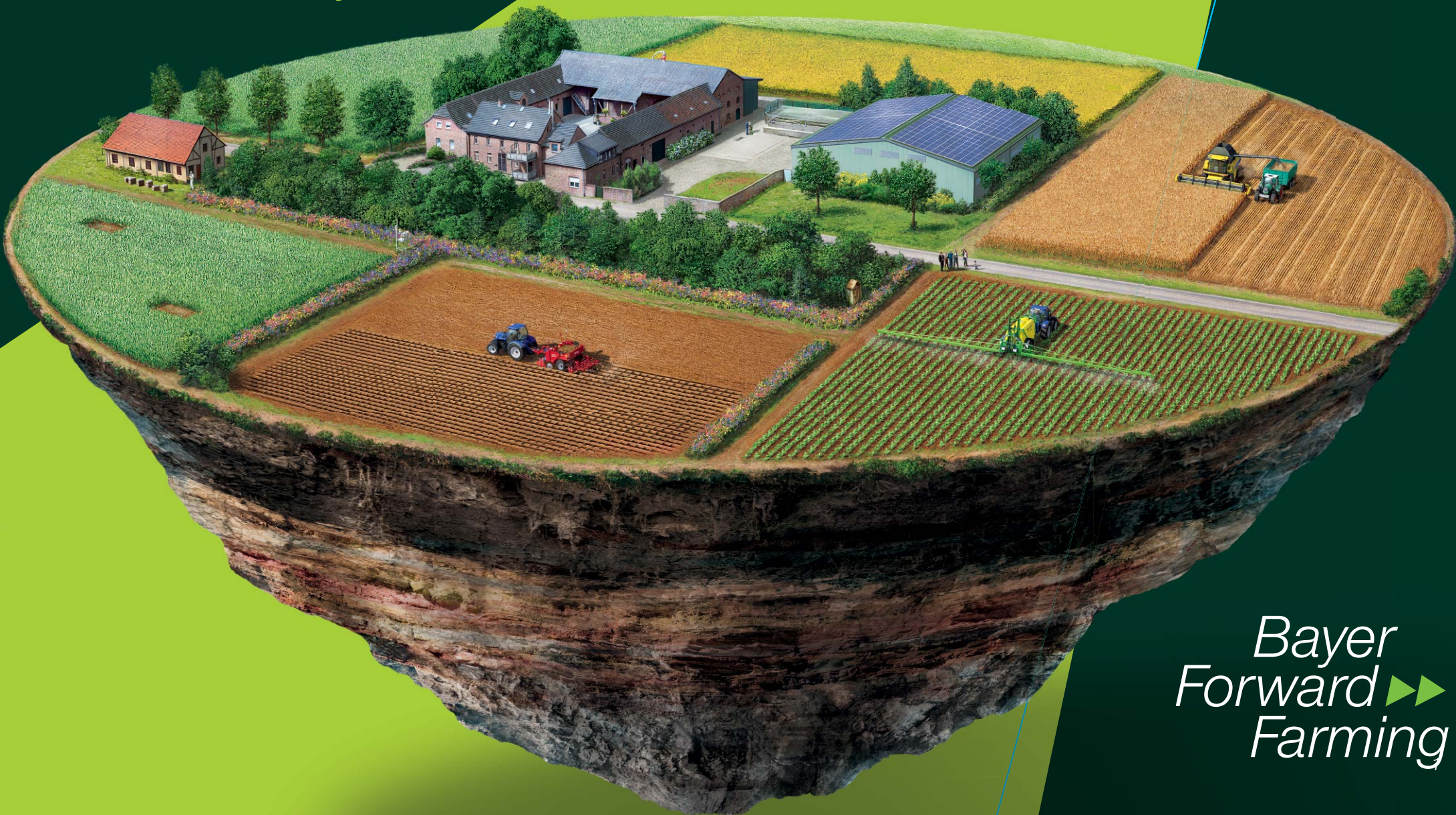


One Step Ahead with Sustainable Agriculture

Damianshof – Germany



Bayer
Forward 
Farming

“Farming for the next generation”

“For me, sustainable farming is the key to successful farming. Here on the Damianshof, I cultivate 115 hectares of agricultural land – with sugar beets, potatoes, winter wheat, winter rape and winter barley. As a passionate farmer, I am absolutely thrilled by the opportunity to farm one of the best regions in Germany, because the quality of the soil here at the loess plateau of Rommerskirchen is really excellent.

