

Adjust main season nitrogen use this spring?

The information below is provided by ADAS and has been agreed with Defra.

The advice here supplements rather than repeats the information given previously in the technical note 'Winter 2011/12 – one of the driest since records began' issued in February 2012.

Summary

- Some winter sown crops are so forward this season that some growers have already completed their planned application of nitrogen. For those that haven't, the main message, even in dry conditions is not to deviate from planned total nitrogen applications, taking into account manure nitrogen supply (from any manures applied since last harvest) and soil nitrogen supply (SNS).
- Correct nitrogen decisions need the SNS to be assessed as accurately as possible. Soil nitrogen is 'free' nitrogen, so it is worth taking SNS into account, especially when it is likely to be much higher or lower than normal. SNS can be assessed using the Field Assessment Method (FAM) or, when SNS is expected to be high, by sampling and analysis using the Soil Mineral Nitrogen (SMN) Method.
- Winter rainfall to 30 March has been well below average in Southern, Central and Eastern England, but above average in parts of South West England, Wales, North West England and Western Scotland. In the drier (mainly arable) areas, N leaching losses this winter are likely to be lower than normal. When combined with poor 2011 crop performance and a mild autumn/winter, this is likely to result in a higher than normal SNS situation. It has never been more important to consider last year's crop performance and the weather since harvest when deciding on how much N to apply. – make sure you use the correct N Index table in the Fertiliser Manual (low, moderate or high rainfall). Many growers in Southern, Central and Eastern England should be using the low rainfall table (Table A) in the Fertiliser Manual, but it is also very important to consider crop appearance and previous manure use.
- Data gathered by ADAS as part of the Defra-funded NIT18 project indicate that autumn 2011 soil mineral N levels (before winter leaching) were similar to or higher than the long term average. When using the SMN (measurement) method it is vital that any overwinter uptake of nitrogen by the crop is also assessed and allowed for at the time of sampling, especially in advanced winter oilseed rape crops which usually contain a large quantity of N - this is nitrogen that might otherwise have leached. The amount of nitrogen in the crop (and in the soil) should reduce the amount of nitrogen fertiliser that needs to be applied.
- Remember that the effect of past cropping and organic manure use will usually have a much more significant impact on SNS than seasonal factors such as rainfall or temperature. Fields with a history of manure use will usually have higher SNS levels than those with no manure use history.
- PLANET version 3.2 was released in March 2012 and incorporates the mandatory changes to the NVZ Action Programme rules that came into force from 1st January 2012. These include a reduction in the Nmax limit for grassland (see NVZ Guidance Leaflet 3, Table 5) and increases to the livestock manure N efficiency values that must be used in the Nmax compliance calculation (see NVZ Guidance Leaflet 3, Table 8).
- **NVZ reminder** – you must have a record of your Nitrogen Plan before any N is applied this spring.
- **NVZ reminder** – make sure you comply with the N max rules for those crops with a specified Nmax limit. Defra's Fertiliser Manual (RB209) provides recommendations ONLY which are **not** N application limits for crops grown in NVZs.
- **NVZ reminder** – the minimum slurry and poultry manure storage must now be in place (since 1 Jan 2012).

Assessing Soil N Supply (SNS) using Field assessment method (FAM) – seasonal adjustments

Figure 1 shows average soil mineral N levels found in autumn 2011 in over 80 fields monitoring soil nitrogen changes in different soil and cropping situations, compared to 2010 and the long term average since 2004 (source ADAS, NIT18 project funded by Defra). These data measure the quantity of soil mineral N residues left following harvest in 2011 before any leaching of N. Levels in autumn 2011 were similar to or higher than

the long term average (see Figure 1). Overall, soil mineral N reserves (in the fields sampled) are similar to the long term average for winter wheat and oilseed rape, but well above average for winter barley. The data shows that, in general, previous manure use is more important than over winter rainfall in determining SMN levels.

What the data does not show is the amount of N that was already in the crop at the time of sampling (thereby contributing to SNS). For early-drilled winter wheat and oilseed rape crops, the mild autumn weather resulted in a number of forward (i.e. high green area index for the time of year) crops in November and December indicating a high SNS situation. However, it is worth noting again that this is not the case everywhere and some parts of the country have had higher than average winter rainfall resulting in low SNS in some fields. It is more important than ever to assess crops on a field by field basis taking into account previous crop performance, previous manure use, autumn temperatures, over winter rainfall and the current state of the crop.

