terra HORSCH

More than just machinery

16 / 2018

Dear reader

The topics food and nutrition become more and more important. Keywords like "Eating with respect, shopping more consciously, eating more healthily" more and more appeal to consumers. The consumer is interested in what he is eating and wants to look after his body consciously. Cookery shows are part of everyday life. Everyone has a notion of cooking and is convinced to know what makes food good and healthy. Of course, there are countless different theories and everyone thinks he is right and in some points perhaps even is right. All in all, we farmers even would not really have to care. But it also is a great opportunity we have to make use of! Perhaps it is via this channel that we will manage to build up more contact to and more understanding among our customers again. We have the chance to explain our work in an open and honest way to become transparent. We can inform the consumer. On the other hand, we will perhaps realise that in the future in farming it will no longer be about moisture, falling numbers, proteins etc. in crops, but quite simply about herbicide and fungicide residues we have to deal with and we have to work on.

With regard to technology, we, our machines and our agricultural solutions stand by your side and support you in the sector of highly precise plant protection, single grain sowing of crops and soon with solutions with regard to mechanical plant protection. We are already running some quite interesting tests on our own farms.

I wish you a successful harvest 2018. Though it has already become clear that it will be at a rather average level depending on the region, we still hope for good prices!!

Cordially

Cornelia Horsch

IMPRINT

terraHORSCH
More than just machinery
is the international customer magazine of
HORSCH Maschinen GmbH
Sitzenhof 1
DE-92421 Schwandorf
Tel.: +49 9431 7143-0
Fax: +49 9431 7143-9200
terra@horsch.com
www.horsch.com

Responsible for the content: Cornelia Horsch

Edited by: Johannes Hädicke

Articles: M. Braun, N. Bleisteiner (School of Agricultural Machinery Triesdorf), C. Flourez (RDN), J. Hädicke, J. Seitz, M. Heinz (Crop Production Agricultural Academy Triesdorf), C. Horsch, M. Mumme (traction), D. Proff (Expert Centre Crop Production, Office for Food, Agriculture and Forestry Ansbach), J. Rath-Kampe, E. de Saint Laumer, H. Wolf

Photos: Archive HORSCH, Photographie Petra Kellner, Agricultural Academy Triesdorf, M. Burgaud (private), NovaFlore, Watier visuel, J. Hädicke, M. Mumme (traction), E. Reinhart (IntegrationSAD)

Translations: English: H. Wolf; French: S. Proust, AeC Traduction; Polish: B. Dudkowski; Russian: V. Veklenko

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

Layout: Otterbach Medien KG GmbH & Co

Print: Vogel Druck, Würzburg

Contents

HORSCH Practical Field Days 2018 - Meeting point for professionals

In the year when there is no Agritechnica HORSCH always organises its large Practical Field Days. For a period of nine weeks from 15th of May till 12th of July 2018 HORSCH opens the Sitzenhof for dealers, customer and prospects.

With the Practical Field Days HORSCH provides a platform where farmers directly on the premises of a manufacturer of agricultural engineering can exchange experiences and get information about current topics concerning technology and agronomic questions.

According to the current state of registrations, about 2500 people will have visited Gut SItzenhof at the end of the Practical Field Days. The participants come from all over the world – even from Australia, New Zealand and Chile.

In addition to the well-known and well-proven HORSCH machines, we also show some new machines in practice in the field: among others the Serto, the Express 4 KR, the Terrano GX and the Cruiser 5 and 6 XL.

The interesting program for 2018 consists of specialised lectures, machine demonstrations in the sectors tillage, seed drills, plant protection technology and logistics.

Our tillage and seed drills are shown in practice in the field. The farmers get an impression of our portfolio and of the working quality of our machines. With regard to plant protection technology, the focus is on two main aspects: the induction area with its user-friendly handling and the efficient induction hopper and the control of the boom. Both is shown live at the Practical Field Days.

In addition to the machines, we this year present field tests on the topic „Focus on the individual plant - what savings are possible with regard to fertilisation and plant protection".

In the past years, we worked on some details around the seed coulter of the HORSCH Maestro. The important points were the embedding of the **maize** grain and the compactions at the wall of the seed furrow. The objective is, with a quick emergence and a fast youth growth, to create optimum conditions for a quick closing of the rows with high yields.

Compactions in the area of the seed furrow slow down the root development. Closing wheels that are adapted to the type of soil, e.g. finger press wheels, can remedy these small-scale compactions. This encourages the development of the roots and guarantees a faster access to the underground fertiliser deposit. In the different latitudes, row spacings between 50 and 75 cm play an essential role for making optimum use of the light and for the row closure.

In **winter wheat**, after the drought in April and May, we notice a slower maturation of the wheat population with a better distribution of the plants. Moreover, the test shows that it is worth the effort to keep an eye on the individual plant and the population density right from the beginning. Well-developed individual plants with a not too excessive population density utilise nutrients, e.g. nitrogen, much more efficiently. Plants with a low competition from neighbouring plants tend to be more stable and the stem base is less affected by illnesses. This opens up new possibilities with regard to the growth regulator and fungicide strategy.

Winter rape plays an important role in a lot of rotations. Its cultivation, however, more and more suffers from volunteer rape, illnesses in the root area and pest infestation. The motto of our rape demo lot is "Strong individual plants with good root development due to fertilisation and tillage". Moreover, we show row spacings that are suitable for hoeing and thus provide the possibility to alleviate a little bit the problem of the volunteering of the previous rape.

In our demo garden, that was laid decades ago, we show the limits of **contact fertilisation G&F**, but also new topics like **CropRelay** where main crop and partner crop are standing side by side. The partner crop usually is a spring crop with the objective of a secondary use and it also allows for stabilising the soil and building up humus for the future.

There are factory tours to get an overall impression of the Schwandorf site and there is an interesting and entertaining program in the evening.

Of course, the HORSCH employees are available for questions, discussions and exchange of experiences.

Joint project with the DLG

The Federal Agency for Agriculture and Food (BLE) sponsors a three-year joint project of HORSCH and the DLG (German Agricultural Society) with the title "Development of innovative P-fertilisation systems to increase P-efficiency and reduce negative environmental effects". These are the intermediate results after the second year.

Phosphor – widespread, shallow or deep – that's the question / an intermediate result

The DLG and HORSCH co-operate in the joint project that is sponsored by the BLE "Development of innovative P-fertilisation systems to increase P-efficiency and reduce negative environmental effects". The project that will last for three years started in 2016, so this is the second test year.

Basic considerations when organising the test

Because of its finiteness of natural resources, phosphate as an important nutrient for plants has been up for discussion for years. This finiteness is in contrast to the unwanted P-removal from fields. While minimum tillage cultivation systems (mulch seed, striptill, no-till) contribute to conserve the soil, these systems in combination with phosphate fertilisers that are traditionally applied on the surface increase the risk of a P-concentration in the topsoil. Despite a P-fertilisation that is in line with the requirements the plants may suffer a lack of P as the availability of the nutrients in the root area is limited. At the same time, the risk of an ecologically effective P-removal from the fields because of a superficial erosion of the topsoil and the eutrophication of adjacent ecosystems increases.

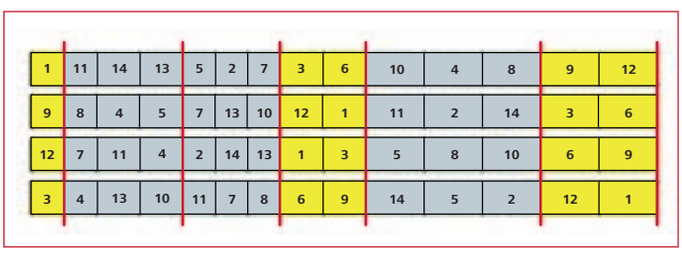
Objective of the test

In practice, applying phosphor while sowing already is an inherent part for some crops (e.g. maize). Other crops, too, like rape and cereals again and again show positive reactions to an underground or deep fertilisation. These observations are mainly made by practical experts who already use such a technology. Within the scope of the three-year test, these observations are to be confirmed and supported with exact test results. The objective is to be able to give recommendations for practical use.

Site and test layout

The test was carried out at the site of the International Plant Production Centre (IPZ) of the DLG in Bernburg, Saxony-Anhalt. The site in Central Germany is ideal for the project due to the soil as well as due to the existing infrastructure. The test for the development of innovative phosphor-fertiliser systems is carried out in a so-called joint project and is financially sponsored by the BLE. The project partners DLG and HORSCH took on different tasks. The DLG respectively the IPZ provides the fields, carries out all tillage, fertilisation (without underground and deep fertilisation) and plant protections passes, HORSCH provides a Focus TD that has specially been designed for the test lots for sowing and for underground and deep fertilisation.

The test itself includes 14 different version that are repeated four times. The layout is a block layout with six respectively nine metres wide randomised lots (see test diagram).



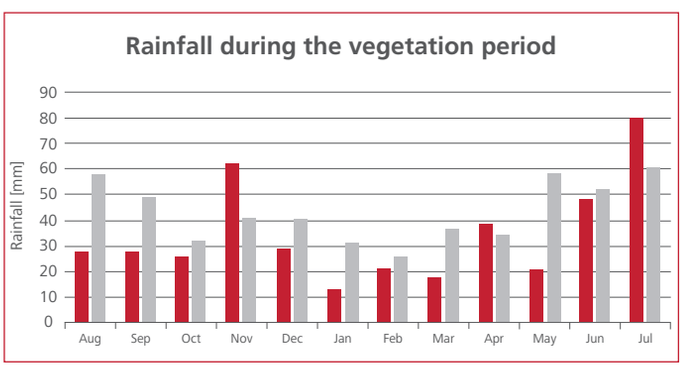
Layout plan for the harvest 2017: example test block 1: yellow: the lots with widespread fertilisation (nine metres wide) and the lots with targeted fertilisation (six metres wide), red: tramlines

The rotation order of the test was winter rape/winter wheat/winter wheat. To gather as much knowledge as possible in the three test years, all three rotation elements are laid every year.

Factor 1	Fertilisation height								
	Not fertilised			Reference value			Removal		
Factor 2	**Type of application**								
Type of fertiliser P NR (Rape) PK (Wheat)	Widespread		Deep	Widespread	Half/half	Deep	Widespread	Half/half	Deep
	Version 1		Version 2	Version 3	Version 4	Version 5	Version 6	Version 7	Version 8
				Version 9	Version 10	Version 11	Version 12	Version 13	Version 14

Type of fertilisation, quantity and placement technique

The IPZ field is characterised by a feeble supply of phosphor (supply level A) in the soil. The advantage of this fact is that, in addition to the non-fertilised version and the version that was fertilised with the removed quantity, another version can be laid according to the reference value, so in this case removal plus an addition to upgrade the soil. Three different phosphor-containing fertilisers were used: a mere phosphor fertiliser with TSP (triple-super-phosphate), for rape a NP- (nitrogen+phosphor) and for wheat a PK-(phosphor+potash) version. (Summary "Type of fertilisation, quantiy and placement technique")



Rainfall distribution Bernburg 2016/2017

The site in Bernburg is rather dry. In the vegetation year 2016/2017, rainfall was just under 420 mm/m². If you look at the chart, you will notice the low rainfall in winter and the particularly dry May.

The field test started on the 9th of September 2016 with the winter rape seed. The field had already been prepared for the seed – the previous crop was winter wheat – and was then loosened with the HORSCH Focus TD at about 22 cm and provided with the respective amounts of fertiliser. The LD+ narrow coulters were used to achieve sufficient loosening without creating rough structures in the seedbed. The placement depth of the fertiliser band can be adjusted directly on the leg of every individual tine. In the test, the versions half/half (h/h), where 50 per cent of the fertiliser was placed shallowly – so at a depth of about 6 cm – and the remaining 50 per cent were placed at working depth level, and deep (ti) were laid with 100 per cent of the fertiliser quantity at working depth level. Sowing with the Focus TD was carried out with the well-proven TurboDisc seed coulter with a row spacing of 30 cm. Each seed coulter exactly follows one loosing coulter.

Winter wheat was drill on the 29th of October 2016 – also after winter wheat – with the HORSCH Focus TD. The fertiliser tests were laid according to the same pattern as for winter rape. The row spacing of the seed coulters is divided in half to 15 cm for sowing cereals. This means: Two seed coulters respectively follow one loosening coulter and are mounted at the left and the right side of the loosened area.

Emergence for rape as well as for winter wheat was optimum and, thus, was the basis for the first test year.

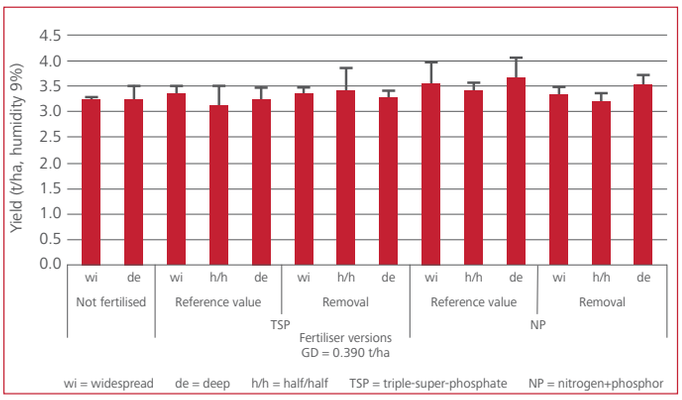
First results from 2017

The presentation of the results of the field test of 2017 are just an initial information about this ongoing project. In the first test year, we can only deduce first tendencies and directions. The respective further results with excerpts from the ratings will be published in one of the next issues of terra-HORSCH.

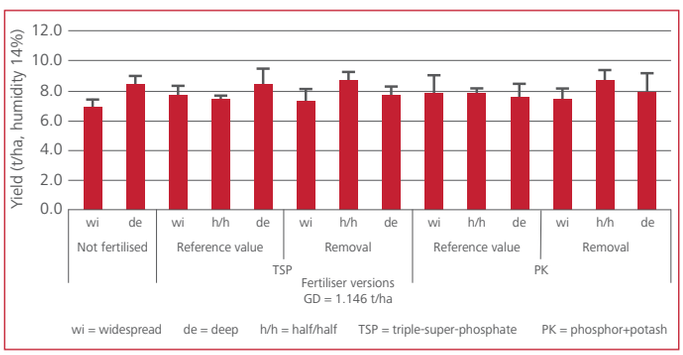
Rape harvest was carried out on the 31st of July 2017 and wheat harvest on the 19th respectively the 21st of July 2017. The results of the four repetitions were summarised and are shown in the following charts. The significance was not marked to make the chart more clear.

Summary

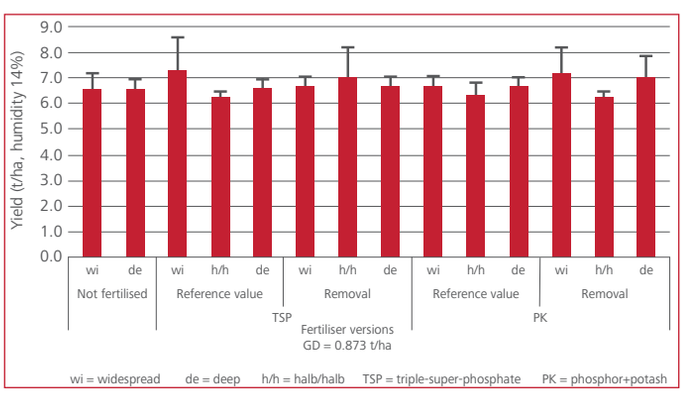
The harvest year 2017 provides a first impression with regard to the questions raised in the total test. The layout of the test in autumn 2017 was laid out according to the same test set-up again. We noticed initial differences in rape on the basis of the root collar diameter that was analysed before winter. The winter wheat lots established well and especially in the dry period from mid-April to mid-May showed small differences with regard to the colour intensity of the plants. These differences were documented by means of plant analysis and will be added to the results in the future.



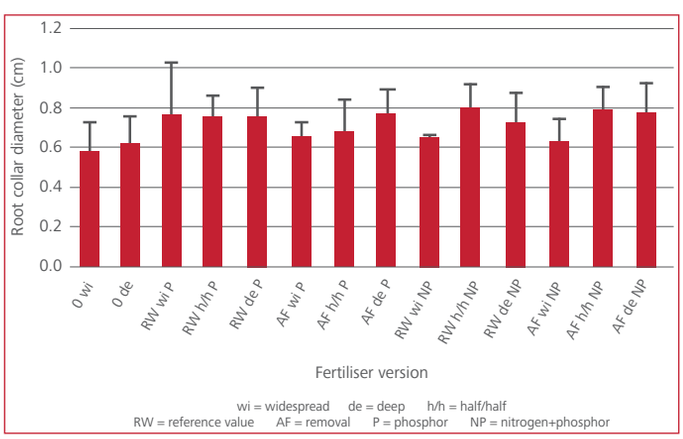
Harvest result winter rape, harvest: 31.07.2017



Harvest result winter wheat 1, harvest 19.07.2017



Harvest result winter wheat 2, harvest: 21.07.2017



Root collar diameter winter rape autumn 2017

Excerpt from

Corn borer – significance, preventive me a

of the Agricultural Academy Triesdorf

When fighting the corn borer, the „all-over" crushing of harvest residues plays a central role.