However, it is also an enormous responsibility. My family has been farming at Damianshof for six generations now. I inherited the farm from my mother, and of course, I want to pass it all on to my sons. This means that I must cultivate my fields in such a way that my children have the same excellent opportunities to reap good harvests as I have today. I don't want to be a successful farmer simply in the here and now, I want to preserve the resources of my farm for my children and grandchildren. And this is where modern, sustainable agriculture comes into play.

My family has been working together with Bayer for more than 40 years. From the people, to the products and services, I've always been convinced that this is the right choice. The decision to work together with Bayer ForwardFarming was the next logical step. Initiatives to promote biological diversity and bee health and measures for erosion control and water protection, as well as correct and safe handling of crop protection products are all things that help me to farm economically, and not just for today. They also help me preserve my land and soil for my descendants, because my farm is only loaned to me by my children.”

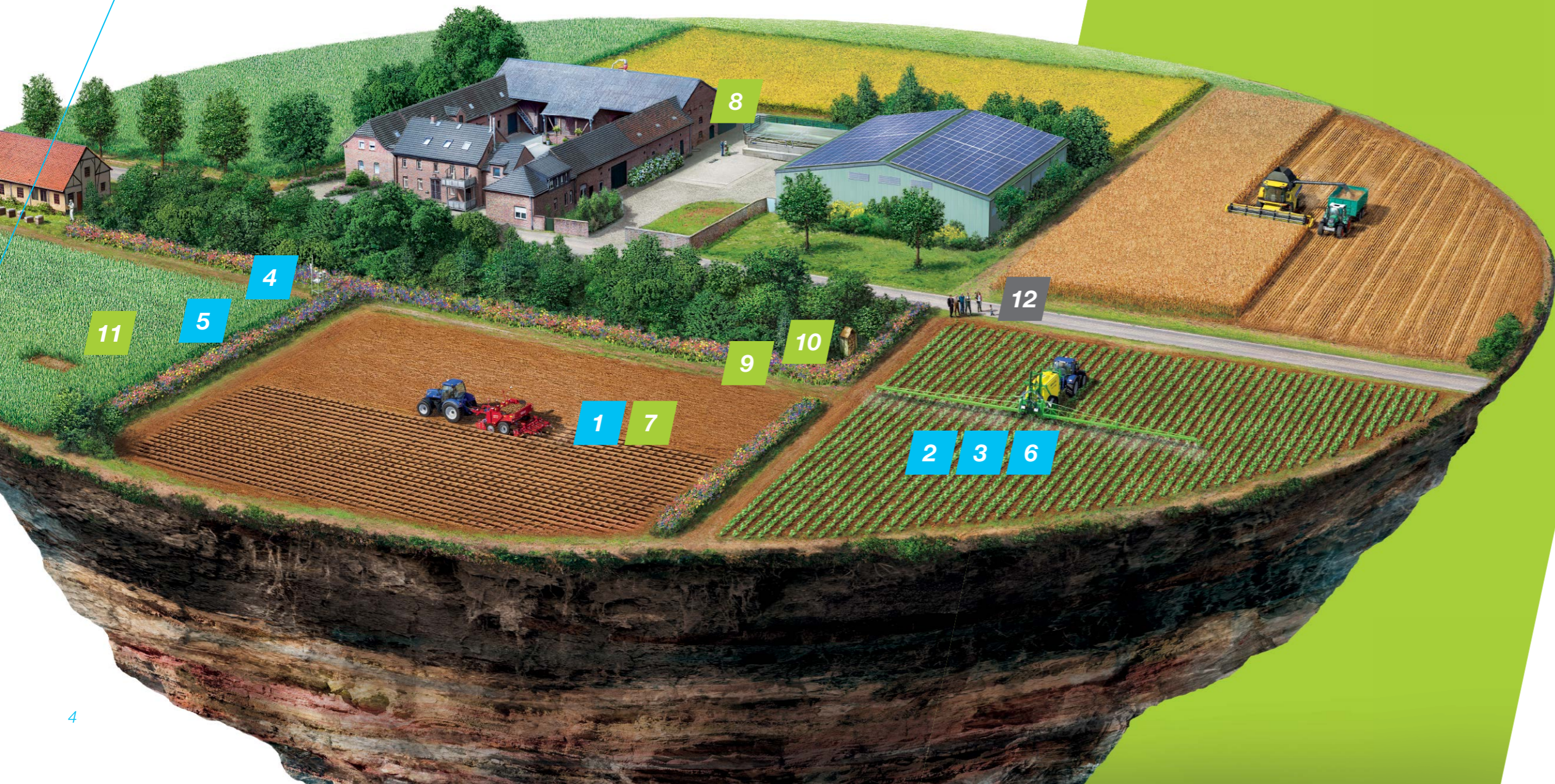
Bernd Olligs,
Damianshof

“Bayer ForwardFarming, together with farmers, promotes cultivation methods that combine environmental and social responsibility with economic success.”

Peter R. Müller, Managing Director of Bayer Crop Science Deutschland GmbH



Sustainable Farming at Damianshof



Farm Profile



Location:
Rommerskirchen.



History:
Founded in 1845, Damianshof has been farmed by six generations of the same family.



Farming Land:
Deep brown soil with 10 to 20 meters of loess topsoil and a soil rating of between 90 and 95.



Crops:
Winter wheat, sugar beets, potatoes, winter oilseed rape, winter barley.



Partners:
FlächenAgentur Rheinland GmbH, Stiftung Rheinische Kulturlandschaft, OICOS Konzepte GbR, biologist & bee expert.

Key Elements

1 Seeds

High-quality, certified seeds are the basis of good yields.

2 Bayer SeedGrowth®

A holistic approach helps farmers make full use of the potential of their seed.

3 Plant protection

Chemical crop protection products guarantee the health of crops and protect plants from diseases and pest infestation.

4 Weather station

Continuous monitoring and documentation of weather data, such as temperature, precipitation, and leaf wetness, optimize targeted plant protection measures.

5 Septoria timer

Timely Septoria monitoring of crops makes it possible to determine the right moment to apply fungicides.

