

# IN FIELD FOCUS

— AGRONOMY THAT DELIVERS —



## FINDING YOUR WAY WITH FERTILISER

High prices and tight supplies of bagged fertiliser mean some creative thinking will be needed to make best use of what is available on many farms.

ProCam technical experts around the country offer their strategic ideas.

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*Image courtesy of KUHN Farm Machinery*

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# Finding your way with fertiliser

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## Central calculations

Avoid excessive knee-jerk reactions to the fertiliser situation, urges ProCam's Oxfordshire-based regional technical manager, Paul Gruber.

Yes, bagged nitrogen (N) has seen dramatic price increases and supplies are concerning. But the return on investment from N is one of the biggest – if not the biggest – of any crop input, he says, so cutting back is not justified in all situations, and it is important not to overdo it even where it is.

“The usual breakeven ratio for N fertiliser for cereals is 5:1,” explains Paul. “This means 5 kg of grain is needed to cover the cost of 1 kg of N.”

“For N purchased before the price rises, the optimum economic dose remains unchanged. It's only for N purchased at higher prices that more grain would need to be produced to cover the cost increase. Therefore, it's only in these cases that the optimum economic dose is less.”

As an example, Paul says for bagged N purchased at late

October prices, the economic optimum dose for winter wheat has been estimated at around 40 kg/ha lower than normal.

“Clearly, N should not be omitted entirely. However, in cases where trimming is justified, or if you can't purchase all your bagged N requirements and don't have alternative N sources, the question is: where can savings be made to have minimum impact on the crop?”

“It will be important to work

with your agronomist to assess your particular situation. But it's particularly important not to starve winter barley and thin winter wheat crops of early N doses, and important to conserve N for later to maximise grain protein in milling wheat.

“In general, anything that promotes rooting up to GS30 in cereals to improve scavenging for soil nutrients – for example using biostimulants and phosphites – will help.

“If you have cover crops, make sure you destroy them at the right time to optimise the amount of N they provide for the next crop.”



*If there is scope to trim N dose in winter barley it could be at the final application, rather than earlier, says Paul Gruber, although later applications are important for bushel weight*



*For farms lucky enough to have bought all their N requirements before the price increases, there will be little or no need to adjust dose, says Mike Thornton*

## Southern savings

ProCam head of crop production, Mike Thornton, who works with farmers in Southern England, also cautions against knee-jerk N cutbacks.

And with phosphate (P) and potash (K) prices also high, excess cutting back on these could have long-term consequences for soil fertility, he adds.

“For farms lucky enough to have bought N before the price increases, there will be little or no need to adjust dose,” Mike confirms. “However, in situations where reduced doses are justified, attention to detail will be key to pinpoint when these can be made.”

“There may be scope to trim back 40 kg/ha N from the first

application in a big, healthy winter feed wheat crop. But there's much less scope to do this with backward winter wheat, owing to the need to maintain tillers.

“Equally in winter barley, particularly hybrids, we mustn't compromise the early N dose – not only for tiller numbers but also to help it compete against black-grass.”

With winter oilseed rape, Mike says there may be scope for early spring N savings in large canopies judged to have drawn up sufficient N from soil reserves, and some savings may be possible in thinner WOSR if N is not the limiting factor for yield. However, some poorer WOSR crops will inevitably require replacing; spring crops offer opportunities for lower N inputs, he adds.

“Spring malting barley looks attractive in this regard. I’ve heard of prices of £240/t, but always try to get a contract. If you have a market, maize could also be an option. It utilises slurry well, though is hungry for K, so drilling later when soil nutrients become more available may be useful.

“Then there are spring beans or peas, although getting decent seed could be difficult, and be wary of growing peas without a contract. No doubt linseed will also be discussed. But if you’ve ruled out growing a particular crop before, ask yourself why? Was it because its harvest was too late?”

For alternative N sources, Mike says foliar-applied N could be used at certain timings in feed wheat, not just milling wheat, especially if soils are too dry for uptake of bagged N.