Mechanical crushing of the stems

When cultivating the maize stubbles mechanically, the crushing degree is an essential indicator for the working quality. The most important criteria is the intact stem residues that are larger than 5 cm as in the following spring the borer larvae might pupate in the remaining hollow space. The number of larvae is already reduced at the time of the harvest. An analysis according to Demmel (2010) shows the following distribution of larvae in the stem: At the time of the harvest 47 % of the larvae are above the second node, 27 % between the first and the second node, 22 % between the root base and the second node and 4 % in the root area. This means that the larvae population is already reduced by 50 % during the harvest. However, the remaining larvae are enough to cause significant damage in the following year. An as complete and as close to the ground as possible crushing resp. all-over incorporation of the stems (deeper than ten centimetre) is necessary to score a success with regard to fighting the borer.

In 2016 and 2017 different machines for maize stubble cultivation were compared in Triesdorf and the working quality was analysed. For the assessment of the individual machines the intact stems > 5 cm as well as the number of the crushed stems were counted, the counting was repeated four times. The analysis was carried out by the Expert Centre Plant Production at the Office for Food, Agriculture and Forestry in Ansbach headed by Mister Dieter Proff.

The machines that were used are described below. For illustration purposes, the power requirement, the working speed and the working depth are indicated additionally.

Tools

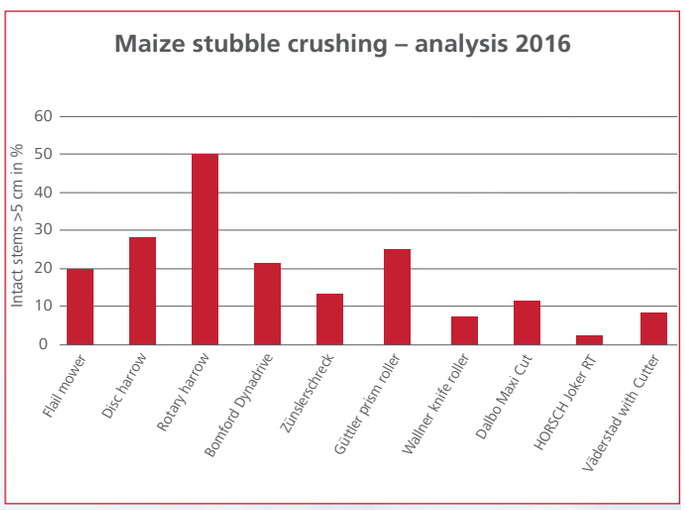
The weather conditions in the years 2016 and 2017 are essential for the interpretation of the results. While in 2016 at the time of cultivation the conditions were very dry, in 2017 wet conditions prevailed. Because of the dry soils and the friable stems, the machines were able to achieve a high squeezing and

Stubble cultivation with the Joker RT

e asures and pest control strategies

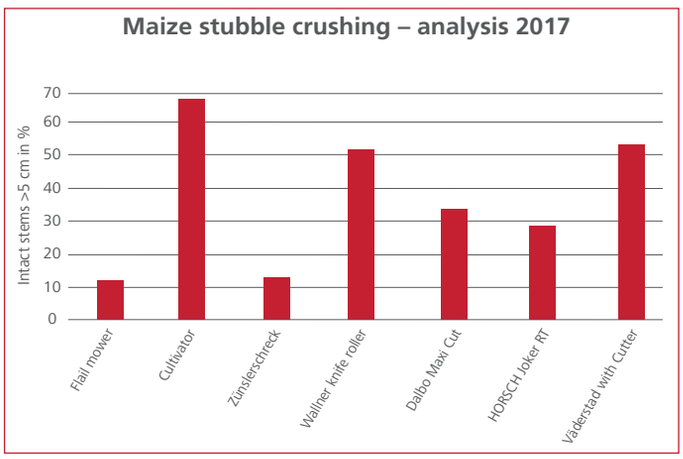
crushing output in 2016. In 2017, however, the stems were saturated and the soil resistance was lower because of the wet conditions. Thus, the crushing effect of the mechanical machines in total decreased.

For an objective assessment of the machines, the cultivation area was arranged in such a way that the track ratio caused by the harvest was the same. Thus, effects resulting from stubbles that had already been driven over could be excluded. In total, the crushing degree and the intact stems > 5 cm were counted at four different spots. The distance between the points were measured to guarantee a uniform analysis of all machines. The following chart shows the average values of the intact stems > 5 cm. To be able to interpret the results the intact stems were put in relation to the area and a percentage frequency was disclosed. In total, the machines that were used showed a distinct differentiation. With an increasing cultivation intensity, the number of intact stems decreased. A sole cultivation with disc harrow resp. rotary harrow did not provide satisfactory results. Special machines like the Zünslerschreck as well as knife rollers solo or in combination with a prism roller (Dalbo Maxi Cut) resp. a disc harrow (HORSCH Joker RT, Väderstad Carrier Crosscutter) achieved a significant squeezing and crushing effect.



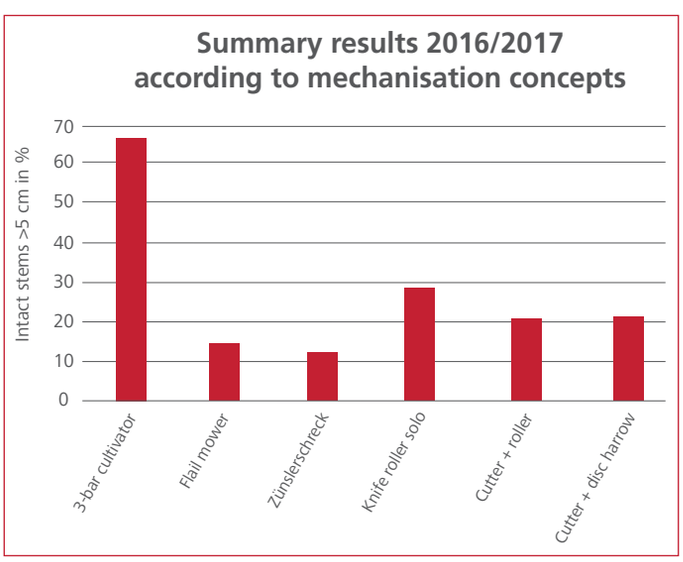
Dieter Proff; Expert Centre Crop Production,
Office for Food, Agriculture and Forestry Ansbach
Markus Heinz; Crop Production Agricultural Academy Triesdorf
Norbert Bleisteiner; School of Agricultural Machinery Triesdorf

Because of the results from 2016, the machine range in 2017 was limited. In 2017, too, the working quality was assessed according to the same pattern. Because of the already described differences with regard to the weather in the two evaluation years, the work results tended to be worse than in 2016. It was obvious that the sole cultivation with a cultivator at a low speed has not sufficient consequences on the crushing of the stubbles.



The work results of the active crushing tools like flail mower and Zünslerschreck did not change significantly. These tools achieve a high degree of squeezing and crushing. As in 2017 the stems were wet the results showed a differentiation between the mere knife roller (Wallner) and the combination of a knife roller with disc harrow (HORSCH Joker RT) and prism roller (Dalbo Maxi Cut). It was not possible to directly compare the results of Väderstad in both years, as two different machines were used. While in 2016 we worked with a combination of knife roller and disc harrow (smooth disc), in 2017 we used a pre-series machine with knife roller and undulated disc.

To summarise the analysis of the machines the results were combined in a chart according to mechanisation concepts. Thus, it became obvious that any cultivation beyond a primary soil tillage (cultivator or disc harrow) have a noticeable effect.



Beside the traditional tillage with a mulcher the working quality of special tools like the Zünslerschreck and the knife roller is good, too. From an area output, a susceptability to wear and a range of use point of view most importance is attached to the machine combinations that consist of knife roller with disc harrow or roller.

Improve capacity utilisation

Purchasing special machines only gets interesting if there are other possible applications in addition to the use in maize, e.g. the crushing of lush catch crop populations, cereal or rape stubbles. In this sector, the use of knife rollers in combination with a disc harrow or a classical prism roller has proven its worth. They cut the existing growth and create a loose mulch layer that is mixed with earth. When using mulch tools or on rolled populations, however, the result often is a hardly permeable mat that delays the drying of the soil in spring. In contrast, the crushed material that is mixed with earth decomposes faster and encourages the biological activity of the soil. In practice, we noticed an active decomposition of the existing organic matter at the end of the winter. Moreover, the mulch cover prevents an early weed infestation of the population at the beginning of the vegetation and thus creates optimum conditions for a subsequent mulch seed respectively strip cultivation.

In addition to the catch crops, harvest residues like rape stems are more and more crushed intensely to create optimum germination conditions for volunteer rape in the thin mulch layer above. This encourages quick emergence and reduces the volunteer rape problems. As for the crushing of maize stems this considerably contributes to field hygiene as the finely crushed harvest residues decompose faster.

Summary

With regard to the cultivation of silage maize stubbles, combinations of knife roller with disc harrow or prism respectively Crosskill roller have proven their worth beside the well-proven flail and sickle mowers. The area output is higher while at the same time wear is low. Moreover, their range of use can be extended by crushing rape stems and catch crops. By combining different tools, even passively working tools can achieve an intensive crushing of harvest residues. The capacity utilisation of the disc harrows is thus improved beyond primary soil tillage and therefore, from an economic point of view, purchasing one can also make sense for an individual farm.

Contractors, too, are more and more ready to invest in special tools like stubble mulchers, Zünslerschreck and Cutter if there are opportunities to use them all over the year. In the meantime, there are different solutions that allow for an optimum tillage and thus, prevent the increase of the corn borer and head blights in cereals. However, it is imperative to sensitise the farmer by training and consulting for this topic. For in 2017, the corn borer reminded a lot of maize farmers that from an economic point of view it still is the most important maize pest. Only if all farmer on all fields fight the borer together by means of the tillage method, a further increase may be prevented. If they do not succeed, the infestation pressure will increase and more and more often require a direct pest control.

More than mere size

Oberhof near Boltenhagen in Mecklenburg-West Pomerania. Only a few hundred metres from the Baltic Sea there is a farm house straight from out of a picture book. Arne Nölck and Syster Maart-Nölck together with their son Ole (1.5 years old) are the second generation to live here. The farm house also is a holiday home that Syster Maart-Nölck takes care of. But the agricultural economist with a doctor's degree still has a lot of other tasks: she works in the management team of the young DLG (German Agricultural Society) and as a tax consultant for the Wetreu LBB, a business and tax consultancy firm that has specialised in agricultural economics. And this is not the only reason why she is a valuable adviser for her husband, Arne Nölck, the farm manager of Gut Oberhof.

Syster Maart-Nölck (ri.) and her husband Arne Nölck manage Gut Oberhof.

The Nölck family came to Eastern Germany in 1991 directly after the German reunification. Before that, Dr. Heinz-Jörg Nölck owned a 90-hectare arable farm with 500 stalls for pig fattening in Stakendorf, east of Kiel. At first, he was only allowed to rent Gut Oberhof with its 500 hectares. "After the war, the farm was a supply farm for the Red Army. After 1952, during the GDR era, it turned into a nationally-owned farm and became a main animal breeding farm. This is why it was not divided for further settlement in the course of the land reform. The large-scale structures were maintained", Arne Nölck tell us. "Moreover, agricultural goods were shipped from this region to the USSR. Only a few kilometres away in Wohlenberg, you can still see the so-called potato wharf. Arable farming in Gut Oberhof was organised via the agricultural production co-operative Klützer Winkel with a total of 5,600 hectares. In Oberhof, there were a lot of stables for dairy cattle, cattle, pigs and sheep. Sheep farming was very popular in the GDR. Moreover, they bred Jerseys that served as the sire line in the F1 generation of the black pied dairy cattle, a typical GDR breed that originated from cross-breeding. There was an orchard at Oberhof and it was an important training farm."

The Nölck family, Arne at that time was eight years old, came upon huge farm premises with numerous old buildings. The tenants had to meet a lot of stipulations: Some buildings had to be taken down, the historic farm house, however, had to be preserved. Yet the arable land was attractive – with regard to the location, but also with regard to the valuation index of the fields. Despite all the additional work, the Nölcks soon were able to expand the farm. In 1995, they took over the cultivation of about 500 hectares in Groß Schwansee/Kalkhorst, one year later the management of the neighbouring agricultural production co-operative Gramkow. The cultivated area now amounted to about 2,000 hectares. In 2000, the Nölck family bought the core farm Oberhof.

Arable farming and dairy cattle

After having finished his agricultural training in Schleswig-Holstein, Arne Nölck studied agricultural sciences in Göttingen and graduated with a master degree. He then did several internships. But he quite soon returned to the family farm: "It was a time during which we got but also gave back a lot of fields." Since 2016 Nölck has been associate and managing director of the original agricultural production co-operative Klütz. He now is farming a total of 4,900 hectares.

"WIth Klütz, dairy farming was added to the farm", the farm manager remembers. "Originally, there were 760 cows plus the second generation offspring. In the first year, we reduced this number to 400 cows and 350 female offspring. The barns are situated in the depreciated old buildings. We have reduced the population density as well as the ratio of resting places and feed lots. Thus, it is easier to form groups according to their performance. We also carried out some constructional changes, e.g. at the water troughs or the neck rails. In combination with an improved quality of the basic ration, a good team, especially the herd manager and external consultants, we succeeded in increasing the milk output from 8,300 to 11,000 kilograms per cow per year. We are now milking exclusively with permanent employees in two eight-hour shifts."

For Nölck, the liquid manure topic is a positive side effect: "For me as an arable farmer this is, of course, very interesting.

Especially as, due to a liquid manure lagoon with a capacity of 12,000 m3 – one of the few big investments of the previous owner – we have storage capacities for the whole year. We want to use this efficiently, also with regard to the new fertilisation act, and spread the liquid manure promptly in spring on the crops that are starting to grow. Spreading liquid manure in autumn is to be reduced to a minimum. For rape it would be possible, but we also place mineral fertiliser underground and this is why we are limited."

Expand rotation

Arne Nölck looks back on extremely difficult sowing conditions in autumn 2017. "Normally we always had sufficient capacities", he tells us. "But last year we were not able to cultivate our winter wheat stubble as scheduled because it was so wet. In general, we try not to sow before the 20th of September. The reason is the black grass problem. This is why we cultivated spring wheat which normally is not part of our farming plan. In the future, however, this might become more important to have a break in rotation. So far, the considerably lower yield expectation has been an argument against this method. Moreover, the fields then would have to be cultivated until the end of March what is rather uncertain because of the weather."

This year the farm cultivates 2,300 hectares of winter wheat, 550 hectares of winter barley, 1,200 hectare of winter rape, 300 hectares of spring wheat, 280 hectares of sugar beet and 190 hectares of silage maize. The rotation mostly consists of rape, wheat, barley, but the farm manager tries to expand it. "More sugar beet instead of rape would be ideal", says Arne Nölck. "However, the closest factory is about 150 kilometres away in Uelzen and thus, an extension of our Nordzucker quota is rather unrealistic. But we joined forces with other farmers and this year for the first time we will market part of our beets by night train to Switzerland."

In average, the crop and rape yields amount to about 9.5 t/ha for wheat, 4.3 t/ha for rape and 9.2 t/ha for winter barley. With 55 soil points, the soils are a little bit heavy.

In addition, there are 400 hectares of grassland – they previously belonged to the agricultural production co-operative Klützer Winkel – that can only be used in part. The rest, thus, is cultivated extensively.

Reasonable investments

„It is quite a challenge to integrate the many farm sites", Nölck admits. "For we have not only taken over the fields, but also a lot of old buildings. And there is a lot to do. We partly knock the buildings down or convert them. For example just now we are on the brink of dismantling the old grain-drying plant from the GDR times. A new one from Agritec with an output of 54 tons per hour and a wet room with a capacity of 3,300 tons is already operational. For storage, we still use old buildings which are fed partly via an auger, but also by trailers via loading cells. For pushing, we use a large wheel loader with a five cubic meter tip-up bucket and pushing shovel. The capacity in the halls amounts to 4,500 tons."

"It is similar with the machinery", the farmer explains. "At the moment, we have a rather wide range of machine population: one Quadtrac, three large Claas, six Fendt and seven John Deere tractors. But we will reorganise this over time. We will surely go for less, but larger tractors and attachments with a larger working width." With regard to a second tractor with power tracks Arne Nölck comments: "This is an exciting topic. For I actually like the Quadtrac with its high performance and the large contact area. But I still have to calculate meticulously if we can really use a second tractor of this kind to its full capacity. For with regard to the range of use, a power tractor always is limited."

The Quadtrac runs in front of a HORSCH Tiger 8 XL, a five-meter Tiger is pulled by an Axion. A twelve-meter Joker is preferably used in combination with the power track tractor. If the latter is used elsewhere, it is replaced by an Axion with twin tyres. Moreover, there is an eight-meter cultivator from another manufacturer on the farm.

"When I use the Quadtrac, I work at a depth of 25 centimeters with the Tiger. And all that on our relatively heavy soils", Nölck states. "With regard to stubble cultivation, our four Claas Lexion combines 780 set the pace and we have to work rather quickly. If everything works out, we thresh 200 ha in one day. After the wheat harvest from the beginning of until mid-August, we quickly carry out a stubble cultivation. After the emergence of the volunteer crops, we loosen deeply at an early stage. At the end of September, we want to sow into a calm field. The reason is the black grass problem. In parallel, we continue with rape. For us, August is an absolute work peak, for there are also other things to be done like mowing the field boundaries, spreading lime and so on. With regard to stubble cultivation, the HORSCH Cruiser is a perfect alternative for us as with a working width of twelve meter we manage to cultivate about 250 hectares in 24 hours! We had a technical gap in this sector – but now the Cruiser guarantees efficiency and quality."

