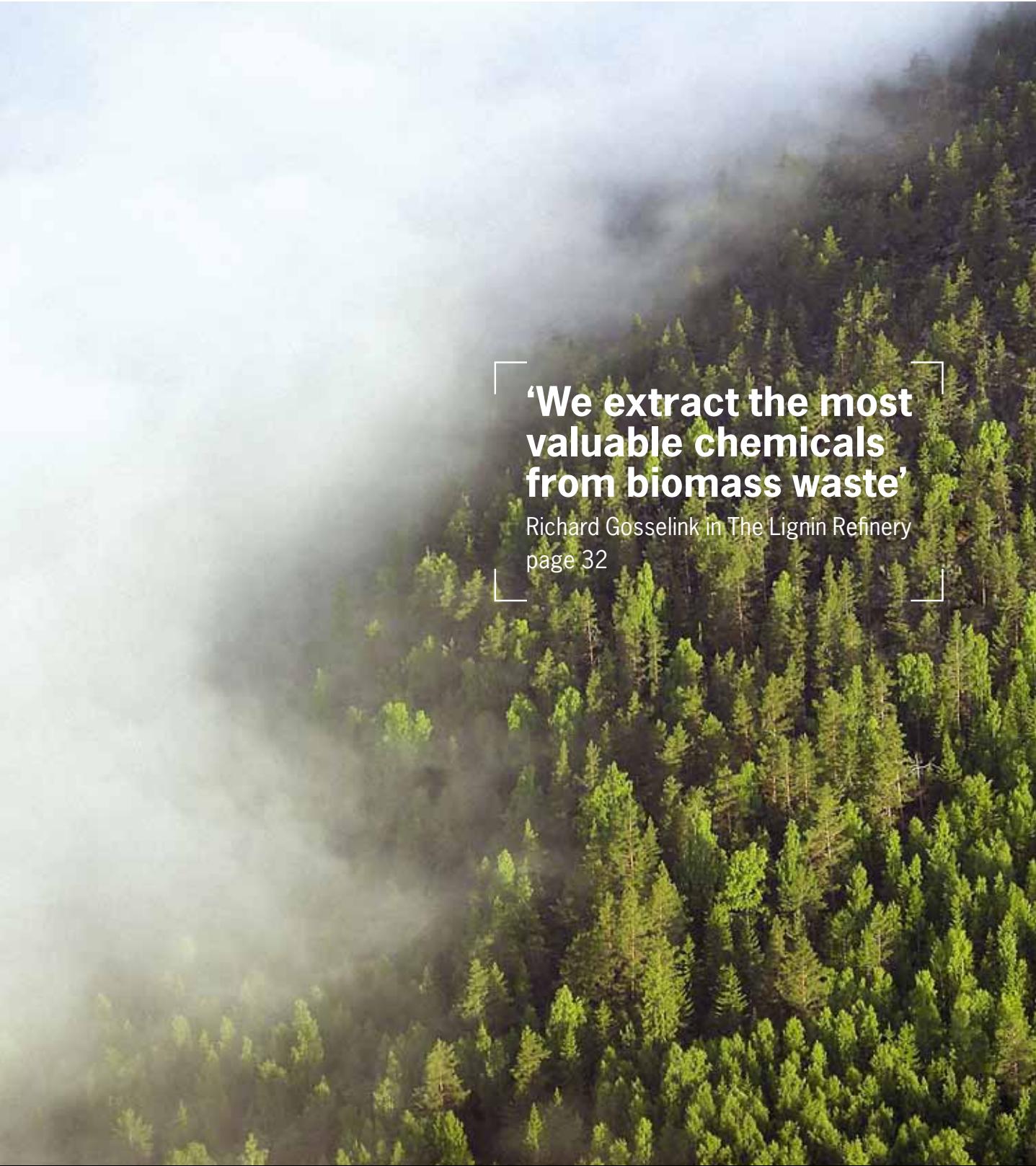


# WAGENINGEN WORLD

MAGAZINE OF WAGENINGEN UR ABOUT CONTRIBUTING TO THE QUALITY OF LIFE

no.2 2014



‘We extract the most  
valuable chemicals  
from biomass waste’

Richard Gosselink in The Lignin Refinery  
page 32

The real price of **chocolate** | Will we miss **glyphosate**? | The rise of the **virtual campus**  
On **boars with balls** | Greening the **brewery** | Surprising insights from the **Seven Countries Study**



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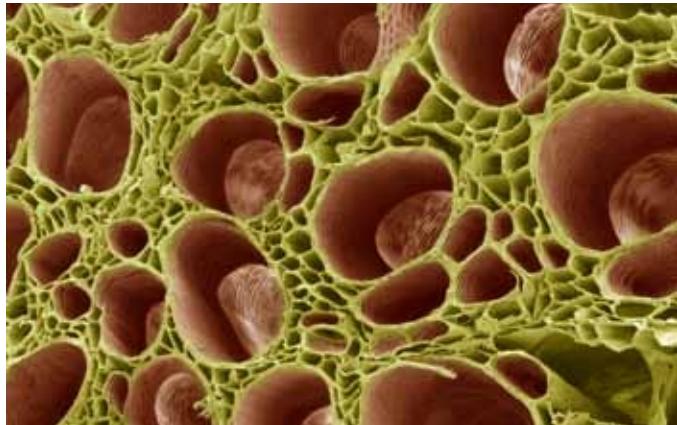
## THE REAL PRICE OF CHOCOLATE

Cocoa farmers in West Africa can only just keep afloat. By 2025 all the chocolate on the Dutch market must be sustainably produced. But whether the cocoa farmer will be any better off is hard to say.

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## WILL WE MISS GLYPHOSATE?

Dutch municipalities will soon be banned from using agricultural herbicides such as glyphosate in their battle to keep pavements and industrial estates free of weeds. But will this ban benefit the Netherlands? Opinion is divided.



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## THE LIGNIN REFINERY

Lignin gives plants their rigidity but is also a treasure trove of valuable basic chemicals. Using new refinery techniques, Wageningen researchers are gradually prising it open. Bringing a sustainable alternative to oil within reach.



**COLOPHON** Wageningen World is the quarterly magazine for associates and alumni of Wageningen UR (University and Research centre) and members of KLV, the Wageningen Alumni Network. A PDF version of the magazine can be found at [www.wageningenur.nl/en/wageningen-world](http://www.wageningenur.nl/en/wageningen-world) **Publisher** Wageningen UR, Marc Lamers, **Editorial Board** Hans Bothe, Yvonne Fernhout, Ben Geerlings, Bert Jansen, Jolanda Jansen, Jeanette Leenders, Jac Niessen, Irene Salverda, Erik Toussaint, Della de Vreeze **Editors-in-chief** Pauline Greuell (Corporate Communications Wageningen UR) **Magazine editor** Miranda Bettenvolle **Cover picture** ANP **Overall design** Hemels Publishers **Translation** Clare McGregor, Clare Wilkinson **Language editor** Clare McGregor **Art direction and design** Jenny van Driel (Wageningen UR, Communication Services) **Copy editor** Rik Nijland **Alumni news** Alexandra Branderhorst **Printer** Mediacenter Rotterdam **ISSN** 2212-9928 **Address** Wageningen Campus, Akkermaalsbos 14, 6708 WB Wageningen, PO Box 409, 6700 AK Wageningen, telephone +31 317 48 40 20, [wageningen.world@wur.nl](http://wageningen.world@wur.nl) **Change of address** [alumni@wur.nl](http://www.wageningenur.nl/en/alumni.htm) **Change of address associates** (mention code on address label) [wageningen.world@wur.nl](http://wageningen.world@wur.nl) **Change of career details** [alumni@wur.nl](mailto:alumni@wur.nl)

The mission of Wageningen UR (University & Research centre) is 'to explore the potential of nature to improve the quality of life'. Wageningen UR includes nine specialist applied research institutes and Wageningen University. These institutions have joined forces to contribute to finding answers to crucial questions related to healthy food and a sustainable living environment. Wageningen UR has a staff of 6,500, 10,000 students, 35,000 alumni and 40 sites, with a turnover of 662 million euros. Institutes of Wageningen UR: Alterra, LEI, Plant Research International, Applied Plant Research, Wageningen UR Livestock Research, Central Veterinary Institute, Wageningen UR Food & Biobased Research, IMARES and RIKILT.



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PHOTO JAN HARRVAN

**Clarity on diet and cancer**

'Every day at the department of Human Nutrition we notice what a great need there is for scientific information about diet and cancer. Our mailbox fills up with questions about this day in day out. And no wonder: on the internet you are bombarded with theories and opinions published by alternative healers, orthomolecular doctors and companies singing the praises of their own products. It can be very hard to distinguish fact from fiction.'

'We see it as our task to provide clarity. That is why we have created the website [voedingenkankerinfo.nl](http://voedingenkankerinfo.nl). People can ask questions, and find information about preventing cancer or what they can do to stop the disease from coming back.'

'So far science comes into the picture far too late, after a product has already become a hype. At the moment, for instance, turmeric is in fashion as a treatment for tumours. It is our task to contribute scientifically sound information. For instance, the fact that there hasn't been a single experiment on people yet, only on cultured cells or the odd lab animal.'

'Even if it doesn't do any good, it can't do any harm, is what a lot of people think, but that is not true at all. There are nutritional supplements such as some anti-oxidants which can have the opposite effect to what you want. And there are supplements which disrupt the chemotherapy process. You have to be terribly careful with these things. And you certainly shouldn't raise false expectations among people who are in despair.'

'We also offer information that is not always what people want to hear. Get more exercise, for example, or lose weight. Overweight is the biggest risk factor for cancer. What is more, it usually goes together with a more negative prognosis. Other important things are: little or no alcohol, eating chicken or fish instead of red meat, and eating more plant-based foods. No special berries or superfoods can compete with that.'

Ellen Kampman, professor of Nutrition and Cancer at Wageningen University, part of Wageningen UR

## Wageningen offers 'top degree programmes'

Of the 29 Master's programmes offered at Wageningen, 20 are labelled 'top programmes' by the Dutch Master's degree guide for 2014. This constitutes one quarter of all the top Master's programmes in the country, making Wageningen University, part of Wageningen UR, the best Dutch institution for Master's programmes.

A total of 730 Master's programmes were evaluated in the Netherlands, with great weight being given to the assessments of students and experts from the Dutch-Flemish Accreditation Organization (NVAO). The highest scoring Wageningen MSc programme is International Land and Water Management. In the QS World University Rankings by Subject for 2014, Wageningen is the best European university in the field of agriculture and forestry.

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AQUATIC ECOLOGY



## Inland waters contain plastic particles too

Just like seawater, Dutch surface water contains microplastics: plastic particles between 0.06 and 5 millimetres in size. In an exploratory study by the Aquatic Ecology and Water Quality chair group at Wageningen University together with waterways board Waterschap Rivierenland, between 0.3 and 1.3 plastic particles were found per 10 cubic metres of water. These concentrations were the same as those found in lakes in the United States and in Switzerland. One of the reasons the plastic particles are problematic is that they can bind toxic substances and disturb the nutrition, re-

production and growth of

# More variety needed in our diet

The best way to combat both undernutrition and overnutrition, as well as to safeguard the food supply, is a more varied diet. This conclusion was drawn by PhD researcher in Crop Physiology Colin Khoury of Wageningen University.

Over the last 50 years, consumers have been eating a less and less varied diet, at the expense of the cultivation and consumption of regional crops. The homogeneity in eating habits across countries has risen by an average of 36 percent, calculated Khoury.

'Nowadays people consume more calories, proteins and fats, and they increasingly choose the ingredients for their meals from a short list of key food crops such as wheat, maize and soya, which they combine with meat and dairy products,' says Khoury. These foodstuffs are crucial to combatting hunger worldwide. The flip side, however, is that these staples chiefly provide energy and not enough vitamins and minerals. If people do not start eating a more varied range of nutritious grains and vegetables, it will be necessary to improve the main food crops so that we get enough micronutri-

ents, including zinc and iron. The research by Khoury and international colleagues also suggests that the growing consumption of a limited number of new crops is accelerating a worldwide rise in obesity, heart diseases and diabetes. 'This is because these conditions are strongly influenced by changed eating habits,' explains Khoury. Another danger of the homogeneity is that it makes agriculture more vulnerable to drought, insect plagues and crop diseases. If a problem develops in a crop which the whole world depends on, it has a big impact.

The findings were reported in March in the journal PNAS. Khoury is doing his PhD research with professor of Crop Physiology Paul Struik. He also works at CGIAR's International Center for Tropical Agriculture (CIAT) in Colombia.

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## ECOTOXICOLOGY



## Imidacloprid acquitted of 'genocide'

**The insecticide imidacloprid is not the cause of mass winter deaths among bees. It does however have a negative effect on bee numbers, the brood and the urge to swarm. These findings have come out of research by Plant Research International, part of Wageningen UR.**

In a multi-annual field test, some of the bees were given sugar water with a dose of imidacloprid that was twice as high as that found in the nectar in the field, to see what effect it would have on the vitality of bee colonies. That imidacloprid does not cause mass bee deaths does not mean it has no effect, says bee researcher Sjef van der Steen. 'In weak bee colonies it could just be the last straw.' Research is still going on at Plant Research International on the foraging behaviour of bees, zooming

in on the effects of exposure to parasites and to imidacloprid. In the Netherlands this insecticide is in the coatings on maize seed, among other places.

The winter death rate among bee colonies was low this year, slightly over 9 percent on average, according to an initial inventory among Dutch beekeepers. The mild winter may have played a role in this.

Seven out of ten beekeepers lost no colonies at all.

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## INNOVATION

## Support for biobased start-ups

Since April there has been a new address for entrepreneurs with a start-up in the biobased economy: the Innovation Lab Biobased Products Wageningen (iLAB Wageningen), where they can try to convert their ideas into a marketable technology or product.

Through iLAB, entrepreneurs can get access to research facilities, researchers and the Wageningen UR network. They can also get help from StartLife, a Wageningen UR partner which supports young companies in obtaining starting capital, a premises and advice.

'In the last few years we have seen an increasing number of enthusiastic people and companies thinking up radically innovative biobased solutions. But they are not always supported in realizing the innovation: banks are reluctant to supply loans,' says Erik van Seventer, biobased products manager at Wageningen UR.

The iLAB is an initiative of the Chemistry top sector, which is setting up a network of Innovation Labs in the Netherlands. The iLAB in Wageningen is the first one to focus on bio-based products. Info: [erik.vanseventer@wur.nl](mailto:erik.vanseventer@wur.nl), [www.wageningenUR.nl/en/ilab](http://www.wageningenUR.nl/en/ilab)



PHOTO iLAB

## WAGENINGEN ACADEMY

## Prevention of postharvest losses

One third of all harvested crops is lost during storage and distribution. Experts say the food lost after harvesting could feed over two billion people. Prevention of postharvest losses is therefore of major importance for global food and nutritional security.

The Postharvest Technology course, with lecturers from Wageningen UR and UC Davis, Postharvest Technology Center, gives an up-to-date insight on the biology of postharvest development and technologies used for handling fresh produce. It includes lectures,

demonstrations, hands-on activities and excursions.

The course is designed for researchers, quality controllers and technical professionals whose work relates to fresh produce quality, safety and marketability.

**October 14-17 2014 | Course leaders: Ernst Woltering and Ulke van Meeteren. For the full range of courses see: [www.wageningenacademy.nl](http://www.wageningenacademy.nl)**

## NATURE MANAGEMENT

### Artificial light disturbs moths

Artificial light disturbs the reproduction of moths, show experiments by PhD researcher Koert van Geffen of Wageningen University, part of Wageningen UR. Under the influence of the light, female cabbage moths change their pheromone composition so that they no longer attract mates. The light also causes the cocooned caterpillars to come out of their diapause, the resting period for autumn pupae. Young caterpillars are not affected by the light. Info: [koert.vangeffen@wur.nl](mailto:koert.vangeffen@wur.nl)



## FOOD SAFETY

### Test needed for safe vegetables

A fast new detection method is needed for microbacterial infections in food crops, in order to prevent situations such as the EHEC outbreak of 2011. Other human pathogens could be transferred from livestock to crop farms, warn Wageningen UR researchers in a review of 200 studies on the EHEC case, in which 54 people die and hundreds fell ill after eating sprouts from fenugreek seeds infected with *E. coli* bacteria. Pathogenic bacteria from livestock seem to be well able to survive in plants, including vegetables, thanks to their ability to take over genes from other micro-organisms in the soil, manure, intestines or irrigation water. They are helped in doing this by bacteriophages (virus-like particles) and plasmids (independent DNA fragments) present in the bacteria. Info: [leo.vanoverbeek@wur.nl](mailto:leo.vanoverbeek@wur.nl)

## NUTRITION AND ENTOMOLOGY

### English edition of insect cookbook

The insect cookbook by entomologists Arnold van Huis and Marcel Dicke of Wageningen UR and chef Henk van Gurp of the Rijn IJssel catering college is now available in English too. New sections of The Insect Cookbook provide information about the nutritional value and environmental aspects of breeding and consuming insects, as well as interviews with Kofi Annan, former secretary-general of the UN, and René Redzepi, whose restaurant has been pronounced the best in the world three times now. Together with the FAO, the entomologists organized a symposium called Insects to Feed the World, from 14 to 17 May. Info: [marcel.dicke@wur.nl](mailto:marcel.dicke@wur.nl)

## The Insect Cookbook

Food for a Sustainable Planet

ARNOLD VAN HUIS, HENK VAN GURP AND MARCEL DICKE



## NUTRITION AND HEALTH

### The longer you chew the less you eat

**When we eat chewy foods we feel full faster. Test subjects given a lunch of hard hamburger rolls and a crunchy rice salad of raw vegetables ate 93 calories (13 percent) less than those lunching on soft rolls and a risotto of cooked vegetables. They did not compensate by eating more in the evening.**

Diet expert Dieuwertje Bolhuis of Wageningen University, part of Wageningen UR, demonstrated with these realistic meals what she had earlier shown in her thesis, based on tests under more artificial conditions: the longer you chew, the less you eat. She would like to see the food

industry picking up on these conclusions. If people consistently ate less, it would be a big step in the direction of combatting overeating. Bolhuis's study was published in scientific journal PLoS One in April.

