

# WAGENINGEN WORLD

MAGAZINE OF WAGENINGEN UR ABOUT CONTRIBUTING TO THE QUALITY OF LIFE

no.4 2012



**'A drastic increase  
in productivity  
per unit of land is  
called for'**

Jason Clay, WWF, page 10

The elm **can be trusted again** | **Extracting minerals** from toilet waste | **Nano research** takes off  
New: **the sustainable tugboat** | Why **global food prices** are high | **Rat droppings** in the post





# 10

## NINE BILLION MOUTHS TO FEED

Board chairman Aalt Dijkhuizen's plea for a doubling of food production provoked a lot of discussion. A few scientists give their views on the issue.

# 26

## SHAME TO WASTE IT

Extracting energy and minerals from toilet waste is both necessary and possible. It can be done with the systems developed by professor Grietje Zeeman. The days of the conventional flush toilet are numbered.



# 32

## SMALL PARTICLES, BIG OPPORTUNITIES

An electronic tongue and molecules that help find and destroy tumours: Wageningen UR is steaming ahead with nanotechnology – but not without weighing up the human and environmental risks.



**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** Paul den Besten, Hans Bothe, Yvonne Fernhout, Ben Geerlings, Bert Jansen, Jeanette Leenders, Jac Niessen, Helene Stafleu, Erik Toussaint, Sil Traas **Editors-in-chief** Gaby van Caulil (Editor-in-chief Resource), Pauline Greuell (Corporate Communications Wageningen UR) **Magazine editor** Miranda Bettonville **Copy editor** Rik Nijland **Alumni news** Alexandra Branderhorst **Translation** Clare McGregor, Clare Wilkinson **Language editor** Clare McGregor **Art direction and design** Jenny van Driel (Wageningen UR, Communication Services) **Cover picture** Corbis **Overall design** Hemels Publishers **Printer** Mediacenter Rotterdam **ISSN** 2212-9928 **Address** Wageningen Campus, Akkermaalsbos 12, 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** [www.wageningenalumniportal.nl](http://www.wageningenalumniportal.nl) **Change of address associates** (mention code on address label) [wageningen.world@wur.nl](mailto: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.



**4 UPDATE**

News in brief about research and developments in Wageningen UR.

**18 RAT DROPPINGS IN THE POST**

Anyone who finds brown rat droppings in the Netherlands can send them to Wageningen. Scientists have enlisted the help of the general public to find out which rat populations are resistance to rat poison.

**26 THE ELM CAN BE TRUSTED AGAIN**

Elms became synonymous with disaster. Now, in part thanks to Wageningen research, there are resistant varieties on the market. Nature managers just need to pluck up the courage to plant the distinctive tree again.

**28 WHY FOOD PRICES ARE HIGH**

World food prices have shot up again. Why is this? And is it a bad thing?

**32 IMPACT: THE SUSTAINABLE TUGBOAT**

The new harbour tugboat E3-Tug saves fuel and minimizes emissions. IMARES Wageningen UR developed the software for calculating an optimal combination of electric and diesel power for this hybrid tugboat.

## FEATURES

**40 LIFE AFTER WAGENINGEN**

PhD student Ab Drent trekked through northern Cameroon with nomads; former coursemate Daan Knoop gained useful insights at the FAO and doing business in the Congo. They look back 14 years after embarking on their degrees in Tropical Land Use.

**44 WAGENINGEN UNIVERSITY FUND**

The Food for Thought campaign raises funds for trailblazing research in 12 new projects.

**46 ALUMNI**

News for alumni of Wageningen University, part of Wageningen UR.

**48 PERSONALIA**

Information about the lives and fortunes of alumni of Wageningen University.

**50 KLV**

Announcements from the KLV alumni network.



PHOTO BART DE GOUW

## Silent spring

'It is fifty years since the publication of American biologist Rachel Carson's controversial book *Silent Spring*, in which she put the use of chemical pesticides firmly on the agenda. The book was very well written, very well documented and the argument was clearly constructed. And it had a tremendous impact. In the US, for example, its publication led pretty much directly to the setting up of the Environmental Protection Agency. Worldwide, Carson opened people's eyes to the damage being done to ecosystems by toxic substances.

'Carson does not denounce all pesticides, however; what she emphasizes is that they are used too often and in excessive quantities. She argues for moderation and more emphasis on alternatives such as organic pest control methods which make use of an organism to keep pests such as destructive insects under control.

'This appeal is still relevant fifty years later. I think we have solved about five percent of the problems. The pesticides used now are less persistent: they are broken down more easily. That is a considerable gain, but spraying too much and too often is still the rule. And it is not only done when a plague turns up somewhere; it is mainly done preventively. That is easier than taking samples first to see whether it is really necessary.

'The environment still suffers badly from these high doses of poison. My colleague Frank Berendse showed in a large-scale European study that there is a strong correlation between the use of toxic chemicals in agriculture and a loss of biodiversity. I think we should get away from our current method of pest control and switch to a more sustainable form of crop protection, paying more attention to organic methods and other non-chemical alternatives. Because they do exist! This is a typical challenge for Wageningen: healthier food and a safe and nature-rich environment to live in.'

Joop van Lenteren is emeritus professor of Entomology at Wageningen University, part of Wageningen UR.

## Fast spread of Schmallenberg virus explained

The speed at which the Schmallenberg virus spread through Dutch livestock herds in 2011 is probably explained by the high percentage of gnats that were infected with the virus. This conclusion was drawn from research by the Central Veterinary Institute (CVI), part of Wageningen UR. The Schmallenberg virus was carried by three species of gnat which also played a role in the spread of bluetongue disease in western Europe. The percentage of infected gnats was five times larger than the percentage involved in the bluetongue epidemic of 2006-2008. The CVI studied these small biting insects because the virus belongs to a family that is often spread by gnats and mosquitoes. The outbreak of this viral infection led to the birth of many deformed animals in the Netherlands and Germany. The research results appeared online in September in *Emerging and Infectious Diseases*. Info: [armin.elbers@wur.nl](mailto:armin.elbers@wur.nl)



PHOTO: PIRBRIGHT INSTITUTE, UK



PHOTO: HOLLANDESE HOOGTE

## Ready for the wolf

**The Netherlands should prepare for the arrival of the wolf, advise experts at Alterra Wageningen UR after a study for the ministry of Economic Affairs, Agriculture and Innovation.**

The number of wolves in France has already been creeping up for 20 years; the wolf population in Germany has grown from one to around a hundred adult animals in just 10 years. And the predator has now been sighted in the Belgian Ardennes. In view of the wolf's capacity to adapt and its ability to live in a cultivated landscape, it cannot be ruled out that it will settle in the densely populated Netherlands, was Alterra's conclusion.

The researchers at the institute have advised the government to follow the example of neighbouring countries and draw up a wolf conservation plan, in line with the Bern Convention for the conservation of wild

animals and plants of 1979, and to designate habitats for the wolf. 'You should also include something about how to deal with a wolf that is being a nuisance,' says Geert Groot Bruinderink of Alterra. The advice also suggests working out regulations to cover damages and ensuring good communication between all those involved. Without hunting, the Netherlands could accommodate about 50 wolves. Research done earlier this year by Bureau Intomart showed that one third of the Dutch feel the wolf belongs in the country. Forty five percent of the population would welcome the return of the wolf, and one third would not. Info: [geert.grootbruinderink@wur.nl](mailto:geert.grootbruinderink@wur.nl)

## GENETICS

## New impulse for livestock breeding

A new top institute called Breed4Food is being formed by Wageningen UR together with breeding organizations CRV (cattle), Topigs (pigs), Cobb (chickens) and Hendrix Genetics (chickens and pigs). By working together the partners hope to speed up the rate at which

they find the genetic basis of complex characteristics in dairy cows, chickens and pigs. The ultimate aim is to develop breeds of animals which are less prone to disease, better able to convert feed into meat or milk, or display more sociable behaviour. Info: [hans.bothe@wur.nl](mailto:hans.bothe@wur.nl)





## CLIMATE

# More CO<sub>2</sub>, fewer clouds

**If there is more CO<sub>2</sub> in the air in future and the earth's temperature goes up, less water will evaporate from plants. There will then be fewer cumulus clouds to reflect light, which will mean even more warming for the earth.**

There is, then, a complex relation between the biological and the physical aspects of the climate system, concluded a research team with members from the Meteorology and Air Quality chair group at Wageningen University, part of Wageningen UR, and from two Max Planck Institutes in Germany, at the beginning of September in the online version of the journal *Nature Geoscience*. The researchers examined the way cumulus

could react to climate change with the help of a new model, developed in Wageningen, which combines soil, water, atmosphere and plant growth.

When the amount of CO<sub>2</sub> in the air goes up, plants close their stoma so that no more water can evaporate. The air which rises during the day therefore contains less moisture, and fewer clouds are formed.

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## NUTRITION AND HEALTH

# Less painful test for coeliac disease

Plant Research International and RIKILT, both part of Wageningen UR, are going to collaborate with companies, a hospital and a patients' organization to develop a new method of detecting gluten intolerance and unwanted gluten in food. With a growing number of coeliac disease patients, the

demand for gluten-free products and simple product tests is growing too. And for detecting the disease, a new test based on blood, saliva or urine is to replace the painful and expensive bowel biopsy with which gluten intolerance is established to date.

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## NUTRITION AND HEALTH

# Magnesium affects growth of bowel tumour

Magnesium-rich food appears to reduce the risk of bowel cancer. This is certainly the case among the over 55 age group and the overweight, although researchers are still not sure why. Together with British colleagues, Ellen Kampman, professor of Nutrition and Cancer at Wageningen University, part of Wageningen UR, studied people undergoing internal examinations because of bowel complaints. Early signs of bowel cancer were found less often in research subjects who ate a relatively magnesium-rich diet. An analysis of the data from comparable epidemiological research confirmed the findings. Kampman suspects that magnesium's main role is in the development of intestinal polyps into more malignant tumours.

The research results appeared online in August in *The American Journal of Clinical Nutrition*.

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## CONSUMERS AND NUTRITION



# More vegetarian main meals

Fewer and fewer people eat meat every day. Nowadays only 18 percent of the Dutch still eat meat every day as part of their main meal. Well over 40 percent eat meat no more than four times a week. These results emerged from a survey of a representative sample of Dutch adults, conducted by agricultural economics institute LEI Wageningen UR.

In spite of the downward trend in meat-eating, two thirds of the Dutch still feel they have only had a square meal if it included meat. Even people who condemn animal suffering still seem to be confirmed meat-eaters. Info: [hans.dagevos@wur.nl](mailto:hans.dagevos@wur.nl)

# Chemical weed killers best for keeping pavements weed-free



Banning the use of chemical weed killers on pavements and road surfaces will not help the environment. If you take the entire life cycle into consideration from the production of the raw materials to the processing of the waste, chemical methods have a substantially lower impact on the environment than burning, brushing, hot air or hot water. This has been shown by a study performed by Plant Research International, part of Wageningen UR, in partnership with IVAM, part of the University of Amsterdam. No single method for dealing with weeds on pavements and roads scores consistently best (or worst) on all environmental aspects. For instance, chemical methods cause the most water pollution while brushing scores worst for toxicity to humans. Using hot water to kill weeds produces the most fine dust particles.

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PHOTO NATIONALE BEELDBANK

## PLANT SCIENCES

## African fibres and wood documented

The Plant Resources of Tropical Africa foundation (PROTA) has published a comprehensive overview of African fibre and wood crops; the information is available online, on CD and in book form. Previously, this information was fragmented and difficult to access. Over the last few years PROTA has published similar overviews of the many varieties of African vegetables, dyes, tannins, grains, pulses, vegetable oils and medicinal plants. PROTA is a collaborative venture involving 11 scientific institutes, including Wageningen University, part of Wageningen UR. Its aim is to make scientific information on useful plants available in Africa.

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## ENTOMOLOGY

## Ladybird victim of exotic rival

**The Asian ladybird beetle devours the indigenous kind if it gets the chance. This fact goes a long way towards explaining the success of this exotic animal.**

The Asian ladybird has progressed in Europe from being used to combat lice to being a pest itself. The insect, which comes from China and Japan, was deployed in

the Netherlands in 1996 for the first time to tackle lice in greenhouses and on trees lining streets. But the introduction was a mistake. The newcomer settled here and decimated other ladybird populations. Lidwien Raak of Wageningen University and Marieke de Lange of Alterra Wageningen UR are investigating why. Their observations have revealed that if the creatures meet in the wild, the indigenous ladybird is eaten up by its Asian relative unless the indigenous animal is able to run away or drops to the ground. They reported this in an article in the scientific journal *PLoS ONE* in July. Use of the Asian ladybird has now been banned in Europe.

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## LAND AND WATER USE

# Water shortage threatens world food production

**Only substantial investments in improving the efficiency of irrigation systems and in water storage can secure a continued supply of sufficient fresh water for food production.**

This conclusion is drawn by Hester Biemans in her PhD thesis, which she defended in October at Wageningen University, part of Wageningen UR. Biemans analysed the combined effects of changes in climate and land use, population growth and economic development on the availability of water for agriculture.

Nearly one fifth of all the water used in farming comes from large reservoirs. However, given their capacity and the inefficiency of much irrigation, there is not enough extra water available to satisfy future increases in demand. Globally, harvests from irrigated farming could be 20 percent smaller by the end of the century than could be achieved with an adequate water supply. And harvests in some river basin areas in

southern Africa and South Asia could even halve as a result of water shortages, according to Biemans. This means more land is needed to satisfy the future demand for food than was previously thought – unless, that is, we start using water much more efficiently.

Biemans also looked into possible solutions. For example, modifications in five river basins in South Asia – such as improving irrigation efficiency and increasing storage capacity – could reduce the water shortage and consequently safeguard a greater proportion of food production. However, the study shows that there is no single ready-made solution, as the best measure differs for each river basin

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PHOTO LINEAR



Irrigation in Nigeria.

## EDUCATION



## Tomatoes in the classroom

Wageningen UR and vegetable seed company Nunhems have developed a study pack that introduces upper secondary school classes to the classic laws of heredity. Pupils doing the 'Mendel's tomato plants' practical lesson sow tomato seeds. Then ten days later they study the seedlings, assessing various features. For example, do the seedlings have dark-coloured or light-coloured cotyledons? Pupils see for themselves how genetic properties are inherited. The tomato seeds and study pack (in Dutch) can be obtained free via [www.tomaatindeklas.nl](http://www.tomaatindeklas.nl). More than 100 Dutch and Belgian secondary schools have ordered seeds since the study pack was launched in June. Info: [richard.finkers@wur.nl](mailto:richard.finkers@wur.nl)

## WAGENINGEN UR



## New website for Wageningen UR

Wageningen UR's new website was launched on 25 September. The new address – [www.wageningenur.nl](http://www.wageningenur.nl) – supercedes the old one, [www.wur.nl](http://www.wur.nl). The website has a new look and there are technical differences which the organization hopes make it easier for users to find information they want.



## Utility of biodiversity

It is still difficult to justify the utility of biodiversity in scientific terms. Gerard Jagers op Akkerhuis, who works at Alterra Wageningen UR, has attempted just that in his book *The Pursuit of Complexity*. He reaches some provocative conclusions in the book, offers a new framework for the debate and argues that evolution is not directionless. Readers will need to be prepared to put their set ways of thinking to one side. Info: [gerard.jagers@wur.nl](mailto:gerard.jagers@wur.nl)

### FOOD SECURITY

## Hunger remains even after food aid

The Ethiopian government has been giving the dry northern part of the country food aid for years but that has not reduced the hunger there, despite support programmes. This is because of a failure to tackle the reasons underlying the low agricultural productivity: environmental degradation, poor soil fertility, plant diseases, and a lack of technology and access to credit for farmers. As a result, production levels have often fallen while the population has grown. These are the conclusions Aschale Dagnachew Siyoum draws in the research for which he received his PhD in September at Wageningen University. Info: [thea.hilhorst@wur.nl](mailto:thea.hilhorst@wur.nl)



PHOTO LINEAR



# European forests falling in value

**If forest management bodies do not take action, the economic value of Europe's forests may be halved by the end of the century. Less valuable tree species are taking over as a result of climate change.**

The timber industry in Europe depends on two million square kilometres of forest, 32 percent of the continent's land surface. Climate change is expected to lead to a shift in the mix of tree species – and the first signs of this have already been seen. This development has economic as well as ecological consequences, say European forestry researchers – including Mart-Jan Schelhaas of Alterra Wageningen UR – in the scientific journal *Nature Climate Change*.

Studies with models show that commercially valuable species will disappear from large areas. That includes the spruce, which currently accounts for nearly half of the commercial value of all European forests. These species are being replaced by more drought-resistant species, such as various Mediterranean oak

species, which have limited commercial value for forest owners and the timber industry, and a restricted capacity for storing carbon. Depending on interest rates and the climate scenario, the value of European forests (excluding Russia) could fall by between 14 and 50 percent by the end of the century. The overall loss could be as much as 680 billion euros.

Projections for the Netherlands, however, are less dramatic. Schelhaas: 'The increased likelihood of drought in the summer could actually be an advantage for our trees. English oak trees and fir trees might benefit from this, mainly at the expense of beech trees. Given how long trees live, it is a good idea to start trying out alternatives to the existing species.' Info: [martjan.schelhaas@wur.nl](mailto:martjan.schelhaas@wur.nl)



## FOOD AND BEHAVIOUR

## Exploring flavours after school

**Taste lessons, a programme of lessons on eating and taste developed for primary schools with the help of Wageningen University, now includes a new study pack for children at after-school care centres.**

The after-school pack, developed in partnership with the Nutrition Centre, uses a light-hearted approach to introduce children to healthy, tasty food.

