departments. 'That is sold all over the world, including in Japan, China, South Africa, Brazil, the US and Australia.' The smallest package for five plants costs 135 euros. Children of 10 and above can put it together: you just have to weave a few wires through a cloth and connect plugs. The plants are not included; you have to go to a garden centre for those.

CHARGING SMARTPHONES

The success of the plant power is not its production capacity at this stage. One square metre of plants produces enough electricity for a LED light. If you want to charge a smartphone, you need 100 square metres of plants. 'That doesn't sound like all that much energy, but it is a steady 24-hour supply. That is the crux,' explains Helder. And research is still being done on how to in- >

‘We soon came to appreciate each other’s qualities’

MARJOLEIN HELDER

Age: 33
Studied: BSc and MSc Environmental Sciences, 2001-2008. PhD in Wageningen for a study of electricity production from plants, in 2012
Works: Founder and director of Plant-e since 2009

‘For the first test I got reed manna grass from the water meadows.’

DAVID STRIK

Age: 41
Studied: MSc Environmental Protection 1997-1999. PhD in Vienna for a study of contamination in biogas, in 2004.
Works: Assistant professor of Environmental Technology at Wageningen University since 2012

WHERE DO ENVIRONMENTAL TECHNOLOGISTS END UP?

Between 1986 and 2016, 2438 people graduated from the Master's in Environmental Protection, later Environmental Sciences. Information is available on where 1055 of the graduates work. One quarter are working for national or local government, and the same number work for technical and consultancy firms. 18 percent are employed by universities and research institutes, and 10 percent in trade and industry. The rest are in other branches. *Source: KLV Wageningen Alumni Network*

crease the yield, witness Strik's tests with flexible pipes. These can be laid down in rice fields, for example. Strik is also working on the development of electrodes made with a fraction of the material they currently require. In 2011, Strik stopped working for Plant-e when he became a father and an assistant professor. In that capacity he continues to do research at the university on plant electricity technology.

Strik's interest in the environment goes back a long time: at primary school in Oisterwijk he set up a nature club which picked up litter in the woods. A career choice test suggested the field of technology and the environment, and Strik did a degree in Environmental Technology at HAS Den Bosch, an applied sciences university. 'During an internship on wastewater purification at the university in Vienna, I did lab experiments and made up my mind to go on to further studies.' Still living at home at that point, Strik moved to Wageningen in 1997. Student life was calling and Strik became an active member of Unitas and took up climbing with Ibex mountaineering club, where he was also on the board. He looks back with pleasure on the many weekends away and the summers in the mountains. 'You get away from it all, and you completely recharge your batteries.'

DISAPPOINTING FIRST YEAR

In that period Marjolein Helder was still at secondary school in Krommenie. After an open day in Wageningen, she knew for sure: that's the university for me. 'The informal teacher-student relations here appealed to me. I went for environmental sciences because I was interested in doing something technical and I was always concerned about things like reducing waste, saving energy and a vegetarian diet.'

But the first year of her degree programme was disappointing. 'It was very general. I wondered what I was doing here. From the second year there was more substance to the programme and I started enjoying myself more.' During her university years Helder was chair of student society SSR-W. 'It's like heading a company with 250 volunteer staff. That forces you to run a tight ship and at the same time you can never please everybody so you learn to cope with criticism.'

Helder went on to take a minor in business studies and entrepreneurship; contents-wise, she focused on energy. During her internship in the Brazilian town of Piracicaba, she studied the production of bio-ethanol from sugar cane. When she returned, she was offered a place to do a PhD and to start a spin-off company as part of it. That was what clinched it for her.

INTO ICT

Strik was less lucky after graduating in 1999. There were no PhD places available so he went into ICT. After one and a half years he could go back to the University of Vienna, where they were looking for a PhD student to develop software. The research was about the purification of biogas. 'There are substances in waste which end up in the biogas. Sulphur and ammonia, for instance. They are bad for the engines. I looked into the effect of waste selection and the conditions in the reactor, such as temperature and acidity, on these substances,' says Strik. On the side, he went climbing every weekend. A PhD trajectory is shorter in Austria than in the Netherlands: Strik finished in two and a half years. He and a friend then travelled around Europe for a year in a minibus, from one climbing location to the next.