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## LAND USE



## NATURE AND HEALTH

## More and more ticks

The tick population is on the rise in the Netherlands. Groups of volunteers have been catching ticks at 11 locations since 2006, and have seen a clear increase in the total number of the insects they catch. Numbers of larvae and nymphs increased the most. This is clear from an inventory of the tick catch for the Nature Calendar study by Wageningen University. Of the ticks Dutch people sent in through Tekenradar.nl in 2013, 20 percent were infected with the *Borrelia* bacteria which can cause Lyme's disease. A study is now being done on the effectiveness of a preventive single dose of antibiotics taken within three days of being bitten by a tick.

Info: [tekenradar.nl](http://tekenradar.nl)

## GENETICS

## Supercomputer increased calculating capacity

CAT-Agrofood at Wageningen UR, which manages advanced research facilities and makes them available to scientists and businesses, acquired a High Performance Computer (HPC) in April. This supercomputer cost over 700,000 euros. It was purchased at the behest of animal breeding companies and research groups within Wageningen UR that are studying breeding and animal genetics, which have joined forces in Breed4Food. The HPC is also suited to other research fields including plant breeding. Researchers are working with ever larger quantities of data, mainly due to developments in the technology for decoding DNA. For this, sufficient calculating capacity is crucial.

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# Dutch countryside faces derelict buildings

**So many Dutch farmers will be going out of business in the coming 15 years that the number of farm buildings that will be abandoned is likely to be bigger than the total number of other industrial, retail and office buildings put together.**

Alterra Wageningen UR expects that between 1600 and 24,000 farms will disappear from the Netherlands, mainly for lack of successors. The land will be taken over by farmers wanting to expand, but about 24 million square metres of farm buildings will also be abandoned, half of them old barns of no cultural-historic value, as well as 8 million square metres of housing. The main areas affected will be the provinces of Gelderland, Overijssel, East Brabant, North Limburg, the North-East Polder and south-west Friesland. Assuming that the houses will continue to be lived in, and some of the barns will be taken over by other farmers for business premises or group accommodation, 15 million square metres will still stand derelict.

The buildings dating from after 1970 and

extensive barns are unlikely to be of much interest to city dwellers and other private individuals. And remote locations will be less attractive for putting to new uses than those closer to residential hubs.

Researcher Edo Gies: 'If we are to prevent the rural areas from becoming impoverished, redesignation is very important. We shall badly need innovative solutions.' Examples would be shops or sheltered accommodation. Land use plans and other rules and regulations now often stand in the way of redesignation of redundant buildings. Demolition will need to be made a more attractive option too. In the Netherlands an average of 1 in 10 premises are still in use as farms. There are no figures for the already abandoned premises. Info: [edo.gies@wur.nl](mailto:edo.gies@wur.nl)



## A dog's life? Plans for improvement

Wageningen UR and several dog-related organizations are working on a joint plan for improving the health, behaviour and welfare of dogs in the Netherlands. It should be clear by mid-2014 which measures are required. In the past year Wageningen UR Livestock Research developed software and a handbook with which breeders and breed associations can improve on the monitoring and prediction of inbreeding and relatedness in dogs. This was done at the behest of the Dutch kennel club's management board and the ministry of Economic Affairs. The book can be downloaded free of charge in PDF form.

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## Hygiene rules for local products

It may soon be easier for producers of local products to work according to the rules for safe food production (HACCP). RIKILT Wageningen UR has developed a programme for this purpose, together with wholesaler Deli XL and farmers' organization ZLTO. After filling in a questionnaire, a producer receives a tailor-made set of hygiene rules based on existing protocols for fruit and vegetables, dairy produce and meat. The hygiene code still has to be approved by the ministry of Health, Welfare and Sport.

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PHOTO ISRIC

## New World Soil Museum on Wageningen campus

**The new building of the World Soil Museum was opened on the Wageningen campus in April. This museum, part of ISRIC – World Soil Information – is the only one with a collection of soil profiles covering the whole world.**

Many of the profiles in the museum show how much humans have influenced the soil: from a city soil from the Dutch town of Hilversum to Terra Preta, black soil enriched by Amazon dwellers. Besides the preserved profiles on the wall, the museum also boasts digital maps with up-to-date soil information from all over the world. These maps show how a worrying number of soils have been degraded in the last 25 years by erosion, salinization, pollution and drought. The museum also shed light on the crucial role of soil for food security and climate, among other things. 'No life without soil' is the message of the World Soil Museum. The soil collection came about after the UN organizations FAO (Food and Agriculture) and UNESCO (Education, Science and Culture) and the International Society of Soil Science (ISSS) decided to make the first global soil map. This

called for a collection of profiles to use for educational purposes and as reference material. The Dutch government took it upon itself to build up such a collection and ISRIC was established in 1966. Since then well over 1000 soil profiles have been collected from about 80 countries all around the globe, and the collection is still growing.

Until three years ago, the soil museum was housed in university buildings on the Duivendaal compound in Wageningen centre. Then the building was declared a fire hazard and the collection and staff were moved to Alterra on Wageningen Campus. Partly thanks to the unique international character of the soil collection, it was decided two years ago to build a new home for the museum.

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## NUTRITION AND HEALTH



## Jury still out on beer or wine

Wine drinkers have a healthier diet and lifestyle than beer drinkers, but their choice of drink plays no role in this. The finding has come out of an initial study based on among Dutch people on whom there was data not only about preferences in alcoholic beverages but also their diets and personal characteristics such as level of higher education. A person counts as a beer or a wine drinker if that beverage accounts for more than 70 percent of their alcohol consumption. Beer and wine drinkers come from different social groups, the study shows. Beer drinkers are

younger, and are often male, smokers, and less highly qualified. Their diet is also less healthy than that of wine drinkers, who stick more consistently to the guidelines for a healthy diet. The differences practically disappear, however, after correction for age, sex, BMI, level of qualification and smoking and exercise behaviour. In short, the difference is not caused by the choice of drink, writes Diewertje Sluik of Wageningen University, part of Wageningen UR, in the January number of the *European Journal of Clinical Nutrition*. Info: [diewertje.sluik@wur.nl](mailto:diewertje.sluik@wur.nl)

## AGRICULTURE AND CLIMATE

## Intensive agriculture warms atmosphere

**Intensification of agriculture has as much effect on global warming as changes in land use such as the conversion of forest to farmland or the expansion of cities.**

The growing demand for food, leading to increasing use of pesticides, artificial fertilizer and irrigation, can therefore contribute to climate change. This conclusion was reached by an international group of researchers including Eddy Moors of Alterra Wageningen UR.

The researchers compared changes in land use – a known cause of the greenhouse effect – with changes due to more intensive farming or forestry practices. For the 34 test locations, historical data suggest that

the climatological effects of the changes in land use and the changes caused by more intensive land management were comparable. Both led to a warming of on average 1.7 degrees Celsius in the lowest layer of the atmosphere. 'For an accurate assessment of the human impact on the climate, intensification of land management should be included, then,' concludes Moors. The findings were published in April in *Nature Climate Change*. Info: [eddy.moors@wur.nl](mailto:eddy.moors@wur.nl)



## ENTOMOLOGY

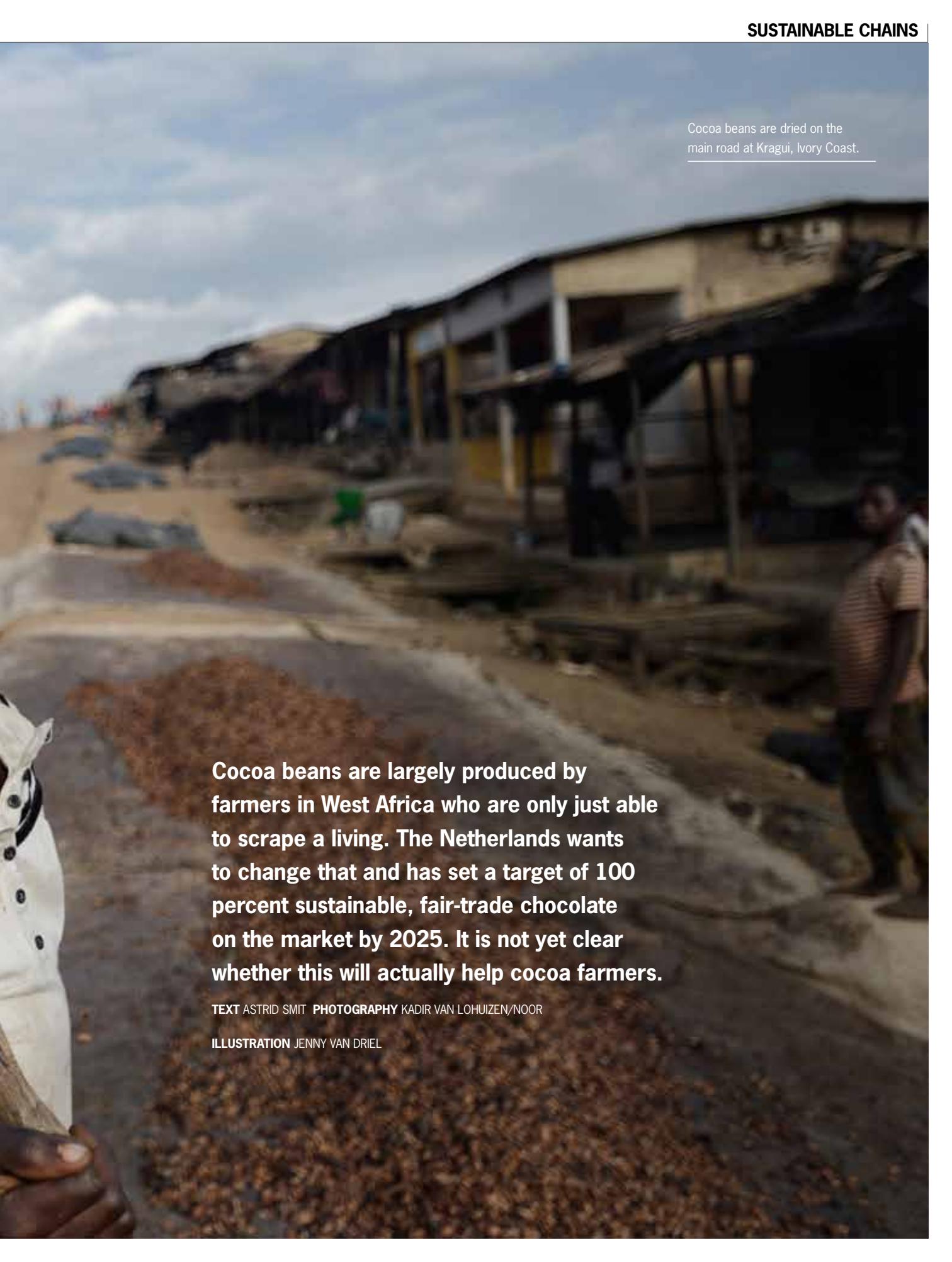


## Exotic ladybird now has natural enemies

The Asian ladybird (*Harmonia axyridis*), an exotic species, now has natural enemies in Europe. Researchers at Wageningen UR and colleagues from Tilburg in the Netherlands and Harvard in the US discovered that fungi, nematodes and mites have moved from the indigenous to the exotic ladybird. It is not yet clear what their impact on the beetle population is. There are, however, strong indications that females infected by nematodes no longer lay eggs. The exotic ladybird was introduced to Europe to control aphids. For lack of natural enemies, the exotic species spread fast at the expense of the local ladybird. The insect also caused various allergic reactions and problems in the fruit-farming industry. Info: [lidwien.raak-vandenbergh@wur.nl](mailto:lidwien.raak-vandenbergh@wur.nl)

A young African boy with a shaved head and a white t-shirt stands in a dry, open landscape. He is carrying a large, wooden-handled hoe on his right shoulder. In the background, there are simple, low-walled mud houses under a cloudy sky.

The real  
price of  
chocolate



Cocoa beans are dried on the main road at Kragui, Ivory Coast.

**Cocoa beans are largely produced by farmers in West Africa who are only just able to scrape a living. The Netherlands wants to change that and has set a target of 100 percent sustainable, fair-trade chocolate on the market by 2025. It is not yet clear whether this will actually help cocoa farmers.**

TEXT ASTRID SMIT PHOTOGRAPHY KADIR VAN LOHUIZEN/NOOR

ILLUSTRATION JENNY VAN DRIEL

**C**hocolate is a popular indulgence in the Netherlands. Who doesn't enjoy a box of chocolates, chocolate spread, Easter eggs, chocolate letters, or simply a chocolate bar or Mars bar as a snack? Some Dutch people claim they cannot get through a day without eating chocolate.

But what most consumers are not so aware of is that the production of that little chunk of pleasure often entails considerable pain and effort. Chocolate is made from cocoa beans (see box) that are largely grown by poor farmers in Ghana and Côte d'Ivoire. 'Most of these cocoa farmers are only just able to scrape a living. The entire family often has to help out just to earn a subsistence-level income, sometimes even the children,' says Verina Ingram, a cocoa researcher at LEI Wageningen UR.

Many farmers are trapped in a vicious circle. 'They don't have enough money or know-how to invest in their plantations. The soil becomes exhausted and the trees grow old. As a result, the yield from the cocoa trees falls and the farmers have to work even harder to make a living. Sometimes they clear woodland to plant new cocoa trees, which destroys the environment,' says Ingram. 'Another problem is that most farmers in these countries are relatively old, with an average age of 47, and don't have any successors. Their children see no future in cocoa farming.'

If this development continues, the production of cocoa in these West-African countries will collapse, even though the demand for cocoa is increasing. The West – Europe

sustainable cultivation of cocoa in West Africa. Their aim is cocoa cultivation that has a long-term future and yields more cocoa beans per hectare so that farmers can earn a decent income and satisfy global demand without damaging the environment. There are now three major sustainability labels on the market: UTZ (originally a Dutch organization), Fair Trade (a label of the Dutch Max Havelaar Foundation) and the Rainforest Alliance (an American environmental organization). While one may set the bar a little higher than another, they all aim for fair trade, good working conditions and protection of the environment in cocoa cultivation.

The Dutch government is supporting the import and sale of sustainable chocolate. It even wants all chocolate sold in the Netherlands to be certified by 2025. This is an ambitious goal that will undoubtedly be discussed at the World Cocoa Conference, to be held from 9 to 13 June in Amsterdam. Is it attainable? And what will it mean for the cocoa farmers in West Africa?

In 2010, a total of 30 Dutch supermarkets, other companies and NGOs undertook to work towards that goal. They included the Plus, Albert Heijn and C1000 supermarkets, the HEMA, Jamin and Kruidvat chains, Unilever, Verkade and even Mars, which has the largest chocolate factory in the world in Veghel and which produces 83 billion Mars bars every year. Major NGOs such as Solidaridad and Novib/Oxfam are also involved. The Sustainable Trade Initiative (IDH) is the organization driving this public-private partnership.

## SUSTAINABLE CHOCOLATE LETTERS

So far, the share of sustainable cocoa on the Dutch market does seem to be increasing. In 2012, according to LEI, 20 per cent of the chocolate sold was certified. Indeed, all the chocolate letters sold in the supermarkets for the Santa Claus festivities were labelled as sustainable. That is quite an achievement for the Dutch government, but there is still a long way to go for the target of 50 per cent certified chocolate in 2015 – the interim milestone agreed by the 30 parties.

Even so, these initiatives are leading to big changes in Ghana and Côte d'Ivoire, according to cocoa researcher Ingram. More and more cocoa farmers are taking part in the certification programme for the UTZ label, for instance. In Côte d'Ivoire, 260 cooperatives took part in 2012 as opposed to only two in 2008. The growth was just as spectacular in Ghana. A total of 221 thousand cocoa farmers now have UTZ certification in West Africa according to UTZ's annual report, about 9 per cent of the 2.5 million farmers. They are taking part in a training programme or have completed training, and are farming in accordance with the label's standards. That means efficient use of pesticides and fertilizer, measures to protect woodland and water, no child labour and delivery of high-quality cocoa beans.

## 'The entire family often has to help out just to earn a subsistence-level income'

and the United States – is consuming more chocolate every year and demand for chocolate is also increasing in countries like China, India and Brazil. The expectation is that one million tons more cocoa will be needed in the years to come; the current level of production is four million tons.

### CHILD LABOUR

In addition, more consumers want their chocolate to be ethical, with the farmers being paid a fair price and not involving child labour.

This is why NGOs, often in collaboration with businesses, took the initiative a few years ago to encourage

## FROM COCOA BEAN TO CHOCOLATE

Turning cocoa beans into chocolate is a long chain of processes: picking, fermenting, drying, transporting, roasting, grinding, pressing, blending, rolling, ripening and manufacturing.



Chocolate is made of cocoa beans, which grow in large pods on the trunk of the cocoa tree.



When the fruit is ripe, farmers remove the pod from the tree, cut it open and remove the cocoa beans by hand.



The cocoa beans are fermented – this improves their flavour and colour – and then laid out in the sun to dry.



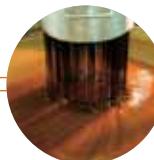
The beans go to the cooperative in big jute sacks and most of them are then exported.



In the factory the beans are first pre-roasted to remove the skins.



The beans are then roasted: very precise work and decisive for the flavour of the cocoa.



The roasted cocoa beans are ground into thick cocoa solids.



Some of the cocoa solids are pressed to produce cocoa powder and cocoa butter.



Some of the cocoa solids are used directly in chocolate production.



Chocolate is made of cocoa solids, cocoa butter, sugar, emulsifiers and milk powder.