'Fun with flavours at the after-school centre' includes a folder with a hundred activities grouped into six themes. The children can get working independently on the activity cards in the ring file. For example, they can design an edible menu, paint with vegetables or work on their own fruit and vegetable plot. They learn through play about new

products, discover where food ingredients come from, learn to cook and find out what healthy, tasty food is all about. The people behind this initiative believe that the more children know about good food, the more likely it is that they will grow up to become healthy adults whose weight is right. At one after-school centre that tried out the pack, children, teachers and parents were very enthusiastic.

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## PLANT HEALTH



## Wild banana genome decoded

**The banana's hereditary characteristics have been mapped. That knowledge is crucial for combatting the fungal diseases threatening crops.**

Researchers at Wageningen UR took on part of the task of mapping the genome. They also paid especial attention to resistance to Panama disease, a major banana disease that remains difficult to deal with. The disease is caused by the soil fungus *Fusarium oxysporum*, which can be just as devastating as *Phytophthora* in potatoes. Bananas are a staple food for millions of people in Latin America, Africa and Asia.

In July the researchers published the genome for a wild banana variety in the scientific journal *Nature*; the Wageningen scientists discovered that this variety is highly resistant to a new, aggressive strain of Panama disease. This offers an opening for controlling and combatting the disease and improves scientists' understanding of the banana's resistance to fungi.

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PHOTO HOLLANDSE HOOGTE

## ENTOMOLOGY

## Mustard plant reacts to eggs

Plants not only release odours when eaten to chase away the attacker and attract its natural enemies, but they also do this when a pestiferous insect lays eggs on the plant. This finding was reported by researchers at Wageningen University, part of Wageningen UR, and the Netherlands Institute of Ecology (NIOO-KNAW), in the scientific journal *PLoS One* at the end of April. They discovered

that the black mustard plant changes, both chemically and structurally, when a cabbage white butterfly lays its eggs. These changes could repel the egg-laying butterflies and attract parasitic wasps that live off the butterfly eggs or caterpillars. The eggs of the far less common cabbage moth did not set off these kinds of changes in the plant.

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An illustration of various white ceramic dishes, including plates, bowls, and a spoon, floating in a dark, textured space. The dishes are arranged in a way that suggests a sense of motion or a chaotic scene, with some dishes appearing to be falling or floating in the air. The background is a dark, mottled blue-grey color.

PRODUCING FOOD FOR A GROWING WORLD POPULATION

# Nine billion people to feed

At the opening of this academic year, board chair Aalt Dijkhuizen made a plea for a doubling of global food production. The ensuing debate was shot through with strong emotions. Now, a number of scientists explain their views on the issue.

TEXT RENÉ DIDDE ILLUSTRATION RHONALD BLOMMESTIJN AND JENNY VAN DRIEL





‘An ox pulling a plough  
looks nice but is not  
remotely sustainable’

**A**t the opening of the academic year in September, Aalt Dijkhuizen, chairman of the executive board of Wageningen UR, stated that food production will need to increase in order to feed the growing global population. ‘There will be nine billion people on the planet in 2050, two billion more than now,’ said Dijkhuizen, ‘and all those people will be consuming more meat and dairy products, especially in fast-growing economies like China and India.’ Food production will therefore have to double in volume, argued Dijkhuizen. ‘Doubling production while satisfying the precondition that you minimize the environmental impact is only possible with intensive farming, as efficiency means fewer emissions, fewer natural resources and fewer chemical agents,’ said Dijkhuizen. The Netherlands is the perfect example. ‘We are the Usain Bolt of the food sector.’ Dijkhuizen also expressed his views in an

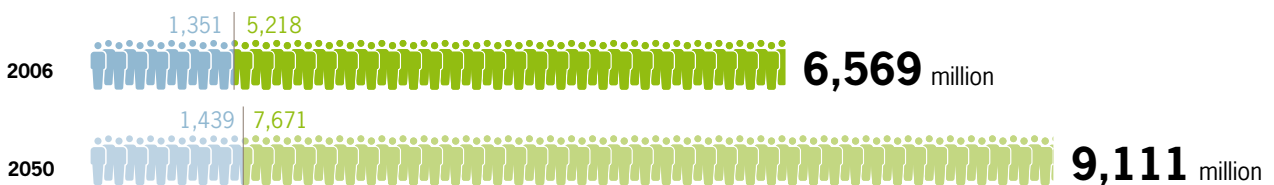
interview with Dutch national newspaper Trouw, and they were picked up on by television news and the rest of the press. There followed a flurry of letters to the press, some supporting and others critical of his stand. His plea was felt as an attack on the organic, small-scale farming that is all about more responsible production and consumption. In the main Dutch TV news, this viewpoint was represented by a farmer’s wife who stood cheerfully clapping her hands in a field full of cows. ‘We simply have to eat a bit less meat,’ she said. In retrospect, Dijkhuizen is somewhat astonished at the ideas ascribed to him. ‘I was amazed by the way what I said was changed, widened in scope and added to. For example, that agriculture in the Netherlands should become even more intensive, that I didn’t think animal welfare was important, or that I don’t give any priority to combating waste in supermarkets or households. I neither said nor meant any of that,’ says

the board chair. But he does believe that production per hectare and per animal must go up all over the world. To this end, the various agricultural systems around the world are all shifting in the direction of the Dutch-style system. ‘Both land and resources are getting scarcer, so people all over the world will have to raise their productivity and efficiency – just like in the Netherlands – in order to keep on feeding all those mouths. And that is good for the environment and climate at the same time – because per kilo of product you need less land and resources, and you generate fewer emissions and greenhouse gases – and you can definitely combine it with improving animal welfare.’

#### NOT A GREAT LIFE

Because have those twelve hens bound by the feet and transported live on a scooter to the market in Indonesia really had such a great life? ‘Of course that’s not a great life, any more than it is for the cows in India and

## GROWING DEMAND FOR FOOD



World population in 2006 and 2050

Developed countries Developing countries



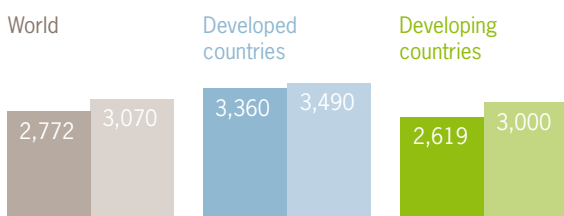
Food consumption world population in 2006 and 2050, per day

Source: FAO 2012

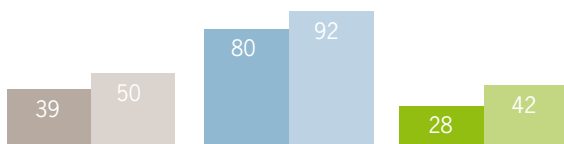


## INCREASE IN CONSUMPTION

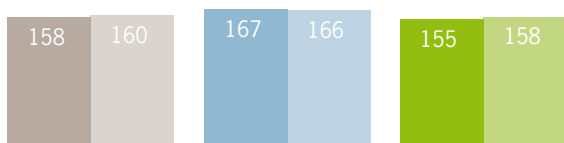
**Calories consumed**  
in kcal per person  
per day



**Meat consumption**  
per person per year  
in kilos



**Cereals consumption**  
per person per year  
in kilos



Source: FAO 2012

parts of Africa that are fed only on straw, ending up malnourished thanks to a protein deficiency,' says Theun Vellinga, a researcher at Wageningen UR Livestock Research in Lelystad.

Simple improvements in the feed for cows in Africa, Asia and Latin America can raise milk and meat production levels and improve public health, says Vellinga. 'In many places this would enable milk production to increase by a factor of four, sometimes from a mere 250 litres per cow per year to 1000 litres, sometimes from 1000 litres to 4000 litres,' explains Vellinga. 'I am convinced that this would give you the doubling in milk production by 2050 that Dijkhuizen wants to see.'

In other words, intensification and more efficient production are compatible with improvements in animal welfare. And these advances in efficiency do not require any Dutch-style mega-barns or cubicles. 'This is possible within the existing agricultural system. The key is sustainable intensification. The main thing developing countries can learn from the Netherlands is how we made huge improvements after the Second World War with our triad of research, extension and education. But when it comes to technology they should find solutions that suit their own countries,' thinks Vellinga. 'Those countries shouldn't try and imitate our excessive system of 10,000 litres per cow.' Vellinga thinks the reason Dijkhuizen's re-

marks caused so much commotion may be that he overturned the romantic image of sustainability and organic farming. 'An ox pulling a plough looks nice but is not remotely sustainable. Farming in Africa is often pure overcropping because the manure from the animals doesn't go back onto the land; it is burnt as fuel for cooking, for example. So the nutrients and carbon are being taken from the soil and not being replaced,' explains Vellinga. 'Until the 1960s, Dutch cows spent large parts of the year outdoors, even when it was boiling hot, or they were tied up in a barn. Now they are much more likely to be able to decide for themselves whether they stay indoors or outdoors.' ➤



Aalt Dijkhuizen, chairman of Wageningen UR executive board



Teun Vellinga, researcher at Livestock Research Wageningen UR

## ‘We need agricultural systems that can manage the decathlon’

Yet Wijnand Sukkel, a researcher of agricultural systems at Applied Plant Research, part of Wageningen UR, does think that the debate sparked off by Dijkhuizen has created a caricature of organic farming. ‘I like Dijkhuizen’s description of Dutch intensive farming as a Usain Bolt,’ he said in Resource. ‘A sprint of 100, perhaps 200 metres – record speeds but only for a few seconds. But what we need is agricultural systems that can manage the decathlon with ease,’ says Sukkel.

‘In addition to the technical aspects of food production,’ he emphasizes, ‘there are also ethical aspects such as animal welfare, socio-economic factors, culture and nature. Sustainability is symbolized by an athlete’s



Wijnand Sukkel, farming systems researcher at PPO, part of Wageningen UR



Han Wiskerke, professor of Rural Sociology at Wageningen University

stamina, because we will still need good agricultural land in 50 years’ time.’

And that is precisely what concerns Sukkel. ‘Far more than extensive systems, the current large-scale intensive farming system is leading to frightening degeneration in the soil quality of farmland all around the world, mainly due to erosion and the deterioration of organic compounds.’ Furthermore, says Sukkel, the global animal feed trade – especially in soya – means that here in the Netherlands we have been landed with an enormous surplus of nutrients in the form of a manure problem while other parts of the world have a shortage. ‘If he had said that farming around the world, including the Netherlands, needs a more knowledge-intensive agro-ecological approach, he would have had me on his side,’ says Sukkel. Our food production systems will need to become more stable and resilient, says Sukkel. ‘We need to shake off the strict segregation between agriculture and nature. Farming needs to make better use of the diversity in production crops. We need to move towards productive agro-ecological farming rather than intensive farming. Organic farming is ahead of the current conventional intensive farming in this regard. But organic farming could in turn make better use of the latest technological expertise.’

### HUNGRY FOR MEAT

Dijkhuizen also warned of the additional demand from the fast-growing economies of China and India. They will almost automatically shift to a more meat-dominated diet. That is inevitable and a cause for concern, according to Dijkhuizen. ‘In broad terms that’s right, but there are big differences between countries,’ argues Han Wiskerke, professor of Rural Sociology at Wageningen University, part of Wageningen UR. ‘The differences between China and India are huge. In 1960 both countries were consuming 3.5 kilograms of

meat per person per year. The figure now is 5.5 kilograms in India but 55 in China. It’s not likely that meat consumption in India will grow to western levels of 80 to 120 kilos a year in just over 35 years.’

Besides, there are other trends. ‘We are seeing meat consumption in Europe and the United States levelling off or even falling. If people also learn more about the disastrous effects of obesity in children and this leads to a change in dietary habits, the global demand for food in 2050 may not require a doubling in current production levels at all,’ argues Wiskerke.

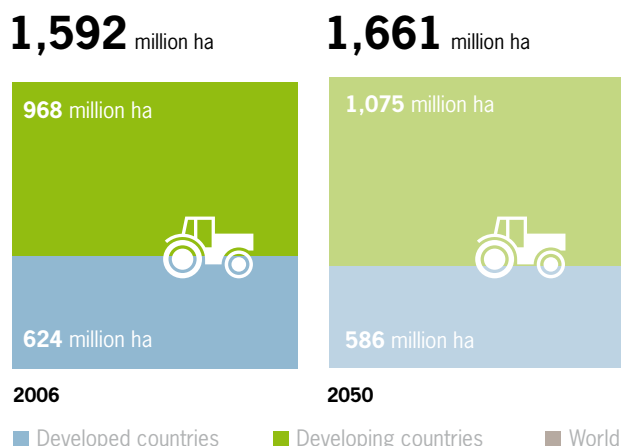
### SUBSTANTIAL SAVINGS

Like Vellinga and Sukkel, Wiskerke too thinks there is plenty of room for improvement in existing agricultural systems all around the world. And substantial savings are possible as well. ‘About 30 percent of food bought in the United States and Europe is thrown away while in Tanzania a lot of food doesn’t reach the cities because of the poor infrastructure,’ says the sociologist. Studies there show that small-scale poultry farmers are perfectly able to supply most of the inhabitants of the fast-growing city of Dar es Salaam with eggs. ‘Farmers with about a hundred free-range hens on the outskirts of the city cycle into the centre three times a week. They slalom past the traffic queues and supply the corner shops where the poor can buy a single egg if necessary rather than the standard boxes of six in the supermarket. That system works like a dream; the farmers earn more than a teacher. And guess what the farmers are asking for? Better cycle paths! That will reduce their losses. Fewer eggs will break because the farmers won’t have to cycle along the bumpy verge when delivering their produce.’ So not intensification at all, just small-scale, local improvements. That is why Wiskerke does not agree with the impres- ➤

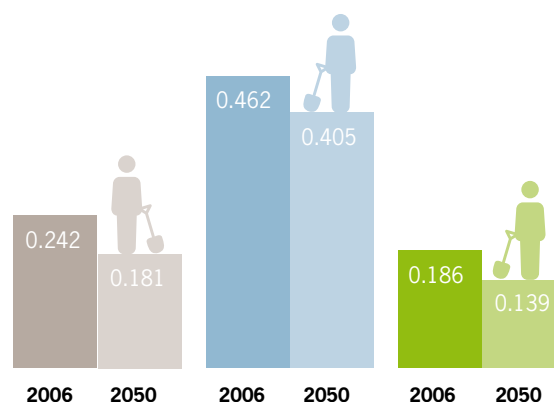


## INCREASE IN FOOD PRODUCTION

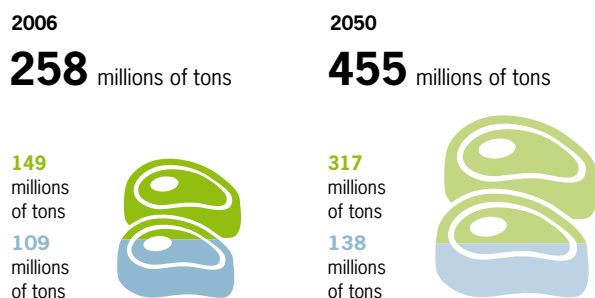
### Total farmland in use



### Farmland in use per person in hectares



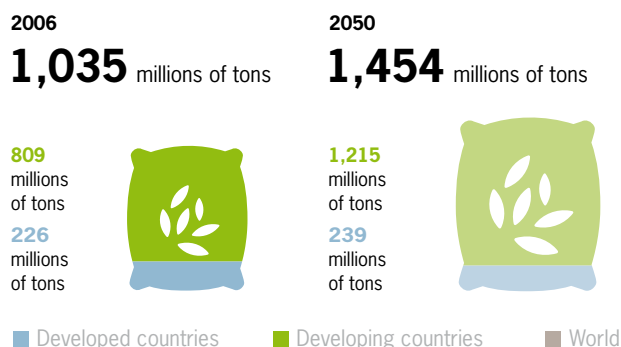
### Global meat production



### Grain yield per hectare, average global harvests



### Global grain production for consumption



Source: FAO 2012

sion given by Aalt Dijkhuizen that hunger or global food shortages are a production issue. 'That's simply not the case. Hunger is mainly related to affordability and the availability of and access to food. So hunger is a question of poverty and distribution. You don't solve the problem by doubling the production, and especially not by adopting Dutch-style farming practices. The challenge is to deliver tailored solutions everywhere and implement genuine sustainability, for example by becoming less dependent on oil and other increasingly scarce resources. Unfortunately, intensive



Martin van Ittersum, professor of Plant Production Systems at Wageningen University

farming in the Netherlands is very far from being a shining example to the rest of the world in that regard.'

### SIXTY PERCENT MORE

Martin van Ittersum, professor of Plant Production Systems at Wageningen University, cannot say exactly how much more food we need to produce to feed an extra two billion people. 'Nobody knows,' he says. Apart from the expected increase in meat consumption, it also depends on the volumes of biomass and agricultural products we will be producing as raw materials for a bio-based economy. 'Let's stick with the FAO estimate for now. It is assuming a 60 percent increase, so 1.6 times the current production rather than twice as much,' says Van Ittersum. But that is no foregone conclusion either. 'There is most definitely a need for intensification and increasing yields, and let's not forget reductions in post-harvest losses in many parts of the former Soviet Union, Asia and Africa. That means improvements to infrastructure, packaging and cold storage. In the West, and in America in particular, we should throw away less food marked as 'past its sell-by date' in supermar-

kets and uneaten food in fridges. When all those losses are added together, 30 percent of agricultural production is squandered. 'We could perhaps halve that figure.'

