

# Many growers still missing out on precision farming benefits

- Survey results highlight need for precision farming advice
- Widespread adoption of GPS steering and variable-rate applications
- Fewer barriers exist for smaller farms
- On-farm variability must be measured and managed

By Louise Impey

What does precision farming mean to you? Pain or pleasure? Frustration or fulfilment?

Either way, the chances are that you have already had a go and are some of the way towards observing, measuring and managing the variability on your farm to make better use of inputs

Not necessarily, says Oliver Wood, precision technology manager with Hutchinsons, and in charge of Omnia, the company's new nutrient management and precision farming service.

Having just completed the largest ever precision farming survey in the UK, Mr Wood is well placed to give an update on the use of the various precision farming technologies and services available.

His information shows one-third of the country's growers are still undecided about the usefulness of precision farming, opting to do nothing with the technology that is increasingly on offer and coming as standard on new machinery.

"It wasn't a huge surprise to us," says Mr Wood. "We have been aware for some time that many growers are looking for far more technical advice with precision technology, as well as a way of linking their findings to

their agronomic decisions.

"Just having the information on its own isn't enough. It has to be useful. Without sufficient evidence of that, or help to achieve it, some farmers have decided to wait before taking the plunge."

The survey, which generated 1,117 responses, covered all regions of the UK and all farm sizes. The participating growers were asked what they currently did with precision farming, as well as what their plans were for the future.

Not surprisingly, by far the most popular development was GPS or auto-steering. Some 55% of those surveyed were already using it across their farms, with instant success and obvious benefits.

"It works," says Mr Wood. "And although there was a trend for the larger farms to make good use of GPS guidance and auto-steering, with 83% of farms with more than 500ha of cropping having opted in, it was also the most popular development on smaller farms."

### VARIABLE RATE

After that, the next most popular operation was variable-rate product applications, followed by yield mapping.

"It was interesting to see just how many growers were making use of variable-rate product applications,"



says Mr Wood. "It takes time and motivation to get these things working well, so growers have clearly accepted this challenge. The reward for them, of course, is the chance to make savings, as well as to boost output."

Yield mapping was being carried out on one-third of the farms surveyed. A closer look revealed almost 80% of those farmers who were already engaged with precision farming were using variable-rate applications for base fertiliser.

"Base fertiliser was well ahead of nitrogen, seed and other crop protection products," says Mr Wood. "Again, it seems growers have faith in it. It is working well for them."

Seed rates were being varied by more than 40%, while nitrogen was being applied using satellite imagery by almost 30% and a tractor-mounted sensor by nearly 20%.

"The technology for nitrogen is regarded with a bit more suspicion

**"It was interesting to see just how many growers were making use of variable-rate product applications"**

Oliver Wood



than it is for seed rates," he reports. "But there is a willingness to get it right, because nitrogen is such a huge expense on arable farms."

Variable seed rates were being used more widely, with growers making alterations according to soil type and weed pressures. While the larger farms – more than 500ha – were making the most use of this technology, even the smallest units had been able to see the benefits.

### VARIABLE PESTICIDES

"More surprising was that 20% of the survey respondents were variably applying crop protection products," reveals Mr Wood. "We are not quite sure how this is broken down between the different types of agrochemicals, but it is most likely to be herbicides and slug pellets that are being applied according to seasonal pressures.

"Of course, there is also potential for plant growth regulators to be

variably applied, especially where seed rates have been calculated in the same way."

When asked whether they needed more technical advice to help them get the most from precision farming, the participants were split evenly, with 51% saying no and 49% saying yes.

"And of those that replied that they would like more advice, there was an even split between the different farm sizes."