6 Digital farming

Digital solutions support the farmer in decision-making. Plant protection applications are optimized, and the environment is preserved.

7 Protection from soil erosion

New techniques, such as cross-dyke ridging in the cultivation of potatoes, protect the topsoil and reduce the danger of flooding.

8 Phytobac®

Eliminates the remains of crop protection products in water used for cleaning equipment to prevent contaminating runoff.

9 Flower strips

Annual and perennial flower strips in strategically favorable locations protect the flora and fauna, including birds, beetles and earthworms.

10 Bee hotels

Wild bees and other pollinators enjoy protection from predators and bad weather in this nesting aid.

11 Skylark plots

Small untilled patches in cereal fields help the endangered skylark land safely and build nests.

12 Partnerships

The aim is to master the challenges of sustainable agriculture in collaboration with most diverse players.

■ Tailored Solutions ■ Proactive Stewardship ■ Partnerships

Great care for valuable seeds

Ripe ears in summer: One of the most important crops for Bernd Olligs is winter wheat. Since around 90 percent of the harvest is commercialized as baking wheat, quality is extremely important, in addition to high yields. At the same time, the soil and the environment must be preserved. Sustainable management has the highest priority.

Every year, despite different requirements and changing weather conditions, Bernd Olligs still faces the same challenge: to produce wheat of excellent quality with high yields. Because it is the most important crop that the business harvests, the farmer cultivates the winter wheat with particularly intensive care. In this, Bernd Olligs is guided by three principles: to select high-yield and healthy varieties, to implement targeted crop protection measures, and to fertilize according to need.

Damianshof already has the perfect basis for producing high-quality wheat: good soil. The loess-loam soil has good permeability for roots and stores copious amounts of water – the ideal conditions for crops such as winter wheat. And Bernd Olligs makes sure that the soil remains as good as it is. He practices crop rotation with sugar beets, winter wheat, potatoes, winter barley, and winter rape. He also ensures that the sowing of the wheat always follows a tuber crop like sugar beets or potatoes, as they are the perfect preceding crops. Together with other measures, such as incorporating cereal straw and substrate soil from mushrooms growing into the soil after the harvest, Olligs is able to ensure excellent humus management.