When he got back in 2006, he got a job as a postdoc in Wageningen, working on the plant microbial fuel cell. In 2012 he got onto the tenure track, a career path for talented academics. 'My ambition is not necessarily to become a full professor, but to develop myself and realize my research ideas.' Strik is currently studying ways of extracting useful chemicals from biomass waste flows such as green household waste. He has just won an Open Mind grant from Technology Foundation STW, to enable him to do further research. 'Acetic acid, and more valuable food ingredients, can be extracted from the carbon dioxide, hydrogen and electrons which bacteria produce.'

Strik wants to apply new technologies to help close cycles and maximize recycling. 'Plastic mainly gets burned because we don't have good ways of reusing it. But biodegradable plastics, made of sugar beet or maize for instance, can be recycled with bacteria too. If you do that you don't have to grow any more plants to produce new biodegradable plastics,' says Strik.

POWER FROM RICE PADDIES

While working towards her PhD, Helder also took courses on running a business and developed a masterclass on bio-energy and innovation, together with the Wageningen Business School. 'There weren't as many facilities for starters as there are now, but there was a lot of coaching.' In January the European Commission made Helder a member of the High Level Group of Innovators. 'Fifteen people were selected from 450 submissions. We will look at how we can make the European research programme more accessible for start-up technology companies.' Helder will spend a lot of time abroad next year to promote Plant-e. 'With the growing world population, we must use land multifunctionally and effectively. Our systems can be used on a large scale in rice fields, wet nature areas and peaty areas: everywhere where plants grow on wet ground.' Once the system is in place, it can be highly productive, Helder stresses. 'Above all because it can be combined with something else, such as food production. This can become an integral part of a sustainable energy supply.' ■

Celebrating with our alma mater

100years

The year 2018 is a big one for Wageningen University & Research, which will then have existed as an academic institution for 100 years. Wageningen intends to celebrate in style with staff, students and alumni. The programme includes parties, a sports event for students and a worldwide alumni day.

TEXT ALEXANDRA BRANDERHORST **PHOTO** SVEN MENCHEL

The first signs of the approaching centennial celebrations can already be detected on the campus. Around The Sower, the iconic 1926 statue by Wageningen sculptor August Falise, flowing lines of flowers and blue-green Timothy grass fan out as though he had broadcast them. Ten thousand bulbs were planted in November to create this 'Seed trail'. A group of ex-students who started in Wageningen in 1967 pulled on their gumboots and helped with the digging and planting.

People were invited to send in ideas for celebrating Wageningen's centenary as an agricultural college and, since 1986, a university. A steering committee selected several projects from the suggestions, for implementation. These include parties for staff, students and alumni, and symposia for both academics and a more general public. The five-yearly Beelden op de Berg art exhibition in Belmonte Arboretum will mark the centenary with the theme 'For ever young', and there will be lectures, films and performances on campus, as well as artists in residence who are going to link art with science.

The University Fund Wageningen (UFW) has adopted four projects related to sport, historiography, international relations and secondary school students, and hopes for support from alumni to get them off the ground. 'In honour of the centenary we want to facilitate something extra for the university,' says Arianne van Ballegooij of UFW. The plan is to collect memories and good wishes for the university's future and present them in an unusual way at the *dies natalis* in 2018. The fund started its fundraising for the centennial year in March. ■

For more information and ways of contributing, see: www.100x100.wur.nl

NEW HISTORY BOOK

It is sure to be on every ex-student's wish list: a book about Wageningen's last 25 years in stories and photos. It is the sequel to the three-part history of Wageningen Agricultural University by J. van der Haar and J.A. Faber, but somewhat lighter reading. 'We'll be looking back on how the university made a comeback at the turn of the century, illustrating what has changed in student culture, in education, research and consultation structures, and describing the emergence of WUR. And we also look at what these developments mean for the future of Wageningen,' says Just Vlak, emeritus professor of Virology and member of the editorial board. Alumni and journalists Martijn de Groot (Communication, 1981) and Joost van Kasteren (Molecular Sciences, 1975) have been engaged as authors.

YOUNG HIGHFLIERS TO BORLAUG DIALOGUE

Every year the World Food Prize organizes the Borlaug Dialogue in Des Moines (US): a 'Davos-style' symposium at which 1500 international experts and policymakers from 65 countries discuss food security and international development. 'We are going to run a competition on campus for secondary school students, about how they would go about combatting hunger using scientific knowledge,' explains WUR president Louise Fresco, herself involved in the Borlaug Dialogue and the World Food Prize as a speaker and an advisor.