“Ultimately, we shouldn’t finalise decisions on N doses until we see how crop canopies are looking in spring.”

## Digestate decisions

Kent-based ProCam agronomist David Owen says liquid digestate can be an option to replace the first spring N dressing in crops such as winter wheat, winter barley and winter oilseed rape.

However, it must be applied with the correct equipment, he advises, and it should be analysed before application, since different AD plants often use different feedstocks, so nutrient content can vary. “Ideally, apply liquid digestate with a trailing shoe applicator or dribble bar to place it between the crop rows so that it doesn’t block out sunlight from leaves.”



Image courtesy of Tramsread

## Northern nous

ProCam Northern England technical manager, Nigel Scott, agrees that farmers who bought sufficient bagged N before prices escalated shouldn’t cut dose from their normal optimum. Even if bought at around £400/t, he sees little requirement to adjust rates.

However, farmers who bought at higher prices and those short on bagged N should conduct an audit of their fertiliser requirements, he advises.

“Add up your total area of winter and anticipated spring crops. Then, calculate the total N requirement for these crops, according to the economic optimum dose based on your N price, and compare that against how much bagged N you have.

“If there’s a shortfall, look at how you can maximise N use efficiency, and at different N sources. This has to be agronomy-led.

“Improving rooting to improve nutrient scavenging is an obvious starting point for better N use efficiency: look at biostimulants and foliar nutrition applied at appropriate times.

“Improved rooting will also

help P and K uptake. But I’d also advise having a good soil analysis carried out – for example for P, K, magnesium, trace elements, sulphur (S) and pH. Crops deficient in P, K or S can’t utilise N efficiently, and if the pH is low various nutrients will be locked-up, which will need addressing before planting spring crops.”

For ongoing deficiency prevention, Nigel urges in-season tissue testing, for example before T0, T1 and T2 in cereals, and would also look at NDVI and chlorophyll

testing. Low chlorophyll indicates N deficiency, he notes.

“You still need to apply bagged N, but you could supplement a proportion of it with foliar N. If applying manures or digestate to replace some bagged N, have these analysed too, so you know the level of nutrients they’re providing. But whatever your N source, apply it accurately.

“I think the current situation, plus agricultural policy, will force the industry to become much more efficient with nutrients long-term.”



Nigel Scott urges in-season tissue testing to head-off deficiencies in other nutrients that could be limiting N use efficiency before damage is done

## Scottish strategies

With grain prices having not increased to the same extent as N prices, ProCam regional technical manager for northern Scotland, Alistair Gordon, puts the optimum dose for bagged N in winter feed wheat at about 20-40 kg/ha less than last season, unless bought at the old price.

However, there isn't the same scope to cut back N in Scottish spring malting barley, he stresses, because most of it already receives a reduced dose in order to stay below the 1.6% grain N limit needed for malt distilling.

"Where bagged N is in short supply, farmers will have to prioritise where to apply it, and look at alternative N sources," says Alistair, "and at ways of encouraging crops to better forage nutrients from the soil.

"Among alternative N sources, consider a stabilised foliar urea spray at the appropriate time. Taken up through the leaves, this is four times more efficient than bagged urea at being utilised by the plant.

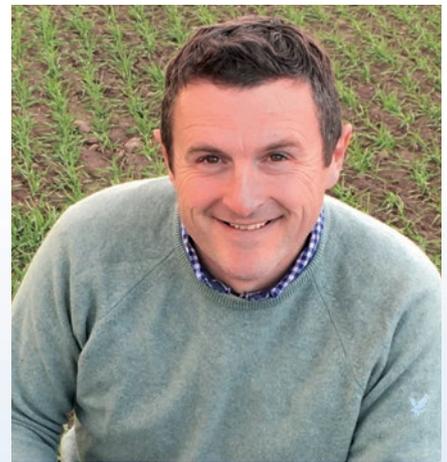
"If you have access to them, manures could also supply 20 kg N/ha, but you must get them analysed and apply them accurately so you know precisely what you're putting on."