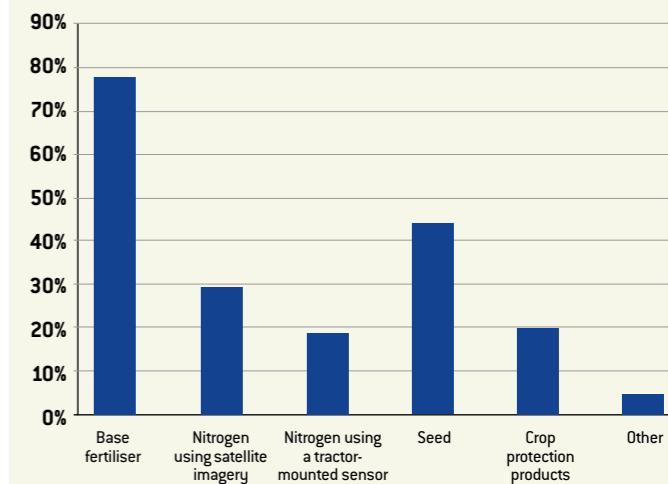
Yield maps were not being used by many of the farmers surveyed. "It seems that growers aren't sure what to do with them. There is also a lack of good software to analyse the data, as well as a danger of putting too much emphasis on one layer of data," says Mr Wood.

### LOOKING AHEAD

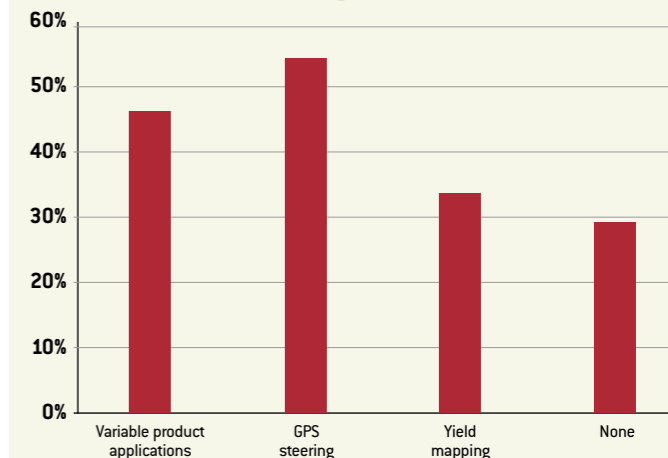
Looking ahead, more than 50% of the growers surveyed were planning to expand their use of precision →p8

## Survey results at a glance

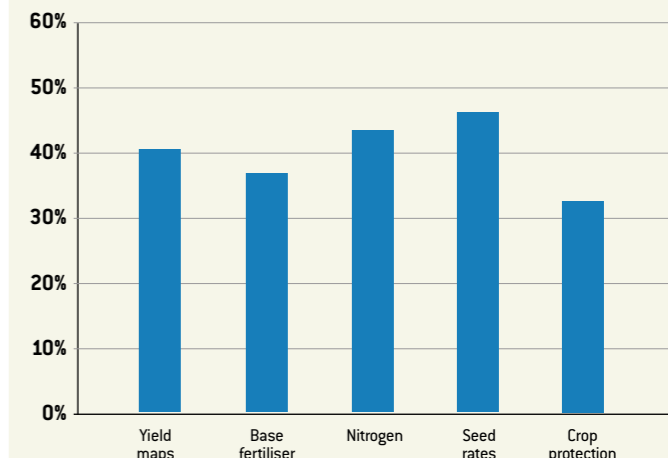
### Products that are variably applied



### Current precision farming operations



### Planned investment area over the next 12 months



Source: Omnia

### Precision farming jargon

Do you know the difference between GPS and RTK? Or your Isobus and correction level? See our guide on 14 precision farming terms explained at [www.fwi.co.uk/precisionfarmingterms](http://www.fwi.co.uk/precisionfarmingterms)

farming operations in the next 12 months. "There was interest in all of the functions, but more were looking at variable seed rates than fertiliser, nitrogen or crop protection."

One-quarter of the farms that are not currently using any form of precision technology are also planning to get involved in the coming year. For them, base fertiliser was the likely starting place.

"It is the traditional entry point," acknowledges Mr Wood. "Of course, it does mean they have to start using straights, if they aren't already doing so, which can increase workloads. The second-hand machinery market is also making some of this technology more acces-

sible, as well as more affordable."

Summing up the survey results, he points out that the link between precision farming information and agronomy is critical. "This is where farmers are looking for more help. They want to be able to make the best use of the information that is being created, which often means combining multiple layers of data."

