

The background features a close-up of green, succulent-like plants with small, round leaves, some showing signs of aging or damage. A large, thin white circle is superimposed over the upper left portion of the image, framing the main text. A thin white horizontal line is positioned below the circle.

# Research programmes of Wageningen Food & Biobased Research



**WAGENINGEN**  
UNIVERSITY & RESEARCH



AXIS

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# Let's connect and innovate!

Wageningen Food & Biobased Research develops technological and organisational solutions for the optimal deployment of agrifood and renewable resources, with the intention of supplying sufficient high quality food and non-food products to enable the transition to an economically viable, circular, biobased healthy society.

Wageningen Food & Biobased Research demonstrates and extends the impact of applied research through its ten research programmes. Let's connect and innovate!



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Cultural materials



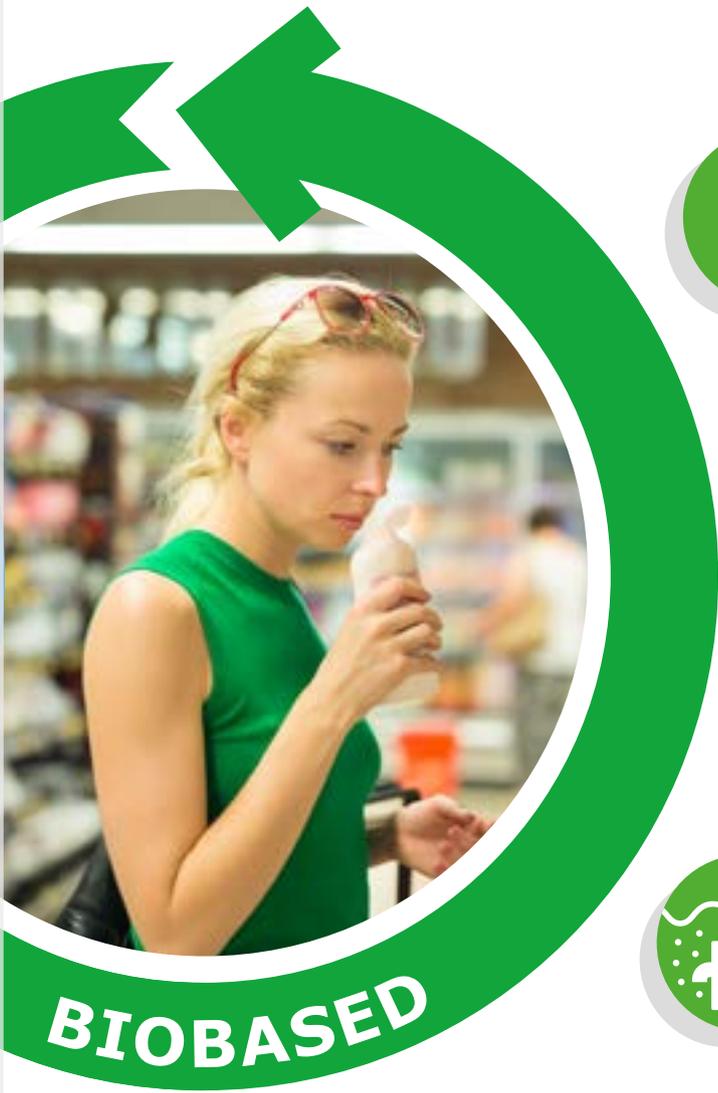
Processing



Food & materials



Consumer



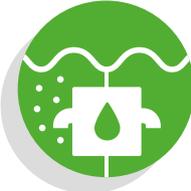
**BIOREFINERY**



**RENEWABLE MATERIALS**



**BIOBASED CHEMICALS & FUELS**



**WATER TREATMENT & TECHNOLOGY**

*'Food loss and waste and optimal valorisation of (unavoidable) residual streams are our focus.'*



## Food loss & waste prevention

Preventing and reducing food loss and waste and optimal valorisation of (unavoidable) residual streams are our focus here. By catalysing and accelerating the transition to a circular economy – in the Netherlands, Europe and globally – we contribute to a responsible food consumption and production system (SDG 12.3), the reduction and mitigation of GHG emissions and other environmental impacts and increased food security. We do this by organising and developing frameworks for action, business case development, creating proofs of concepts, developing impactful solutions, delivering results and monitoring progress.