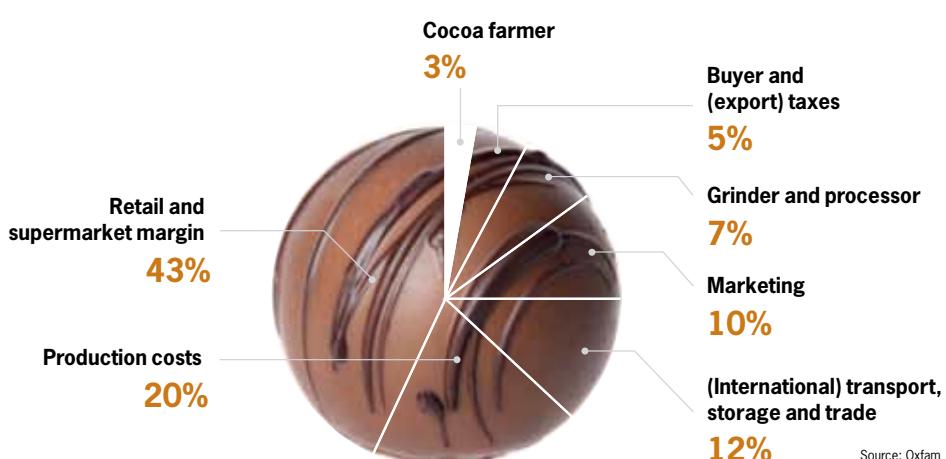
After a long process of blending, rolling, ripening and hardening, the result is chocolate, which is then packed and distributed.



The most chocolate is eaten in Europe. The Swiss are the biggest consumers, at 11.4 kg per person per year.

## THE PRICE OF CHOCOLATE

Of the price paid for chocolate in the west, no more than 3 percent ends up with the cocoa farmers. Thirteen percent goes to the traders and processors of the cocoa beans and to pay local taxes. The rest of the price is made up of the costs of marketing, trading, production and retail margins.



Source: Oxfam

## 'I have serious doubts about the usefulness of certification'

In return, the cocoa farmers are paid a few percent extra per kilo of cocoa beans on top of the fixed price set by the local government authorities. The cooperatives can decide for themselves how to spend that extra percentage. Ingram: 'In some cooperatives, part of that money is spent on the joint purchase of fertilizer or

pesticides or on social facilities such as a local hospital, a school or a water pump. In other cooperatives the extra percentage is passed on directly to the cocoa farmers.'

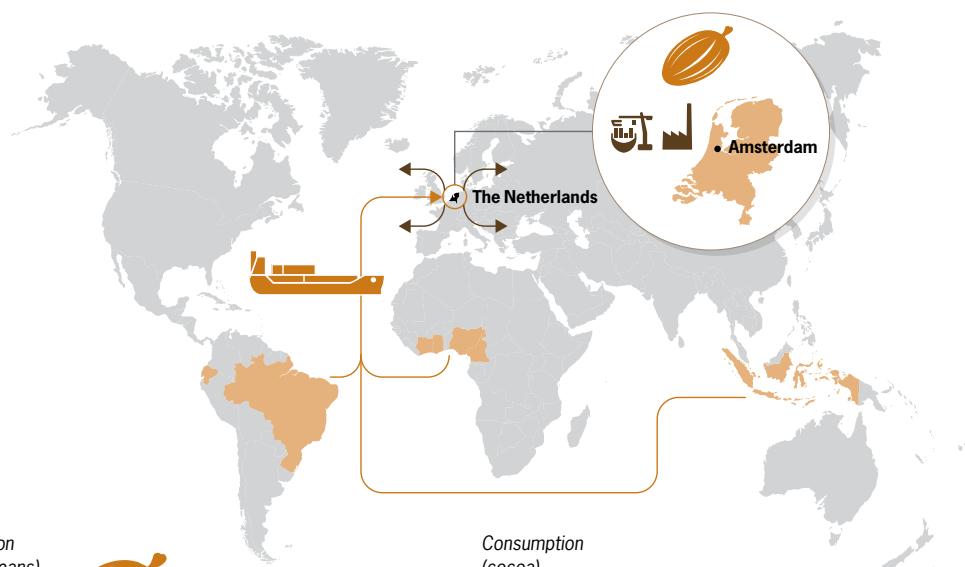
The additional percentage the farmers receive for certified production does not automatically lead to higher incomes as the farmers also have to invest more to meet the standards. They can no longer make use of the free labour of their own children for example, but have to pay adult workers instead, and they need to buy extra clothing for use when applying pesticides. 'The great promise with certification is that farmers will see an increase in yields and income because they have more know-how and better resources. In theory, production could increase by a factor of two or three,' says Ingram. That can be achieved not only by making optimum use of the existing know-how but also by developing new

### COCOA PRODUCTION AND CONSUMPTION WORLDWIDE

Most of the cocoa beans in the world are grown in West Africa. The region where the most chocolate is consumed is Europe.

Amsterdam harbour is one of the biggest transhipment hubs for cocoa. Most of the further processing into chocolate takes place in other countries.

Source: Cacao Barometer 2012



Continent	Production (cocoa beans)	Consumption (cocoa)
<b>Africa</b>	<b>74%</b>	3,232,000 tonnes  128,000 tonnes
<b>South America</b>	<b>13%</b>	544,000 tonnes  342,000 tonnes
<b>Asia and Oceania</b>	<b>13%</b>	537,000 tonnes  503,000 tonnes
<b>North America</b>	-	-  25% 912,000 tonnes
<b>Europe</b>	-	-  49% 1,795,000 tonnes
<b>Total worldwide</b>		<b>4,313,000 tonnes</b> 3,680,000 tonnes

knowledge. However, the problem is that knowledge about cocoa is highly fragmented worldwide. What is more, there is little cohesiveness in the research, says Don Jansen of Plant Research International Wageningen UR. 'It would be good to have a research agenda, including a central coordination point, as that would help research institutes in both producer and consumer countries collaborate more.' That is why Jansen started a survey a few months ago along with Sietze Vellema of the Social Sciences group and Verina Ingram. They approached more than 60 parties involved in cocoa production – from researchers, policy makers and manufacturers to farmers' organizations – and asked them what research is needed, what should be given priority and who would be prepared to invest in a cocoa coordination point. This project kicked off on 23 May and will be presented to the international organizations and companies at the World Cocoa Conference in Amsterdam. 'We hope that we will soon be able to set up a sound research programme that gives even better support for the production of sustainable cocoa,' says Jansen.

### INTERVIEWING COCOA FARMERS

Ingram's research group has been interviewing farmers in Ghana and Côte d'Ivoire over the past few years in an effort to monitor the impact of certification on cocoa farmers. The interviews in Ghana were commissioned by Solidaridad and UTZ and those in Côte d'Ivoire by the cocoa manufacturer Cargill Cacao, from the Zaan region, as well. What is the added value of this certification for the farmers when compared to the farmers who do not take part? And what is the programme achieving? Her research group interviewed 944 cocoa farmers in Côte d'Ivoire and 385 farmers in Ghana. They were asked about their production and income, the quality of the beans and the know-how and experience they had acquired.

In Ghana, farmers who took part in the training programme said they now knew more and were more likely to swap information with each other, but their yields and income were no higher, nor was their cocoa of a better quality, when compared to the farmers who did not take part in certification. Ingram: 'This was the first baseline measurement. The groups were incredibly diverse with huge differences in income and productivity, regardless of whether they were certified. That makes it difficult to find a significant difference. And perhaps it was still too early to see any effect from certification. Many of them had only just started.'

Her team will soon be going back to Ghana for a second monitoring session. 'I'm expecting us to find differences this time. The farmers will be two years further and some will have been certified for four years or so by then. On average, it does take a few years before you can

### THE FLAVOUR OF COCOA BEANS

Each individual cocoa bean is different. Like coffee beans, cocoa beans can vary a great deal in terms of quality and flavour, depending on the variety, region they come from, season in which they were grown or the fermentation process. These quality variations are closely monitored in the cocoa factory. Taste panels make sure the right beans are mixed in every time to get constant quality and flavour of the cocoa mass and ultimately the chocolate. In the past these panels operated mainly on the basis of know-how and experience. But soon they will also have the aid of metabolomics, a technique for the analysis of the substances present in a plant. In a project commissioned by a major cocoa manufacturer, the research group led by newly appointed professor Robert Hall at Plant Research International Wageningen UR used a mass spectrometer to investigate exactly which aroma and taste substances can be found in cocoa beans. They detected hundreds of compounds and were able to relate them to differences in flavour. The research will soon be published in a scientific journal. 'Metabolomics will let manufacturers screen cocoa beans faster and more accurately,' says Hall. But the technology can also help plant breeding companies that want to develop a cocoa variety with a specific flavour.

measure an effect; that's what we have seen with other crops that have been certified.'

The results of the study in Côte d'Ivoire are fairly similar. The certified farmers saw rises in their yields but it is too early to tell whether this was due to the certification programme or to other factors such as the favourable weather conditions of the past few years; there were no significant differences between the certified farmers and those who were not certified. One striking finding is that the farmers who had been taking part in the programme for several years had higher incomes than those who had only just started with the programme.

Ingram is not the only researcher tracking certification in West Africa. Doctoral student Enrique Uribe Leitz of the Social Sciences group is also doing that. He is looking at the social and economic aspects of the certification of cocoa in West Africa. 'Certification requires a huge amount of training, investments by farmers and monitoring of course, often deep in the bush. The question is whether it is worth all that,' says his supervisor, Kees Burger, who carried out research himself as an economist ten years ago in Côte d'Ivoire. 'I have serious doubts about the usefulness of certification. There are an awful lot of cocoa farmers who don't take part in certification and are still doing well.'

'I think it's going to be a lengthy process,' concludes Ingram. So socially conscious consumers will have to remain patient for the next few years. Buying sustainable chocolate seems like a good choice but the jury is still out on the impact. ■

# Will we miss glyphosate?

**In one and a half year's time Dutch municipalities will be banned from using agricultural herbicides such as glyphosate to rid pavements and industrial estates of weeds. Does the Netherlands stand to gain from this ban?**

TEXT RENÉ DIDDE ILLUSTRATION IEN VAN LAANEN

**T**he lower house of the Dutch parliament agreed this spring to a ban on the use of chemical weed killers anywhere except on farms. This means that from 1 November 2015, the popular weed killer glyphosate – known by the brand name Round Up – will be taboo for municipal councils. The herbicide has been sprayed onto pavements and squares for many years to control unwanted vegetation.

In fact the use of all agricultural herbicides on paved areas will be a thing of the past: even substances based on acetic acid or organic fatty acids are included in the ban. The new ruling covers industrial estates, sports fields, campsites and cemeteries, although it only goes into effect there from November 2017.

Industrial estates account for almost half of the glyphosate used outside agriculture in the Netherlands. One fifth of the total amount is sprayed by town councils on pavements and sports grounds. Parliament would like to ban the use of glyphosate by a far bigger group of users, namely the private individuals who use almost one third of the total to keep their

doorsteps and terraces weed-free. This household use will indeed be banned but banning sales to private individuals is apparently legally impossible. So the public will have to be persuaded to stop using glyphosates through information provided at garden centres. 'Protecting human health against avoidable use of chemical substances,' is how secretary of state Wilma Mansveld justifies the ban. 'A second priority is improving the quality of surface water. Both are vitally important,' adds Mansveld. The phrase 'Avoidable use' refers to the availability of alternatives: a range of non-chemical methods of clearing weeds which have come into fashion among gardeners in recent years. On the streets machines are now seen blasting off weeds or attacking them with steel brushes, hot water or steam. Half the pavements in the Netherlands are already kept weed-free without resorting to chemicals.

## FLAG OUT

When the ban was announced, RIWA, the branch organization for drinking water companies that depend on river water, hung the

flag out. 'Now the water quality in the Maas will improve at last,' says Harry Römgens, director of RIWA-Maas. 'Glyphosate runs off pavements through the sewers and into the rivers. There we regularly measure amounts exceeding the European norms.'

By following the Sustainable Weed Control on Paved Areas (DOB) protocol drawn up with the help of Wageningen UR, and spraying more selectively – not just before a rain shower for example – such excesses have been reduced, confirms Römgens. 'But not enough. In 2012 we found excessive levels of glyphosate in 20 out of 89 samples of water from the Maas. Norm is norm, full stop. We've got to stick to them.'

## NO BETTER OFF

Water is the winner here, asserts Corné Kempenaar, researcher at Wageningen UR. 'But the air quality, the climate and the general public are definitely not better off with a ban on glyphosate and the other substances.' Kempenaar, who has been doing research on sustainable methods of dealing with weeds and helped develop the DOB >



protocol, considers glyphosate a 'safe and cost-effective substance'.

The environmental score of non-chemical weed-killing is none too good, says Kempenaar. 'Hot air blasting, steaming and hot water consume a lot of energy, cause a lot of air pollution and therefore contribute to climate change. This has become clear from a life cycle analysis by the University of Amsterdam (UvA).

But this Amsterdam study is not without its critics. According to the University of Leiden, it failed to include a separate risk analysis for the role of glyphosate in local water systems. The life cycle analysis focuses mainly on global background concentrations in the environment.

Corné Kempenaar does not think this would have changed the picture significantly.

'Anyone who claims that glyphosate is "super-toxic" for water ecosystems is wrong. Toxicological reports are quite clear on this point,' says the researcher. 'It is true that EU water norms are sometimes exceeded, al-

though measurements show a clear drop in that since the introduction of the DOB. And those excesses can be brought down further by, for example, not using glyphosate within a radius of 10 kilometres upstream from intake points for drinking water. For the sake of clarity, the EU's drinking water is based on the principle 'there shouldn't be any' rather than on toxicological risks,' says Kempenaar.

### SHEDLOADS OF REPORTS

After 20 years of research, the market deserves some clarity, thinks Bert van Loon, chair of the branch of the foundation for non-chemical weed control NCO. 'I have read shedloads of reports, but people keep on comparing apples with pears. The discussion on water quality gets mixed up with the discussion on CO<sub>2</sub> production,' says Van Loon. His organization, which defends the interests of blasting and steaming companies, took part in the preparatory discussions for the life cycle analysis by the UvA in 2012.

'We didn't see any added value in that study,' says Van Loon. Non-chemical techniques are difficult to compare, in his view. 'No two techniques are alike. Each one has its particular set of effects.' He therefore thinks the best idea is a simple ban. 'By doing this Secretary of State Wilma Mansveld stimulates innovation and knowledge transfer. In the past few years we have already seen an improvement in techniques and knowledge about non-chemical weed control. For every problem there is a chemical-free solution which doesn't require regulations or monitoring,' says Van Loon. 'So the balance just works out better for society.'

### FOOT-DRAGGING

Unlike Van Loon, Kempenaar thinks it is perfectly possible to make a good environmental analysis for all the options for weed control, and the possible combinations of them. 'There are formulas with which you can sort out which part of a machine should be put down under sweeping, under litter collection and under weed control. It was simply a case of foot-dragging about getting together to figure it out.'



PHOTO GUY ACKERMANS

### CORNÉ KEMPENAAR,

researcher at Plant Research International, part of Wageningen UR

**'Anyone claiming that glyphosate is "super-toxic" for ecosystems is wrong'**

Wilco Boender shares this view. He is commercial manager at Verhey Integrale Groenzorg, a company which has been working with both chemical and non-chemical weed control for years. 'We need bigger trailers to transport the hot water and hot air machines than we do for the quads used for glyphosate, and they also take more time to load and unload. In other words, it costs more energy and money per hour to run the machines.'

Boender has no doubt that all the Dutch municipalities will switch obediently to chemical-free weed control, but he is afraid the owners of business premises will switch to small gardening companies which will go on using glyphosate illegally. 'Many owners of premises will balk at the cost increase of about 20 percent for chemical-free weed control, especially in these hard times. You can always find a small gardening company which can get hold of a barrel of glyphosate through an uncle who is a farmer. Anyway, it

PHOTO MARCEL VAN DEN BERGH

**HARRY RÖMGENS,**  
director of RIWA-Maas

**'The water quality in the Maas will improve at last'**

## ‘Banning sales to individuals is legally impossible’



PHOTO NCO

**BERT VAN LOON,**  
branch chair of non-chemical weed control foundation NCO

**‘For every problem there is a chemical-free solution which doesn’t require regulations or monitoring’**

will still be on sale at garden centres.. We’ll be faced with unfair competition and illegal practices.’

### EMOTIONS RUN HIGH

Boender thinks when it comes to weighing up the pros and cons of glyphosate, the Dutch government has lost its sense of proportion. ‘Scientific facts are cast in a bad light by the government. Politicians are talking about ‘strong poison’. Yet river water is much cleaner now than 20 years ago. ‘Glyphosate is quite simply a good and environmentally substance, and the ban is nonsense.’

Although he has a different take on the subject to Boender, Römgens from the drinking water companies agrees that emotions have brought the discussion to an impasse. ‘It often turned into an opinion debate between believers.’

According to Corné Kempenaar, it is almost impossible to make good environmental analyses in the Netherlands. ‘Interest groups



PHOTO HARMEN DE JONG

**WILCO BOENDER,**  
commercial manager at Verhey Integrale Groenzorg

**‘Glyphosate is quite simply a good and environmentally friendly substance, and the ban is nonsense’**

dominate in supervisory committees and try to influence the results.’ In his view one factor is that glyphosate gets framed as a chemical produced by multinational Monsanto.

‘That company delivers glyphosate to farmers in the US and South America, and at the same time sells them genetically modified soya and maize seed that has been made resistant to glyphosate. Many people are against this. When these kinds of emotions are in play, it is a continuous search for a way forward for scientists at Wageningen University.’

Concerned members of the public will be happy with the ban, while others will carry on using chemical weed-killers on their patios even after they become illegal. Wilco Boender does not have much faith in the idea of information being provided through garden centres. ‘I can’t see a Saturday girl or boy educating people about chemical-free weed control.’ ■

[www.wageningenur.nl/weedcontrol](http://www.wageningenur.nl/weedcontrol)

# The virtual campus

**Online learning is making education accessible for new groups of students all around the world. Wageningen University is part of the digital revolution.**

TEXT ALEXANDRA BRANDERHORST PHOTOGRAPHY JORIS SCHAAP

**S**hort video clips will serve up teaching material in digestible chunks. At a time that suits them, students will play educational games and carry out interactive assignments, or participate in online work groups and international discussion forums. They will take core courses online at the university which excels in that particular field. This is the future sketched by Ulrike Wild, director of online learning at Wageningen University, part of Wageningen UR. 'It is fantastic when you can consult the best information from all over the world. But gaining new skills is not something you can achieve on your own at your laptop. So there will always be a place for doing research and projects on campus. That is what we are going for at Wageningen.'