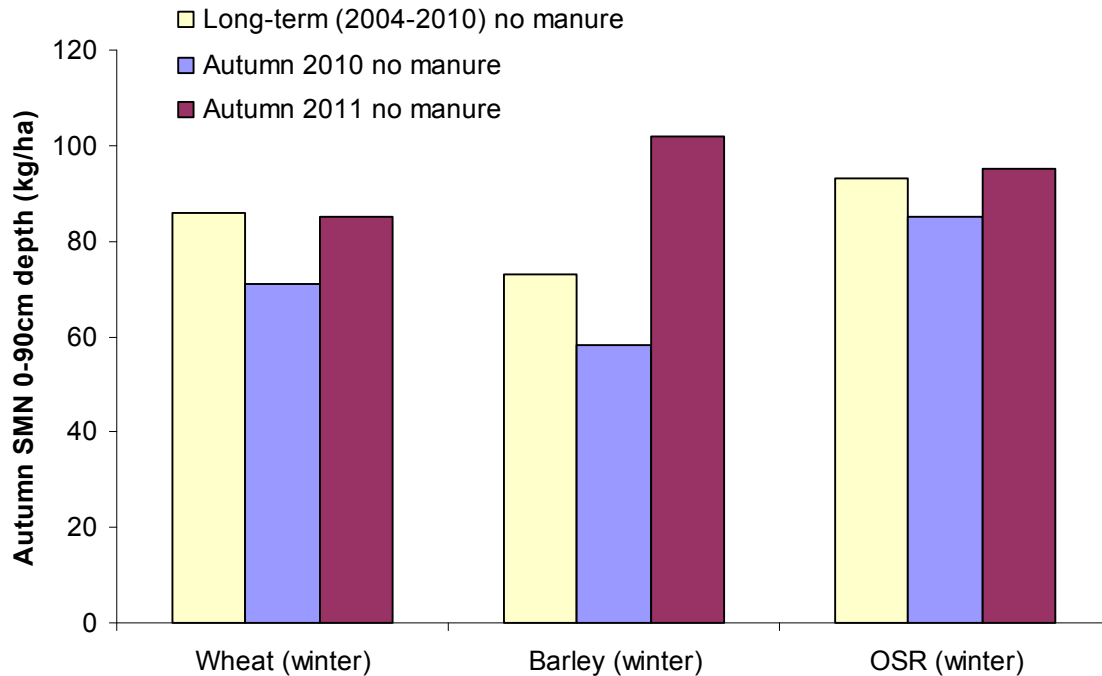


Figure 1. Average soil mineral N (kg/ha to 90 cm) in autumn 2011 compared to autumn 2010 and the long term average following different previous crop types

Figure 2a shows Excess Winter Rainfall (EWR) this winter from October to 30 March 2012 (source Met Office) – this is the rainfall that drains through medium textured soils causing leaching of nitrate-N. Rainfall since mid February has not been sufficient to significantly increase the total excess winter rainfall in most areas, so this map provides a good basis for estimating how much soil N has been lost by leaching during the winter compared to the ‘average’ year.

The Fertiliser Manual (RB209) uses EWR to assess the SNS Index (the ‘Field Assessment Method’); Table A – EWR <150mm; Table B – EWR 150-250mm; Table C – EWR >250mm). Comparison of this years map (Figure 2a) with the long term average (Figure 2b) shows that many farms in Southern, Central and North Eastern areas (and even as far west as Shropshire and Herefordshire) may be justified in using a lower rainfall table than normal for assessing the SNS Index of crops. Since this will tend to reduce the RB209 recommended N rate compared to an ‘average’ rainfall year, make sure that other factors support this approach before making any decision to reduce the total amount of N to apply to the crop (see below).

