

Mechanical seed drill

Testing the only 6-meter mechanical seed drill on the market – Junkkari W uses augers and gravity instead of air. In Junkkari's W-series combi seed drills, fertiliser is moved mechanically and by gravity – not by air. Koneviesti tested a production version of this unconventional machine in autumn 2024.

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The coulters on the Junkkari W600 combi seed drill are divided between two side wings. Each wing features its own seed and fertiliser hoppers, with individual metering devices for each coulter. During seeding, the small wing hoppers are continuously refilled from the central main hopper. Slowly rotating augers transport seeds and fertiliser from the middle of the machine toward the outer ends, ensuring that every metering device is consistently supplied.

JUNKKARI W600 COMBI SEED DRILL

A six-metre-wide combi seed drill with a transport width of just three metres. Seeds and fertiliser are moved using transfer augers.

Both seeds and fertiliser are placed through the same coulter, which can be weighted with 20 to 100 kg of downforce.

Each coulter is equipped with its own depth control and press wheel. Coulters are located behind the packer wheels.

The machine is designed for use on harrowed or lightly cultivated fields. Thanks to its foldable frame, the wide working width can be halved, making it suitable also for small or irregularly shaped fields.

The idea behind the Junkkari W600 seed drill was born from a practical need: in Central Europe, the maximum allowed transport width is three metres, and Junkkari only had a rear-wheel machine with a working width of three metres. The decision was made to develop a six- or seven-metre drill that would still fold down to three metres for transport.

The use of augers for seed and fertiliser transfer was a deliberate choice to make the machine stand out from the crowd. When the W700 was introduced at Agritechnica, there were already 22 drills wider than six metres on display – and every single one of them, except the Junkkari, was pneumatic.

Pneumatic or mechanical – two different systems

Unlike other Junkkari models, the W-series coulters are positioned behind a packer wheelset equipped with 7.50–20 tyres – just like most pneumatic competitors. A disc cultivator or levelling board can also be mounted

in front of the packer wheels on the W-model.

In a pneumatic seed drill, there are usually 1–2 metering units and distribution heads for both seeds and fertiliser. The hose lengths vary depending on the distance between the distributor and each coulter, which can affect pneumatic drills' precision. In the W600, each coulter has its own rifled feed roller, all placed at an equal distance from the coulters. This ensures that with the mechanical system, seeding starts and ends precisely at the field edges.

Performing a calibration test is generally easier with a pneumatic drill than with a machine that has individual metering units for each coulter. However, during work, checking and verifying the actual seeding rate is easier with a mechanical seed drill.

Auger conveyors are an alternative to pneumatic material transfer, but there is a potential risk of seed and fertiliser granules breaking. However, in Koneviesti's field tests conducted in 2017 and 2024, no signs of granule breakage were detected.

A common issue with pneumatic drills is the dust they generate. In dry

conditions, the airflow can blow away fine "germination soil" from the bottom of the seed furrow.

Air carried by the fan can sometimes be so humid that fertiliser and seed treatment dust sticks to the inner walls of the piping and causes blockages in pneumatic drills.

The fan in a pneumatic drill produces more noise and requires more hydraulic oil compared to the 20 l/min flow needed to power the augers in W600.

Tested in challenging conditions

Koneviesti tested a pre-series model from Junkkari's W range in autumn 2017. (See the article published on 30 November 2017.) The basic concept proved to work well, and no major changes have been needed since. The machine's appearance and technical design have improved a lot, and the W600 looks good.

The full-production model was tested in autumn 2024 during winter wheat seeding on Tino Sipilä's fields. Due to rainy weather, only 20 hectares were sown. Unfortunately, it was too late to use the Junkkari for hybrid rye or winter oilseed crops.

A positive first impression

Sipilä's test plot had been ploughed and harrowed once. Despite the wet autumn, the soil was surprisingly dry. The soil type varied a little but was mostly fine sandy soil.

The machine, without a front cultivator, is light and runs smoothly both on the road and in the field. The drawbar had two additional weights, but once the main hopper was empty and the wing hoppers were still partly full, the machine became rear-heavy.

Average working speed was around 15 km/h. The machine turns well, even in tight corners, since there's no front cultivator to drag. Reversing is also easy thanks to the lower link hitch. The driver can monitor the rear view and hoppers via the screen – up to three cameras can be installed. With no front tool blocking the view and low-profile wing hoppers, visibility stays clear.

The manufacturer recommends at least a 150 hp, 6-tonne tractor, especially in hilly terrain. With full hoppers, the W600 weighs around 12 tonnes.

The Junkkari W600 is operated via an ISOBUS terminal. The interface is clear and offers plenty of functionality. The augers are controlled directly

from the tractor, while all key settings and operations are handled from the same screen. The wing sections can be shut off independently, and application rates can be adjusted using yield maps.

The latest update to Junkkari's control system didn't show the seeded area on the display of Sipilä's Fendt. Tino solved the issue with a "virtual implement" that painted the map on Fendt's second screen.