PHOTO HARMEN DE JONG

**MARTIN KROPFF,**  
rector magnificus  
Wageningen University

**'It is important that teachers and study advisors know their students well, even on the online Master's'**

Wageningen University is expected to grow from the 8000 students it has now to nearly 12,000 in 2018. In order to offer some of the international students – those from developing countries for instance – better and more affordable education, Wageningen

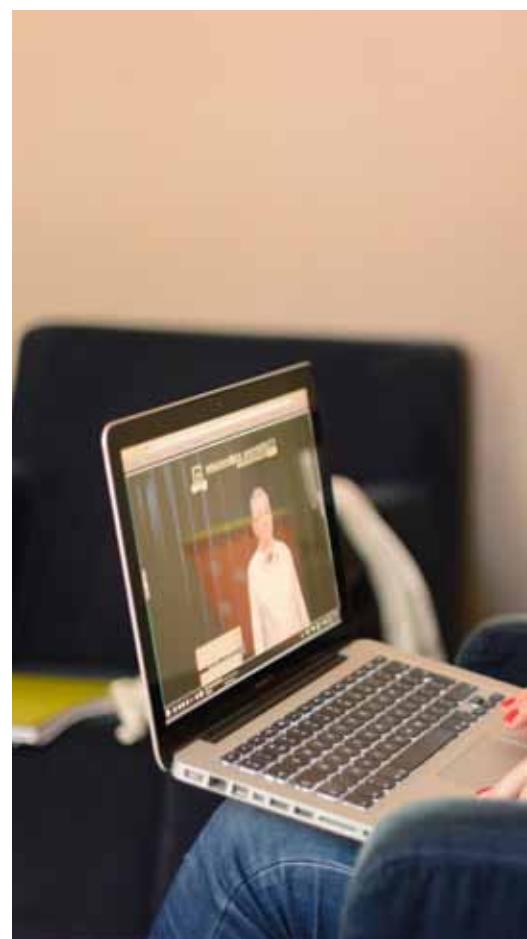
University wants to offer a few Master's programmes online. 'Research shows there is a market for part-time online students, such as people who have a job in their home countries,' explains rector Martin Kropff. At Wageningen University's Founders day on 10 March he announced plans to further develop distance education at the university. Two online Master's programmes will be starting in September 2015: Plant Breeding, and Nutritional Epidemiology and Public Health. Some American universities offer full Master's degrees online, but

Wageningen does not want to do that. 'It is important that teachers and study advisors know their students well, even on the online Master's. One of the reasons our degree programmes always come out top in the degree programme guide is our small scale, and we want to hold on to that,' emphasizes Kropff. In the course of the four-year part-time degrees, the students will come to Wageningen for one period each year for group work and lab work. 'That way students and teachers get to know each other face-to-face as well.'

## REVIEWING LECTURES

Even for students who are studying fulltime in Wageningen, the computer and the internet are already playing a crucial role. Over the last decade, online manuals on lab work have been developed, and teachers record their lectures and put them on Eduweb, Wageningen's digital learning environ-

ment. This makes it possible for students to review the lecture later. Tens of courses already have online components. Kropff: 'Many of our international MSc students first have to follow one or two foundation courses in order to get up to scratch. Nowadays they can do those at home before they come to Wageningen even.' New forms of collaboration between universities are growing up as well. On a number of courses, students in Wageningen do assignments together with students in the US or in Kiev



## WAGENINGEN ACADEMY

Wageningen Academy is already offering online courses: Plant Pathology and Entomology, Plant breeding, Food Safety Management, and Better Safe Than Sorry: awareness training biosafety for lab workers.

See: [www.wageningenacademy.nl/distancelearning](http://www.wageningenacademy.nl/distancelearning)

via an online platform. A Bachelor's degree programme in Food Technology has even been developed with online courses both at Wageningen and at the Nanyang Technological University in Singapore. 'We give the course we are better at; Singapore does courses Wageningen doesn't have yet,' explains Ulrike Wild.

The terms e-learning and distance learning no longer cover what is on offer, according to Wild. 'They assume interaction between the person and the computer. But online

learning also provides possibilities for communication and group work between students or with the teacher.'

Besides regular degree programmes, more and more universities are also providing short online courses known as MOOCs, or massive open online courses. Students on these courses do assignments online without any teachers. They can exchange information among themselves through online work groups and platforms.

Certification is done by means of online

exams. Tens of thousands of students from all over the world can take part in one MOOC at the same time. This makes it possible for people in a country such as China, for instance, to follow an affordable online course at a top university such as Harvard. And the universities can select the very best students and perhaps offer them a scholarship.

There are more than 1000 MOOC's offered by about 200 universities, most of them American. In the autumn of 2014, Wageningen University will be offering its first MOOCs in the fields of food security and nutrition. It will do so through edX, the MOOC platform of Harvard, Berkeley and MIT.

### SPREADING KNOWLEDGE

In the long term, online learning will change the whole education system, Wild predicts. 'Learning from a teacher in a lecture theatre is not the most efficient way of conveying material about complex processes. Essential knowledge about topics such as genetics can be provided online with the help of video clips. Only later do you give a lecture or webinar – an online seminar in which the teacher can answer questions and go into greater depth on the subject matter.' Wild also expects that it will soon be possible to make better use of Wageningen expertise in developing countries.

Wageningen University can collaborate on online courses with local universities. 'That way you can help to further develop academic ideas.' ■

Info online masters:  
[www.wageningenur.nl/en/distancelearning](http://www.wageningenur.nl/en/distancelearning)



# Boars with balls

**Until recently, pig farmers used to castrate all male piglets as a way of preventing boar taint. That was not pleasant for the animals or the farmers. Researchers at Wageningen UR have found alternatives.**

TEXT HANS WOLKERS PHOTOGRAPHY HOLLANDSE HOOGTE AND THEO TANGELDER

**L**ook, you can see that the animals are perfectly calm,' says pig farmer Jaap Kreuger in Woerden as we peer through a dusty window into the pig shed. 'I have put 12 boars in each stall and I don't get any problems.' The animals, which weigh almost a hundred kilos, are lying in a relaxed pose on the heated floor or walking around peacefully. Occasionally one will chew on a roll of compressed straw that has been hung up in the corner especially for

that purpose. Although the animals have not been castrated, there are no signs of undesirable sexual conduct or aggressive behaviour. And there is hardly any boar taint in the meat.

Kreuger was one of the first pig farmers to stop castrating young piglets, in 2009. 'Castration started getting bad publicity and the supermarkets were accepting meat from uncastrated boars as long as there was no boar taint,' he says. 'And it saves an awful lot



of work if you don't have to bother with that operation.'

Keeping uncastrated animals has gone well for him. 'You never have serious problems provided the living conditions in the stall are right.' An added bonus for the farmer is that pigs that have not had the operation have an improved feed utilization of five to eight percent thanks to their male hormones. They grow faster for the same given amount of food. With a hundred million boars being



An employee at Vion Foods in Boxtel specializes in detecting boar taint.

**'We really hope the EU will also have taken the plunge by 2018'**

bred for meat each year in the EU, that translates into savings in feed of thirty million tons, about six euros a pig.

#### BACON IN THE FRYING PAN

Male piglets have been castrated since time immemorial, mainly to prevent boar taint. 'About 30 to 40 years ago, this odour problem affected 20 to 30 percent of the uncastrated boars,' explains Gé Backus, a former employee at LEI Wageningen UR

and now director of DLV's Connecting Agri & Food. 'Castrating prevented this and also made the animals calmer.' The pheromone androstenone along with the amino acid breakdown products skatole and indole are responsible for boar taint. This off-putting aroma is only noticeable when the meat is heated, for example when a slice of bacon is cooking in the frying pan. But castration is unpleasant for the animals, although anaesthetics have been used since >

2009 following pressure from the supermarkets. Farmers are also not happy about the fact that they have to castrate thousands of piglets every year. Time for a new approach, decided farmers and the animal protection organization Dierenbescherming. Abattoirs and supermarkets were also interested in working on a joint solution. In 2005, the sector and Dierenbescherming agreed to put an end to the castration of pigs. This led two years later to the Declaration of Noordwijk, in which the the parties agreed not to castrate any more piglets as of 2015. The EU moves at a rather slower pace: farmers' organizations, the meat industry and the retail sector have only expressed their support for a plan to stop castrations from 1 January 2018.

In 2009, Wageningen UR started research on the options for abolishing castrations while maintaining meat quality. This five-year project - Boars heading for 2018 – the final report of which was presented last February, was a collaborative venture between the Wageningen UR institutes of Livestock Research and LEI, pig farmers, abattoirs, breeding companies and Dierenbescherming. Backus led the research, including after he left LEI. The funding was five million euros, half of which came from the sector and the other half from the government.

Breeding programmes were started up to prevent meat with boar taint ending up in the supermarkets. Another priority was the improved detection of boar taint on the slaughter line. Researchers also studied consumer acceptance of the pork. In addition, about 70 pig farmers took part in a large-scale applied study of the behaviour of uncastrated pigs, the prevention of boar taint and farming factors such as feed and hygiene.

#### AGGRESSIVE BEHAVIOUR

The abolition of castration can lead to more undesirable behaviour between male animals. And that would simply shift the wel-

fare problem. 'Uncastrated boars can exhibit sexual and aggressive behaviour, such as mounting one another and head-butting each other. That creates a great deal of unrest in the group,' says Carola van der Peet-Schwingen, a researcher at Wageningen UR Livestock Research. 'If an animal mounts another one, the sharp claws can damage its skin. They can also develop foot problems if they slip during these capers.' Van der Peet tracked 70 farms to monitor this behaviour and the prevention of boar taint and to relate this to farming methods. The aim was to develop specific guidelines on how to successfully keep uncastrated boars.

#### WITH A SOLDERING IRON

There have been a lot of changes over time. Pigs have developed a higher meat to fat ratio over the years, and boar taint is more prevalent in the fat. In addition, breeding programmes have cut the number of uncastrated boars with boar taint substantially. The three to four percent of boars that still have odour problems do not end up as fresh meat on the supermarket shelves. Specially trained experts test each carcass passing along the slaughter line by burning a piece of meat with a soldering iron. With their trained noses, they unerringly pick out boar taint. That meat ends up in cold meat products where the smell is not a problem.

The applied research clearly showed that ideal farming conditions can also reduce the incidence of boar taint. 'You need to tackle

the entire system,' concludes project manager Backus. 'As well as changes to the feed composition, with more chicory for instance, hygiene is important too. You can improve that with better manure removal and dry places for the animals to lie down.' Substances such as skatole and indole are in the manure and can permeate the skin, ending up in the meat.

With all these measures, the proportion of pork from uncastrated males in Dutch supermarkets increased from virtually zero percent in 2009 to 100 percent as of 1 January 2014. Consumers did not notice the change. While the consumption of pork throughout Europe fell between 2010 and 2013, partly because of the economic crisis, the decline in the Netherlands was below the European average.

#### REST, ROUTINE AND CLEANLINESS

The results of the behavioural study at 70 farms showed that boars' behaviour varied hugely. At some farms everything went without a hitch whereas the animals exhibited a lot of undesirable behaviour at other farms. 'Yet it is certainly possible to keep uncastrated boars as long as the farmer takes certain things into account,' says Van der Peet. 'All aspects have to be perfect: rest, routine and cleanliness are the key.'

Good quality feed with plenty of amino acids reduces the risk of problematic behaviour considerably. In addition, having plenty of places to eat and drink and a plentiful supply of water curbs the competition and aggression between animals. But hygiene and health are also important factors in guaranteeing peace. So farmers need to put sick animals in separate quarters, for example, as their abnormal behaviour can arouse aggression in other pigs. Open barriers, for example with railings, around stalls give the animals a better view and stop them from being panicked. 'Shy, nervous animals exhibit more aggression towards each other,' says Van der Peet. 'So farmers can do a lot in the way they run the farm to make condi-

**'I have to segregate a nuisance case like that a couple of times a year'**



Uncastrated boars are loaded for transportation.

tions optimal and predictable, which can pretty much prevent all undesirable behaviour.'

Now that research has shown keeping uncastrated boars does not have to lead to problems, there seems to be nothing preventing the abolition of piglet castration in the EU. Yet there are still a few obstacles to be overcome. While consumer acceptance of pork from uncastrated animals is no problem in the Netherlands, important markets such as Germany and Italy are still reluctant. That is why about a quarter of the males in the Netherlands are still being castrated, all of them destined for export.

Backus explains, 'We are talking to foreign companies, social organizations and politicians in an effort to change the views of these export countries, and we are contributing our positive experiences in the expert group on pig castration set up by the European Commission. It all takes time but we really hope the EU will also have taken the plunge by 2018.'

#### SEGREGATING NUISANCE CASES

The Woerden pig farmer Kreuger has got everything nicely under control, with spick and span floors and clean, calm pigs. Even when we enter the shed, the animals do

not seem unduly worried. After eying us curiously, the pigs return to their daily routine. But then a commotion starts up in one of the back stalls. A somewhat thinner pig aggressively head-butts his fellow boars in the stall, which protest loudly. 'That could well turn into a problem pig,' points out Kreuger. 'I have to segregate a nuisance case like that a couple of times a year, but fortunately they are very much the exception.' When we close the shed door behind us shortly afterwards, peace soon returns. ■

[www.wageningenur.nl/boartaint](http://www.wageningenur.nl/boartaint)

# The brewery goes

**HEINEKEN and the province of South Holland are working with Alterra Wageningen UR on making the brewery in Zoeterwoude sustainable. The surrounding landscape is benefitting too.**

TEXT GERT VAN WIJLAND PHOTOGRAPHY MISCHA KEIJSER/HH

It was an unusual order for the HEINEKEN brewery last summer: instead of barley malt or hops, the brewery took delivery of a load of flower seeds specially selected in order to attract bees and other insects. The results can already be admired by visitors and passers-by on the park-like premises near Zoeterwoude. Where there used to be a neat but rather dull lawn, there is now 6000 square metres of meadow full of wild flowers. Sowing the nectar-rich flowers is part of the Green Circles Agreement, a public-private collaboration between HEINEKEN, the province of South Holland and Alterra Wageningen UR. The shared objective of the partners is that the brewery and the wider community around it should support each other by working together on making both the company and the landscape more sustainable, says Paul Opdam, professor of Landscape and Spatial Planning, who works at Alterra. HEINEKEN wants a sustainable profile, says Opdam. 'The company is aiming for climate-neutral beer production, starting at the biggest brewery in Europe here in Zoeterwoude.'

## TRANSPORT BY WATER

For some time already, ingredients and beer have not been transported by road but by water, explains Jan Kempers, sustainable development manager for HEINEKEN. Meanwhile, four wind turbines due to be installed soon are going to generate 43 percent of the brewery's electricity. But the idea of Green Circles goes further than that: the vision is that the entire region can make a contribution to sustainability and recycling of materials, becoming greener, more beautiful and eco-

The HEINEKEN brewery in Zoeterwoude is working with the province and Wageningen UR on greening both the company and the surrounding landscape.



# green

nominally stronger in the process.

The first steps are already visible. 'On the brewery premises a trial is going on to purify waste water by breeding algae,' says project leader Eveliene Steingrüber of Alterra.

As part of the Green Circles initiative, the institute is also developing a ditch containing purifying swamp vegetation, helophytes, into which a local dairy farmer can dump the water used to clean the milk tanks so it can be purified naturally. Steingrüber: 'The farmer then gets less water in his manure and saves on transport costs too. We are going to study how this ditch copes with the pollution and which animals and plants benefit from this. It is a way of promoting biodiversity.'

## NICER ENVIRONMENT

According to Opdam, this exemplifies the core principle of Green Circles: how do you make use of nature in order to create a sustainable economic system in which you make responsible use of water and resources, if possible improving the environment at the same time. 'Why use purification technology if nature can do the work?' The same goes for a second important principle for the Green Circles partners: the use of biogas to generate energy from locally sourced manure and biomass such as wood from pruning or verge grass. 'That would be another big step towards a climate-neutral heating system at the brewery,' says Kempers.

This stage has not yet been reached, says Steingrüber. 'Before you can use mown verge grass you have to apply for an exemption under the waste substances law, because it could be polluted. That takes time and money.'

According to Kempers from HEINEKEN, reducing these kinds of obstacles is one of the aims of the collaboration. He mentioned the role of the province as a

crucial one. 'Traditionally a government tends to look mainly at licenses and compliance with existing rules and regulations. In Green Circles we talk much more at policy level: what should a future framework of laws and enforcement look like in order to bring about a viable sustainable economy?' The answer to this does not come readymade. But just the fact that it is being discussed 'in a good atmosphere' makes Kempers happy, in his own words. The implementation of the project is in part an assignment from the ministry of Economic Affairs. One focus of attention in the discussions, says Steingrüber, is how to involve landowners and farmers in the project. 'There are all sorts of ways for farmers to get rid of their manure, for instance. It is up to us to show them the advantages and offer a workable business model.' Kempers agrees: you can't have ecological sustainability without economic sustainability, he stresses. The broad collaboration makes Green Circles 'unique', thinks Paul Opdam of Alterra. The way knowledge, political influence, economic interests and financial capacity are joining forces in the interests of greening a company and the environment around it has not happened before on this scale within a region.

## MEADOW FLOWERS

And this is visible to the casual passer-by, thanks to the Green Circles project Biodiversity at the Brewery, in which the 35 hectares of green space at HEINEKEN is being made bee-friendly. 'Neat lawns and boring meadows will change into meadows full of flowers with bramble and hawthorn thickets – an Eldorado for bees and butterflies,' says the website. 'The biodiversity of wild bees, butterflies, birds, dragonflies and fish is expected to increase dramatically. Pollinators such as bees and butterflies will become so abundant that the brewery will become a source of nature for the area.' The question remains what HEINEKEN stands to gain from sowing wild flowers. Kempers willingly explains: 'It strengthens our image as sustainable and it generates a lot of goodwill. Our staff enjoy it, and people passing by see that the greening of our company leads to a nicer landscape. And last but not least: who wants to live in a world without flowers?' ■

**'The brewery is going to be a source of nature'**

[www.greencircles.nl](http://www.greencircles.nl)





RESULTS OF SEVEN COUNTRIES STUDY ONLINE

# The science of a healthy diet

We owe our understanding of the link between diet and health to the Seven Countries Study. This study, which Daan Kromhout has been involved in for nearly 40 years, is still coming up with new results. The role of high blood pressure in cardiovascular disease, for instance. Or the value of three cups of coffee a day for keeping the mind sharp.

