

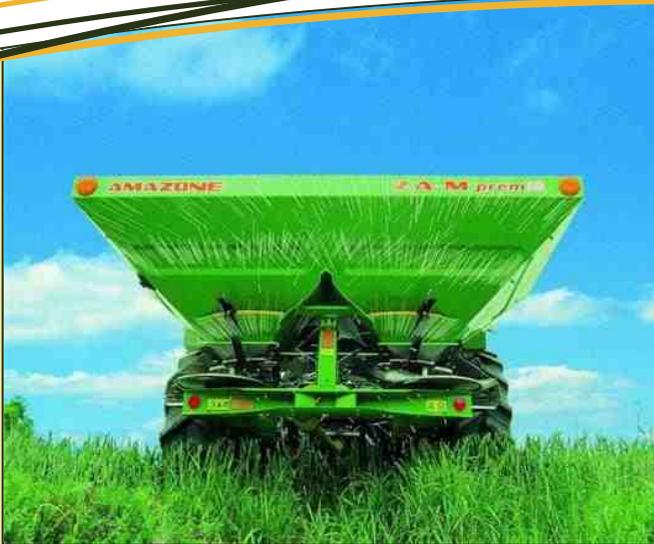
## IT'S FOR YOU!

Zoning matters magazine is free to IPF subscribers. It keeps you up-to-date with all new GPS technologies and explains the science behind them. Every issue will visit an IPF farm to look at how they get the best from IPF zoning.

## INDEPENDENT JOURNALISM

We believe our independence as a business is one of our main strengths. So we are delighted to have independent articles provided by Andrew Blake.

Andrew has worked as an agricultural journalist for 24 years concentrating mainly on arable crops. He managed arable farms before taking up journalism giving him ideal experience for contributing to this magazine.



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## Farmer Focus

### Making the most of all Nitrogen sources

Precision applied farmyard manure is the latest input in a Wiltshire family's drive to farm more efficiently.

**Andrew Blake reports.**

Given the valuable nutrients in livestock manure it makes sense to apply them uniformly to land known to vary in fertility and production potential.

That is the thinking behind the Oram family's uptake of the newest aspect of Intelligent Precision Farming – the system launched by the Swindon based Courtyard Partnership in 2003.

Oram & Sons is a mixed arable and dairy business all operating within 12 miles of Manor Farm, Allington near Devizes. Including South Farm, West Overton and Manor Farm, Wedhampton the area runs to about 880ha (2175 acres).

The team consists of brothers Richard and Philip and their sons, respectively James and Nicholas, and Andrew – their only employee being a herdsman.

The soil types range from light chalks to Pewsey Vale clay plus a small area of greensand.

"But I know people say our blue clay over chalk is really 'boy's land' compared with some other clay soils," says Richard.

Generally pH levels are high due to the calcareous nature of the soils. The fields farmed on greensand need regular liming to maintain a suitable pH. The indices for phosphate, potassium and magnesium sampled in 2007 were variable, ranging from index 1.0 – 4.0.

(Continued over page.)



Cropping consists of first and second winter wheat with breaks of winter oilseed rape and maize for silage. There is also about 200ha (500 acres) of permanent pasture supporting the cattle that are housed all-year round on straw.

Three years ago yield mapping began via Lexion 480 combine. That highlighted considerable within-field variations and prompted the team to take a closer look at the reasons behind them. Until then each field had been analysed for pH and base nutrients every three

years, employing traditional zigzag sampling.

"We felt we needed to be a bit more sophisticated," explains Philip.

"We talked to SOYL, but felt their system was overly complicated and quite expensive. Why take soil samples all over a field when you

already know it's much the same all over?"

Instead they opted for Courtyard's zoning approach. In this the firm's staff (in this case Vince Gillingham) discuss with farmers where key soil type differences and fertilities are

"I thought it would take perhaps six to ten years to get where we wanted to be," says Richard.

"But Vince has just done the first batch of our re-testing and I'm surprised at the evenness of the samples."

believed to occur, confirming the zone boundaries by relatively few representative samples. Individual mapped zones are then treated as required with lime and straight fertilizers, the aim being to bring whole fields up to more uniform pHs and phosphate and potash indices.

"I thought it would take perhaps six to ten years to get where we wanted to be," says Richard.

