



“It’s a lot better to have automatic control.”

Have a nozzle at the latest sprayers

Machinery Sprayers

Choosing a variable rate sprayer can be something of a minefield – every firm seems to have its own technology, so it can be hard to compare like with like. *CPM* takes a look at what’s on the market.

By Olivia Cooper and Charlotte Cunningham

Variable rate spraying technology is advancing all the time, improving accuracy, efficiency, and thereby cost control. But with higher spec equipment comes a higher capital outlay, so it’s important to work out exactly what you need and what is superfluous to demand.

At the basic level, it’s important to have accurate tramlines, as that is the foundation of all precise applications, says John Handbury, managing director of J&S Industries which specialises in precision farm equipment. Automated steering and GPS positioning is extremely useful here, and when applying pre-emergence sprays as there is no visible crop.

Other fundamental considerations include:

- Tank size and boom width — which will depend on the farm hectareage, topography, field size and access.
- Boom levelling — which comes down to the software and speed of reaction. You want it to react quickly but smoothly. Controlling yaw is also important.
- Driver comfort in self-propelled machines.
- Weight and impact on soil.
- Nozzle choice. Anti-drift or flat fans? Air induction nozzles create coarser droplets with less drift, whereas conventional hollow cones produce a finer mist.

Section control

When it comes to precision, the next box to tick is section control on the boom, to switch off certain nozzles to avoid overlapping while turning on headlands. “You can do this manually, but it’s a lot better to have automatic control,” says John.

Individual nozzle control is another step up, and combined with flow control means the sprayer automatically speeds up the flow on the outside of the boom as it corners, and reduces the flow on the inside, making for even coverage of the crop.

However, taking individual nozzle control to the next level is PWM — pulse width modulation. Instead of adjusting the spray pressure to regulate flow, it uses an electric solenoid on each nozzle, which typically pulses 10 times a second and within that

pulse opens the nozzle 30-100% of the time. This provides extremely accurate and rapid adjustment of the spray flow, without affecting droplet size and spray pattern — a tremendous benefit over conventional pressure-based systems.

With PWM farmers can set the droplet size — based on chemical recommendation, climatic conditions and a nozzle flow chart — and within limits the sprayer will maintain that size regardless of travelling speed, says John. “You can also install injection metering pumps, which allow you to add the chemical to the carrier as you’re spraying. This means you only have the carrier — usually water — in the main tank, so don’t have wash-out problems. It also gives you the capability to vary the ▶



Chafer has introduced PWM nozzle control on the trailed and self-propelled ranges.

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Sprayers



The Lemken Sirius 12 has electric single-nozzle valves which can be operated individually.

► pesticide application rate without altering the water rate and select different pesticides for varying requirements across the field.”

All of this technology works best when integrated with field mapping, and while

many machines will have their own software, Trimble's in-cab display and software is compatible with any brand, explains Lee Clarke, UK sales representative at Trimble Agriculture. “This means you can take it out of one machine and put it into another, so you're making the most of your investment.”

Trimble's GFX screen is extremely user-friendly, while the TMX offers increased performance, controlling 48 spray sections against the GFX's 24. When installed on ISOBUS equipment it can look after 255 sections — useful if you're running a twin line on a large boom.

“Most people will use a USB stick to transfer maps to the machine, but you can do it wirelessly, too,” says Lee. “Afterwards, you get a report back to show what has been done — something I believe Defra

will require in future to prove environmental consideration.”

So what technology is on the market?

John Deere

John Deere's R4040i and R4050i PowrSpray self-propelled sprayers will see some new additions in 2019, including the latest 4640 touchscreen display with built-in documentation, mapping and variable rate spraying capabilities.

The sprayers come AutoTrac ready and with a free JDLink subscription for five years, which enables a range of additional FarmSight precision farming solutions including Remote Display Access and Wireless Data Transfer, as well as Service Advisor Remote.

Conventional spray pressure regulators have been eliminated, with a 1000 l/min pump instead reacting to changes in spraying speed or application rate.