'The young people who come up with the best idea will be invited to attend this conference.'

WORLDWIDE WAGENINGEN DAY

On 21 June 2018, UFW will be organizing a worldwide alumni day. 'There will be a reunion in Wageningen for all graduates, and we'll be planting a jubilee tree on campus,' says alumni relations manager Caroline Bijkerk. 'But because a great many alumni live abroad, we want to help run an alumni activity in as many other countries as possible. So, overseas alumni: sign up and help Wageningen to run 100 activities in 100 countries on 21 June 2018!'

100years
1918 — 2018

STUDENT CHAMPIONSHIPS IN WAGENINGEN

Although the Great Dutch Student Championships have existed since 1967, they have only once been hosted by Wageningen, in 1999. 'Being the smallest university, we never had the means or the facilities to put up 1500 to 1800 sportspeople,' say Henri ten Klooster, head of Sports Centre de Bongerd (SCB). During the two-day event, students from all the Dutch universities compete in 16 different sports. The event is a combination of fanatical sport and fun. 'Wageningen has come out as the best university in the Netherlands in the Higher Education Guide for 12 years in a row now, partly because of the sports centre. So over the past couple of years, the executive board has invested in expanding that,' says Ten Klooster. 'We are keen to show the whole country Wageningen's international character, unique degree courses, and campus, as well as showing off our facilities in the greenest and most compact GNSK ever. But we can't do that on our own. We hope alumni will want to contribute financially to making this fantastic event possible. There is more to sport that exercise: it brings people together.'

NETWORK

Alumni visit brewery in Ethiopia

A group of 19 Ethiopian and Dutch Wageningen alumni visited the Heineken Brewery just outside Addis Ababa (Ethiopia) at the end of January. The excursion was organized by the WUR alumni network in Ethiopia. Hilbert van der Werf (Food Quality Management, 2008), product manager at the Heineken brewery, took the group on a guided tour. 'It was impressive to see how professional everything was at the brewery. It was all incredibly clean and tightly organized,' says Meskerem Ritmeester (International Development Studies, 2014). The afternoon ended with a sociable drinks reception. *Info: alumni@wur.nl*

FUND

New technical expertise thanks to the Dijkhuizen Fund

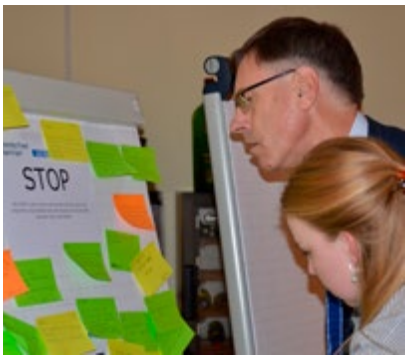
Two Wageningen PhD candidates were able to acquire experience with new advanced research techniques thanks to the Aalt Dijkhuizen Fund. The grant let Meinou Corstens, a PhD candidate in Food Process Engineering, perform in-vitro tests for her research at INRA in France on the product properties that make people feel full sooner. Ruud Barth, who does research on improvements to harvesting robots in greenhouse horticulture, was given the opportunity to spend a few months working at Harvard (USA). He acquired experience there in 'training' a computer system to recognize parts of a plant, working at the pixel level.
Info: ufw@wur.nl

WORKSHOP

Student board members learn from alumni

The University Fund Wageningen organized a series of workshops at the end of 2016 for student board members with input from alumni. The aim was to improve skills that these students need but that are not taught in the standard education programme.

In four evenings, students on student society boards and in student council parties learned more about networking, etiquette, finances, the law and governance, and how to deal with the media. Various alumni gave talks, including Gerda Feunekes (director of the Netherlands Nutrition Centre), Tjapko Poppens (mayor of Wijk bij Duurstede) and Albert van Zadelhoff (from Triodos Bank). One of the more than 50 participants in this first Business Skills Programme was Deanne Verkroost, a board member of the Argo rowing club. She learned a lot from the sessions. 'I now know more about how to send someone an official invitation and how to address people when you want something from them,' explains Verkroost. 'These are useful subjects that you don't normally learn anything about.' The evenings also helped foster contact between



the different societies, notes one of the organizers, Caroline Bijkerk of the University Fund Wageningen.
The Business Skills Programme was a pilot. The possibility of a follow-up is now being considered with the WUR Education Institute.
Info: caroline.bijkerk@wur.nl

Students listening to alumni running workshops.