"The 81 tines with a spacing of 15 cm can be equipped with eight-centimeter wide points and thus can carry out an all-over cultivation of the crop stubbles, even at a depth of only a few centimetres. This saves fuel and increases the area output."

Because of the farm acquisitions the machine population is rather motley.

Due to the tine spacing in combination with the double RollPack packer the cultivator consolidates the soil excellently and thus is ideal also for seedbed preparation.

Arne Nölck sows with a nine-meter Pronto and a six-meter machine he took over from one of the farms. For rape, the HORSCH Focus 6 TD has been proving its worth for four years whereas the farmer prefers a rather undulated cultivation horizon as a drill horizon. Another important machine is a Rauch AGT 6036 that spreads up to 90 per cent of the nitrogen, the remaining 10 per cent are spun. Nölck particularly appreciates the accuracy (even if it is windy) and the efficiency of the AGT.

There are three sprayers running at Gut Oberhof: a self-propelled HORSCH Leeb PT 270, a Leeb GS 8000 and a Damann 6000l. The PT 270 was retrofitted with BoomControl Pro. Before starting with the plant protection measures Nölck and his manager checks the crops. If there are still problems during the measures, e.g. thistle nests, the employees document it so that they can be treated separately. Nölck attaches great importance to a top training for his drivers. They are trained annually, attend events of the Department of Agriculture so that they get as much information as possible about this topic. According to Nölck's experience, the employees thus get a completely different understanding for the big picture and start to scrutinise a lot.

In the focus of the public

The whole farm employs seven people in Oberhof, another seven in Klütz, nine in dairy farming and two in the office. As of late, the farm manager is supported by a sub-manager. In summer, there are twelve temporary seasonal employees. "It is an enormous challenge to get good employees", Nölck points out. "Our region develops very positively, the unemployment figures are now within the national average. I am very happy that we have such a good team. Our people love technology and farming and will go through thick and thin with us. Among them are several young fathers. This is why we try to keep the working hours as flexible as possible."

The different farms are cultivated together, the harvest is pooled. The same is true for the distribution of the costs, e.g. for grain drying. For this is the only way the farm manager can avoid conflicting interests with regard to cultivation and harvest.

Nölck also makes an effort with regard to the image of agriculture in public. This is particularly important in a touristic region. He tries to avoid plant protection measures near residential areas especially on weekends. But is not only for the public image that he has sown bee pastures. This year even 37 hectares!

For transport, he, among others, uses truck rigs that are more common in public than the gigantic tractor-Tridem-combinations. "Trucks also have additional advantages", Arne Nölck explains. "The second-hand vehicles are relatively well-priced. And with our 47-cubic alu skips we can transport 27 tons. With a tractor there often is the risk of overloading."

Logistics in general is an important topic for Nölck. "For no matter if seed drill, plant protection sprayer or fertiliser spreader: It is important that the machines work smoothly in the field", Nölck emphasises. "One or two km/h more or less is not the most decisive argument. But the idle times and the routes have to be minimized." His recipe is a well organised logistic chain, block cultivation and a certain standardisation. For example, for sowing he tries to do with as few different varieties as possible as thus the set-up times of the seed drill (cleaning, calibration, …) are reduced drastically.

For the future Arne Nölck sees a lot of challenges coming up to agriculture in general and thus also to his farm: "With regard to the topic plant protection and fertilisation we will definitely be confronted with an increasing number of restrictions by the legislator. Basic agronomic aspects will get more and more important again to maintain, if not even increase the yields. Therefore, we need good technology to achieve the best results in a limited time under different conditions."

The HORSCH Leeb PT 270 is one of the three plant protection sprayers on the farm.

The AgVision farm

Farming centre for North America

For quite some time, HORSCH has been producing machines for the United States. Now they also bought an arable farm: the AgVision Farm in Downs, Illinois. Michael Braun from the HORSCH product marketing was on site and talked to terraHORSCH about it.

Communication with the customers has always been important to HORSCH. Not without good reason was the first large investment in the company's history the FIT Training Centre that was built adjacent to the demo garden at Sitzenhof. On the farm AgroVation in the Czech Republic, this combination of theory and practice works on a large scale. A lot of farmers from all over the world have already visited the farm to get information about future-oriented, efficient farming. The Practical Field Days 2014 alone attracted about 2100 visitors.

Now such an opportunity is also available in North America: HORSCH bought a test farm in the US. Michael Braun from the HORSCH product marketing and his colleague Daniel Halbmann from the product management have already visited the farm. Upon his return, Michael Braun talked to terraHORSCH.

terraHORSCH: Herr Braun, what was the purpose of your trip to the US?

Michael Braun: On the one hand, we wanted to visit customers and machines. Family farms that normally also work with foreign labour are typical for this region. The main crops are maize and soya. The region is one of the top farming regions in the US. Accordingly, the farm managers are very ambitious. And: Although the sowing season was in full swing, they took the time to talk and discuss with us. On the other hand, we wanted to discuss and to work on some topics directly with our colleagues from HORSCH LLC. We keep a close contact to the US – by phone, e-mail or video call, but for a lot of things it is easier to discuss them face to face. An important stop, of course, was the visit to the AgVision farm.

Daniel Fulton (left) and Michael Braun (right) discuss the tests that were set up in 2018.

terraHORSCH: Please tell us more about the farm.

Michael Braun: HORSCH bought the AgVision farm in November 2017. The previous owner was an American seed producer. The reason for buying the farm was to make the HORSCH brand better known and particularly to establish a meeting point for our customers to talk intensively with them about farming topics – on the field, not only in theory. The infrastructure of the farm is ideal as it had already been used for such a purpose previously. There is a large administrative building with a large training respectively conference room, a machine hall with repair shop and about 163 acres (about 66 hectare) right beside the building for field and machine tests.

terraHORSCH: What about its location in the US?

Michael HORSCH: It is situated centrally in the Corn Belt of the USA. The farm in Downs is located in the state of Illinois and only a few kilometres away from an airport in Bloomington. The connections within the US are excellent. The farmers work on a very high yield level. For maize it ranges between 220 and 250

bushel (about 14.0 to 15.5 t/ha). The soils are good and deep with five to eight per cent of organic matter. Although they are relatively heavy and clayey, the silt ratio is rather high. The average temperature amounts to 51 degree Fahrenheit (10.6 degree Celsius), the average rainfall to 41 Inch (1042 mm/m²).

terraHORSCH: Who runs the farms?

Michael Braun: The farmsite manager is Daniel Fulton. For HORSCH he is a new colleague. But he is very experienced in setting up, supporting, analysing and particularly in presenting field tests. So he is exactly the person we need over there! His contacts in the company are Jeremy Hughes in the US and myself in Germany.

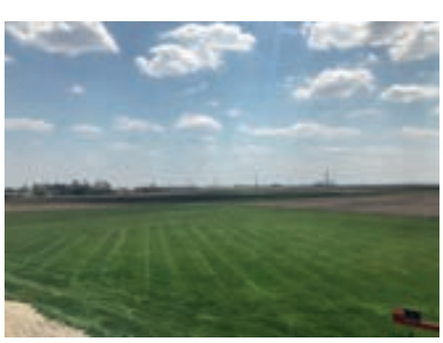
terraHORSCH: What tests are set up on the farm?

Michael Braun: Since the spring seed, we have already been right in the middle of the tests. But first of all it is important that the whole farm has already been converted to Controlled-Traffic-Farming (CTF). We are working with a twelve-meter-system. For seedbed preparation we use a forty-foot-Joker and for sowing a Maestro 3215 with 32 rows with a spacing of 15 Inch. This is how we sow soya. For maize, we use a row spacing of 30 Inch. Tractors and combines run in one track. The next machine we will have on the farm is a HORSCH Leeb LT sprayer. The working width is 36 m respectively 120 foot. With regard to the crops, the focus – typical for the region – is on maize and soya. However, we want to expand the range with wheat, rape and sugar beet to be able to show something to farmers from other regions as well. Currently, there is a special dynamics in the US with regard to the topic catch crops. Meaning: how do I handle residual nutrients, how can I store them efficiently, what is the soil cover like, how can I develop my site further, how do I improve the soil condition and the fertility? Our focus is: Which catch crops do I cultivate with which main crop? Do I cultivate maize or soya after the catch crop? And how do I handle the catch crops when sowing the main crop? Do I carry out a traditional tillage or do I go for no-till? Some years ago, catch crops have not been very important. This is the reason why we gather experiences and want to show which combinations work well, which tools and sowing methods are suitable for main crops and catch crops. But above all: Which positive effects can I achieve in the medium term? Moreover, we set up some test lots with GMO and non-GMO seed (GMO= Genetically Modified Organism). We are discussing this very intensely. In the US this is not an issue at all. However, some farms have started to produce non-GMO crops for export again. Apart from that, the test topics are similar to those in Europe: In the single grain seed sector it is for example about different coulter pressures for maize and soya, about the automated regulation of the coulter pressure, about different trash wheels and closing wheels and about the targeted placement of fertiliser.

Training room, office and adjacent hall for practical training and working on the machines

Together with Roman Scheller (right) from the HORSCH marketing in Schwandorf farmsite manager Daniel Fulton (left) prepares the tractor-machine-rig.

Preparatory works for the first seed in 2018 with a Maestro 3215



View of the test fields

terraHORSCH: How about crop singulation?

Michael Braun: We will start with that with the autumn seed. I think this method could be very interesting for some US regions.

terraHORSCH: What else is going to happen at the AgVision farm?

Michael Braun: We will never work there in a rigid way, but always dynamically. We will surely try other crops and a lot of agronomic systems. The AgVision farm is to generate impetus. At the same time, we want to discuss with farmers in the field and find out together which topics might be interesting in the future. For the US in general, perennial tests are very important. But the farm will also be available for HORSCH sales partners, the sales and the service team. We want to give all parties the opportunity to bring people to the farm, to show ideas, to talk to each other. Thus, we do not only have test fields, but we also can demonstrate and test the machines with customers, the sales and the service team directly in the field. Our top priority now is to make the site known. Therefore, we make full use of our new opportunities right from the start. In July, there will be the first Practical Field Days at the AgVision farm. One of the main speakers will be Michael Horsch. The program will be a potpourri of demonstrations, lectures, test inspection. And of course, of discussions.

Digital variety is required

Everyone still talks about digitisation – in farming, but also in other sectors. terraHORSCH talked to Philipp Horsch if and to what extent it already dominates us.

terraHORSCH: Mr Horsch, what is your opinion on the topic "digitisation"?

Philipp Horsch: Sometimes I am under the impression that there is too much „hype" about digitisation in all sectors – in industry as well as in farming. It seems that nothing works any more WITHOUT it and that everything will improve WITH it. And that we are only now starting to digitise everything.

But especially in farming we have been digitising for about 30 years with increasing dynamics – and as soon as new technologies are available they will be used.

terraHORSCH: But don't digital solutions also solve problems?

Philipp Horsch: Digitisation is no universal remedy although it often is suggested. We don't believe that digitisation alone will solve a lot of our agronomic problems and challenges. You only have to think about topics like handling of resistances, the so-called "good professional practice" with regard to the treatment of plants, soil, weather etc.

In the crop farming sector, it will still be the farmer with his expert knowledge and his agronomic feel who counts and who will make the difference after all! For nothing will be able to replace a good farmer, not even in the future. Surely, digitisation can be a support, but not much else – and, as I already said, definitely no replacement.

terraHORSCH: But for all that, to what extent does digitisation still dominate the market?

Philipp Horsch: The big players of the agricultural sector use digitisation to dominate the markets. For these companies, digitisation first and foremost is a business model and a possibility to tie the customer to them and to dominate them.

The motto always is the same: "Our IT solutions carry out the same work as you – just as well or even better and moreover, you will, thus, be able to achieve a higher income."

Philipp Horsch

I am quite sceptical. Take the soil maps as an example: A farmer knows every detail of his fields and is well able to differentiate when handling them. However, on the one hand, the digitisation of this information is not necessarily more accurate than the knowledge of the farmer, on the other hand, the task of using this information in the field remains a complex one. Thus, it is not that easy as it often is suggested.

terraHORSCH: Is there a difference in the way of thinking of the farmers for example in the US?

Philipp Horsch: There definitely are differences. Perhaps not so much with regard to the way of thinking, but unfortunately in the US there hardly is a strong, agricultural medium-sized industry. This fact in this case for example helps the big players like John Deere, AGCO and Case to become more and more dominant vis-à-vis the farmers.

terraHORSCH: So what is the farmers' opinion on the topic of digitisation?

Philipp Horsch: Farmers do not want to be dominated. There is hardly a sector where a company succeeded in dominating us digitally – neither in the smartphone nor in the computer world. Thus, it is rather unlikely that this will happen in the agricultural sector. For in all digital areas of life we live on digital variety – in private as well as in professional life. For example, today, everyone has a smartphone – with apps of different providers. The same is true for the PC world: We use various software and services of different providers and all that in a free, open and highly dynamic environment.

Our farmers, too, want digital variety and you need compliant interfaces and good systems to be able to guarantee that.

terraHORSCH: What does this mean for the future of digitisation?

Philipp Horsch: I think that the future of agricultural electronics and agricultural digitisation will be the same as it already exists today. I.e. we need compatible systems that interact well together and the user, in this case the farmer, chooses from this wide range of offers the solution that suits him best. However, some large market actors more or less actively try to prevent this variety and also the possibility to select and combine the appropriate systems. Our whole sector should cling to the openness and the compatibility of the systems and work together!

terraHORSCH: What has been HORSCH's position with regard to digitisation so far?

Philipp Horsch: For us, the part of digitisation that concerns us as an equipment manufacturer is not primarily the electronic functionalities within a machine. In our opinion, digitisaton first and foremost is the range of functions that take place outside respectively around the machine. For this purpose, we provide the interfaces that are already standard today and actively support their further development, e.g. ISOBUS. This standard interface allows for example for using SectionControl or VariableRate etc… The first has already been well-established on the market and is used intensely in the plant protection as well as in the seed drill sector.

terraHORSCH: What is HORSCH concentrating on at the moment?

Philipp Horsch: We, currently, are dealing with connecting all our machines to the internet. We want to provide possibilities to realise various functionalities, for example by means of additional applications on the machine, external systems that connect to the machine or can be used to handle service topics.

terraHORSCH: How do the machines connect to the internet today?

Philipp Horsch: For this purpose, we developed the SmartCan technology – a topic we continue to pursue intensely to provide the necessary interfaces. The HORSCH SmartCan can transfer data from the machine (e.g. applied quantity of seed/fertiliser or spraying mixture, coulter pressures etc.) via a wireless connection to a tablet. The apps from the future HORSCH App-World allow for displaying these data, sending them to a server or, of course, transferring them to the machine. Moreover, HORSCH is a partner of the DKE-Data GmbH & Co. KG that develops an internet-based data exchange platform for farmers and contractors that will combine the machines and the agricultural software across the companies. The objective is to create an open internet connection, third parties are to be able to use it, too. We attach special importance to standardised solutions. HORSCH has no primary interest in data, the data will be hosted by certified external providers.

terraHORSCH: Which partners could HORSCH imagine with regard to the cross-linking?

Philipp Horsch: Open interfaces offer linking possibilities in various directions, always provided that the customer wants to share his data and connections with others. I could imagine that in the future for example a consultant can get involved in the production process of the farm anytime via digital interfaces and can transfer his recommendations directly to the machine. The farmer can grant the dealer respectively service technician access to the machine to carry out services (e.g. updates) more quickly. Augmented Reality will play a major role. Or for a large farm the machine can be accompanied from the office in real time to faster recognise any optimisation potential and so on…

terraHORSCH: In your opinion, what are the next big steps respectively topics in the digitisation sector?

Philipp Horsch: As a general trend I see a logical combination of the following technologies approach us very fast:

The Internet Of Things (IOT) is gaining momentum: The number of the things, machines etc. that are connected to the internet increases exponentially in all areas of life and also in the agricultural sector. The result will be a huge amount of data that can only be handled by using artificial intelligence.

Consequently, there will be an increasing number of fully automated processes – not everywhere of course, only where it makes sense and supports the farmer.

And that's exactly the sectors we are, among others, focusing on: We continue to pursue a reasonable automation. The first automation steps have already been implemented: For example our BoomControl system in all HORSCH Leeb sprayers – a fully automated boom control system that has reached a so far unparalleled level of boom control precision – fully automated and completely reliable. Or our AutoForce system in the Maestro single grain seed drills: The technology can adapt the coulter pressure automatedly according to the type and the condition of the soil.

The next step will be the automation of complete working processes. The first solutions will be shown at the Agritechnica 2019.

Creative solutions put into practice

Dirk Rücker is the head of the jig department at HORSCH. With his 23 years of experience within the company, five of them in the jig department, he is the creative head when it comes to solving a problem in any sector. terraHORSCH talked to him and Philipp Horsch.

Dirk Rücker (right) with his jig team: Sebastian Zapf, Peter Lottner, Maximilian Neft and Daniel Vollberg (from left to right)

terraHORSCH: Mr Horsch, how important is the jig department within the HORSCH company?

Philipp Horsch: Jig manufacturing, in general, is an important topic for any manufacturer. For HORSCH the topic is particularly important as we want to have more process safety, professionalism, traceability, operational safety, ergonomics and efficiency. We are slowly approaching standards similar to the automotive industry.