TEXT NIENKE BEITEMA PHOTOGRAPHY PETER MENZEL/HH



Most of us know by now that the Mediterranean diet rich in vegetables, fruit, pulses, nuts, olive oil and fish, is healthier than traditionally meat-based diets like the Dutch one with its meatballs and gravy. But just two generations ago this was news. At that time nobody was talking about cholesterol and cardiovascular disease, simply because the links between diet, lifestyle and health were not yet known. That changed thanks to a long-running international study which has delivered one revelation after another since the nineteen seventies: the Seven Countries Study. This study, which has a sizable Wageningen component, is now coming to an end. An English-language website, [www.sevencountriesstudy.com](http://www.sevencountriesstudy.com), was launched this spring to present the results of 40 years of research to a broad public. 'I had been pondering the idea of creating a website like that for a long time,' says Daan Kromhout (1950), professor of Public Health Research

at Wageningen University Agrotechnology and Food Sciences and one of the Seven Countries researchers. 'An incredible amount has been learnt over all those years, and about 10 books and more than 500 articles have come out, but the results have never been brought together in an accessible form till now.'

For anyone who takes the trouble to look, there is a wealth of results. And they are still coming. The latest news? High cholesterol levels do raise the risks of a heart attack, but not of other heart diseases. And regular exercise lowers the risk of depression.

#### DIFFERENCES BETWEEN COUNTRIES

The story begins in the early nineteen fifties, says Kromhout. During a sabbatical at Oxford at that time, American professor Ancel Keys became interested in differences between countries regarding diet and cardiovascular disease. So Keys set up the Seven Countries Study in 1958: the idea was to compare men's

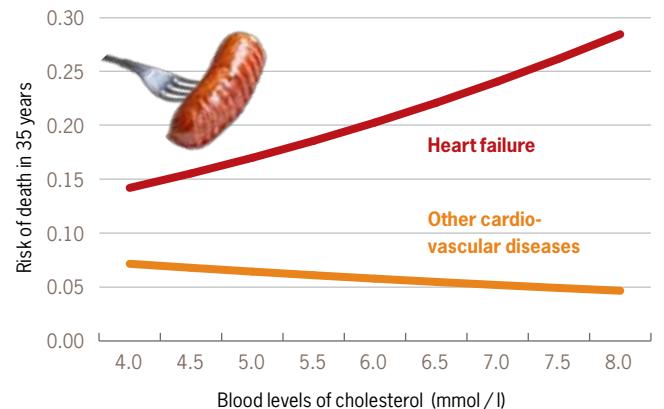
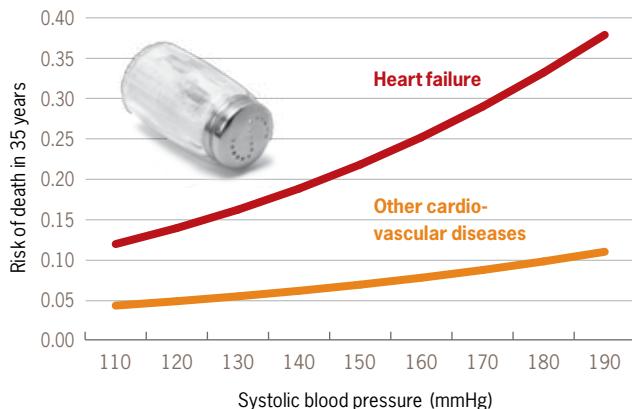
A miner in Kentucky, USA (left) and a sumo wrestler in Nagoya, Japan (right), with their menus for the day. From the book 'Around the World in 80 diets', by Peter Menzel.

diets, lifestyles and rates of cardiovascular disease over a long period in the US, Finland, the Netherlands, Italy, Yugoslavia, Greece and Japan. The Netherlands was very much involved, says Kromhout, and the Dutch branch of the study was in the hands of Frans van Buchem, professor of Internal Medicine at Groningen, and Cees den Hartog, professor of Nutrition at Wageningen, who was also director of the Netherlands Bureau for Food and Nutrition Education. The Dutch research organization TNO and the then Nutrition Council joined the research team too.

#### ZUTPHEN STUDY REVIVED

Kromhout himself got involved in the study in 1978. After getting off to a flying start, >

## RISK OF DEATH IN RELATION TO BLOOD PRESSURE AND CHOLESTEROL



Source: Menotti et al.

Blood pressure is a bigger risk factor for cardiovascular diseases than cholesterol. Cholesterol is only a risk factor for heart failure, whereas high blood pressure is a risk factor for all cardiovascular diseases such as stroke, thrombosis etc.

the Dutch component, the Zutphen study, had almost come to a standstill. 'I did my PhD research in the field of human nutrition at Wageningen,' says Kromhout. 'I happened to hear about the Zutphen study at a seminar in Mexico, of all places. I immediately thought: the Netherlands should carry on with this. I got in touch with Den Hartog and I could start straightaway. I started fundraising so as to process the existing data and do new research in Zutphen on the elderly, a topic which was new at the time.'

From 1960 on, the Zutphen study followed a group of 878 men who were between 40 and 59 years of age at the start. The study consisted of monitoring their blood, blood pressure and smoking behaviour, and was repeated every year until 1973. Every five years, the men were also interviewed in-depth about their eating habits. 'That was the first longitudinal health study in the Netherlands,' says Kromhout. 'And it was particularly interesting because it was prospective: it tracked people who were still healthy at the start of the study.'

Research on diet and diseases, explains Kromhout, usually starts by comparing healthy people with ill ones. A disadvantage

of this is that when you ask sick people about their diet, their answers are coloured by their illness. 'That is what makes prospective nutritional research so important,' he says. 'You exclude sick people at the start and then find out which healthy people fall ill in the course of the study, and compare them with the ones who stay healthy.'

### CHOLESTEROL AND DEATH

The initial results of the Seven Countries Study started to come in from 1970 on. It quickly became clear that there was a strong link between the consumption of saturated fats (such as those in meat, dairy produce and hard margarines), blood levels of cholesterol and fatal heart attacks. In Finland, 22 percent of the energy intake came from saturated fats, while this figure was only 3 percent in Japan. Cholesterol levels in the blood were one and a half times higher in Finland than in Yugoslavia, and the percentage of heart attacks was ten times higher. 'Of course that does not necessarily mean that the one causes the other,' adds Kromhout, 'but there was a strong suspicion that there was a causal relationship, and that was confirmed later by experiments.'

By 1980 about half the men in the Zutphen study had died. Kromhout therefore decided to add 500 men of the same age to the cohort, so that he could continue with 900 people.

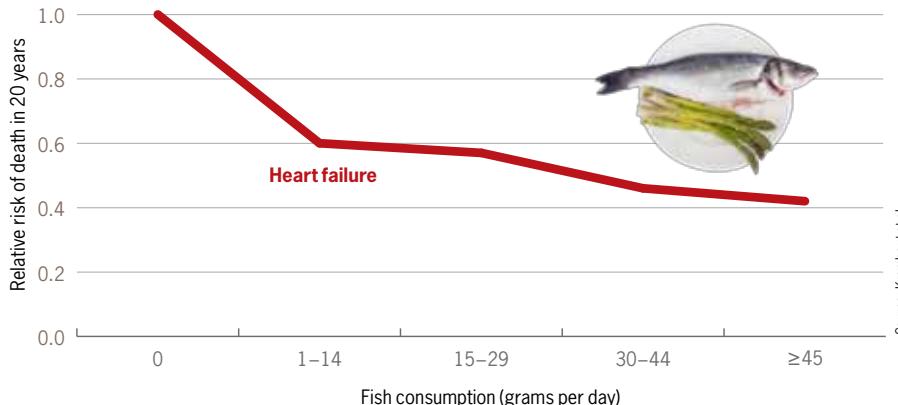
Now that all the men were over 65 years of age, the focus of attention shifted from cardiovascular disease to aging in general. So the study was extended with issues related to physical wellbeing and self-reliance, for instance, mental issues such as cognitive decline and depression, and social issues such as loneliness. 'And there too, some surprising things came out straightaway,' says Kromhout. 'For example, there is a strong relation between how healthy people say they feel and the risk of death.'

### PREVENTION HELPS

One of the key findings of the Seven Countries Study was reported in the *Journal of the American Medical Association* in 2004. It came out of research on men and women of 70 to 90 years of age who were followed by the HALE project, a combination of the aging research in the Seven Countries Study and the European SENECA study by Wageningen professors Wija van Staveren

**'It is hard to get grants for analysing old data'**

### RISK OF DEATH AND FISH CONSUMPTION



Source: Kromhout et al

ILLUSTRATION JENNIE VAN DRIEL

The Zutphen study showed that eating fish reduces the risk of dying of heart failure.

### SEVEN COUNTRIES STUDY



and Lisette de Groot.

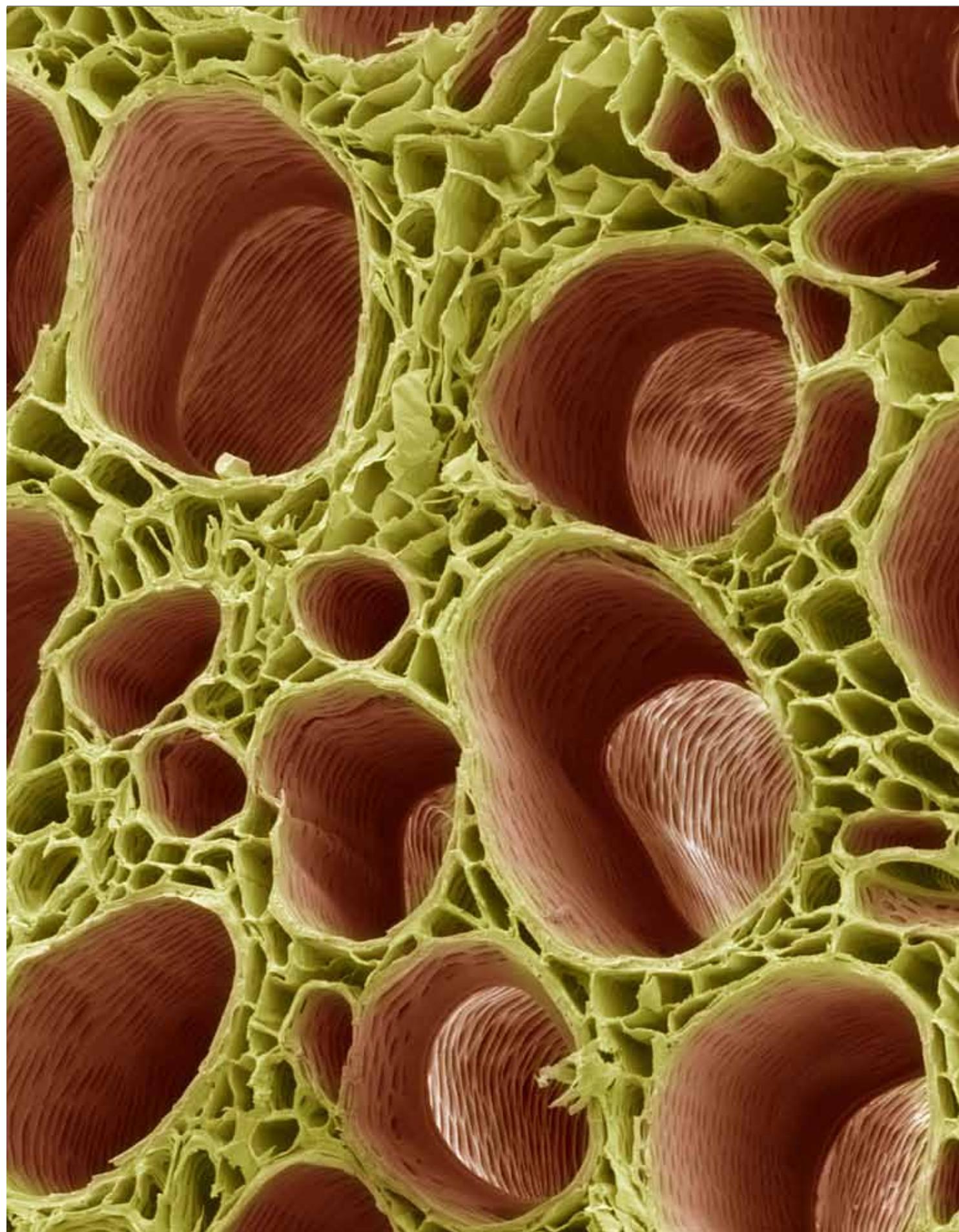
The publication showed for the first time that the combination of a healthy diet, moderate alcohol consumption, not smoking and regular exercise can largely prevent cardiovascular disease and death in the near future, even among the elderly. This too sounds no more than logical to us now, but it had hitherto only been proven for the middle-aged. It was now clear that prevention was worthwhile even in old age. Surprising new insights have continued to come out of the Seven Countries Study even in the last 10 years. High blood pressure, for example, has been shown to be a bigger risk factor in cardiovascular disease than cholesterol. This discovery has led to a wave of new research around the world. And then there are the recently discovered links between diet, lifestyle and cognitive decline, including the memory. 'People who get regular exercise perform better cognitively into old age,' says Kromhout. 'The same goes for people who drink up to three cups of coffee a day and have a partner. These are very nice results.'

Something else he finds interesting is that it is now becoming clearly visible how eating habits have changed in the vari-

ous countries over the last half century. In Northern Europe, unhealthy fats now make up a much smaller proportion of our diet, whereas in Crete that has gone up. 'Whereas the Cretans used to live on a relatively frugal plant-based diet, with rising wealth their diet has become much less healthy,' says Kromhout. 'The percentage of overweight on Crete now is the highest in Europe.'

The Seven Countries Study is slowly coming to an end now, according to Kromhout, if only because most of the participants have died. The researchers are still working on processing the causes of death since 2000. But there is also a lot of data from previous years that has not yet been analysed. In the Zutphen study, for instance, data was also collected on hours slept and the quality of sleep. 'I would very much like to correlate that with the various diseases,' says Kromhout. But he doubts whether there will be enough funding for that. 'It is very hard to get grants for analysing old data,' he says. 'I would really like to go on for another five to ten years. I expect there is a lot more to be got out of it.' ■

<http://sevencountriesstudy.com>



# The lignin refinery

**Lignin is what gives plants their rigidity but the compound is also a treasure trove of valuable basic chemicals. Wageningen researchers are gradually prising it open. Bringing a sustainable alternative to oil within reach.**

TEXT RENÉ DIDDE PHOTOGRAPHY AND ILLUSTRATION SCHWANDT

Electron microscope image. A cross-section of plant tissue with wood vessels (brown) which transport water. The thick lignin-rich walls provide structure and rigidity.

In the last few months we have set a world record,' says Jacco van Haveren, a researcher at Wageningen UR Food & Biobased Research. Van Haveren and his colleagues have managed to convert 10 percent of the total amount of lignin in wood into the direct precursor of phenol, a valuable aromatic building block for the chemical industry. 'This way, not only can we make pure bio-phenol, but also benzene. We are bringing to light useful building blocks which can provide alternatives to basic chemicals based on oil.'

The Wageningen world record may not seem very impressive, but it represents a significant breakthrough. Up to now the maximum harvest of the various aromatics from lignin barely reached 5 percent.

For years, researchers have been aware that lignin is a treasure trove of basic chemicals such as benzene, toluene and xylene (known collectively as the BTX aromatics), which are much-used raw materials.

Numerous solvents and plastics could potentially be made from lignin.

This treasure trove does not give up its secrets lightly, however. The key lies in a code that is very hard to crack. Until now, lignin could only be broken down with brute force, at extremely high temperatures and producing very low yields.

The biggest success story so far comes from Norway, where the highly valuable flavouring vanilla has been extracted from lignin since 1962. 'The yield is less than one percent, though – a pathetic three kilograms per thousand kilos of lignin. And then more than 99 percent of it is only of use for low-value applications – as a source of energy or as an additive in cement,' says Richard Gosselink, lignin research leader at Wageningen UR. 'We have now shown that there are milder and more subtle conversion methods which deliver a range of products with a higher yield.'

The Wageningen world record is based on a specially developed process. Lignin, dissolved in water under alkaline conditions, is exposed to a catalyst of the noble (corrosion-resistant) metal palladium at a temperature of 200 to 300 degrees Celsius. On that interface lignin is broken down into stable aromatics.

#### COMPLEX NETWORK

This elaborate process is necessary because the complex network of bonds in lignin are very difficult to break down. It is not surprising that lignin is such a resilient substance. Without this compound, a tree would be blown down by the first puff of wind and maize stalks would buckle under

the weight of the growing cobs. If a plant only had the other two basic components – cellulose and hemicellulose – in its cell wall, the earth's vegetation would be little more than a soup of algae. Lignin, which is sandwiched in between the cellulose and the hemicellulose in a cell wall, gives it its rigidity.

Even fungi have difficulty breaking down lignin. 'Look how long a dead tree lies in the forest,' says Van Haveren. 'It is true, it starts to rot and you do see some fungi, but most species of fungus first feast on the nice digestible cellulose before they resort to the lignin. The organic breakdown goes extremely slowly.' So Gosselink and Van Haveren are looking at an arsenal of chemical weapons. They try using acids, alkalis and catalysts to get the better of this tough substance. But even chemically, lignin can defend itself tooth and nail. 'Exposing lignin to acids or alkalis alone often creates radicals that regenerate the broken bonds by cross-linking to other parts of the lignin. This creates a sort of unusable charcoal. We prevent that with a catalyst,' says Van Haveren.