Additionally, cover crops could provide 40 kg N/ha, says Alistair, depending on how long they have been in the ground, their size and whether they contain legumes. Some grassland farmers are also thinking of stitching clover into swards to fix N, he notes.

"Thinking about ways of boosting soil nutrient scavenging, ProCam conducts regular evaluations of biostimulants, and we've certainly seen increased root growth with the right products.

"Another technique is a foliar spray of P and K in spring to promote rooting, especially if taking a bagged P and K holiday. Again, this gets P and K into the plant efficiently, but the low dose it supplies isn't a long-term solution because of the significant P and K offtakes by crops, which will ultimately need replacing in soils."

Growing crops with a lower N requirement may also be a solution. Spring oats have a similar requirement to spring barley, says



*Alistair Gordon sees little or no scope to cut back N in spring malting barley grown for malt distilling, since most crops already receive a reduced dose to stay below the maximum 1.6% grain N limit*

Alistair, but spring beans could be appealing, particularly with increased interest in UK-grown protein for livestock.

"The other thing to decide is where to prioritise applying the bagged N that you do have for the best return – on poorer fields or better ones? This needs assessing on a case-by-case basis. There are multiple factors to consider, including the previous crop."

## ProCam pointers

- Conduct an audit of how much N you need versus how much you have
- Apply available bagged N according to the economic optimum for the crop, based on your N purchase price
- Maximise N use efficiency:
  - Improve rooting to maximise nutrient scavenging from soil
  - Consider alternative N sources to supplement bagged N – e.g. foliar N, manures, digestate
  - Analyse organic N sources so you know their nutrient value
  - Consider spring crops with lower N requirements
  - Conduct soil and tissue testing – including for nutrients that enable plants to utilise N efficiently so deficiencies can be prevented
  - Take account of soil type, previous crops and cover crops that can affect residual N
  - Where N cutbacks are needed, identify situations that will have minimal impact on crop output
  - Apply all nutrient sources accurately to avoid inefficient under- or over-dosing



*With an aim of improving soil nutrient scavenging, ProCam evaluates different biostimulants, says Alistair Gordon, and has seen increased root growth with the right products*

Image courtesy of KUHN Farm Machinery

# Peeling back the covers

A two-year study on cover crops at the Stockbridge Technology Centre has revealed some relevant results for spring.

Unplanted and soil-damaged fields in spring 2020 generated multiple enquiries from farmers asking about the best cover crop options, recalls Francis Dunne, head of Field Options, ProCam's forage and cover crop seeds business.

Finding all the answers was challenging, he admits. So, to shed light on the subject, ProCam and Field Options conducted trials at ProCam's trials hub at the Stockbridge Technology Centre in Yorkshire.

Looking at 17 different cover crops, including single species and recently-developed mixtures, one trial was planted in May, the other in July – with the aim of evaluating the suitability of each of the 17 options within the main cover crop sowing windows.

Half of each block also received 50kg/ha of nitrogen (N). Afterwards, the spring-sown cover crops were sown to winter wheat, while the July-sown area was sown to spring barley.

In this way, not only could the cover crops themselves be evaluated for biomass, root development and weed suppression with and without N – and for suitability for pollinators and regrowth after cutting – but any benefits of each cover crop and N regime to the following cereal could also be assessed.

## Reviewing results

“Looking at the results, in both the spring and summer-sown blocks, the brassicas of Smart Radish and Tillage Radish created high biomass both above and below ground with 50kg/ha N,” Francis reports.

“Mustards also performed well, suppressing fat hen very well, and although their biomass was less

impressive without N, they still suppressed the weed. Typically, these species are less suited to spring sowing because they flower relatively fast and can produce very stemmy material which can be challenging to incorporate. The exception was Carlinda Turnip Rape, which remained leafy and regrew after cutting.

