AVOID SPREADING FERTILISER TO FIELDS AT HIGH RISK TIMES

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Description

Targeted at nitrate (N) and phosphorus (P).

- Do not spread mineral fertilisers at times when there is a high risk of surface flow or rapid movement to field drains from wet soils.
- Do not spread N fertilisers between September and February when there is a high risk of nitrate leaching loss, unless there is a specific crop requirement during this time.
- Do not apply N fertilisers when there is little or no crop uptake.

Rationale, mechanism of action

Fertiliser timing affects the mobilisation of nutrients released from land to water. Avoiding spreading to fields at high-risk times reduces the availability of nitrate for loss through leaching and of P for loss in surface run-off or rapid preferential flow. Surface run-off can lead to the direct loss of surface spread fertilisers and is most likely to occur when rain falls onto sloping ground with soils that are saturated, frozen or snow covered. Rapid preferential flow of nutrients through the soil is most likely to occur from drained soils when they are wet and rainfall follows soon after fertiliser has been applied. The method aims to prevent nutrients being added at times when there is rapid transfer of water from the soil surface to water bodies or rapid leaching to ground water.

Avoiding the addition of N s in the autumn reduces the amount of nitrate available for leaching by over-winter rainfall.

Relevance, applicability & potential for targeting

The method is potentially applicable to most farming systems, i.e. all which use mineral fertilisers. In the UK, timing to avoid high-risk periods is compatible with the Environmental Stewardship Scheme and there is no conflict with other methods.

It would be relatively acceptable to the farmer, although the prediction of rainfall and restriction on the timing of mineral N applications may cause practical difficulties for some farmers. The adoption of this method will require a degree of education and advisory activity to persuade farmers that the spreading of fertiliser at high-risk times (e.g. when soils are ‘wet’ and surface run-off or drain flow losses may occur) should not be undertaken. Farmers may be particularly reluctant to avoid applying fertilisers to drained clay soils in early spring to promote early season crop growth.

The method, decreasing fertiliser losses, will allow farmers to reduce the amount of fertiliser applied. This reduction has been estimated in some cases [1].

Effectiveness, including uncertainty

N: Cuttle et al. [2] expected a moderate reduction in nitrate leaching losses in the affected areas depending on circumstances. The reduction, averaged over the farm area, will be smaller depending on the proportion of the farm affected, and in some circumstances would be negligible.

P: Cuttle et al. [2] estimated that option implementation would result in a moderate reduction in the fertiliser component of the baseline P loss. However, it is noteworthy that the fertiliser component contributes little to the total loss from sandy loam soils.

FIOs: Unaffected by the method.

Time frame
If correctly applied, this option may have an immediate effect on fertiliser mobilization from fields.
Medium term
Considering the above mentioned influence of annual rainfall on the loss of N and P fertilisers, it can be inferred that for nitrate leaching losses, it is more effective to avoid spreading fertilisers in the autumn and winter periods.
Short term
Because there is a high risk of nutrient loss (through runoff) when fertilisers are spread shortly before rainfall, in the short term (few days) the effectiveness of this option is strongly related to the ability to make reliable weather forecasts and to the possibility of communicating them to farmers via PC or text messages, as done in the UK within some priority catchments.

Environmental side-effects / pollution swapping
The method will also be effective in reducing ammonium-N losses and nitrous oxide emissions.

Administrative handling and control
The option can be relevant for all fields where mineral fertilisers are applied. However, control from local agricultural offices is almost impossible.

Costs: investment, labor
This is a zero cost method because in most cases, the fertilisers should not be required at high risk times, since the crop will not be growing. However, there may be indirect opportunity costs if the high risk times coincide with crop development in spring. These may be zero or a higher figure; for example, if the timing of spring top dressing on arable crops or grass is not optimal and caused a reduction in farm gross output. Therefore, assume this method generally has a zero cost, but that there may be significant costs, perhaps one year in ten. This option assumes that fertilisers will be applied late, so application costs including materials will still be incurred. The costs relate to poor timeliness and reduced yield for late application, perhaps one year in ten. See UK report [2].

References
[1] Sharpley, A. N., Daniel, T., Gibson, G., Bundy, L., Cabrera, M., Sims, T., Stevens, R., Lemunyon, J., Kleinman, P. and Parry, N. (2006). Best management practices to minimize agricultural phosphorus impacts on water quality. U.S. Department of Agriculture, Agricultural Research Service, ARS-163, 50 pp.
[2] Cuttle, S., Macload, C., Chadwick, D., Scholefield, D., Haygarth, P., Newell-Price, P., Harris, D., Shepherd, M., Chambers, B. & Humphrey, R. (2007) An Inventory of Methods to Control Diffuse Water Pollution from Agriculture (DWPA) USER MANUAL. Defra report, project ES0203, 115pp. p. 50-51