"But Vince has just done the first batch of our re-testing and I'm surprised at the evenness of the samples."

Nitrogen fertilizer inputs are largely according to RB209 guidelines, wheat's usually receiving three applications through a GPS – guided Amazone spreader. Dressings are automatically adjusted to rates pre-determined for the zones after discussion with Mr. Gillingham and agronomist Colin Edwards and using the firm's relatively new on-line IPF toolbox.

However the FYM from the 250-cow dairy herd and followers was a resource not being fully exploited, the team believed. In the past we've always 'blanket'-dressed it," says Philip. Although that strategy is still acceptable for maize that "laps it up", other crops should benefit from more precise use, explains Richard,

So, in Autumn 2008, for the first time, they set out to apply the manure according to zone needs. But that posed practical problems. "Clearly there aren't any variable rate precision muck spreaders – yet" explains Andrew.

Instead they hired several 12t

rear-discharge machines at £100/day to "blitz" the job.

Having had representative manure samples analysed by The Courtyard Partnership at £55.00 per sample, the GPS-defined zones were outlined by the first applications.

"We then looked at the soil analyses of the zones and worked out how much to apply when we filled them in" RDS weighers on the spreaders allowed him to check several sample loads.

Once the areas of the zones were determined he calculated how many loads were required for each, forward speed adjustment being used to control the dressing levels.

"It all worked out pretty well. Manure's so valuable we're quite prepared to haul it six miles. With three 15ft trailers that doesn't take long. We applied up to 20t/ha on some zones, cutting back to 10t on the more fertile ones."

The straw yards are cleared every three weeks, the manure being stored on headlands. That means that by spreading time

at least 80% of it is well rotted which helps even distribution.

Last Autumn – the second of the precision approach – none was ploughed down.

"We just worked it into the top 4-5in with our Vaderstad TopDown"

In that first season zonal allowances

"We averaged in excess of 11t/ha of wheat and 4.3t/ha over 400 acres of rape. It was a very good year, but I reckon some of it must be down to IPF's system."

for the manure's N content were made to the final top dressings, some second wheat totals being reduced by as much as 70kg/ha. The main aim was to avoid lodging.

However, future adjustments may be made to the earlier N inputs, experience suggesting that some fields may also merit extra zones.

So how does the team rate the latest refinement to their use of manure?

"We certainly had some excellent yields last harvest," says Richard

"We averaged in excess of 11t/ha of wheat and 4.3t/ha over 400 acres of rape. It was a very good year, but I reckon some of it must be down to IPF's system."

Embracing IPF when fertilizer prices were going through the roof was somewhat fortuitous the brothers admit. Costs have since eased.

"But it's not just about saving money," says Philip. Zonal application of all inputs, of which seed could be the next at Manor Farm, is logical both economically and environmentally, he

maintains. "Everyone with an arable/dairy farm should be doing it."

Recent inclusion of the farms in a Nitrate Vulnerable Zone makes participating in IPF even more worthwhile, adds Richard.

"We're prepared to go down to 1ha zones if need be, and having all the documentation behind them is a valuable record for whenever we get an NVZ inspection."

Beyond the initial soil sampling charge of £3.00 per hectare the cost of the IPF service is about £400 a quarter

## ORAM'S IPF

- Yield mapping spur
- Field Zoning exercise
- Nutrient efficiency goal
- Variable FYM latest move.





## **Discount Centre**

IPF service subscribers already get large discounts on our annual services but in every Zoning Matters issue we will have further offers on relevant products and services.

### **SPRINGS SPECIAL OFFER – 25% OFF NITROGEN TESTING**

IPF subscribers planning variable nitrogen applications this spring can take advantage of our discounted nitrogen sampling service. Using our experienced soil sampling team, samples will be taken using GPS equipment and stored in cooling boxes for same day laboratory delivery.

An accurate way of measuring soil nitrogen is to sample for soil mineral nitrogen at 0-30 cm and 30-60 cm. This method can cost £95.00 per sample using other services. We are offering the SMN service at £69.50 per sample a 25% discount.

SMN helps you decide on accurate N rates for each zone and will increase the efficiency of fertiliser usage and decrease potential leaching. SMN testing is normally carried out during February; this sampling period provides you with the most accurate data possible for the growing crop.

