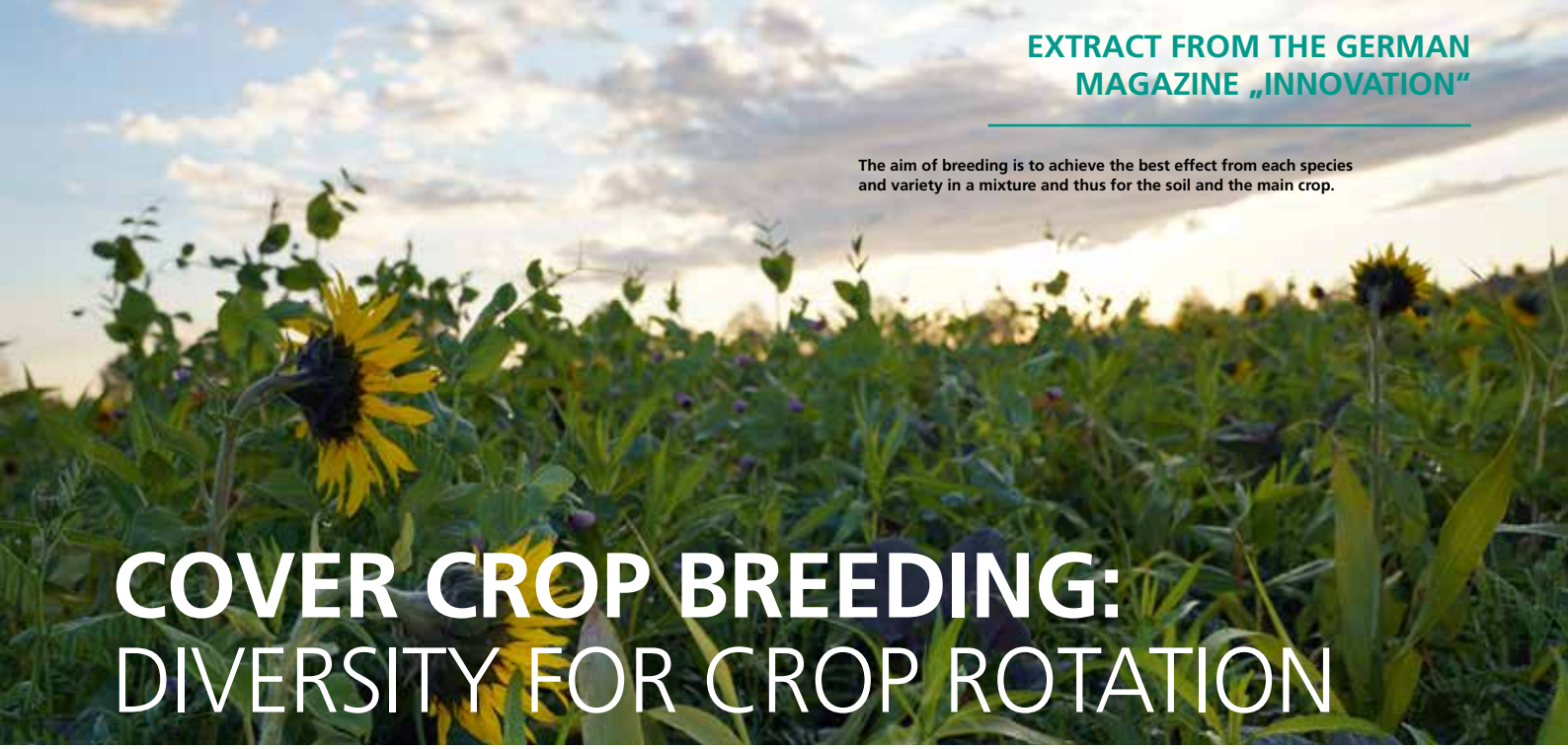

The aim of breeding is to achieve the best effect from each species and variety in a mixture and thus for the soil and the main crop.

COVER CROP BREEDING: DIVERSITY FOR CROP ROTATION

Cover crop mixtures can have a decisive influence on the soil and main crop – but how do you create the perfect mixture? Breeding expert Nic Boerboom provides insights into the development of new varieties, their specific characteristics and the challenges of breeding. Find out why well-thought-out combinations of cover crop species offer real added value for agriculture.

Cover crops have a long tradition at Deutsche Saatveredelung AG (DSV) and have been a key part of the company's more than 100-year history. That is why the seed company has set itself the task of developing cover crops that provide the best possible support for the main crops in the crop rotation. „We are convinced that plant communities offer many opportunities to utilise resources more efficiently and also close cycles," says Nic Boerboom, breeder for cover crops, companion and undersown crops at the Dutch breeding site in Ven-Zelderheide. „This makes our product development varied and innovative – from breeding to the final mixture," he continues.