However, the major advances need to come from narrowing the gap between actual yields and the theoretical yields. 'That gap can be closed by better management of nutrients, water and crop protection products and by the use in some cases of modern genetic techniques,' says Van Ittersum.

### SIMPLE MODIFICATIONS

Van Ittersum expects that some places will see the development of highly intensive farming along Dutch lines. But in other places, such as many African countries, traditional farming will be able to improve through simple technical modifications, schooling and development of the markets, says Van Ittersum. 'Incidentally, Dutch farming over the past twenty years has consistently shown that it can become slightly more productive while simultaneously reducing the environmental impact. For instance, volumes of phosphate fertilizer have fallen in Western Europe since 1980 without this having an adverse effect on yields. This has been made

## USE OF GRAIN FOR BIOFUELS

Global use in 2006 and 2050, in weight and in percentage of total grain production

2006

**65** million tons

**3.2%**



2050

**182** million tons

**6.1%**



Source: FAO 2012

## ‘There is no single universal solution’

### WWF: ‘THE MORE INTENSIVE FARMING IS, THE BETTER’

‘If you have to choose between a tree and enough food for your child, the tree will always lose out,’ says Jason Clay, vice president for market transformation at the World Wildlife Fund (WWF) in the United States. He regularly meets with senior executives at multinationals to persuade them to give biodiversity a bigger role in their supply chains.

His claim: the more intensive farming becomes, the more nature and biodiversity will be left in 2050. That is why the WWF is supporting Aalt Dijkhuizen’s plea. According to Clay, we need to produce

just as much food in the next 40 years as we did in the last 8000 years. ‘That means doubling production. If nothing else changes, we will then need 70 percent of the earth’s land area for farming rather than 35 percent.’

*Isn’t a plea for more intensive farming rather strange coming from a nature organization?*

‘Business as usual isn’t enough anymore. Forty countries are currently using land in national parks for farming activities; they are sacrificing nature conservation.

In other words, the productivity per unit of land will need to increase dramatically while at the same time waste production and the burden on the environment will need to fall. We will also need to improve degraded soils and unproductive land. What is more, I’m convinced that modern genetic technology could help get better yields from local and regional crops in Africa and South-East Asia.’

*Is the Dutch farming system the way to go?*

‘None of the systems are functioning now in the way they will need to in 2050. We will need to produce twice as many calories with half the volume of water, half as much pesticides and half as much fertilizer. To achieve that, we need to develop new knowledge and improve its application. Wageningen is among the world leaders in that area and is unique in its global perspective.

‘The information gained in practical applications then needs to spread more quickly. In this information age it is unacceptable to have great ideas taking eight years to put down roots. That should be possible in two to four years. We have no time to lose.’



Jason Clay.

possible by using the phosphate accumulated in the soil.’ And so previous mismanagement is turned into a benefit.

Van Ittersum thinks there is no point polarizing things, with organic farming on one side and conventional farming on the other. ‘They are both necessary, they can learn from one another and converge to a certain degree. As Wageningen, we need to make sure others have access to our technical expertise in farming and our knowledge of markets and organizations, such as cooperatives.

That knowledge should be applied around the world in a form tailored to local requirements. There is no single universal solution.’

Dijkhuizen agrees on this point. ‘Every region will have to go about it in its own way. Different measures will be needed in the Ukraine than in Brazil or China. I think it is a pity my words have been interpreted so one-sidedly but I am happy that the issue of the global food supply is well and truly on the agenda again.’ ■

For further information see the internet dossier at [www.wageningenUR.nl/hoe-voeden-we-g-miljard-mensen](http://www.wageningenUR.nl/hoe-voeden-we-g-miljard-mensen)

Data source: World agriculture towards 2030/2050: the 2012 revision. FAO.



# Rat droppings in the post

**Wageningen scientists have enlisted the help of the Dutch public to find out which rat populations are resistant to rat poison. Anyone who finds droppings from the brown rat can send them in.**

TEXT NENKE BEINTEMA

Theo van der Lee had stopped getting post as everything comes by e-mail nowadays. But this year the scientist at Plant Research International, part of Wageningen UR (PRI), has been checking his pigeonhole every day. And nearly always finding something. Envelopes containing rat droppings are flooding in from all over the Netherlands. 'It's fantastic that people are making the effort to send them to us,' says Van der Lee. 'We'd never be able to do this study without their help.' Van der Lee is working with Bastiaan Meerburg of Wageningen UR Livestock Research on a project aimed at charting the resistance of Dutch brown rats to rat poison. Increasing numbers of rats are turning out not to be sensitive to the poison, and further information on this is required for rat control to be effective. And rat control really is needed, the re-

searchers emphasize. Rats can pass on diseases such as Weil's disease to poultry and sometimes even people. They feed on food stocks, which then have to be destroyed, and can cause damage to electrical wiring. 'Rats and humans are not a good mix,' says Van der Lee in summary. 'The damage is considerable.'

## INTERNAL BLEEDING

PRI was drawn into the project despite being a plant institute as it has a great deal of experience in inventing tests for showing specific genetic properties. Van der Lee explains that resistance to rat poison is programmed in the DNA. Rat poison acts on one particular protein that is necessary for blood clotting. The poison stops that protein from functioning properly and the rat dies from internal bleeding. But the protein has mutated in some rats due to a sim-

**'Rats and humans are not a good mix'**





ple change in the DNA; the protein still does its job but is no longer sensitive to rat poison. If only the resistant rats in a rat population get the chance to reproduce, it is not long before the entire group is resistant.

‘We developed a test to show this change in DNA in a relatively simple manner,’ explains Van der Lee. ‘You don’t have to sequence the entire DNA, which saves a lot of time and money.’ The test PRI developed is based on what is known as the TaqMan method, in which a preselected genetic mutation – in this case the mutated gene for the blood clotting protein – is revealed by means of a fluorescent signal.

#### **PULVERIZED**

The Wageningen researchers extract the rat DNA from the droppings that arrive by post. They use the latest technology for

this: a lab robot isolates the DNA from a purified ‘extract’ of the pulverized droppings. ‘We have had 160 packages up to now,’ says Van der Lee. ‘There is still a lot of interest so I’m expecting us to reach twice that number by the end of the year.’ Is that enough to be able to draw conclusions? ‘Definitely. Of course we’d like to process as many samples as possible but we are already seeing patterns.’ For instance, it is now clear that resistant rats can be found in large parts of the Netherlands. Especially in the east of the country, there are areas where all the droppings are from resistant rats. It also appears that the two different mutations of the gene have arisen, with each variant displaying different sensitivity to certain toxic compounds.

Van der Lee: ‘This information is extremely important in determining a rat control

strategy.’ If rats in a particular region are known not to be sensitive to a specific toxic compound, different toxic compounds could be used, or a combination. ‘And if the rats are resistant to everything, then we will have to use traps. Actually, they are always the first-choice strategy, but it’s good to know when poison is not an option anyway.’

In principle the project runs until the end of the year but Van der Lee says there are already concrete plans for an extension. ‘We want to add more detail to our map,’ he says, ‘but we also want to do more tests on the DNA we already have. We may find other mutations which contribute to the resistance too.’ ■

Information about the project’s progress and results can be found at [www.bruinerat.nl](http://www.bruinerat.nl) (Dutch only).



A vacuum toilet at the NIOO in Wageningen. The contents are vacuumed out under pressure, after which the toilet is rinsed with 1 litre of water.





**GRIETJE ZEEMAN,**  
personal professor of  
New Public Sanitation at  
Wageningen University

'Nutrients can be extracted  
from our wastewater. And there  
is every reason to do so.'

NEW PUBLIC SANITATION BLAZES A TRAIL

# Shame to waste it

**Extracting energy and minerals from the waste flushed down the toilet is both necessary and possible. Professor Grietje Zeeman wants to make the techniques for doing this broadly useable. The days of old-fashioned flush toilets are numbered.**

TEXT RIK NIJLAND PHOTOGRAPHY GUY ACKERMANS ILLUSTRATION JENNY VAN DRIEL

**T**hey come in porcelain and in stainless steel, in standing and wall-mounted versions, and from different makers.' Like an experienced salesperson, Grietje Zeeman (1951) of the Environmental Technology department at Wageningen University, part of Wageningen UR, outlines 'her' range of vacuum toilets. 'When you press the button everything is sucked away under pressure. Only when the valve shuts again does a litre of water flow in, to keep the toilet clean.' In the Technotron building on the Wageningen campus there are various urinals without a flush and separation toilets with a receptacle at the front of the pot for urine. By using this toilet you not only save water but also con-

tribute to research. The waste matter is piped to Zeeman's lab for further processing and purification. Zeeman (1951) gave her inaugural lecture as personal professor of New Public Sanitation mid-September. 'It's all about the collection, transportation and treatment of household waste water,' says Zeeman. 'What is 'new' about it is that I am adding extraction and reuse to the process.' Zeeman consistently refers to urine and faeces as 'resources', referring to nutrients such as nitrogen and phosphate compounds, and to organic matter which can be used to make biogas. These resources disappear into the sewer every day along with tens of litres of >

drinking water from each toilet. Zeeman wants to call a halt to this waste of water and of resources. To this end she has developed a sanitation method based on separating black water (from the toilet) from grey water (from the bath, shower, washing machine and kitchen), followed by anaerobic purification – i.e. using bacteria that do not need any oxygen. The UASB (Upflow anaerobic sludge bed) reactor used for this is a typical Wageningen product, developed by ex-professor Gatzke Lettinga.

### MASSIVELY DILUTED

Not only is biogas produced by this anaerobic purification, but nutrients can also be extracted for reuse in agriculture. It is almost impossible to apply this method in traditional sanitation systems. ‘The bacteria that are responsible for the anaerobic digestion process function better in warm conditions. In order to purify conventionally collected household waste water anaerobically, all that water would have to be heated. That would take too much energy.’

So sewage treatment plants traditionally rely on aerobic purification. The bacteria that do this work can function well in cold conditions. The disadvantage is that oxygen has to be added to the water, which costs energy. ‘What is more, those bacteria convert organic matter into CO<sub>2</sub> instead of into biogas that you can use as a source of energy.’

Zeeman has set herself the goal of making the ‘new sanitation’ broadly utilizable. First and foremost, that entails separating black and grey water. ‘You treat the grey water from the shower, bath, washing machine and kitchen separately. After a fairly simple level of purification, that water can be reused in the household, for irrigation or for soil infiltration,’ Zeeman explains. ‘A second important step is to reduce the amount of water used in the toilet itself. For this we have opted for a vacuum toilet: these are the only ones at present that

meet our demands for minimal water use and optimal comfort. Conventional toilets use about six to eight litres of water per flush; vacuum toilets just one litre. It is also a fully developed system, designed for aeroplanes and cruise ships, which we can simply copy-paste.’ The black water from the toilet is treated on the spot. This is no longer only done in the Wageningen lab, but also in various real-life situations.

Since 2006, for example, vacuum toilets have been installed in 32 new houses in Sneek in the northern Dutch province of Friesland. These toilets are linked with a treatment plant in situ, but because it was just a trial, the sewage system was kept as a backup.

‘Wageningen University wanted to set up a pilot project for decentralized waste water processing using anaerobic digestion. Then we stuck our necks out,’ says Henk Heikema van der Kloet, director/ manager of the De Wieren Housing Association in Sneek. ‘If you want to get sustainable, innovative techniques onto the market, you need experiments. That is the only way you will get innovations in newly built homes.’

### CHLORINE-FREE

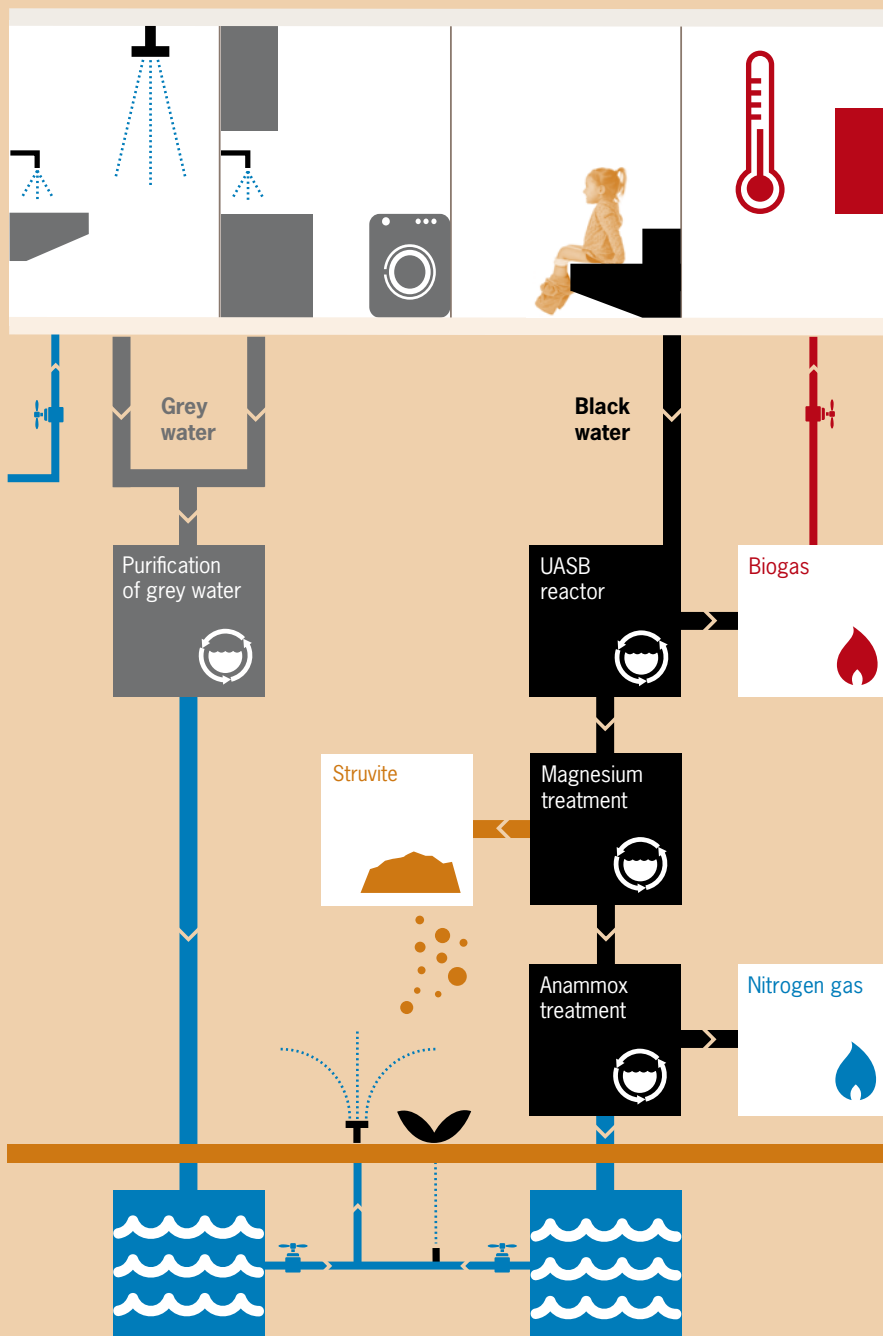
The study showed that the project partners, De Wieren and Patrimonium housing associations and Sneek municipal council, were satisfied with the system, as were the residents themselves. ‘Only the noise made by the vacuum toilet caused some complaints at first. So a sort of silencer was fitted onto it,’ says Zeeman.

Zeeman’s principle is now being applied by the DeSaH company, which commercialized the concept, in the newly built Noorderhoek housing estate of more than 200 houses. Confidence in the system is now so high that the traditional sewage system is being abandoned. ‘Here we are going to use the biogas produced to fuel a seasonal thermal storage system which will provide heating.’

Nutrients are extracted in Sneek as well. ‘In traditional water purification, most of the phosphate ends up in ➤

‘It is our duty not to  
waste phosphate’

## NEW PUBLIC SANITATION



**'New public sanitation'** stands for the collection, transportation and treatment of household waste water so that minerals can be extracted from it. The first step in the method is to separate black water (from the toilet) from grey water (from the bath, shower and kitchen).

After a relatively simple purification process, the grey water can be reused in the household and for irrigation.

The black water – which contains the most minerals – is purified by anaerobic bacteria in a UASB reactor which produces biogas, mainly methane.

Treatment with magnesium leads to precipitation of phosphate and some of the nitrogen compounds in the form of struvite.

The remaining nitrogen compounds are converted into nitrogen gas with the Anammox technology.





Anaerobic digester for purifying 'black water' and producing biogas, at the NIOO in Wageningen.

the sludge, which is then burned. And nitrogen compounds are converted by bacteria into nitrogen gas, which disappears into the air,' says Zeeman. In anaerobic purification most of the nutrients are in the watery effluent. 'That is sometimes seen as a minus point: the water cannot simply be discharged. But the flip side of that is that there is a considerable advantage: the nutrients can be extracted.' And there is every reason to do so, Zeeman stresses. 'Phosphate is a finite resource. We are already getting warnings of scarcity. It is actually our duty not to waste it.' In Sneek this is being done by treating the anaerobic effluent with magnesium so that the phosphate and some of the nitrogen compounds sink to the bottom in the form of struvite. 'Currently that is just being

collected but we are hoping to get struvite approved as a fertilizer for use in agriculture. That way we can close the cycle and the nutrients that get into our food through agricultural crops go back to the fields.'