***We already have significant number of SMN samples booked so please get your orders in early to avoid disappointment.***

**\*\* If you would like potentially available nitrogen sampling (PAN) then please talk to Vince Gillingham.**



## Helping Reduce UK Agriculture Energy Consumption & Greenhouse Gas Emissions.

Agriculture uses 5% of the total energy used in Western Europe, 52% of which is used to produce, distribute and apply nitrogen fertiliser and a further 8% used for phosphorus and potassium fertilisers (IFA Statistics UNEP, World Bank). 56 GJ of energy is consumed in manufacturing, transporting and spreading one tonne of nitrogen, phosphorous and potassium and is equivalent to 5.83 tonnes CO<sub>2e</sub> emissions (Table 1).

To cut UK agriculture's carbon emissions, efficient use of fertilizer is essential, whilst ensuring that agricultural production is not affected. Application of precision farming technology can significantly reduce fertilizer use whilst maintaining crop production.

**Table 1 energy consumption and CO<sub>2e</sub> emissions per tonne of fertiliser manufactured, distributed and spread**

Fertiliser	Energy consumption (GJ / tonne of fertiliser)				Tonnes CO <sub>2e</sub> emissions/ tonne of fertiliser
	Manufacture	Transport	Spreading	Total	
Nitrogen	40	1	3	44	5.29
Phosphorus	3.4	1	1	5.4	0.23
Potassium	4.6	1	1	6.6	0.31

A conservative estimate for the IPF precision farming approach is 20 kg/ha of nitrogen, 10 kg/ha of phosphate and 10 kg/ha of potassium saved (Table 2). For an average 400 ha farm IPF could save 8800 litres of diesel, which is enough for a small car to travel 289,000 km and would save 45 tonnes of CO<sub>2e</sub>.

**Table 2 Typical Energy and Greenhouse Gas Savings per Hectare achievable by use of IPF**

Fertiliser	Kg Fertiliser Saved/ha	Energy saved/ha		GHG saved/ha	
		MJ/ha	Equivalent as diesel (litres)	CO <sub>2e</sub> kg/ha	Distanced travelled by Peugeot 106 (km)
Nitrogen	20	800	20	106	688
Phosphorus	10	34	0.85	2.3	15
Potassium	10	46	1.15	3.1	20
<b>TOTAL</b>		<b>880</b>	<b>22</b>	<b>111.4</b>	<b>723</b>

(BERR – Estimated average calorific value of fuels – 2004 Diesel = 40 MJ/litre  
Official UK Government CO<sub>2</sub> emissions figure for Peugeot 106)

### THE FACTS...

Farming contributes 7% of the UK's greenhouse gas emissions, consisting of:

**39% of UK methane** emissions,

**67% of UK nitrous oxide** emissions

**1% of UK carbon dioxide** emissions.



### IPF CARBON CALCULATOR

We are very proud that IPF farmers are helping reduce CO<sub>2e</sub> emissions. We will display in every addition of Zoning Matters just how much potential CO<sub>2e</sub> has been saved.

We estimate:

**3,300 tonnes of CO<sub>2e</sub>** were collectively saved last year by IPF farmers.

**Be proud and market your low carbon farming system.**

## BE AWARE...

### 1. Soils with high organic matter content.

(Dark soils, soil code 0, as A0, B0 etc) release mineral nitrogen gradually and supply crops with N through the year, while the nitrogen in crop debris release rapidly soon after incorporation into the soil.

