Karlheinz Köller, Hohenheim

Trends in seeding and mineral fertilizing

Below, important trends in seeding and fertilizing are presented, which will be reflected by the machine and implement programme shown at the Agritechnica 2007. This preview cannot replace a trade fair visit. It only provides pre-information and does not claim to be complete.

Every year, leading manufacturers of seeding machines and mineral fertilizer distributors present surprising technical innovations which are convincing in practice due to an increase in work productivity, work quality, or operating comfort. The trend towards the automation of work processes, an additional increase in area capacity, and even better operating comfort is going to continue and raises hopes for spectacular new developments.

Development trends in seeding technology

The trend towards larger working widths of drawn or PTO-driven drill combinations or solo drills is continuing. The current trend also continues to favour so-called universal drills, which are suitable for mulch drilling and in some cases also for direct drilling.

Fig.1: At the Agritechnica, Kongskilde presents a new series of drawn universal drills named "FlexiDrill".

Meanwhile, almost all manufacturers offer so-called universal drills. Even though restrictions apply in some cases, these drills are suitable for conventional drilling after ploughing and mulch drilling, which is the main area of application of these drills. Generally, these machines are equipped with tools which loosen and level the seedbed in front of the seed coulter. For this purpose, mainly inclined hollow discs like in a disc harrow are used. In some cases, the disc elements can be adjusted in order to reach the desired work intensity. The disc elements are followed by roller systems which take over several functions, namely the levelling of the seedbed and its reconsolidation. In most cases, they consist of large-volume tyre rollers or tapered ring rollers. During the drilling process, the entire weight rests on the rollers. This provides even weight distribution and constant reconsolidation. Pneumatic seed metering and seed hoppers with a volume of approximately 3 000 l are generally part of series equipment.

For the increasing electronic control and automation of processes, several systems for seed rate measurement during drilling are available. They allow a calibration test to be dispensed with and enable the seed rate to be varied in different areas of the field. For the variation of the seed rate during the ride, stepless seed metering drives with electric or hydraulic motors are increasingly establishing themselves. In combination with electronic GPS-based control, the conditions for site-specific drilling are fulfilled.

Single grain drilling

Seeding technology for single grain drilling is focusing on solutions suitable for mulch drilling. These drills are primarily equipped with double disc coulters. In order to guarantee optimal adaptation to different drilling conditions during mulch drilling, coulter pressure can be adjusted hydraulically or through spring tension. This provides even working depth under all conditions. Due to the reform of the sugar market regime and the insecure market development in the future, no single grain drills for sugar beet have been newly developed.

The manufacturers concentrate more on flexible systems which can be used for maize, sunflowers, beans, and sugar beet. By changing the perforated plates and the coulters, the drills, which generally work pneumatically, can be adapted to the individual seeds. For 6-row single grain drills, hydraulic row width adjustment from the tractor cab in a range between 45 cm and 80 cm is offered. For this purpose, the seed units, which

Prof. Dr. Karlheinz Köller is director of the Department of Process Technology in Plant Production of the Institute of Agricultural Engineering of Hohenheim University and compiled the present overview on behalf of the DLG.

Keywords

Trends of development, seeding technology, mineral fertilizer application

Fig. 2: In its space drill EDX 9000-T, Amazone separates seed singling and the placement system and thus realizes working speeds of up to 15 km/h.

are firmly mounted to the frame, are shifted by two telescopic arms. Like in conventional drilling, stepless seed metering drives are increasingly gaining in importance in single grain drilling for precision farming applications.

In single grain drilling, no groundbreaking innovations have been realized in the past years even though in particular contractors and large farms are waiting for solutions which allow precise single grain drilling to be carried out at working speeds of more than 8 km/h. At the Agritechnica 2007, a machine will be exhibited for the first time which meets this demand for doubled working speed while providing the same work quality. This machine certainly belongs to the attractions in the field of seeding equipment.

Mulch and direct drilling

The areas cultivated using the mulch and direct drilling technique is growing every year. This applies to both drilling and single-grain drilling. According to the latest surveys, more than 50% of the winter wheat area in Germany is meanwhile cultivated without ploughing. The growing importance of these drilling techniques is reflected by the adaptation and optimization of the seed units. Straw or residues of intermediate crops in the drill reduce field emergence and lead to yield and quality losses. Suitable treatment of the mulch layer for better seed insertion is the goal of numerous new developments. “Strip drill”, a new cultivation concept for row cultures, which has already been practiced for quite some time in the USA, is also establishing itself in Europe. When this system is applied, the soil is loosened only strip-wise in the area of the later seed rows. Appropriate technical solutions which make strip-wise loosening possible require the use of a GPS-controlled tractor with an automatic steering system in order to be able to place the seeds precisely in the loosened strips.

Development trends in mineral fertilizing

Especially two-disc mowers, which are the most widely used kind of implement, have reached a very high technical level. Machines from the leading manufacturers distribute virtually all mineral fertilizers used in a highly precise manner over working widths of up to 24 m. Fertilizer varieties with very good spreading characteristics can even be distributed over a width of 36 m. From a technical viewpoint, the claim for high distribution accuracy is fulfilled today.

Computer systems equipped with GPS allow for switching at precisely determined positions on the headland and at field boundaries (turning on and off of the metering system, switching of spreading sections) so that over-fertilizing in the headland area and at the field boundaries is avoided.

In addition, modern on-board computers have automatic documentation systems for the registration of different measures on the field and their connection with the farm management software. With the establishment of the above-mentioned systems in practice, the manufacturers of mineral fertilizer distributors proved their over-average innovation potential.

In this area, spectacular developments can be expected at the Agritechnica 2007 which mean a step towards the full automation of fertilizer distribution with regard to drive technology and the control of the spread pattern.

Conclusion

The above-described trends show that the leading manufacturers of seeding machines and mineral fertilizer distributors are going to display a host of innovative ideas at the Agritechnica 2007.

Fig. 4: Rauch drives its two-disc fertilizer spreader electrically, which provides precise fertilizer distribution, low energy input, and high operating comfort.

Fig. 3: The camera system Argus from Amazone allows for contactless scanning of the spread fan in order to determine the set values of lateral distribution (company photos)