ON CLAY AND SILTY SOILS - ESTABLISHMENT OF IN-FIELD BUFFER STRIPS

2011 Authors: B. Ulén, M. Bechmann, T. Krogstad

Description

On sloping fields, establishing grass buffer strips along the land contours, in valley bottoms or on upper slopes reduces the slope length and can reduce and slow down surface flow. It is recommended to cut the grass regularly in order to control annual weeds and freezing/thawing effects on P loss.

Rationale, mechanism of action

In-field buffer strips can reduce P losses. An in-field buffer strip is a vegetated strip of land, located along the land contour, on upper slopes or in valley bottoms. It is usually a permanent feature, although it can be temporary. The strips act as a natural buffer to reduce the transfer of diffuse pollutants in surface run-off from agricultural land to water. The buffer strips reduce the length of the slopes, can act as a sediment trap, and help to reduce nutrient and pesticide losses in run-off.

Factors to consider before installation of in-field buffers include: (1) Types and concentration of pollutants for which they are designed; (2) soil characteristics, such as clay content and infiltration rate; (3) size of contributing area; (4) steepness of slope, irregularity of topography; (5) types of grass/Lucerne adaptable to the area; (6) climatic conditions at planting time.

The buffer should be expanded by approximately 1.6 metres for every 1% increase in the slope.

Applicability

Buffer strips are primarily applicable on clayey or silty soils with surface runoff problems. There is a great potential for this method in areas with complex soil or landscape patterns, particularly on erosion-susceptible sandy or silty soils.

Effectiveness, including certainty

Nitrogen: The measure has a limited effect on N. Any benefit derives from taking land out of production and harvest N by cutting the grass.

Phosphorus: The efficiency of vegetation filters along slopes is strongly linked to the filter width. For example, a Canadian study found that P losses were reduced by 31% in a 2 m wide filter and by as much as 89% when the width of the filter was increased to 15 m [1]. Flow velocity, vegetation type and density of the vegetation cover have been shown to be of secondary importance for the magnitude of the losses. In a Scandinavian study, Total P content in runoff was reduced by between 27 and 97% depending on filter width, which is equivalent to 0.24-0.67 kg P ha^{-1} yr^{-1} [2]. In UK 'expert weighting' for grasslands, scenarios estimated an overall reduction in P losses of 40% [3]. Buffer strips are highly relevant in many areas of the Nordic countries [4]. The positive effect is mainly related to the buffer strips effect as sediment trap.

Time frame

Establishment of in-field buffer strips means short-term implementation but the real effects may take a long time to evaluate [5].

Environmental side-effects
When slurry is applied, faecal organisms can be reduced by buffer strips slowing down run-off and intercepting the delivery of sediment. Another positive effect of buffer strips that are established along watercourses is that ploughing and fertilising close to the stream bank are avoided.

Relevance, potential for targeting
The measure has relevance for areas with surface run-off but is less important for artificially drained areas where water passes through the drain pipes under the buffer strips. Several countries use buffer strips along watercourses as a target since it is easy for administrative handling.

Costs: Investment, labour
Smaller fields enable separate parts of the landscape to be managed in different ways but buffer strips increase the time required for field operations and would be resisted by many farmers. For field operations, this time increment has been estimated at 10% in the UK [3].

References

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