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Trends in sugar beet harvesting

Below, important trends in sugar beet harvesting are presented, which are reflected by the machinery- and implement programme shown at the Agritechnica 2005. This preview only provides pre-information and cannot replace a trade fair visit. Completeness is not aimed for.

Fig. 1: More than 70% of the German sugar beet cultivation area is harvested by 6-row tankers today (company photo Ropa)

In Germany, self-propelled sugar harvesters are dominating the market. Efficient 6-row tankers harvest approximately 74% of the cultivation area in Germany. The share of one-row harvesters has dropped to less than 4% of the areas, and two-row harvesters only harvest about 9% of the sugar beet. Mainly, harvesters owned by harvesting cooperatives or contractors are used. Due to their good annual capacity exploitation, the harvesting costs are considerably lower than those of machines owned by individual farms.

In sugar beet processing, concentration is progressing. In all of Germany, only 28 sugar factories were still in operation in 2004. While the cultivation area remains the same, the catchment areas of the factories are growing, which results in even greater demands on the organization of harvest, haulage, and delivery. Therefore, transport management systems which use the data of sugar beet harvest and logistics and integrate the data flow of all those involved from the sugar beet farmer, the haulage cooperative, the loading mouse, and the sugar beet harvesters to service providers for clamp maintenance are used for the organization of beet harvesters as well as loading- and transport vehicles. These systems work with positioning- and navigation systems, which allow the loss times of the machines to be minimized.

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Keywords

Trends of development, sugar beet harvesting, topping and lifting, cleaning, loading

Reform of the sugar market regime: additional rationalization steps necessary?

As a result of the planned reform of the sugar market regime, additional rationalization steps in sugar beet cultivation will become necessary if this reform is implemented according to the plans which have become known so far. Due to the planned price reductions, experts anticipate that sugar beet cultivation will be restricted in the future particularly in dry and hot regions of southern Europe and in the cold regions of northern Europe. In the core regions of sugar beet cultivation, such as Germany, France, Benelux, Poland, and the UK, however, rather small cuts are expected. Thus, the total volume of the beet quantity to be harvested is most likely not going to change significantly. With regard to technology, this means that the use of efficient, highly modern machinery is going to continue in the future. If the reform is implemented, the domestic sugar industry is also going to face comprehensive structural change. According to estimates, only factories which process a minimum of 12,500 t per day during a campaign lasting more than 100 days will be able to survive providing that the costs of beet haulage can be reduced. The percentage of the haulage expenses in the total production costs grows with increasing factory size. In the future, the highest possible beet production density in the catchment area of a factory is likely to become even more important.

Trends in beet harvesters

The functional reliability of 6-row tankers, which are the most widely used kind of harvester, is very good. Studies of renowned institutes show that this harvesting technology allowed both beet rupture losses in the soil and root rupture losses to be halved within the past 25 years. An optimally set harvesting machine reduces unavoidable total technical beet mass losses to 5%. In the segment of self-propelled tankers, the trend is favouring 9- and 12-row harvesting units. For road transport, the harvesting units can be folded in or taken off and transported separately. Self-propelled 9- and 12-row tankers, however, are rather built for locations where fields are long and yields are low. Since the harvesting speed is currently limited to 6 to 7 km/h, larger working width provides greater efficiency.

Among defoliating tools, flail choppers are still predominant. For bed harvesting, the manufacturers offer leaf throwers with double-sided leaf discharge. However, integral choppers are also gaining in acceptance. Integral choppers comminute the leaves more intensively and deposit them between the rows. They are offered as an option by many manufacturers.

Fig. 2: For its Maxtron 620, Grimme offers fully hydraulic row width shifting from 45 to 50 cm at the touch of a button (company photo Grimme).

Most beet harvesters are equipped with polder shares. Often, an additional vibrating share is available for use under extreme soil conditions or in case of heavy weed infestation. Hydraulically driven wheel lifting shares are used as well. The latter can be shifted laterally, and their rotational speed can be varied. On cohesive soils and under moister harvesting conditions, wheel lifting shares pick up more dirt attached to the beet, which then puts a heavier burden on the following cleaning rollers. Generally, however, this is no problem for after-cleaning. The cleaning systems of many self-propelled machines are set at the terminal. Often, different cleaning programmes for various locational conditions are pre-programmed there. If a larger beet flow or more attached dirt reach the cleaning units, cleaning performance can be increased by means of fully automatic rotational speed adjustment if the machine is coupled with an automatic monitoring system. This provides optimal work quality of the harvester under changing harvesting conditions. More and more modern machines are equipped with self-controlled power split. If the beet harvester needs more power for propulsion under adverse soil conditions and if oil pressure is then insufficient to drive the turbines, this system automatically reduces the driving speed so that reliable beet lifting and -cleaning are still guaranteed. The manufacturers of self-propelled machines generally use engines which are electronically controlled with the aid of a CAN-BUS system. The monitoring of all engine functions enables all performance data to be controlled on the on-board monitor. Modern engine management allows full engine power to be exploited even at low engine speeds and thus saves fuel.

Chassis concepts

During the sugar beet harvest, one tries to work in a soil-protecting manner. Thus, the complete working width is intended to be rolled over only once. This objective is reached by means of wide tyres or special chassis. 2- or 3-axle chassis with articulated steering and double-pivot steering on the front- and rear axles are known. For their larger working widths, 9- and 12-row machines sometimes also feature telescoping axles. Some harvesters have rubber tracks. All these concepts enable the harvested surface to be rolled over only once. The improvement of chassis and tyres keeps its growing importance for the sugar beet harvest because the heavy sugar beet harvesters are considered harmful for the soil in particular under wet soil conditions.

Trends in loading

With the aid of their pick-up system, cleaner-loaders pick up beet from clamps over a width of up to 8.70 m and clean it using spiral rollers both in the pick-up area and on the following sifting belts. The installation of clamp dividers allows the working width of self-loading cleaner-loaders to be increased to 15 m.

Trends in electronic data systems

For the optimization of the harvest, the storage, and the processing of sugar beet, electronic data systems are used which enable the data of all those involve in sugar beet haulage and -harvest to be networked. Thus, it becomes possible to optimize beet haulage planning with the aid of field data and the visualization of the clamp position. This allows the yields of the individual fields to be evaluated for better beet quantification and the control of beet flows to the factory. In addition, the quality of the individual beet deliveries and the field can be assessed. Such systems enable the campaigns of delivery cooperatives to be planned precisely. On a digital map, the expeditor can follow the status of his plans and the completion of the individual beet transports. Even after a very short campaign time, reliable information about the actual yield of the fields can be obtained, which fulfils an important condition for campaign planning and its control. Shortly after the sugar factory has received the beet delivery, the delivery cooperative and the beet farmer have the opportunity to inform themselves about all values of the individual beet deliveries.

Conclusion

The development is characterized by the comprehensive use of electronics for control functions with the goal of reducing the driver's workload and improving work quality. In neighbouring European countries, more and more 9- and 12-row harvesters are offered in order to increase the efficiency of the harvest. Structural change in the sugar industry has a significant effect on the organization of the beet harvest and the logistics of beet haulage. Therefore, modern electronics and information technologies are gaining more and more in importance.

Fig. 3: The RL 200 SF „mouse" from Kleine loads 250 t/h at a maximum loading reach of 11.20 m (company photo Kleine)