terra HORSCH

19 | 2019

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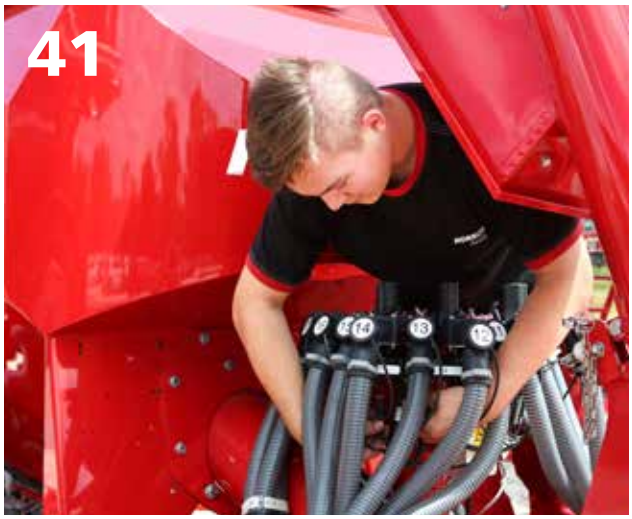
ISSUE 19



IMPRINT

terraHORSCH is the international customer magazine of
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Photos: Archiv HORSCH, Photographie Petra Kellner, VDI, Seite 27: iStock.com/hfoxfoto (CO2), Seite 29: iStock.com/dhughes9, Farming Photography, Adrienn Fekete-Pálfi, Johannes Hädicke, C. Kappes, Simon Wyatt, Ceres Award: © Timo Jaworr for agrarheute

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terraHORSCH is published twice a year in the following languages: German, English, French, Polish, Portuguese, Russian, Slovakian, Czech and Hungarian.

Production & Graphic Design:
Beckmann Verlag GmbH & Co KG, Lehrte

Print: Frischmann Druck und Medien GmbH, Amberg

Paper: 120g/qm Maxi Offset. The paper is certified according to the EU Ecolabel. This label is only granted for products and services whose environmental consequences are considerably lower than those of comparable products. For more details see www.eu-ecolabel.de.

Printing ink: Printing ink QUICKFAST COFREE. Free from mineral oil and cobalt. Moreover, it is certified and recommend for printing according to the „Cradle-to-Cradle" principle (quasi "from the origin back to the origin) – an approach that deals with the spreading of continuous and consequent recycling management. For more details see www.c2c-ev.de.

Dear readers!

The Agritechnica 2019 lies behind us. Every two years we are looking forward to this international trade show where we have the opportunity to meet a lot of our customers and partners from all over the world and to discuss current topics with them.

Many exhibitors presented digitisation as one of the most important topics. In our opinion, today a lot of aspects of agriculture are at a turning point. And this is what we have to prepare for. Current topics like environment, climate protection, health and, of course, digitisation 5.0 rank first in the discussions of the farmers, but also of society. And they are closely connected. They lead to questions with regard to new farming methods, new rotations, changes of our eating habits, humus development in the soil (is it practicable?), the trade with CO_2 certificates…

Times have never been as interesting as they are today. We have to be open for anything new – even if it might turn our familiar paths and structures upside down.

Enjoy reading this issue of terraHORSCH. I wish you a merry Christmas and a happy and successful New Year!

Cordially

Cornelia Horsch

01

01 The HORSCH Team at the Agritechnica

02 The HORSCH stand was well frequented during the whole show.

02

AGRITECHNICA 2019 – A REVIEW

This year's Agritechnica again was a huge success. About 150 HORSCH employees welcomed a lot of customers from all over the world at the stand. The visitors were particularly interested in the innovations.

At the beginning of the Agritechnica Cornelia and Michael Horsch were honoured with the Award of Merit by the European Society of Agricultural Engineers (EurAgEng). Every two years, this prize is awarded to personalities who contribute to agricultural engineering in an outstanding way and develop ground-breaking innovations of European and international importance.

But this was not the only award for HORSCH at the Agritechnia. The HORSCH Transformer VF was elected "Machine of the Year 2020" in the category mechanical population management. This prize is awarded on a two-year basis by the professional trade magazines traction and agrarheute.

Cornelia and Michael Horsch received the Award of Merit for their achievements in and their commitment to agriculture. F.l.t.r.: Prof. Peter Groot Koerkamp, President EurAgEng, Michael and Cornelia Horsch and Prof. Martin Kremmer, member EurAgEng Executive Board

Michael and Philipp Horsch gave us their personal summary of the Agritechnica.

Michael Horsch: "I was very surprised how many people visited our stand – despite the tense situation in the agricultural sector. I myself did not talk very much about our machines. I mainly talked about the direction agricultural will take in the future. Among others the topics were: what are the chances of hybrid farming and what will have to face if glyphosate is really banned. Farming minister Julia Klöckner and Joachim Rukwied, President of the German Farmers Association, independently visited our stand. They both explained in detail which topics they are focussing on at the moment. I was very surprised how intensely they deal with new topics. I think that both have very good ideas for the future that however will still take time to mature. On the whole, what I heard from them was rather encouraging even though they have not yet talked about everything in public."

Philipp Horsch: "We are very satisfied with this year's Agritechnica. We are happy that we had so many opportunities for good discussions and to network with so many of our customers and partners. This year we presented more innovations than ever before. Our explosion of innovations set off. Especially the new self-propelled sprayer Leeb PT and the tools for mechanical weed control got an excellent feedback. This is why we are looking quite positively into the new business year. At the moment, we are surely facing the biggest changes in the history of agriculture – and the farmers sense it. The Agritechnica, thus, was an ideal opportunity for an exchange. I noticed that most of the farmers are expecting these changes with a positive and optimistic attitude. In the future, we together with the farmers will tackle this change in agriculture."

The ACI is extended

HORSCH's continuous growth also has an effect on the R & D sector. So it was high time to add another office building to the ACI (Agricultural Centre of Innovation). For terraHORSCH, Hubertus Bultmann, the head of R & D in Schwandorf, explains the reasons for the extension of the building.

terraHORSCH: Why did the ACI have to be extended?
Hubertus Bultmann: When the existing ACI was planned, the offices were laid out quite spaciously. Over the years, however, we reached a point where all offices were occupied and the need for further capacities became more and more obvious. Thus, an extension was indispensable. The construction works were finished this year at the beginning of September. We now have room for 60 additional employees.

How many employees have already moved in and how fast will the free desks be occupied?
The first employees started to move in at the beginning of June, as soon as the first offices had been finished. At the moment, we are still far from all of the offices being occupied. The rooms in the old buildings where the colleagues have moved out are used for example as a laboratory for the electronic development team. We now have more space to carry out fully automated software tests to get even better in this sector. The workplaces that are still free will be filled step by step. Since the beginning of the year we have been able to recruit and integrate ten new employees. For next year we want to concentrate on filling the new business unit structure with life. Moreover, I want to focus on and strengthen the pre-development team – we call it "FutureLab".


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01 Ideal conditions for a quick exchange of ideas – the meeting room of the FutureLab team.

02 The construction works for the extension of the ACI started in July 2018.

Why do you attach such importance to reinforcing the FutureLab team?
HORSCH has grown due to the quick realisation of the requirements of the customers. In addition, we keep close contact with farmers and together with them test a lot of new things. Currently, there are so many exciting topics we want to work on. Besides the usual key projects in the single grain, tillage and crop sowing sector, we also focus on hybrid farming and digitisation. To be able to work on all these new topics, we need enough capacity in the pre-development sector. When recruiting new employees, we look out for colleagues who have already proven a creative mind in other sectors of the company.

Will there be more restructuring in the individual teams?
We already have used the opportunity to restructure the teams when we moved into the new building. Under the umbrella of the product development we created three business units: Tillage, Seeding, Planting. Our objective: intensify the focus on the individual products of these sectors. As the product range increased significantly over the past years, this is a very important step. The future heads of the three business units at the site in Schwandorf will then assume the global responsibility for the respective sector. Right from the start they should work closely together with the purchasing, production and service department. But the most important focus of our actions still is on the benefit for our customers.

PHILLIP KRAINBRING INTRODUCES HIMSELF:

Hi

My name is Phillip Krainbring. I am 33 years old and married. I grew up on a farm in Schleswig-Holstein. After I had passed my A levels, I trained as a farmer and then passed by master exam in agricultural sciences. Currently, I am the farm manager of an arable farm in the Magdeburger Börde. I am thankful to say that I was able to turn my passion into my profession.

HONEST CHANGES

The certified agriculturist Phillip Krainbring wants to familiarise the consumers with agriculture and encourages the dialogue via social media. He surely has enough to tell: Since 2016 he has been managing a 440-hectare commercial farm. As a farm manager he mixes rotation, sees to the optimum selection of varieties, chooses the appropriate application rates and uses modern biologicals.

The 33-year-old farmer uses the best of conventional and organic farming. For cereals and maize, he relies on electron-treated seed and compounds with micro-organisms. More and more often he does without chemical agents and mineral fertilisers. His objective: to use 30 to 50 per cent less nitrogen, reduce fungicides and insecticides by half and use no growth regulators at all. He tells terraHORSCH what motivates him:

"This year I won the CeresAward in the category "Arable farmer" – something very special for me as my father won the prize in this category in 2015 and now I follow in his footsteps. The Ceres Award offers the opportunity to show which new paths agriculture takes, which innovations we push and which ideas we develop to prepare the agricultural sector for the future. In my opinion, this is very important as we are facing major challenges and changes.

On the one hand, we realise that our production methods are reaching their limits. Be it resistances in plant production, stagnating or declining yields, too large and too heavy machines, extreme weather and lots more. This list could go on endlessly. But we chose these challenges when we chose our job. And this is what makes agriculture so attractive that we constantly develop further and not simply tread water. But in my opinion, all this is not only about the latest machine, the next high-tech solution or digitisation ad nauseam. Further development means to remember topics that do not attract the most attention, for example the soil. The soil can achieve a lot. But, to put it bluntly, in the past we often only considered it as the "carrier substance" for seed, plant protection and

The CeresAward

Today agriculture more and more becomes the focus of public attention – sustainable use of resources, environment and climate protection are only some of the topics that everyone is talking about within the scope of guaranteeing the food supply. The demand for transparency with regard to the production and the product origin plays a more and more important role.

This is why the CeresAward as the reward for extraordinary achievements of farmers in Germany in eleven different categories came into being. The award is a high-publicity platform to point out the skills and important achievements of farmers in Germany – in the agricultural sector and beyond. The CeresAward ceremony is a gala event that takes place every year. HORSCH is the sponsor of the category „Arable farmer".

CeresAward winner Phillip Krainbring and his wife Julia (middle) with Cornelia Horsch (2.from the left) and the jury members Andreas Lege (left, Association of the Chambers of Agriculture), Daniel Brandt (2. from the right, HORSCH Maschinen GmbH) and Klaus Strotmann (right, agricultural magazine agrarheute).

fertiliser. There is a lot of potential we do not yet know and even underestimate.

On the other hand, we are suddenly exposed to a societal and political pressure that we would not have thought possible five to ten years ago. Society demands that we radically change the way we farm and the politicians respond to these demands with restrictions and bans. Many people do no longer have any relation to agriculture and they know nothing about today's production methods. But how should they know? Let's think about ourselves and about the sectors we are not in contact with. I don't know anything about the daily routine of a nurse or of a media designer. In the past we simply missed the opportunity to talk about the development of agriculture.

But even though people have little relation to a topic or know little about it, they still talk about it. Exactly this can be our opportunity. The topic agriculture is of interest and we have to make use of this interest. Let's talk about our work! But not only with figures, facts and scientific documents. We and our work can inspire people. There are so many nice experiences, situations and stories we can proudly talk about. But it has to be honest. We must not whitewash things. Let's take the plant protection agents as an example. Plant protection agents have side effects – period! As an agricultural scout I visit a lot of cities to talk about agriculture. Plant protection agents or – the more common term – pesticides always are an important topic. If I only talk about how amazing and important these agents are, no-one will listen to me respectively will start arguing against. But if I deliberately mention the side effects, we are entering a completely different level of conversation. We also have to admit that the reduction of plant protection applications is not only to our credit. Regulations, restrictions and bans partly forced us. Therefore, we cannot stand up and demand that we earn all the merit. This is not credible.

We must not wait any longer! We have to enter into the discussion proactively. And it is important that we ourselves approach the critical topics and do not wait until others bring them up. This is the only way how we can have a word in these discussions and shape them. And this is only possible in combination with self-criticism. Those who today still claim that agriculture is ok the way it is and that we do not make mistakes haven't understood anything. We do not keep animals in a species-appropriate way, we do not work sustainably etc. And yes, we partly bear the blame. Not all of it, of course. But if we ourselves do not approach these topics and show that we are changing something and that we want to continue to change something, the pressure on us will even increase.

I think with honesty, some self-criticism and the will to risk something new we farmers can show that we want to change something from within."

01

On a knife's edge: Cultro TC

With the double knife roller Cultro TC HORSCH launched a new machine line right in time for the Agritechnica. The range of use covers all tasks from an extremely shallow cultivation of rape stubbles to the incorporation of catch crops.

For a start the Cultro TC will be available in three and twelve metre working width. What both machines have in common is the double knife roller. When the machine was developed, service life was given top priority. Six close-fitting knives are arranged on a closed shaft with a diameter of 300 mm. This well-proven design was copied from the knife roller of the Joker RT. The strain on the individual knives can be controlled in a better way as the forces are transferred to the main tube and the knives cannot flex. These characteristics guarantee a long service life even in extreme conditions, e.g. on dry and stony soils.

The double knife roller is designed as a tandem and connected in the middle with the main frame via a rubber bearing. Three-metre wide elements are used that can adapt to the unevenness of the soil in an optimum way.

The Cultro 3 TC with an effective working width of 2.90 m is a 3-point tool that can be attached at the front or at the rear of the tractor. If it is attached at the front, the standard stone protection hood helps to keep stones and root material away from the tractor. If the Cultro is attached at the rear a packer is available as an option.

The Cultro 3 TC can be used solo or in combination with for example the Joker 3 CT.

The Cultro 12 TC with an effective working width of 12.20 m is launched as a trailed tool. In transport position the two wings of the machine respectively fold lengthwise to the front to stay within the statutory frame for the width of three meters and for the height of four metres. The four three-meter-double knife roller elements can be combined with a 1-row harrow and the well-proven RingFlex packer or

01 The horsepower requirement of the Cultro 12 TC is very low. The machine can be used with a 250 hp tractor.

02 Due to the high rotational speed the Cultro TC intensely squeezes and crushes harvest residues.

with a 3-row heavy harrow. Depending on the region where they are used both equipment lines have their advantages.

The combination with harrow and packer mainly makes sense on rather light soils to be able to rest part of the machine weight on the packer.

The 3-row heavy harrow however guarantees an additional redistribution of straw in the direction of travel. The harrow tines with a diameter of 14,3 mm take up straw and harvest residues and distribute them. The machine weight of the Cultro 12 TC almost completely rests on the knife roller what is particularly advantageous in case of tenacious or partly green harvest residues.

A LOT OF POSSIBLE APPLICATIONS

In a manner of speaking, the Cultro works on a knife's edge and can be used in very different ways:

To get this straight: There usually is no smooth cut. It rather is a mechanical breaking or crushing of harvest residues or growth.

Rape stubble cultivation surely is the most obvious application of the double knife roller. The main tasks are: break the stubbles open, crush them and take up the harvest residues again without penetrating the soil too deeply to avoid burying the volunteer rape. The Cultro TC perfectly meets these requirements and carries out the tasks very fast – at an operational speed of up to 20 km/h. The relatively low costs for such a pass play an important role.

During the second pass in rape stubbles, the already emerged, small rape can be incorporated. The straw that at that time already is brittle is crushed even further and the volunteer rape can be stimulated to emerge a second time.

In addition to rape stubbles, knife rollers are also quite commonly used in sunflower stubbles. The main focus is on crushing the stems to create – in combination with tillage – a seedbed for the following crop. The breaking open of the stubble and stem sections additionally guarantees that the residues are disintegrated as quickly as possible.