Mr Wood also adds that growers are planning to invest in further developments, despite the current downturn in commodity prices. "That is good news, as it shows they have understood what it can do for their business and how variable-rate application plans can be employed."



Data management needs to be easily accessible via all devices in the field.

## ANDREW WILLIAMSON, SHROPSHIRE

# 'Precision agriculture has to be based on good agronomy'

Shropshire farmer and Nuffield scholar Andrew Williamson is convinced of the benefits of precision farming, seeing a yield increase in oilseed rape.

His decision to embrace the technology within his own business back in 2007 encouraged him to investigate the concept further, and he was duly awarded a Nuffield travel scholarship in 2013 called "Precision agriculture: how to realise the full potential".

That opportunity took him all over the world, looking at how different techniques and technologies were being employed and how the resulting data was being used for economic and agronomic gain.

Now making use of variable-rate applications for seed, fertiliser and other crop inputs, as well as yield mapping, auto-guidance and sectional sprayer control, he is clear about what it is bringing to his 364ha arable farm.

### ECONOMIC BENEFIT

"There is an economic benefit," he says. "And that comes from being able to push the farm to its potential. It allows us to get every part of the field to perform."

On his farm, it has also helped with environmental performance. As all the land he manages is in HLS, he has been able to take the most relevant areas out of production and pinpoint measures accurately to boost bird populations.

Mr Williamson admits he has spent time and effort getting to this point, putting in many hours of office work and having some initial teething problems with machinery

compatibility.

"Eventually, collecting the data turned out to be the easy part. Measuring that there is variation is only the first stage – you then have to find out what is causing it."

His quest started with yield mapping in 2007. While that showed there were fluctuations in yield, it was only the first stage in providing him with the level of information required to make better decisions.

"We used the yield mapping results to do some targeted soil sampling, so we could compare the highest-yielding areas with poorer-performing ones," he says.

By 2008, he was variably applying P and K fertiliser according to soil test results. In the same year, he began using Yara's N Sensor technology to alter N rates according to crop requirements, based on measurements taken as the tractor passed through the crop.

"The N Sensor works in a completely different way to soil analysis maps and is an example of real-time agronomy," he explains. "A



tractor-mounted sensor measures the crop's light reflectance and then calculates the actual N uptake of the crop. As a result, it can adjust rates while on the move."

He has since gone on to purchase an N Sensor, sharing the cost with three other farmers. As a result, more nitrogen is now being applied to his oilseed rape, with a corresponding yield increase, but the total amount applied to wheat has remained the same.

"Of course, the rate varies within the field, according to the crop's potential. But overall, our N use is very close to what it was before."

### GPS GUIDANCE

By 2010, Mr Williamson had moved to GPS guidance and auto-steering on his machinery, adding automatic and sectional control to his sprayer. These developments gave him improved accuracy and better input targeting, saving time and money while allowing greater fine-tuning than before.

From there, he began to look at electrical conductivity scanning of the soils, to be able to produce maps of similar soil zones and vary seed rates. That has worked very well at Upper Overton Farm, with different seed rate information now being combined with pest and weed data, to allow more complex variable treatment plans to be implemented.

"With hindsight, I would have preferred to start out with the electrical conductivity scanning," he admits. "But it is an expense, albeit a one-off. It costs somewhere between £10-£30/acre."

The scanning process assesses the soil's physical properties, with the resulting values varying according to clay content, soil depth, stoniness and moisture content.

"It allowed us to reduce seed rates on our lighter land, where we have better seed-to-soil contact. But some of the same land also has brome grass problems, so we have had to bring two layers of data into our thinking on those areas and manage them accordingly."

### DRONES

Recently he has been looking at using drones to help map brome infestations and to be able to introduce site-specific weed control.

Standard formats and processes are needed with precision farming, but they have been slow to appear, he says. "All of the field information comes back through my Gatekeeper software, which allows me to make good use of the data."

And data management is critical, he adds. "It is the key to unlocking the full potential of variable-rate technology. Precision agriculture is not the same as picture agriculture – you have to understand the causes of variation to be able to do something about it."

He also believes data management needs to be simple, intuitive and freely available across all devices, whether that is an in-cab controller or a smartphone.