### PRODUCTION OF FERTILIZER

In Sneek, the nitrogen compounds that are still in the effluent at this point are converted into nitrogen gas by anaerobic bacteria. Nitrogen is not a finite resource – the air is full of it. Nevertheless, it is worth extracting from the waste matter. 'One percent of worldwide energy consumption goes into producing artificial fertilizer by extracting nitrogen from the air. So extracting nitrogen is really a way of saving energy,' states Zeeman. 'However, the effluent is still too

‘To apply this on a large scale you need new infrastructure’

diluted for it to be possible to extract nitrogen in an energy-efficient fashion with the existing technology. We use PhD research projects to work on alternatives such as using ammonia to generate electricity in a microbial fuel cell.’

Zeeman is also hoping to see innovations in the sanitation branch. ‘I am no toilet designer but I think it should be possible to design a separation toilet in which you only use one litre of water for the faeces, while collecting the urine. In that case you can not only extract the nitrogen more efficiently, but you can also carry out the anaerobic purification at higher temperatures. By using thermophilic digestion at 50 to 70°C, for example, whereby biogas production is linked with disinfection. My future research will concentrate on this anaerobic disinfection. We shall also look at ways of cleaning up the micro-pollution such as traces of drugs and hormones.’

### ALGAE AS HARVEST

Meanwhile, Zeeman’s approach has reached other places too. The Villa Flora at the Floriade horticultural expo in Venlo, for example, is equipped with a vacuum toilet and a digester. Closer to home, her principles can also be seen in action at the Dutch Institute for Ecology (NIOO), which moved into a new building for about 250 employees in Wageningen early in 2011. ‘The construction was based on the cradle-to-cradle principle, in which cycles are closed,’ explains Louise Vet, director of the institute. ‘Before building started, I asked Environmental Technology: what is the state of the art and how can NIOO take things a step further? That is how we ended up with the idea of the vacuum toilet and anaerobic digestion, but that was not enough for us. We want to use the effluent coming out of the digester for something useful such as feed for growing algae. We are working on

that with Grietje Zeeman now.’ NIOO and Environmental Technology are studying whether an algae reactor can provide a method of extracting phosphate and nitrogen compounds. The algae grow – still in the lab at present – on the water that comes out of the digester. The ‘harvest’ can be processed into fertilizer, fish feed, bioplastic or fuel. ‘Our building is an engine for new research. That is a great adventure,’ says Vet.

### LARGE-SCALE USES

Zeeman’s appointment as professor reflects her role as a trailblazer. And yet the predominance of old-fashioned water purification has not been challenged yet. ‘In 2001, we started with three homemade cubicles in a testing centre. Ten years on, a few projects have been carried out. I am certainly satisfied; this is a long-term ambition,’ says Zeeman. ‘To apply it on a large scale you need new infrastructure. Sewers last at least 50 years, so you cannot just dig up all that investment tomorrow. That is why we need to set out a strategy for a transition from old to new infrastructure. Water boards often tell me: we would really like to introduce new sanitation systems but we have just installed a new sewer. Or: we have overcapacity in water purification. I want to develop modules that can be installed when part of the system is up for renewal.’ Little by little, then, our old-fashioned toilets will have to make way for the new. ‘It is definitely easiest on a new housing estate or in a renovation project,’ says Zeeman. And when residents are highly motivated. Like Zeeman herself: she lives in an old house in Wageningen that is currently under renovation. A vacuum toilet is being installed on every floor, linked to an anaerobic digester. ‘No, it is not profitable. Normal people would certainly never do it, but I want to practice what I preach.’ ■



# The elm can be trusted again

**Dutch elm disease almost wiped out the elm right across Europe. Now, in part thanks to Wageningen research, there are resistant varieties on the market. All that remains is for nature managers to pluck up the courage to plant this distinctive tree again. ‘Elms became synonymous with disaster.’**

TEXT NIENKE BEINTEMA

S tately elms lining rivers and canals, on village squares and on every city street corner... One hundred years ago, they were a fixture of the landscape in the Netherlands and its neighbouring countries. And if it is up to Jelle Hiemstra, they will be so again in the not-too-distant future. Hiemstra

works at Applied Plant Research (PPO), part of Wageningen UR, where he leads a project called ‘A future for the elm’. This joint project involving scientists, tree nurseries and municipal councils has delivered a top 10 of new elm varieties which are resistant to the fungal disease that wiped out the ‘ancient’ elm.

‘The elm is an ideal tree for both city and countryside,’ says Hiemstra. ‘It can cope with high winds, and even with salty sea breezes. That is why it used to be such a feature of the coastal areas. And it can handle the tough conditions in the cities. No other tree species is a perfect substitute. We don’t





want to lose the elm.’ But that is precisely what happened on a large scale over the past century. In the early years of the 20th century the Asian fungus *Ophiostoma ulmi* turned up in Europe. Asian elms are resistant to this fungus, but their European counterparts are not. The fungus disturbs the sap flow, causing leaves, branches and eventually the whole tree to die off. The elm bark beetle, which lives off the sap of the elm, quickly spread the fungus throughout Europe.

### BREEDING FOR RESISTANCE

‘As early as 1928 Dutch researchers started a breeding programme in order to develop new resistant varieties,’ explains Hiemstra. ‘That work was later continued in Wageningen at the then forestry institute De Dorschkamp.’ This programme went on until 1992 and was a textbook example of successful traditional breeding. Hiemstra: ‘As a starting point, the researchers took Dutch varieties with useful characteristics, the most important being all-round robustness. Resistance was bred into those varieties from Asian elm varieties. Then it was a question of endless further breeding: selecting seedlings with resistance to the elm disease as well as the right characteristics, and breeding out undesirable charac-

teristics. In total 100,000 saplings were grown and tested for resistance.’ Meanwhile, in the nineteen seventies a new and aggressive variant of the elm disease emerged. Even though their breeding work had had good results, nature managers lost their last remaining faith in the tree. ‘Elms became synonymous with disaster,’ says Hiemstra. ‘Nobody wanted to plant them anymore.’

Something had to be done about that, thought Wageningen scientists. They joined forces with tree nursery owners and municipalities and launched the ‘Future for the Elm’ project in 2006, with the support of the Horticultural Product Board, the municipality of Amsterdam and De Bonte Hoek tree nursery. ‘It had two goals,’ says Hiemstra. ‘Firstly to test and compare the resistance of the new Dutch and foreign elm varieties under Dutch conditions. And secondly, to show what you can do with them in both town and countryside, and thus to restore nature managers’ faith in the elm.’

### GOOD PERFORMANCE

The Wageningen researchers tested the resistance of all new elm varieties available on the market. This was done on trial plots in the Betuwe area of the Rhine delta. The

trees were deliberately infected with the fungus which causes the elm disease, with a view to convincingly demonstrate their resistance. ‘That part of the research has now been successfully completed,’ says the researcher. ‘Out of 20 promising varieties we selected 10 that perform very well. We also tested the trees’ other characteristics in real situations. First in Amsterdam, in the harbour area and on the IJburg islands, and then in five other municipalities.’

The researchers will continue to monitor their ‘trial trees’ until 2015 at least. Hiemstra hopes to be able to expand this work. ‘We are looking for older trees, from resistant varieties bred in the nineteen seventies, for example, to see how they perform. And we also want to do some trial planting in other parts of the Netherlands.’ But Hiemstra is satisfied with the progress of the project to date. ‘Managers have enough varieties to choose from. They just need to pluck up the courage to take the plunge. The research that is still going on now is targeted at this. The only thing we haven’t managed to do is to get the distinctive broad crown of the old Dutch elm back. The new varieties are all a bit taller and slimmer.’ ■

Info: [www.wageningenUR.nl/jep-in-nederland](http://www.wageningenUR.nl/jep-in-nederland)

# Why food prices are high

**When global food prices shot up in 2008, panic broke out all over the world. Some countries decided to restrict exports so as to be able to feed their own populations. Now, once again, the prices of agricultural produce are high on global markets. Why is this? And is it a bad thing?** TEXT KORNE VERSLUIS ILLUSTRATION JENNY VAN DRIEL, WAGENINGEN UR

**Food prices are a matter of supply and demand: is there enough food for a growing world population?**

Over much of the past 50 years, world food production grew consistently faster than the world population, causing the price of food to plummet. That was until the year 2000 when the trend reversed and prices started to rise – slowly at first and more recently in sudden spurts. Can agriculture no longer keep up with rising demand? On the contrary, believe world food organization FAO and the Organization for Economic Cooperation and Development (OECD). This year they jointly published a forecast until 2021, and they think food production will continue to outstrip the growth in the world population in the decade to come. Growth in food production is set to level off, however – from 2.3 percent in recent decades to 1.7 percent in the coming years – but it will still be sufficient to produce 0.7 percent more food every year per world citizen.



### What is the current level of world food prices?

There are several different indicators for world food prices. The FAO and the World Bank both regularly publish statistics, including a food price index based on export prices of a number of commonly traded food crops. Both institutions report that food prices are about as high as they were in 2008. That is twice as high as the average between 2002 and 2004. The World Bank reported record prices for maize and soya this summer.

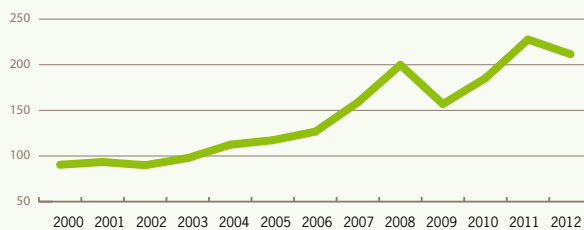


### What drives prices up?

According to the World Bank, one of the main reasons for the high prices is an exceptionally hot dry summer in the 'corn belt' in the United States. It has not been as dry in America as it was this summer since the nineteen fifties. And it was not just in the US that the weather was bad, but also in Russia, the Ukraine and Kazakhstan, where the summer was dry and 10 percent less grain than expected was harvested. In anticipation of a short-fall, traders are charging higher prices.

FAO Food Price Index: an indication of relative international world food prices.  
2002-2004 = 100.

Source: FAO



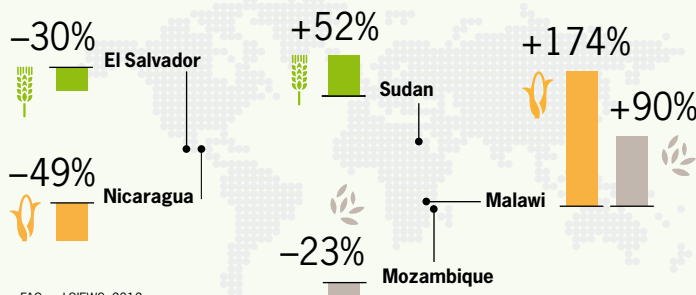
### Where do you pay 'world food prices'?

On many local markets there is no sign of the prices set in offices in Rome or Washington. An overwhelming proportion of the food produced worldwide does not come onto the global market but is traded and processed regionally. The price of rice on the world market went up by 7 percent between July 2011 and July 2012, for example; the price of maize rose by 11 percent, and that of wheat by 14 percent. Yet in the same period in Malawi, the price of rice went up, not by 7 but by 90 percent, while in Mozambique it went down by 23 percent. In Malawi you paid not just 11 percent more for maize, but 174 percent more, but in Nicaragua you paid 49 percent less. The price of wheat in Sudan rose during that period by 52 percent, while in El Salvador it dropped by 30 percent.

### Changes in the price of food crops

at various locations around the world between July 2011 and July 2012.

Average price change Wheat +14% Maize +11% Rice +7%



Source: FAO and GIEWS, 2012

**The local harvest has a much bigger impact on prices than the world market**





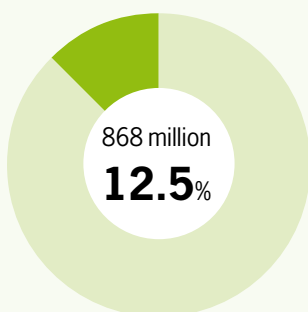


### What were the consequences of the price peak of 2008 in the end?

The high prices came in for extra attention in 2009 because the UN reported that the number of people going hungry in the world had risen above one billion, partly due to high food prices. At the beginning of October this year, the FAO adjusted that figure downwards. Further analysis had shown that the price peak had in fact had very little effect on the number of people going hungry. To some extent, this good news could be attributed to the FAO's chosen method of calculation. Hunger levels were overestimated because the model could not handle fast price fluctuations, the organization claimed. But at least as important was the fact that in many countries, such as China, India and Indonesia, the prices during the peak had hardly gone up.

#### Hunger

Number of people going hungry in the world, 2010-2012. In numbers and in percentage of world population.



Source: FAO, WFP, IFAD. 2012.

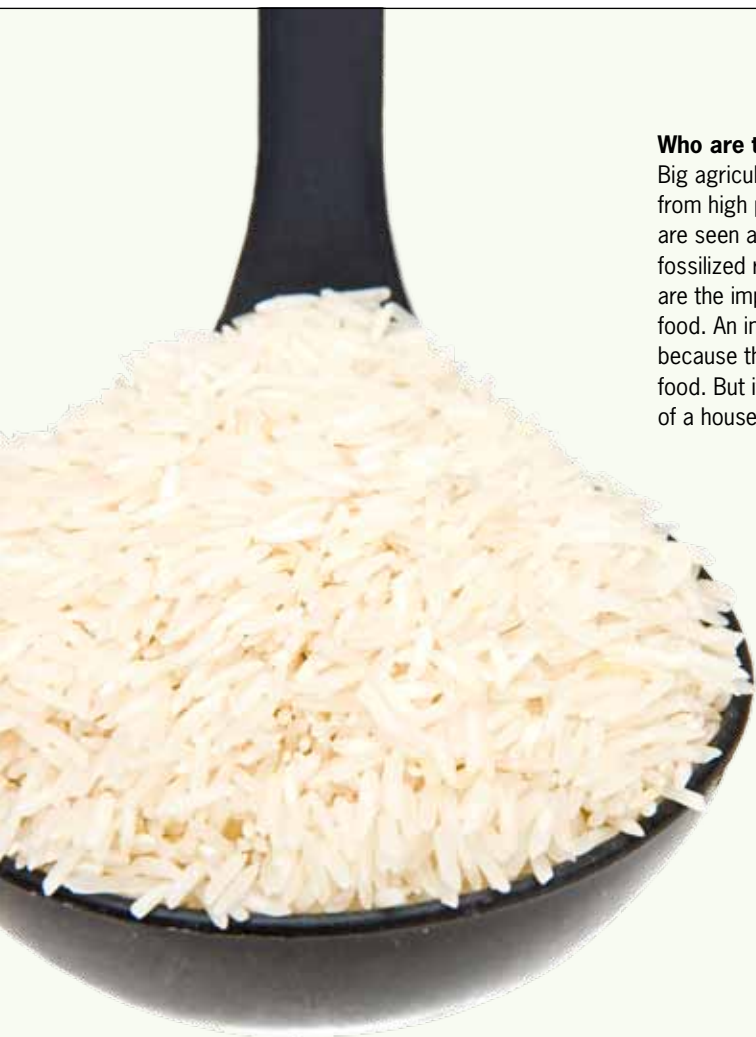
### Does speculation play a role?

After the price peak in 2008, several economists said the soaring prices were partly due to speculation and investments. Various financial products in that period offered the opportunity to speculate on rising food prices, and the big influx of money into those funds was said to have driven food prices up. This claim is still controversial among economists. According to the sceptics, investors only confirm existing trends; their money is at stake so they are not eager to speculate on uncertain price rises. The prices, goes this argument, only rise because investors make sure they are well informed about the current situation and base their decisions on that. What is more, say the critics, the proponents of the theory do not differentiate between various different sources of finance. Speculators always go for options and the trade in those has very little influence on prices in the here and now, they argue. It is not yet possible to declare a clear winner of this debate.

### And is there such a thing as desirable world food prices?

The experts put out mixed messages about this, said Belgian economist Johan Swinnen in an article published in *Science* at the beginning of this year. After 2005, the FAO sounded the alarm because food prices were too low, he explains. That depressed farmers' incomes, leading to severe poverty. In 2008, the same organization held a summit about the price hikes which, it said, also led to severe poverty. The truth is more complicated, Swinnen explained. High prices are a blessing for farmers but a curse on city dwellers. But, says Swinnen, development organizations only stand to gain from bad news, so that is what they tell. And this trend, he believes, is reinforced by the media, which have a preference for bad news. High prices do create winners too, and they are found in the countryside.

**High prices do create winners too, and they are found in the countryside**



### Who are the victims of higher food prices?

Big agricultural exporters such as Australia, Argentina and the US benefit from high prices. The victims are the importers. For this reason, high prices are seen as one of the causes of the Arab Spring. Latent dissatisfaction with fossilized regimes was ignited by anger at the high price of food. Hardest hit are the importing countries in which people spend most of their income on food. An importer such as Norway is not seriously affected by a price rise, because the Norwegians only spend about ten percent of their income on food. But it is a different story in the Congo or Liberia, where more than half of a household's income goes on food.