*As much as necessary,
as little as possible*

From October to December, the sowing of the winter wheat takes place at very different times on Damianshof. This means that the farmer is always facing new challenges, especially when not losing sight of his number one priority – best quality. In order to achieve the highest quality with the greatest yields, he must be certain at the very start to choose the correct seed varieties that can withstand the most common diseases. Of course, the seedlings are also given optimum support. Targeted crop protection and fertilization help them develop into a high-yielding wheat crop. The farmer constantly monitors the needs of the plants and only takes action if certain damage thresholds are exceeded. This means that he can effectively fight weeds and fungal infections, whether in the spring or the fall, while at the same time guaranteeing an optimum yield.

“Winter wheat is vital for us since it is the most important crop our business cultivates. Naturally, this is why we want to protect the crop, and this is where products from Bayer give us optimal help.”

Bernd Olligs, Damianshof

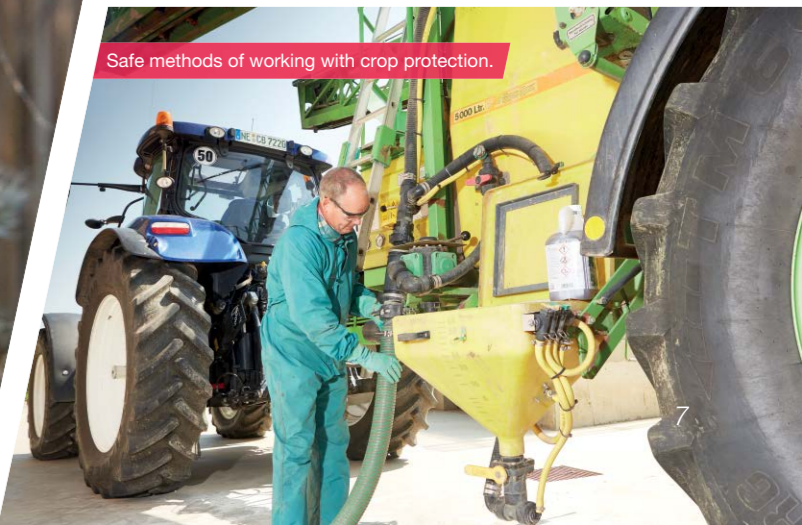
With the help of cutting-edge technology...



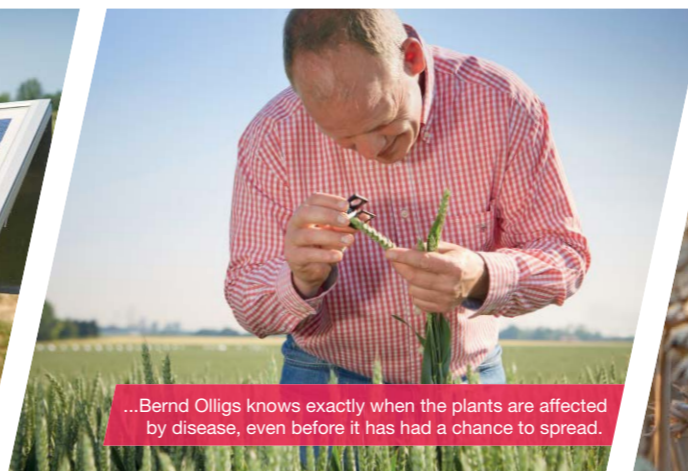
...application rates are optimized.



Safe methods of working with crop protection.



Thanks to the Septora timer, pictured here...



...Bernd Olligs knows exactly when the plants are affected by disease, even before it has had a chance to spread.

Great yields from *good soil*



“We have quite an outstanding location that is typical for this region,” explains Bernd Olligs. A fair appraisal, considering the soil has an average quality rating between 90 and 95. “But it is also a huge challenge to be allowed to farm such outstanding soil here.”