“However, the most impressive performer was Brassica Break. A balanced blend of Buckwheat, Phacelia, Crimson clover and Berseem clover, with each species rooting into a different level of the soil profile, it out-yielded the average of its components. Response to N was minimal – indeed, root development was better without N. But it suppressed weeds well and flowered



The most impressive performer was Brassica Break, says Francis Dunne, with this balanced blend out-yielding the average of its components, suppressing weeds well and flowering over a long period

over a long period. Usefully, Brassica Break dies back to a manageable cover for drilling into.”

Although not as good at weed suppression, two ryegrass-based options in the trial – Hurricane Pro-Nitro and Clamp-Saver – created the greatest below-ground biomass and produced the best regrowth after cutting, says Francis, which is important if using for forage.

Both of these ryegrass-based options also contain Berseem clover. Hurricane Pro-Nitro, which contains added Crimson and Red clovers and vetch, is designed for cutting. Clamp-Saver, which also contains re-growing Greenland Fodder rape, is designed for repeat grazing. Both can provide 9-18 months of continuous cover.

“As we approach spring 2022, it was concluded that the best choices for early-season cover are Brassica Break, Phacelia and Buckwheat, Berseem Clover, Turnip-Rape, Hurricane Pro-Nitro and Clampsaver,” Francis adds.

**For more information on the trials or cover crops, contact your ProCam or Field Options agronomist.**



Two ryegrass-based options in the trial – Hurricane Pro-Nitro and Clamp-Saver (pictured) – created the greatest below-ground biomass and the best regrowth after cutting

## Cover crop benefits

- Weed management
- Building fertility
- Building soil organic matter
- Enhancing soil structure
- Preventing soil erosion & nutrient leaching
- Maintaining & developing soil biology
- Provide pollen & nectar for beneficial insects
- Some have potential for livestock grazing or ensiling

### Example results from the spring-sown cover crop trial

Variety	Fertiliser	Fat hen ground cover %	Below ground mass t/ha	Above ground DM yield t/ha
Carlinda Turnip Rape	N	5.0%	16.4	4.3
Brassica Break	N	3.0%	9.0	8.4
Clamp Saver II	N	7.0%	50.0	3.3
Hurricane Pro Nitro	N	7.0%	26.9	3.0
Carlinda Turnip Rape	No N	3.0%	15.7	2.7
Brassica Break	No N	3.0%	17.8	8.1
Clamp Saver II	No N	5.0%	30.7	2.2
Hurricane Pro Nitro	No N	5.0%	22.8	1.8

# Drilling down into spring crop options

ProCam 4Cast analysis shows a clear ranking order for spring combinable crop margins, but it is important to also look at other factors.

## Spring cereals

Topping the list for the highest average gross margin crop in the 11-year ProCam 4Cast 'big data' analysis, and likely to remain the biggest spring crop by area in 2022 – although slightly back on 2021 owing to a larger winter cereal area – is spring barley.

As well as grain yield, spring barley offers the potential for 4-6 t/ha of straw, says ProCam seed manager, Lee Harker. That is a valuable commodity on mixed farms, he says, or it could be sold for an extra £300-£500/ha.

"Some growers were pleasantly surprised by spring barley yields last year, but there were also some good yields of spring wheat.

"Compared with feed barley, a tonne of feed wheat tends to be worth more. However, spring wheat can suffer more from ergot picked up from flowering black-grass. By comparison, spring barley tillers more than spring wheat, which helps with competition against grass weeds."

Depending on location, Lee says spring barley also has more drilling

date flexibility than spring wheat, though later drilling of either crop can result in a late harvest.

"A crop that could see an increase in 2022, but where harvest date also needs watching, is spring oats. This is partly driven by oat milk demand.

"Agronomically, spring oats also offer good grass weed suppression, but frit fly can be an issue in a following winter wheat crop if oat volunteers, where frit fly eggs are laid, haven't been destroyed early enough. Oats can also be difficult to sell unless grown on a contract as the market can become over-supplied."