WUR is the founder of Food Waste Free United, the leading National private-public initiative in the Netherlands to deliver target SDG 12.3, with over 65 stakeholders from business, government, and knowledge institutions.

*Contact: [sanne.stroosnijder@wur.nl](mailto:sanne.stroosnijder@wur.nl)*



## Biorefinery

Biomass is a highly versatile and widely available source for numerous products. It will play a central role in the transition to a fossil-free, sustainable and climate neutral society. Especially low or negative value residual biomass and agricultural residual streams have the potential to replace most of the fossil-based products we use nowadays. The inherent functionality that nature provides e.g. in fibres and sugars gives us the properties we need. We have the expertise in mild pre-treatment, fractionation, and separation technologies, which allow the functionality of biomass components to be retained, thereby aiming at total biomass valorisation. In our integrated approach, we cover the entire value chain, from the efficient use of raw materials to value creation. As a result, our specialists connect supply chain partners in the biobased and circular economy to each other in the most efficient way. This has proven to lead to viable solutions for a more sustainable, biobased planet.

*Contact: [edwin.hamoen@wur.nl](mailto:edwin.hamoen@wur.nl)*



## Renewable materials

Our activities in renewables focus on developing performance materials that can compete with and replace their virgin and fossil equivalents. We draw our resources – valuable building blocks and polymers – from both biomass and waste produced by industries and consumers. In our pilot facilities, our experts convert these materials into sustainable, innovative products with excellent functional properties. We have developed many new renewable materials and products for our customers, ranging from biobased plastics for packaging and casings for electronics, to textiles, building materials, paper and board made from natural polymers such as cellulose and starch. Our ambition is to continuously develop even more valuable products, and, by doing so, usher the circular and biobased economy ever closer.

*Contact: [christiaan.bolck@wur.nl](mailto:christiaan.bolck@wur.nl)*



## Postharvest quality: a fresh view of supply chains

Supplying healthy, tasty, fresh, high-quality vegetables, fruits and other perishables to an ever-growing population demands innovative facilitators. Our philosophy is founded on fully utilising naturally-occurring biological variation in crops by selling them to the markets with those specific demands. This results in satisfied customers and reduces food loss and increases sustainability. We possess unique, in-house knowledge and expertise in the field of measuring quality not only after the harvest, but also during storage and transport. We advise suppliers and retailers about questions concerning quality-driven logistics. We support governments, investors, sectors, societal organisations, and trade associations in food systems design and setting up and structuring sustainable food chains and systems. And we help them to collect, analyse and interpret data.

Contact: [eelke.westra@wur.nl](mailto:eelke.westra@wur.nl)



## Food innovations for responsible choices

The growing consumer concern for their health and environment coupled with the demands for higher quality food products has resulted in the food industry's need to develop healthy, sustainable food products. At the same time, consumers associate 'healthier' with 'as little processing and artificial additives as possible.' This requires alternative ingredients and mild processes which are natural and recognisable to people (the clean-label concept). Products must also be safe, nutritious, tasty and sustainably-produced. We help food manufacturers with our expertise and facilities to meet these challenges.

Contact: [joost.blankestijn@wur.nl](mailto:joost.blankestijn@wur.nl)

*'Wageningen Food & Biobased Research helps companies to close water cycles thanks to smart, integrated solutions for water treatment and desalination'.*



## Water treatment & technology

Sustainable water treatment, preventing water scarcity and using alternative water sources, without compromising water quality. These are the main challenges for sectors such as the food industry, agriculture, and horticulture. Other sectors also face challenges concerning optimum water processing, cooling, and heating as vital parts of their industrial activities. Disturbing phenomena like corrosion, microbiological growth, and pollution, are being tackled by dedicated water treatment technologies and chemicals. As most of these chemicals end up in the aquatic environment, biodegradability and the utilisation of biomass instead of fossil-based compounds is required. Wageningen Food & Biobased Research helps companies close water cycles thanks to smart, integrated solutions for water treatment and desalination, to ensure a viable transition to sustainable chemicals and to recover valuable nutrients.