In regions with a high silage maize ratio, stubble hygiene is the subject of fervent discussions and mostly is already used intensely. The objective is to damage the stubbles of the harvested maize in such a way that the corn borer does no longer find wintering grounds. The Cultro TC can support this effect by crushing and breaking open a large part of the stubbles. Thus, the stubble dries up, gets in contact with the soil and the disintegration process starts. Though the use of the Cultro TC as an individual measure in most cases might not be enough, it can be used as an alternative for mulch technology during the work process. A high operational speed and relatively dry, compact soil is essential for the destruction degree of the maize stubbles. Thus, the knife roller can cultivate the stubbles even more intensely.

In catch crop populations the Cultro TC can be used at different times. The scope ranges from a growth limitation of the populations by bending and crushing via a shallow incorporation of green populations to the targeted crushing of the mulch cover after winter. The latter can be a huge advantage with regard to a fast soil heating and drying especially on colder sites.

HORSCH always thinks in farming systems. The Cultro TC is another complement to different systems that allow for working shallowly, intensely and with little effort. Different stubble passes and the use in standing catch crop populations are part of the agenda. Depending on the working width the Cultro TC can be combined with the most different tools to achieve the optimum work effect. In extensive regions or in no-till farming, especially the Cultro 12 TC with the 3-row heavy harrow can be a highly efficient tool to rework stubbles, distribute straw, break capillaries and create an optimum seedbed for no-till farming.

VERSATILE

There are quite a lot of innovations in the single grain seed drill sector of the Maestro line. Michael Braun and Thomas Murr from the HORSCH product marketing department have summarised the main characteristics.

The most important feature for single grain seed drills is versatility – not only with regard to the size of the seed. Depending on the region and the crop the row spacing differs, too. To meet the requirements of the farmers, HORSCH has refreshed the Maestro family with the product lines CV and RV as well as CX and RX.

terraHORSCH: Mr Braun, what does the letter V respectively X stand for with regard to the new Maestro lines?
Michael Braun: We use two different metering systems. The CV and RV lines are equipped with the well-known AirVac metering device that works according to the vacuum principle. For the CX and RX lines, the new AirSpeed overpressure metering device will be used.

How does the customer benefit from the two different systems?
Thomas Murr: Our machines work in the most different countries, under the most different conditions and they have to cope with all seed sizes. Depending on the conditions and the requirements both systems have their advantages. Vacuum systems are very flexible with regard to the seed size. They are ideal for rape and bean seeds and even for exotic crops like hemp. Overpressure systems excel when it comes to high efficiency, that is operational speed: lots of hectare in a short time. But there can be restrictions, e.g. by the catching rollers in the row to make sure that the grains do not bounce. There are limitations of use in wet, sticky soils, the sowing window gets tighter. Finally, we want to provide optimum advice to our customers to supply them with a seed drill that is optimally adapted to their conditions.

Are there regions in the world where one system fits better than the other?
Michael Braun: There is no general answer to this question. I am rather sure that both systems will work in almost all markets. It depends on the focus of the customer. Our task will be to find out together what is be the best solution for each customer. In any case, we will soon have both systems ready for the export markets.

Which operational speeds are possible?
Michael Braun: For the AirSpeed metering devices 15 km/h is a realistic top speed, for the AirVac metering devices it is 10 km/h. But I think it is more important to guarantee a high sowing quality than to sow as fast as possible. Quality in this case does not only refer to longitudinal distribution, but also to meticulous embedding and regular depth placement. The operational speed largely depends on how the seedbed has been prepared. And if the humidity fits in, too, you can make full use of the efficiency of the seed drill.

With all the differences of the systems – do they also have something in common?
Thomas Murr: The design of both metering devices is very similar. From the outside you can see that there is a hose leading from the vacuum metering device and that the overpressure metering device is equipped with a hood. The inside of the housing is almost identical. The grain is sucked into the hole or with overpressure. The singulators of the new single grain system work completely mechanically for all crops to avoid doubles and do not have to be adjusted. The grain then is taken into the fall or shot tube and then into the seed furrow. The supply has to be regulated and the overpressure or the vacuum has to be adjusted. One condition, of course, is the correct metering disc that corresponds to the grain size. An ejection wheel cleans the hole for example in case of pollution or broken grains to avoid incorrect placement. By the way, our metering discs are made of plastic. The advantages of plastic are the increased freedom of form for the design, a lower weight and a lower price. Thus, the farmer can purchase different discs for different seeds at manageable costs.
Michael Braun: The metering devices are mostly low-wear and only low driving forces are required. Up to a number of eight row we do not even need an additional connection for power supply. The electronics allow for an individual row

01 Michael Braun (right), team leader of the HORSCH product marketing, and Thomas Murr (left), within the product marketing responsible for the single grain seed drill sector.

02 The Maestro RV works according to the well-proven principle of one seed tank per row.

02

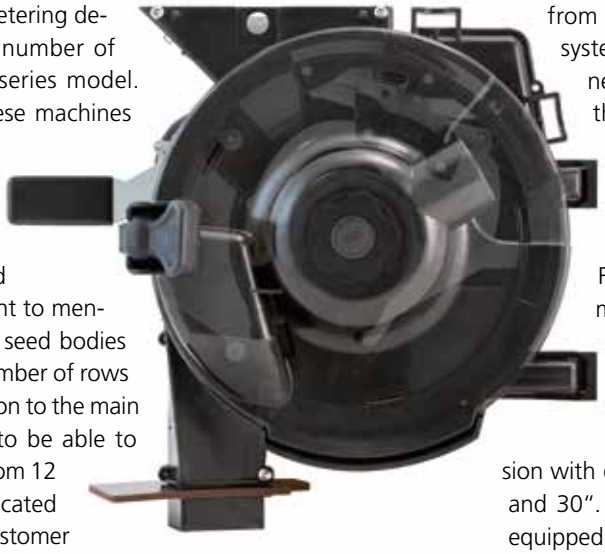
shut-off, SectionControl, VariableRate and a tramline control. But that is the well-proven, standard HORSCH technology.

What is the difference between the new single grain seed drills and their predecessor models? Which versions will be available? And when?

Michael Braun: Our new price list was published on the 1st of October. It includes a mounted Maestro RV and a trailed CV as successors of the successful models CC and RC. Sales for CV and RV have already started, the machines will be delivered in early spring. With regard to machines with the new overpressure metering device we will build a limited number of a 3-point and a trailed pre-series model. Primarily we want to use these machines to advance optimisations and carry out demonstrations.

Thomas Murr: We designed a lot of new equipment options and changed some details. First of all, I want to mention the flexible fixing of the seed bodies that allows for varying the number of rows and the spacing. The connection to the main frame is a clamping profile to be able to change the number of rows from 12 to 8 easily and in an uncomplicated way. This was an important customer requirement. For the Maestro RV and RX, we kept up the principle of one seed tank per row. Fertiliser is supplied via a front tank, e.g. the HORSCH Partner 2000 FT. This is the most significant difference to the Maestro CV and CX. As before, they are available with one seed tank per row, but now they can also be equipped with a central hopper for fertiliser and seed as we know it from the large Maestro SW. This technology is called MTS – Main Tank Supply. The capacity of the central tanks is 3,000 l for fertiliser and 800 l for seed. If the central hopper is only used for fertiliser, the capacity amounts to 3,000 l and 70 l seed per row. Beside an 8- and 12-row version the Maestro CV will also be available in a 9-row version. In this case the sowing section is offset towards the middle. So if you work with a 2.10 m or a 2.25 m track you no longer have to drive over the rows.

I think that especially the 9-row version will become a very interesting machine, especially in markets with a 70/75 cm row spacing. The only impediment might be that grain maize then would have to be threshed in 9 rows. But it is an option to generate additional yield. The requirement came from France and parts of Germany. The system is already known there. Another new feature of the Maestros CV is that the seed drill can be folded forward to rest on the seed hopper. This guarantees a reliable vertical load and a smooth running on the road even if the fertiliser hopper is empty. For markets outside Europe, the DV model will be available as of 2020. The requirements on the tractor are low – what is particularly important for customers in Russia and the Ukraine. There will be an 8-row version with different row spacings: 70 cm, 75 cm and 30". The basic version of the DV will be equipped with mechanical coulter pressure and a single fertiliser hopper. Options like AutoForce, double hopper for fertiliser and filling auger are part of the comprehensive equipment list. What all lines and variants have in common is the fertiliser placement. The nutrients are applied via a single disc coulter with a separate depth control which is particularly advantageous on heavy cohesive soil. A double disc fertiliser coulter will be available as of 2020/2021.



The AirVac metering device is ideal for all seeds of the most different crops.

Michael Maier (l.) and Alois Schneider (r.) on their way through the new production hall.

HORSCH builds "Forest Factory"

HORSCH invests 23 million Euro in the production site in Schwandorf. The construction of the so-called Forest Factory so far has been the largest investment in the company's history. Michael Maier (head of production) and Alois Schneider (head of logistics) explain the reasons for the construction.

terraHORSCH: Why was it necessary to extend the production sector in Schwandorf and build the Forest Factory?
Michael Maier: One of the crucial points was that due to the sales volume we have reached the capacity limits – in the logistic as well as in the production sector. In the past, the large working widths and the growing product portfolio caused immense problems with regard to the available space in the old halls. The additional 11,000 m² of the Forest Factory will now allow for a further growth and for reacting more flexibly to customer requests. At the same time, we can improve our assembly and logistic processes and make them more efficient to be prepared for future requirements.
Alois Schneider: In the logistic sector, too, the workspace was increased considerably. Due to the new logistic areas for the production department the workload of the existing high rack system is reduced. Thus, we obtain the storage capacity we urgently need for spare parts.
Michael Maier: The new Forest Factory allows for scheduling production in a completely different way. Small batches can be assembled taking the delivery dates into account. Machine changes in the line can be realised in a simpler and more effective way and we can use the know-how of our employees more efficiently. The assembly lines will be supplied with the required material right at the time when they need it. Special demands of our customers can be planned and managed in a more targeted way. In the future, there will be a specially trained assembly group to meet the increasing demand for special equipment.

What is the extent of the demand for special equipment?
Michael Maier: In 2019 we carried out quite a lot of special orders. It is difficult to assess how this sector will develop in the future.
Alois Schneider: In this respect, it is important to mention that in the Forest Factory each production line has one alternative workplace at its disposal. It will be particularly useful if special demands cannot be carried out in the line during the normal assembly process as they would disturb the smooth workflow. So far, we have never had such an additional space. The alternative workplace can also prove useful if there are problems in the line.

01 The new logistic hall with pallet and storage shelves to supply the assembly teams with the required parts.

02 Aerial view of the Forest Factory

03 The production team with the first machine, a Maestro 24 SW, that was built in the Forest Factory

Will there be automation projects in the new production hall?
Michael Maier: One of the objectives of the new hall is to create areas for automated processes, especially in the pre-assembly department. In January, a robot plant for the assembly of bearing stubs will be installed. I think this is an important step to advance automation in the production department even further.

Are there other workflows that will change in the future?
Michael Maier: Production logistics will change significantly. Before, the logisticians went to each storage location and withdrew the parts that were required for the whole production department. With the new Forest Factory this system will be restructured. The storage areas will be divided. The individual order pickers are assigned to one storage area and pick the goods to order. The goods are brought together from the different areas and provided for the respective assembly line. Moreover, there will be four supply logisticians who independently supply the individual teams with the correct material

Will the new hall have an influence on the shift schedule?
Michael Maier: The shift schedule will not change. We will continue to work at normal working hours from Monday to Friday. If necessary we will switch to shift work.

Will the number of employees increase, too?
Alois Schneider: Quite understandably, the extension of the factory does not mean that there automatically is a need for new employees. We created the basis for further growth by extending the space for assembly and logistics. If the sales continue to develop as positively as they did during the past years, the need for new staff will increase, too, and we will employ additional people in the production and the logistic sector.

What about the construction progress? When will the construction works be finished?
Alois Schneider: In December we have moved into the whole production area. The buildings have been completed to such an extent that the logistic as well as the assembly areas are operative. We already use 80 % of the new halls. The outdoor facilities have not yet been finished completely. The office building is still under construction and will be ready in the middle of next year. The spare parts warehouse will be extended, too. The construction works for the additional wing of the hall will also be finished in the middle of next year.

What is the size of the office building? Which departments will move in?
Alois Schneider: The office building will be a five-storage building on an area of 480 m². The total area of the offices will amount to 2,340 m². The ground floor and the first floor will house the staff rooms with lockers, showers, fitness and break room. The second floor will be used by the production management and the purchasing & supplier management team will move into the third floor. The top floor is still unoccupied to have some capacity for a further growth of the company. In total there will be 115 workplaces in the office building.

Diversification to increase yields

Agricultural cultivation in the Brazilian savannah (Cerrado) only started a short time ago. But today especially the federal state of Mato Grosso considerably contributes to the production of agricultural commodities of the country.

The timeline also shows the development of the grain yields in the region (Ill. 1).

In the beginning, the farmers faced enormous challenges. One of them was the originally very nutrient-poor soil. They had to improve the pH value by liming and to increase the phosphor and potassium content. These immense investments were the basic requirement to achieve productivity of the soils and the basis for an economic agricultural use in the first place.

As agriculture developed further, the complexity of the production methods increased and cultivation became more and more intensive (Ill. 2). The reduction of the cultivation cycles for soybeans, maize and cotton combined with sowing soybeans in mid-September and the beginning of January allowed for making better use of the vegetation period.

The current farming system consists of the successive cultivation of soybeans/maize and/or soybeans/cotton for a second harvest – at the moment, more than 60 per cent of the arable land of Mato Grosso is cultivated this way.

The double cultivation raised questions that so far had only to a little extent been dealt with from a scientific point of view. For the research projects mostly regarded one crop in isolation and not in combination with others in the same agricultural year. The intensification led to more favourable conditions for weeds, pests (insects), nematodes and diseases. Resistance was another problem.

Ill. 1. Development of soybean and maize production 2nd harvest in Mato Grosso and its share in the total production of Brazil

III.3. The test fields of the MT Foundation. The red marker shows the lots of the rotation test with focus on soya production.

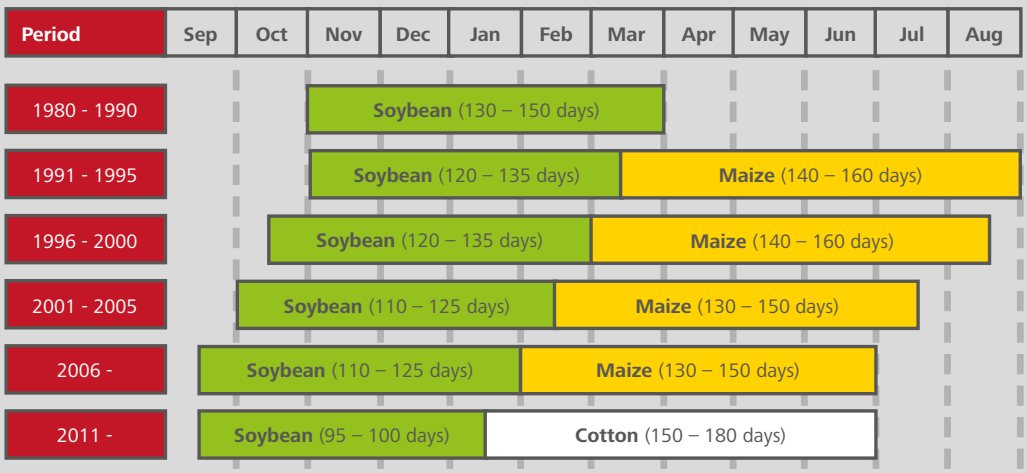
Against this background, several long-term tests were carried out in Mato Grosso.