## Spring pulses

As well as being a broadleaved break crop, spring beans and peas could be of particular interest this season, believes Lee, because they are nitrogen fixers.

Also, a reasonable area of spring beans for seed was sown in 2021, he says, so this should lead to decent availability, although pea seed tends to sell out quickly.

"The key with both spring beans and peas is to know the end market.



*If planning to use farm-saved spring bean seed, be sure to get it tested for stem weevil and Ascochyta levels, says Lee Harker*

There are some decent contracts, but if you can't grow for quality and get a good yield then gross margins can suffer.

"Herbicide options for post-emergence broad-leaved weed control in spring beans are extremely limited. However, there are a number of pre-emergence options, so with a reasonable seedbed and moisture there's no reason why weed control shouldn't be good. If using farm-saved bean seed, it is imperative to get it tested for stem weevil and Ascochyta levels."

## Spring oilseed rape

Spring OSR may be relatively low-yielding, but this can be offset by high prices, says Lee (about £500/t at the time of writing). It is also



*If growing a spring crop, don't treat its agronomy as an afterthought, urges Lee Harker*

another good entry into a cereal crop, and helps in the battle against grass weeds.

“Spring OSR is a classic example of where attention to detail to maximise yield is essential. It needs just as much care as winter OSR. Drilling conditions can be more important than absolute calendar date. Moist, warming soils help it to establish strongly, and a vigorous hybrid can be a good investment.

“Usefully, spring OSR isn’t affected by cabbage stem flea beetle, but it can suffer sporadic pollen beetle attacks that can come back quickly even after spraying. This has put off some growers, but others have made a success of it. Again, good management is key.”

### Linseed

Although a rather specialist crop that should also ideally be grown on-contract, there are some added value outlets around, such as for omega 3 oil, says Lee, and although it can take moisture out of soil, good wheat crops can be achieved after it. “Like all spring crops, linseed needs to be properly planned.”

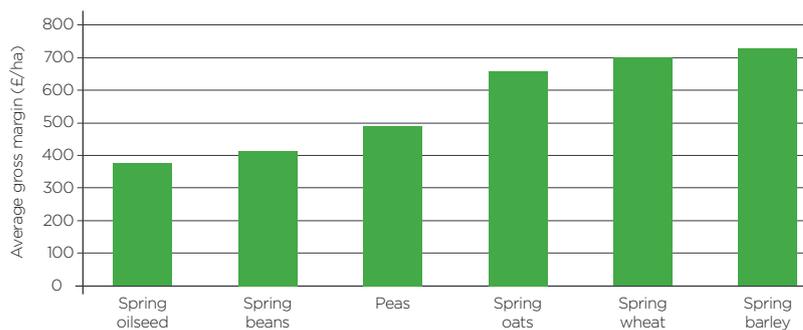
## Pushing up margins

Average gross margin figures are useful when planning spring crops, says Lee Harker, but they only tell part of the story. Drilling deeper into the ProCam 4Cast analysis, which uses yield data from around 150 farms, shows the range of gross margins for each crop can be considerable.

“As an example, while the average gross margin for spring barley was £728/ha, the figure for the top 25% of farms was over £200 above this. Similarly, the top 25% gross margin for spring OSR was more than twice its £375/ha average.

“These wide variances underline just how much difference producing high yields through good agronomy can make. If you’re growing a spring crop, don’t treat its management as an afterthought. Work closely with your agronomist to get the best out of it. Attention to detail is key.”

Comparison of spring crop average gross margins 2010-20



Source: ProCam 4Cast big data analysis. Figures assume grain price premiums achieved

# Nematode control beyond the Vydate era

With the Chemicals Regulation Division (CRD) electing not to grant a reauthorisation for the use of Vydate (oxamyl), root crop growers will have to find alternative means of managing nematodes.

We hear from three ProCam agronomists on how they believe crops can remain protected going forwards.