FUND

Marina van Damme: 'Once a year, I invite all the women to my home'

New fund for female alumni

Every year, the Marina van Damme Fund awards a grant worth 9,500 euros aimed at supporting female graduates and PhD holders from Wageningen who want to make the next move in their career.

Marina van Damme studied at Delft, did her PhD at Twente and had a career at the royal salt company KNZ and the company that went on to become AKZO. At the end of her career she was a member of the Scientific Council for Government Policy and she held various advisory positions.
'When I started my degree in Delft in 1947, only one percent of students were female. It was far from inevitable that I would have a career, but I enjoyed it thoroughly. I would like other women to have that experience too,' explains Mrs Van Damme, now aged 86.
'My husband had passed away, we don't have any children and I was wondering what to do with my money. The promotion of Dutch women to senior positions is still lagging behind that of their male colleagues and women in other countries. That was what gave me the idea of giving support to female graduates who have a few years of work experience and want to develop further. So in 2003 I established the annual Marina van Damme grant at the universities of Twente and Delft. In 2010, they were joined by Eindhoven Technical University. After the 4TU Federation [the four universities of technology] was set up last year, I added Wageningen to the list too.'
The grant will become available in Wageningen as of 2018. Women generally spend the grant on additional university courses alongside their work in areas such as marketing, finance or management, on a practical additional study at an applied sciences university, or on a guest worker position at a leading university abroad. Together, the 35 women who have received a grant so far are forming an increasingly active Marina van Damme network. 'Once a year, I invite all the women to my home for a meeting – under the apple tree.'
Info: ufw@wur.nl

CHARITIES

Proceeds from calendar for Anne van den Ban Fund

Ceres' charitable foundation Durf! donated almost 1000 euros to the Anne van den Ban Fund in January. That amount was earned through sales of the 'Ambitious' calendar, with twelve portraits of go-getting members. 'We always look for a connection between the charity and our members,' explains Ceres member Liselotte Verheij at Durf! 'The Anne van den Ban Fund supports students from developing countries who want to come and study at Wageningen. They are ambitious, just like our members who actively work on their development alongside their studies. For example, one portrait is of Martijn Visser, who is spending this year as a youth representative for sustainable development at the UN. The graphical design was also done by a student. So it really is a calendar for and by students.' *Info: arianne.vanballegooij@wur.nl*

The members of Ceres' charity, Durf! hand over their donation to Pim Brascamp, chair of the Anne van den Ban Fund.

MEETING

Young graduates help start-ups

Mid-January saw the first gathering in Amsterdam for alumni who graduated in the past five years. Thirty young alumni met up at ABN AMRO's head office. They were mainly from the Amsterdam region and were of various nationalities, so everyone spoke English. During the evening, the alumni worked on business challenges provided by the Wageningen start-up Greenfood50 (products based on quinoa) and Tinyfoods (edible insects). It resulted in interesting insights for the companies. One of the teams working on the Tinyfoods case won tickets for the ABN AMRO tennis ournament in Rotterdam in February.
The University Fund Wageningen is using get-togethers like this to invest in contact with young alumni.
Info: alumni@wur.nl

Guido van den Ackerveken PhD, WUR PhD 1993, has been appointed professor of Translational Plant and Microbial Biology in Utrecht. 17 November 2016.

Robbert Blanken MSc, WUR Forest and Nature Conservation 2011, lecturer in nature and technology at Windesheim and a primary school teacher, has been awarded the Groentje prize in *Trouw* newspaper's sustainable 100 list, a prize for talented young people in the field of sustainability, for the way in which he teaches children about sustainable thinking and practice. 11 October 2016.

Andre Bianchi PhD, University of Amsterdam Medical Biology 1979, has stepped down as director of the CVI (Central Veterinary Institute – now Wageningen Bioveterinary Research) after 34 years. He was appointed director in 2002. 7 February 2017.

Prof. Johan Bouma,

WUR Soil and Fertilization Sciences 1966 and emeritus professor of Soil Science, has been awarded the Alexander Von Humboldt medal by the European Geosciences Union. April 2017.

PHOTO PHOTO GUY ACKERMANS

Prof. Johan Bouma

Prof. Louise Fresco, WUR Rural Sociology of the Non-Western Regions 1976, president of the WUR Executive Board, has been awarded an honorary doctorate by KU Leuven for her contribution to the academic and public debate on sustainable food. 15 February 2017.