Two automatic boom levelling control systems provide more precise control of the 24-36m steel booms, bringing in lower boom heights and higher speeds. Both systems feature a new ultrasonic sensor which tracks the height of the ground and the crop simultaneously, providing better performance in down or very open crops, or in crops grown in rows. Proportional hydraulic valves provide fast and precise adjustment of the boom.

The standard pressure-circulation system keeps the liquid moving right up to the nozzles, even when not spraying, enabling the sprayer to go from 0-100 l/min in three seconds. And automatic section control avoids overlap on headlands, while LED boom lights help to maintain high productivity at night.

McConnel

Anyone looking for an ultra-low ground pressure solution would do well to consider McConnel's self-propelled Agribuggy A280. It features auto steering, a five-cylinder spray pump offering an output of 335 l/min, a TeeJet control system, and a variable geometry boom with 15 automatically controlled sections across its 24m width.

Cornwall-based contracting business Howton Cropcare recently added an Agribuggy with a 2700-litre tank to its fleet, mainly to cope with small field sizes and awkward access.

“With an unladen weight of just five tonnes the Buggy suits smaller acreages and less well-drained land,” says Howton Cropcare director Dave Allen. “Its lower overall height and narrower chassis makes it the first choice when you consider some of the



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narrow lanes that we have to negotiate. We can also extend our working window, getting on wetter ground much sooner, and staying on it later.”

Kuhn

Kuhn Farm Machinery has added four new models to its range of Oceanis trailed crop sprayers: the Oceanis 5002, 5602, 6902 and 7702 machines have tank capacities of 5000-7700 litres and are available with all-aluminium booms from 24-48m.

The new sprayers are fully ISOBUS compatible, enabling them to be controlled from a single in-cab terminal, while a separate ISOClick control box places the key sprayer controls (section control, boom height and angle) within fingertip reach.

Each model is available with Kuhn's Multispray system which enables in-cab nozzle selection, automatic nozzle selection to suit the forward working speed and for variable rate applications, plus individual nozzle control to reduce overlapping.

The e-Set cleaning system automates the tank rinsing sequence, while the self-levelling boom uses three sensors to distinguish between crop canopy and ground level, thereby improving spraying accuracy in high

Fendt now offers another boom width with a special fold-out feature.

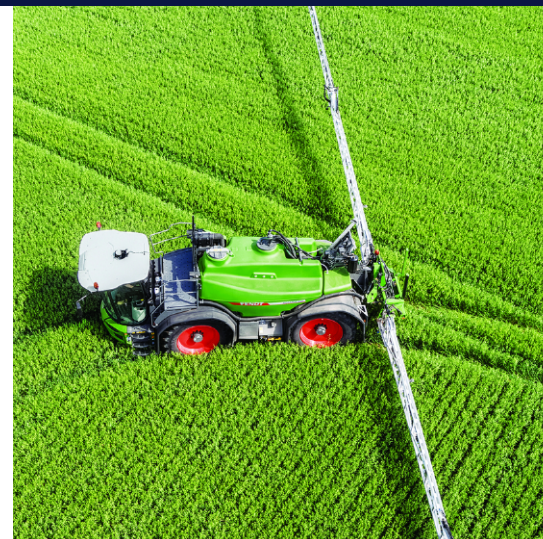
density crops like oilseed rape or potatoes, or where the crop has lodged.

Kuhn is also working with artificial intelligence company Carbon Bee to develop spot-spraying technology to allow targeted application of herbicides. Previewed at SIMA 2019, the I-Spray concept has shown the potential to reduce herbicide use by as much as 80%. It opens up the potential to address some significant environmental and weed resistance challenges.

Agrifac

New to the British market is the Condor Endurance II — Agrifac's largest self-propelled sprayer to date. With a tank capacity of 8000 litres, booms from 24-55m, and working speeds of 36km/h, this is a beast of a machine, capable of covering 160ha of cereals with a single tank.

Equipped with the EcoTronicPlus II computer system for easy control, it also has a fully suspended cab for good stability on steep slopes, says Agrifac.



The pneumatically controlled pressure regulator results in less rest liquid, while the CAN-controlled valves and flow meter optimise flow levels, and the multi-stage centrifugal pump maintains high output at even higher pressures.