DURING SEEDING, the metering unit housings are kept full at all times. Seeds drop by gravity from the rear hopper directly into the metering units. Fertiliser is transferred from the front hopper using a screw auger into an upper housing, where a second auger returns any excess fertiliser back to the front hopper. The rear hopper has a shallow bottom, which may cause issues with seeds that don't flow easily – such as caraway or oats treated with certain seed coatings. Graphite powder can be added to improve seed flow.



Junkkari W600 technical features

A different input method requires different technical solutions.

The wings have four small hoppers

The W600 uses the same mechanical metering devices as other Junkkari models. They are powered by the outermost packer wheels. The feed rate is adjusted with a stepless gearbox, and the seeding volume is verified with a calibration test.



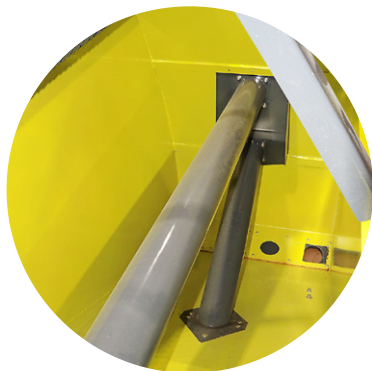
Augers and gravity

The upper sprocket at the front of the machine (in driving direction) is connected to a hydraulic motor that powers the augers in the wing hoppers. These augers are used to fill the wing hoppers once the machine's wings are lowered and seeding is about to begin. The sprocket has a freewheel mechanism, allowing it to rotate the hydraulic motor when needed. During seeding, the feed units and wing augers are driven by the seed drill's own wheels. This ensures that their rotation speed automatically matches the driving speed.



Total hopper capacity is 7150 litres

The ratio between the hoppers cannot be adjusted. Fertiliser is moved from the front hopper to the distribution box at the rear of the machine using a speed-controlled auger. A second auger returns any excess fertiliser back into the hopper. The total hopper capacity is 7,150 litres.



Functions operated via tractor valves

The tractor only needs three pairs of hydraulic quick couplers: one for lifting the coulters, one for the side sections, and one for the hopper augers and side section locks and filling. A flow rate of just 20 l/min is sufficient, since there's no fan involved.



Fertilizer and seed through the same coulter

Fertiliser and seed are both delivered through the same coulter. A guiding fin positioned between the double discs presses the seeds firmly to the bottom of the furrow. Each coulter pair has its own press wheel and levelling tines, and the pressure can be adjusted between 20 and 100 kg. The coulter spacing is 15.8 cm.



Working depth and coulter pressure adjustment

The working depth is adjusted using lamellas that limit the stroke of the cylinder. In the photo, the depth adjustment lamellas are located at the front side in the direction of travel. The upper lamellas are used to set the coulter pressure. The adjustment is straightforward. Stepping platforms make it easier to move on top of the machine, even though you sometimes have to step on the wheels. Since the wheels stay on the ground, they don't rotate, which improves safety.



JUNKKARI W600

Hopper Capacity (Total):	7 150 litres
Hopper Division Ratio (53/47)	3,800 L / 3,350 L
Filling Height	3.4 m
Weight of the Test Machine	7 000 kg (empty)
Total Length of the test machine	8.3 m
Transport Width	3.0 m
Manufacturer	Junkkari Oy

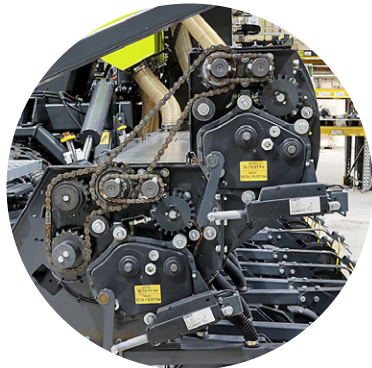
Augers transfer seed and fertilizer

When driving with the wings lifted, fertiliser and seed in the side hoppers tend to settle toward the centre of the machine. After lowering the wings, the augers should be run for about 20 seconds to ensure that even the outermost metering units receive material. Behind the auger, there is a sensor in the fertiliser hopper that alerts the operator when the hoppers are full.



Metering units are driven by wheels

The metering devices are powered by the seed drill's own wheels through a dog clutch. When the coulters are lowered, the clutch engages automatically via the same hydraulic function.





AN AUGER located at the bottom of the fertiliser hopper transfers the fertiliser into a “distribution box” at the rear of the hopper. From there, the material flows through pipes to the side sections. Gravity takes care of filling the side hoppers—as long as there is enough material in the main hopper.



JUNKKARI'S DOUBLE disc coulters is suitable for ploughed, harrowed, and lightly tilled fields. Direct seeding is possible on lighter soils. The working depth is adjusted using a depth wheel for each coulter. Fine-tuning is done by raising or lowering the tractor's linkage, to which the drawbar is attached. The track marker folds to the rear.