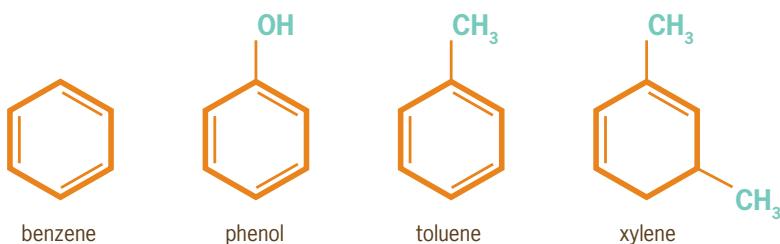
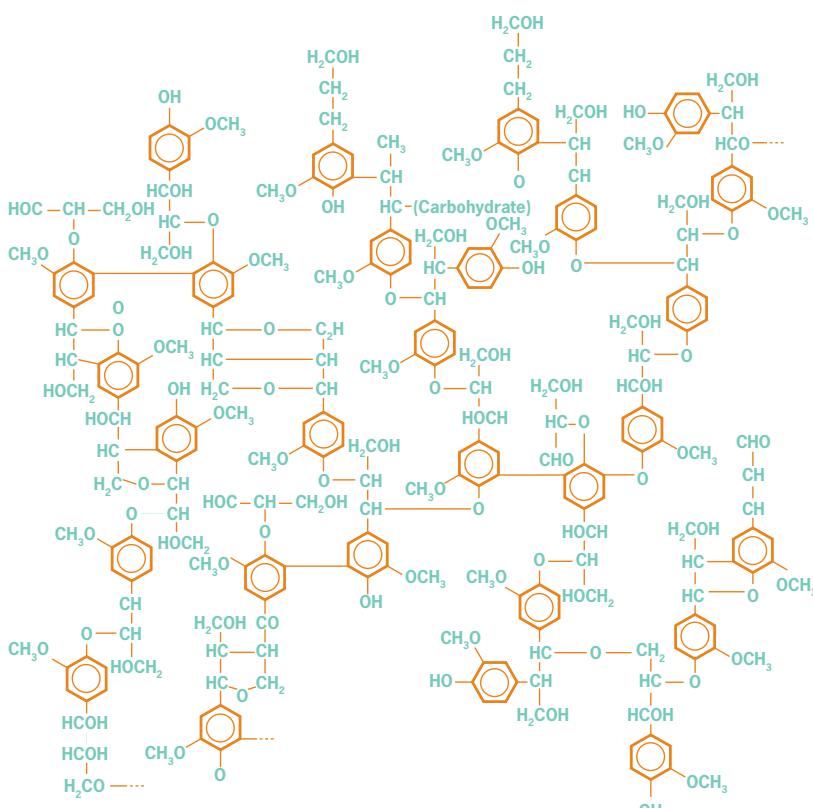
#### HYDRA

In order to slay this hydra, the Wageningen UR scientists took the initiative three >

**'We extract the most valuable aromatics and the rest can still be burned'**

## LIGNIN

Lignin polymers form a complex network of bonds that is almost impossible to break open. They are a treasure trove of valuable basic chemicals such as benzene, phenol, toluene and xylene.



**JACCO VAN HAVEREN,**  
programme leader at biobased  
chemicals Wageningen UR

**'We are bringing useful building blocks to light which can provide alternatives to basic chemicals based on oil'**



**RICHARD GOSSELINK,**  
Lignin research leader  
Wageningen UR

**'We want to convert lignin into aromatic building blocks as well as use it for other applications'**

years ago to form the Lignin Platform in order to bring together all the existing knowledge about lignin. Wageningen UR collaborates in this with institutes including Utrecht University, the University of Amsterdam and the Technical University of Eindhoven. 'Big chemical firms such as DSM and DuPont are collaborating on the platform as well,' says Van Haveren. With funding from European research grants and from the Top Consortium for Knowledge and Innovation Biobased Economy, the vari-

ous lines of research started within the platform are being implemented by consortia of companies and research institutes.

### POTENTIAL

There is massive potential. The kaleidoscope of potential biobased applications not only includes aromatic basic chemicals such as phenol, benzene and xylene; it is also possible that the poor yields of extremely pricey vanilla could be improved, and that other aromas and flavourings could be ex-

tracted which could find a ready market in the food and cosmetic industries.

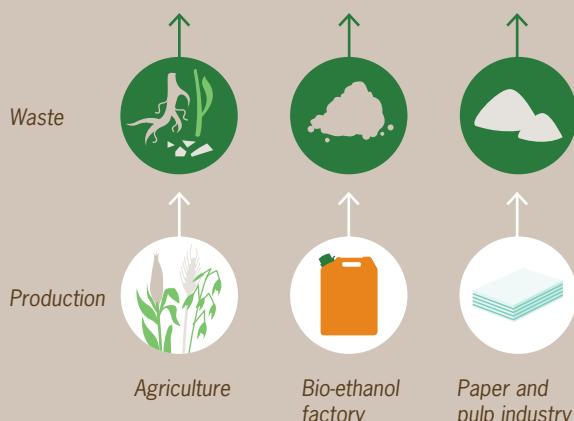
Besides breaking lignin down into components, there are also more straightforward method of largely separating lignin from the celluloses. 'Then we get reasonably pure lignin, which we want to use for other applications besides converting them into aromatic building blocks, says Gosselink. 'With its long chains, lignin can be used directly in PUR foam – up to a proportion of 30 percent – and even up to 70 percent in

## LIGNIN REFINERY

Lignin-rich waste from biomass is normally burned. It could, however, provide the raw materials for valuable basic chemicals, offering a sustainable alternative to oil.

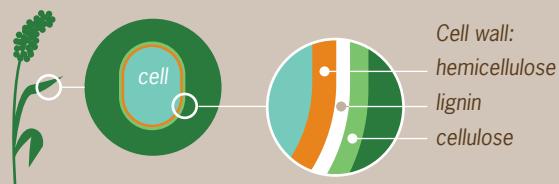
### Raw materials

Biomass waste

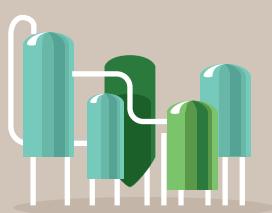


### 1. Extraction

Lignin is separated from cellulose



### 2. Purification



Purified lignin chains can be mixed into products such as PUR foam and formaldehyde-based glue for plywood.

phenol formaldehyde, familiar from glue. These percentages could perhaps be raised even higher and there may be other applications,' adds Gosselink. One of the ideas the researchers are targeting is to use lignin as a substitute for bitumen and asphalt. 'Ultimately we want to develop a lignin refinery': this is how Jacco van Haveren expresses the ambitions. 'In order to extract a range of products from lignin, comparable to the way oil refineries extract a broad spectrum of products from oil.'

&gt;

**'There is no competition with food production'**

### 3. Refinery

#### Biological



The enzymes laccase and peroxidase break down the lignin chains



→ smaller fragments of lignin chains

#### Chemical



200-250 °C



Pressure



→ range of useful basic chemicals



Treatment with acids and alkalis, dissolving in water / solvents, exposure to a catalyst

Formerly, the only way to break down lignin was by brute force: subjecting it to high pressure or temperatures, with only meagre yields as a result.

A new process only requiring low temperatures and pressure produces higher and more varied yields.

### 4. Useful chemicals



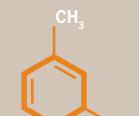
benzene



phenol



toluene

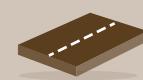


xylene

Chemicals can provide a sustainable alternative to oil and are used in:



Solvents



Additives for fuel and asphalt



Additives for plastics such as polycarbonate and PET

In this respect, the researchers are in line with the typically Wageningen philosophy that thinks in terms of cascading and valorization. 'We focus primarily on the most valuable products, what is left is for the next useful application, and it is quite possible that there will be a third application as well. And you can always use whatever is left over then for fuel,' says Van Haveren, summing it up. 'We are not only interested in energy, like many American researchers, but target both energy and chemistry.'

#### PRUNING WOOD

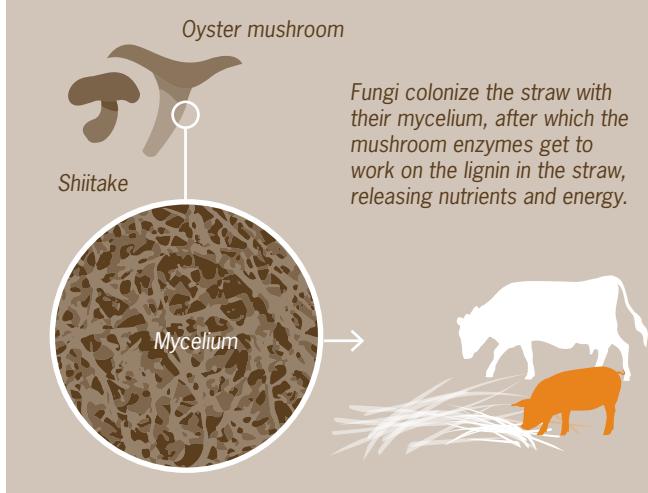
There is no shortage of sources: the world harbours enormous reservoirs of lignin. Van Haveren and Gosselink estimate that 20 to 25 percent of all plant biomass on the earth consists of lignin, and another 200 billion tons is added every year free of charge. A big potential source is all the

'Ultimately we want to develop a lignin refinery'

#### OYSTER MUSHROOM MAKES STRAW MORE NOURISHING

Two billion tons of straw are produced globally each year. For lack of juicy grass or hay, in many countries straw is fed to ruminants such as cows, goats and sheep. It is not very digestible. 'Lignin in the straw stalks affects the availability of the cellulose and hemicellulose for animals,' says John Cone of the Animal Nutrition chair group at Wageningen University. With a view to improving on this, the chair group is conducting trials with white rot fungi from edible mushrooms which are harmless for animals, such as shiitake and oyster mushrooms. 'They colonize the straw with their mycelium, after which the fungal enzymes attack the straw. By stopping the process just before new fungi grow out of the mycelium we get straw that is digestible for ruminants and full of cellulose,' explains Cone. The mixture of straw and fungi is dried and milled, and is then suitable for use in animal feed. Field trials still have to take place. The idea is that thanks to this treatment of straw ruminants in developing countries will give more milk and meat.'

The research is being funded by the Wageningen University Fund. 'We are one of the seven honoured Food for Thought projects that have been granted funding from private donors. We applied for 1.5 million euros and have already been given 700,000 euros.'



trees and branches coming out of forests, parks and gardens every year after pruning. The woody leftovers of maize, grains and elephant grass could contribute too, although there is something to be said for leaving some of this post-harvest biomass on the land to help maintain soil fertility. Millions of tons of lignin come out of the paper industry as waste products, too. For manufacturing paper fibres, the industry is interested in the cellulose fibres and not the lignin. For similar reasons, the production of bio-ethanol from sugar beet, sugar cane and other crops produces lignin-rich waste too. Since the emergence of the political goal of mixing more fuel from plant sources into petrol, the amount of lignin waste from bio-ethanol production has gone up. To date, this lignin is simply burned, whereas it could be put to much better use. There is another advantage as

well. 'These raw materials do not compete in any way with food production in the world. You do not need to cultivate lignin specially,' says Gosselink.

He expects the first lignin refineries to be built in places where a lot of biomass is processed. 'Paper and bio-ethanol factories are obvious locations. Then we would first extract the most valuable aromatics and the rest can still be burned.' In future he thinks there will also be smaller factories at places where pruning wood and dead trees from municipal parks or the forest service are collected.

#### HELPED BY FUNGI

Van Haveren has great expectations of the mild chemical catalyst reactions such those used for the Wageningen 'world record for phenol'. 'We will gain a better understanding of how lignin reacts with the chemical

substances we add, which will make more lignin building blocks available.'

The researchers also hope eventually to be able to combine chemical breakdown with organic breakdown using enzymes from white rot fungi. This group of fungi has a preference for lignin. 'We know that the enzymes laccase and peroxidase play a key role in this,' says Gosselink. 'In the long term we might be able to prise the treasure chest a bit wider open by combining enzymatic and chemical breakdown.'

Van Haveren: 'I expect that within three years we shall have lignin-based additives for shipping fuel which will make the engines work more efficiently and emit less soot. And we have the world record of having brought the production of phenols from lignin up to 15 to 20 percent.' ■

[www.wageningenur.nl/lignin](http://www.wageningenur.nl/lignin)

## PLATFORM TACKLES LIGNIN

The Wageningen UR Lignin Platform is a multidisciplinary expertise network of researchers from both Wageningen and other academic institution, which works closely with the business world. The aim is to do interdisciplinary research that will eventually lead to the industrial production of fuels, chemicals and materials made of lignin. Wageningen UR Food & Biobased Research plays a key role in the platform, which is currently working on three projects.

In collaboration with ECN in Petten and with industrial partners, the LigniFAME project is exploring the potential for converting lignin into fuel additives for shipping, materials (bio-bitumen) and energy. The raw materials for this are waste products from the production of bio ethanol, prunings from town councils and harvest waste. The main focus lies on

developing new catalytic processes.

In YXY fuels, chemical company Avantium is working with the paper industry on converting cellulose waste into energy conductors and chemical building blocks. Wageningen UR is contributing a patented catalytic breakdown process for depolymerizing the released lignin chains to obtain phenols.

Heat and electricity are useful by-products.

The CatchBio project is more academic. Key players in this programme are several universities (Wageningen, Utrecht, Amsterdam, Eindhoven, Groningen), which collaborate on new catalysts that are not based on noble metals and consume less energy. This is fundamental research with a strong commitment from the business world as well.

*Info: [www.wageningenur.nl/lignin-platform](http://www.wageningenur.nl/lignin-platform), richard.gosselink@wur.nl*

## MARINE RESOURCE MANAGERS SIX YEARS ON

# Making ships cleaner and saving coral reefs

**Preserving coral reefs is a big priority for Ingrid van Beek. She studied Marine Resource Management and now does research on ecosystems in tropical seas. Merijn Hougee, from her cohort, has stayed closer to home. His targets are cleaner shipping and less rubbish in the North Sea.**

TEXT ALEXANDRA BRANDERHORST PHOTOGRAPHY HARMEN DE JONG

**O**n the beach in India I saw how disused ships are dismantled by hand using gas burners. This releases a lot of oil and chemicals. The fires, the smoke, the penetrating smell of metal and burning – it is almost surreal. There is something quite impressive about the sight of such heavy industry and big ships, but it also causes tremendous pollution for people, the environment and marine life,’ says Merijn Hougee. He has visited India and China in the course of both his graduate research project and his work. He did his Master’s in Marine Resources Management part-time between 2008 and 2013, alongside a job as project leader for the North Sea Foundation. Hougee’s thesis was about ship recycling and ecological modernization, a sociological theory based on the assumption that the state and the business world will improve the world together through innovation and market mechanisms. He interviewed shipping companies with a safe, environmentally-friendly policy on ship-breaking, such as Maersk, Grieg and DFDS. ‘Regulations, policy, public opinion, pressure from clients and ethical considerations all play a role in the decision how and where to break the ships,’ he explains. Besides his job at the North Sea Foundation, he has also been working for the Clean Shipping Index (CSI)

since 2013, currently as interim director. This index helps companies opt for cleaner and lower energy shipping for their products. Affiliated companies include H&M, the Swedish firm Volvo, DSM, Philips, AkzoNobel and the Volkswagen group. ‘Of course, price, efficiency and reliability are the decisive factors, but these companies consider the environmental performance of ships when deciding whether to contract a shipper. And that is quite something,’ reckons Hougee.

### RESEARCH ON BONAIRE

The Caribbean island of Bonaire formed the setting for fellow student Ingrid van Beek’s graduate research project. In 2011, she studied the economic value of the coral reef off Bonaire for IMARES, Wageningen UR’s Institute for Marine Resources & Ecosystem Studies. ‘We wanted to provide insight into the services the ecosystem provides. Certain species of coral break down the energy of the waves, for instance, providing coastal protection. We developed a method of measuring how healthy the Bonaire reef is at 116 places along it, and what its capacity is to deliver ecosystem services.’

Van Beek has now been working as a researcher in tropical marine ecology at IMARES for more than two years. The meth-

od of assessing the value of the reef will shortly be published in an academic article. Meanwhile, she is leading several long-term projects. ‘I often need to do a short literature study first so as to be in the picture. There is no fixed routine, you keep on learning and it stays challenging.’ She lives on the island of Texel, where IMARES has its headquarters. ‘If you walk out of the door, you are by the sea in five minutes. And the atmosphere on the island is friendlier and less hurried than on the mainland.’ Yes, this is her dream job, Van Beek agrees with a laugh.

It was a long road that brought her here. After secondary school she studied business economics and became an accountant. ‘At that point I was not interested in biology or nature at all. I am a typical late bloomer,’ she explains. Inspired by a trip around the world, she worked in financial jobs for Doctors without Borders in Kenya and the Congo. ‘Gradually I felt the urge to be more involved with the substance of the work. I came in contact with nature organizations and biologists. At the same time, through my passion for diving I saw with my own eyes how the coral reefs were deteriorating.’ After voluntary work at a marine national park on Saba, she took a fulltime degree in Coast and Marine Management at Van Hall Larenstein University of Applied >



‘Good management  
makes a reef more  
resilient’

### INGRID VAN BEEK

**Age:** 47

**Studied:** MSc Aquaculture and Marine Resource Management, specializing in Marine Ecology 2009 – 2011

**Works:** as a researcher on tropical marine ecology and coordinator of the Tropical team at IMARES Wageningen UR



**‘We must keep the North Sea intact and where necessary restore it’**

#### **MERIJN HOUGEE**

**Age:** 34

**Studied:** MSc Aquaculture and Marine Resource Management, specializing in Marine Governance 2008 – 2013

**Works:** as Acting Director at Clean Shipping Index and project leader for shipping at the North Sea Foundation

## WHERE DO MARINE RESOURCE MANAGERS END UP?

The MSc in Marine Resource Management has been going since 2010. Its predecessor was called Aquaculture and Fisheries (2002 – 2010). A total of 138 people have graduated from this programme, and we have information on the careers of 37 of them. Eleven alumni work at a university, and four at a research institute. Five work for an agricultural company, four for consultancy firms and another four in other branches of trade or industry. Three have jobs with associations or organizations in the Netherlands, and two work for the Dutch government. *Source: KLV Wageningen Alumni Network*

Sciences (VHL) in Leeuwarden, which she could complete in two years, thanks to exemptions. In the meantime she worked at the NGO Wetlands International in Wageningen. Van Beek took a minor at Wageningen University, and the academic approach appealed to her. So after working and saving for another year, she did the fulltime Master's in Marine Resources Management. 'Alternating work and studying was hectic, but if you are motivated you can do a lot.'