In addition, Agrifac has launched add-on technology options to boost efficiencies on other models. StrictSprayPlus enables individual nozzle control without affecting spray pressure or droplet size, while StrictHeightPlus improves boom



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Sprayers



Axiale booms have proven stability and performance, says Berthoud.

► balance, with four wide-view sensors enabling the system to 'read' the crop better and reducing the impact of minor irregularities.

Horsch

The latest addition to the Horsch stable is the Leeb AX, a 3800-litre sprayer with a boom width up to 30m. With hydraulically spring-loaded and damped, parallelogram suspension, the BoomControl system can drop the boom as low as 30cm above the target area at speeds of 15km/h. This has proven to be the biggest reducer in drift, claims Horsch, with a soft and smooth boom position even in hilly terrain. Farmers can also add an extra two sensors — extending the field of vision and making it suitable for row and ridge crops.

When it comes to spray circulation, the liquid is taken straight to the section — for section-controlled booms — or to the nozzle for individual pneumatic nozzle control. This means the pre-mixed fluid is quickly



Agrifac's Condor Endurance II features the EcoTronicPlus II computer for easy control.



John Deere's 4640 touchscreen display has built-in variable rate capabilities.

available as soon as the apparatus or section is switched on, with the suction side of the pump set to fresh water for easy cleaning.

Lemken

Lemken's Primus and Albatros trailed sprayers have benefited from some improvements this year, with a new intuitive graphical user interface on the CCI-50 terminal. With ISOBUS controls as standard, a differential GPS receiver can be retrofitted for automatic-width section control or parallel tracking assistance.

A circulation line on the basic Primus means uniform spray fluid is instantly available across the full boom width. EES models feature automated water hydraulics, and cleaning procedures can be controlled from the cab.

In addition, the Sirius 12 mounted sprayer has been updated, featuring a circulation line and electric single-nozzle valves which can be operated individually or in up to 13 nozzle groups.

The optional electric four-way valve on the suction side makes switching between spraying, suction from an external tank, the front tank and clean water as easy as pressing a button with no need for the operator to dismount.

Fendt

Although the Rogator series isn't new, Fendt has introduced some changes for the 2019 fleet. To minimise downtime, all new Rogator models are equipped with a five-way valve, allowing water to be flushed into the inductor at the same time as the canisters are rinsed.

The eQuadSelect nozzle carrier enables operators to switch between four mounted nozzles from the comfort of the cab and respond better to individual requirements.

And for self-drivers with a 6000-litre tank, Fendt now offers another boom width with a special fold-out feature. For booms that have a total working width of 18m after the first boom segment, there's now an option to add a special 3m boom on each side, offering a choice of three different working widths.

Chafer

For 2019, Chafer has introduced Air Purge to reduce wash-out time and chemical residue at the end of the tank load, and PWM nozzle control on the trailed and self-propelled ranges. This ensures consistent spray pressure and therefore droplet size as forward speed varies, with operators able to tune the droplet size from the cab.

It will also be showing the new Defender self-propelled sprayer to the public for the



Kuhn has added four new models to its range of Oceanis trailed sprayers.

first time at Cereals 2019. This is the smaller sibling of the Interceptor, offering all the advantages in a more compact package. Featuring the same Deutz engine (reduced to 180hp) and Bosch Rexroth CVT transmission, it has reduced tank sizes (3000-5000 litres) and boom width (24-30m), allowing the machine to be both smaller and lighter.

Berthoud

New to the market this year will be Berthoud's three-arm folding B3 Axiale Boom, which folds safely within the length of the machine and is available on the Tracker 3200 trailed machine and Vantage trailed range.

The Axiale booms have proven stability, accuracy and performance, says Berthoud, providing horizontal stability when turning and excellent performance on sloping ground. This is all achieved due to the low centre of gravity positioning of the central pivot suspension.

Also coming soon to the UK is the Spraytronic system, which features solenoid valves on each nozzle and can vary the flow of a nozzle by 70%, matched to the working speed, without changing the operating pressure. Not only does this reduce running costs, a single nozzle can be used to cover a wider range of requirements without having to be changed. ■



The light Agribuggy A280 is ideal for small field sizes and awkward access.

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