In 2008, the MT Foundation decided to set up a test series to study the effects of crop succession, crop rotation and monoculture systems – with soybeans as the main crop to analyse the effect of crop sequences on the soybean yield and on the fertility of the soil. The long-term text is carried out under practical conditions on the test fields of the Foundation at the Learning and Dissemination Center that is located at Cachoeira Farm (17° 09′ S, 54° 45′ W and 490 m altitude), near the motorway BR-163, in the municipality of Itiquira. The soil is very clayey. For more than 30 years, it has been supplied with mineral nutrients and lime and, thus, is now considered to be a fertile soil. The eight cultivation systems of the test are described in chart 1. They cover the following sectors: different rotations, the combination with catch crops, crop succession and monocultures.

During the eleven test years several important results could be observed. The straw accumulation between the systems is significantly higher for systems with crop succession and crop rotation (Ill. 4). For systems with crop rotation it is important to take the diversity of the types of straw and the roots of the different species into consideration – they all influence the soil profile in completely different ways. Soybean yield, the main crop of the test, is influenced by the different production methods and has increased over the years. The increase of the productivity level of all methods during the past three vegetations periods is mainly due to the fact that more high-yield varieties have been used that only recently were launched on the Brazilian market. The average yield for this period is significantly higher for crop rotation and crop succession systems than for monoculture.

Over a period of six harvests (2008/2009 until 2013/2014) the different cultivation methods did not have an influence on productivity. Differences started to show as of the harvest 2014/15. The main reason was a combination of water stress and an extremely early soybean variety. This highlights the buffering power of clay soils with a good nutrient supply like they prevail on the test farm of the MT Foundation. The most important message for the farmers is: persevere with no-till farming – for the good results will not be achieved right at the start, but over the years as the system stabilises.

So far it has not been possible to notice a significant increase in soybean yields for crop rotation systems compared to crop succession systems. However, further evaluations will be carried out. The Foundation wants to find out how crop rotation versions might contribute to improve the biology of the soil. Illustration Ill. 6 shows how the accumulation of humus



III.2. Development of the cultivation methods in Mato Grosso after the introduction of crops for a 2nd harvest in the same agricultural year

Source: Adapted from Kappes (2015)

S	------- Year 1 -------	-------- Year 2 --------	------- Year 3 -------	Tillage
	---------- 1st harvest / 2nd harvest ----------			
1[a]	Soybean / Fallow	Soybean / Fallow	Soybean / Fallow	NT
2[b]	Soybean / Millet	Soybean / Millet	Soybean / Millet	NT
3[c]	Soybean / Brachiaria	Soybean / Brachiaria	Soybean / Brachiaria	NT
4[d]	Soybean / Millet	Soybean / Crotalaria	Maize + Crotalaria	NT
5[e]	Soybean / Crotalaria	Maize + Brachiaria	Soybean / Crotalaria	NT
6[f]	Soybean / Crotalaria	Soybean / Maize + Brachiaria	Brachiaria	NT
7[g]	Soybean / Maize	Soybean / Maize	Soybean / Maize	NT
8[h]	Soybean / Fallow	Soybean / Fallow	Soybean / Fallow	CT

Legend:

S – System; NT – No-till; CT – conventional tillage (annual tillage with plough/harrow during the off-season)

[a] Soybean monoculture without mulching, 2nd harvest (without tillage during the off-seaon)

[b] Millet ADR-300, 2nd harvest

[c] Urochloa ruziziensis (congo grass), 2nd harvest

[d] Millet ADR-300 and crotalaria ochroleuca, 2nd harvest, and urochloa ruziziensis, sown simultaneously with summer maize

[e] Crotalaria ochroleuca, 2nd harvest, and urochloa ruziziensis, sown simultaneously with summer maize

[f] Crotalaria ochroleuca, 2nd harvest, and urochloa ruziziensis, sown simultaneously with maize for 2nd harvest and kept until the summer of the following crop

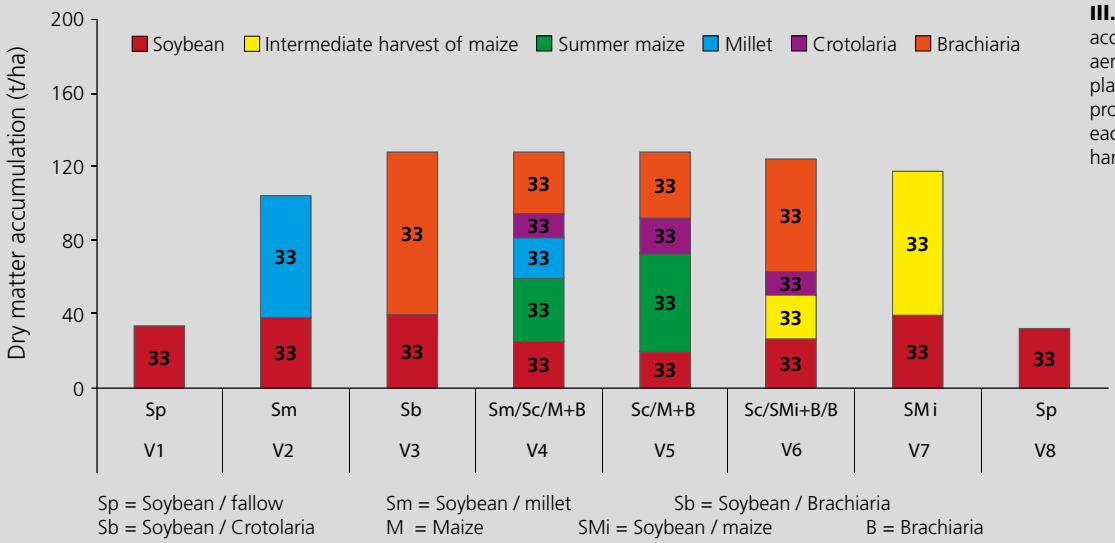
[g] Crop succession with soybeans and maize as 2nd crop

[h] Soybean monoculture without mulching in the 2nd crop (with tillage during the off-season)

Chart 1: Systems with different production (monoculture, crop succession and crop rotation) and cultivation methods

can change the fertility especially of tropical soils. During the test, microbiological analyses were carried out to break down the soil enzyms that have an effect on the carbon, sulphur and phosphor cycle. Thus, it was possible to define indicators for the biological quality of the soil. Production methods with a higher amount of straw increase the biological activity.

These parameters show how much straw is required in tropical soils to activate the full biological potential. For some cultivation systems the biological activity was eight times higher than for monoculture cultivation of soybeans. These results will be incorporated in the routine analyses of soil research laboratories and will soon be available for farmers



III.4. Dry matter accumulation of the aerial part of the plants (mulch) for each production method and each species over 10 harvests

S1 – Soybean/fallow (NT) – monoculture

S7 – Soybean/maize (NT) – crop succession

S6 – Soybean/crotolaria, soybean/maize + brachiaria/brachiaria (NT) – crop rotation

Photos: C. Kappes (2016)

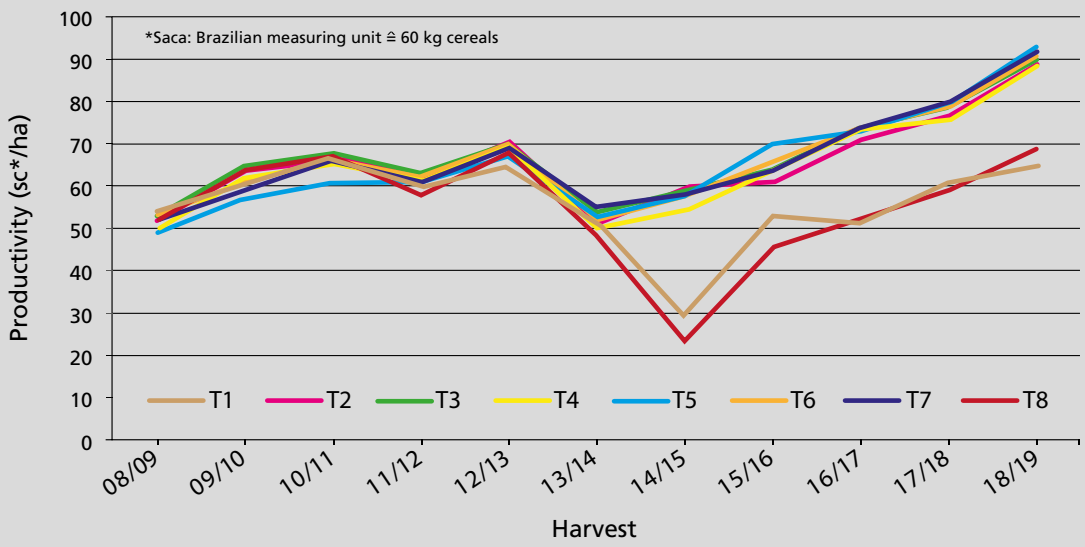
III.6. View of the soil surface, 0-10 cm layer for soybean/fallow, soybean/maize and soybean/crop rotation systems. Over time and with the accumulation of different types and quantities of mulch on the surface, the soil gets darker and darker. The organic matter content in the 0 to 10 cm layer for the three production methods is: respectively 3.2%, 3.8% and 4.0%.

to gather microbiological information about different soils on different farms.

SUMMARY

The summary after eleven test years with eight different cultivation systems is as follows: The productivity of soybeans is closely connected to the cultivation method used. Where there was more straw in the soil, the productivity of the soybeans was higher. For systems where a larger variety of species are cultivated (crop rotation) the soybean yield is still similar to less varied systems (crop succession). However, you can notice higher values for microbiological activity in the soil. This shows to what extent it makes sense to maintain grain production and thus to have a cultivation system with a higher amount of straw. The result is an increase of the humus content in the soil.

The MT Foundation will continue to carry out this long-term test for quite some years to examine the effect of the cultivation system on the productivity of soybeans even more intensely. Other analyses, e.g. with regard to carbon sequestration, will follow soon. The objective is to assess the effects of crop diversity. All this is to contribute to make agriculture, especially farming, in the savannah even more sustainable.



III.5. Soybean yield over 11 years, for each production method in the crop rotation test

HORSCH Academy: Training and network

Technology and agricultural methods develop more and more rapidly. With its innovative machines HORSCH takes an active part in this development to meet the new requirements of the farmers. However, it gets more and more difficult to keep pace with it.

With technology alone it will not always be possible to sufficiently respond to all these demands. The agronomic solutions for the requirements of society and politicians call for more and more documentation and high-tech. And you also need more and more specific knowledge to operate the agricultural machines. Thus, it is indispensable to accompany the farmers with trainings and professional exchange.

This is the reason why in September 2018 HORSCH France set up the HORSCH Academy. This new training concept is only available to HORSCH customers. They meet at an agricultural farm for trainings and field trips and exchange experiences with the present experts about a certain topic. This year four field days and two excursions took place all over France. "The topic of the first sessions of the HORSCH Academy was conservation farming", Rémi Bohy, HORSCH France's specialist for sowing and Precision Farming, explains. Mineralisation of organic matter, soil erosion, weed resistances: today farmers have to face new phenomena and have to rethink their cultivation systems. "Conservation farming is one way to approach these challenges. Rethink rotation, cultivate catch crops and disturb the soil as little as possible – this is how some of our customers really solved for example the problem of resistances", Rémi Bohy specifies. The agronomic interaction of these different methods will allow for keeping pace with the changes in the agricultural sector in France – in economic as well as environmental terms. Moreover, conservation farming requires an enormous know-how. Thus, the choice of topic was obvious.

FIGHTING THE GLOBAL WARMING

terraHORSCH visited the first event that took place in in Arronville (department Val d'Oise), 50 km north-each of Paris at the beginning of June 2019. About 40 farmers had come to the Saint-Lubin farm. Frédéric Rémy manages the 450-hectare farm that by now has been converted completely to conservation farming.

The day started with speeches of Fréderic Rémy and Julien Senez, a farmer from Vignemont (department Oise) and founder of Kiwi Agronomy, a training centre for conservation farming: "The number of French farms that have been converted to conservation farming is estimated to be 4 %", Julien Senez explains. "Some of them can rely on 15 to 20 years of experience."

For Julien Senez the most important objective of the conversion to conservation farming is to contribute to the fight against global warming. The associated methods really allow for storing larger amounts of carbon in the soil: the carbon balance of a converted farm is positive. Generally, cultivated soils release 300 kg carbon per ha. Only little cultivated soil with catch crops, however, can store up to 600 kg carbon per ha per year. And via government aid programs as they

01

01 During a field trip the participants were able to see the results of Frédéric Rémy's agronomic methods on site.

02 Frédéric Rémy mainly uses the Airseeder 6 CO in summer in stubbles.

03 The Avatar only moves little soil. Thus, the emergence of weeds in autumn is reduced.

already exist in Switzerland such ecosystem services might soon be reimbursed.

The second objective is to become competitive again by reducing the production costs per ton of wheat. This can be achieved by reducing the agricultural inputs and particularly the fuel savings that result from a sophisticated tillage. "In France, the production costs for a ton of common wheat on average amount to 155€. With the cheapest methods it is produced for 175€! In Russia the average costs amount to 100 €… This is why we have to develop our methods further", Julien Senez emphasises.

CHALLENGES

Despite the obvious advantages the conversion to conservation farming is not easy at all. There are numerous obstacles, but also possibilities to avoid some of them. First of all, you have to master the climate conditions of the soil. "Via mineralisation tillage allows for concealing the disfunctions of the soil. As soon as you convert to minimum tillage or no-till farming, these disfunction are revealed", Julien Senez explains. It is essential to classify the fields, even individual lots within one field, into three categories: type of soil, share of organic matter and pH value. In some cases (e.g. an increased share of organic matter and a neutral pH value) the conversion to conservation farming will proceed easily. In other cases, increased care will be required, whereas on suboptimal lots preparatory work will be inevitable. Liming can solve the pH problem. Including catch crops in the rotation and adding organic matter can take the amount of organic matter in the soil to an adequate level again. "A targeted placement of fertiliser can compensate a poor mineralisation", Julien Senez adds.

Frédéric Rémy then presented the Saint-Lubin farm and the gradual conversion to conservation farming. With 750 mm rainfall per year and the constantly increasing drought risk it became necessary to keep as much humidity in the soil as possible to guarantee a successful sowing in summer. Frédéric Rémy needed a seed drill that penetrated the soil in an optimum way. He chose a HORSCH Avatar 6.16 SD. Moreover, he very carefully selected catch crops that would perfectly fit into his rotation. "A versatile rotation and sowing without disturbing the soil – that's the key when you want to fight weeds", Frédéric Rémy summarises.

04 Due to the single disc seeding element you can go through large catch crops without causing any clogging.

05 For Julien Senez the most important objective of the conversion to conservation farming is to contribute to the fight against global warming.

CATCH CROPS

His rotation is as follows: winter rape/common wheat/spring flax or sunflowers/common wheat/spring field beans or winter peas followed by buckwheat/common wheat. It always includes a mixture of different catch crops that is adapted to the following crop. The mixture consists of at least four different varieties, among them at least 50 % legumes. The mixture also has to be matched with regard to the root development.

"If the catch crop develops well, you do not need any chemical measures. Glyphosate is solely used to get a grip on weeds and perennials." The possible ban on glyphosate would turn his current production method completely upside down, however positive the intention behind it may be. By the way, Frédéric Rémy only uses 1.5 litre of glyphosate per hectare. It would be a step backwards to re-introduce tillage on the farm. "I am not sure if the politicians understand the problems correctly. You cannot demand from the farmers to make an effort to reduce greenhouse gas emissions and at the same time deprive them of the main tool that would allow them to achieve this objective", he states.

After eight years, the balance of the conversion of Saint-Lubin farm to conservation farming is excellent. Frédéric Rémy estimates that he spends 455 h per year less on the tractor – this corresponds to a diesel saving of 21,200 litre. This amounts to 13,650 € per year and this, in turn, means up to 30 € per hectare. At the same time, the yields for common wheat have increased by 14 dt and for rape by 7 dt per hectare.

IN THE FIELD

After lunch, the group went out into the field to see the results of Frédéric Rémy's agronomic methods on site. The exchange between the farmers and the two experts was quite lively. Frédéric Rémy then showed the participants round his machine park. He particularly pointed out his two seed drills – one with discs, the other one with tines. Mainly in summer, he uses a HORSCH Airseeder 6 CO in stubbles. The tines guarantee an excellent seed-soil contact even if there are high amounts of straw and allow for a satisfactory emergence of catch crops without cultivating the soil. In autumn, he uses the HORSCH Avatar 6.16 SD. Due to the single disc seeding element he can go through large catch crops without causing any clogging and only little soil is moved. Thus, the emergence of weeds in autumn is reduced.