In driving direction, the rear augers fill one side of the metering units. The front augers return any excess material back into the system. As the wing hoppers start to empty, more material flows down from the main hopper through drop pipes, keeping the wing hoppers constantly filled. Each wing hopper has a sensor that alerts the operator on the screen when it runs empty. Before starting seeding, the wing hoppers are filled using a hydraulic motor.

Double Disc Coulter

Seeds and fertiliser are sown using the same double disc coulter, which has a special pressing tongue that presses the seeds down to the bottom of the furrow. The coulter pressure can be adjusted between 20 and 100 kg. It's recommended not to use maximum pressure all the time – moderate settings are often more effective. Working depth is adjusted by changing the height of the coulter unit and the wheel system using spacer rings (lamellas) on the cylinder. The pressure on the gauge wheels can be fine-tuned by adjusting the height of the tractor's lower link arms.

Due to the late season, the winter wheat was sown at a shallow depth. The sandy loam soil was surprisingly dry and supportive, and the machine was not tested on peat fields. The press wheels have a diameter of 94 cm, and they carried the full hopper load well. There were no ruts or ridges left in the field that would have interfered with the operation of the coulters.

The wheels are aligned in a single row rather than staggered in two, but this caused no issues during the test. However, the spacing between the wheels and coulters is not even, as the wheel set is the same as in the 3-meter machine, but the coulter spacing is 15.8 cm instead of 12.5 cm. In dry spring conditions, separate rolling after seeding might be beneficial.

The lubrication nipples for the wheel system are conveniently grouped on the sides of the machine.

The track marker moves horizontally and extends very quickly.

Material transfer works as intended

The mechanical metering units performed well. Fertiliser was transferred smoothly from the main hopper to the back of the machine and onwards to the side hoppers via augers, with no signs of granule damage inside the metering units. The operator can adjust the rotation speed of the fertiliser auger by changing the oil flow. Any excess fertiliser is returned to the main hopper via the return auger. The rotation speed of the augers that transfer and balance the material in the side hoppers is linked to the application rate, as they share the same drive as the metering system.



Large hoppers

Easy and light to tow both in the field and on the road

Can be driven at 40 km/h with full hoppers

Working width can be halved

Quiet and doesn't raise dust



Feed tubes are bent when coulters are lifted

Low grids in the hoppers

Bottom step is low

Sowing in tight curves works well, as the metering units on each wing section adjust individually based on the distance travelled (they are powered by the outer packer wheels of each wing). The machine follows the tractor smoothly, especially without a front cultivator, since there are no discs resisting the turns or limiting the tractor's turning ability, even with dual wheels.

When entering the field, the driver needs to activate the hydraulics to rotate the augers in the side hoppers — especially if the warning light indicates that the outer edge of a hopper is not receiving seed or fertiliser.

Material flow to the coulters worked reliably — there were no unseeded stripes left on the field.

Seeds flow by gravity from the rear section of the main hopper toward the ends of the side hoppers. The hopper bottom is fairly shallow, but seeding downhill presented no issues.

Easy to fill

Filling is straightforward with the filling auger, and fertiliser bags can be lifted even with a relatively small tractor—there's no front cultivator to get in the way. The steps leading to the hopper are narrower than the platforms, so extra caution is needed when climbing down. The ground clearance beneath the lowest step is quite limited, making it prone to contact with the soil. Ideally, the step attachment should be flexible to avoid damage.

Proper cultivation is essential

When seeding with a Junkkari, the field must be cultivated in advance,

sometimes more than once. The coulter, with a maximum pressure of 100 kg, is not designed for direct drilling. In Finland's often wet conditions, pre-cultivation is usually recommended to give the soil time to dry before seeding.

A machine without a front cultivator is easy to handle and pulls lightly, which means it can be operated even with less than the recommended 150 hp, if you're fine with speeds just above 10 km/h. The W600 has 38 coulters due to its 15.8 cm row spacing - only six more than Junkkari's 4-meter models with 12.5 cm spacing.

In good conditions, a machine without a front cultivator can be driven faster than one equipped with disc harrows, for example. Optional equipment like cultivation discs or a levelling board can reduce the need for pre-cultivation — an advantage especially for contractors.

Tino was left with a positive impression of the Junkkari. “Junkkari is a serious contender in the 6-meter category as well. Price will largely determine commercial success—there's definitely demand for more affordable options.”

If you're considering a 6-meter seed drill, it's worth taking an open-minded



Although the centre of gravity in the Junkkari is relatively high, the machine remains stable during transport. On the road, the W600 runs on 12 centre-mounted packer wheels. These are divided into two bogie-type units with six wheels each, which pivot sideways and are mounted on a longitudinal axle. This design ensures that the outermost wheels also stay in contact with the ground, even if the middle of the road is higher than the edges.

look at the Junkkari and weighing the differences between mechanical and pneumatic material transfer systems. ■