Percentage of income spent on food

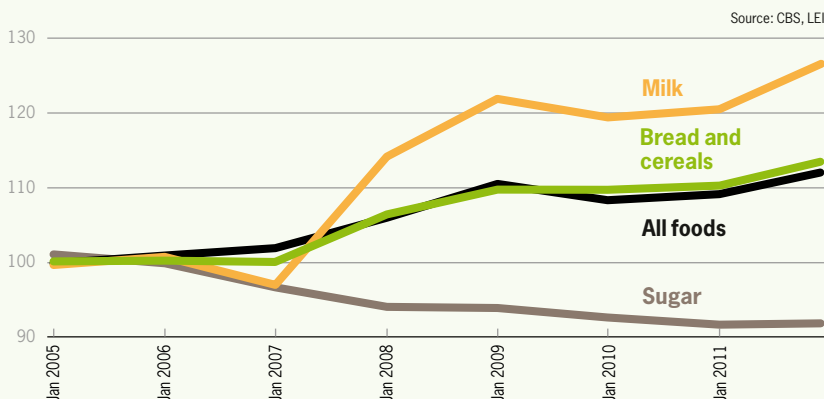


Source: USDA, 2011

### Are Dutch consumers paying more for their food?

The world price plays a very modest role in the Dutch supermarket, the LEI shows. The Netherlands is an importer of food such as cereals and soya. However, the prices of most foods rose very little more than the rate of inflation between 2005 and 2011. Sugar even went down in price. And milk, which is produced in the Netherlands, went up in price.

Relative price of foodstuffs in the Netherlands  
2005=100



Source: CBS, LEI

### What is the influence of biofuels?

LEI Wageningen UR states in a dossier on the high food prices that biofuels are not the main cause of the high prices, but that they do play a role in them. The targets for the use of biofuels in the European Union, the US and Brazil create an increased demand for food crops. The EU obliges oil companies to mix biofuel into their petrol, while in the US one third of the maize harvest is processed into bio-ethanol. In spite of that extra demand, American maize exports were kept up at the same level until last year. So biofuels do not play more than a minor role, according to the LEI. ■

Info: Internet dossier on food security and FAQ on world food prices:  
[www.wageningenUR.nl/lei/foodsecurity](http://www.wageningenUR.nl/lei/foodsecurity)

# Ten percent lower emissions





## The new harbour tugboat E3-Tug saves fuel and cuts emissions. IMARES Wageningen UR developed software for calculating an optimal combination of electric and diesel power.

TEXT HANS WOLKERS PHOTOGRAPHY SMIT

**‘We estimate the fuel savings at 5 to 10 percent’**



Harbour tugboats are extreme vessels. With their enormous engine capacity, four tugboats can tow a supertanker of 350,000 tonnes into a harbour. Rather as if four sturdy mice were towing a human being through the water. But these powerful diesel engines consume relatively large quantities of fuel, even when the boat does not have to tow anything heavy. ‘Measurements have shown that this top capacity is only used for 2 percent of the time,’ says Jules Verlinden, Innovation Coordinator for the Rotterdam company SMIT Harbour Towage, part of the Royal Boskalis Group. That is inefficient and means needless energy consumption and emissions of harmful substances. In anticipation of ever stricter environmental regulations, SMIT thought it was high time for a sustainable tugboat. Together with shipbuilder Damen Shipyards and IMARES Wageningen UR, the tug services company launched a project to develop the E3-Tug, a hybrid tugboat powered by both diesel and electric motors.

### DEVELOPING SOFTWARE

Working with Damen, IMARES modelled the emissions from tugboats under a range of conditions, from diesel engines running on standby to tugging large tankers. Software was then developed for optimizing the use of the diesel and electric motors so that the boat could meet local environmental regulations. ‘The environmental effects of emissions de-

pend on what the local area is sensitive to,’ explains Chris Karman, maritime marketing manager at IMARES. ‘In densely populated areas you want to minimize the amounts of fine particles and nitrogen oxides, whereas in less densely populated areas you can focus more on reducing CO<sub>2</sub> emissions or underwater noise.’ This system gives the company a choice about which impact it wants to minimize.

### PROFITABLE OPTIONS

Verlinden at SMIT is enthusiastic. ‘Electric power is especially useful for light work such as sailing without a load,’ he explains. ‘Only when there is heavy work to be done, such as tugging, does the software engage the diesel engines.’ These engines are therefore only used when they are really needed. The new model of tugboat delivers environmental benefits and sustainable and profitable options that can be applied anywhere. The boat will cost a lot more than a regular tugboat, however. ‘Our estimate is that the E3-Tug can operate with about 10 percent lower emissions and fuel savings of 5 to 10 percent,’ claims Verlinden. ‘With rising fuel prices, we expect that the boat will be cost-effective.’ The E3-Tug is a collaboration between SMIT Harbour Towage, Alewijnse Marine Technology, Damen Shipyards, TU Delft, Wageningen UR (IMARES) and the Port of Rotterdam company. ■

NANOTECHNOLOGY TAKES OFF

# Small particles, big potential

**An electronic tongue, sieves that can detect pathogenic bacteria within an hour, and molecules that can help with tracking down and killing tumours.**

**Wageningen UR is going full steam ahead with nanotechnology – but not without weighing up the potential human and environmental risks.**

TEXT ASTRID SMIT PHOTOGRAPHY ANP ILLUSTRATION SCHWANDT INFOGRAPHICS

It is up to Maarten Jongsma, tasting panels will soon be up against some stiff competition. They will not need to taste all the new products that food companies dream up because an electronic tongue will have done the groundwork. Jongsma, a researcher at Plant Research International, part of Wageningen UR, is working on creating a chip with miniscule human taste and odour receptors on it. It detects odours and tastes just as precisely as a real tongue does. Perhaps even more so. Because while a human being's sense of taste may be distorted by whatever he or she has just eaten, this electronic tongue stoically goes on registering whatever taste comes its way. A perfect tool for breeders or manufacturers who want to know how their new product tastes. 'We are not there yet, though,' says Jongsma. 'There are quite a few technical problems still to be solved. But if it is up to us, this electronic tongue will be in use in a few years' time.' And it won't stop with an elec-

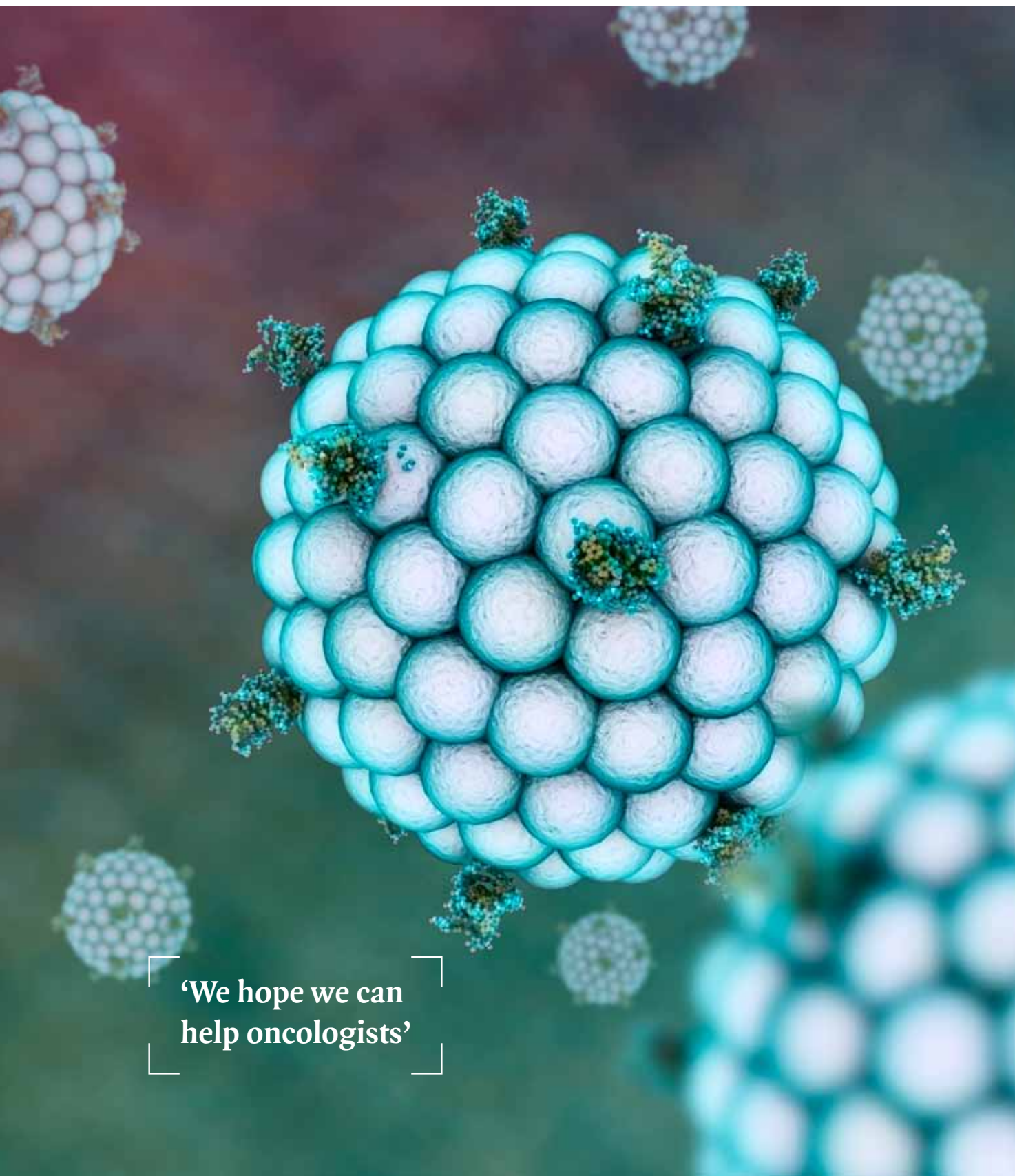
tronic tongue, either. There may one day be an electronic bowel with all the receptors found in the human bowel, or an electronic brain with human brain receptors. Jongsma: 'Human beings have about 1000 receptors for chemical signals. The genes for these have already been mapped so in theory we could put those receptors onto a chip.' Such a chip can also be used to test potential medical drugs, says Jongsma: 'Now pharmaceutical companies use things called microtitre plates. This is a relatively expensive method because you need 1000 times more testing material than you need if you use these chips.'

## HUMAN RECEPTORS

The development of a chip with human receptors is one of Wageningen's promising projects in the field of nanotechnology. In the past five years, Wageningen UR has made a big push into this new science. Last year NanoNextNL – a research programme

in which universities, government and the business world invest jointly in micro- and nanotechnology – allocated 20 of its 250 million euros to Wageningen project proposals. This meant that, after the Technical University of Twente, Wageningen got the most funding in this programme. Frank Kampers, coordinator of the Wageningen research programme that paved the way for this one: 'During the period 2007-2010 we very consciously built up the knowledge to be able to gain a position in this investment programme, especially in the area of food nanotechnology, one of the ten themes within NanoNextNL. And we succeeded.'

The group that gained the most funding was the one led by Han Zuillhof, professor of Organic Chemistry at Wageningen University, part of Wageningen UR. The funding enables him to set 10 fulltime scientists to work. 'Our core specialism is introducing layers one nanometre thick onto >

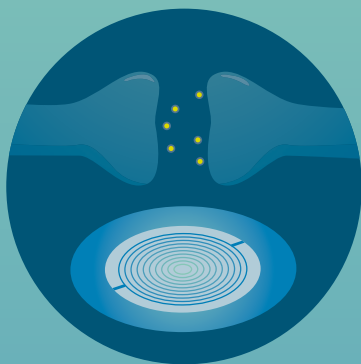


Visualization of a new organic nano molecule with other molecules attached to it.



## NANOTECHNOLOGY FOR FAST AND SUPER-PRECISE DETECTION

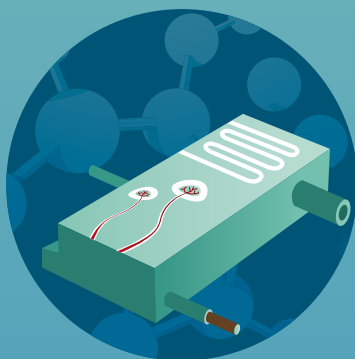
A major branch of nanotechnology research within Wageningen UR is the development of fast and super-precise means of detection. Using bio-molecules which detect harmful bacteria, for instance, and are embedded in a one-nanometre-thick layer of material. Or using human receptors on chips that identify the taste of foods, for example. Or even using newly created nanomolecules which look for specific cells in the body such as cancer cells.



### CHIPS WITH HUMAN RECEPTORS

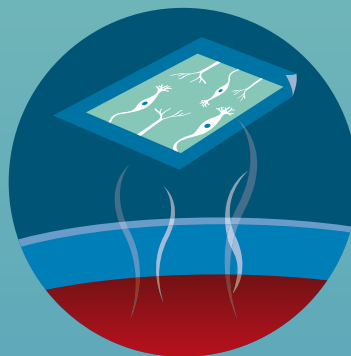
#### Electronic brain

Chips with human brain receptors which detect neurotransmitters, growth factors and hormones: substances which regulate health and wellbeing. Pharmaceutical companies could use the chips to test whether a medicine really does block a particular signal substance.



#### Electronic tongue

Chips with miniscule human taste and smell receptors make it possible to find out whether a new food flavour will fulfil consumers' wishes, using very little testing material and without the aid of time-consuming taste panels.



#### Electronic bowel

Chips with human bowel receptors which regulate such things as a feeling of satiety, inflammation responses and secretion in the bowel and related organs. Pharmaceutical companies could use the chips to test medicines that work through the signal substances and receptors in the bowel.

material,' says Zuilhof. 'A specialism which paves the way for many new applications, such as the electronic tongue. This is because we can place on that layer all sorts of bio-active molecules which bind bacteria to themselves, or which intercept specific proteins or molecules.'

For example, his research group is working on microsieves with which it is possible to establish quickly which bacteria are present in a liquid. The sieves have a silicon nitride coating on them on which there are specific antibodies which only hold onto the target bacteria. 'This could be a useful tool for General Practitioners and hospitals. Like

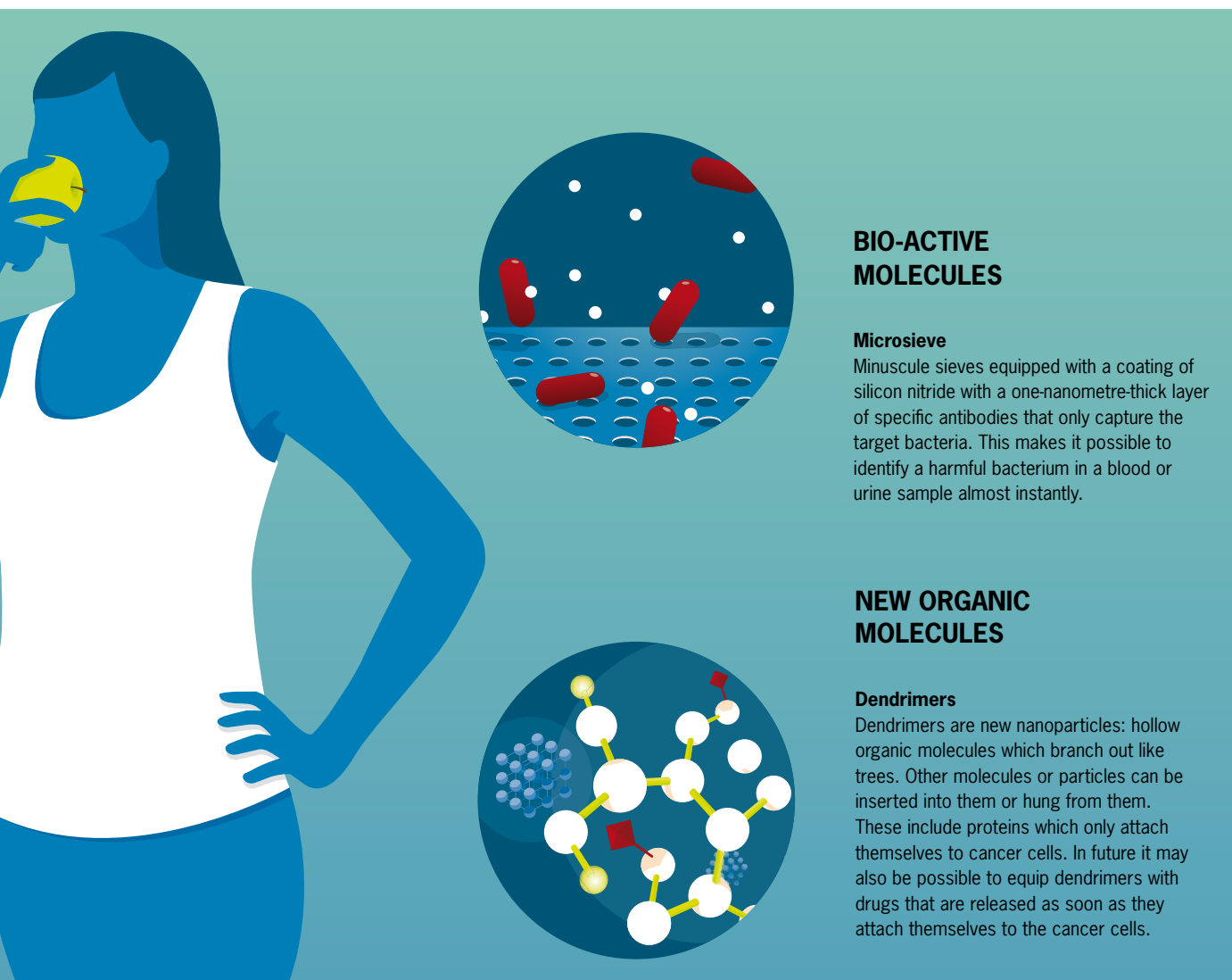
this they can almost instantly establish whether a urine sample contains a harmful bacterium and the patient can be started on the right antibiotic straightaway. Currently they first have to culture the sample, only seeing the result after four days. That is quite a gain,' says Zuilhof. 'The sieves can also be used to detect bacteria on other fluids such as blood or sputum.'