In my opinion, jig manufacturing considerably depends on which people are working in this sector. Especially in this sector, we need talented and creative employees who are able to spot problems and solve them. For in this sector you cannot simply take something ready-made, everything has to be prepared from scratch. Moreover, assembly processes have to be thought through meticulously before building the jig.

terraHORSCH: How did you come to join the jig team, Mr Rücker?

Dirk Rücker: Since childhood I have already been interested in the interaction of electronics and mechanics. During my professional life I got into CNC machines. I have been working for HORSCH for 23 years and about five years ago I joined the jig department. Our head of production talked to me about it – my predecessor was retiring at that time. He worked in the welding department so the jigs at


Automated assembly of a TerraGrip tine with torque safety system: only if the part meets the required quality standards (green tick – right photo), it will be installed in the machine.

that time were mainly characterized by welding. In the course of the years, the number of jigs increased and this is why this sector expanded considerably.

terraHORSCH: How did the HORSCH jig department come into being at all?

Philipp Horsch: Previously, the employees initiated jigs for their respective welding or assembly team themselves. They had ideas and then tried to put them into practice – with the framework conditions that at that time allowed them to do so or not. 20 years ago a then-colleague started to attend to this topic more intensely. It was still far from being a department of its own. Today, there is a jig department in every HORSCH site. However, most of the knowhow still is concentrated in the jig team at Sitzenhof, a fact that is also due to Dirk Rücker's passion.

terraHORSCH: What has changed since then?

Dirk Rücker: Today, almost every sector needs jigs. Jigs no longer are simple mechanical units to keep parts together or to assemble them. In fact, it becomes more and more important that the jigs are equipped with sensor systems to guarantee the traceability of certain work steps. Another big change concerns the origination process of a jig: Today, they are designed with CAD, provided with material numbers, thus treated like a standard part. This means that the jig can be provided or built again anytime.

terraHORSCH: How many employees are working in the jig department?

Dirk Rücker: At the moment there are four employees in Schwandorf alone. Moreover, the apprentices join the team for a certain period of time during their training.

terraHORSCH: Are you working across the sites?

Dirk Rücker: Yes, we are partly working across the sites. Ronneburg and Landau for example have their own jig team.

terraHORSCH: What kind of jigs are there?

Dirk Rücker: Currently, we mostly have lifting, loading, transport, assembly and quality control jigs.

terraHORSCH: Can you explain one jig in more detail?

Dirk Rücker: Of course. For example our release systems, the so-called TerraGrip elements for our cultivators. They have always been assembled with jigs that involved a lot of manual work. You have to pre-tension the release springs to be able to mount them. Previously, the pre-tensioning process was completely hydraulic and only pressed the spring. The employee then tightened the holding-down screw with an impact gun to the desired torque.

Today, this process is semi-automated: The spring is not only pressed, but the holding-down screw is tightened afterwards. Moreover, a torque control and a path measurement is carried out alongside. Thus, we can make sure that only flawless parts are mounted and that the complete assembly is carried out correctly. Safety provisions, the documentation of the individual parts and efficiency, of course, play a major role.

The holding-down screw process is controlled in such a way that there is no room left for human errors. In the beginning, a lot of things were still based on the fact that the employee was actively involved and had a feeling for what he was doing. Today, the process is carried out completely by the system.

terraHORSCH: Can you describe another example?

Dirk Rücker: Another example is the hub unit assembly. The hub units are our mountings for the discs of the compact disc harrows Joker. Several ten thousand items are produced every year. Previously, these hub units were assembled completely manually. The bearings are pressed in, grease is filled in, a seal is inserted; everything then is tightened and closed. It was very difficult to monitor tolerances during this manual process. However, the bearing tolerances have to be as accurate as possible. It was also difficult to fill in the right quantity of grease manually or to position the


The needles fill the bearing with exactly the required quantity of grease (left photo). The subsequent fitting of the bearing stub is documented accurately (right photo).

seals correctly. The parts in the hub units make great demands on tolerances – shaft and bearing shell tolerances. Moreover, the individual parts are galvanized during the production process. And this always is a special challenge for the tolerance management of the supplier.

Philipp Horsch: For us, the example of the hub unit assembly is a highly sensitive sector. Our customers permanently expect – and rightly so –highest quality. Therefore, it was important to increase the operational reliability of this complex assembly process. Then Dirk Rücker dealt with this topic and automated the process. It first was a semi-automation, further automation steps were added gradually.

terraHORSCH: So what has changed until today and which problems do you now have solutions for?

Philipp Horsch: When pressing the bearings in, we measure the forces and the path and can then draw conclusions with regard to tolerances. If the part is not ok, there immediately there is an error message and the part is rejected. Every part is documented.

Dirk Rücker: We constantly control our processes, document them and continue to optimise them. In certain sectors, we already document individual parts and measure the tolerance and the torque the screw has been tightened with.

terraHORSCH: Were there other challenges?

Dirk Rücker: Yes, indeed. Another challenge was to fill the bearings with a special grease. It is not easy to get the grease into the bearing. So the problem was to fill the bearing with the correct amount of grease without producing bubbles. This is why we built a special jig. The grease does not pull any threads, there is no bubble formation and the grease gets exactly to the spot where it has to be. With our jig, we can fill the required seven gram of special grease into the hub units. This process now is semi-automated, reproducible and documented.

Philipp Horsch: We will take further steps towards automation and will focus on automating complete processes.

The first step will be realised with the construction of the new site here in Schwandorf. Thus, it will be possible to have the hub unit assembly carried out completely by robots in the future.

Philipp Horsch (left) and Dirk Rücker (right) with another „invention": an assembly aid for disc systems

terraHORSCH: When will you start production?

Philipp Horsch: Our schedule is to start in the second half of 2019.

terraHORSCH: Why do you take this path?

Philipp Horsch: So far, we have only been able to trace back individual aspects. With the automation, we will be able to reproduce every individual part of the hub units. During the assembly process, a number is lasered into every hub unit and linked to the serial number of the machine it is installed in. For us, the advantage is obvious: In the future, we can see exactly which parts are installed where and in a service case, we can trace everything back to the assembly and the supplier. In the end, everything is about quality on the highest level.

terraHORSCH: How have you so far been approaching the topic traceability in practice?

Dirk Rücker: We are already linking quite a large number of individual parts with the serial number of the machine, e.g. oil motors, hydraulic cylinders or metering units. In the future, we want to further extend his linkage to the serial number by automation.

Philipp Horsch: Another good example is the metering device of our Maestro line. We test every single metering device in the production line. I.e. we fix it on a test facility (another jig), have it run with seed for a certain time and measure all function-relevant parameters. These data together with the serial number of the metering device are saved in a test protocol. Later the individual metering devices are assigned to a Maestro single grain seed drill. By means of the serial number of the Maestro, we can then see the installed metering devices with their test results. It is thus guaranteed that the customer will get flawless metering devices.

terraHORSCH: To what extent have you been involved in the initiation of the automation?

Dirk Rücker: I know the previous processes and I often thought that a robot would be able to carry them out. And you cannot demand from an employee to push one button 1,000 times a day. Moreover, this process would have to be monitored in an automated way anyway. A robot simply carries out all tasks – from pushing the button to the monitoring. In addition, our number of items gets larger and larger.

terraHORSCH: In your opinion, what are the advantages of automation?

Dirk Rücker: Every employee can work with it, not only a specialist who has been trained in this sector. Especially as there is less and less skilled labour.

Philipp Horsch: Automation increases operational safety and simplifies the tasks for the employees as less physical work is required.

Dirk Rücker: Here, too, the keywords are traceability and documentation of the individual components. We want to detect exactly if something is not right and which parts are affected.

„Away from manipulated food towards honest food!?“

Michael Horsch

terraHORSCH: Mr Horsch, in 2050 more than ten billion people will have to be fed. Does the agricultural sector has to reposition to achieve this objective?

Michael Horsch: No, not really. On the contrary! We should stop to use this argument in public to justify our actions. Nobody wants to hear this anymore and it only contributes to our lack of credibility.

What if, in the meantime, until 2050, the eating habits of more and more people will have changed, e.g. towards less meat, keyword flexitarian. We will then need less fodder for animals and can cultivate more plants that are suitable for direct consumption.

However, we should carefully change our attitude towards the food retailers. They partly approach us farmers directly to find out what really is possible.

You increasingly notice that with regard to regulations for healthy food

the food retailers go several steps further than is required by the legislator. The food retailers are close to the consumers – much closer than the legislator or any NGO – and they managed to reposition so that they will not lose the confidence of the consumers.

terraHORSCH: So what will the food retailer look at in the future?

Michael Horsch: He will particularly watch the residues in different foods – in wholefood products as well as in conventional products. We should not deceive ourselves: In the different production directions, you will find different residues that have to be classified as critical. In the conventional sector, there will rather be chemical substances. The wholefood products are no less problematic as they partly contain residues of heavy metals like copper or mycotoxins. Food retailers deal with both products and thus, of course, try to market food with as little residues as possible – this creates confidence and, above all, avoids problems and even scandals.

terraHORSCH: Can you explain an example in more detail?

Michael Horsch: Some time ago, a large food retailing concern showed me an analysis of a sample of a muesli. This sample contained a total of 23 different residues of chemical substances that are used in plant protection. All measured values were below the legal limits and thus, non-hazardous for retailing.

If we take a look at the list of residues, especially fungicides, insecticides and growth regulators rank first. Herbicides only appear if for example glyphosate has been used for desiccation. By the way, of all the agents that are used in plant protection glyphosate is the least toxic one if it is measured at all.

In the end it is not about doing what is required by the legislator, but about what we can do beyond that. And this is where we, if we are clever, can win the food retailers over.

Of course, this list was a deliberate provocation as most of the residues mainly were found in the dried fruits that come from the Middle East where the requirements with regard to plant protection and the training of the farmers on site is not always guaranteed. In any case, I realised that in the future, we farmers should no longer only focus on falling numbers and the moisture content of our products, but additionally on residues.

terraHORSCH: What does the food retailers do in this respect?

Michael Horsch: On the market, nobody is closer to the consumer than the large food retailers like Edeka, Rewe, Aldi, Metro and Lidl – much closer than the large processors like Oetker, Nestlé etc. It were for example the food retailers that some years ago started to sell non-genetically modified milk and meat products. Now they are anxious to significantly reduce respectively completely eliminate residues in food.

To do so, the food retailers are looking for a direct contact to the producer, thus to us farmers – to the arable, vegetable- and fruit-growing farmers as well as to the livestock farmers.

terraHORSCH: What are the resulting opportunities?

Michael Horsch: A global trend has developed away from manipulated, cheap food towards "honest" affordable food. But let's not be fooled: This, too, finally is about the „big money", especially for the food retailers. But there also are new business models for those who understand how it works.

terraHORSCH: Can you give us an example?

Michael Horsch: Yes. One model example is our neighbour, the private dairy Bechtel. Some years ago, Bechtel as one of the first dairies in Europe together with their farmers managed to take the risk and market completely non-genetically modified milk products. With Lidl, one of the first large retailers, Bechtel found a partner that offered and advertised these products in its supermarkets.

Thus, Bechtel and Lidl set new standards without genetic engineering in the whole sector that in the meantime have also been adopted by their competitors and that go way beyond the standard that is required by the legislator.

And their success proves them right. Today, you will find almost all milk products in a non-genetically modified quality in the shelves of almost all food retailers.

terraHORSCH: Is it is enough to put up new shelves or does the initiative have to go further?

Michael Horsch: If everyone only meets the legal minimum standard, he must not be surprised that he becomes a pawn in the hand of the processors who in turn will become a pawn in the hand of the food retailers.

I think the farmer has to change his basic attitude of the victim that only is exploited. And if he is asked to change something he expects to get money first.

I think it would better if the farmers joined forces with like-minded people and ideally got an agile processor involved who is on good terms with the food retailers, and developed ideas of their own about how to improve food sustainably. They also should do some clever preparatory work so that in the end, if they have something interesting to offer, they have a better bargaining power.

terraHORSCH: So do we have to find new ways?

Michael Horsch: Ultimately, we are talking about quality parameters. The question is: Will the standards, that in the case of cereals consist of moisture, protein, falling number, mycotoxin pollution etc,, still apply in the future as a basis to determine the quality of a product? In the future, the necessary characteristics will change respectively further characteristics will be added. The example of soybeans shows how quickly another „non-genetically modified" parameter can be added and has a significant influence on sales and perhaps the price in certain markets. For crops, I can imagine that the residue situation will soon play an important role as a quality criteria. Or in other words: Farmers will quickly see a market for crops with significantly less or even no residues of plant protection agents at all.

terraHORSCH: In your opinion, how can residues be eliminated?

Michael Horsch: Each time we are reproached with the residues in our products, we quickly find solutions and ways to reduce them. An essential aspect surely is the application of plant protection agents. A targeted and efficient application is influenced by several factors. For example the weather conditions at the time of application. Today, a lot of farms postpone their plant protection measures to the evening or the night time to make sure there is enough

air humidity, low temperatures and wind speeds. With the boom control system BoomControl Pro we get closer to the crop than anyone else and are able to apply even the smallest amounts in an extremely precise way and get them to the population or the soil. By means of higher operational speeds and lower water quantities, technology, too, helps to better hit the optimum window to carry out the application. If we continuously pay attention to all those things, we can do quite a lot without doing completely without pesticides.

Of course, we have to continue to deal intensely with this subject. It is our responsibility as a sprayer manufacturer. This is why we have already started a counselling and training system to pass on the experiences we gained from our own tests to our customers. Thus, we will finally not only cut down significantly on plant protection agents, but also get residues partly or completely out of our field products.

terraHORSCH: You have started to cultivate a small part of the HORSCH farm AgroVation in the Czech Republic ecologically.

Michael Horsch: That's right. First and foremost, we are interested in maize and soya. We co-operate with organic farmers and try to convert and further develop an already field-tested CTF method to six respectively twelve meter. We are still at an early stage and still have some problems. But I am rather confident that as a result we will develop a new product line for organic farming.

terraHorsch: Will there only be organic products in the future?

Michael Horsch: No, surely not. Organic products have their price and not everyone will be able to or will want to afford it. And if everyone will be able to afford "organic", then organic would no longer be organic. But what will surely develop is a "new way" of farming that will be situated between organic and conventional. Let's call it "organic with glyphosate". We all know that there is much truth in this combination. However, there will still be a long way to go until the consumer understands this.

terraHORSCH: To what extent do you still see organic farming on the rise?

Michael Horsch: The demand still seems to increase and larger farms, too, more and more tend to convert their farming system. The result is that there will be an increasing pressure on the prices of organic products. But we and society have to be well aware of the fact that this will affect the small organic farms and in my opinion, this is not beneficial!

Let's wait and see what politics will come up with to interfere in this respect. From experience, it will be the small farms that will suffer and that's a pity!

terraHorsch: Your summary: Which direction might agriculture take in the future?

Michael Horsch: From today's point of view, I can imagine three directions for farming:

1. *Conventionall - with wider rotations and a slightly lower intensity in fertilisation and plant protection.*
2. *„The new way" - a combination of organic and conventional farming with a more than three-course rotation.*
3. *Organic - with a better approach to build up humus, a holistic nutrient cycle and a little less livestock farming.*

With regard to processing, it is not so easy to provide a forecast. But in this sector there will surely be a long social discussion as it is not only about animal welfare but also about how many meat we will eat at all in the future!?

The first eco-crops on the HORSCH farm AgroVation.

Powerful cut

Closed: Looks worse than it is – even on cohesive soil the knife roller segments cut, bend and squeeze very intensely.

There is a growing trend for knife rollers. HORSCH offers this preliminary tool for the Joker RT line. In a practical field test on rape and maize stubble, we were able to assess the advantages and disadvantages of the closed design.

See more on

YouTube

A film of the test and other information on: www.traction-magazin.de

Technical data

Technology: closed design with an outside diameter of 30 cm; 6 diagonally arranged, self-sharpening blades; screwed to the drum with 4 bolts respectively; can be swung up hydraulically; hydraulic pressure application with max. 100 bar

Availability: for HORSCH Joker RT with 4.75 to 8.0 m working width

Range of use: stubble cultivation after rape, sunflowers, maize catch crop incorporation; optimum working speed 15 to 20 km/h, limitations of use on wet, cohesive soil

Used solo or in combination with other tools, knife rollers can be a reasonable addition to the machine pool. For almost any arable farm can use it for a shallow cultivation of stubbles or catch crop populations, especially in the context of greening and controlling the corn borer. Using the example of the HORSCH Joker 6 RT with knife roller, we will show you the potentials and the limitations of use and how the closed and open versions differ with regard to working quality and clogging tendency.

Primary objective: corn borer

Knife rollers can be used for a lot of tasks. Its range starts with the ultra-shallow stubble cultivation after rape, followed by the efficient crushing of sunflower stems during primary tillage and the cultivation of standing or dead catch crop populations and ends with the stubble cultivation after silage and grain maize. Other fields of activity, like for example the turning of grasslands, are rather a „side-line“. Being a passively driven tool, when used on maize stubble, they particularly compete with flail and rotary mulchers – which due to their actively driven rotating tools achieve a good to very good crushing of organic residues, but can only work closely to the soil and not directly in the soil. Especially in combination with other tools like a compact disc harrow, standard discs harrows, tine tools, harrows or rollers (prism rollers, Crosskill rollers etc.) knife rollers can combine the crushing of organic residues and tillage that in addition to mechanical pest control also speeds up the rotting process. In contrast to cultivators or tine harrows they virtually work in a clogging-free way due to their rolling mode of operation, but because of the large contact area and the missing grip the penetration into the soil is worse. Crushing the maize stems is indispensable

At the moment, the knife roller as a preliminary tool is available for the Joker RT line in working widths ranging from 4.75 to 8.0 m.

for efficiently fighting the corn borer – even if the field is ploughed afterwards. For if despite the use of the plough, long, intact stubbles and stems remain at the surface, the corn borer larvae can finish the development into a butterfly in this surroundings. If, however, you consequently do without a plough or if because of the soil conditions (dry, hard) or on shallow soils you cannot use a plough, the corn borer has to be fought by other means of mechanical cultivation.