This first event was the successful start of the HORSCH Academy. The new concept allows for intensifying the already close contact between manufacturer and customer even further. The customers want to become better and better and they want a platform for an exchange about innovative methods. In fact, the agronomic methods develop faster and faster, as well as the technology level of the machines that are to realise these methods. The training and exchange days do not only provide the farmers with new insights, but also allow for networking with their professional colleagues. The combination of speeches, a practical part in the field and an exchange of experiences has impressively proven its worth and will be continued next year.

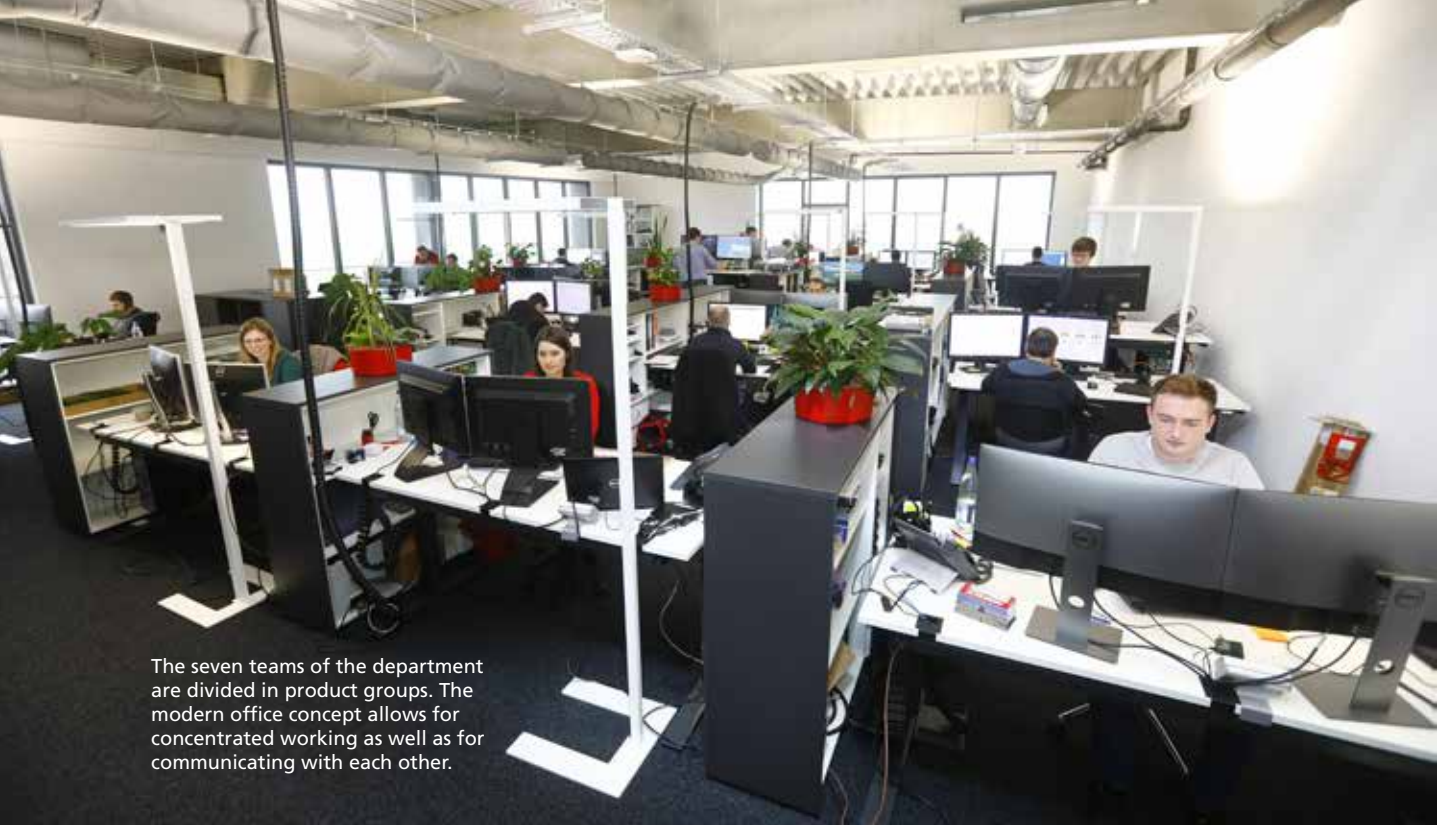
The R & D Crop Care team in Landau

CENTRE OF EXCELLENCE

The bigger part of the HORSCH R & D team is located at the company headquarters at Sitzenhof. The plant protection experts, however, have their offices at the HORSCH LEEB site in Landau upon Isar. terraHORSCH visited the R & D team in Landau.

The plant protection sector clearly is a growing market for HORSCH. Since the foundation of the HORSCH LEEB Application Systems GmbH the investments in buildings and production halls especially at the site in Landau were considerable. The administration and also the R&D team were still located at the former Leeb headquarters only a few kilometers away in Oberpöring. In the course of the fourth extension of the production facilities within ten years an office building was added in Landau that now is housing the R&D team. This is where we meet Florian Zink. Until some time ago he was simply called Department Manager R&D, today his exact title is "R&D Department Manager – Engineering BU Crop Care". He explains what is behind it: "The plant protection sector has always been a relatively independent profit centre, with a R&D, purchasing, production and service department. This is very advantageous as certain sectors that are necessary for a dynamic development thus are combined and clearly assigned. There are less capacity problems and, what is most important, everyone concentrates on one topic: plant protection! Therefore, we are able to react fast and flexibly. The way of thinking is almost like in a start-up company." This experience was the basis for the idea of the Business Units (BU). This structure will now be transferred to other product sectors at HORSCH.

Florian Zink has been working for Leeb since 2007. He is a mechanical engineer with an agricultural background and he wrote is final thesis at Leeb. "In 2013 we only were six people in one office. We did neither need rules for communications nor a lot of processes. Everyone was able to work in a concentrated way, but still automatically got everything that was going on. Theo Leeb was in the office next door and the door to his office was always open. It was very efficient. With the growth of the company, the number of colleagues grew, too. The offices were extended and we formed teams for special sectors. To minimise the need for communication, we imposed rules for certain things on ourselves, e.g. a colour code for our water hoses. Thus, everyone sees at once what's what, does not have to ask and any confusion is prevented. The more a sector grows, the more important it is to introduce some rules. We summarised all that in a



The seven teams of the department are divided in product groups. The modern office concept allows for concentrated working as well as for communicating with each other.

"Developers' Guide" – but in a very pragmatic way, not as an end in itself."

Take decisions

Two years ago, a team leader structure was introduced. At that time the department consisted of 17 employees. Florian Zink was the sole contact for quite a lot of things. With the new structure it was possible to split up the tasks. "It is most important for our co-operation that we all have the same basis. Everyone knows how the other one thinks. We trust each other. And we all know exactly what makes our boss, Theo Leeb, tick and which experiences he has. You can see this in our products – the customer immediately recognises the HORSCH LEEB DNA. And not only with regard to design and handling. It also is about special ideas and functions. In large corporate groups, but especially if product groups are bought in addition, this often is no longer the case." One thing is very important to Florian Zink and his team leaders: "Every employee is to take decisions in his area of responsibility. Otherwise we would only spend our time in meetings."

Florian Zink knows it first-hand: "I was soon allowed to take on responsibility", he says. "While I wrote my diploma thesis I, together with the colleagues, worked on the first stages of BoomControl, after my graduation on a new boom generation including a control system. The next step was the GS 6000 and the first project I was completely responsible for was the HORSCH Leeb GS 8000."

Currently the department employs 31 people. They are mainly mechanical engineers, technicians or mechatronics. The six teams are divided in the following product groups: self-propelled sprayers, trailed sprayers, boom and components, electrics, electronics as well as testing and product management. The latter also is the interface to the product marketing.

"The product marketing actually is located in the marketing department in Schwandorf", Florian Zink explains. "But we need someone on site who acts as our communicator. In the past years we had quite a few milestones: e.g. the LT as the first machine with a polyethylene tank, new electronics and an immense market potential. And it is very important to communicate this correctly within the company. Moreover, via our own product management we directly get the information from the market, can keep a close contact to the customer and develop a feeling for the market."

But how does the team proceed in practice when it comes to developing new products? Florian Zink describes the process: "Of course, we know the position of our machines in the market respectively where there is a demand. Together with Theo Leeb we exchange our experiences and opinions about which projects are to be prioritised. Though always without a definite starting date. As soon as we get the go, we draw up a rough concept to see if the ideas can really be put into practice. This happens fast and promptly. The next step is to extend the circle. Our management for example brings in key customers right from the start. It always is our aim that technologies can be broken down to other machine sizes without having to design everything again from scratch – sort of a modular kit. But we still are free to follow up ideas and visions and we often discuss with Theo Leeb and Michael Horsch. And this adds to finding even better solutions. This culture of a dynamic advance was particularly evident when HORSCH and LEEB merged. There was no messing around, we immediately started to move forward."

Q-Gates

Synergies between Schwandorf and Landau are used consequently, for there quite simply are things that do not have to be available twice in one company, i. e. the circular test plant or the hydro-pulse plant at Sitzenhof. "Our products do not overlap in many respects, but there are things they have in common", Florian Zink points out. "If the colleagues work on a project with liquid fertiliser we can provide our know-how. But when it comes to welding connection, we benefit from the specialists in Schwandorf."

The new office building in Landau was inaugurated in 2019.

"As several departments are involved in the development of new products, we work with so-called Q-Gates", Florian Zink explains. "It might be that one department advances faster and the other departments cannot keep up the pace. With our system we make sure that at the serial start the optimum quality is available for our products. Q-Gate 1 is passed as soon as we are ready to build a prototype. All parts lists are completed and all necessary parts have been provided by our purchasing department. The prototypes are assembled by our test team and the responsible engineers supported by the colleagues from the production department. Thus, we engineers have the chance to remain close to practice. And that's important. The prototype stage corresponds to Q-Gate 3, 4 and 5 (pre-series) and in stage 6 every department involved has to confirm that we are ready for serial production. The reason is that in the pre-series stage we might not have completed all possible equipment options. They are added subsequently. At the start of the serial production the maturity level of the machines has to comply with all our quality parameters. Our department works hand in hand with the purchasing, production, quality management and service department. The latter is particularly important as for new products it makes sense to involve the service department right from the start. The assembly teams, too, are involved at an early stage. We discuss how the products will fit in best in the assembly lines and we get impulses how to facilitate assembly. Thus, we combine the expert knowledge from all departments. The objective is: We have to work on a new product until everyone is satisfied."

Florian Zink heads the R&D Crop Care team

Impulses from practical experiences

There is one thing that does not fit in with so many similarities and networking – at least at first glance: HORSCH in Schwandorf and HORSCH LEEB in Landau work with two completely different design programs. The reason are the products themselves. According to Florian Zink the CAD program they use perfectly matches the HORSCH LEEB products and their design: "We purchase larger components like cabin or engines from external suppliers. This means that we receive high amounts of data that our program can handle really well. The requirements for HORSCH machines are quite different. A standardisation might have some advantages. But for us, the most crucial arguments are having a perfect tool for the respective requirement and the corresponding performance. Load simulation for example is integrated in our program. Thus, we do not have to import data. In both cases, the programs are supported by the specialists of our own IT department in Schwandorf. This constellation is perfectly in line with our company philosophy. The pursuit of the optimum requires flexibilty."

There are a lot of small components that lead to the success of a product. The objective HORSCH and HORSCH LEEB have in common is the satisfaction of the customer. And the R&D teams often create the basis. And despite all systematics and regulated processes: A lot of impulses still come from the owner families. For they themselves are deeply rooted in agriculture.

This year, a trailed tandem sprayer with a capacity of 12,000 litre and a boom width of up to 45 metre was among the HORSCH innovations in the plant protection sector. Theo Leeb, managing director of the HORSCH LEEB Application Systems GmbH, explains the product in detail.

Theodor Leeb

A double plus

During the past years the number of machines as well as the market share of the HORSCH LEEB plant protection range increased significantly. Among the innovations of this year's Agritechica was a new self-propelled sprayer generation and the HORSCH Leeb 12 TD. The latter is a trailed tandem sprayer.

terraHORSCH: Mr Leeb, why do you launch a tandem sprayer?
Theo Leeb: The principle of a trailed tandem sprayer, admittedly, is not completely new. There are competitors who have been offering such products for more than 20 years. We have been watching the sector for quite some time and we have been noticing that the topic is discussed time and again, but that the demand also decreases rather fast. The large tank capacity is to increase the acreage performance and to ease the logistic problem if large distances have to be covered between the farm and the fields. On even sites or light soils you can drive on even if it is wet the high weight of the machine usually does not cause any major problems. However, the system soon reaches its limits in hilly terrain. In this case, the tractive power of the tractor often is no longer sufficient. Track damages are the result. So far, this problem has been solved by means of for example retractable axles or a traction reinforcement.

And it works?
Only to a limited extent. The problem actually is quite an easy one: Because of its design the tank of the tandem sprayers is long and slim. If the tank is only partly filled or if you go up a hill the spraying mixture moves backwards. Thus, the centre of gravity changes and the load at the front of the sprayer is reduced. The result is a negative vertical load what in turn means less weight on the rear axle of the tractor. This causes traction problems. To solve this, some tractors are equipped with wheel weights. This, however, is rather counterproductive. For after all we do not want to enter the field with more weight than necessary. With a retractable axle the vertical load at the tractor is kept up, but there is even more load on the rear tandem axle – the consequence of this high axle load might again be unnecessary tracks. Therefore, tandem sprayers so far have rather been a product for a niche market.

A market that you are going to enter now…
We thought long and hard about it. So far, tandem sprayers have mainly been working on large farms in Eastern and Northern Germany. In Eastern Europe, the farmers either use smaller, trailed sprayers or self-propelled sprayers. In my opinion, the reason is the tractor park of the farms. Among the traditional Belarus tractor and the large articulated tractor or the tractor with power tracks there hardly ever is a large tractor with 250 and 300 hp. However, we notice that the staff topic becomes more and more important even on Eastern European farms. As a result, especially in the plant protection sector larger machines will get more important. The HORSCH Leeb 12 TD can be an excellent alternative to a self-propelled sprayer that can show its strength especially if a high clearance (up to 1.35 metre) is required, for example for a late maize or sunflower treatment. In many crops or vegetation periods, however, clearance only plays minor role. In our opinion, a rig that consists of a modern tractor and a large, trailed sprayer is an interesting possibility to carry out efficient plant protection treatments. With regard to the operational speed the 12 TD – and our other trailed sprayers, too – matches the self-propelled sprayers as it is also equipped with BoomControl. This was the potential we saw and that made us enter this market.

01 The boom is available as a 5- and as a 7-section version.

02 The problem of a lot of tandem sprayers with regard to traction respectively axle load has been solved in an optimum way: with a two-tank system.

Despite the problems you mentioned?
Our clear priority was to solve the issue of the traction respectively the axle load. And we did: with a two-tank system. The total capacity is 12,000 litres which we divided into 7,000 litres at the front and 5,000 litres at the rear. Both tanks are connected so one tank can never be overfilled. When spraying the two tanks are emptied alternately step by step. And there is always more spraying mixture in the front tank than in the rear one. Moreover, the two separate tanks prevent that too much spraying mixture gets to the back when going up a hill. Thus, there is always enough vertical load on the tractor for an adequate traction. As there is no retractable axle the load is distributed evenly to all four wheels. Thus, the horsepower requirement for our tandem sprayer is very low.

But what about the concentration of the spraying mixture in both tanks? Is it always the same?
A homogenous concentration of the spraying mixture is always guaranteed! In fact, without electronics or sensor technology. Already during the filling process, we separate water and spraying mixture in a ratio of 7:5 so that both tanks are filled with the right quantity of water and plant protection agent. In addition, there is a homogenisation mode that circulates the spraying mixture. The high pump output of 1,000 litres per minute contributes enormously. In general, agitation and mixing is very important, especially when working with micronutrients or powder substances.