"Precision agriculture has to be based on good agronomy," he says. "So we need to be able to get all the information out into the field, if we are going to make more use of it to improve our efficiency."

### Agronomist's view

■ Farmacy agronomist Rich Daubney (pictured) looks after the agronomy on a number of farms around The Wash, where roots, cereals and bulbs are all grown and precision farming is used to varying degrees.

Growers are keen to tap into the developing technology and improve efficiency, with savings in input costs being just one driver, he says.

"There is potential to save £40-£60/ha with herbicides, by targeting them at weed patches and bad areas of the farm," he says.

"Blackgrass is a particular case in point, with possibilities

with both pre-emergence and post-emergence sprays."

Slug pellets and growth regulators are also relevant for variable-rate applications, as their use can be tweaked in line with seasonal pressures, he says.

Fungicides, however, are different, believes Mr Daubney. "There is much more technical advice surrounding fungicide use and some complex tank mixes are used in the busy times.

"There are also weather variables to consider, as well as spray quality, water volume and nozzle choice factors. It makes it much more difficult to apply variable rates with success, especially as buffer zones and water protection are another concern."



A way to cut costs is to share kit, such as N Sensors, with neighbouring farmers.

### CHRIS WRAY, LINCOLNSHIRE

## Mastering precision farming requires commitment

■ Lincolnshire grower Chris Wray is taking a far more cautious approach to precision farming, despite having a healthy interest in what it has to offer.

Farming 645ha of combinable crops near Spalding in collaboration with two neighbours, he admits to being frightened by all the equipment and expertise required and put off by the time commitment it involves.

"It is scary," he says. "I have made one or two attempts to get started, but getting anywhere meaningful with it was both painful and difficult. So we are right back to where we started."

However, Mr Wray remains open-minded about precision technology and can see the benefits of getting it right. And while he is aware of the various precision farming services around, which could reduce some of the time demands and trouble by managing the data produced on the farm, he is also keen to understand it better when he does take the plunge.

"I know it would be easier to let someone else do it for me," he says. "But I would like to get maximum benefit from it, which means going through every stage as it is introduced so I can have confidence in the technology."

### BASE STATION

Wray Farms is already making good use of GPS guidance on its machinery, which has proved to be reliable and trouble-free. The farm has its own base station and all operations are now carried out with greater accuracy and timeliness.

"GPS guidance has been a really good introduction for us," he acknowledges. "It has brought sav-

**“It would be sensible to put the data through our own farm office software, rather than exporting it elsewhere”**



ings in time and fuel, allowed us to target inputs more accurately and improved our working day."

However, an attempt to use variable seed rates failed, after proving too difficult to put into practice. "I thought we could start our precision farming journey with seed rates, as it seemed to be the easiest concept to understand and develop.

"In addition, the fact that I had a John Deere box and Vaderstad drill meant I already had the relevant equipment to make it work, so wouldn't need to make a big investment."

Some initial soil zones were identified from soil brightness images, but he was not convinced by their conclusions or about the need to put all his data through third-party software.

"The data is mine," he points out. "It has been generated from my fields, so it would be sensible to put it through our own farm office software, rather than exporting it elsewhere."

### TIME COST

Mr Wray is also aware that mastering precision farming will require commitment and dedication.

"I am kept very busy on the farm, especially at drilling, spraying and

harvesting times. So it is difficult to see where the extra office hours are going to come from."

He also believes there should be more transparency with the costs involved with precision farming and the compatibility between machines. "Some services are charged for on a per-hectare basis and others have an annual subscription, while the machinery manufacturers all offer different levels of support. That makes it difficult to see if you are getting good value or choosing the right option."

Knowing what he wants to achieve with precision farming would be the best place to start, acknowledges Mr Wray.

"The easiest win on this farm seems to be seed. It may be that I have to invest in soil conductivity scanning, at about £13/ha, to get things moving."

He is convinced the rapid pace of technological development will make it easier for him to manage multiple layers of data in the future.

"There's no shortage of innovation in this area," he concludes. "I'm sure that in time I will be using the technology without having to think about it. But in the meantime, I have got plenty of fieldwork to be getting on with."