### Protecting potatoes

Phil Garton-Pope

Despite having been the go-to option for controlling Potato Cyst Nematodes (PCN) in short-season potatoes, the loss of Vydate isn’t necessarily the end of the world, although growers will need to think outside the box to ensure crops remain protected.

A key requirement going forwards will be to use integrated crop management more effectively, with future PCN control strategies dependent on the nematode loading of each parcel of land.

The first step is to assess the level

of threat by carrying out robust soil sampling earlier in the rotation so that land earmarked for potatoes can be treated accordingly.

If used properly, cover cropping with an anti-nematode seed mixture

can help reduce the burden prior to establishing the potato crop.

For example, Nematode Buster – a blend of black mustard and fodder radish – releases a compound

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Velum Prime & Nemathorin give good PCN control

# Nematode control beyond the Vydate era

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effective against nematodes as it decomposes in the soil. The timing at which the cover crop is worked into the ground is critical for this to be effective, with a large, green canopy (i.e. just prior to flowering) needed for maximum efficacy. As such, the crop should be managed carefully for it to be truly effective.

Beyond the use of cultural measures, chemical controls are still available. For example, incorporating granular Nemathorin (fosthiazate) into the soil prior to planting will give a level of control comparable to Vydate, albeit that Nemathorin is less suitable for early lifted crops as it has a 119-day harvest interval compared to Vydate's 80 days.

For early crops, and those being grown on land with a lower PCN loading, Velum Prime (fluopyram) is an ideal option as it can be sprayed directly onto potato land and incorporated into the soil profile prior to planting or applied in-furrow using on-planter application technology.

On land with a higher PCN load, a half-dose of Nemathorin followed by a full-rate application of Velum Prime offers the best results, but it is essential both products are applied carefully and accurately.

## Caring for carrots

Tom Smith

Vydate has historically been used to control free-living nematodes (FLN) which can significantly impact carrot yield and quality, chiefly as a result of fanging. As we enter our second season without Vydate, growers have two main product options: Velum Prime and Nemguard.

Velum Prime (400 g/l fluopyram) is the most obvious alternative, as its liquid formulation makes it easy to spray directly onto soils prior to bed-making. It also has the benefit

of protecting against root-knot nematodes and has been shown to enhance the control of sclerotinia.

Applied at 0.625l/ha, Velum Prime should be incorporated to a depth of 10-20cm within 72 hours, although I prefer it to be worked in straight away (preferably within 24 hours), especially if applied in sunny conditions.

Nemguard (450g/kg garlic extract) is a little trickier to use as its granular formulation means good soil moisture (at least 80mm of rain in the 4-6 weeks after application) is needed, so it is best suited to growers with access to irrigation equipment.

Besides chemical control, growers should also minimise green bridges between successive crops by removing stubbles and controlling over-wintering volunteers and weeds. The inclusion of carrots in rotations should also be limited to one in seven years or longer where nematode loadings are highest.

## Safeguarding sugar beet

Alison Hardesty

Although Vydate is no longer available in sugar beet, Nemguard is a more than worthy replacement and is proven to successfully reduce docking disorder and root fanging caused by free-living nematodes (FLN). The BBRO recommends an application rate of 10kg/ha for Nemguard which is higher than the outgoing Vydate rate, so granular applicators will need to be re-calibrated accordingly. Soil sampling for FLN is also recommended, with *Trichodorus* populations greater than 1000/litre of soil or *Longidorus*



Velum Prime & Nemguard are good options in carrots

populations above 100/litre of soil, indicating a potential risk to crops.

Soil sampling is also useful in terms of beet cyst nematode (BCN) control, with the key for growers with a known or suspected BCN burden being the selection of a tolerant variety: this won't eliminate the issue, but it will help to mitigate the potential for damage to be incurred. Rotation also has a role to play in reducing BCN loadings, with care also needed to reduce survival rates from one crop to the next by eliminating green bridges.



Nemguard is a worthy replacement for Vydate in sugar beet



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