If you have two tanks, the surface is larger. Does that affect the cleaning process?
On the contrary. The net cleaning area of our two-tank system even is smaller. Conventional large tanks need baffles to steady the spraying mixture. Normally, these are zigzagged elements that are integrated diagonally in the tank. Due to the division in two smaller tanks we can completely do without baffles.

Which versions of the HORSCH Leeb 12 TD will be available?
First of all, we will offer a stainless steel and a polyethylene tank version. There are no restrictions with regard to applications. All boom versions will be available – from the 5-section boom of the self-propelled sprayers to the seven-section boom of the trailed models GS and LT. Boom widths are possible up to 45 metres. The nozzle spacing of the nozzle control will be 50 or 25 cm. In combination with our boom control system BoomControl this will allow for a target area distance of 30 cm. With regard to water there will be two versions: With CCS Pro the whole sprayer – on the suction as well as on the pressure side – is controlled fully electronically via an external terminal or in the tractor. Inside cleaning is carried out continuously. Moreover, we also offer a simpler water system ECO CP with a powerful rotary pump and standard cleaning. With regard to the steering system there is a version with rigid front axle plus a passive following steering axle or a version with two actively steered axles.

How do you assess the market for this new product?
The HORSCH Leeb 12 TD is a top model among our range of trailed plant protection sprayers. I still think that Northern and Eastern Germany as well as Eastern Europe will be the main markets. But North America, too, might become interesting. For with a corresponding powerful tractor high operational speeds, comparable to a self-propelled sprayer, are possible – however with a considerably larger tank capacity. We can surely score at farms that have to cover large distances or if crops are cultivated that required a high application rate. An absolutely unique feature is the maximum tyre diameter of 2.05 metre. The price differences will mainly be based on the material of the tanks. Our objective is that the polyethylene version will be slightly more expensive than a 8 GS with stainless steel tank.

And when will the tandem sprayer be available for the customers?
A prototype is already working, a second one is being built at the moment. In spring five pre-series models will be ready. We are planning to deliver the first series machines as of August 2020.

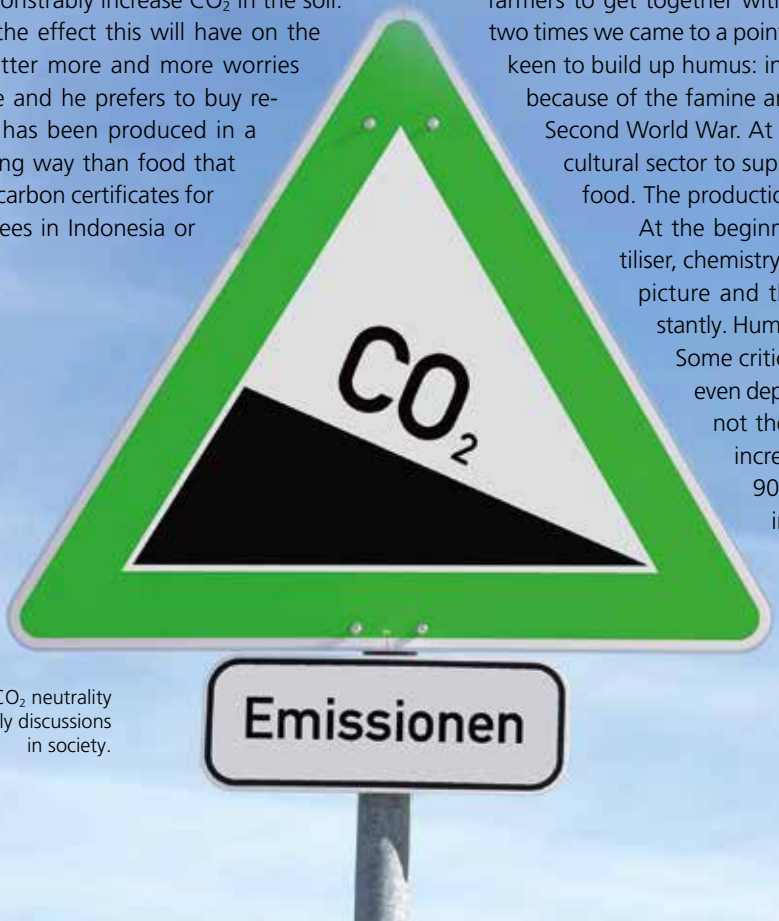
Agriculture of the future

What could the agriculture of the future be like? In what way does agriculture contribute to climate protection? What will society demand from the farmers? Michael Horsch also asks himself all these questions and provides some answers.

terraHORSCH: Which strategies for a positive contribution to the climate protection do you observe?
Michael Horsch: I have become a little bit tired of the topic future. For we already are right in the middle of it! Currently there are the most different activities with regard to CO_2. Let's take a look for example at the organic associations that have turned humus management into a central topic. The question I wonder about is: How can we manage to store permanent humus – as the word implies – permanently in the soil and not only try to build up nutritive humus? For this kind of humus decomposes rather quickly. Moreover, we need a certification that is acknowledged by the carbon-certificate buyers.

At the moment, there is a lot of potential for the certificate buyers among the automobile manufacturers or in the food retailing sector. The food retailers do not only pursue CO_2 neutrality, but even think about offering CO_2 positive food. They might succeed by promoting products from farmers who demonstrably increase CO_2 in the soil.

Just imagine the effect this will have on the consumer. The latter more and more worries about our climate and he prefers to buy regional food that has been produced in a humus encouraging way than food that is promoted with carbon certificates for the planting of trees in Indonesia or the Himalayas.



At the moment, CO_2 neutrality is the topic of lively discussions in society.

How can the agricultural engineering sector support the farmers with regard to CO_2?
I am in two minds about this question. For on the one hand, we achieved a lot with regard to the CO_2 footprint of diesel engines. But on the other hand, it feels like a drop in the ocean.

In farming for example, we today need approximately 100 l diesel/ha. This corresponds to about 300 kg CO_2/ha. With better engines and better gear units we saved perhaps 20 l/ha or 60 kg/ha of CO_2. However, if this is compared with another cultivation system that we as agricultural engineers can also influence to a great extent, it would definitely be possible to save 5,000 to 10,000 kg/ha of CO_2 in the soil each year. In comparison, a saving of 60 kg/ha is only marginal.

It seems that CO_2 will be one of the central topics for farmers in the future.
The climate change could be another opportunity for us farmers to get together with society. In the past 100 years two times we came to a point when agricultural research was keen to build up humus: in 1920 after the First World War because of the famine and then again in 1950 after the Second World War. At that time, it was up to the agricultural sector to supply the population with enough food. The production of humus was a top priority.

At the beginning of the 1960s, tractors, fertiliser, chemistry and plant breeding entered the picture and the yields started to grow constantly. Humus was of secondary importance. Some critics accused the farmers that they even depleted humus. This, however, was not the case. Due to the considerably increasing yields in the 70s, 80s and 90s the nutrient humus values even increased, too.

Do the objectives of modern agriculture have to change to meet the current requirements?
We, of course, wonder if yields will continue to increase by 1 % per year. Until ten years ago this was the case for rape, wheat, barley rotations in Western Europe. Now we notice that yields stagnate in some regions, i.e. in Southern Germany, Central France or East England.

It might perhaps be an alternative for many farmers to generate additional income by producing humus. But this will not necessarily be compatible with the principle of an absolute yield maximisation. And it will not work in every region.

If today certificates are traded with up to 50 €/t or in the future perhaps with up to 250 to 500 €/ha, it is worth thinking about.

I am sure it would be well received by society if farmers would get 500 €/ha for the production of humus instead of 300 €/ha as a subsidy.

Especially in conventional farming the discussion with regard to the production of humus also involves a reduced working intensity and the use of glyphosate. What is your opinion on the component glyphosate?
From a political point of view, glyphosate is all but banned in Western Europe, at least at the moment. Small quantities of glyphosate as a partial replacement of tillage would absolutely be an environmentally friendly contribution to erosion protection and humus production. I have heard some anti-glyphosate activists say that they agree.

However, as long as roundup soya and roundup maize are grown in North and South America and as long as they use the largest quantities of glyphosate, no anti-glyphosate activist will warm to this idea.

What do you think? Which consequences might the increased use of microorganisms (EM) have on the soil and the plants?
It is not new to breed special bacteria, fungi and enzymes that can be found in nature and apply them on the plant. What is new is that with today's biotechnology we can better explain what happens and how we can use it. But we have to be aware of the fact that there still is only little basic research and a lot is based on the empirical experiences of practical experts.

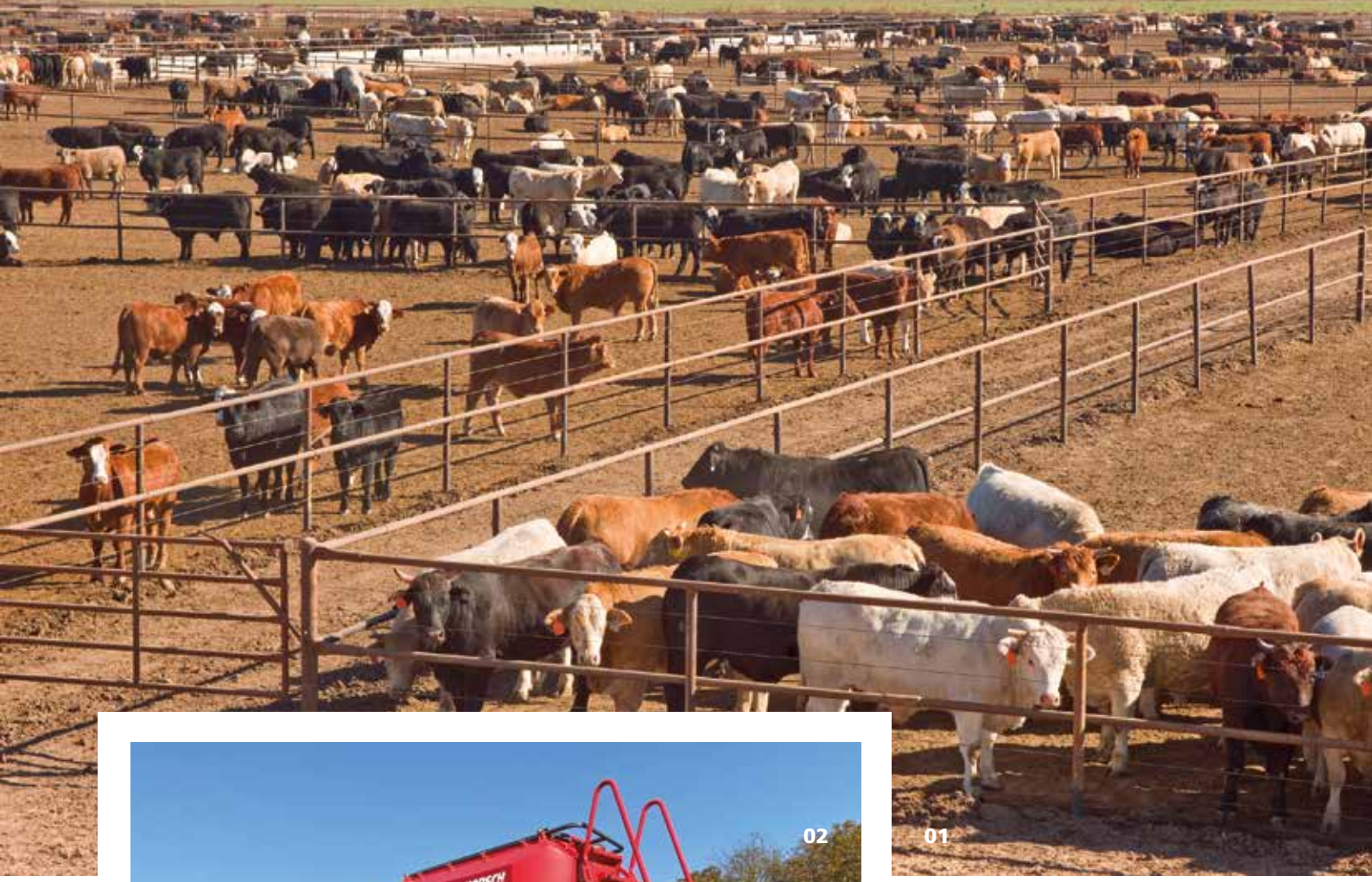
However, in our opinion this is an ingenious field of activity that allows for understanding and using correlations in the soil and the positive effect on the plant in a better way – for example to reduce fungicides and insecticides until they one day can be replaced completely. At the moment we are observing this procedure at the large soya farms in Brazil.

The integration of micro-organisms could be another approach for the production of permanent humus. Microbial carbonisation could soon become one of the major topics.

EM – Effective Micro-organisms are a concentrated mix of renewable microorganisms that have a positive effect on vital processes. They are for example able to prevent rot and mould formation.

PF – Precision Fermentation describes the process for the synthetic production of meat substitute products.

MC – Microbial Carbonisation: During this process organic biomass, i.e. farm fertiliser from animal husbandry or vegetable matters, is recycled in an anaerobic way. This also happens by adding selected microorganisms.



01 Cattle herds for slaughter in the US.

02 The cultivation of catch crops encourages the production of humus in the soil.

How can HORSCH contribute?

By continuing to focus on the topics we have been dealing with for quite some time. I always talk about topics like CO_2, EM, MC, nutrient density in food or residue-free food. We have to fill these topics with life. That's what especially our customers want us to do. Moreover, we also concentrate on organic farming.

And we are curious how hybrid farming will develop. Insights from the organic sector and established practices from conventional farming are merged and perhaps, in combination with modern biotechnology, a completely new way of producing food might develop.

Humus management often comes along with animal husbandry. How will meat consumption develop in the future?

It will be exciting. For PF (Precision Fermentation) and flexitarism (less animal food, but vegetable food instead) are on the rise.

Think tanks predict that ten years from now PF will replace 50 % of the beef in the US alone. I would not worry too much about it. However, if only 10 % of these predictions will come true, the soya and maize producers in the US and in Brazil will have to face difficult times.

But I still think that conventional and organic farmers who produce regionally and sustainably must not be afraid of the future. They understand best what the consumer demands from them.

Philipp Horsch

HORSCH IN NORTH AMERICA

HORSCH has been operating on the North American market for quite some years. Philipp Horsch describes HORSCH's history in North America and the objectives for the future.

terraHORSCH: Why did HORSCH decide to establish a subsidiary in the US?
Philipp Horsch: Our family has always had an affinity for North America. We have several family connections to the United States. Moreover, most members of our family spent a longer period of time in the States. Thus, it was not only a merely factual decision to establish a subsidiary in North America. Gut feeling, too, played a major role. Since the beginning of the 1990s we have been operating on the US American market. In the beginning, we closely co-operated with Case on the development of a special TerraTrac. Another example is at that time a new tine seed drill we developed with the company Concord for the European markets. The result of this co-operation was the well-known Airseeder that we sold in Europe very successfully. Our first HORSCH auger wagons 160 UW were completely manufactured in the US according to our specifications and then imported to Germany. As we already were regularly on site, we were tempted to become even more active on this market. At the end of the 1990s we, together with Kevin Anderson, launched a new Airseeder generation especially for the United States. And our business dealings gained momentum. It was only logical that we started to discuss having our own subsidiary in North America to be able to produce on site.

How would you describe the current situation of HORSCH in the US? What is the position of the company? Is it able to hold its ground?
In 2011, we decided to build a factory in Fargo, North Dakota. In autumn 2013 all constructions were completed and

HORSCH builds special machines that are adapted to the requirements of the North American market.

we moved from South Dakota to Fargo in North Dakota. Unfortunately, it was exactly at this time that the whole US market broke down. The prices for soya and maize hit rock bottom and were almost cut in half. The market has not recovered until today and still is under great pressure. As a consequence the farmers' income decreased considerably and, thus, also the readiness for investments. The market for agricultural machinery dropped by 50 to 60 %. We were not prepared for this. After several years of growth in the US we were very euphoric and expected a lot from our new factory in Fargo. Since this time, however, the US market has been becoming more and more difficult. This year and next year, the market situation will not improve significantly. Spring in North America this year was marked by wet and cool weather. Maize and soya could only be sown very late. The result was that the harvest was postponed by four to eight weeks. Until recently, it still rained too much in the north of the US.

