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Technology trends in sugar beet harvesting

Presented here are important technical trends in sugar beet harvesting as reflected in the machinery and equipment program at Agritechnica 2001. The preview cannot take the place of a visit to the event and instead only offers preliminary information and does not claim to be comprehensive.

Established in the German market nowadays are self-propelled sugar beet harvesters with sales of pulled harvesters being of little importance. In 2001 less than 25 two and three row harvesters were sold. Beet harvester owner-users represent only about 20% of all users currently, the majority of harvesters being used by farmer groups or contractors. The high performance self-propelled harvesters are used because they allow lifting costs to be definitely lowered through higher annual exploitation. The delivery dates are determined more precisely by the sugar processors and thus demands on the entire beet harvest process and transport are increased. For organising harvesters as well as loaders and transport vehicles, management systems with identification of beet pile locations and satellite navigation of vehicles are increasingly necessary for minimising vehicle downtime.

Foliage collection hardly occurs mow and plays a minor role in new machine investment. „Gehalt" beet is mainly grown for feed and energy cropping. Sugar beet harvesting machinery is used although the tradition is that the speed is often greatly reduced.

Gentle lifting machinery

The sugar beet grower aims to substantially reduce losses through root breakage or roots left in the ground during harvest and the processors want less tare. This requires gentler handling of roots even at the lifting stage because they should be removed from the soil without smearing onto the roots. For this, shaker-shares – developed as polder shares – have become established with modern lifters designed so that the share movement can be controlled from the driver seat. The newer machines also allow row width to be easily adjusted from 45 to 50 cm, an important aspect, especially for contractors.

The constructor aims to increase the reliability of the machines while keeping daily service needs as low as possible through strategies such as equipping lifting groups with rubber sleeves at the bearing shafts to protect from dirt. Large self-propelled machines have central greasing points for the most important bearings. Often, harvester components are oil-filled.

Presented by Kleine at Agritechnica is the low ground pressure SF 2002 sugar beet harvester. This attribute is achieved through lower net weight of 21.3 t with 20 t sugar beet capacity through completely new design and four tyres of 1.10 m breadth.

Mainly flail defoliators

Defoliating beet is mainly done by flail machines. These, too, are height adjustable from the driver seat and can be moved to the side. As a rule, a parallel-guided topper then beheads the roots. Through choosing lighter construction materials the aim is for lighter toppers for more precise results. For foliage deposit, side-discharge and inter-row systems are used. Machines that remove foliage and distribute it laterally on filed surfaces are increasingly fitted for discharge on either or both sides. This has the advantage that the harvesting can take place simply up and down the same side of the crop instead of in blocks. Here, immediate re-cultivation and drilling after harvest is facilitated. Some manufacturers also continue with foliage placement between the rows, this having the advantage of ensuring relatively even distribution of foliage over the field. Wet soil conditions and large amounts of foliage can lead to harvesting systems becoming very dirty.

Matching the cleaning system to acceptable tare level

For handling beet as gently as possible on the harvester, cleaning equipment systems must be matched with the acceptable tare. The rpm, and thus cleaning intensity, of the sieve stars can be matched to the prevailing conditions controlled from the driver seat on many models. Through the application of job computers and the menu-managed pre-setting of the machine, operator-ease is increased with the possibility of reacting more precisely to the prevailing conditions.

Reduced drops in bunker filling

Another aim is avoiding high falls for the beet during bunker filling. Some manufacturers position distribution augers in the bunker constructed so that they can move upwards in association with the beet level and thus reduce the throw height. Beet is also distributed in-bunker with some models for even weight distribution on tyres and similar axle loads.

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Keywords

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Electronic steering and control systems

Electronic steering and control systems are increasingly applied in beet harvesters. Autopilots and tempomats mean the driver can pre-set controls via terminal and use the settings to achieve an automatic operational standard, easing his work for more concentration over longer days.

On-board computers communicating through CAN-bus system with the terminal keep the driver continually informed on all important machine processes. A decisive difference currently in modern harvesters is whether the machinery has these steering and control systems available or not.

Low-pressure running gear

Soil structure protection discussions have led to manufacturers fitting their machines with large-volume tyres low ground pressure running gear. For some time now German-made harvesters have come with staggered tracking in the running gear which spreads ground pressure consistently over the whole field surface and now it's clear that many foreign manufacturers are following suit. Modern running gear is also being used in attempts to keep the large machines manoeuvrable. Axles are coming into use which enable a large steering angle for wheels so giving sufficient manoeuvrability for the long machines in the fields and on the road.

New self-propelled beet loaders

Dumping the beet after harvest and before road transport to the plant usually takes place on the headlands. Towards the end of the campaign there is an increasing frost risk for the roots. Through covering the piles there are attempts to reduce mass and sugar losses. Bigger and broader piles also offer better protection against frost. The standard loading machinery can only tackle, however, breadths of 8 m at the foot. New loaders allow piles to be up to 15 m broad in that the pile is divided by the machine whilst loading with a rotating paddle splitting the pile longitudinally with beet falling into the mouth of the loader. The new-design self-propelled loaders can feature up-and-over elevators covering up to 15 m.