## LOOKING AFTER SHARKS

Merijn Hougee was the opposite of a late bloomer. As a child he was already 'crazy about marine life and everything that lives, crawls and slithers.' Yet his path did not lead him straight to Wageningen either. He dropped out of his applied science degree in Aquatic Ecotechnology at Vlissingen when there was a baby on the way. He worked for a while at a large aquarium, where his tasks included looking after the sharks, and then embarked on a degree in Land and Water Management at VHL in Velp. After graduating, Hougee became a consultant with RPS consultancy group, where he worked for Dutch water boards. But his heart lay with salt water. When he got a part-time job with the North Sea Foundation in 2007, he decided to do the Wageningen Master's in Marine Resources Management. Hougee's main interest was in a market-oriented approach to using the sea sustainably. The environmental economics courses were a particularly good fit with his work. 'It is very interesting to look at how you can make the value of marine ecosystems more tangible for companies. That provided a good basis for discussions at the strategic level – on cleaner shipping for instance.'

From her financial background, Ingrid van Beek was equally interested in environmental economics. During an internship in

Madagascar she helped calculate the economic value of a marine nature reserve. 'I learned how to express the value of nature in monetary terms, and the language of policy-makers. Awareness-raising is very important too. If you tell people about the regulating functions that are fulfilled by nature, you make ecosystems tangible,' she emphasizes. Soon after she graduated, there was a vacancy at IMARES. At the end of 2010, the Antillean islands of Bonaire, Saint Eustatius and Saba became Dutch municipalities, adding a lot of biodiversity to Dutch territory at a blow. 'Research based in the Netherlands really took off. The timing was perfect for me.' Most of IMARES's tropical research takes place in the Dutch Caribbean and is financed by the ministry of Economic Affairs.

However, IMARES wants to become less dependent on government funding and seeks more public-private collaboration. 'There are big ambitions for the tropical team. We are acquiring projects in Colombia, Malaysia and Indonesia, for example,' says Van Beek, who coordinates the tropical team.

## ALTERNATIVE FUNDING

The North Sea Foundation has always been government-funded and is now hard at work looking for alternative funding sources. 'Getting sponsorship by companies or grants from private funds like the Postcode lottery demands a different approach to a project proposal for a government grant,' remarks Hougee. 'For sponsors your programme must be concrete. It is difficult, for instance, to make something like lobbying for effective regulations measurable.' But the foundation is succeeding in drawing attention to the overfishing and pollution of the North Sea. Since 2001 the foundation and the National water authority Rijkswaterstaat have been systematically analysing the kind of waste washing up on the coast. 'On average 450 pieces of garbage

wash up per 100 metres of beach. They include sweet packets, cigarette butts, leftovers of nets and ribbons off balloons. Nowadays people send up balloons at every wedding. Birds use the ribbons for their nests but their claws and beaks can get caught up in them.'

Then the idea came up of conducting a publicity campaign to draw attention to the garbage problem. The *MyBeach Cleanup Challenge* was held last year for the first time. Groups of volunteers cleaned up the entire Dutch coast on a tour lasting 24 days. About 600 people took part and there was plenty of media coverage of the event, which will be repeated this year, now renamed the *Boskalis Cleanup Tour*.

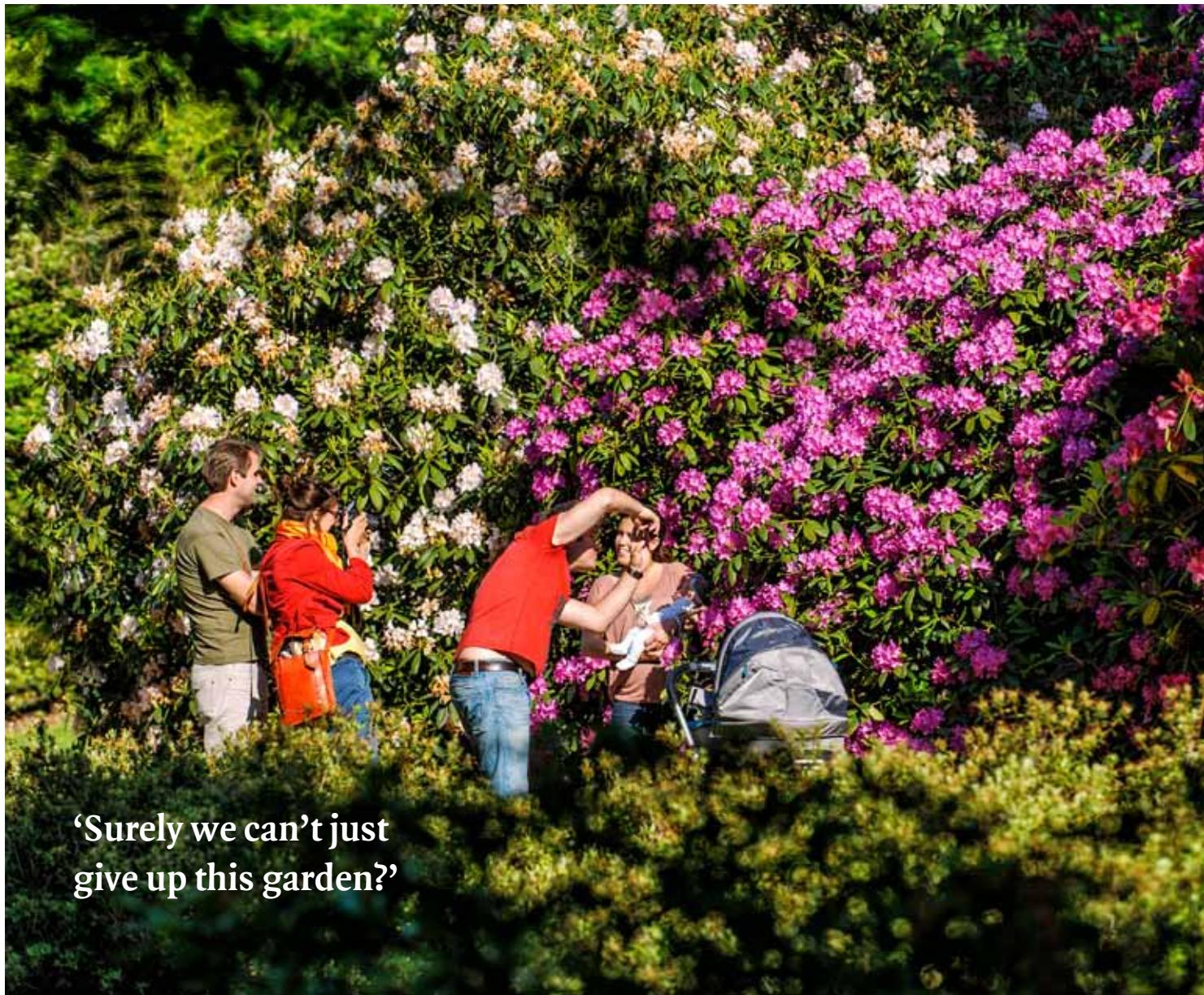
## NORTH SEA INTACT

Both alumni feel sure there will be no shortage of challenges in the next few years. For the North Sea, a single vision is needed, says Hougee, with the ecosystem as the starting point. 'At present, the regulations for fisheries, shipping and wind turbines, for example, are very sector-based. We must keep the North Sea intact and where necessary restore it. The fish stocks and the biodiversity have diminished enormously; there is hardly any hard seabed left because of destructive bottom-trawling.'

The state of coral reefs in tropical regions has worsened deplorably in recent decades too. The coral coverage on reefs in the Caribbean Sea has gone down from 50 to 17 percent on average, says Van Beek.

Warming, overfishing and acidification of the oceans are posing global threats. 'Corals and ecosystems can adapt to high water temperatures, but the speed at which these changes are taking place is too high. So it is important to make sure there is good management at the local level. Then a reef will be more resilient and able to cope with the global threats.' ■

# Let Belmonte bloom again



‘Surely we can’t just  
give up this garden?’

The Belmonte arboretum, with one of the largest rhododendron collections in Europe.

# The Belmonte Arboretum in Wageningen is both a botanical garden with exceptional collections and a popular spot for walks. The Wageningen University Fund is helping out by raising money to cover the costs of running the 12.5-hectare garden.

TEXT ALEXANDRA BRANDERHORST PHOTOGRAPHY GUY ACKERMANS

**T**he rhododendrons are in full bloom. Red, pink, purple or orange flowers stand out against the dark-green foliage. Dead leaves cover the ground. Dedde Smid, the Belmonte Arboretum director, digs his hand deep into the earth and displays a fistful of leaves. 'There is a 15 centimetre thick layer of leaves on top covering a layer of peat compost. That is good for the shrubs and means they need less watering. It also stops weeds from taking root. In recent years we've been running the garden along more natural lines, without chemicals.' The Belmonte estate came into the possession of the nature and heritage foundation Geldersch Landschap in 1936. In 1951 it was taken over by the university, which wanted to extend the botanical garden. However by the end of the twentieth century, the arboretum no longer had any relevance for teaching or research. But the garden still has some exceptional collections, such as the rhododendrons, one of the biggest collections in Europe with 550 varieties. The Rosaceae family collection, with roses, ornamental cherries, apples and pears, hawthorns and rowans, is also renowned. To safeguard the garden's continued existence, Wageningen UR, Geldersch Landschap and Arboretum Foundation Wageningen jointly set up the Belmonte Arboretum Foundation in 2012. In addition to the director Smid, the foundation also employs a collection manager, both for one day a week. 'A firm of gardeners looks after the arboretum and volunteers help out with the maintenance. We keep the costs of running the place as low as possible – about 140 thousand euros per annum – through smart management and making maximum use of volunteers.'

Like many other Wageningen alumni, Smid

has warm memories of the arboretum. He first set foot in the garden during the general introduction in 1979, when he started his degree in Livestock Farming. When his parents visited Wageningen, he used to take them to the arboretum with its breathtaking views out over the Rhine. Friends held their wedding parties there. 'Many people have said 'I do'. We reintroduced the possibility of getting married here last spring, in part for financial reasons.'

The foundation still receives contributions from Wageningen UR and Geldersch Landschap, but it is also dependent on donations and sponsorship. In 2012, the Wageningen University Fund (WUF) raised funds among alumni for the collection of apple and pear trees and the rose collection. That resulted in 25 thousand euros. Smid: 'In addition to cataloguing and creating a digital record of the collections, we also planted 56 apple trees to replace and extend the existing collection.'

## NAMED FUND

As of this year, the Wageningen University Fund is providing systematic support by raising funds for the management of the garden. The Belmonte Arboretum will have a separate fund in its name within WUF, aimed at fund-raising among private individuals. Smid says the WUF is significantly reducing the arboretum's financial burden this way. He is hoping for an additional financial boost of some tens of thousands of euros a year.

He is also talking to the municipality of Wageningen and companies about regular contributions and sponsorship. 'We may need to consider the option of charging for admission. The challenge for the decades ahead lies in the integrated, sustainable

management and exploitation of this garden with all its various functions. Surely we can't just give up this garden?'

The entire plant collection has now been recorded in a database thanks to aid from the Prince Bernhard Cultural Fund. That means that as of last spring, the collection can be accessed by anyone interested in it. 'People can find information about all the different species, at home on their computer or on their smartphone or tablet as they walk around here. They can even find routes for themed seasonal walks online.'

## WISH LIST

In the near future, the foundation wants to convert the coach house in the grounds so that it is better suited for hiring out for weddings and other events appropriate to the character of the botanical garden, such as trade fairs. 'That will let us improve the commercial operation,' explains Smid. Other items on the wish list are solar panels and a new watering system.

New information panels are already scheduled for the summer. 'In the past, the emphasis was on the collections but we do also want to tell the story of how the landscape was shaped, and talk about the history and management of the garden.' To talk for example about the beech tree in the far southwest corner, high above the Rhine, which bears traces of the fighting in September 1944 during the Second World War. The growths in the bark with the frayed edges all around are due to grenade splinters. 'It would be nice if we had something new to tell even the people who come here every day.' ■

General information: [www.belmontearboretum.nl](http://www.belmontearboretum.nl)  
Info and searching the collection:  
<http://belmonte.arboretumexplorer.org>

# ‘Extra incentive to take a good look around’

**At the alumni gathering at Koppert Biological Systems in Berkel en Rodenrijs. Alumni Lennart van der Burg and Lidwine Dellaert, two of the organizers, talk about why they decided to get involved. ‘We want to engage young people through new topics and different locations.’**

Groups of alumni are sitting eating soup and luxury bread rolls in the large hall at Koppert, the global market leader in organic crop protection and pollination products. The atmosphere is friendly. Not many of the visitors know each other but conversations are starting up everywhere about student days, work and today’s event. About 90 graduates are attending the alumni gathering in April about product innova-

tions at the company in Berkel en Rodenrijs. ‘It’s fantastic to see how organic crop protection uses natural systems,’ says Lidwine Dellaert. She studied Plant Breeding, starting in 1965, and went on to work for De Ruiter Seeds, now Monsanto. Dellaert is on the committee of the Hague-Rotterdam alumni group. ‘I find all aspects of the Wageningen domain interesting. Organizing these meetings gives you an

extra incentive to take a good look around,’ she explains.

Like Dellaert, fellow committee member Lennart van der Burg has been an organizer in the alumni group for about four years. He did a Master’s degree in Environmental Economics from 2006 to 2008 and now works for Grontmij. ‘I like bringing people into contact with one another and I have a lot of ideas. At every gathering, I get to know people informally who are also useful business contacts for me. And I get to see all kinds of organizations and companies,’ says Van der Burg. He thinks it is important to have a good balance between young and old. ‘Young people are busy with their work and family, as I am too. We want to engage them through new topics and different locations.’ Last year they addressed the topic of Leisure at the Dutch Water Dreams waterpark in Zoetermeer, and a network meeting is planned for the end of this year with companies that have lots of job vacancies.

After informative talks by alumnus Jan Omvlee, managing director at Rijk Zwaan, and Ernst Woltering, professor in the Horticultural Supply Chains Group at Wageningen UR, it is time for drinks and nibbles. Dellaert enjoys a glass of wine with someone it turns out she knows from her student days. Van der Burg is standing talking to a friend. He is pleased with how the evening went, with one proviso. ‘We do need to make sure there’s enough time for discussion. Wageningen people like to delve into the subject matter, as you can see from the questions at the end of the talks.’

For more information, email [Caroline.bijkerk@wur.nl](mailto:Caroline.bijkerk@wur.nl)

PHOTO HARMEN DE JONG



Caroline Bijkerk of the alumni bureau and three alumni board members from the regional circle in The Hague: Lennart van den Berg, Jos Frantzen and Lidwien Dellaert.

## Wageningen Press Award for *Uitgekookt!*

In March, the science journalist Annemieke Smit received the 2014 Press Award from the Wageningen University Fund (WUF) for her book *Uitgekookt!* This book examines the chemical, biological and physical processes that take place during cooking to find out how to avoid disasters in the kitchen. For instance, grey-looking beans turn out to be the re-

sult of acids and enzymes breaking down the green chlorophyll.

Smit consulted a number of Wageningen researchers when writing *Uitgekookt!* The jury said she deserves the Press Award because of her ability to make complex knowledge from the food sciences comprehensible for a broad public. In doing so, she is making a significant contribu-

tion to our understanding of what we eat. Smit worked for Dutch newspaper NRC Handelsblad and the VPRO broadcasting company, and she writes the cookery blog [100gradenmeer.nl](http://100gradenmeer.nl). During the celebrations of Wageningen University’s 96th Founders’ Day on 10 March, she was handed the Wageningen Tree sculpture, a jury report and 2500 euros.

## FUNDS

## ACTIVITIES

PHOTO GUY ACKERMANS



## Top student sportspeople get grants

Judoka Krijn Schetters and ballroom dancer Dieuwertje de Wagenaar have been given grants of 1500 euros from the Niels Smith Fund. This fund supports elite athletes studying in Wageningen.

Schetters (student of Biosystems Engineering) was surprised to get the grant. 'I'd applied a number of times and now I'm one of the older students. Of course I was really pleased – I can certainly use the money!' he says in an email. The grant will let him attend international training camps and competitions, such as the British Open and the Slovenian Open this spring. Schetters has been Dutch champion a number of times in the under 66 kilos weight class. In March he came first in the Holstein Open Neumünster, an international competition in Germany. 'I'm managing to

combine my studies with my sporting commitments,' says Schetters. He completed his Bachelor's degree without any delays by working through the summer holidays, but he will probably need an extra six months for his Master's.

Bachelor's student Dieuwertje de Wagenaar (Landscape Architecture) and her ballroom dancing partner are currently training in Italy. They take part in competitions at the highest national level. Her grant is also intended for training purposes. The Niels Smith Fund is administered by the WUF and provides support to two students each year.

## Alumni competition Veluweloop

If you jog regularly, then why not get together with old university pals and take part in the Veluweloop relay race on Saturday 13 September 2014? The Wageningen UR Alumni Office will be handing out prizes again this year to the three fastest alumni teams in the Veluweloop. To be eligible for this alumni competition, at least half of the team should consist of Wageningen graduates.

The relay race starts and ends in Wageningen. The teams consist of 12 runners, each of whom runs a leg of between 4.4 and 11.2 kilometres.

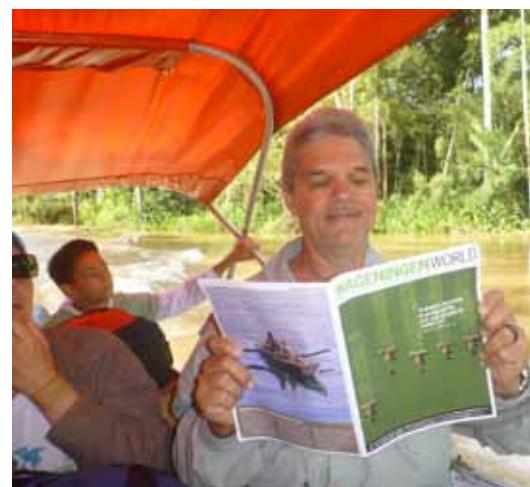
'Alumni make up about 20 percent of the participants,' says Arianne van Ballegooij of Wageningen University's Alumni Office. 'You get former student flatmates taking part, for example, or former teams from the Tartlétos athletics club. So the Veluweloop does have quite a reunion feel to it, and we are encouraging that with the alumni competition.'