The farmers in North America and parts of Canada often had to cope with bad harvest conditions. A relatively early onset of winter additionally thwarted some farmers. The yields, as far as we can see at the moment, were rather average. However, you have to know that in spring approximately 10 % of the fields could not be sown at all even when it was possible to drive on them again, it was too late for sowing. In addition, the farmers struggle with low prices. All things considered the market in the US is under great pressure and business is only developing very slowly. And next year will be even more difficult than the past one!

What about the Canadian market? What are differences to the US?

Since the 1990s Canada has been turning into a country where rape is the main crop. Due to the climate change and an improved variety breeding maize, soya and legumes slowly spread out in Canada, too. The farmers benefit substantially from that as these are not only crops that help to stabilise and improve their income, but they add to an improved rotation. Nevertheless, rape still plays the most important role in Canada. In the past years, compared to the US, the market in Canada has always been a little bit better as the Canadians did not depend to such an extent from maize and soya. However, last year, the Canadians also faced enormous problems in the rape sector because of the well-known trade turbulences with China.

At the moment, the US American as well as the Candian market have almost come to a standstill, as they are under enormous pressure. We are going to carry on and to continue to invest, for example last year in a branch for spare parts in Saskatoon (province Saskatchewan). Slowly but surely, we will get to where we want to be.

What are HORSCH's strategies to develop the market in North America even better?

Generally, we are focussing on establishing reasonable trade structures. We concentrate on the northern middle of the US, the so-called Corn Belt, and West Canada. It is not easy to set up sales areas and we more and more come to the conclusion that we have to increase our support from Germany.

This year we have already taken some important steps in this respect. We sent some employees to Fargo that will support some departments on site. One employee is responsible for the introduction of SAP and the adaption of the design systems. One employee supports the service colleagues. At the beginning of next year, another employee will go to the US to, together with the sales colleagues, will establish further sales structures. These are important steps that show our commitment to the North American market. We invest a lot in this market – not only in infrastructure, sales and people. We also work intensely on transferring the HORSCH corporate culture to North America.

For the future, we see a lot of potential in the North American market. However, at the moment it still is very small and our turnover amounts to just under 30 million US Dollar. Before the crisis our turnover was higher. Now we are slowly recovering.

Last year we also invested in a farm in Downs, Illinois. We use it for field tests, machine demonstrations and trainings. This site will help us to further develop agronomic topics and to improve the communication with our customers and sales partners. That's the key to develop the market in North America even better in the long run. Our objective always is to offer our customers an additional value.

What are your plans with regard to the technical aspects?

In the US we are producing in imperial measurements to make sure that the products that are designed over there can also be produced there. We, of course, include all our know-how and complete the North American products with the appropriate European components.

In the long run, we are planning to pursue the harmonisation of our production sites all over the world in the R&D sector. Our objective is to create sort of a global platform. Especially for the US this means that in the future we will build machines according to the metric system. If we develop and produce machines with the same measuring units at each production site, we can flexibly react to changing market conditions. The ideal situation would be to use our factories all over the world at full potential as they are able to produce for the global market. This is one of our visions for the future.

> When I was young I spent one year in the US to get to know the country and their way of farming.

In the long run we can imagine that with regard to the turnover potential the North American market might develop similar to the European market.

Why is it so difficult to gain a foothold on the North American market?

The dealer landscape plays an important role. The dealers often sell machines of only one single brand. This trade structure is completely different from what we have in Europe. However, we slowly notice that something is changing in this respect. Farmers no longer want to be forced by the dealers to be limited to only one manufacturer of agricultural machinery. They want more variety to choose from.

Another reason is that it, of course, is a really large market. We do not concentrate on the whole land area, but to start with only on individual parts of the United States and Canada. It helps a lot that despite the size of both countries there is one common language – except for some parts in Canada

The landscape of the Corn Belt is characterised by large areas of arable land.

Large working widths are very important in North America.

– and that from a legal point of view jurisdiction is relatively homogeneous.

Are there other topics that influence the North American market?

Like in Europe, environmental topics start playing a major role in the States. The largest lakes are located in the middle of the country, the Corn Belt. Increasing nutrient inputs in waters caused by the farming sector are discussed more and more intensely. At the same time, other sectors, for example the use of biogenetics in agriculture, are questioned, too. In North America farmers now also have to face societal topics and cannot simply ignore them. Not so very long ago it was not natural at all to deal openly with such topics.

Moreover, society more and more questions the farming methods in the Corn Belt, i.e. the tight rotation of maize and soya in turn and much more. Farmers more and more concentrate on the cultivation of catch crops and the basic extension of their rotation. Organic farming, too, becomes more and more important.

Are there topics where North American farmers are different from European farmers?

There is one sector that North Americans are more susceptible to than Europeans: Prescription Farming. In North America farmers have more confidence in external consultants than in Europe. Cultivation consultants guide and direct farmers to a greater extent than in Europe. That's also a question of mentality and culture.

Their attitude with regard to all topics around the use of digital media is very similar to ours.

Another topic where North American farmers are different from the European farmers is the working widths of their machines. The further you go north the shorter is the vegetation period. In spring, farmers often have a short window when the sowing conditions are optimum. This is why they want to get as much work as possible done in one pass. The machine widths in relation to the field sizes that have to be cultivated are larger than in Europe. In the north, farmers depend on large working widths. Further down south, that's not the case, but the farmers still work with large working widths. And they are willing to invest quite a lot of money. In North America, a farm that cultivates 1000 ha of maize and soya at any rate disposes of an 18-m seed drill. For this farm size a farmer in Europe would maximally work with a 9 m seed drill. North Americans are more technophilic than we Europeans. Machines have to be large and passes have to be carried out fast. They are willing to invest much more money per hectare on technology.

01

Achieve a lot with just a little

The shortage of labour is one of the biggest challenges in the Hungarian agricultural sector. About one fifth of the actually required workers are missing on the market. The Csontos family, too, is faced with this problem. The challenge: How can you get the same work done with less employees? Their solution: minimum tillage without a plough.

Due to its plain landscape Hungary offers optimum conditions for farming. The climate is continental with frequent dry periods. With regard to the hours of sunshine – about 1,900 to 2,500 per year – Hungary ranks top in the European average. Based on these conditions almost all important crops that are suitable for the temperate climate can be grown in Hungary.

The plant protection and agro-chemical engineer Károly Csontos is responsible for the agronomic part – not only on the family farm, but also in the Bács-Cereal Kft. His mother, Mária Csontos Károlyné, runs the family farm. His brother, Attila Csontos, is the managing director of the Bács-Cereal Kft. and takes care of all business matters. Attila's wife, Szilvia Csontosné Kocsi, is the co-director and in addition to the staff and work planning is also responsible for accounting. They attach utmost importance to teamwork. Their common objective is to make farming as profitable as possible. terraHORSCH talked to Károly Csontos about what this means in detail.

Both farms cultivate a total of 250 ha. They share all the machines. Last year they converted the farms to a plough less system – including an investment that compared to the farm size was rather large: they purchased a universal cultivator HORSCH Terrano 4.3 GX, a disc harrow HORSCH Joker 5 RT, a universal seed drill HORSCH Pronto 4 DC as well as a Claas-Axion-850-tractor with 260 hp. And this spring the machine park was completed with a trailed sprayer HORSCH Leeb 4 AX.

„My father founded our family farm in the late 80s. At first, we only farmed 5 ha, step by step the number of hectares increased.

The soils here in North-Bácska are calcareous black earth soils. Thus, the conditions are optimum. The soils are easy to cultivate, their water balance is excellent, and they have a good structure. The humus content is very high. The land of our farm is divided into more than ten fields, but fortunately they are quite close together. The largest distance is about three to four kilometer. So we do not have to cover large distances between the fields. The size of the plots differs:

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01 The house where the two brothers grew up is part of the family farm. The whole family still meets there quite often.

02 The Pronto 4 DC works very precisely. The set values are maintained exactly.

03 A good team: the Csontos brothers Károly (left) and Attila (right) with their mother Mária (middle).

04 Attila Csontos (right) and his wife, Szilvia Csontosné Kocsi (left), are the managing directors of Bács-Cereal Kft.

There are larger plots with 40 to 55 ha, but also smaller ones with only five to ten ha.

Our rotation is simple. Our objective is to optimise the number of crops in such a way that we get an agronomically reasonable rotation. Our main crops are wheat, hard wheat, rape and soya. In the past, we grew soya organically. But when the EU regulation that forbid to carry out plant protection measures in organic soya took effect, we gave it up. Fields where cultivation does not pay off from an economic point of view are used as fallow land. For wheat we always chose early varieties, e.g. GK-Futár, GK-Csillag, GK-Pilis, GK-Bétadur, GK-Julidur. The harvest is sold to a mill. Therefore, quality, of course, has to be top. For quite some time now we have been using Dekalb hybrid rape which is ideal for our conditions.

If the weather plays along, our yields are rather good: six tons for wheat and three to 3.5 tons for rape on average. However, the rape yield once even amounted to four tons and the wheat yield to seven tons. At that time, the weather conditions were optimum. But last year we had to grapple with extreme weather. From September until end of April it hardly rained. Minimum tillage, however, helps to keep water in the soil. But this was not the only reason why we converted our farm. For quite a long time we have been carrying out conventional tillage: ploughing, loosening, then a pass with the disc harrow, after that with a cultivator and after sowing another pass with a packer. There were quite a lot of passes. At least two to three tractors were required to get the work done in time. However, because of the situation on the labour market it became more and more difficult to find drivers for the tractors. The lack of labour became a constantly growing, serious problem. Last year we finally decided to convert to minimum tillage without a plough. The work that before with conventional tillage was done by three people now is carried out by one employee. His workload is quite considerable, but it works.

When it was about purchasing the machines, we solicited quotations from several companies. But we finally opted for HORSCH and the dealer Axial. We are already familiar with

This spring the machine park was completed with a trailed sprayer HORSCH Leeb 4 AX.

HORSCH machines and we know that the technical standard of the machines is extremely high. Moreover, Axial offers an exceptionally reliable service."

GOOD EXPERIENCES

„We do not regret our decision. The machines do an excellent job. With the Joker you can work shallowly at a depth of five cm. This has proven its worth on our fields as, thus, you can keep a lot of water in the soil. Shallow tillage also is ideal for the emergence of the crops. Weeds are fought mechanically. After the Terrano we use a disc harrow to get a perfect seedbed. It is important to create a crumbly seedbed at an even depth and to carefully level the soil on the surface.

The working depth and the metering of the Pronto 4 DC were optimum for rape. The set values were maintained exactly. Last year, rape germinated really well and without any problems. Fortunately, we had 15 mm of rain right after sowing. Wheat, however, germinated rather irregularly because of the extreme drought. This year, despite the drought, our rape yields improved– compared to our previous production system. With the minimum tillage system, we saved a lot of water. As the year was very dry, this was extremely important.

It did not rain until the end of April. In May, the rainfall amounted to 180 mm and partly to 200 and 220 mm. This, too, of course, was a problem! It rained so hard that it often was not possible to work in the field. This is the reason why the fusarium problem in some regions increased considerably. There were areas where wheat could not be sold as the toxin values were so high. On our fields, too, there was the risk of contamination, but with our new HORSCH Leeb Sprayer we were able to achieve a much better wetting and thus to protect our plants in an optimum way."

ENTHUSIASTIC FARMER

„I love farming. I have a feeling of success when the professional achievement becomes visible in good yields and a high quality of the products. And I love nature. I love walking in the fields and watching the plants and the animals. This is why I so much appreciate the precision of the Leeb Sprayer. It contributes enormously to keep the environmental impact as low as possible. With our old sprayer one tank covered twelve hectares. Due to the 24 metre boom and the 4,000 litre tank the performance of the Leeb AX is much better. With 200 litre plant protection agent we now cover 20 hectares. Moreover, we cannot only work more efficiently, the acreage performance increases, too. With regard to drift it is essential that the sprayer constantly keeps up the 50 cm boom height. Even if there is a strong wind while spraying, we are able to achieve an optimum wetting and, thus, to reduce the environmental impact. In addition to these aspects, one should not disregard the financial side. Plant protection agents are expensive. And this is the reason why it does matter if they get into the air or into the population they are intended for. If the plants are protected against fusarium infections, you can achieve good prices. Contaminated wheat can at most be sold as fodder. And if the toxin content is very high not even that."

WHAT ARE THE NEXT STEPS?

„We think that we are done with the bulk of investments. But we always keep our eyes open for interesting, innovative developments. We do not have a combine and do not intend to buy one. Manax Ltd, a subsidiary of Axiál, carries out all the harvesting for us. We are more than happy with this solution. And I think that our current machine park will be perfectly ok for our 250 hectares for quite a long time. The employee who takes care of the machines is a real pro. He looks after them with great care as if they were his own machines. Such a good care will, of course, pay off in the long run.

Many farmers complain that farming to a great extent depends on the weather und therefore is a very insecure business. They are right, of course, A lot depends on the weather. But if you set up the machine park in an intelligent way, choose the right crops and varieties, use and develop the professional skills, knowledge and experiences deliberately and remain open for innovations, farming can be successful."

LEAN MECHANISATION

Mindaugas Šemežys, a farmer from Vikaičiai, apparently has found his agronomic system. And it works with a lean mechanisation. terraHORSCH visited his farm in Lithuania.

On the farm in Lithuania (f.l.t.r.): Nerijus Žukauskas (HORSCH sales manager Lithuania), Jonas Žebrauskas (sales representative of the HORSCH sales partner Audrokesta), farmer Mindaugas Šemežys and Nerijus Mišenis (HORSCH service manager).

When we arrived in Vikaičiai at the end of October, the weather was rainy and windy. The little town is located about 80 km north of Kaunas, thwe second largest city in Lithuania. On the farm, most of the work for this year has been done. Harvest is finished, there still is a little tillage to do, but most of the machines have already been winterised and put indoors.

Together with his parents Mindaugas Šemežys farms about 600 ha. From an organisational point of view the farm is divided in two parts, the young farmer joined in in 2007. The structures in Lithuania are varied. Until Lithuania became independent in 1991 almost all arable land was cultivated by collective farms. Today you can find all farm sizes – from self-supporters with one cow to large farms with several thousand hectares.

"We own about 400 ha", Mindaugas Šemežys explains. "The rest of the fields are rented. In our region, there are some established farms. Therefore, it is not easy to get farmland. But I do not want to grow at all costs anyway. I am quite happy with the present situation." The main crops are rape, wheat and barley. The two cereals each make up 40 % of the rotation. Next year the farmer wants to grow sunflowers, provided that he can get seed. It would be possible to cultivate sugar beet, but at the moment it is quite hard to get a contract. Moreover, this would require high investments for the corresponding technology. So he decided to intensify the cultivation of barley. He sows a mustard-pea-mix as a catch crop. The field size varies between one and 80 ha, but most of his fields are 30 to 40 ha. Mindaugas Šemežys employs five people who in addition to the work in the field take care of a lot of service and repair works single-handedly. If there are more difficult problems, they rely on the local dealer. Like everywhere in the rural areas it is quite difficult to find reliable and skilled staff. Mindaugas Šemežys himself is an environmental engineer and has a master degree in agriculture.

Modern equipment

"My parents mainly worked with machines from the East, with Kirovets-K700 tractors from Russia or with model T 150 from the Kharkov tractor plant in the Ukraine", Mindaugas Šemežys remembers. "My first measure was to change to western technology, to the brands Claas, Case and John Deere. I converted the farm to a minimum tillage system and got rid of the plough." Today the farms works with seven tractors between 80 and 520 HP. The smallest one is a Russian tractor, the largest one a Claas Xerion that was bought this year. The rest ranges between 180 and 320 HP. For harvest he uses two combines, a Claas Lexion 540 and a John Deere S785. Beside a self-propelled sprayer with 36 m working width there are two telehandlers and one truck on the farm. Seed drills and tillage tools are from HORSCH: a Joker 8 RT with knife roller in front of the discs, a Focus 6 TD as well as a Partner 2800 HT. Moreover, an Amazone fertiliser spreader is used to apply mineral fertiliser.