Bakery-quality wheat – that is the aim. And fertile soil is a prerequisite for this. But only if it stays where it is needed – in the field. In order to ensure this, especially in years with heavy precipitation, Bernd Olligs has put a selection of erosion protection measures in place. For example, he sows his winter wheat in the crop rotation without plowing. Also, to minimize erosion, he always tills the soil parallel to the slope of the field wherever possible. Soil compaction is minimized by using wide tires on the tractors and machines. The farmer drills the sugar beets in a mulch-till process, and for potatoes he uses a cross-dyke ridger. This technique creates “micro-dams” when planting and furrowing. After planting, small perpendicular dams are formed in the soil furrows, which not only increase water retention, but also help keep nutrients in the soil, right where they are needed. This practice acts as a stabilizing factor on the yields and noticeably reduces the danger of erosion.

Properly protecting *water resources*

“Water pollution control is resource protection,” states Bernd Olligs. That is why one of his top priorities is to systematically manage water protection at Damianshof to ensure absolutely no crop protection residues enter the water.

Water is used in many ways on farms, including for the filling and cleaning of field sprayers. The sprayer equipment is extremely important for farmers and it is made up of many sensitive, individual parts. In order to stay in perfect working order, a sprayer has to be meticulously cleaned. When changing from one crop to another, any residues are an absolute taboo.

The power of microorganisms

During the cleaning of the field sprayers, crop protection residues can become a problem. To ensure that these residues do not enter the water system, Bernd Olligs uses an innovative biological system called Phytobac®. Installed on Damianshof back in 2012, it reliably removes any residues of crop protection products and protects the local water source. How does the solution work? From a watertight concrete platform, where the sprayer is filled and cleaned, the waste water is channeled and collected in buffer tanks and then flows to a watertight basin that is filled with a substrate mix of soil and straw. The cleaning water is allowed to drip onto this

When cleaning sprayers on the farm, wastewater trickles through the Phytobac® and with the help of microorganisms, residues are broken down. The result: no contaminants in the water.



Give life more room

As a spokesman for modern and sustainable agriculture, Bernd Olligs has one aim at Damianshof: Enough space for all! He seeks sufficient space for his crops to reap good yields, and at the same time to ensure that there is ample habitat for bees, insects, birds and other animals to flourish.

This is why there is a wide range of measures within the framework of Bayer ForwardFarming focused on ecological enhancement. Thus, in the cereal fields at Damianshof there are areas called skylark plots, in which skylarks and other ground-nesting birds can land and build their nests. The farmer also has set up special nesting boxes for swallows and owls on his farm, which are also extremely popular with bats.

Helping the pollinators

Bees and other pollinators are essential for biodiversity. They also help the farmer in his work by supporting the pollination of important crops, which is more than enough reason to provide them with a home at Damianshof. Together with nature conservation experts, Bernd Olligs has set up a

network of measures on his farm to provide the pollinators with protection and food:

- Annual and perennial flower strips and pastures create a safe haven and provide a rich variety of pollen.
- Herbaceous beds with flowering plants on the southern side of the barns provide abundant pollen and nectar over a longer period of time.
- Numerous wild bee species find a sheltered nesting place in the bee hotels on the farm.
- In earth mounds called beetle banks, ground-breeding insects such as wild bees, bumble bees, beetles and spiders find an ideal nesting place.

Using the latest application technologies



Spraying below the flowering zone: protecting bees.

When crop protection products are applied using the Dropleg^{UL} precision spraying system by Lechler, the treatment is applied below the flowering zone and thus prevents direct contact with bees and other pollinators.



Working together for a good harvest



Safe nesting places



Abundant food for pollinators

“By putting in place many small measures, we preserve biodiversity at Damianshof in an effective and practical way.”

Bernd Olligs, Damianshof



Well protected

Using crop protection products responsibly doesn't just apply for use in the fields. The correct handling of products is a top priority in the implementation of ForwardFarming practices. This is why Bayer supports farmers with comprehensive information and training sessions.

In order to guarantee the comprehensive protection of the farmer, as a user, and of the general public, as consumers, Bernd Olligs only uses seeds and crop protection products that have undergone comprehensive safety testing and registration.

Further innovative solutions such as the closed filling system easyFlow® M protect the farmer from direct contact with crop protection products. The system facilitates the safe filling and dosing of crop protection products into the application tank as well as in the cleaning of empty canisters. It prevents drips or splashes, which is good both for the farmer and the environment. In addition, Bayer advises the farmer on how to optimize protective clothing, proper product storage and disposal.