Marjolein Helder PhD, WUR Environmental Sciences 2008, founder and CEO of Plant-e, has been appointed adviser to the European Innovation Council. 20 January 2017.

Prof. Gert Jan Hiddink, WUR Human Nutrition 1975, has stepped down after 17 years as professor by special appointment in Nutrition Communication through Health Professionals, in the Strategic Communication chair group. 9 February 2017.

Jacques Horsten PhD, WUR Plant Breeding 1972, has been made an honorary member of the Royal Netherlands Society of Plant Pathology (KNPV) for writing the history of the KNPV and phytopathology. 17 November 2016.

Diederik van der Loo MSc,

WUR Landscape Architect and Planning 2013 and Wageningen councillor for the Socialist Party (SP), has been appointed a party worker for Dennis de Jong, an SP MEP in Brussels. 1 February 2017.

Diederik van der Loo MSc

Prof. Arthur Mol, WUR Environmental Protection (water purification) 1985, rector magnificus and vice-president of the WUR Executive Board, has been awarded an honorary doctorate by Örebro University in Sweden for his work as professor of Environmental Policy. 4 February 2017.

Carla Moonen MSc, WUR Agricultural and Environmental Economics 1993, chair of the Brabantse Delta water board, has been appointed chair of the board of the Zorg en Welzijn pension fund. 1 March 2017.

Hendrik Oosterveld MSc, WUR Land Development 1974, has been appointed chair of SNP, the foundation for the Dutch National Parks. 24 November 2016.

Harry Paul PhD, WUR Phytopathology 1985, Wageningen Ambassador and inspector-general at the Netherlands Food and Consumer Product Safety Authority (NVWA), has been appointed project-based deputy secretary-general for finance at the Ministry of Finance, with the positioning of the Tax and Customs Administration as his portfolio. 26 November 2016.

Prof. Jan Douwe van der Ploeg,

WUR Rural Sociology of the Non-Western Regions 1976, has stepped down as professor in the Rural Sociology chair group at WUR. Van der Ploeg put Wageningen sociology on the map with his research on business styles. He is known as an advisor on farming and rural matters and as a critic of agricultural policy. 26 January 2017.

PHOTO PHOTO GUY ACKERMANS

Prof. Jan Douwe van der Ploeg

Prof. Marten Scheffer, Utrecht University Ecology 1985, WUR professor of Aquatic Ecology and Water Quality Management, has received the BBVA Foundation Frontiers of Knowledge Award in the Ecology and Conservation Biology category for his research on how nature reacts to human interventions. 7 February 2017.

Prof. Rogier Schulte, WUR Biology 1997, programme leader at Teagasc, the Agriculture and Food Development Authority in Ireland, and adjunct professor at the agricultural university in Latvia, has been appointed professor of Farming Systems Ecology at WUR. February 2017.

Berno Strootman MSc, WUR Landscape Architecture 1988, has been appointed a government advisor on the physical living environment at the Board of Government Advisors (CRa). 1 September 2016.

PERSONALIA (CONTD)

Hanneke Suijkerbuijk MSc, WUR Biology 2012, marketing and communication officer at WUR, has received the Uytttenboogaart-Eliasen Master's thesis award.
16 December 2016.

Sylvo Thijsen MSc, WUR Landscape Architecture 1985, director of Staatsbosbeheer, has been appointed a supervisory director of ATKB, a consultancy firm on soil, water and ecology.
1 September 2016.

Wieger Wamelink PhD, WUR Plant Breeding 1993, ecologist at Wageningen Environmental Research, has joined the advisory board of InFin Innovative Finance AG's Mars One. 1 December 2016.

PRIZE

PHOTO JACOB KAPTEIN/NATIONAL GEOGRAPHIC

Best nature photo

Jacob Kaptein, Jacob Kaptein, WUR student Forest and Nature Management, has been chosen 'Nature Photographer of the Year 2016' by National Geographic in the landscape category.
The student took the winning photo of a beech tree near the Leuvenumse stream in the Veluwe area. After completing his Bachelor's degree, he would like to try his luck as a professional photographer. 'If I can't make a living from that, I'll come back to do a Master's,' he said in the university magazine *Resource*.
20 December 2016.