In an interview with the cover crop breeder, we learn about the effort involved in developing a diverse cover crop mixture and how the right species and varieties are selected for this purpose

Everything for the main crop, everything in the system

For the breeding objective „cover cropping", the varieties are analysed in particular for their suitability within a cover crop mixture. Here, for example, it depends on their complementarity with other mixture partners. Early or late sowing suitability also plays a role, as certain mixtures are more suitable for early sowing and others for late sowing. During the breeding process, the breeding material is also analysed for its suitability for companion and undersown crops. „A companion or undersown crop should not compete with the main crop and therefore tend to grow more inferior.

The characteristic „shade tolerance" should be particularly pronounced for this purpose. This is characterised by healthy growth under poor light conditions, which we test in shade trials, among other things," explains Boerboom.

The DSV breeders work closely with the product managers to define the optimum mixture composition. This also takes into account country-specific requirements and regulations. „The team of breeders and product managers work together to define the optimal composition of DSV cover crop, companion and undersown seed mixtures," explains Boerboom, adding: „We pay attention to the national and EU-wide regulations for each country."

Why use a mixture at all?

The DSV cover crop mixture with the most components is currently the TerraLife®-MaizePro DT 50, which now consists of 17 species. Each species has a very specific characteristic. Due to its composition, TerraLife®-MaizePro DT 50 is considered the ideal mixture for maize rotations, leaves an optimal soil structure, has good N-utilisation and is partially winter hardy. In addition, there are also different „versions" of this mixture with more or less leguminous and cruciferous components, so that the mixture can be selected specifically for different locations.

„A cover crop mixture with selected, high-performance varieties has the advantage that it has been proven to provide more and better nutrients.

The right variety is so crucial for the effects of a mixture," Boerboom explains. In addition, there is also a stronger binding of nutrients in the main crop. These statements have been confirmed in the CATCHY scientific project, among others. Another advantage of cover crop mixtures is a better soil structure due to more water-stable soil aggregates. You can read more about this from page 13 in the article by Dr Norman Gentsch from Leibniz University Hannover.

Each species fulfils a specific purpose

Each species performs a specific function in the cover crop mixtures. DSV's TerraLife® programme comprises 15 mixtures specially designed for different agricultural crop rotations. In addition, there are also seven organic mixtures for organic farming. Depending on the farm and the main crop, the appropriate mixture can be selected, which is optimally tailored to the corresponding crop rotation terms of its composition. There are very different requirements for the species that are combined in breeding.

Phacelia, for example, ensures good and rapid soil cover. It has a dense root system and is very good at absorbing immobile phosphorus from the soil and then making it available for the next main crop through P mobilisation. Cruciferous crops can also develop quickly and cover the soil. In this case, this is also possible at low temperatures.

„Legumes such as clover, vetches, but also cereals and grasses, serve to fix N and contribute to physical structural improvement of the soil through their roots," explains Boerboom when asked what other important species there are and what purpose they fulfil in mixtures.

Further development at variety level

The development of a new variety is the result of years of breeding work. DSV has over 30 different species in its cover crop, companion and undersown crops product range. The seed company breeds and propagates a large number of its own selected varieties in these species.

„The focus of our breeding work is on optimising the most important agronomic properties of a variety for use in our cover crop mixtures," says Boerboom. DSV breeds various large- and small-grain legumes, oilseed rape, mustard and phacelia, among others. „We want to optimise them even further with new traits. To this end, we test our mixtures and varieties systematically and continuously," emphasises Boerboom.

„For this purpose, trial mixtures are produced and analysed, for example, for the competitive strength of a new variety within a mixture". In addition to other breeding parameters such as early growth and biomass development, plant and root architecture and flowering time, seed yield and germination capacity of a variety play a decisive role. This creates the basis for successful seed production.

Our Phacelia already has an excellent genetic. On this basis, we have created new potential successors.«

Nic Boerboom

The TerraLife® mixtures will be based on seeds that achieve excellent results in the repeated tests for seed yield and germination capacity," emphasises Boerboom.

Nic Boerboom is currently working on a successor to the phacelia variety BEEHAPPY, among other things. „Our phacelia already has an excellent genetic. On this basis, we have created new potential successors," he explains. „Internal analyses of our selections have shown that the DSV phacelia genetics are at the upper limit of phosphorus content within the varieties we have tested. This means that our genetics demonstrate the most efficient mobilisation and fixation of phosphorus." Based on the data and analyses collected during the breeding process, the breeding team can evaluate the results for various candidate varieties and decide whether an application for variety approval can be submitted. „However, this process takes another five years. It can therefore take up to 10 years before a new variety is fully established," adds Boerboom.

Conclusion

It's a long way from the variety to the mixture. Breeders like Nic Boerboom are constantly trying to improve their varieties and thus also the mixtures and to prepare them for future challenges.

With a strong focus on breeding and introducing new varieties, DSV aims to develop cover crop mixtures that not only improve soil quality, but also increase farmers' yields and further optimise soil sustainability. „This is breeding for a sustainable future and our daily motivation at work!" concludes Boerboom.

Ellen Heesen, DSV Ven-Zelderheide (NL), conducted the interview. Edited by Sophia Breische, DSV Lippstadt.

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