Closed tools crush more intensely

At the moment, a knife roller as a preliminary tool is only available for the compact disc harrow Joker RT. Depending on the total working width, the roller is divided into a varying number of segments with widths ranging from 165 to

For the 5.75-meter wide Joker 6 RT the knife roller is divided into three segments

The six self-sharpening knives are screwed in a slightly diagonal way to a closed shaft – thus a high cutting pressure is possible.

The optimum operational speed is between 15 and 20 km/h.

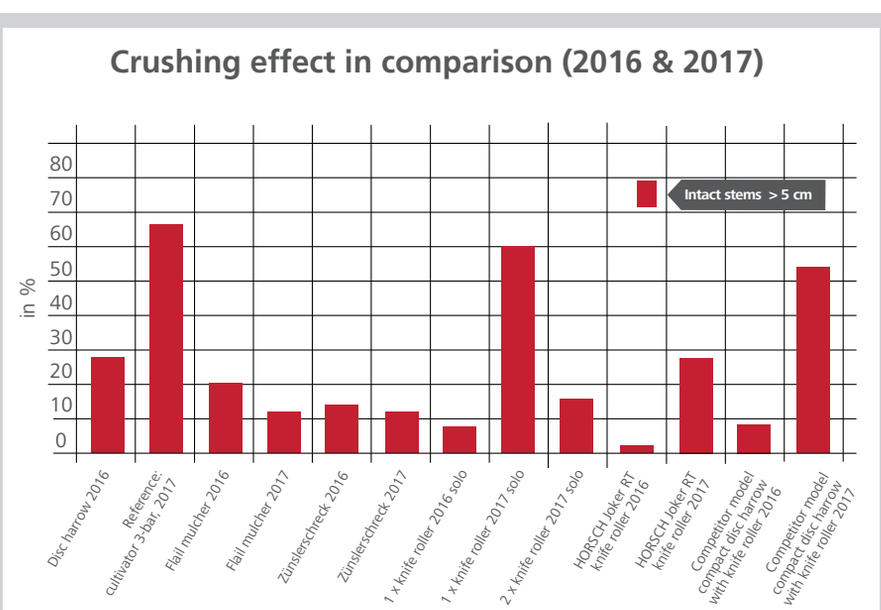
On rape stubble: left uncultivated, right cultivated.

The discs were set shallow, the cultivation depth was 3 to 4 cm.

Emerged shatting rape, about three weeks after an ultra-shallow cultivation.

The roller cannot get through thick rape straw covers, it mostly passes over these mats.

A lot of stems were crushed to an almost similar length.



Practical test: *In the dry year 2016, the Joker RT with knife roller achieved excellent marks in the practical test in Triesdorf, the share in intact stems with a length of more than 5 cm was below 5 per cent. In the wet summer 2017, the share was significantly higher, but due to the closed design of the knife roller, it was only half as much as for a competitor's model. Bent and squeezed stems are considered as "not intact", too, they do not have to be cut completely.*

220 cm and is equipped with six self-sharpening knives made of boron steel (however, the cutting edges round off gradually) that have not been designed as reversible blades. When they are new, the outside diameter is 30 cm so that there is a cut every 15 to 16 cm. The knives are set slightly diagonally to the direction of travel to create a real cutting effect. Thus, it only is the rotational direction of the cut that presses the knives into the soil. This creates a higher punctual pressure than knives that are arranged in a straight line and the running smoothness is increased by the oblique cut. The diagonal arrangement, however, is also known from other manufacturers. But one characteristic of the HORSCH knife roller is the closed design while most of the other manufacturers rely on open knife rollers. If the knife roller is not used, it can be swung up hydraulically. Via this hydraulic circuit the individual segments are pre-stressed with 100 bar.

The advantages of the closed design of the knife roller are summarised clearly in a systems comparison carried out in Triesdorf by the expert centre crop production at the Department of Food, Agriculture and Forestry in Ansbach under the direction of Dieter Proff, Markus Heinz and Norbert Bleisteiner (see chart). During two years after having been used on grain maize stubble the intact stem share with a length of more than 5 cm was counted and analysed in per cent with regard to the cultivated area. The HORSCH Joker RT with knife roller achieved the best results of all tillage tools and in the dry year 2016 performed even better than the flail mulcher and the Zünslerschreck. However, the comparison of the solo-knife-roller combination and the compact-disc-harrow combination of a competitor is remarkable: While these tools were on the same level in both years for one working pass with regard to the crushing of stems, the cutting effect of the HORSCH Joker RT is significantly better. For quite a long time we searched for explanations and then came upon the open design of the knife rollers. The other two manufacturers used an open design. Apparently, long stems are less bent and cut as they partly can wiggle through the free space between the knives and pass the knives in an almost unhindered way. The closed knife roller, however, bends and thus damages all long stems. These stems are considered as

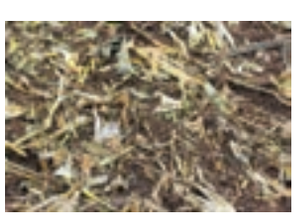
The knife roller works most efficiently at operational speeds between 15 and 20 km/h.

View on the diagonal knives with a spacing of about 16 cm. Soil that adheres to the knives can influence the cutting depth.

The knives bend the stubbles in the direction of travel and also squeeze and break them.

If the working depth is low, stubbles often are only bent and not disrooted.

Frayed stems speed up the rotting process.



On grain maize, you can achieve an excellent mixing of harvest residues and soil.

Squeezed and broken stubbles prevent that the corn borer can survive the winter

„not intact", even if they are only partially broken, completely broken, crushed or bent. Moreover, due to its solid closed design the HORSCH knife roller can be used with a significantly higher contact pressure that, according to practical experts, also improves the work result.

But: Although the crushing effect of the two other tools possibly was good, they still left slightly longer stem components – which were more than 5 cm long. This is not obvious from the values without length fractionation. Good: The values from 2016 and 2018 clearly show that the crushing degree of knife rollers on dry, hard soil is better than on wet, soft soil. For a certain resistance of the soil is necessary to cut and to crush.

Feedback from a practical expert

Stone-resistant and strong cut

In August 2017, Johannes Hüttner from Amberg retrofitted a knife roller to his Joker 6 RT. "We partly work on very stony soils so that using a flail mulcher to fight the corn borer after maize is completely out of the question. And from colleagues and friends I heard a rather negative feedback about open knife rollers that in our conditions with a lot of stones bend too quickly. This is why we only considered the closed design of the HORSCH knife roller. So far, I have cultivated about 300 ha of rape stubbles and maize stubbles with the knife roller. On cereal stubbles the knife roller has no visible effect."

He uses two tractors with 215 resp. 320 hp whereas on slopes the 215 hp are only sufficient for rape stubble. "You have to go at at least 17 to 18 km/h to make sure that the work result and the self-cleaning effect are optimum. The high press weight of the closed knife roller are an enormous advantage. The roller cuts very intensely and I can set the discs in an extremely shallow way. Due to the closed drum design the knives do not bend. Moreover, soil adaption is excellent. On wet loamy soils, the knives clog quickly, but with the remaining cutting edge of 2 to 3 cm the knife elements still work sufficiently well. Another advantage is that couch grass roots are not cut, the couch grass, thus, remains green and later on can be successfully fought with round-up."

Stones: Johannes Hüttner partly works on fields with an extremely high amount of stones.


Effective: work result on silage maize stubble with a working depth of the discs of only 3 to 4 cm.


Self-cleaning: On cohesive soils harvest residues and soil can adhere to the knives. However, you can still go on working.

But the closed roller of the Joker RT also has disadvantages. In wet conditions, it especially tends to get clogged with earth or a straw-earth mixture. Although there is a self-cleaning effect caused by the centrifugal force that increases with rising working speeds, there are also limits to it. During our practical test on grain maize stubble under humid to wet conditions on loamy soil earth adhered especially to the edges of the sections. The work effect, however, was hardly affected. A positive aspect of the closed design is that the knives on the closed drum are more stable and resistant to stones and do not bend resp. twist. Basically, the knives of the knife roller - the same is true for other comparable tools - are not used for cutting and crushing of organics, but also for squeezing. The latter increasingly occurs in humid to wet conditions and light soils as well as for thick stems (e.g. maize) and green plant parts with low dry mass content.

Use on rape stubble

For the cultivation of rape stubble, the Joker 6 RT was adjusted in such a way that the discs only reached one to two centimetre into the soil. In dry conditions, the knife roller worked excellently and cut dry as well as green stems very efficiently. Stems that were still standing were mostly bent and cut as well as crushed. The mixing with earth in a depth of about 2 to 3 cm created ideal conditions for the germination of volunteer seeds. However, in case of thick straw mats, the knife roller only passed above them so that there was no cultivation. But volunteer rape also germinates in the micro-climate below these straw mats.

Use on maize stubble

When it was used in maize, the conditions were humid to wet, the population was heavily infested with the corn borer and a lot of stems were bent. The pass with the Joker 6 RT with knife roller was carried out immediately after the field chopper resp. combine, i.e. without any mulcher pass. The discs worked more deeply than when used in rape, but the working depth was only to 4 to 5 cm.

On grain maize, stubbles that were still standing were consequently bent and squeezed, but hardly cut similar to the maize straw. Because of the shallow setting of the discs only few stubbles were uprooted. However, the mixing of harvest residues and soil was excellent producing a lot of fine earth. Stems that had already been damaged were squeezed open and frayed intensely. Moreover, the work pattern was very level – without the creation of piles that is quite well known from tine tools or cultivator-disc-harrow combinations. In wet spots, the roller segments got clogged with earth and straw at the outer edges of the drums, only slightly affecting the working effect. After silage maize a very shallow cultivation was carried out at the same working depth without uprooting the stubbles – this has also been the objective of the cultivation. Standing stubbles were frayed intensely and thus the corn borer larvae were deprived of the possibility of surviving the winter.

Our summary:

The knife roller of the HORSCH Joker RT can be used universally. The knives can crush dry as well as green rape stems, maize stems are mostly squeezed and frayed. When crushing the roller benefits from its closed design and the resulting high cutting pressure. It is resistant to stones, but tends to clog fast in wet conditions. A working speed between 15 and 20 km/h is optimum for the work effect and for self-cleaning.

+ Efficient and water-saving after rape
+ Low horse-power requirement when working shallowly
+ High production of fine earth
+ High ratio of damaged stems, especially in maize stubbles
+ High stability of the knives (resistant to stones)
+ Very high cutting pressure of the knives
- Partly tends to cloggings (but still continues to cut, bend and squeeze)
- No reversible blades

Diversification to secure yields

Miguel Burgaud's farm is located in the heart of the Loire valley, in Saint Jean des Mauvrets in the province of Anjou, department Maine et Loire. The village with 1,700 inhabitants is characterised by agriculture and especially viticulture.

Originally, Miguel Burgaud comes from the department Vendée. In 2002, he took over a farm in Maine et Loire, the home of his wife. His parents were not farmers, but since he was little he had loved helping on the dairy farm of his uncle. In the middle of the 90s, he graduated in the field of crop farming. He worked one year at a co-operative, then five years as an employee on a mixed farm with livestock breeding. Finally, he ventured to take the step and purchased his own farm.

Atypical and varied

This region of the Loire valley is known for its seed producers and the cultivation of flowers. Here Miguel Burgaud cultivates 175 hectare, 40 hectare of them are his own fields. Typical for this region he cultivates maize seed, hempseed and gladioli on 18, 15 and two hectare respectively. In addition, there are traditional crops like wheat (75 hectares), grain maize (20 hectares) and rape (20 hectares). "The region is a very important viticultural region. So I could have got into this line of production, especially as the previous owner of the farm also had 18 hectare of vineyards", Miguel Burgaud explains. "But I did not know much about viticulture, so I stuck to the crops I am familiar with."

Cultivation of gladioli

2004, two years after the purchase of the farm, Miguel Burgaud started to grow gladioli. "It was more or less by chance that I came across the advert of the co-operative Terrano that was looking for a producer of gladioli", the 43-year old farmer remembers. Since then he, together with six colleagues from the same region, has been growing gladioli under contract: first for Terrena and now for the company Nova-Flore that two years ago bought Terrena's bulb branch. "I opted for this crop to diversify my range. I wanted to secure my income to compensate for the extremely low crop prices", he explained. Cultivating gladioli is similar to the cultivaton of traditional crops. So Miguel Burgaud could rely on his existing knowledge.

The bulbs are planted at the beginning of April with a bulb planter that is equipped with a GPS steering system. The task of planting one million bulbils is taken over by Nova-Flore. At this time, the bulb diameter is only about three to four centimetre. In addition to the passes that have to be carried out for traditional crops, the farmer carries out one pass with a small rotary mower to scythe the first head buds. Thus, the sap flows back and the bulb gets larger.

Harvest is carried out between end of October and the beginning of Novem-

Quick facts about the farm:

- Location: Maine-et-Loire, France
- Farm was purchased in 2002
- Labour: one full-time employee and seasonal workers for the castration of the maize seed and the gladioli harvest
- Area: 175 hectare
- Irrigation for 50 hectare
- Crops: hard wheat, common wheat, hempseed, grain maize, maize seed, rape and gladioli
- Soil: 35 % sandy soil, 35 % dry silty soil and 30 % clayey soil

For his farm, M. Burgaud relies on diversification to improve the profitability. This is why he included two hectares of gladioli in his rotation.

ber with a special harvest machine that is also provided by Nova-Flore. After that, the bulbs are sold. "Besides the planting and the harvest the company that is specialised in flowers also fixes the production plan and decides on the varieties", Miguel Burgaud explains. "I did not have to invest in a storage building as after the harvest Nova-Flore stores, washes and destems the bulbs before they are sold."

Diversification as an economic asset

The reimbursement for the gladioli is based on the diameter. The price for 1,000 bulbs ranges from 5 Euro for a diameter of 8/10 cm and 21 Euro for a diameter of 16 cm and more. Nova-Flore fixes the price and as it does not depend on stock-exchange prices it remains stable. In average 1,000 bulbs achieve a price of 13 Euro. You have to deduct the planting and harvest work of Nova-Flore that amount to 1,600 Euro/ha respectively 880 Euro/ha. The remaining costs are agricultural inputs (fertiliser and plant protection agents) as well as transport costs amounting to 1,000 to 1,500 Euro/ha. In comparison, the margins for the traditional crops like wheat amount to 400 to 500 €/ha.

The seed cultures are nothing short of the gladioli with regard to the economic

Miguel Burgaud is a farmer in Maine-et-Loire, a region where a lot of flowers are cultivated.

advantages. "For maize seed and hempseed, too, you can achieve a similar margin as for the gladioli (between 1,000 and 1,500 Euro/ha). The working hours, however, are higher than for a traditional crop." Miguel Burgaud sells the maize seed to a breeder and the hempseed to a co-operative that has specialised in this sector. "Similar to the gladioli, I do not have to handle the sale of the seed myself. It is the task of the breeder and the co-operative", Miguel Burgaud states.

Tillage

On Miguel Burgaud's farm tillage is carried out by a HORSCH Terrano 3.5 FX and a HORSCH Joker 6 CT. The Terrano is equipped with MulchMix points and both tools with a RollFlex packer. He uses both HORSCH machines before sowing, except for maize and hemp. In these two cases, he still uses a plough. "With these tools I try to loosen the soil and mix it with plant residues. And all that at a high speed", he says. "Moreover, the Terrano penetrates the soil perfectly and cuts it open in an optimum way."

After the harvest, he carries out one pass with the disc harrow Joker, in September before sowing another pass with the Terrano.

For sowing, he combines his six-meter Joker with the front hopper Partner HT. The actual sowing is carried out via distributor heads that are located between the packer and the last row of discs. The working depth is six to seven centimetre at a speed of ten to twelve km/h. The distributor heads and the hoses were mounted by MGAV, Burgaud's local HORSCH dealer. "Previously, I prepared my fields with a Joker 5 CT with front weight and then sowed with an Express", he tells us. "By changing over to the Joker 6 CT with front hopper I can cultivate my soils in a more favourable way, avoid compactions and save one pass." The speed of the machine was important criteria for this decision. Thus,

he can finish sowing in three days as soon as a climatically favourable window allows for sowing. With regard to maize for consumption, he also carries out one pass with the Terrano FX, then with the disc harrow.

Rotation is of central significance

With regard to rotation, the cycle for gladioli is about five to six years. Grain maize is often cultivated before and also after it because of the sowing and harvesting time. Every year, Miguel Burgaud sows about two hectare into his sandy soil. The rotation and the sandy soils are two factors that limit the extension of the cultivable land for gladioli. If necessary, he can irrigate the fields with a plant for 50 hectares. "With regard to weeds, the crop is compatible to the hormonal weed control of dicotyledons. This, of course, saves costs", Miguel Burgaud comments

The seed crops, too, play a role in rotation. Maize seed and hempseed are excellent previous crops for wheat. This is why Miguel Burgaud sows wheat as a following crop of the two seed crops two years in a row. "Hemp is not only a good previous crop for wheat, it normally is harvested in the course of September. This is an enormous advantage if you want to keep your fields clean", the farmer explains.