Mindaugas Šemežys's year is as follows: After having spread fertiliser and after a pass with the Joker, sowing is carried out with the Focus. Fertiliser is applied simultaneously – according to the requirements, one half on top and one half in the soil. Especially in dry years, they rather use liquid UAN during the vegetation period which is applied with the self-propelled sprayer. The next step are plant protection treatments. Rape harvest starts mid-July. Stubble cultivation is carried out with the Joker. According to the experiences of the farmer, rape sowing should be finished until 15th of August, wheat should be sown until 10th of September. Barley normally

01 Mindaugas Šemežys uses the farmstead together with his neighbour.

02 The 3,000-m³-grain store is outside the farm.

03 According to Mindaugas Šemežys rape should be sown until 15th of August at the latest. This is what the population looked like at the time of our visit in mid-October.

04 The HORSCH Focus is the key machine of Mindaugas Šemežys's agronomic concept.

05 Its work is done: The Joker is waiting to be winterised.

03

is sown before the 25th of April. Mindaugas Šemežys calculates with one week per crop for all this fields. "In the past years we always managed it", the farmer says. "We have quite a lot of time in between", he smiles. "It might be interesting to establish an additional line of business like dairy farming. But I am afraid that this might be rather difficult from an economic point of view because of the high investments that would be necessary." For Lithuanian conditions, the soil on the farm, a slightly clayey soil, is average.

StripTill proves its worth

"In the past, we often had problems with soil erosion on the hills where the soil was a little bit heavier", the farmer explains. "The plough definitely had a negative effect. Minimum tillage solved the problem. However, it was not easy to find the right seed drill for our conditions. For we leave all the straw on the field. But the HORSCH Focus is perfect for us. We first bought a second-hand machine that this year was replaced by a new one. And we bought a Xerion to pull the Focus. So far, we have not been thinking too much about no-till farming. The humus ratio in the soil still is too low. To improve it is the focus of our crop production strategy. In this respect, rotation and the cultivation of catch crops are important measures. The cultivation of grain maize is not an issue either. It simply does not fit in in our region as the ripening is not optimum. Because of the high drying costs it would be un-profitable."

Like in many other regions in Europe the last two summers around Kaunas were too dry. If there was rain, it was scattered. Mindaugas Šemežys for example harvested 3.6 t of rape. One of his neighbours was luckier with the weather and got 3.9 t. In addition, the farmers had to struggle with heat and sunshine. A lot of cereals ripened prematurely. Usually the wheat and barley yields on his farm are 7.5 t and 4 t for rape. For Mindaugas Šemežys StripTill with the Focus is the optimum solution to cope with the climatic conditions that get more and more difficult.

Mindaugas Šemežys mainly uses his free time to gather information about new methods and systems. But so far, his situation does not call for action. His system works well, is

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efficient and he can keep his machine costs low. He does not regret his decision to work with StripTill. Some of his colleagues can confirm this. For today ten Focus machines are working in the region. So Mindaugas Šemežys was a real pioneer.

HORSCH Dealer Days – benefit for the customer

In the middle of September 2019, the HORSCH Dealer Days took place. Sales partners from all over Europe came to Sitzenhof.

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01 In his opening presentation sales director Christoph von Starck informed the participants about the current sales figures and the forecasts for next year.

02 The hoe HORSCH Transformer – one of the innovations in the sector of mechanical population control – was shown in the field.

The utmost benefit for the customer is HORSCH's top priority. The Dealer Days are a platform to train the dealer even more intensely to be a competent contact for HORSCH products and to provide him first-hand with all necessary information.

This year the event was even more important as HORSCH presented a lot of innovations at the Agritechnica. Especially in the new product segment mechanical population control the training was very intensive.

About 190 sales partners from Germany and the whole of Europe were invited. They were divided in several groups – depending on their home country and the sales region. On the eve of the training the representatives of the dealers met the HORSCH management, represented by Cornelia Horsch, and the sales director Christoph von Starck for dinner.

The actual Dealer Day took place the next day. In his opening presentation, Christoph von Starck informed the participants about the current sales figures and the forecasts for next year. He emphasised that only with an increased customer focus of the dealer and HORSCH there would be the best chance to really close a deal. A continuous development of the service sector also plays a major role. At the end of his speech, the sales director had a special tip for the sales partners: „As long as you are a HORSCH sales partner, you should remain a friend of ploughless tillage." Thus he pointed out clearly that HORSCH will not launch a plough.

Michael Horsch described in his speech his view of the future of agriculture. He also spoke about his experiences with sowing all over the world and about the harvest forecasts for 2019.

The sales partners spent the rest of the day in the field together with employees of the HORSCH marketing and sales department. The innovations from the tillage, seed drill, plant protection and mechanical population control lines were shown in practical use. The resulting discussions between the HORSCH employees and the sales partners were quite lively.

After the Dealer Days there was another internal training for the HORSCH sales employees to provide them with an even more profound insight into the new products.

In retrospect, these training and exchange days were very successful. They will contribute a lot to transfer knowledge from the dealer to the customer.

NEW VOCATIONAL TRAINING CONCEPT

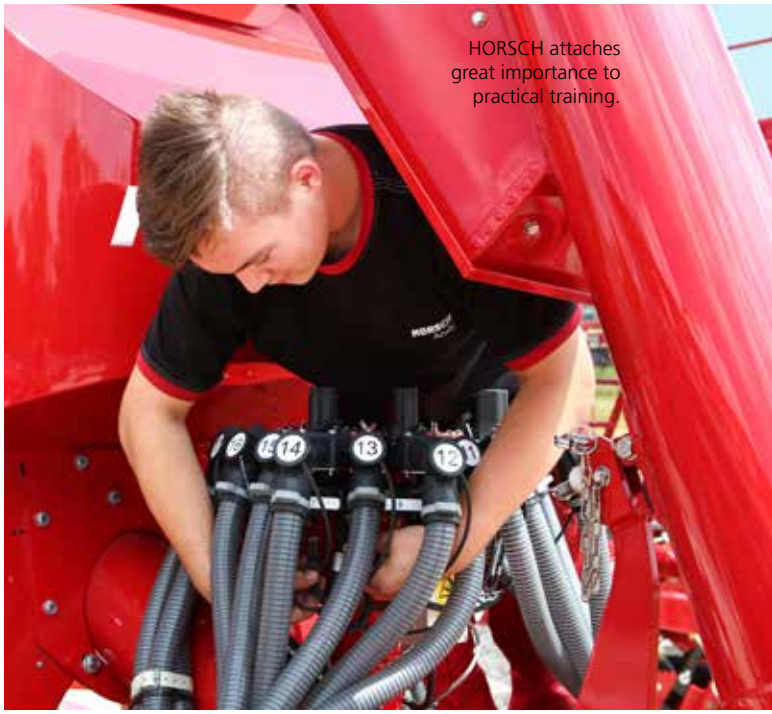
As of next year, the vocational training at HORSCH will be adapted even better to the requirements of the individual departments. This requires a restructuring of the apprenticeship model.

The professional world is changing constantly. New professions arise, old ones cease to exist. Digitisation considerably contributes to this change and the professions that require vocational training are also concerned. HORSCH already recognized this change some time ago and therefore will adapt the vocational training concept to the changing conditions. This is another way to put the focus on the customer. The apprentices are prepared even more subject-specifically for their tasks in the individual departments and thus can respond even better to the individual requirements of the customers.

As of 2020 some vocational training professions will no longer be available in their present form. For the remaining professions there will be new concepts with individual training modules. The objective is to adapt the vocational training at HORSCH to the future requirements. In the future, the focus will be on the internal training within the company to prepare the apprentices better for their tasks in the different departments.

Vocational training professions like industrial mechanic, agricultural and construction machine mechatronic, electronic technician, production technologist and agricultural services specialist will no longer exist at HORSCH. These professions will be replaced by a mechatronic training with different advanced training modules.

The vocational training as a mechatronic more and more comes to the fore as topics like sensor technology and electronics become more and more important. This is why it will be used as a basis and individual additional training modules will be added to replace the other outdated professions.



HORSCH attaches great importance to practical training.

If in the future an apprentice for example is to work in the service sector, enhancement modules in the sectors hydraulics, English and communication will be added to the vocational training. This replaces the vocational training as an agricultural and construction machine mechanic. If the apprentices will work in R & D and in the quality management department the training as a mechatronic includes additional modules for CAD drawing, hydraulics and English. For apprentices who will work in the agricultural services sector there will be additional training modules for agricultural practice, hydraulics, English and communication.

The additional training modules will mostly be carried out inside the company. The number of lessons depend on the subject. The final finishing is done in the respective departments. Due to this new concept the basic training is shortened considerably, as the apprentices soon start to work in the different departments. Due to the frequent changes between the educational modules and the practical work the apprentices can take up employment in the specific department directly after they have passed their exams without any onboarding time.

Digitisation also involves a change of the vocational training professions.

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CLAAS dealers offer strong customer support

At the end of 2016, CLAAS and HORSCH set a new world record by drilling 448.29 ha in 24 hours with the Maestro 24 SW drill and a Xerion 5000 Trac tractor. The natural synergy of two well-respected premium German brands working together was built upon in 2017, as HORSCH UK and CLAAS UK announced they would begin selling and servicing HORSCH products through their dealers.

Today, CLAAS UK own 3 of its 10 dealers that cover the UK; MANNS, CLAAS Eastern and CLAAS Western, which operate from 18 locations from Yorkshire in the North to Kent and Dorset in the South. Although all HORSCH products are available throughout the dealer network, each dealer made its own determination if the HORSCH products suited their customers.

UK sales have grown strongly, backed up by an impressive parts and service offering to support customers. Richard Vaughan, Director of Retail Operations at CLAAS UK, sees

01 Richard Vaughan, Director of Retail Operations at CLAAS UK, sees huge benefits for both brands and their customers through the strong working relationship of HORSCH and CLAAS.

02 In addition to the larger machines, both brands have a wide range of products for the smaller operation so they are able to support a wide customer base.

03 There are sprayer specialists at key locations and those skills are available across the CLAAS group.

huge benefits for both brands and their customers through this strong working relationship.

MEETING THE NEEDS OF ARABLE CUSTOMERS TOGETHER

"We are the UK market leader in sales of combine harvesters and self-propelled forage harvesters, as well as being one of the leading tractor manufacturers. We have a very wide and strong product range. If you look at the area covered by our dealers, this accounts for more than 75 % of combines sales and 50 % of tractor sales opportunities in England," highlights Mr Vaughan. "It's clear that professional arable operations are one of our key customer groups."

Supplying and supporting HORSCH cultivation, seeding and crop-protection machinery has complemented the dealers' operations perfectly. CLAAS has a comprehensive product range and adding these specialisms, without overlaps, gives the dealers an extensive product offering.

"That enables us with very minimal other franchises to meet all the needs of the arable customer. This is a huge benefit, as with just two brands, we can supply 90% of the machinery requirements, whether they are a large-scale contractor or a small family farm," adds Mr Vaughan.

Ongoing service is an essential part of the dealers' relationship with customers and CLAAS has invested heavily in HORSCH aftersales support, too.

PARTS AND SERVICE VITAL TO SUPPORT CUSTOMERS

The CLAAS dealers have invested the time and resources to become specialists in HORSCH products. Alongside its own products, there is a prominent promotion of HORSCH at the dealers' location and very evident branding on their service vehicles.

"We're not diluting our time and training resources over many franchises. We can invest heavily in product training so that sales, parts and service staff can offer customers the best advice and support. You can't hope to do this with a long list of brands. And, of course, this allows for a deeper product knowledge and operational skills that are shared across the group for the benefit of the customer," says Mr Vaughan.

More than 130 service technicians and apprentices are employed across the three dealers. "All our technicians follow training pathways that last up to three years and combine technical training and practical experience," explains Thomas Hancock, After Sales Director at MANNS. "This includes train-

ing from experts at HORSCH UK so that we have at least two HORSCH specialists at each retail location. In addition, we'll have sprayer specialists at key locations and, of course, those skills are available across the group."

Special HORSCH-supplied, fast-response kits are available at each location. "We have a full range of seeding and cultivation kits, such as one for Maestro, for example, and three for sprayers. These sets of key parts are held at each dealer to help technicians quickly deal with an issue. They can also be drawn from if required, the first priority is always getting the customer working," adds Mr Hancock.

CLAAS UK is continuously developing its dealer workshops. "As machinery is growing in size and complexity, we are creating facilities that can service machines not just now, but 15 years in the future. Our new workshop at MANNS Saxham, for example, can take a HORSCH Leeb 280 PT self-propelled sprayer with its 36m boom unfolded, has a 5-tonne overhead gantry and plumbed oil. Our technicians can work safely and efficiently, and it offers greater capacity in terms of size and number of machines."

Once a HORSCH machine is delivered, the specialists provide an installation service to ensure customers are familiar with their new machine. This helps users achieve the maximum potential of the machine and the maximum return on investment. The specialist ensures customers understand the machine including daily maintenance, accessories, parts and modifications available to achieve the very best performance.

"Knowing that these products are a prominent group offering, we can invest in the training to become HORSCH specialists and we have attracted highly knowledgeable staff keen to work with the brand," says Mr Vaughan. "As products become more sophisticated and technology moves further into our industry, specialists will be a key factor for us – go-to people with specific parts and service expertise for each category."

CLAAS UK is developing its site at Saxham, including a new central parts warehouse that is three times larger than the existing one and will provide parts to the whole of the UK.

The Parts Inventory Management system is being enhanced to administer CLAAS, HORSCH and other suppliers' parts. The system uses machine learning to predict the required parts stock levels and supply all frequently used parts to the dealers. Less frequent items would come from HORSCH's UK parts operation while rarely required items would come from Germany.

There is a comprehensive parts stock holding across the group with the aim to meet more than 85% of parts requests off the shelf at each dealer. There are spare parts that a single business would struggle to justify stocking, but the CLAAS dealers can do this from a group point of view and make the level of parts and service commitment to the customer.

OPENING UP NEW OPPORTUNITIES

Mr Vaughan says that the CLAAS dealers and HORSCH have common business goals. "Our strategy is to be number one with the franchises we have by offering the customer the best products backed up by the best service. We carefully evaluate all the brands that we work with. They must be market-leading, professional and they must have a proven record of product innovation, which HORSCH certainly has."

Although the larger machines often get the limelight, Mr Vaughan is keen to point out that both brands have a wide range of products for the smaller operation. "We have sub-100hp to 500hp-plus tractors, for example. HORSCH also has 3m to 12m cultivators and drills, so we are able to support a wide customer base. With no duplication in our product line-ups there is no restriction to growth."

"Investing in strong partnerships allows us to offer greater value to the customer and build a closer relationship with them, so that they only need to deal with one professional organisation for all their needs. As a group, we are able to work very closely with HORSCH. For example, putting together the new contract service packages for sprayers that further enhance the support we give to customers."

Mr Vaughan emphasises the need to have the right products for UK farmers, developed to meet their needs. "HORSCH has done this and made a substantial investment to have its own UK operation at Peterborough and have good spare parts availability."

Both brands have the same clear commitment to providing the best support to customers. "Modern farming is a tough business with large capital investment. Our customers want to invest with the least amount of risk and that means working with a dealer that has invested for the future, is flexible and understands the challenges facing both professional and family farmers."

"We employ great people and supply products and solutions we believe in. Working with CLAAS and HORSCH allows us to sell professional, durable and well-supported products that offer great value for money. It's a strong partnership with a positive future."

CLAAS UK is continuously developing its dealer workshops to offer greater capacity in terms of size and number of machines.

More than 1,000 farmers and dealers visited the Field Days that took place from September 10th to 12th, 2019.