TELEVISION

Farmer seeks wife

Marc Verkuyl MSc, WUR Aquaculture and Fisheries 2011, a tilapia farmer in Zambia, is one of the five participants in the popular Dutch TV programme *Boer Zoekt Vrouw Internationaal* ('international farmer seeks wife') this season. Marc received 829 letters from interested women, making him the favourite farmer this season.

PHOTO KRO-NCRV/LINELLE DEUNK

IN MEMORIAM

Alumni, current or former employees of Wageningen University & Research and KLV members who have recently passed away.

Mr C. Berkouwer MSc, WUR Rural Economics 1969. 9 July 2016.
Mr H.P. Beukema MSc, WUR Agricultural Plant Breeding 1962. 27 December 2016.
Mr E.W. Boogaard MSc, WUR Agricultural Plant Breeding 1956. 3 December 2016.
Ms A.L. Borst MSc, WUR Tropical Domestic Science 1964. 29 September 2016.
Prof. J. Bruinsma, WUR emeritus professor of Plant Physiology. 1 January 2017.
Mr J.W. van der Burgt MSc, WUR Environmental Protection (Water Purification) 1995. 12 July 2016.
Mr E. Dwarshuis MSc, WUR Agricultural Plant Breeding 1965. 14 December 2016.
Prof. M. Flach, WUR Tropical Rural Economics 1957. 19 December 2016.
Mr B.J. van Goor PhD, KLV member. 8 January 2017.
Mr B. de Jong MSc, WU Agricultural Plant Breeding 1958. 16 December 2016.
Mr G.J.J. Kortstee PhD, WUR Zootechnics 1962. 13 December 2016.
Prof. B. Krol, WUR Dairy Science 1954. 23 December 2016.
Ms A. de Lang MSc, WUR Biology 2004. 22 November 2016.
Mr H.C. van Ommen PhD, WUR Soil and Fertilization Sciences 1983. 23 October 2016.
Mr P.H.L.M. Regout MSc, WUR Tropical Rural Economics 1966. 9 September 2016.
Mr M.P. Teeuw MSc, WUR Biology 1998. 30 December 2016.
Mr S. van Veen MSc, WUR Horticulture 1954. 1 November 2016.
Mr C.A. Vriezinga PhD, WUR PhD 2000. 28 August 2015.
Mr W. van de Westeringh MSc, WUR Soil and Fertilization Sciences 1966. 10 October 2016.
Mr J.J. Westra MSc, WUR Forestry 1956. 26 January 2017.

If you wish to inform us of the death of a fellow former student or relative, you can email alumni@wur.nl or call +31 (0)317- 485 191.

KLV members first to try out new Wageningen alumni platform

It was launched at the end of January: the brand new online alumni platform WUR Connect, for Wageningen alumni, KLV members and students. KLV members were the first to receive access to the new platform. We asked several KLV members – alumni and students – for their initial reactions.

"It's highly promising! I will use it to find people and keep informed about meetings. Fantastic way of staying in touch with foreign contacts, something that LinkedIn is less suitable for."
- Sandra Tempelman (graduated in 1992)

"That connection with LinkedIn is really useful. A slick and modern alternative for the address book and and a nice way to occasionally see what's happening in Wageningen!"
- Lennart van der Burg (graduated in 2008)

"It's great that it can be reached from the newsletter; you always end up reading more than just the news item you came for. WUR Connect makes it easier to maintain contacts, as there are more possibilities to connect!" *- Hugo Albers (graduated in 1979)*

"Great way to network. As everyone is a Wageningen alumnus, everything works a bit more informally than via LinkedIn. The mentorship function certainly contributes to that as well. You can see where people end up working, which provides insight into the career possibilities." *- George Penders (Bachelor student)*

"It is immediately clear what the platform can be used for - searching for people, helping others or expanding your network. I am in the initial phase of my master's programme and now is a good time to actively seek some contacts for my graduation project. It's great to be able to approach people directly without first having to send them an e-mail via the secretarial office." *- Joar Nilssen (Master student)*

"I'll mainly use it to search for vacancies and to better orientate myself on the job market. I'll also definitely use the services that people offer, such as a CV check. For me personally, that's the real added value of this platform; it's a fantastic way to help young alumni establish themselves!" *- Madieke Michels (Master student)*

Project leader Marisca Lanni:
"What makes WUR Connect so great is that it is specifically matched to the needs of alumni. It goes further than a LinkedIn group. There are pages with interesting vacancies and events, for example. You can start your own community, add pages, share photos or post specific requests for help. A beautiful and useful aspect that is also highly appreciated is the option to tick 'willing to help'. With this, you can offer an internship, indicate that you are willing to be a mentor or coach or offer to give a guest lecture, among other things. Due to their link with Wageningen, many alumni are happy to help somebody from a younger generation develop. Nostalgia plays a role as well, of course: the platform is a great way to share old photos or recollect old memories from a special period in your life."