For sowing wheat, the farmer uses a Joker CT in combination with a Partner FT to avoid compactions and to save one pass.

New machinery

The machines on this farm are relatively new and for Miguel Burgaud is goes without saying to keep his machines in best shape. He parks the machines indoors and replaces his machinery regularly. For the tractors, he attaches great importance to the regular maintenance check-ups. "There rarely are repairs to be done as I work with relatively new machines", Miguel Burgaud explains. Since 2012, the farmer has been working with HORSCH machines. He considered his choice carefully. "HORSCH convinced me as the quality of the machines is excellent and they are very solid. Moreover, the resale value is very interesting. This is very important for me as I regularly replace my machinery", he comments. For tractors, too, the farmer from Maine-et-Loire relies on a German brand: Fendt.

Miguel Burgaud uses the machines for maize seed and grain maize as the member of a machine co-operative: a five-meter disc harrow, a sprayer with 24 m and a single grain seed drill. "Due to the machine co-operative I can use machines with a larger working width that otherwise I would not be able to afford for the fields I need them for", he points out.

The Terrano FX is used before sowing. It is equipped with MulchMix points, penetrates the soil excellently, cuts it open and allows for an optimum mixing of soil and straw.

The future of the farm

Miguel Burgaud does not think about retiring for a long time yet. "My son is 13 years old and wants to be a farmer, too. But he simply is too young to know what he wants to do later in his life", the young father explains. "And I still have some other strings to my bow: I could for example start to cultivate miscanthus. Or get into agroforestry. Or build a storage hall with photovoltaics. Or employ an apprentice. I will keep all my options open."

HORSCH honours long-time employees

The HORSCH end-of-year celebration which took place in Hof at the end of December 2017 was attended by employees from all HORSCH sites at home and abroad. A good opportunity to carry out honouring's and retirement celebrations.

The employees who were honoured for their 10th company anniversary together with the management.

Tenth company anniversary:

HORSCH Maschinen GmbH Ronneburg: Thomas Dombrowka, Matthias Fahr, Sergey German, Sven Gleissner, Christian Herbst, Stefan Hynek, Margit Kirmse, Mark Plaul, Mathias Plötner, Steffen Siebert, Ralf Steinbrecher, Thomas Stiegler, Ronny Vollrath

HORSCH Industrietechnik: Holger Arnold, Frank Badura, Silvio Behr, Steffen Hilpmann, David Müller, Steffen Poser, Bernd Reinsch, Arndt Schlegel, Patrick Stiehler, Carsten Wille

HORSCH LEEB: Josef Biermeier, Dennis Brinster, Stefanie Fuchs, Karl Nachtmann, Andreas Schmid, Yüzer Ulas, Florian Zink

HORSCH Maschinen GmbH Schwandorf: Daniel Brandt, Ilona Glück, Josef Göth, Jan Schmid

HORSCH France: Ludovique Leturque

In 2017, too, the HORSCH apprentices excelled in their final exams. Two of them were honoured for the best exam at the Chamber of Industry and Commerce Bavaria: Simon Schöndorfer, production mechanic; Andreas Butz, construction mechanic

Moreover, there were several awards to be celebrated:

HORSCH received the Future Award of the District of Schwandorf in the category Education for the commitment with regard to the integration and training of unaccompanied underage refugees. "Integration can only succeed if it takes place on the training and employment market", ICC vice president Thomas Hanauer pointed out in his laudation. This commitment motivated other companies to join the project.

The AGRI-Router project HORSCH developed together with other leading manufacturers of agricultural engineering was awarded a DLG silver medal at the Agritechnica 2017. AGRI-Router is a universal data exchange platform for farmers and contractors that connects the machines and the agricultural software across all manufacturers to simplify operational processes and to improve efficiency.

The HORSCH SingularSystem, the innovation in crop singulation, received the Goldene DLG Prüfsiegel Getestete Arbeitsqualität (Golden DLG Seal of Approval Tested Working Quality) (Test Report 6795). For Pronto, Express and Focus, the unique HORSCH SingularSystem currently allows for a variation coefficient of up to VC 40% (incl. gaps and double spots).

In Australia, the Sprinter 12 NT was elected Imported Machine of the Year.

In 2017, HORSCH received the Bayerns Best 50 award.

25th company anniversary:
Isidor Dobler (HORSCH Schwandorf, team leader line production 2), Huu Chon Ha (HORSCH Schwandorf, pre-cut department) and Stéphane Proust (HORSCH France, marketing) have been working for the company for 25 years.

Huu Chon Ha (3.from the left) and Isidor Dobler (3.from the right) were honoured for their 25th anniversary within the HORSCH company.

Retirement:
There also was a retirement celebration for four employees:
HORSCH Maschinen GmbH Schwandorf: Jürgen Höhlig (welding department), Sandor Kiss (CIP), Rudolf Pirzer (assembly department), Wilfried Thürigen (sales Saxony)
The management thanked them for their commitment and gave them their best wishes for the retirement.

Wilfried Thürigen (2.from the left) and Sandor Kiss (4.from the left) are retiring (not in the photo: Jürgen Höhlig, Rudolf Pirzer).

HORSCH France SARL:
On the occasion of the HORSCH France SARL end-of-year celebration in France Cornelia Horsch and Robert Dorsemagen honoured Stéphane Proust for his 25th and Ludovic Leturque for his 10th company anniversary.

Left: Stéphane Proust

Right: Cornelia Horsch (ri.) and Robert Dorsemagen (le.) with Ludovic Leturque (middle).

IntegrationSAD

A charity gala that took place in November 2016 and was organised by the Rotary Club, the Round Table and the Lions Club was the starting point of the project IntegrationSAD. The project still is supported by the service clubs Schwandorf and Oberpfälzer Wald. And it is one of the projects that is sponsored by the HORSCH Foundation. In the beginning, the objective of the project was to give young refugees the opportunity to do an apprenticeship or to get a job and thus, to facilitate integration. Today, IntegrationSAD is active in a much wider range.

The HORSCH Foundation has committed itself to support social projects. Especially, if it can help directly on its doorsteps. This is why Cornelia Horsch, as the representative of the HORSCH Foundation was present when the second-hand shop EMMA was opened in Schwandorf in June. EMMA stands for „Einfach Mode Mehrmals Anziehen" (=simply wear clothes several times). Everyone can shop there, people in need will get the goods at half the price upon presentation of a corresponding proof. EMMA sells second-hand clothes and shoes for women, men, children and babies. The range also includes curtains, draperies, towels, bed linen, belts, bags, accessories and small toys for children. The surplus that is gained will in turn be used for the benefit of other regional social projects.

„Everything EMMA has to offer is intended for the whole population and all age levels. It is a meeting point for animated integration", Elke Reinhart, the project manager of Integration SAD, emphasises explicitly.

She also holds the strings for all the other projects. For in addition to EMMA, there are "German for mothers", "Special tuition for children" and "Living in Germany".

Cornelia and Michael Horsch (4. and 3. from the right) together with Elke Reinhart (2. from the right) could see for themselves during a visit in one of the courses: the mothers study hard – together with their children.

Since June 2017, IntegrationSAD has been offering a language course for mothers inlcuding a child care program. Currently, 49 women attend the course. They have a total of 125 children. About one third of them are taken care of during the course. The rest already attends school, kindergarden and so on. The origin of the women does not matter. Refugees can participate, but also EU citizens. "Those who live here have to get the chance to learn our language, otherwise it is almost impossible to participate actively", Elke Reinhart points out.

Two reading tutors in Pfreimd and three respectively in Schwandorf, Oberviechtach and Neunburg vorm Wald attend to children at primary school age – some during class, some for language training and some in the afternoon for homework mentoring. These services are, of course, also provided for German children with issues.

Moreover, there are courses that last several weeks in shared accommodations to make the participants fit for everyday life – fit for "Living in Germany", language lessons included.

And the original project – the promotion of young refugees by doing an apprenticeship or getting a job? Works! And quite successfully so. At HORSCH the apprentices of the second year of apprenticeship have settled and are well integrated. The language barriers have disappeared more and more and they passed their intermediate exams – very successfully. As the apprenticeship program „Metal technology specialist" is scheduled for two years, they are now preparing for their final exams. The new apprentices started in September 2017. To help them to get acquainted the older apprentices act as tutors and are their contact for any problems or questions. And this system proves its worth: Like their predecessors, the new apprentices are highly motivated.

At HORSCH, the project of promoting young refugees by doing an apprenticeship or getting a job is very successful.

Growth market

Romania's membership in the EU has changed the frame conditions not only in the agricultural sector. For HORSCH the country is an absolute growth market. terraHORSCH visited the specialist dealer MEWI.

Source figures: www.agrarheute.com

At the moment, the HORSCH Joker together with the Pronto and the Tiger is one of the most important machines in MEWI's sales strategy.

In 2007, Romania became a member of the European Union. That this fact has done the economy of the country good, becomes obvious right upon arriving in Timișoara: Especially important automotive suppliers with modern factories have settled directly at the airport. In between are huge fallow lands that apparently are owned by real estate investors and are to provide space for further growth.

Large parts of the country, however, are still heavily characterised by agriculture. And here the gap is quite huge. Though the number of small farms with an area of below one hectare is declining significantly, they still are very important. In Romania, a farm is already classified as a large farm with an area as of 50 hectares. As they, however, cultivate about half of the arable land and only make up for a 0.5-per-cent share of all companies it becomes obvious what the structures are like*. Between several hundred, thousand and over 10,000 hectares – Romania has it all. The investors often are from abroad, a lot of them come from Denmark or Germany. Partly they are farmers who seized the change to expand their farm and to transfer it completely respectively partly to Romania, but also mere investors.

Cristian Dănescu is the managing director of the specialist dealer MEWI in Romania.

A start with second-hand machines

MEWI is HORSCH's sales partner in Romania. At the company headquarters in Orțișoara, 25 kilometre north of Timișoara, we are welcomed by managing director Cristian Dănescu. The company was built in 2007 and completely corresponds to western standards. However, it is bursting at the seams – a fact that Dănescu straight out admits to: "During the past years we only focused on growth, we definitely have to catch up with the constructional situation."

But this will change soon. The plans for a new building have already been finished, further building sites will be purchased additionally.

The company MEWI was founded in 1995 by the two German companies Schröder Landmaschinen in Wildes-

The company headquarters of MEWI are located in Orțișoara, 25 km north of Timișoara.

hausen and Saltenbrock in Melle. The name was formed by the initial letters of the two cities. One year later Schröder took over 100 per cent of the company shares. Since that time, Cristian Dănescu has been working in the company. At that time, MEWI only had 10 employees. "Our main line of business was selling second-hand Claas combines, Dominators, Matadors and Senators, from Germany. We sold about one hundred units per year. I was responsible for selling spare parts that were ordered in Germany. Our market was mainly regional. But we also had customers who drove the second-hand combine they had just purchased to their farm that was 800 kilometres away. Every now and then one of the machines broke down and we carried out the repairs on the road..."

New partners

This changed in 2004. Due to the efforts of getting closer to the European Union the first subsidies were provided and the demand for new technology from the West increased. "It was not so easy to find partners," Dănescu remembers. "The then-main suppliers of the Schröder group, Claas and Fendt, already had an importer. So we mainly ordered the new machines via Germany. In 2007, we got the contract with Fendt, in 2011 with Valtra. However, we still did not "officially" have a combine in our range of products so we continued to buy second-hand Claas machines from Schröder. This situation was not always easy. So much the better for us that Fendt included combines in their range. The origin of Laverda was no problem for us as the reputation of this brand with regard to the threshing quality was very good in Romania. The size, too, matched the requirements: Our customers want cutting units with six respectively nine meter and five or six straw walker combines." When questioned about the Ideal, Danescu says: "I see a potential here. However, it has to convince from a technical point of view. Our customers for a combine of this size demand utmost quality!"

The entry into the segment will be prepared with two demonstration machines that are going to work all over Romania in the coming threshing season.

Subsidies

"Investments in the agricultural sector mainly depend on the subsidy policy", Cristian Dănescu admits. "Small farms get up to 90 per cent, large farms about 50 per cent as a grant for their investments. This year, the programs have not yet been published and with regard to sales, we notice this considerably. In general, with our premium range, we rather approach the larger farms with an area of several hundred hectare. They normally invite tenders for large packages consisting of tractors, harvest technology and other machines. The dealer then delivers from his range."

And for the HORSCH products there is one particularity: MEWI often makes this deal even if the customers opted for another tractor brand than Fendt or Valtra.

Stories of earthworms

MEWI and HORSCH have been working together since 2002. At that time, the farms almost exclusively worked with older, mechanical seed drills with a working width of three to four meter. The larger farms already used Airseeders.

"Right from the start HORSCH's sales approach was completely different from other manufacturers", Dănescu remembers. "They did not talk about the technical assets of the machine, but about agronomic systems and earthworms. The customers were thrilled. After all, they are passionate farmers – and that is exactly where HORSCH stepped in. At that time, an important topic was to convince the farmers of the advantages of sowing with tines. HORSCH vehemently argued against the discs. And quite successfully so: To this very day, there are still farmers that are completely convinced by the tine although with the Pronto HORSCH has been offering an adequate alternative for quite some time", the managing director smiles. For meanwhile, the Pronto has become MEWI's top seller – and in turn prepares the path for strip tillage with the Focus. But for all that: With the combination of Tiger and Pronto the farmers actually cannot go wrong.

Dănescu is sure that though at the moment these two machines and the Joker are the most important machines, in the future there will be a lot of potential for especially the Serto and the Cruiser: "They simply are in line with the Romanian market!"

Crop singulation is not necessarily a current topic. "We rather are still working on establishing an understanding among our customers to sow thinner in general", Cristian Dănescu says. "700 grains per square meter for cereals partly are still common practice – we recommend 300 to 400." What limits the practicability additionally are the seed qualities. PPF (Precision Placement of Fertiliser) is experiencing a real boom at the moment. Whereas until recently only a small share of machines were equipped with this system, the number has already risen to more than half of the machines. The

breakthrough happened about two years ago. It is common practice to place fertiliser with the Tiger during tillage.

Plant protection

As an AGCO dealer, they are facing a big challenge, the more so as it is generally known that the American concern is no longer working exclusively in the self-propelled sector. But as a Fendt dealer; MEWI exclusively offers Rogators.

Self-propelled as well as trailed sprayers are provided by HORSCH Leeb. So far, the former have been even more popular than the latter. "In my opinion, the HORSCH Leeb sprayer is the best sprayer on the market at the moment", Dănescu estimates. "However, the price level is rather high for our conditions. I would like to have a 4,000-litre model with a boom width of 36 meter for 60,000 Euro. This would push sales considerably. But I will not moan about the current situation. If the customer is convinced of the quality, the price is of secondary importance. And for the HORSCH Leeb products this definitely is true."

Service counts

Of course, the tractors of Valtra, but especially of Fendt are MEWI's most important products. Recently, the power track tractors come from Fendt and no longer from Challenger. With regard to the attached machines, HORSCH is the most important partner. The remaining range is wide and includes brands like Alpego, Knoche, Krampe, Lemken, Mascar, Merlo and Rauch.

MEWI has seven own sites all over Romania, a B dealer has another four. There soon will be an eighth MEWI site. In total, the company employs 180 people, 70 of them in the service respectively repair shop, 40 in sales, 27 in the parts sector and about 20 in administration. The mobile service is particularly important. MEWI works with a fleet of 80 vehicles in this sector.

The salesmen have fixed sales regions, but they sell the whole range. "The Romanian market is too small to work with specialists", the managing director explains. "But in the future, we will have a certain separation. For example, three young salesmen joined the team that will take care especially of the smaller farms. We have a brand manager for each brand who is in close contact with the supplier. He takes care of the orders and keeps an eye on the stock of new, second-hand and demonstration machines. Moreover, he takes part in the trainings of the manufacturers and passes on the information to his colleagues. In the case of HORSCH, we also can rely on the support of the HORSCH sales and service team in Romania."

Romania surely is not an easy market as it heavily depends on investment allowances. Moreover, investors sometimes order their machines abroad, e.g in Denmark or Hungary. The more important it is for Dănescu to not only rely on sales: "After sales is an important part of our business concept. In fact with increasing importance. In our repair shops, we repair anything. No matter which brand it is and where the machine comes from. We want to convince with our service. And more than once, this has been the essential factor for making the deal for a new machine."

The HORSCH sales and service team in Romania: Ciprian Ion, Adrian Lutas, Constantin Curca and Deian Iorgovan (from left to right)

Present on site

Four HORSCH employees support the importer MEWI in Romania. Constantin Curca is the head of the sales team on site. He studied agriculture and graduated with a master degree in the field of International Agricultural Management at the university of Weihenstephan-Triesdorf (Germany). Curca fluently speaks German, English and Romanian and due to his internship at HORSCH he is well connected within the company. In the sales sector he is supported by Ciprian Ion, an automotive engineer. The team is completed by the service technicians Dejan Iorgovan and Adrian Lutas. Constantin Curca is also responsible for the neighbouring country Moldavia.

The Romanian HORSCH team is young and committed. Not for nothing did sales in 2017 amount to 27 million Euros - compared to 2016 this is an increase by 49.9 %.