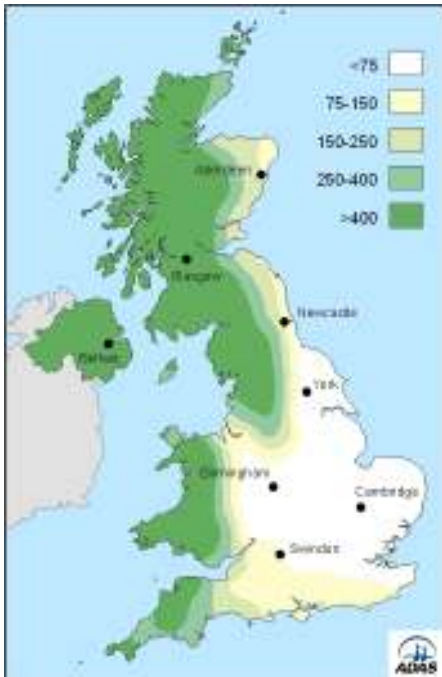


Figure 2a. Excess Winter Rainfall to 30 March 2012

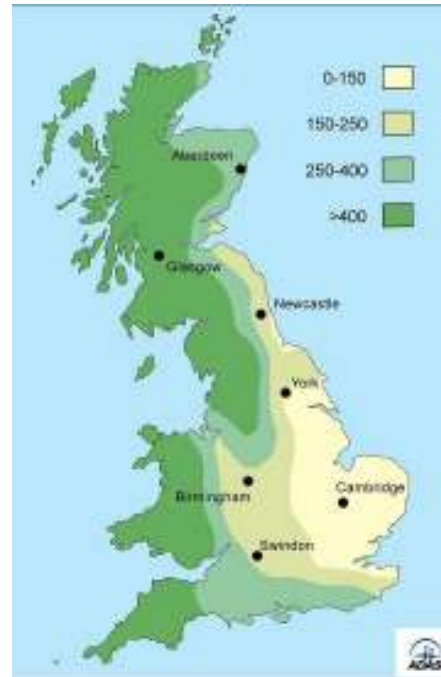


Figure 2b. Long term 'Average' Excess Winter Rainfall (whole winter to 30 March)

The Moderate rainfall area (150-250 mm EWR) forms a narrow band running from Dorset, through the Welsh borders, skirting the Peak District and running up the eastern edge of the Pennines and up into eastern Scotland. Areas to the west of this moderate rainfall band have had high excess winter rainfall. Indeed parts of South West England, Wales and the North West have had higher than average winter rainfall. So, although many areas are experiencing drought conditions this is by no means the case everywhere.

Commentary and Conclusions

Data confirms that seasonal effects are usually less than the effect of previous cropping, manure use and soil type. However, the evidence indicates that residual soil mineral N levels (SMN) at the end of 2011 were similar to or slightly higher than the long term average. A generally mild autumn/winter and forward early-drilled winter crops have also indicated higher than normal soil nitrogen supply in Southern, Central and Eastern areas. Meanwhile, in South West England, Wales and North Western regions the winter has been as wet or in some cases wetter than the long term average so it is business as usual here.

This year it is more important than ever to consider how much nitrogen was contained in autumn sown crops at the start of spring growth. Early autumn sown crops, especially oilseed rape, that established quickly with significant autumn growth, will have taken up much of the residual autumn soil mineral N. For those using canopy management or SMN (measurement) methods, this crop nitrogen content should be counted as part of how much N fertiliser needs to be applied.

Where final N applications have not been made, crop inspections will be an essential part of the decision-making process, as the crop is the best indicator of the SNS – if the crop is more lush and green than normal then the SNS is also likely to be above normal, if the crop is pale and backward then the SNS may be low unless there is something else causing these symptoms. Winter oilseed rape crops can take up large quantities of nitrogen in the autumn/winter period (up to 100 kg N/ha) and in forward crops it is important to hold growth back if possible. High yields of oilseed rape come from avoiding excess leaf production and thus allowing light into the canopy for optimum seed setting.

- **Overall, the effect of soil type, past cropping and (especially) organic manure use will usually have a more significant impact on SNS than seasonal factors such as rainfall or temperature.**
- **The available evidence and opinion suggests that SNS levels for crops are similar to or slightly above average this year but, as always, are likely to be variable from field to field.**

- **Crop inspections are essential to help final N decisions. Adjustments to the long term strategy of N use should take account of how previous crops have performed and the appearance of this year's crop relative to previous crops.**
- **The below average winter rainfall in many areas will mean that some farmers may need to use a different Fertiliser Manual SNS Index Table when assessing the SNS – i.e. a table for a lower than average winter rainfall. But take account of crop appearance and the factors discussed above as well.**

PLANET version 3.2

A new release of PLANET (version 3.2) is now available that includes the mandatory changes to the NVZ Action Programme rules that came into force from 1st January 2012.

These changes include;

1. The Nmax limit for grassland that has reduced from 330 to 300 kg N/ha (see NVZ Guidance Leaflet 3, Table 5).
2. The livestock manure N efficiency values that must be used in the Nmax compliance calculation have increased (see table below). These updated values must be used when calculating the supply of crop available N from livestock manure applications made after 1st January 2012. Details of the Nmax rules are described in NVZ Guidance leaflet 7. The crop specific Nmax limits are given in Table 5 of Leaflet 3, and the livestock manure N efficiency values in Table 8 of Leaflet 3 (repeated below).