Go to [www.veluweloop.nl](http://www.veluweloop.nl) for information and registration (before 6 September). Individual runners looking for a team or vice versa can visit the 'Mr. Swine zoekt snelle loper' Facebook page or email [veluweloop.wageningen@gmail.com](mailto:veluweloop.wageningen@gmail.com).

## WAGENINGEN IN THE WORLD

## Greetings from the Amazon!

Ricardo Silveira Bernardes is on a field trip in the Juruá River Valley in the Amazon and is reading an article about research by his former colleague Grietje Zeeman into toilets that do not use much water. Silveira Bernardes is working on a project researching the treatment of wastewater. 'It's nice to read news from Wageningen, the university that gave me opportunities in the fields of education and research. I have warm memories of my time there.' Silveira Bernardes spent the period from 1990 to 1994 working on his PhD in the Environmental Technology sub-department at Wageningen University. He received his doctorate in January 1996. He is now a lecturer and researcher at the University of Brasília, working on the treatment of wastewater and public health. 'One of the projects I'm involved in concerns the improvement of wastewater treatment in isolated communities in the Amazon area.' Are you reading this magazine a long way from Wageningen too? Send your photographic evidence to [wageningen.world@wur.nl](mailto:wageningen.world@wur.nl)



## PERSONALIA

**Raymon van Anrooy MSc**, WU Rural Development Studies 1997, has been appointed chair of the BES Fishery Commission in Barbados. 20 November 2013.

**Annemieke Beers MSc**, WU Food Technology 1988, has been appointed Director of Operations of the Agrotechnology & Food Sciences Group (AFSG) at Wageningen UR. 1 March 2014.

**Nettie Buitelaar PhD**, WU Food Technology 1986, has been given the first Roland Lageveen Award by HollandBIO, the association representing the interests of the Dutch biotechnology industry, for the effort she put over many years into strengthening and promoting the Dutch biotechnology sector. 29 January 2014.



Erwin Bulte

**Prof. Erwin Bulte**, WU Forestry 1992, professor of Development Economics at Wageningen University, is the best economist in the Netherlands, according to a ranking produced by economists at Tilburg University and the VU University Amsterdam and published in *De Economist*. April 2014.

**Aalt Dijkhuizen PhD**, WU Agrarian Economics 1977, was appointed Commander of the Order of Orange-Nassau in February when he stepped down from his position as chair of the executive board of Wageningen UR. Clemens Cornelje, the King's commissioner in

Gelderland, handed him the honour. When he left, Dijkhuizen asked people not to give presents but instead to make a donation to the Anne van den Ban Fund. That resulted in 23,500 euros for scholarships for students from poor countries who want to do a Master's degree at Wageningen University. 13 February 2014.

**Gerda Feunekes PhD**, WU Human Nutrition 1989, has been appointed director of the Netherlands Nutrition Centre with effect from July. 31 March 2014.

**Prof. Louise Fresco**, WU Rural Sociology of the Non-Western Regions 1976, chair of the executive board of Wageningen UR as of 1 July, has been awarded the 2014 Comenius Prize for 'her unstinting efforts to bring science to the attention of the general public'. 22 March 2014.

**Lars Hein PhD**, Utrecht University Environmental Science 1993 and WU PhD 2005, working in the Environmental Systems Analysis group, has been appointed a professor holding a personal chair.

**Bart van den Hurk PhD**, WU Environmental Protection 1989, a climate scientist at the Institute for Environmental Studies at the VU University Amsterdam, has been appointed part-time professor of Interactions between Climate and the Socio-Ecological System at that institute. 1 January 2014.

**Prof. Han Joosten**, Radboud University Nijmegen Biology 1983 and WU PhD 1988, has been appointed professor by special appointment of Food Microbiology at Wageningen University. 27 February 2014.

**Prof. Dik Mevius**, researcher at CVI Wageningen UR and professor of Antimicrobial Resistance at Utrecht University, has been appointed Officer in the Order of Orange-Nassau. 27 March 2014.

**Andrew Oftehage MSc**, WU Development and Rural Innovation 2010, has been given a Fulbright Award for his

research at the Anthropology Department at the University of North Carolina at Chapel Hill, USA. 16 April 2014.

**Lourens Poorter PhD**, WU Biology 1991, working in the Forest Ecology and Forest Management group, has been appointed a professor holding a personal chair. 1 March 2014.



Riëlle Ruiter and Jolet Ruiter

**Riëlle Ruiter MSc**, WU Food Technology 2009 and her twin sister **Jolet Ruiter MSc**, WU Food Technology 2009, received their doctorates on the same day at the University of Twente. They carried out research into the behaviour of liquids within the Physics of Complex Fluids group. 25 March 2014.

**Prof. Willem de Vos**, professor at the Laboratory of Microbiology at Wageningen University, has received an honorary doctorate from the Örebro University in Sweden. 8 February 2014.

**Jeroen Wijsman PhD**, WU Biology 1993, has been appointed a lecturer in Aquaculture in Delta Areas at the HZ University of Applied Sciences. 14 February 2014.

PHOTO TC TUBANTIA/ANNA ROMITA

## BOOK



## On the Himalaya trail with Katja Staartjes

**Katja Staartjes MSc, WU Food Technology, the most successful mountaineer in the Netherlands and the first Dutch woman to climb Mount Everest, presented her third book in March. Called *Lopen over de grens, Great Himalaya trail door Nepal* (Walking over the border, the Great Himalaya trail through Nepal), it is an account in words and (especially) images of a 2000-kilometre trek through the Himalayas.**

[www.katjastaartjes.nl/uk/books/](http://www.katjastaartjes.nl/uk/books/)

## ALUMNI

## Sustainable Young 100

Three alumni and two Wageningen University employees can be found in the Sustainable Young 100, the list of 'the most innovative and inspiring young people in the field of sustainability in the Netherlands', a new initiative.

The sustainable alumni are:

**Marjolein Helder**, WU Environmental Technology 2008, founder of the energy company Plant-e

**Liset Meddens**, WU International Development Studies 2010, coordinator of the international movement Fossil Free NL

**Loes Mertens**, WU Organic Agriculture 2009, plant breeding specialist at De Bolster, a seed company for organic seeds

The Wageningen University employees are:

**Kimo van Dijk**, University of Amsterdam Biological Sciences 2010, researcher in sustainable agriculture and nutrient management specializing in phosphorus security

**Bart van Roekel**, sustainability officer at Wageningen UR, better known as The Green Man

## IN MEMORIAM

**J. Baas MSc**, WU Agricultural Economics 1946, passed away at the age of 94. 1 January 2012.

**W.G. Beetink MSc**, WU Horticultural Plant Breeding 1951, passed away at the age of 88. 16 March 2014.

**D.T. Bremer MSc**, WU Land Development A 1978, passed away at the age of 62. 1 February 2014.

**E.J. van Busschbach MSc**, WU Forestry 1950, passed away at the age of 91. 23 December 2013.

**J.H.M. Davina PhD**, WU Biology 1977, passed away at the age of 62. 25 April 2014.

**Ms M. Douma MSc**, WU Development and Rural Innovation 2011, passed away at the age of 30. 19 March 2014.

**B.W. Hartong van Ark MSc**, WU Rural Economics 1954, passed away at the age of 90. 7 March 2014.

**Prof. J.G.T. Hermsen**, WU Agricultural Plant Breeding 1954, has passed away. 2011

**H.O. Hooghoudt MSc**, WU Soil and Fertilization Sciences 1969, passed away at the age of 74. 10 February 2014.

**W.C.M. de Klerk MSc**, WU Environmental Protection 1990, passed away at the age of 65. 21 September 2013.

**H.J. Kolkman MSc**, WU Dairy Science 1965, has passed away.

**Ms S.A. Loozekoot-ten Wolde MSc**, WU Domestic and Consumer Studies 1996, passed away at the age of 42. 6 April 2014.

**T.K.E. Meijer MSc**, former WU employee, passed away at the age of 79. 3 April 2014.

**H.J.M. van Miltenburg MSc**, WU Agricultural Plant Breeding 1959, passed away at the age of 84.

17 November 2013.

**C. Mosselman MSc**, WU Farming Technology 1967, passed away at the age of 74. 12 July 2013.

**H.R.F.M. Pilzecker MSc**, WU

Horticulture 1954, passed away at the age of 92. 19 January 2014.

**A.E.J. van der Ploeg MSc**, WU Dairy

Science 1954, passed away at the age of 89. 7 April 2014.

**P. de Putter MSc**, WU Agricultural Plant Breeding 1946, has passed away.

**P.E. Röhrlig MSc**, WU Tropical Plant Breeding 1953, passed away at the age of 84. 28 September 2011.

**P. Roodhuijzen MSc**, WU Rural Economics 1956, passed away at the age of 85. 20 February 2014.

**H. Scheer MSc**, WU Tropical Forestry 1953, has passed away.

**J.P.M. Schenkelaars MSc**, WU Molecular Sciences 1984, passed away at the age of 55. 1 April 2014.

**E.J. Scholten PhD**, WU Biology 1999, passed away at the age of 40. 16 March 2014.

**F.H.M. Stappers MSc**, WU Molecular Sciences 1996, passed away at the age of 41. 2 October 2013.

**Prof. A. van Tienhoven**, WU Landscape Architecture 1949, passed away at the age of 91. 31 January 2014.

**W.J. Tigges**, a former WU employee, passed away at the age of 70. 26 February 2014.

**G.J. van der Torren MSc**, WU Environmental Protection 1994, passed away at the age of 44. 15 February 2014.

**Baron E.H. van Tuyl van Serooskerken MSc**, WU Rural Economics 1968, passed away at the age of 73. 14 July 2013.

**W.P.N. Vlasveld MSc**, WU

Horticulture 1946, passed away at the age of 93. 19 November 2013.

**H. Völlmar MSc**, WU Tropical Forestry 1953, passed away at the age of 86. 5 April 2014.

**A. Wesseling MSc**, WU Horticulture 1983, passed away at the age of 62. 13 March 2014.

**J. Wolthuis MSc**, WU Forestry 1971, passed away at the age of 69. 11 June 2013.

**C.J.J. Wouters MSc**, WU Plant Breeding 1972, passed away at the age of 67. 9 February 2014.

# 'LEGAL CHECKLIST' FOR EMPLOYMENT ISSUES

You have a dispute with your employer or you have doubts about signing a non-competition clause. What is a realistic position in such cases? You are thinking about starting your own business, what things do you need to bear in mind? These are just a few examples of situations that KLV members are in when they call upon the services of the "Ingenieursrechtshulp" [Legal help for graduates] that KLV offers. We asked Pieter Tubbergen, KLV's 'own lawyer' since 1995, how this help works and which questions he mainly deals with.

## How often does the phone go? And has that become more or less over the years?

"In the early years, the initial contacts were always by phone but nowadays people often pose the questions directly per e-mail. It is of course handy if people have itemised things in an e-mail and have sent important documents as well. From the number of questions you can see that KLV's membership has grown considerably over the years and that there are now far more sole proprietors and independent entrepreneurs than previously."

## With which questions do people phone?

"That is very diverse. Many of the questions concern employment law: what exactly are the rules for secondment? Can my employer make me sign a non-competition clause? Is it wise to participate in an employee shares scheme? Sometimes there is an employment conflict: my employer and I no longer wish to work together. What is my position and can I demand compensation? Or questions about pensions or social security law. And of course questions about starting your own company. What are the advantages

and disadvantages of a sole proprietorship compared to a limited company, the fiscal advantages but also the liabilities?

In principle, legal help is intended for employment-related questions, but sometimes other questions are posed as well. For example, if the other party fails to meet the agreements made concerning the sale or purchase of a house. There is also room for that and the line drawn is not that strictly. Furthermore, work matters and private issues are often related to each other. If you start your own company that has consequences for your own capital and that of your partner. You need to make agreements about that and we are pleased to help you do so."

## Are there patterns in the type of questions posed?

"Since the financial crisis we have received more questions about the 'defending' side. About social plans, about a person's position in the negotiations concerning severance pay. And significantly more questions about starting a company. Before the financial crisis the questions were more about the extras that you could insist on in a new employment contract or about employee shares schemes.

And from the type of questions we have received more recently we can tell that the economy is picking up: the questions are once again more about the extras that are possible, the 'pleasant things'. Or questions about growing companies, for example from sole proprietors who after a number of years are considering becoming a serious entrepreneur."

## How are the questions dealt with?

"The arrangement with KLV is that its mem-

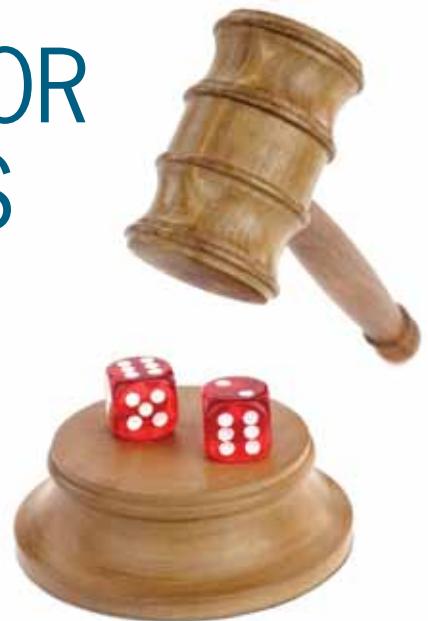


Photo: Shutterstock

bers receive the first half hour for free. After that they receive a favourable rate. In that first half hour we try to achieve as much as possible. In such a conversation, mostly by phone, I try to determine the legal question as quickly as possible. We analyse the problem and then come with concrete recommendations. Usually that is a concrete checklist with the most important legal points that the person making the call must subsequently arrange or have done on their behalf: you need to discuss this with your solicitor, this with your employer, and you need to arrange that with respect to your liability. That can be done in a follow-up arrangement with our office, but also through other parties. No abstract advice, but concrete and practical issues that a non-lawyer can actually do something with."

*Pieter Tubbergen is a lawyer with Schaap en Partners in Rotterdam and is attached to KLV's "Ingenieursrechtshulp". He can be reached by e-mail and by telephone or via the KLV website. For KLV members the first half hour is free of charge. Further information and contact details can be found at [klv.nl/ingenieursrechtshulp](http://klv.nl/ingenieursrechtshulp)*

# STARTLIFE: SUPPORT FOR ENTREPRENEURIAL STUDENTS

Entrepreneurship is in, especially among younger KLV members. KLV wants to support its members in this. An important part in this respect is StartLife. Ideas such as rearing prawns, selling second-hand clothes or making job vacancy films have since grown into a company with the support of a microcredit from StartLife. "Our aim is simply to reward entrepreneurship", says Jan Meiling from StartLife. "The risk profile may be high. But to be honest, everything goes okay too often."

"Students are already welcome at an early stage", says Meiling. "In an initial meeting we assess the reality level of their idea: is it a team, do they have the competencies needed, and are they communicative? A fairly subjective initial assessment. If that works out well StartLife's review committee decides whether or not we will offer a microcredit."

Such a microcredit is a soft loan up to a maximum of €10,000 with a low interest rate or without interest, and a long term. "We expect that half of the money will not come back", says Meiling. But to be honest, everything goes okay too often. The ambition level is sometimes low: students are happy if their product is ready for the market, if they can make a bit of turnover, if their founders are covered, and if the pair of them can make a living. That ties in with the Wageningen mentality: avoiding risk and socially engaged. There is nearly always a social or sustainable aspect to the initiative. But we would like to see them

get the maximum out of the initiative. Ultimately you have more impact then."

The education at Wageningen is increasingly focused on entrepreneurship. "We notice that but not yet enough", says Meiling. "The number of registrations is increasing; we now have contact with twenty starters, ten of which have a microcredit. But I am convinced that there is far more potential."

StartLife and KLV are literally neighbours. "We work together a lot with KLV, for example in the Business cafés that we organise. You can see that a lot of Wageningen graduates offer themselves as a coach, an informal investor or a person who can open doors. Many alumni have an affinity with entrepreneurship and of course it is a major advantage if starters can draw upon that network."

*StartLife, a collaborative initiative from Wageningen UR, Ontwikkelingsmaatschappij Oost NV and others, is the contact point for starting entrepreneurs. Besides entrepreneurial students it also supports so-called 'technostarters' in the sectors Agro, Food and Environment to enable innovative knowledge to enter the market. Further information: [startlife@wur.nl](mailto:startlife@wur.nl)*



Photo: Guy Ackermans

## ACTIVITIES

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

10 June

Training - Spead reading

11 June

KLV - Annual General Assembly KLV

12 June

Wageningen Business Café - Gala

20 June

VWI - Workshop - Female Leadership & Ambition

18 September

Wageningen Business Café

3 October

KLV - Workshop LinkedIn for beginners (40+)

16 October

Wageningen Business Café

17 October

Reunion voor 50 year alumni 2014

31 October

KLV Workshop - Social Media business (40+)

WANT TO BECOME A MEMBER?  
Go to [klv.nl/membership](http://klv.nl/membership)



PHOTO: VEGIMPACT

## Boost for vegetable farming in Indonesia

The scale of vegetable production in Indonesia is not big enough to provide an adequate diet. Vegetable cultivation is also under pressure because horticultural districts around the cities are falling victim to urban expansion. With a view to providing a more varied menu, Wageningen UR is working with Dutch companies and Indonesian partners on vegIMPACT, a Dutch government-funded programme. 'In four years we shall advise

10,000 vegetable farmers about how to make their farms more productive and more sustainable,' says coordinator Arij Everaarts. On the coastal plain in the north of Java a trial is also going on with permanent vegetable growing. Currently farmers alternate vegetables with rice. 'That is bad for the structure of the soil and for vegetable productivity,' says Everaarts. 'Rice does not spoil and can be imported from outside Java. It is not

possible to do that with vegetables without refrigerated transport.'

To give the farmers some support, marketing will be given a boost as well. 'For instance, we shall teach them to select the best shallots, now a bulk product, and package them nicely. They can be sold in Jakarta for a higher price.' ■

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