### 2. Leaching.

**Light sandy or shallow soils** are leaky (such as C0.5/C1; H0.5/H1 etc.) SMN levels are usually low.

**Deep Clay and silt soils** are retentive.

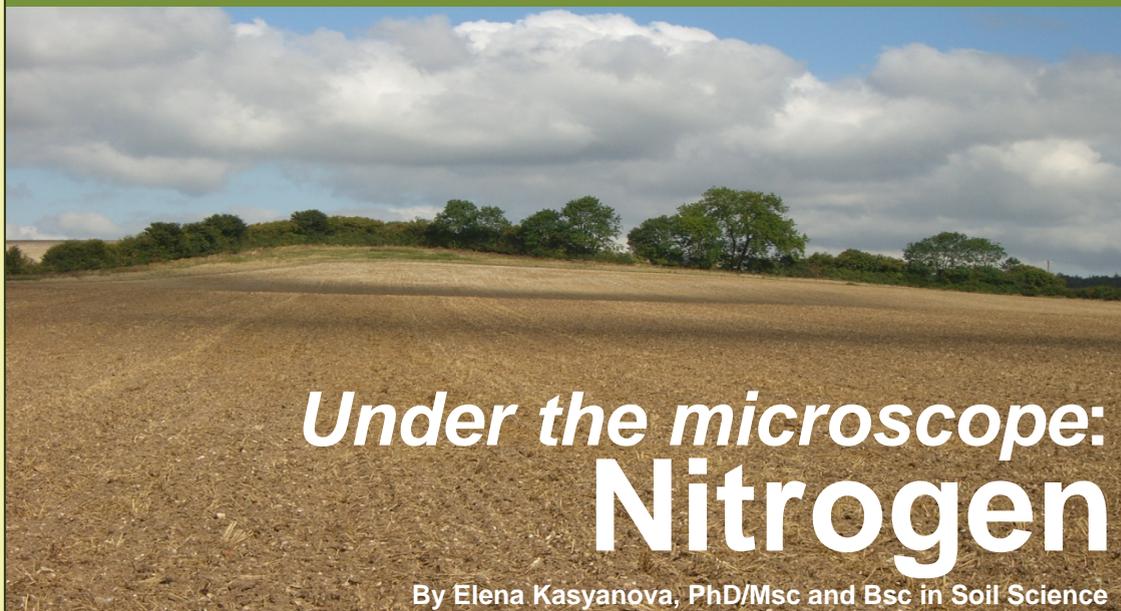
**Shallow soils –**  
SNS levels are usually low.

**Light soils –**  
SNS levels are usually low.

### 3. Crop N

Visual assessment during the early spring is vital. Very lush crops have utilized more N and thin crops less.

Consider applying extra on poor crops and less on lush crops.



# Under the microscope: Nitrogen

By Elena Kasyanova, PhD/Msc and Bsc in Soil Science

Nitrogen is well known as the most important nutrient for plant growth and development.

The most important source of N for the crop is the soil it grows in. N is available in the soil in two forms, Nitrate and Ammonium, and adding these together gives us the total Soil Mineral Nitrogen (SMN). SMN is much more stable than applied N, and losses through leaching or atmospheric leakage are very low.

Nitrogen cycling is a dynamic chain of processes, resulting in different chemical forms of N. Nitrogen from organic matter mineralises into ammonium and nitrate at the same time as nitrogen from ammonium and nitrate immobilises into organic matter. At the same time N deposits from the atmosphere, converts from the air into SMN and leaches from the soil.

The major factors affecting the N cycling processes are weather and soil characteristics.

Soil physical and chemical characteristics affecting SNS have are taken into account during IPF zoning, i.e. soil depth, organic matter content, texture, stone content, etc. As an IPF farmer you have access to all this information for each of your zones and it can be used to improve your nitrogen management.

The main source of SMN is organic matter in the soil. DEFRA's RB209 fertiliser manual states that a soil with 10% organic matter in the topsoil may release 60-90kg more SMN to the crop over the course of a season than an equivalent soil with 3% organic matter content.

Soil texture affects the physical and chemical soil processes. For example light soils are 'leaky' but have good aeration, while deep clays and silt soils retain N better but can suffer from drainage problems.

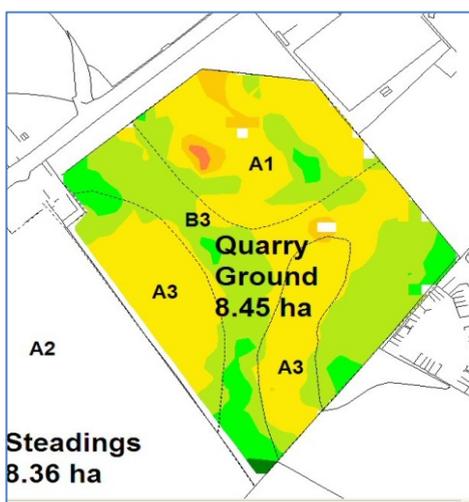
While SMN can supply a certain amount of the crop N requirement, addition of applied fertiliser is needed to 'top-up' the difference. It is important to remember that the main source of N for crops is the soil, not the fertiliser.