### SALMONELLA IN SALMON

According to Kampers, then, much of the nanotechnology being developed in Wageningen will soon make faster and better detection possible. The detection of

tastes and odours by means of the electronic tongue, for instance, and the detection of rotten packaged meat or fish in hospitals or the food industry. 'The dream of every food manufacturer is to have a dipstick which tells you within an hour whether your product is free of pathogens. With such a test, the recent outbreak of salmonella poisoning in the Netherlands, which came from infected salmon from a company in the town of Harderwijk, could have been prevented. I think nanotechnology can make that dream come true.'

The food industry also hopes to use nanotechnology to produce better quality and



## BIO-ACTIVE MOLECULES

### Microsieve

Minuscule sieves equipped with a coating of silicon nitride with a one-nanometre-thick layer of specific antibodies that only capture the target bacteria. This makes it possible to identify a harmful bacterium in a blood or urine sample almost instantly.

## NEW ORGANIC MOLECULES

### Dendrimers

Dendrimers are new nanoparticles: hollow organic molecules which branch out like trees. Other molecules or particles can be inserted into them or hung from them. These include proteins which only attach themselves to cancer cells. In future it may also be possible to equip dendrimers with drugs that are released as soon as they attach themselves to the cancer cells.

healthier food. Kampers puts a jar of 'nano-naise' on the table. 'It will never be put on the shelves like that of course. A name like that will not attract any consumers at all. But it spells it out that Wageningen is researching whether you can improve foods using nanoparticles.' In one project, the group led by Wageningen University professor of Agrotechnology and Nutrition Sciences Remko Boom is working on how to make water droplets with a nano coating of fat molecules. 'Because of the fatty outer layer, the product still tastes the same but it contains fewer calories.' These kinds of nano coatings can also be used for such ends as ➤

**'We can track down  
a harmful bacterium  
almost instantly'**

## 'Nanoparticles can end up in the food cycle'

masking the nasty taste of healthy nutrients such as fish oil, or for getting health-promoting bacteria through the stomach without their being broken down there.

### HELPING ONCOLOGISTS

Wageningen is also experimenting with nanoparticles outside the NanoNextNL programme. Funding from the Ministry of Education, Culture and Science, for example, made it possible to appoint Aldrik Velders, who came to Wageningen from the Technical University of Twente in April. One of the topics the new professor of Bionanotechnology will focus on in the Physical Chemistry and Colloid Science laboratory is the building of new nanoparticles. He has a lot of experience with hollow organic molecules known as dendrimers, which branch out like trees on the outside. 'The nice thing about these molecules is that

you can put other molecules or particles inside them, or hang them from them,' says Velders. 'They are very suited to medical uses. We hope we can help oncologists with them.'

Rather in the way we might decorate a Christmas tree with baubles and lights, Velders hangs molecules containing metals and specific proteins from the branches of the dendrimer. The proteins ensure that the nanoparticles only attach themselves to tumour tissue; thanks to the metal compounds, the nanoparticles are visible in the body. Because of their magnetic or fluorescent characteristics, they can be tracked with the radio waves in an MRI scanner before the operation, or with the naked eye during the operation. 'By injecting cancer patients with these dendrimers, the oncologist can track down the tumour very precisely and remove it,' explains Velders, who is doing this re-

searcher together with his colleague Fijs van Leeuwen of Leiden University Medical Centre. 'We design the nanoparticles; he gets them ready for application in the clinic by first testing them on cells and on lab animals.' Eventually they hope to be able to equip the dendrimer with a drug that is released as soon as it attaches itself to the cancerous tissue.

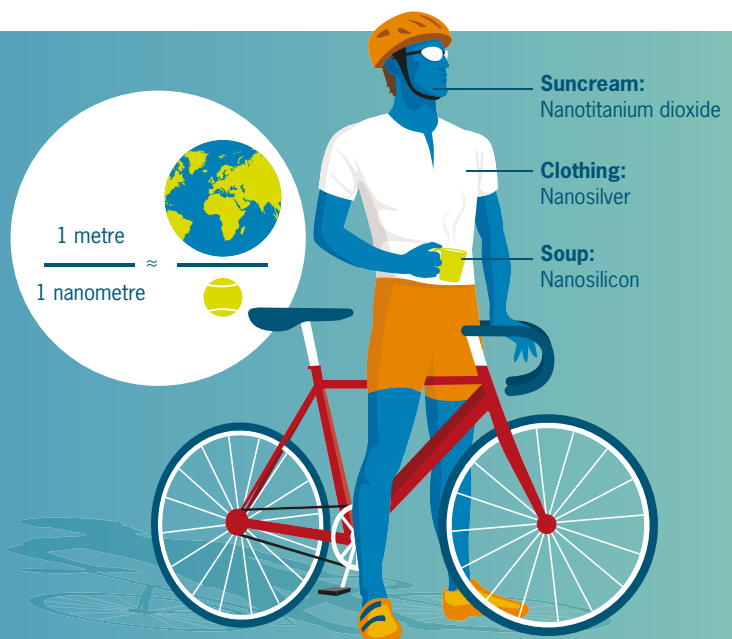
### NEW CHEMISTRY

'In nanotechnology we are actually developing an entirely new chemistry,' declares the new professor with enthusiasm. 'A sort of periodic system of nanoparticles with new characteristics and functions.' But he is also the first to stress that these new chemicals entail risks. 'We are making particles whose characteristics are harder to define than they used to be in traditional chemistry. Then we knew right down to the atomic level precisely

### WHICH PRODUCTS ALREADY CONTAIN NANOPARTICLES?

Nanoparticles are human-made structures smaller than 100 nanometres (= one billionth of a metre). To give some idea: a human hair is 60,000 to 80,000 nanometres in diameter. There are very many different kinds of nanoparticles. They can be made up of metals (silver, gold and iron), of silicon, titanium and carbon, of biological molecules such as DNA, proteins, antibodies, lipids or a combination of such particles. On a nano scale, materials sometimes gain new characteristics: they might become super-strong or water-resistant, for example. In the Netherlands, manufacturers are already putting nanoparticles into about 120 products, mainly cosmetics and packaging. They use nanosilver, for instance, as an antibacterial substance in sportswear or packaging, nanosilica (E551) as an anticoagulant in milk powder, soups and sauces, or nanotitanium dioxide in sun cream to protect against UV light.

Source: [www.rijksoverheid.nl/nanotechnologie](http://www.rijksoverheid.nl/nanotechnologie).





which molecules we were making and how they functioned. Now we don't know. Not all the molecules hanging on to one of those supermolecules are attached with sturdy compounds and under some conditions they can become detached. That is not just a nuisance for us – because we then have less idea what we are making – but also for monitoring organizations such as the Food & Drugs Administration, the Dutch Food and Consumer Product Safety Authority or the Medicines Evaluation Board. They are not yet sure where the dangers lie and what exactly they should measure.'

So five years ago, the ministry of Economic Affairs, Agriculture and Innovation (EL&I) and the Dutch Food and Consumer Product Safety Authority asked RIKILT, part of Wageningen UR, to find out whether the current testing procedures are adequate for a reliable assessment of the risks of nanoparticles in food or in the human body. Are the in-vitro tests which imitate the behaviour in the human body adequate? And the animal tests that accompany them? 'Both issues are now under research here,' says researcher Hans Bouwmeester. 'For two types of nanoparticles – silver and silica ones, both of which are already used a lot in products (see box) – we have now looked at how they behave in animal tests and cell cultures. As far as silver is concerned, the result is clear. Silver nanoparticles, some of which dissolve, appear to pose no additional risks.' It is not as clear in the case of silica. 'In our in-vitro

model – which imitates the digestive tract in the human body – it turned out that nanoparticles of silica clumped together to form bigger particles in the stomach, but fell apart again to go back to their original size in the intestines,' explains Bouwmeester. 'We are now doing animal tests to see whether intestinal cells absorb them, which would mean they could end up in the blood. The results of these tests have not come out yet.'

Through these studies, RIKILT aims to gain insight into the risks of nanosilver and nanosilica, as well as the risks of nanoparticles in general. Bouwmeester: 'Each type of nanoparticle behaves differently, but we may soon be able to estimate in advance roughly where the dangers lie, on the basis of particular characteristics.'

### ACCUMULATING OR BREAKING DOWN

It is not just the behaviour of nanoparticles in the human body that is still unclear. Very little is known either about what goes on in the natural environment. Do they accumulate or do they get broken down? Are they a problem for living organisms and, if so, in what quantities? A few ongoing exploratory studies by Alterra and IMARES, both part of Wageningen UR, are showing negative effects. For example, Alterra showed that buckyballs – promising carbon nanoparticles that are still only used in laboratories – are harmful to earthworms. Exposure to these particles slows down the growth and the rate of reproduction of the worms and causes

them to die earlier. Meanwhile, IMARES showed that mussels exposed to plastic nanoparticles eat less. Bart Koelmans, attached to IMARES and professor of Water and Sediment Quality at Wageningen University: 'We gave the mussels huge concentrations of nanoparticles, so the results do not tell us anything yet about what happens to mussels in the sea. The concentrations are probably much smaller – but we do not yet know how to measure them. But we have shown that there are effects and that these aquatic organisms can suffer from them. Other studies have shown that plastic nanoparticles are absorbed into the tissue of the mussel. So in theory they could also end up in the food cycle, and the consequences of that are unknown.'

For this reason Koelmans thinks we should treat nanoparticles with caution. 'I fully support all the applications, and we can create fantastic new products with nanoparticles. But we must make sure we do not regret it later.' A thorough risk assessment should take place before we start producing them on a large scale, in Koelmans' view. What does exposure to nanoparticles mean for workers who will be making them, what does it mean for consumers, and what happens when all these particles end up in the water, the air or the soil? 'We should deal with nanoparticles in the same way as we do all new materials that come onto the market. First do our homework, and only then give the go-ahead.' ■

## CONSUMER IS STILL IGNORANT

Consumers are critical of nanotechnology but they do not reject it out of hand, according to results of two studies by Wageningen UR Food & Biobased Research for the ministry of Economic Affairs, Agriculture and Innovation. In fact the technology does not mean much to them yet: they can hardly imagine its applications or its implications. Remarkably, when they consider nanotechnology in general consumers tend to emphasize the risks, whereas for particular applications they focus more on the advantages. Their attitude varies according to the application. Consumers are positive about a nanotechnological sticker that indicates the freshness of a product, but are critical of drinks to which healthy substances are added using nanotechnology.

## TROPICAL AGRICULTURE 14 YEARS ON

# Facing extortion and chasing nomads

**One of them has an enquiring mind and the other is an entrepreneur at heart. PhD student Ab Drent went trekking through Cameroon with nomads; his fellow student Daan Knoop gained many insights at the FAO and doing business in the Congo. Neither of them has a high opinion of traditional development aid.**

**TEXT** ALEXANDRA BRANDERHORST **PHOTOGRAPHY** RUBEN DUIPMANS AND JÖRG GLÄSCHER

Initially I was overwhelmed by the diplomatic number plates and the enormous salary of 6000 dollars tax-free per month,' says Daan Knoop. Six months after completing his studies in Natural Resources Management – specializing in Tropical Land Use – he applied to the United Nations' Food and Agriculture Organization (FAO) for a 'promising young talent' post in Cameroon, where he had also done research for his final thesis. To his own astonishment, he got the job. 'I had few illusions, but I did want to achieve something there.' Amongst other activities, Knoop was involved in two projects addressing food security and combatting tree-felling. 'In the course of those projects we learned what worked and what didn't. What came next was a pre-packaged third project; the FAO did nothing with our feedback. The solutions were thought up behind desks and based on political and ideological motives,' says Knoop. 'It was not about opportunities but about politics. For example, countries where there was little for us to do were in line to receive some money. There were

posts for local people – it was 'jobs for the boys' all over. The FAO circulated money within a political elite.' After two years in Cameroon Knoop worked another year for the FAO in the Congo. But the local projects there were just window dressing too. Disappointed, Knoop resigned.

### CRAZY

His coursemate Ab Drent had already formed the impression at university that development aid often did not achieve much. 'The projects we studied always went wrong. I saw that people were the biggest factor in this. So I wanted to gain a better understanding of why people act the way they do. Then their behaviour often seems very logical.' So Drent concentrated on anthropological, sociological, economic and political courses.

He is now working on his PhD research at the International Max Planck Research School on Retaliation, Mediation and Punishment, which focuses on conflict management and the social order. Jurists at the institute research how legislation helps to restore and main-

tain the social order. At the same time anthropologists, including Drent, study how people deal with conflicts. 'People don't go to court about all their problems. There are also normative codes and traditions to which people adjust their behaviour,' he explains. Drent, who is stationed in Halle in Germany, spent a year in 2009 studying how nomads in northern Cameroon solve conflicts with farmers about grazing land. 'The land use rights of the nomads are protected by law but the authorities are often involved in the conflict,' explains Drent. Nevertheless, he saw that the nomads and farmers nearly always reached an agreement, even though the end of one conflict often heralded the start of a new problem. 'It is a dynamic process.'

It is no coincidence that Drent's PhD research is about nomads in northern Cameroon. He was in the same area for his final research thesis – just like Knoop. He travelled around with a group of nomads for 10 months. He learned their language, bought two horses to carry his baggage, and researched why the group headed for >

‘People were  
starving while food  
was rotting away’



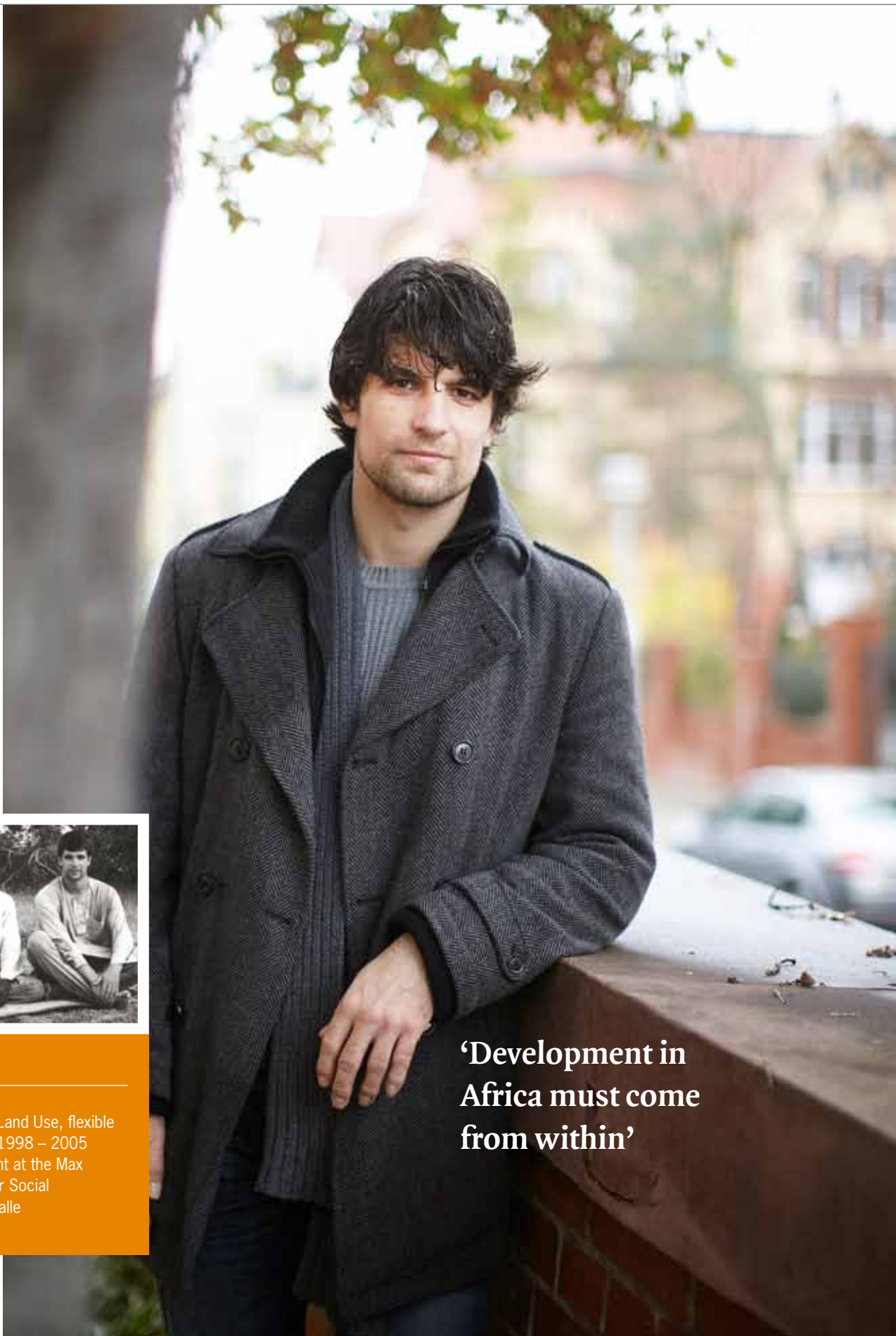
**DANIËL (DAAN) KNOOP**

**Age:** 32

**Studied:** Tropical Land use,  
specializing in Natural Resources  
Management 1998 – 2006

**Work:** Entrepreneur in the  
Netherlands, [www.danielknoop.com](http://www.danielknoop.com)





## AB DRENT

**Age:** 35

**Studied:** Tropical Land Use, flexible  
MSc programme 1998 – 2005

**Work:** PhD student at the Max  
Planck Institute for Social  
Anthropology in Halle

**‘Development in  
Africa must come  
from within’**

## WHERE DO TROPICAL LAND USE GRADUATES END UP?

We know what about half of the 384 Tropical Land Use graduates from between 1989 and 2000 are doing now. Most of them are in salaried jobs; about 8 percent are self-employed. About 21 percent work for an international or development organization, 21 percent at a university or research institute; 19 percent work for a consultancy bureau; 10 percent for the Dutch government; 6 percent in education.