The initial use and the support of demonstration machines are the daily business of the technicians. And if there are problems after all, they work on the solutions without involving MEWI too much. This is why Cristian Dănescu emphasises: "HORSCH products are comparatively easy to sell. It is not only the technology that is excellent, but also the support from the manufacturer. Together we have achieved a high degree of brand awareness in Romania. We also had customers whose most important requirement for their new tractor was that it had to be able to pull their Tiger", he states with a smile. And he adds: "Moreover, we can offer HORSCH ideal conditions for testing prototypes: challenging conditions, heavy soils and a lot of hectares..."

Successful closing

The foundation for the later yield is laid while sowing. To optimize yields, HORSCH has been working for quite some time on different press wheels to close the seed furrow. Among others, tests have been made in France. Etienne de Saint Laumer, the product responsible in the HORSCH marketing department in Schwandorf, talks about the experiences.

Maize seed drill HORSCH Maestro, equipped with finger press wheels

If you want to improve yield, you have to know the influencing factors. For maize, there are mainly five – and all of them take effect in the very early development stages:

- **The number of plants per square metre:** it is determined by the seed rate and the germination rate.
- **The number of cobs:** Two or three cobs are normal. However, sometimes only one cob is fertilised.
- **The number of rows and the number of grains per row:** The shaping of the cob, i.e. the number of rows per cob and the length of the cob measured by the number of grains, is determined as of the two- to three-leaf stage until the development of the eighth leaf. Although the size of the cob is defined genetically, any kind of stress the maize is exposed to reduces the size and thus affects the later yields. This might be the case if the concentration of the plant protection agent is slightly too high. The maize is stressed, the growth is slowed down. This is why the maize should feel as much at ease as possible until it has reached the eight-leaf stage.
- **The TSW:** The last yield factor comes in only at the end of the plant growth, after the fertilisation of every single grain by the male pollen via the silks: All grains are filled and reach their maximum thousand seed weight (TSW). To obtain an optimum TSW the plant has

to be supplied with a sufficient quantity of water and nutrients. However, only those grains are filled that have developed before. Grains that were lost because of stress cannot be replaced.

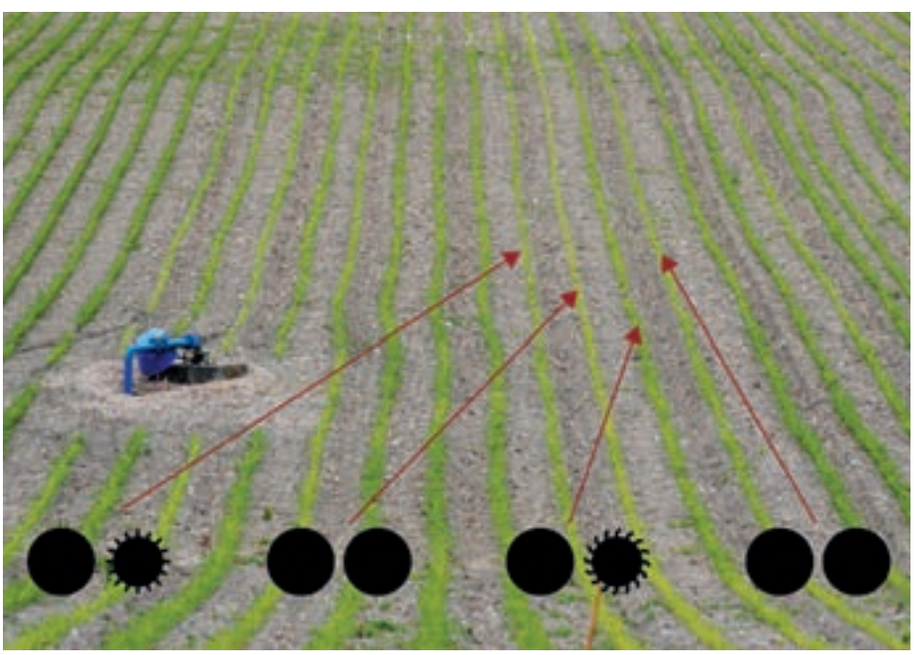
The five factors depend on each other and play a major role for the final yield of the maize cob. Therefore, it is important to influence these parameters in a positive way and, moreover, to reduce any stress that might occur during the development of the plant or of the cob between the two- to three-leaf stage and the development of the eighth leaf.

This was the reason why we started to focus on the placement of the seed, especially on the press wheels that close the seed furrow.

During our tests with regard to the automatic regulation of the sowing pressure we noticed that the seed furrow can open up again if the weather is dry. In other cases, we observed a less intensive development of the germination and the crown roots that hardly got out of the seed furrow. If you examine the grains while adjusting the machine, you notice the following phenomenon: A vertical wall surrounds the grain. This vertical, compacted walls are created by the two seed discs. Thus, the roots are limited to the furrow and cannot expand to absorb the necessary nutrients from the soil. In this case, the seedling soon lacks water and nutrients. This might stress it and reduce the size of the maize cob – and this means a cut-back on rows on the future cobs. These vertical compactions are also reflected optically in terms of an open furrow that remains visible until the harvest.

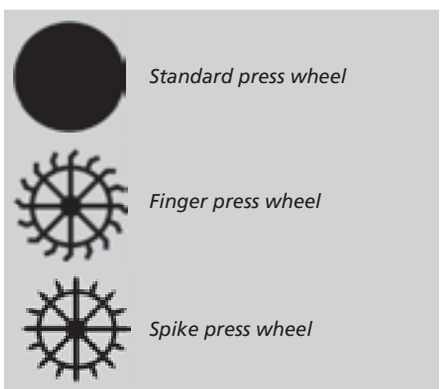
This is why, in the past years, we tested various press wheels for closing the seed furrow for our single grain seed drill HORSCH Maestro. The press wheels were developed and welded by the HORSCH apprentices in the apprenticeship workshop at Sitzenhof near Schwandorf.

We chose various test sites with different soil conditions starting in France via the Danube plain to the Ukraine. In France, in the region around Angoulême, we made the first important observation. After sowing, when the maize has started to emerge, the farmer contacted us with the following question: "Why is there a difference in the colour of the maize rows?" On site, we really found out that the rows showed different hues, from a yellowish green in some spots to a dark green in other spots (see photo below). The reason is quite simple: In the dark green rows the germination roots were better developed and the crown roots were longer than in the yellow rows. The plants of the green rows that were sown with finger or spike press wheels broke through the wall of the furrow. Thus, the root development outside the furrow was facilitated. In the yellow rows where the furrow was closed with standard press wheels vertical compactions had formed that limit the available space for the growth of the roots.

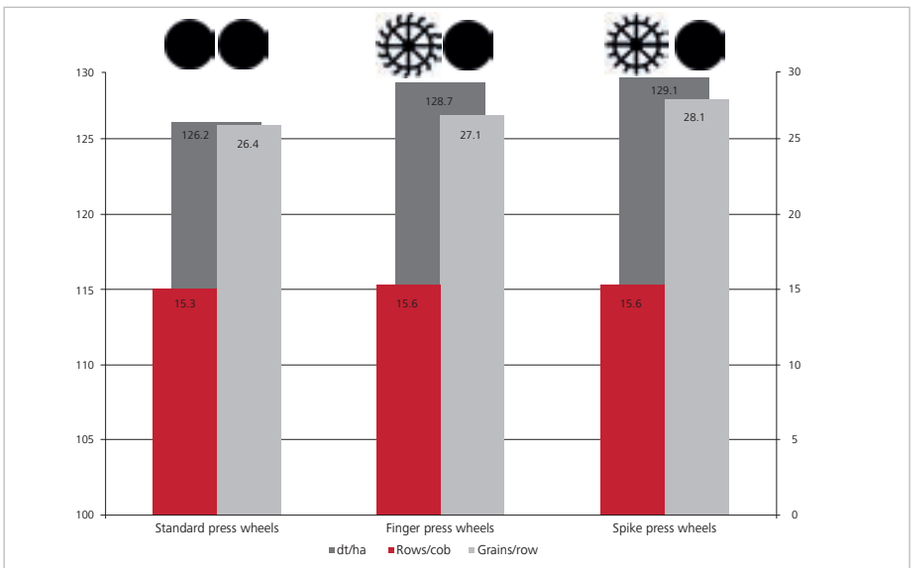


Sidewall compaction of the furrow

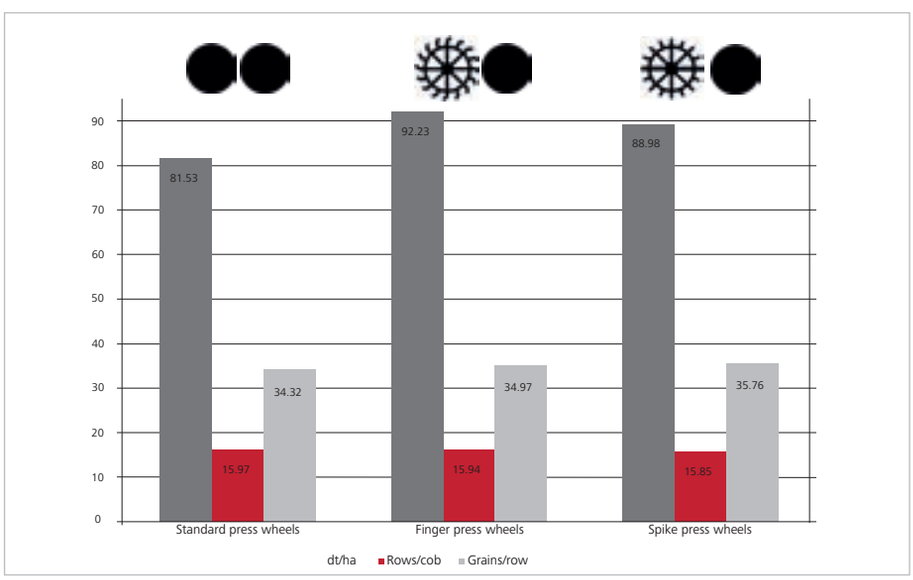
Open furrow at the time of harvest



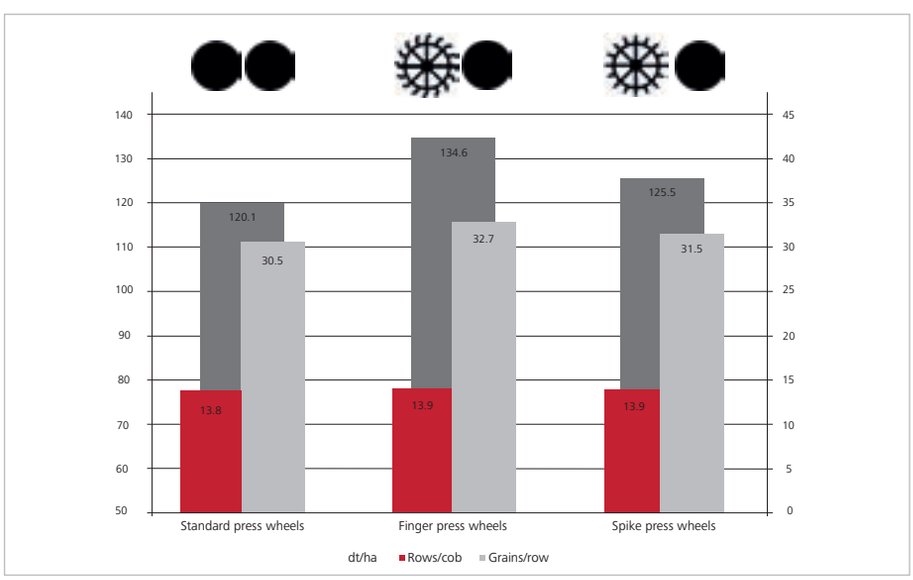
When the yield was calculated, it became obvious that the finger press wheels work better in heavy soils, whereas the spike press wheels are ideal for medium soils. We also found out that it is necessary to always use a standard press wheel in combination with a special press wheel to guarantee an optimum placement of the seed grain at the



Press wheel test 2016 – Dresden area/Germany (silty soil) – yield dt/ha (humidity15 %)



Press wheel test 2016 – Ukraine (black earth soil) – yield dt/ha (humidity15 %)



Press wheel test 2015 – Beauce/France (medium-heavy clayey soil) – yield dt/ha (humidity15 %)

105.000 grains/hectare – sown on 10th of April 2015
The furrow was closed with standard press wheels: The maize roots only develop within the furrow.

bottom of the furrow: The standard press wheel controls the depth and the special press wheel breaks the walls of the furrow. The finger press wheels are more efficient on heavy soils, whereas the spike press wheels are ideal for loamy soils. But attention: These press wheels do not work for seed that is sown shallowly, like for example rape or sugarbeet. Moreover, on sandy soils the compaction effect is only minor (sand is hard to compact) and the press wheels only have little effect. The analysed yield differences partly are quite spectacular, especially on heavy soils with a certain ratio of clay. On the latter, we observed a yield deviation in favour of the finger press wheels – partly more than one ton per hectare compared to the standard press wheels. These yield differences can be mainly explained by the improved root development in the row that were closed with the special press wheels instead of the standard press wheels. The maize feels more at ease and can produce more.

105.000 grains/hectare – sown on 10th of April 2015
The furrow was closed with spike press wheels: The maize roots develop in all directions and can get out of the furrow.

HORSCH Seminars 2018

In 2018, the HORSCH Seminars took place at four locations – Schwandorf, Leipzig, Peine and Linstow. More than 800 farmers attended the events and heard interesting speeches on the topics single grain sowing, maize, fertilisation and plant protection.

More than 800 farmers heard interesting speeches on the topics single grain sowing, maize, fertilisation and plant protection.

The first speaker in Schwandorf as well as in Leipzig was Michael Horsch. He talked about the topic "Plant protection – introduction to a new point of view". He explained the current situation in the agricultural sector that has not changed much during the past years. On the contrary: the corn market is still cautious and the harvest year 2017 in all core markets of the world was worse than 2016. According to Horsch, only the producing regions in Russia performed significantly better than in 2016. It is not acceptable that in the mass balance from 2016 to 2017 more than 30 million tons went into export. He would not be surprised if the trade sector would take advantage of this situation. The price for milk is currently ok, but there might be level decreases in June/July 2018. Michael Horsch described three big challenges in farming: There are still climate changes. In Horsch's opinion, the measure we think we have to take is the reduction of CO2. It is often argued that the temperatures in average are rising, thus affecting the yields and their increase in the fields. According to Michael Horsch, this assumption is not totally true, for in some regions quite the opposite happened. In the northern hemisphere, the warm winters increase. This leads to more vegetation days, more rainfall and finally to a higher harvest. Thus, the harvested quantity rose during the past five years and the worldwide increase on the corn market for the most part is due to the climate change.

Michael Horsch continued that due to their deliberate focus on the topic "organic farming" a co-operation with the

Michael Horsch was the main speaker in Schwandorf and Leipzig.

organisation "Eco-Foundation Switzerland" has been set up. The foundation wants to find out what the best farming method is to establish humus and biological activity in the soil. Funds of the foundation go to farmers that renew and deepen their relation to the soil and that select and carry out appropriate measures to maintain and build up soil fertility at their site. Michael Horsch made the co-operation contingent on one condition: In addition to the organic farms that are already members of the foundation, he wanted one or two conventional farms to be allowed to join the foundation. This requirement was discussed with the members – all of them organic farms. First, Michael Horsch was quite surprised by the result of the discussion, but then he was very pleased: All farmers supported the idea to let the conventional farmers join in the exchange of experience.

In the meantime, the co-operation between HORSCH and the foundation is in full swing.

Another challenge for agriculture still is the topic „Nature wants Variety". Resistances keep on increasing, therefore the rotations have to change. Despite a low turnover, farmers want to achieve higher yields. Horsch predicted that in the years to come plant protection agents will be reduced and quite a lot of active components will be omitted. Fertiliser, too, will have to be used more efficiently.

The last challenge Michael Horsch explained is the topic nutrition. In 2050, more than ten billion people will have to be fed. According to Horsch, we do not have to worry about being able to achieve this with our current way of farming. At the moment, the result of the increase of the average living standard is that the eating habits will change, too, and that the health awareness will increase. Thus, in the future, the meat, milk and sugar consumption will decrease. But this does not necessarily mean that less milk and meat will be produced in Bavaria. For Michael Horsch this is a business opportunity as people want quality instead of consumption, for the consumer wants to know what he is eating. Honestly generated data for the produced food have to be available. In this respect, Horsch talked about his visit to Silicon Valley. The founder of a start-up he met there said in a talk show that he had invented something that replaces the most destructive technology of mankind. So far, man has been killing animals to produce meat. His vision was to analyse the molecular ingredients of meat. According to his theory, he has to find the molecules meat consists of in the fodder of the animals, e.g. maize, soybeans or potatoes. He then tries to use and extract the molecules without the stomach of a cow or a pig and to form meat from them. In the end, you will get a product that looks, smells and tastes like meat, but is absolutely vegetarian.

According to Horsch this movement from the Silicon Valley has to be taken seriously, as over there they dispose of a cash capital of 1,000 billion dollars to support exactly such start-ups. They systematically invest in ideas that appeal to the populace and that may change the world. Thus, we should be careful to dismiss such a movement as ridiculous. For the farmer, however, the changes are only minor as for this method, too, you will still need fields. Getting back to organic farming, society believes that it will only work if there is an absolute cycle via the animals. This kind of thinking, however, is no longer in line with the strategy of lower meat consumption. This is why organic farming, too, has to orient towards arable farming.