Want to connect?
Go to wurconnect.nl (works best on Google Chrome), register and get connected!

What does WUR Connect offer?

Update: KLV conference 'Inspired by Uncertainty'

Friday 23 and Saturday 24 June 2017 | Various locations on the Wageningse campus

On Friday 23 and Saturday 24 June 2017, the Wageningen campus will host the KLV conference 'Inspired by Uncertainty'. This event is organised with and by the study groups and subnetworks of KLV. Together they will show how the theme 'uncertainty' can provide a stepping stone towards change across the entire range of professional fields that Wageningen represents. It is a highly relevant topic, as uncertainty plays a role in all fields and at every level. A brief update on this two-day conference.

Prepare yourself for a wide range of workshops from across the entire range of professional fields that Wageningen represents. "All study groups, subnetworks and alumni received a call to register workshops. The result is a vast harvest of original subjects", says project leader Caroline Bijkerk. "Now, we must make a choice from the contributions offered."
"There are three types of submissions", says KLV board member Jannemarie de Jonge. "In the first place, we have the specific Wageningen subjects, of course, such as climate change or the future of grazing. Then we have subjects that play a role in every working field, such as privacy in the digital world, uncertainty in entrepreneurship and the Theory U method for change management. The third and last category is more about soft skills and personal development, such as how uncertainty and stress influence each other. It is a broad and interesting palette that reveals the wide range of positions that Wageningen alumni end up in, including outside of the standard Wageningen themes."
"This means there is plenty of choice for the participants", says Caroline. "Various workshop rounds will be held, to give participants the chance to select their own mix."

What else? How about having breakfast with a renowned professor? We have already made contact with quite a few well-known names. Caroline lets slip who one of the keynote speakers will be: the conference will be opened by Bas Haring, philosopher and extraordinary professor in 'public understanding of the natural sciences' at Leiden University. "As for the rest, we'll keep you guessing for now", she concludes. "So don't forget to check the KLV communication channels regularly!"

INVITATION

If you check our KLV Facebook page on a regularly base, you will be informed what KLV has been up to and what we are working on. This way you will keep in touch with the alumni association of your Wageningen University. Of course you are welcome to post your own interesting status updates too.

Join KLVNetwork!

www.facebook.com/klvnetwork

ACTIVITIES

Info: klv.nl/en (unless indicated otherwise)

30 March
Science Cafe - Artificial Intelligence

23 and 24 June
Two day KLV conference 'Inspired by uncertainty'

14 October
Reunion 50th-years alumni, starting year 1967

4 November
Reunion 25th-years alumni, starting year 1992

YOUNG KLV PROGRAMME

4 April
Young KLV - CV writing course

11 May
BCF Career Event, expand your career possibilities!

PHOTO SHUTTERSTOCK

Preventing the Mara River in Kenya from running dry

Herds of wildebeest and zebra cross the crocodile-infested Mara River in Kenya twice a year in search of food and water. This results in impressive wildlife documentaries. Last year, however, too little rain fell in East Africa and the region is suffering from extreme drought, says Saskia Werners of Wageningen Environmental Research. She and her Wageningen colleagues are involved in efforts to prevent the river from running dry through the MaMaSe Project, in collaboration with Unesco-IHE, the Worldwide Fund for Nature, and the Dutch development organization SNV. 'For both the local people and the animals it is hugely important that the Mara River remains a reliable source of water. That is why we are encouraging farmers to make agreements on water use.' Wageningen is also working on agroforestry in the higher-lying zone of the river basin. Planting trees such as avocado trees between the fields prevents rainwater from draining away immediately and causing erosion. And the soil can retain more water for longer as a result. 'We advise farmers on which crops to combine with which trees, and whether the soil is suitable,' says Werners. MaMaSe also aims to make the local residents economically self-reliant. 'With microcredit, farmers can buy new beehives. That is already starting to bear fruit.'

Info: saskia.werners@wur.nl