Going forward together

Sustainable farming is not something that Bernd Olligs practices alone: Experts from many different fields contribute their know-how to support ecological and economical food production. Damianshof takes advantage of the partnerships formed together with Bayer ForwardFarming and others.

In order to promote biodiversity, the farmer works closely with the Stiftung Rheinische Kulturlandschaft, Flächen-Agentur Rheinland GmbH, and the company OICOS Konzepte GbR. In the first step, the actual biodiversity species scope was determined at Damianshof. Building on this, appropriate ecological enhancement measures were developed and implemented. The effects of these measures are consistently monitored to gain insights that will inform the recommendations for the future.

"We must unite ecology and economy."

Interview with Dr. Matthias Schindler (OICOS Konzepte GbR) and Dr. Patrick Lind (FlächenAgentur Rheinland GmbH)



Dr. Matthias Schindler



Dr. Patrick Lind

What contribution does Bayer ForwardFarming make to maintaining biodiversity in agriculture?

Patrick Lind: To maintain biodiversity within the agricultural landscape, ecological enhancement measures must have the broadest possible acceptance. The measures must both protect nature and be compatible with the farming operations. At Damianshof, such solutions are proven in practice and shared with other farmers.

Matthias Schindler: Thanks to Bayer ForwardFarming, many local farmers have already been able to get information from Damianshof about the implementation of biodiversity measures on the farm. In my opinion, this knowledge transfer will help convince more farmers to implement these important measures.

Why does your institution support Bayer ForwardFarming?

Patrick Lind: Informing farmers about nature conservation topics is one of our top priorities. In order to promote nature conservation in the agricultural landscape, we have to work with farmers to examine which measures are actually feasible. It is particularly important to combine economy and ecology and to consider operational and organizational processes. Mr. Olligs gives us some incredibly useful tips in his role as farmer and entrepreneur.

What can farmers do to promote biological diversity?

Matthias Schindler: It's a question of enhancing the farming land to create living spaces for animals, such as those species that live in meadows and open fields. This means that there must be safe havens and food all year round. We have had success with flower strips that attract a variety of insects and other invertebrates with their long flowering season, thus providing more food for field birds. And if the flower strips are left in place throughout the winter, they provide shelter and seeds for food during this time as well.

The future is digital

Agriculture underlies continuous evolution. An important next step in innovation in agriculture is integrating digital technology meaningfully. Today, Bernd Olligs has a better picture of what is happening in his fields – even when he is sitting at his desk.

Digitization gives farmers real-time and field-specific decision-making support, from the selection of the correct variety and most exact dosage of crop protection products, to the determination of the optimum time for application, and the early identification of plant stress factors. Bernd Olligs is benefiting from these advances by testing Bayer's digital farming technologies.

This means that he can implement the most innovative solutions possible on the farm. One of these is a GPS-controlled parallel guidance system that supports highly precise sowing,

crop protection, fertilizer use and harvesting of the crop. This enables pinpoint accuracy when sowing and saves time and effort for the driver. The overlap of fertilizer use and crop protection applications can be avoided, the cost of operating inputs can be reduced, and the environment can be preserved. The additional mapping of individual field zones enables site-specific adjustments to be made, optimizing the use of crop protection products, which in turn results in greater sustainability, both ecologically and economically.

"I am testing out the digital farming offers from Bayer, to always remain at the cutting edge of developments in farming."

Bernd Olligs, Damianshof



Sustainable Agriculture in practice

At Bayer ForwardFarms, farmers and Bayer experts demonstrate innovative solutions for sustainable agriculture that comprise three components:

- // **Tailored Solutions** – Innovative products and services tailored to customer needs, including high quality seeds and traits, biological and chemical crop protection products and digital solutions. These solutions are backed by tailored services ranging from agronomic support, field demonstrations, diagnostics, and prediction tools to documentation.
- // **Proactive Stewardship** to ensure product integrity (for seeds and crop protection products), protect human health, and preserve the environment. We offer training to raise standards of handling and usage, as well as to minimize any possible risks to human health and the environment.
- // **Partnerships** to enhance the quality of life for farmers, communities, and society. Mutually beneficial partnerships that include all players in the value chain and help to leverage the potential for collaboration in modern agriculture.

For further information, visit our website:

www.forwardfarming.com

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