*Contact: [irma.steemers-rijkse@wur.nl](mailto:irma.steemers-rijkse@wur.nl)*

*'Biobased chemicals offer higher value-added outlets for biomass side and waste streams from the agricultural & forestry industries and municipal waste processing.'*



## Proteins for life

A world built on sustainable food systems, in which every resident receives enough high-quality protein. That is the vision of Wageningen researchers engaged in the Proteins for Life research programme. Wageningen Food & Biobased Research supports its partners with tailor-made advice, based on the latest scientific insights and technologies, and years of experience in relevant disciplines. We support companies in their attempts to identify and develop new sources from plants, microorganisms, and residual streams. We develop energy-efficient extraction processes to provide functional proteins. Our experts provide companies with insight into the functionality of proteins in plant-based foods. Finally, we support our partners in demonstrating the nutritional quality of proteins.

*Contact: [stacy.pyett@wur.nl](mailto:stacy.pyett@wur.nl)*



## Biobased chemicals & biofuels

Climate change and the depletion of fossil feedstocks are the drivers for developing a circular and biobased society. Biobased chemicals provide sustainable replacements for fossil-based products in applications such as personal care, water treatment, lubricants, paints, and coatings. They can also be used in biobased fuels and as polymer building blocks in the packaging, electronics, or automotive sectors. Moreover, biobased chemicals can replace hazardous petrochemicals with a safer equivalent. We support the private sector in developing bio and chemo-catalytic or fermentative technologies for the production of biobased chemicals. Such chemicals provide industry and consumers with products that ensure an enhanced performance and a reduced ecological footprint. Biobased chemicals also offer higher value-added outlets for biomass residual and waste streams from the agricultural & forestry industries and municipal waste processing.

*Contact: [jacco.vanhaveren@wur.nl](mailto:jacco.vanhaveren@wur.nl)*



## Agro food robotics

In the field of Agro Food Robotics research and development, Wageningen University & Research is the most experienced and innovative organisation worldwide. More than 60 engineers and researchers work together with industrial partners on new robotic systems for the agricultural and food sectors. We design agricultural robotic systems for marine, open field livestock, horticulture, and food chains, together with many experts on these application fields. We develop robotic systems that are intelligent, robust, hygienic and can work in harsh conditions. Robots that learn, run at high speed, are flexible and can cope with big data issues. Systems that transfer sensor data into field maps and management support. AI systems with learning and decision-making skills. Our technology experts specialise in robotic systems design, as well as innovations in robot intelligence and sensing, especially spectral, learning and vision.

*Contact: [erik.pekkeriet@wur.nl](mailto:erik.pekkeriet@wur.nl)*

*'Wageningen Food & Biobased Research enables the development of scientifically proven products and services for specific target groups and individuals.'*



## Nutrition & health

From children and the elderly to people with a food allergy: with tailor-made nutrition, consumers start and continue practicing healthier food habits. Wageningen Food & Biobased Research enables the development of scientifically proven products and services for specific target groups and individuals. We provide advice based on the latest scientific insights and use our network to introduce innovations to the market. Our experts have exhaustive knowledge about the food choices and eating behaviour of special groups of consumers. Furthermore, we have modern facilities and a large database of consumers to run clinical trials, laboratories for in vitro trials and our experts are able to translate the scientific nutritional knowledge gained from our research into algorithms, leading to easy access databases and models.

Contact: [martine.vandermast@wur.nl](mailto:martine.vandermast@wur.nl)



We help clients around the world to develop healthy, tasty food, sustainable food chains and 'green' alternatives for products currently produced from scarce fossil resources.



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### **Wageningen Food & Biobased Research**

Bornse Weilanden 9

6708 WG Wageningen, the Netherlands

T +31 317 48 00 84

[www.wur.eu/wfbr](http://www.wur.eu/wfbr)

### **Gerhard de Ruiter**

Business Unit Manager Fresh Food & Chains

T +31 317 48 91 50

### **Wouter Noordman**

Business Unit Manager Biobased Products

T +31 317 48 30 88

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Wageningen Food & Biobased Research develops knowledge and technologies that help companies, government authorities and other research organisations create innovative solutions for a healthier, sustainable and prosperous world. We help clients worldwide to develop healthy and tasty food, sustainable food chains and 'green' alternatives for products currently produced from scarce fossil resources. Our clients value us for our focus on finding solutions, our knowledge level and the quality of our research. As a contract research organisation, we work with companies individually (bilateral), or with various organisations at the same time (public-private partnerships). Confidentiality and appropriate agreements on intellectual property (IP) form the basis for our relationships.