Michael Horsch showed four photos that the media connected with glyphosate. He asked what these illustrations had to do with glyphosate. The answer is: nothing at all. According to Michael Horsch, the media often use photos that have absolutely nothing to do with the topic: "We are not only annoyed by the fact that the journalists apparently have not done their work thoroughly enough, but that the biogenetics discussion has been reduced to glyphosate. The agrochemical sector keeps a low profile – and it probably is better this way. But what the NGOs are up to does not seem to be very funny. From an objective point of view, we all know that the application of glyphosate in genetically modified crops and for desiccation has to be considered as precarious. However, we also know that glyphosate as an addition to tillage to preserve the soil and to reduce the use of herbicides after sowing probably is the most environmentally friendly kind of conventional farming. Moreover, glyphosate – when used this way – is perhaps the most harmless of all the plant protection agents we use! And the NGOs know this, too! If so, what are they up to? Or has genetically modified soya even become respectable again!?"

With regard to glyphosate in general Michael Horsch points out: „During the

past 25 years, no arable farming region in this world has built up more humus than the newly-cleared areas in the so-called rain forest regions. To better understand this fact, you have to know two important points: These so-called rain forest regions are sparsely vegetated shrub lands that have been cleared. In these farming regions, humus can only be produced with an all-year vegetal cover and consistent no-till farming. This kind of sustainable subsistence strategy with regard to the production of humus also required glyphosate."

The main speaker in Peine was Philipp Horsch.

Golden times for agriculture

The main speaker in Peine was Philipp Horsch. The media always tell us that in the year 2050 ten billion people have to be fed and that the golden time for agriculture is yet to come. But Philipp Horsch does no longer believe in these statements. He backs up his opinion with some figures: From 2000 to 2017 the wheat and maize consumption has risen by 50 per cent – from 1,200,000,000 to 1,800,000,000 tons. This is an increase of 35 million tons per year – and mainly due to the worldwide increase of the harvest quantity of maize. At the same time, the world population has grown by 23 per cent – from 6.1 to 7.5 billion people. "Production and consumption develop almost congruently", Philipp Horsch stated. "And this will not change – despite a continuously growing world population."

If you look at the worldwide maize production from 2000 until 2017, it has increased from 600 to 1,000 million tons. An important reason is the breeders' progress in the maize sector. "Maize offers more potential in breeding", Philipp Horsch emphasised. "This is why the cultivated area and even more considerably the yields increase."

In Philipp Horsch's opinion, there are various factors that are responsible for the continuously increasing crop production. Russia is not the only reason. In 2017, the Russian wheat production amounted to 73 million tons. This is only ten per cent of the global production and nothing to be afraid of. "The production know-how worldwide has improved ", Philipp Horsch stated. "This is the reason why the produced quantity will continue to increase. The innovations in genetics, in plant nutrition, in plant protection and in cultivation technology contributes to this fact. Additionally, the cultivated area increases, too. In Brazil alone, about 80 million hectares could still be cleared. And in Africa, too, there are gigantic possibilities. "

Another factor is the climate change. It apparently positively affects farming, especially on the large landmasses of the northern hemisphere. Philipp Horsch took Canada as an example: So far, rape has been the „cash crop" over there. In the north of Canada, the number of vegetation days now is increasing from 90 to 110. Thus, the Canadian farmers cultivate peas, beans, soybeans and maize to an increasing degree.

"The population growth definitely does not save us! We will easily produce the additional demand of crops", was Philipp Horsch's final comment on the world nutrition situation.

Take an active part in the turning of times

„We are at a turning point in agriculture", Philipp Horsch continued his observations. "We increasingly have to deal with unfamiliar conditions."

Among them are:

- Drastic constraints in plant protection. The possible ban on glyphosate is only the beginning.
- Even more stringent fertiliser provisions
- Stricter regulations for rotations.
- Further intensification of the Cross-Compliance regulations.
- The consumers increasingly interfere with agricultural production.

„All this spoils the fun of agriculture", Philipp Horsch challenged the audience. "But it is up to us to build our future in a positive way. More than ever before we have to deal with the challenges."

Among the challenges in farming figure the questions: how can we keep up the yields, how can we lower the costs, how can we shape arable farming in a positive way?

"The presentation of the population at the end of the vegetation is mainly determined at the time of sowing", the speaker emphasised. Harvest residues have to be incorporated into the soil in a shallow way, the mixing of straw is a central topic in tillage. With the new FlexGrip tine, a pre-tensioned spring tine, HORSCH is offering a new tool. The Cruiser XL equipped with the FlexGrip tine can be used with various, site-specific rollers. In addition, HORSCH is working on a seed unit for the tine coulters.

An exacter distribution in the row is very important when sowing. This is why research goes towards single grain sowing – also for crops and rape. At HORSCH, the development in this sector has taken 15 years. Beside the cross distribution of

In Linstow, Theo Leeb talked about the topic plant protection.

the seed, it is also the longitudinal distribution that is important. In the field a variation coefficient of 40 to 50 per cent is realistic, e.g. for rape, wheat or peas. In good conditions, it may even be 30 per cent for longitudinal distribution. The DLG tests for cross distribution require a variation coefficient of less than five per cent. "However, this only works in a test and not in practice", Philipp Horsch pointed out. "In the latter case, the values are higher."

Another point is SectionControl while sowing. "The pressure to develop this technology comes from Canada and the North of the US. Because of the large working widths and the partly very badly shaped fields respectively the high ratio of wet spots that have to be bypassed, there are overlaps of up to 25 per cent", Philipp Horsch said. "In Europe, the overlaps amount to about ten per cent without SectionControl." With the new HORSCH RowControl system there will be a solution for SectionControl for seed drills in the future. In combination with adapted metering inserts, the control of even an individual row is conceivable, comparable to single grain sowing for maize.

Philipp Horsch demanded that with regard to nutrient application, precision has to be improved. According to him, to apply fertiliser with a plane is the worst alternative. What about precision in case of a two-disc spreader, especially in windy conditions and/or uneven fertiliser quality? This is the reason why HORSCH equips all seed drills and tillage tools with an option to apply fertiliser. Even the single grain coulters of the HORSCH SingularSystem now allow for applying fertiliser into the seed coulter. Thus, already extremely low quantities of fertiliser can take effect in a highly efficient way.

To increase precision in plant protection even further, HORSCH will bring the BoomControl system to perfection by combining it with BoomSight. The radar sensor of the BoomSight system looks ahead and scans the population to detect gaps or holes and thus helps to control the boom even more precisely.

The nozzles with pulse system are another innovation. The drop sizes can be adjusted exactly for the most different application rates.

Another important feature is a consistent resistance management. "All over the world, resistances become stronger and stronger", Philipp Horsch stated. "They develop at a tearing pace. Without resistance management we will paralyse ourselves."

According to the speaker, a transparent residue management is essential, too. He showed a list of plant protection agent residues in a muesli. "So far, all values have been below the statutory damage thresholds. However, we should set up a monitoring and actively deal with this problem."

Philipp Horsch is sure that electronics and digitisation will help to stabilise the yields. "We will launch the HORSCH Smart-Can, the ISOBUS connected with the internet", the speaker explained. „In the future, the job computer will be connected with the cloud. In addition, there will be telemetry and data documentation. Smart-Can will be a standard on all machines, but the farmer decides if he will use it or not."

„It is a turning of times with huge challenges for agriculture. We have to take an active part", Philipp Horsch concluded.

Adjust coulter pressure

The introductory speeches were followed by workshops. Etienne de Saint Laumer is the HORSCH responsible for tests in the single grain sector. He talked about "Maize – Perfect start right from the seed". He first showed the components of a maize plant in per cent and the yield set up of maize. It consists of plant per square meter, cob per plant, rows per cob, grains per row and the TSW. The interaction of these factors first of all defines the maximum yield of the population, the decisive factor is the development of the plant before the eighth stage. I.e. the youth development and especially sowing is particularly important. To master the decisive factor for the optimisation of yields when sowing maize, the adapted coulter pressure when sowing, HORSCH developed the automatic coulter pressure control AutoForce.

Farmers state that they adjust the coulters two or three times a week to achieve an optimum result. Etienne de Saint Laumer explained that tests were carried out on a field with four types of soil. The pressure on the seed elements has an influence on three factors: the regularity of the placement depth, the compaction of the soil and the quality when closing the seed furrow. „On stony soils, with a maximum pressure of 300 kg on the seed element, we were able to see a very regular placement depth and the loss during emergence was lower compared to the version with a pressure of 150 kg. On loamy soils, however, the

coulter pressure of 300 kg rather increased the compaction of the soil and emergence was less regular." These results confirm how important it is to adjust the pressure correctly to adapt the seed drill to the different soils and thus, to achieve higher yields. HORSCH is the only manufacturer of single grain seed drills in Europe who equipped the whole product line with this option. Due to the automatic coulter pressure adjustment AutoForce, the coulter pressure is adjusted constantly as this system permanently measures the weight on the support wheels and adjusts it in an optimum way. According to Etienne de Saint Laumer, it was possible to achieve a yield increase of 0.6 t/ha in the past four years. Parallel to the soil pressure tests, test were carried out with regard to the influence of the closing wheels on the vegetal development of the plant. When sowing maize this device to close the furrow considerably influences the surroundings where the grains germinate and then sprout. It turned out that, depending on the prevailing type of soil, different shapes of closing wheels achieve the best results. Today, HORSCH offers four different versions: two different widths of rubber press wheels, finger press wheels and spike press wheels. These versions meet the requirements of all sites.

Efficient fertilising

Michael Braun, HORSCH Maschinen GmbH, was another speaker in the workshops. His topic was "Fertilisation – The handling of underground, depth and contact fertilisation". He showed the possibilities of targeted fertilisation. Two things are particularly important: on the one hand water and on the other hand soil supply. The topic "targeted fertilisation" has become important again which is mainly due to the fact that the farmers want to farm even more efficiently with even smaller quantities. So what does targeted fertilisation mean? Contrary to the widespread application, targeted fertilisation is a targeted application in direct proximity to the plant. Underground, depth and contact fertilisation are examples for targeted fertilising methods.

The crucial point for HORSCH is to provide the plant with nutrients. A test that was carried out in Thuringia showed winter barley and the different efforts to increase the yield. The two versions "widespread fertilisation" and "targeted fertilisation" were compared. The latter did very well already with small quantities of fertiliser.

So what do you have to do that nutrients can be absorbed? Nutrient uptake always has to be considered as a function of the distance to the root and takes place in main categories: mass flow (water flow to the root, driven by transpiration, e.g. nitrate-N), diffusion (concentration compensation for phosphor and potassium) and root growth (ammonium, phosphate). This encourages the side roots to expand towards the higher nutrient concentration. To absorb nutrients, the factors of the chemical availability (soil reaction, liming, P-supply in the soil, organic fertilisation) and the local availability (soil structure, soil density) have to be suitable. For a good soil structure allows for an optimum root penetration and thus for an optimum utilisation of the nutrients.

The result of the P-underground fertilisation is a high nutrient offer in direct proximity to the roots. Crops that are suitable for strip loosening resp. depth fertilisation are for example wheat, rape, sugar beet or maize.

Especially when placing phosphor you can witness very good effects in the field. To expand and to confirm these observations scientifically, HORSCH started a joint field test project. The partners of this joint project are the DLG e.V. (German Agricultural Society) at the international crop production centre in Bernburg (this is the site where the tests were carried out) and the BLE (Federal Agency for Agriculture and Food). The project already started in August 2016 and will last for three years. At the end of the project, secured results will contribute to optimise phosphor fertilisa-

In all four seminars, the introductory speeches were followed by workshops.

Etienne de Saint Laumer spoke about the topic „Maize – Perfect start right from the seed".

„Single grain seed for crops and rape" was the topic of Josef Stangl's workshop.

Josef Stangl presented the sector plant protection „The right concept for the individual site".

Michael Braun's topic was „Fertilisation – The handling of underground, depth and contact fertilisation".

tion with the appropriate technology for the placement.

Nutrients that are suitable for the placement are ammonium, phosphate, potassium or gypsum.

Nutrients that do not stay in a band are nitrate, sulphate, calcium.

Stable yields with single grain sowing

Josef Stangl from the HORSCH marketing department explained what single grain sowing is like for crops and rape, which requirements have to be met and what the agricultural potential is. There is a formula to describe the quality of singulation: the so-called variation coefficient (VC). It describes the quality within the rows. Tests with sugarbeet showed a VC between 15 and 20 per cent, maize is about 30 per cent and with the current seed drills – no matter from which manufacturer – the VC ranges between 90 and 110 per cent. „The high value results from the fact that, with their inherent metering and distribution technology, the seed drills cannot achieve an exact spacing of the grains in a row", Stangl informed. "With the HORSCH SingularSystem (grain singulation for crops or rape) we managed to achieve a VC of 40 to 60 per cent – this means that almost every plant gets an individual standing area." This statement raised the question how many space a plant really needs. For wheat for example a spacing between two to six centimetres are optimum. A spacing between the plants of less than two centimetres results in a high competition between them. If the spacing is larger than six centimetres, there will a yield loss. So why singulation? According to Stangl, one does not necessarily want the same spacings in the row and not every grain has to be exactly 3.4 centimetre away from each other. It is more about avoiding double spots or spots with multiple grains. The roots develop much easier if the plants do not compete during the growth. The nutrient uptake is better while at the same time the population is more homogenous. Last but not least a slight population management results in a homogenous ripening, a lower weed pressure and a faster covering of the soil. The advantages, thus, are obvious: more vital plants and lower susceptibility to illness. Moreover, singulation leads to only minor yield differences between main and side shoot and thus to an increased yield of the individual plant.

But what are the requirements?

„Of course, the sowing date has to be considered", Stangl said. To get the largest possible standing area, early to medium-late sowing dates for crops are optimum. However, sowing too early might be dangerous. Plant illnesses might occur or black grass might increase. This is why a balance between an early sowing date and a nevertheless sufficient health status and competitive power against weeds is very important.

The SingularSystem requires an excellent seed quality. Seed that is calibrated according to the grain size is used to achieve a very good singulation result. It is not only the absolute yield advantage that has to be considered, but also the increased yield safety as well as the opportunity to achieve optimisations in the fertilisation sector. "In total, single grain sowing still achieves the most stable yields", Stangl stated.

Plant protection of the future

Theodor Leeb and Josef Stangl talked about the latest developments and trends in plant protection. "The current public discussion about plant protection, especially about glyphosate, is extremely pushed by lobby groups and not based on the real facts", Theodor Leeb criticised. "Because of the partly very emotional and even incorrect coverage in the media the public gets a wrong image with regard to the handling of plant protection agents. This is a topic where the farmers are the experts, we can assess the situation. For other political topics, however, we have to be able to rely on the fact that decisions are taken on the right basis. I really hope that here the discussions and the coverage will be handled in a more factual way."

Josef Stangl concentrated on the topic „Handling of „adapted" plant protection". "Adapted" does not only mean to adapt agents and the quantity of the agents, it goes even further. Thus, the water application rate can be changed for example from 100 l/ha, 200 l/ha or 300 l/ha as a function of the agent, the crop and the area that has to be moistened. The operational speed, too, is not a constant and can be adapted to the outside conditions. An adaption of the speed to the weather conditions, to the agent, but also to the nozzles has to be considered. Sometimes, however, so-called simple strategies with a constant water application rate, nozzle, pressure and speed are more in line with the farm processes and allow for the plant protection measures to proceed in a cost- and risk-minimised way.

With regard to the weather, in addition to the wind speed that has to be below 5 m/s to reduce drift the temperature and the air humidity are crucial. The latter has a significant influence on the application success. In our region, temperatures between 10° C and 25° C and an air humidity that is considerably above 40 % can be used as an orientation guide. Moreover, the thermal, but also the leaf moisture in the population should be taken into consideration, too.

The selection of the nozzle depends on the drop size and the water application rate that is necessary for the application. The pressure is regulated via the operational speed, but should not exceed the optimum pressure range of a nozzle. An automatic nozzle change is advantageous in this case. At the moment, spraying systems with a pulse-width modulated nozzle control are tested in practice. The adaption of the opening and closing times (Duty Cycle) allows for a flow regulation of the nozzle output of more than 60 %. When turning, these systems allow for improving the cross distribution even further.

At present, only nozzles without injector principle are used for pulsing. The nozzle manufacturers work on new nozzles that will achieve the 90-% classification even for drift reduction.

Theodor Leeb ventured a forecast: Drones with three meter working width and a 25-liter tank are already used today. And the development might even go further. Theodor Leeb does not think much of Field Robotic. In his options, large machines are possible for which the respective tracks have to be planned with Controlled Traffic Farming (CTF).

Maestro SW FAST – PRECISE – VERSATILE

— The pro for large working widths: available as a standard: 12-, 16-, 18-, 24- or 36-row version

— Exact monitoring of the placement quality

— Universally suitable for maize, soya, sunflowers and sugarbeet

HORSCH

horsch.com

Serto SC A NEW SEED DRILL FOR LARGE FARMS

— Compact seed drill with 10 and 12 metres working width for large farms

— The new HORSCH PowerDisc point is ideal for difficult conditions

— The hopper capacity of the Serto amounts to a total of 6,000 litres partitioned in a ratio of 60:40.

— Undulated discs or loosening tines have been mounted in the range of the tractor tracks to efficiently loosen the tracks.

Cruiser XL WITH THE HORSCH SPRING TINE

— Intensive mixing of harvest residues by 6-bar frame design

— With a release force of 150 kg the HORSCH spring tine constantly maintains the working depth even under difficult soil conditions.

— All-over cutting in stubble cultivation

— Excellent levelling of the fields

— Fine earth production in the seedbed

HORSCH

horsch.com