Manure type	Crop available N (% of total N applied) until 1 st January 2012	Crop available N (% of total N applied) from 1 st January 2012
Cattle slurry	20%	35%
Pig slurry	25%	45%
Poultry manure or litter	20%	30%
Other livestock manures	10%	10%

PLANET has a facility that calculates compliance with the Nmax limit for each Nmax crop type grown on the farm.

All of the Fertiliser Manual (RB209) recommendations for arable crops and organic manures are included in the PLANET version 3 software available free from www.planet4farmers.co.uk.

The Nitrate Vulnerable Zones (NVZ) regulations (in force from January 2009)

Approximately 62% of land in England is designated as an NVZ, and the relevant NVZ rules must be complied with on this land. Non-compliance with the rules will risk a deduction from the Single Farm Payment.

Key points of the NVZ regulations that need to be thought about this spring are as follows.

For individual fields this spring

- A Nitrogen Plan must be prepared before any manure or N fertiliser is applied to the crop. The soil N supply, crop N requirement, crop available N from manure applications and the need for manufactured fertiliser N must all be assessed or calculated. Records must be kept of the Nitrogen plan for 2012 crops before applying any N this spring, and of each fertiliser and manure application after application. These records must be available for inspection and kept for at least 5 years (Guidance leaflet 6).
- Defra's 'Fertiliser Manual (RB209)' (8th edition, published June 2010) provides best practice advice, but it is not mandatory to follow or keep within the RB209 recommendations provided that you can demonstrate that you have planned your nitrogen applications using a recognised recommendation system or FACTS qualified advice.
- DON'T apply (Guidance leaflets 8 and 9);

- manufactured N fertiliser or organic manure if the soil is waterlogged, flooded, frozen or snow covered (under extreme conditions, farmers should seek advice from the EA),
- organic manure within 10 metres of a surface water, or 50 metres of a spring, well or borehole,
- N fertiliser within 2 metres of surface water.
- All other required field Records must be kept, including details of the crop grown, the use of N fertiliser and manure *following application*, and any written advice from a FACTS qualified adviser. All records must be available for inspection and kept for at least 5 years (Guidance leaflet 6).
- The quantity of N applied (from manufactured fertiliser plus livestock manure N) must not exceed the Nmax limit for the whole area of each crop type with a specified N max limit grown on the farm (see Guidance leaflet 7 and above - changes to the Nmax limit for grassland).
- The amount of total N in organic manures applied to land must not exceed 250 kg N/ha in any 12 month period (Guidance leaflet 8).
- A Risk Map of the farm must be prepared to identify suitable field areas for manure applications, and for locating temporary field heaps of solid manures (Guidance leaflet 8).

For farms with livestock

- Show compliance with the Livestock Manure N Farm Limit – 170 kg N/ha produced by livestock in a calendar year, or 250 kg N/ha for farms that have applied for and received a derogation for the calendar year.

NEW (as scheduled) from 1st January 2012:

On farms that produce slurry or poultry manure

- You must now have **at least 6 months storage capacity for pig slurry and poultry manures**, and **at least 5 months storage capacity for cattle and other types of slurry**. The minimum storage requirement must be calculated using the specified calculation method (Guidance leaflet 4).

Nmax limit for grassland

- The Nmax limit for grassland that has reduced from 330 to 300 kg N/ha (see NVZ Guidance Leaflet 3, Table 5)

Manure nitrogen efficiency values

- The livestock manure N efficiency values that must be used in the Nmax compliance calculation have increased (see above table).

Remember! Non compliance is likely to result in a reduction in the Single Farm Payment and further inspection.

Further reading

Fertiliser Manual (RB209), 8th edition. Defra (June 2010), available from the Stationery Office, www.tsoshop.co.uk or www.defra.gov.uk/rb209.

Nitrogen for winter wheat – management guidelines. HGCA (autumn 2009), www.hgca.com.

Crop nutrition for potatoes. Potato Council (November 2009), www.potato.org.uk.

PLANET. www.planet4farmers.co.uk.

Full details of the NVZ rules can be found in Defra's NVZ Guidance leaflets (go to <http://archive.defra.gov.uk/environment/quality/water/waterquality/diffuse/nitrate/library.htm>, or ring 0845 955 6000 for a copy).

Further important clarification of the rules by the EA can be found in the NVZ Q&A at http://www.environment-agency.gov.uk/static/documents/Business/NVZ_QA_Version9_Sept2011.pdf