Manufactured N is expensive and inefficient, as it is relatively unstable, meaning that anything between 30% and 45% of the N applied may be lost before it can be used by the crop. The efficiency of applied N usage is also affected by soil type, with 30% loss on light sand soils, rising to a 45% loss on shallow soils. Once again, understanding soil type is key to understanding how much Nitrogen is required

across the field.

Having established that the key factors affecting N application requirements are weather and soil type, a growing number of IPF farmers have moved to varying their N applications by zone. Many of those farmers now report that varying N delivers the biggest cost saving benefit of using IPF zones. Duncan Lee, who farms Ramsbury Estate in Wiltshire, reported savings of c. 40Kg/Ha of N, equivalent to £30/ha.

Biomass scanning on fields with IPF zones has supported this approach, showing a strong correlation between soil type and zones (see maps below).

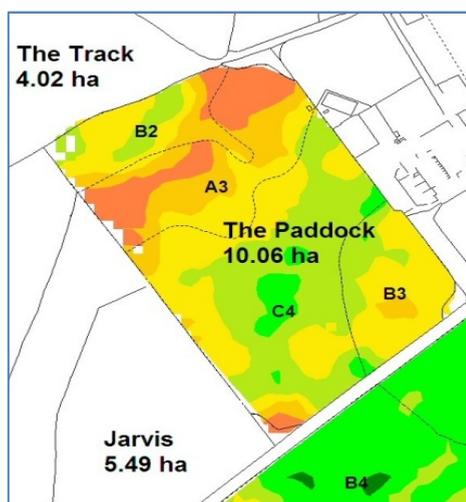


The start point of your N strategy should be identification of the levels of SMN. There are two ways to get this:

DEFRA's RB209 Fertiliser Manual uses a combination of rainfall, soil type and previous crop to estimate Soil Nitrogen Supply (SNS). This approach estimates to a 20Kg 'band'. Estimating in this manner could be surprisingly expensive, as being a single SNS index out changes the recommended N application by up to 40Kg. With Ammonium Nitrate currently costing c. £220/T, this equates to a cost of £25.50/ha, or £127.50 per 5 ha zone.

The alternative is to carry out SMN testing. This technique can cost up to £95.00 but it increases fertiliser efficiency and decreases potential leaching. SMN testing is normally carried out during February giving the most accurate data possible for the growing crop. It will provide you with precise information of soil mineral nitrogen content and enables calculation of the optimal N application rate.

Usually not all zones are tested. Normally a few zones of each soil type should be tested to give an indication of how the Nitrogen supply will differ between soil information can then be used together with crop observation to identify how much additional N should



be applied to the crop at each dressing.

Accurate use and planning of N fertiliser saves money and improves crop performance. NVZ requirements will continue to pile the pressure on farmers to reduce usage, and varying N by zones is a very effective way to achieve this.

## SMN SAMPLING

SMN testing is expensive if you get it wrong.

Follow these simple steps to avoid poor information.

1. Analyse about 10 -15 zones per 400 ha's
2. Select zones with different IPF codes and different crops.
3. Select fields with and without manure.
4. Samples should be taken from 0-30, 30-60, 60-90 cm
5. Assess stone content and deduct from total N figure
6. Samples should be chilled and sent to the laboratory next day.

## PROFESSIONAL DEVELOPMENT

Free online tuition is available for all IPF Toolbox users. An interactive conference can be used to help clearly communicate training via the internet.



## UPCOMING ISSUES

### • Autumn 2010

- The importance of variable seed rates on modern arable farms.
- Exciting changes to the IPF Toolbox
- The science behind P, K, Mg sampling

### • Winter 2010

- Looking forward to NVZ regulations.
- Analysing yield data successfully
- Trends in IPF zones and SMN sampling.

## IPF SOCIAL LIFE

Congratulations to Mr. Jeremy Margesson who won the Inaugural IPF Golf cup. He claimed the prize of £100 after a very close finish.

For those who like to see others suffer on the golf course the picture is of Jeremy retrieving his ball from the first tee... and yes it hurt getting the ball back!



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