Field Days in La Lucine

At the beginning of September 2019, the HORSCH France Field Days took place for the twelfth time. Every two years interested farmers meet at the company headquarters in La Lucine near Châteauvillain in the department Haute-Marne. This year, too, the event was a huge success.

More than 1,000 participants – dealers and farmers – followed the invitation to the three-day-event with speeches, machine demonstrations and workshops. Philipp, Michael and Cornelia Horsch as well as Theo Leeb also were on site.

The 10th of September was reserved for dealers, the next two days for the farmers. The agenda was the same: speeches, exchange and discussions in the morning, machine demonstrations and presentation of the innovations of the HORSCH and HORSCH LEEB product range in the afternoon.

The Leeb PT, the first licensed HORSCH self-propelled sprayer in France, left a good impression. The guests were also very interested in the new HORSCH tools for hybrid farming: the hoe Transformer VF, the hoeing harrow Cura ST and the fine cultivator Finer SL.

Each workshop highlighted one part of the HORSCH product range from a certain point of view:

- Workshop "Hybrid Farming" – with a detailed presentation of the new HORSCH weed control line
- Workshop "Low Disturbance" – with focus on the HORSCH direct seed drills
- Workshop "Biogas" – with a presentation of the latest Focus TD that has been perfectly adapted to the cultivation of catch crops for the production of energy

Eddy Fougier, political scientist specialised in protest movements, talked about agri-bashing.

- Workshop "Minimum Tillage" – introducing the two different versions of the Terrano GX – one for deep and one for very shallow cultivation
- Workshop "Plant Protection" – with detailed technical information about the precision spraying technology of the Leeb AX, Leeb PT and Leeb LT.

All machines were presented again in a final show.

PESTICIDE RESIDUES IN THE FOCUS OF DISCUSSION

The consumers ask more and more questions about the influence of food on their health. After the worries about the quantities of sugar and fat in our food new topics come along step by step. The focus more and more is on pesticide residues in our food. In the speeches on the first public day, two speakers from different sectors talked about their point of view.

Julie Sabourin is responsible for the sectors quality and technology of the "Collectif Nouveau Champs", an association that was founded in 2018 by producers that actively campaign for agriculture and environment. Their cachet is called "Zéro résidus de pesticides" (= Zero pesticide residues). The initiative was founded by "Les paysans de Rougeline", a company that sells fruits and vegetables. In the meantime, their product range includes the first product line without pesticide residues.

The seven founding companies devised a strategy that can be applied to the whole sector of plant production. "Our association represents 20 per cent of the fruit and vegetable sector in France. And we are growing extremely fast! But we also want to expand our ideas to other sectors of plant production", Julie Sabourin explains. In viticulture and for hard wheat the project already is in full swing.

The Collectif acts on the fact that society demands more and more transparency with regard to pesticide residues. "There is a demand: 89 per cent of the French demand more information and want to know if there are pesticides in our food or not", Julie Sabourin points out. "Thanks to the cachet "Zero pesticide residues" they can read it clearly and precisely." The Collectif has committed itself to success to show the consumer that they make every effort to keep their promise. This success, of course, requires the active contribution of the members. „We encourage our producers to look for alternatives to chemical pesticides, e.g. products for which there is no maximum residue limit and no associated residue definition. They also have to expand their knowledge about the contamination risks", Julie Sabourin explains. The cachet also is based on the HVE cachet (Haute Valeur Environnementale = Of high environmental benefit). A lot of the producers have already been certified respectively are right in the middle of the certification process.

Such measures would not be possible without the scientists who can trace these pesticide residues. They are supported by laboratories like for example the Labor Kneissler, that was founded in 1993 by Dr. Andreas Kneissler. He was the second speaker of the morning.

Dr. Kneissler's laboratory has specialised in tracing active substances, mycotoxins and pesticides. Their customers are cachets like "Zero pesticide residues" who want to guarantee the sustainability of their measures. "We carry out 15,000 tests per month – in food, drinking water and feeding stuff", Dr. Andreas Kneissler explains. "Our job requires an enormous expert knowledge. One example: tracing the glyphosate ratio below the maximum residue limit – 1 mg per kg – in olives, is as if you tried to find out where on his ship the captain of the Queen Mary 2 is at the moment. Today we even succeed in finding his captain's hat."

Dr. Andreas Kneissler presented the different analysis methods and then described the project "HORSCH wheat". The objective is to answer the question under which circumstances conventionally cultivated wheat does not contain any pesticide residues. "We have examined the connection

Michael Horsch (middle) finished his speech like he started it: "The future of farming has never before been so interesting as it is today!"

between the cultivation conditions and the pesticide residues in common wheat – based on the agricultural, geographical and meteorological conditions", Dr. Andreas Kneissler specifies. The results will soon be published.

WHAT CAN WE DO AGAINST AGRI-BASHING?

Eddy Fougier was the third speaker of the morning. The political scientist analysed several protest movements. He acts as an advisor on these topics and in 2018 he wrote a study about agri-bashing.

"Some misuse this word and refer to any criticism of the agricultural sector as agri-bashing. Others, however, claim that there is no such thing as agri-bashing", he points out. And he also offers a good definition of the term:

"Agri-bashing is a feeling shared by many farmers that means that their profession, some of their activities and the conventional production methods are regularly subject to hostility, criticism and defamation in public and especially in the large leading media."

"The criticism of conventional agricultural production methods is not new. People already pointed a finger at the use of growth hormones in the 70s or at genetically modified organisms in the 90s", Eddy Fougier clarifies. But some time ago, this criticism changed massively. It first extended to numerous topics (climate, animal well-being, plant protection agents…) and then became radical: visible campaigns with reports shown at prime time; invisible campaigns like trespassing into the stables of livestock farmers or even aggressive behaviour towards farmers.

At first, the reaction of the professional associations was not appropriate. "It was too technical, too far away from the worries of the population", Eddy Fougier regrets. We also have to shake off the antiquated image of the farmer as a victim: "75 per cent of the French have a high opinion of the farmers. It's their methods that are questioned." Eddy Fougier's advice for the farmers is to seize the opportunity to take the communication into their own hands and get back into contact with the consumer.

In fact, you must not equate the organisations that express this criticism with the consumers. The opinions of these two groups often differ widely. You have to address the consumers. The "societal expectations" regarding agricultural production that are often discussed (organic, production relocation etc….) so far have only been expressed by a small part of society. Though it only is a small part, it is a loud one. According to the political scientist "it therefore is essential that you do not underestimate the weight of those who criticise you."

"Society is polarised. 60 per cent of the French say that they do not mind whether they pay 10 Euro more or less when they do their shopping. But the price still remains the main concern. The average citizen is considerably less prejudiced against you than you might think!" Eddy Fougier is convinced.

So what can we do? According to Eddy Fougier it is important to rectify the untruths about agricultural methods that are told everywhere in public. On the other hand, it is indispensable to use the negative aspects of agri-bashing and react to them with a positive communication. "A good example happened in October 2018. After they had faced death threats from their neighbours, the attacked farmers decided not to retreat, but to organise an open house event to show their neighbours how they work. It was a huge success. Everyone was satisfied."

Last but not least: "We have to take advantage of the criticism we are facing to re-invent us. It has to become our motivator for innovation and integration in new markets. We must not dissipate our energies in an ideological war."

LOT OF CHALLENGES

"The agricultural sector always develops an enormous passion when it has to overcome challenges." This is how Michael Horsch started the series of speeches on the second public day. He first described some big breakthroughs mankind ex-

The innovations were presented in a ring.

perienced in the past 20 years. First place: the smartphone: "It almost is an inherent part of us. We go to sleep with it. We only can imagine the consequences of this little machine on mankind." Another breakthrough: the evolution of energy production. After the closure of the nuclear power plants, in Germany 40 per cent of the energy comes from renewable sources. In China, sun and wind energy is booming at the moment.

Electric vehicles are another example: "If you had asked me six months ago, I would have called those who believed in electric cars complete idiots. I was wrong." And even to such an extent that German industry will be hit hard. This industry that is so deeply attached to the cars with a combustion engine will find it very difficult to hold out against the Chinese dominance on the market of electric vehicles. "But I am still optimistic. We others, we farmers, will play a decisive role in the next few years."

SELF-CRITICISM AS A SOURCE OF PROGRESS

"However, we get the impression that we more and more lose our grip on our destiny. But actually this is not the case. It is just that the power that so far has been in the hands of political and economic circles now more and more is kept by the NGOs", Michael Horsch clarifies. And he continues: "This phenomenon is very distinct in Germany. Sometimes they are given more credence than the scientists." These NGOs want to get into contact with HORSCH, especially as Michael Horsch took the liberty to criticise his own company. "Each time something positive came of it", he emphasises. The discussion always is positive and constructive. "You have to be aware that the NGOs do not necessarily want that all their demands are realised, but only some of them. Due to the discussions we can find the compromise they are looking for." An example: Despite his initial position, the president of the European Professional Beekeepers Association does no longer want a complete ban on glyphosate. In fact, it is glyphosate that allows for maintaining some agricultural wildflower strips, e.g. catch crops within the scope of conservation farming.

"These examples of consensus and discussion reflect what we want to achieve with our concept of hybrid farming: a combination of the best from two – actually different – worlds (organic and conventional farming)", Michael Horsch explains. The farmer and the agricultural sector, thus, can be the driving force in fighting the climate warming. And they can earn money by doing so. An example: If Germany increases the humus content on its twelve hectares of arable land by 0.1 percent, 100 million tons of carbon could be retained. On the carbon market, one ton of CO_2 costs about 50 Euro…

Michael Horsch finished his speech like he started it: "The future of farming has never before been as interesting as it is today!"

A QUESTION OF BALANCE…

The next speaker was Nicolas Kerfant, the managing director of the Agro branch of BASF France. When he was asked about

The farmers that came from France, Belgium, Germany and Spain were very interested in the machines for hybrid farming.


The self-propelled sprayer Leeb 7.300 PT was presented in the plant protection workshop.

his point of view with regard to the future of agriculture, he preferred to keep his distance. In our society, everything is a question of balance. "If you change something on the scales, it does not necessarily have an immediate consequence. But once society starts to move, it will be too late to reverse the trend." And he adds: "I would rather prefer to be in your place than in mine. Despite my position, despite the nice company I am working for, I, unlike you, do not cover such a basic demand of society." And eating is one the most vital needs.

Nicolas Kerfant then shortly presented BASF. The company operates in many different sectors and works on an international level. 900 million Euro are invested every year in solutions for agriculture.

A WAR OF OPINIONS THAT IS ALREADY LOST?

„We can show the results, e.g. application solutions, we found, but we had to notice: We, too, are faced with agri-bashing. We are losing the battle of opinion, if it has not already been lost", Nicolas Kerfant explains. "With regard to the plant protection agents, the main target of the attacks, no effort we took during the past 60 years was enough." Just take the mere decrease in quantity by 60 per cent or the reduction of the hazardous nature of the products by one thirteenth as an example. "Even my mother-in-law has become a plant protection expert within six months. Therefore, we try to take an educational approach to explain the difference between hazardous nature and risk, but the misinformation on the internet is too strong for us…"

According to Nicolas Kerfant the scientists have to put an end to this and point out the right track. For example, the decision to introduce in France not-treated field sections ranging from five to ten metre, was, in his opinion, not based on a real scientific assessment, but a merely political one. "There is lobbying on each side, everyone defends his position…"

"We have to talk about what we can do and about our innovations. We regularly have new solutions, for example biological agents on a pheromone basis", Nicolas Kerfant emphasises. But despite these innovations, the plant protection market will be facing a decline by 25 to 50 per cent until 2030.

Nicolas Kerfant is sure: „In some years there will be at least three different types of agriculture: conventional farming that will allow for feeding the world at low costs. Organic farming with cachets that meets the requirements of a small, but not negligible part of the population. And a farming system that is somewhere in between – a name has not yet been created for this system – that is based on the HVE principle (Haute Valeur Environnementale = Of high environmental benefit)." Why should we not call it hybrid farming? Each of these three systems is, by all means, already obsolete as they develop constantly. So you have to keep pace with the development.

Among the other new solutions Nicolas Kerfant particularly points out hybrid wheat. Enormous sums are spent on it and the results will only be available in three to four years. This wheat will allow for increasing yields and it will be considerably more resistant to illnesses. Digitisation, too, brings about a lot of solutions with regard to the optimisation of application and metering. "We are rather afraid of the machine manufacturers as their solutions become more and more efficient", Nicolas Kerfant says with a sideways glance at Michael Horsch. "For us it means a loss of earnings, but the direction is the right one."

During the following discussion a farmer asked point-blank if BASF had chemical solutions that might replace glyphosate. Nicolas Kerfant's answer was emphatically: "Yes! We do have such products – more expensive, less effective and more harmful for the environment…" Food for thought…

THE RIGHT SOIL FERTILITY MANAGEMENT FOR ORGANIC FARMING

Josef Hägler is an organic farmer from Bavaria and works without a plough. He advises his colleagues with regard to organic and conventional farming and runs a contracting company. He was the final speaker of the event.

The arable land of Josef Hägler's farm amounts to 110 ha. The farm is located at a height of 540 m above sea level. The average annual rainfall is about 600 mm. The potential of his rather light soils on sandy silt is rather low. Moreover, he raises beef cattle.

At the end of each day, there was a show with all machines of the HORSCH product range.

Some years ago, Josef Hägler and his farm took part in a five-year-test regarding the effect of liquid manure on the activity of the soil. Soil sciences have been his passion ever since.

In his opinion, the main focus has to be on the correct metering of the fertiliser. Using too much fertiliser is as problematic as using too little. The risk to turn the balance of the other components upside down by over fertilisation with one component is really high. This is the reason why Josef Hägler for more than ten years has been relying on the Kinsey method. The Kinsey soil analyses are based on a method that mainly depends on the knowledge of the balance between the mineral nutrients of the soil and that suggests corrective measures if there are any problems.

Moreover, Josef Hägler does not incorporate liquid manure that is not yet decomposed. He uses a special method to make sure that the liquid manure is transformed via fermentation and decomposed properly. The manure is put into a manure spreader to obtain a homogeneous mixture and an optimum oxygen content and to avoid nitrogen losses. The heap then is compacted with a dredger bucket from the outside. Thus, the CO_2 can no longer escape. The whole process is monitored with a thermometer. The temperature must not exceed 55° C to prevent the fertiliser elements from being burnt. The silo must not be covered as the light has an effect on the water retention. In summer the heap growths within eight weeks and a lot of humus-enhancing elements are generated.

For him it is a matter of honour to never incorporate residues that are still green. This little mistake would automatically entail pollution problems that could hardly be fought without a plough as earthworms do not eat green plants and the rotting process would damage the humus.

Due to his decision to work without a plough, Hägler is able to maintain the bacterial life of his soils. Not turning the soil means that anaerobic bacteria remain deep down in the soil and aerobic bacteria stay on the surface. If organic substratum is added, mineralisation does not only proceed very well, but also very fast!

The cultivation concept contributes to a considerable increase of the humus ratio in the soil. As the adsorptive capacity of humus is thrice as high as the adsorptive capacity of silt, the soil is better able to store elements like nitrate, sulphur and boron. The difference is enormous: for soils with tight structures and a humus ratio of respectively 3.3 and 5.6 per cent the yield difference amounts to 0.20 t per ha! In the first case, 650 m^3 water are retained compared to 1630 m^3 in the second case!

Fertilisation can be carried out in two different ways. The previously prepared compost can be spread directly before sowing. Another option is to turn the compost into pellets and to spread them while sowing.

The soil is cultivated at a depth of 3 cm, the residues are kept and left on the spot. The soil can be cultivated at a maximum depth of 4 cm. The first pass with the roller closes the soil hermetically and produces fine earth. Humidity is kept in the soil.

As a seed drill Josef Hägler uses a modified HORSCH Pronto DC. The discs have been replaced by duck foot coulters. Thus, even the last crop growth is cut off before the seed. The traditional harrow of the Pronto was modified, too. The soil can be closed in a better way and the roots can be taken to the surface. The soil is rolled once more to avoid nitrogen losses and to stimulate weeds.

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