Source: KLV Wageningen Alumni Network

particular places. 'Normally they only saw white people in cars. They were amazed that a white person could walk more than 300 metres. They had no idea at all why I was going along. In the end they concluded that I was crazy, but well-meaning.'

Yet the differences between him and the nomads were not all that big. 'My girlfriend in the Netherlands had just broken up with me, my assistant had marriage problems, the wife of one of the nomads had run away and another woman was threatening to do the same. We were all sitting around the campfire miserably. But the way we made fun of ourselves about our lack of skills when it came to women created a bond.'

## THE DOCTOR LIVINGSTONE FEELING

Knoop and Drent have plenty in common. Besides the fact that they both come from Haren in Groningen, and they both did the research for their final thesis in northern Cameroon, both of them wanted from an early age to work in developing countries. Friends of Drent's parents who worked in Guatemala were a shining example to him. What attracted Daan Knoop was adventure: 'the Doctor Livingstone feeling.' He had an enterprising uncle in Nigeria and he went to visit him when he was 17. His own entrepreneurial spirit was awakened when he was in the Congo with the FAO. 'The situation was appalling. People were starving in the capital, while food was rotting away in the countryside,' says Knoop. Mobutu's dictatorial rule from 1965 to 1997 and the long civil war that followed it left the country's infrastructure in a poor state. Government institutions are dysfunctional and the vast majority of the population has had no education at all. Knoop saw the need for investment in agriculture and decided to start a cassava flour

factory. 'Cassava is eaten by everyone in the Congo so it is tremendously important for food security,' he explains. Farmers cut down trees to grow cassava. Knoop: 'I wanted to increase their income and introduce them to modern savannah agriculture so that the forest would be preserved. To this end I started marketing high quality cassava flour.' He hoped to achieve more as a businessman than he was able to do with the FAO.

Sadly, he was not able to expand his pilot factory. Apart from donations from Stichting Doen, the Dutch embassy and small investments by private individuals, it turned out to be difficult to find investors for an enterprise in such a high-risk country. Knoop: 'You need enough money to absorb the shocks – if a truck gets stolen for example. I didn't have that. And I was being squeezed by the Congolese tax authorities. It is a country in which civil servants line their pockets. I once had the experience of watching a policeman pull the battery out of my car. I could buy it back for 60 dollars. That doesn't happen to a UN worker; he gets out his blue passport and is waved on.'

Because his own capital was finished, Knoop returned to the Netherlands early this year, although he does have plans for a second attempt at a later date.

## FOOT AND MOUTH DISEASE

Ab Drent will be switching workplaces soon too. Next year he is going to coordinate a research project for Ohio State University, looking at the spreading of foot and mouth disease in the cattle of the nomads of northern Cameroon from the veterinary and social sciences point of view. 'If we gain insight into the spreading mechanisms and are able to model them, we can use the in-

formation for other contact viruses as well.' Drent has seen multimillion dollar projects in Africa that achieve nothing. 'Now western organizations are trying to pinpoint where it goes wrong in a couple of sessions. That doesn't work. I believe it has to come much more from within. Africa is so diverse: development should be far more in tune with local history, context and future prospects. Cameroon is a good example. There are seasonal food shortages but there are also many enterprising and creative people.'

'Cameroon has the potential to become very successful,' agrees Daan Knoop.

'Corruption goes on at a high level but educational levels and the quality of the institutions are reasonable. The Congo is a different country altogether: it has too little human capital.' His work in the Congo drew a lot of media attention in the Netherlands. On Twitter Knoop is affectionately referred to as an *enfant terrible* because of his 'blunt and clear-eyed opinions' on development aid. He regularly joins in debates and gives public talks and guest lectures. Together with Alexander Bakkes, he started the company Bakkes & Knoop, which combines high-quality meat production with nature management. They have a flock of sheep and work closely with livestock farmers, nature managers, butchers and chef cooks. His African experiences have left Knoop more pessimistic than he used to be. 'If we do not watch out, we will sacrifice all our biodiversity for agricultural land. We will only invest in sustainable solutions when it is too late. But I try to make life enjoyable by setting up nice little companies and worthwhile projects, and regularly having a few beers in the evening with a big slice of lamb.' ■

# From bees and duckweed to a parasitic plant

**As a contribution to feeding the growing world population, the Food for Thought campaign raises money for cutting edge research. Twelve new projects have been selected which will research a wide range of subjects including bee deaths, duckweed as a protein source, and the parasitic striga plant.**

TEXT ALEXANDRA BRANDERHORST

‘If farmers were to see one third of their cows or pigs dying for no apparent reason, everyone would be kicking up a fuss,’ says Marcel Dicke, professor of Entomology at Wageningen University, part of Wageningen UR. At the moment, many beekeepers in Europe and North America are faced with losses on this scale in their bee populations. If the bee deaths go on, they could pose a threat to global food supplies, in Dicke’s opinion. ‘Honey bees are livestock too, just like cows and pigs. Three quarters of our agricultural crops, including all the fruits, tomatoes, peppers, soya, cotton, sunflowers and rape seed, are pollinated by bees. That represents one third of all food production.’

Dicke suspects the bee deaths are due to a combination of causes. ‘There are experts who suspect that it is all because of the Varroa mite,’ says Dicke. ‘That is a serious pest for beekeepers. But there is also a fungal disease, nosema, which can bring about hefty bee losses. And then there are the newest pesticides, which could also be to blame. I think it is due to a combination of factors.’

In order to gain new insight into the causes, Dicke wants to start a new research group.



‘If a field is heavily infested with striga, the entire harvest can be lost’



To do that he needs 3.5 million euros. Dicke hopes that the Food for Thought, Thought for Food campaign (with which Wageningen UR and the Wageningen University Fund are raising funds for research on solutions for the world food problem) will be able to raise this amount. The campaign has been going for two years and has already raised more than eight million euros for research into, for example, malaria, the reuse of phosphate, potato diseases and cultivating rice with less water. An entrepreneurs' network in Africa has been launched as well.

#### DUCKWEED BURGER

Since the end of October, Food for Thought has put the spotlight on 12 new projects, including the bee death research. Another newcomer is research on duckweed as a new source of protein. 'Duckweed is the smallest flowering plant on earth. Some people cannot help laughing if you tell them something so small could solve the protein problem,' says Ingrid van der Meer, senior researcher in the Bioscience department at Plant Research International, part of Wageningen UR. 'Duckweed has very high protein levels and grows incredibly fast. The plant does not use any land but grows in ditches, reser-

voirs and greenhouses. It can also be used for water purification, in industry for example.'

To feed the growing world population and the growing livestock herds, alternative sources of protein are sorely needed, Van der Meer stresses. 'Duckweed produces 10 times more protein per hectare than soya. And you can harvest non-stop.' Planned topics of research include the kinds of protein available in the plant, the best variety of duckweed and the most effective cultivation method. Also on the agenda are how to process it into livestock feed, and its potential as a human food source. 'It would be nice if you could soon buy a duckweed burger.' Van der Meer needs 2.2 million euros for her research.

#### HEAVILY INFESTED

Meanwhile there are crops that we have been eating for thousands of years which are now under threat. In Africa more and more harvests of maize, millet, barley and sorghum are failing because of a parasitic plant: striga. 'Those grain crops account for at least 70 per cent of food production in Africa. If a field is heavily infested with striga, the entire harvest can be lost,' says professor of Plant Physiology Harro Bouwmeester.

Striga grows on the roots of the grain plant, extracts nutrients from it and slows its growth. The parasite lives in phosphate-poor soils and is attracted to signal substances in the grain crops. These substances are actually intended to attract symbiotic mycorrhizal fungi which the plants need in order to get enough phosphate. Bouwmeester: 'We want to develop a sorghum crop that does give off the right signal substances for attracting the fungi, but not the sort of signal substances that attract striga.'

The professor also wants to do research on a way of cultivating grain crops with the addition of as little phosphate as possible, as well as on the use of mycorrhizal fungi to keep the parasite off the crops. Bouwmeester hopes Food for Thought can help raise the 1.8 million euros needed for this research. 'Developing striga-resistant grain crops is not interesting for commercial plant breeding companies. Most farmers grow grain for their own consumption and not for sale. If their harvest fails they have no food.' ■

More information about the projects and the possibilities for contributing to them can be found at: [www.wageningenur.nl/foodforthought](http://www.wageningenur.nl/foodforthought), or from Monique Montenarie at [Monique.montenarie@wur.nl](mailto:Monique.montenarie@wur.nl) or call +31 317 483490



**'To feed the growing world population, alternative sources of protein are sorely needed'**

## ‘We were dependent on the student societies’

**1962 was the year of the Cuba crisis, Love Me Do by The Beatles and the introduction of the European common agricultural policy. This is how agricultural economist Gerrit Meester summarizes life 50 years ago for his audience at the reunion of alumni who were first-years at Wageningen half a century ago.**

Meester is giving one of the three talks about developments in agriculture during the reunion on Friday 20 October. These talks hold few surprises for the alumni. ‘We read Wageningen World and there’s a lot in that.

We have strong ties with Wageningen,’ says Joke Waaijenberg (Landscape Architecture). Indeed, former fellow student Kees van Heemert (Plant Breeding) still visits the university regularly. ‘I’m one of the editors of a journal about beekeeping.’

For many, the key ingredients of the reunion were a chance to visit present-day Wageningen and to share memories. Nearly half of the roughly 200 alumni who were sent invites are here. They have a packed programme, including a welcome from the rector magnificus Martin Kropff, lunch, a group photo and a choice of visits to the Blauwe Kamer nature area, Het Depot art gallery, the

new building for the Netherlands Institute of Ecology (NIOO-KNAW), or a treasure hunt around campus.

‘There is a great atmosphere,’ says Henk Lange (Economics) at the drinks do. He reckons that he has met at least 40 old friends. ‘The best bit is seeing one another again and all the old stories.’ He is also a regular visitor to Wageningen, as chairman of Naktuinbouw horticultural inspection services. ‘In 1962, there was nothing to do in the town. All we had was one Chinese restaurant. The only cinema burnt down in our first year. We were completely dependent on the student societies.’



Alumni at the 50th anniversary celebration.

PHOTO BART DE GOUW

### JOB MARKET

## More graduates choose research

According to the Career Monitor, alumni of Wageningen University, part of Wageningen UR, are increasingly opting for a job in research after graduation, in particular PhD posts. The monitor, which appears every five years, is an initiative of Wageningen UR and alumni association KLV.

Of the alumni who graduated between 2006 and 2010, 43 percent have a research position, 31 percent a PhD post and 12 percent other research work. This is an increase of 14 percent compared with the graduates

from the previous five years. One fifth of all graduates since 1970 have a doctorate. The proportion of female graduates from Wageningen has soared from 16 percent in 1970 to 57 percent in 2010. The percentage of international students rose in the same period from 2 to 37 percent. Wageningen alumni take an average of five months to find their first job. In 2008, 80 percent of them had a job to go to as soon as they had graduated; that proportion had dropped to 60 percent in 2010.

### ANNIVERSARY

## Three birthdays!

Thirteen is not unlucky for Wageningen – on the contrary. In 2013 the town will be celebrating 750 years since it was founded, while the university will turn 95 and the Wageningen Ambassadors will have been going for 10 years. As part of the ‘750 years of Wageningen’ festivities, a big reunion for all Wageningen graduates will be organized on 14 June 2013. There will also be a worldwide series of debates throughout the year on the subject of food security.



## PRIZE FOR ENTREPRENEUR

# Jan Hadders wins sustainable entrepreneurship prize

Jan Hadders, owner of the company Dacom, has won the **Mansholt Business Award for Sustainable Entrepreneurship (M-BASE)**.



PHOTO GUY ACKERMANS

Jan Karel Mak and Jan Hadders (right).

Dacom develops combined IT and sensor technology systems for precision agriculture that determine the best time for applying manure, water or crop protection agents. The prize is intended for entrepreneurs with a direct link with Wageningen UR who man-

age a successful company with a big impact on society, and do so in an inspiring and sustainable fashion. According to the jury, Dacom is making a substantial contribution to the efficiency of world food production in terms of costs and energy.

This new prize is a fusion of the WUF entrepreneurs prize and the Mansholt prize. It is awarded by the Wageningen University Fund and StartLife, which supports and encourages entrepreneurship. Jan Hadders received 25,000 euros, a jury report and a miniature of the *Wageningen Tree* on 12 November 2012, during the opening of Global Entrepreneurship Week in Wageningen. One of the other entrants, Lieselotte Heederik of PT Holland for Water, received an honourable mention.

## WAGENINGEN WORLD

## Wageningen in the world!

**Wageningen World** magazine travelled more than 10,000 kilometres across 20 countries in Christy Duijvelaar's baggage. The alumna, who studied Environmental Protection between 1990 and 1996, spent May to September 2012 travelling with her family around the Balkans, Central Europe and the Baltic states. Normally, Duijvelaar and her partner take it in turns to travel through Central and South-east Europe for their company TreeVelop Projects & Processes. This time they were able to travel together, taking their four young daughters with them. The photo was taken at the Hill of Crosses in northern Lithuania. 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)



## ALUMNI AWARDS

## Nominations for Alumni Award

On the occasion of Wageningen University's 95th anniversary on 15 March 2013, the Alumni Award will be conferred on a Wageningen alumnus who has made an outstanding contribution to improving the quality of life. The prize is awarded every four years and consists of a jury report, a trophy and a statue. The prizewinners are shining examples in the world of Life Sciences. For more information about the prize, the criteria, and if you would like to nominate Wageningen graduates: [www.wageningenuniversiteitsfonds.nl/alumniaward](http://www.wageningenuniversiteitsfonds.nl/alumniaward).

## FUNDS

## Gift from alumnus Frans Geurts

Alumnus Frans Geurts left 140,000 euros in shares to the Wageningen University Fund. The return on his endowment is to be spent on international student activities that are not covered by the degree programme and on scholarships for students from poor countries.

Frans Geurts began his Tropical Agriculture degree at Wageningen Agricultural College in 1955. He spent much of his subsequent career in developing countries as a consultant for the Royal Tropical Institute (KIT). Geurts has been a faithful donor to the Wageningen University Fund since 1996. He passed away on 10 June 2012, aged 81. 'His involvement with the fund and the university was always very inspiring and we are extremely grateful to him for this special gift,' say the fund organizers.



## PERSONALIA

**Niels Anten PhD**, WU Tropical Crop Production 1990, has been appointed professor of Crop and Weed Ecology at Wageningen University, part of Wageningen UR. 1 June 2012.

**Robert Best PhD**, WU Tropical Crop Production 1953, has been knighted in the Order of Oranje Nassau for his contribution to international agricultural development and the conservation of cultural heritage. 3 October 2012.

### Jeroen Dijsselbloem MSc,

WU Agricultural and Environmental Economics 1991, has been appointed Dutch minister of Finance. November 2012.



Jeroen Dijsselbloem

### Adriaan Geuze MSc,

WU Landscape Architecture 1987, has been made professor (by special appointment) of Landscape Architecture. 1 September 2012.



PHOTO HOLLANDSE HOOGTE

Adriaan Geuze

**Kees de Gooijer PhD**, WU Food Technology 1985, director of Food & Nutrition Delta, has been appointed chair of the board of directors of the Top Consortium Foundation for Knowledge and Innovation in the Biobased Economy (TKI-BBE). 7 June 2012.

**Ab Groen PhD**, WU Animal Breeding 1986 and policy director for Education, Research & Innovation for Wageningen UR, has been appointed chair of the board of directors of green vocational education organization Helicon Opleidingen, with effect from 1 February 2013.

**Lieselotte Heederik**, MSc WU Rural Development Studies 2004, and

**Hugo Verkuil**, MSc WU Agricultural and Environmental Economics 1992, are the winners of the Global Social Benefit Incubator 2012 at the University of Santa Clara in Silicon Valley. Lieselotte Heederik is co-founder of Nazava Water Filters in Indonesia. Hugo Verkuil is the CEO of Mali Biocarburant SA, which makes biofuels from jatropha in a sustainable way. 2 November 2012.

**Stineke van Houte MSc**, WU Molecular Sciences 2007, PhD student at the Laboratory for Virology, has been awarded the Society of Invertebrate Pathology's Mauro Martignoni Prize for her research on behavioural changes in insects infected with a virus. 6 August 2012.

**Prof. Martin Kropff** (WU 1989), rector magnificus of Wageningen University, has been appointed to the board of the Consultative Group

on International Agriculture Research (CGIAR). 30 October 2012.

**Joop van Loon PhD**, WU Biology 1981, associate professor of Entomology at Wageningen University, has been appointed personal professor. 11 September 2012.

**Annelein Meisner PhD** (WU 2011), researcher at the Dutch Institute for Ecology (NIOO-KNAW) in Wageningen, has been awarded a Rubicon grant by the Dutch Organization for Scientific Research NWO in order to continue her research at the University of Lund in Sweden, on how soils function after drought, for another two years. 4 July 2012.

**Prof. Coen Ritsema** (PhD WU 1998), professor (by special appointment) at Wageningen University, has been appointed to the chair of Soil Physics and Land Management at Wageningen University. 1 September 2012.

**Rob Roggema MSc** (WU Landscape Architecture 1990), who works in the Soil Systems Science chair group at Wageningen University, has been awarded a Rubicon grant by the Dutch Organization for Scientific Research NWO to continue his research on climate change at the School of Architecture and Design at RMIT University in Australia. 5 July 2012.

**Prof. Ben Scheres**, WU Plant Diseases 1985, is bringing the Molecular Genetics chair group at the University of Utrecht to the Plant

## WAGENINGEN UR

# New members of the Supervisory Board

With effect from 1 January 2013, five new members have been appointed to the Supervisory Board of Wageningen UR by secretary of state Henk Bleker of the ministry of EL&I:

- **L.C. (Bert) Bruggeman MA** (1950), ex-chair of the Supervisory Board of Groningen University Medical Centre
- **Job Cohen PhD** (1947), ex-Mayor of Amsterdam
- **Prof. Siem Korver** (1953), WU Animal Sciences 1978, director of Public Affairs at VION Food Group and professor by special

appointment at the University of Tilburg

- **Robert Smith MA** (1960), CEO Cosun
- **Harm Evert Waalkens** (1948), ex-PvdA (centre left) MP and ecological livestock farmer

The new board members take over from resigning members Ms. Hanja Maij-Weggen, Laurent van Depoele PhD and Jaap van Duijn PhD. The five new members join current Supervisory Board members Margreeth de Boer (chair) and Berry Marttin, board member. 2 November 2012.



PHOTO JOS VAN ZETTEN

Job Cohen

## IN MEMORIAM

Sciences Group at Wageningen UR. Scheres has also been appointed professor of Molecular Genetics at Wageningen University. 1 September 2012.

**Karin Schroën**, WU Food technology 1990, associate professor of Food Process Engineering at Wageningen University, has been appointed personal professor. 11 September 2012.

**Prof. Martin Verstegen**, WU Animal Sciences 1966, emeritus professor of Animal Nutrition at Wageningen University, is the first professor in the 95 years the university has existed to have been promoter at 100 PhD degree ceremonies. To mark the occasion, the university awarded Verstegen a silver medal. 11 September 2012.

**Jan Carel Zadoks**, UvA Biology, emeritus professor of Ecological Phytopathology at Wageningen University, has been appointed honorary member of the International Association for Plant Protection Sciences (IAPPS) for his services as a phytopathologist. 14 August 2012.

## ONDERZOEK

## Three Veni grants

Three young scientists from Wageningen UR institutes have been awarded Veni grants of a maximum of 800,000 euros by the Dutch Organization for Scientific Research NWO. 24 July 2012.

- **Colette ten Hove PhD**, who works at the Laboratory for Biochemistry, for research on fundamental tissues in the young plant embryo.
- **Wilma Steeneveld PhD**, WU Animal Sciences 2006, who works in the Business Economics chair group, for research on sensors for managing large numbers of cows.
- **Chris Templeton PhD**, who works in the Behavioural Ecology chair group at Wageningen University and for the NIOO, for research on the alarm calls of tits.

**M. Bakker**, VHL student of Business Studies and Agribusiness, passed away at the age of 23. 29 October 2012.

**H. Boer PhD**, WU 1973, passed away at the age of 72. 3 June 2012.

**G. Blok MSc**, WU Agricultural Crop Production 1950, passed away at the age of 92. 31 July 2012.

**Ms N.I.A. van Dijk MSc**, WU Plant Breeding 1991, passed away at the age of 45. 12 August 2012.

**Prof. A.J.H. van Es**, WU Dairy Processing 1954, passed away at the age of 87. 15 October 2010.

**E van Geldermalsen-de Jongh MSc**, WU Horticulture 1958, passed away this year.

**C.P. van Goor MSc**, WU Tropical Forestry 1949, passed away at the age of 91. 7 September 2012.

**M. Halma MSc**, WU Agricultural Crop Production 1946, passed away at the age of 94. 1 October 2012.

**C.F. Hayes MSc**, WU Biology 1993, passed away at the age of 41. 22 December 2010.

**K. Harteveld MSc**, WU Tropical Agricultural Economics 1973, passed away at the age of 67. 3 June 2012.

**J. Hogen Esch MSc**, WU Agricultural Crop Production 1991, passed away at the age of 46. 2 August 2011.

**M.W. Jalata MSc**, WU Organic Agriculture 2009, passed away at the age of 39. 10 2012.

**Machteld Klok BSc**, WU Food Technology 2009, passed away at the age of 23. 12 June 2012

**J.P. Koole MSc**, WU Irrigation and Soil and Water Conservation 1965, passed away at the age of 78. 8 March 2012.

**A.R. Kuit MSc**, WU Animal Sciences 1957, passed away at the age of 84. 10 October 2012.

**H.F. Ledeboer MSc**, WU Irrigation and Soil and Water Conservation 1962, passed away at the age of 86. 20 August 2012.

**F.J. van der Meer MSc**, WU Food Technology 1968, passed away at the age of 71. 19 August 2012.

**G. Montsma MSc**, WU Forestry 1956, passed away at the age of 82. 1 August 2012.

**S.P. Oom PhD**, WU Irrigation and Soil and Water Conservation 1994, passed away at the age of 39. 2 December 2008.

**A. Osinga PhD**, WU Animal Sciences 1962, passed away at the age of 73. 3 October 2012.

**R. Ossewaarde**, VHL student of Forensic Sciences, passed away at the age of 20. 14 August 2012.

**W. van der Poel** passed away at the age of 73. 22 June 2012.

**J. Proost MSc**, WU Irrigation and Soil and Water Conservation B 1982, passed away this year.

**A. Raad MSc**, WU Tropical Forestry 1936, passed away at the age of 93. 3 December 2011.

**Ms M.A. Ruibing MSc**, WU Horticulture 1973, passed away at the age of 70. 20 July 2012.

**P.K. Schenk PhD**, WU Horticulture 1954, passed away at the age of 82. 10 July 2012.

**M. Schrevel MSc**, WU Tropical Forestry 1946, passed away at the age of 92. 17 May 2012.

**J.P.J.H. Ubachs MSc**, WU Forestry 1990, passed away at the age of 45. 17 August 2012.

**H. Veenendaal MSc**, WU Forestry 1948, passed away at the age of 89. 26 August 2012.

**P.K.J. van der Voorde MSc**, WU Tropical Forestry 1951, passed away this year at the age of 87.

**P.D. Voute MSc**, WU Forestry 1991 passed away at the age of 52. 25 August 2012.

**G. van Vuren MSc**, TU Delft 1978, who worked at the Irrigation and Water Engineering chair group at WU, passed away at the age of 57. 22 September 2012.

**A.P.A. van der Weide MSc**, WU Irrigation and Soil and Water Conservation B 1988, passed away at the age of 50. 14 July 2012.

**J. Wesseling PhD**, WU Irrigation and Soil and Water Conservation 1953, passed away at the age of 86. 19 September 2012.

**J.J. Westerhof MSc**, WU Agricultural Crop Production 1947, passed away this year.

*Death announcements can be submitted through secretariaat.klv@wur.nl.*



# CROWDFUNDED FISH

A fish farm in a paper factory doesn't seem to be a very obvious idea. But a brilliant one nevertheless, reckons Harm Luisman, a KLV member and one of the people behind Vallei Vis. They got their starting capital together through crowdfunding.

In the past, you borrowed money from acquaintances if you wanted to start a company. You gave them shares, or paid them back later (with or without interest). Nowadays you usually go to a bank, but the idea of 'normal people' financing it has recently reappeared with a vengeance: crowdfunding. Social media have made the circle of potential investors suddenly much larger than it was. If your 100 friends, followers and connections are enthusiastic about you, they will get their 100 contracts involved too, and it can then go very quickly. The basis is a good

## KLV for entrepreneurs

An increasing number of KLV members - nearly 500 now - are independent entrepreneurs. This is another reason why supporting and encouraging entrepreneurship is an important task for KLV. Two ways that KLV does this are using its own network actively and through coaching. Startup businesses can for instance use a matching tool on the alumni portal to make contact with experienced colleagues for advice.

KLV also works closely with its 'good neighbour' StartLife, another of the residents of KLV's new home base, Impulse.

For more information: [bit.ly/TuBS1F](https://bit.ly/TuBS1F)



photo: Vallei vis

*Harm Luisman (on the left, in the orange jacket) and his partner in Vallei Vis watch proudly as their first trout are released into the aquaculture pilot project at the paper factory in Renkum.*

idea that gets the investors on your side. High returns for the investor are not then usually a deciding factor.

Harm Luisman had one of those ideas. "Papermaking produces a lot of wastewater that has to be purified," he explains. "To do that, they have to add urea and phosphorus - which just happen to be substances that are in the wastewater from fish farms in high concentrations." That led to the idea of a fish farm on the premises of a large paper factory in Ren-

kum. Fully in line with the latest insights into sustainable, animal-friendly fish breeding, with advantages for both Vallei Vis and the paper factory. "We started with trout and we want to expand to other fish species. We will provide them through webshops and other sales channels for sustainable and local products."

To raise their startup capital last year, Vallei Vis used the crowdfunding platform CrowdAboutNow, offering investors a return of 16% after four years. "We simply



have a good concept, as you can see from the Food Innovation Award that we won last year. We've been on TV, we've sent hundreds of e mails and we've profited from the CrowdAboutNow network. We needed €30,000 and we raised it within a couple of months!"

For more information: [valleivis.nl](http://valleivis.nl) and [tinyurl.com/crowdfunding-valleivis](http://tinyurl.com/crowdfunding-valleivis)

## Crowdfunding, a booming phenomenon

There are different forms of crowdfunding:

- donations, i.e. money you do not have to pay back
- loans that you pay back in kind (a.k.a. fan support, from the creative world)
- loans that you pay back after an agreed time at an agreed rate of interest
- shares, i.e. a dividend rather than repayment

You can use an existing online platform (see [www.crowdfunding.nl/links-test](http://www.crowdfunding.nl/links-test)) for crowdfunding, as Vallei Vis did, or you can do it yourself. Examples of crowdfunding campaigns that Wageningen UR alumni have set up for themselves are [www.buitengewonevarkens.nl](http://www.buitengewonevarkens.nl) and [www.grebbeveld.nl](http://www.grebbeveld.nl). These both repay their crowdfunders in kind (meat and activities respectively).

A recent new option for sustainable projects is [oneplanetcrowd.nl](http://oneplanetcrowd.nl), of which StartLife is a founding partner.

## DE ONTZETTING: KLV'S HOUSE ORCHESTRA



photo: De Ontzetting

KLV recently acquired its 'own house band', the student orchestra De Ontzetting. They started working together more or less by chance.

Last New Year, De Ontzetting - an orchestra consisting of over fifty Wageningen students and alumni - went on a two-week tour of China. They performed a mixed Western and Chinese repertoire six times in the Shanghai region and a couple of times in the Xiamen region, as musical ambassadors for Wageningen UR.

The organisers spoke to KLV about financing this concert trip. Paul den Besten, the director of KLV, says, "A really nice project. We liked the sound of it, but were left scratching our heads a bit - what's the connection with KLV? We found a link when it transpired that three quarters of the fifty or more musicians are also KLV members. For us, that was a good reason for making the cooperation more structural: KLV is sponsoring De Ontzetting, and in return they perform at KLV events. So yes, we have our own house orchestra!"

## ACTIVITIES

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

**January 2013 (date will be announced)**

**Young KLV - Course - Negotiating skills**  
Learn how to better reach your goals in negotiation processes and which are the do's and don'ts in order to also keep your counterpart happy.

**15 February**

**Young KLV - Course - CV Writing**  
How to write an excellent CV. Tips and tricks from our experts.

**26 February**

**Young KLV - Work Search Café - Starters & Young professionals**  
You have almost completed your education or you are looking for your next contract. You could use a career coach, but cannot afford the fees for individual coaching sessions. In the Work Search Café you will receive advice from professional career coaches for 25 Euros. After taking part in the Work Search Café you will have a better insight in your qualities, your dream job and how to make that a reality.

**18 April**

**Young KLV - Course - CV Writing**

## Now in English too



You can read more KLV news in KLV Update, the journal for KLV members. From now on, KLV update will also be appearing in English. If you would like a sample copy, send an e mail to [secretariaat.klv@wur.nl](mailto:secretariaat.klv@wur.nl) (while stocks last).

**WANT TO BECOME A MEMBER?**  
Go to [bit.ly/membershipKLV](http://bit.ly/membershipKLV)

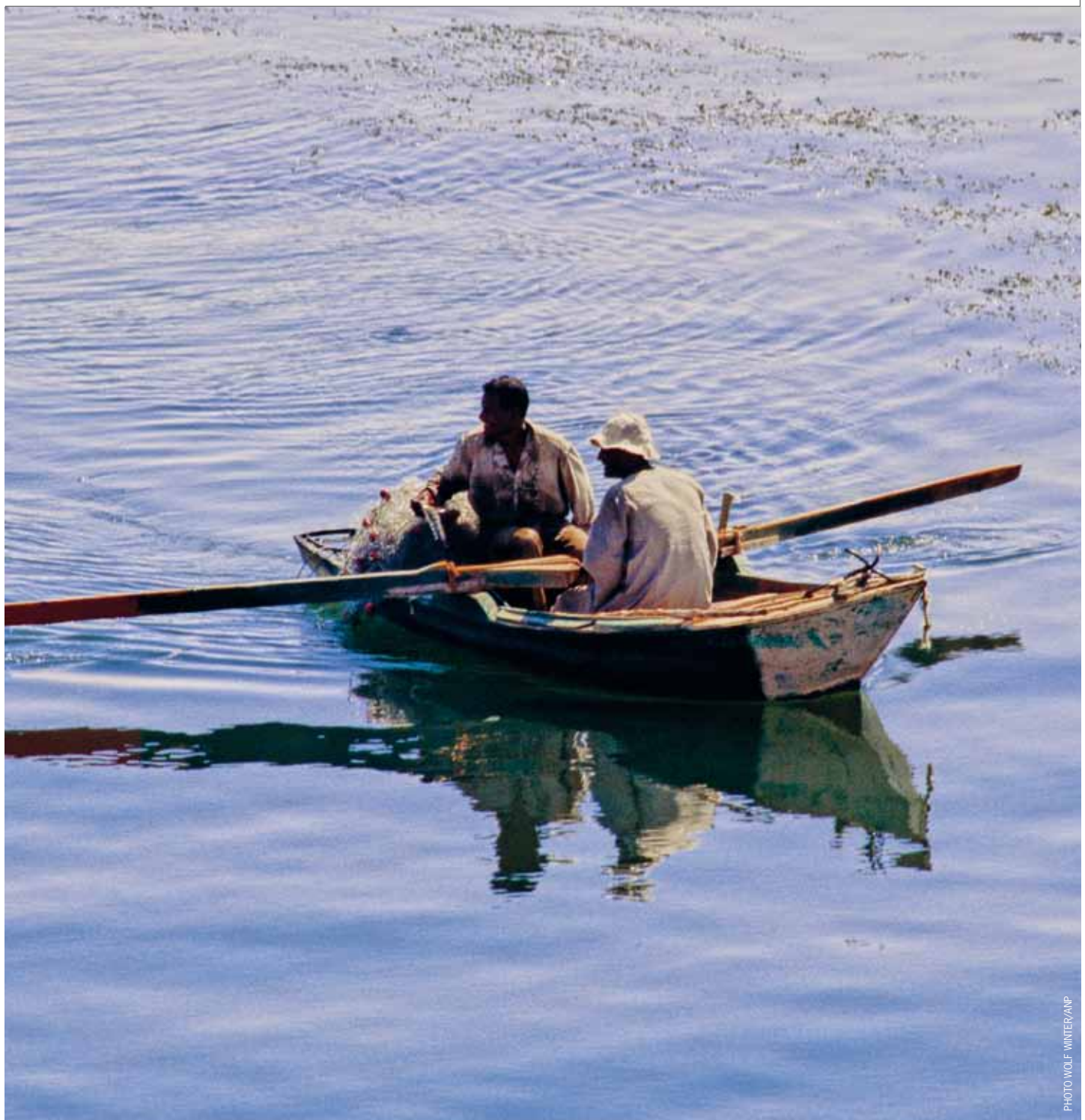


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## Egyptian fishers' livelihood under pressure

'Lake Burrulus provides a living for about 50,000 small fishers in northern Egypt. Their lives are now at a turning point,' says Henk Zingstra of the Centre for Development Innovation (CDI), part of Wageningen UR. Thanks to illegal reclamation of land for farmland and fish farms, the lake has shrunk to less than half the size it was a century ago. This has happened at the expense of local fishers' livelihoods, as well as of the

quality of the water. Between them, the influx of waste water from cities, the fish farming and agriculture have wiped out seven of the main fish species that are important to local fishers. Also, the fish farms get some of their fish from the lake, fatten them up and transport them to the cities. 'This puts pressure on the protein supply of about 600,000 local people as well as on the fishers' livelihoods,' explains Zingstra. He and his col-

leagues are analysing the situation – the water quality, the water management and the needs of the stakeholders – and using their findings to advise on future management strategies. He hopes that the trends pointed out by the CDI will be a wake-up call for the parties involved. 'The problem is perceived in very divergent ways, whereas a joint approach is urgently needed.'

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