Modelling of the buffer strip effect on surface P losses from agricultural fields

Frank Schmieder, Karin Blomback, Kristian Persson and Andres Lindsjo
Swedish University of Agricultural Sciences, Sweden

The ICECREAM model (Tattari et al. 2001, Larsson et al. 2007) is frequently used to estimate phosphorus (P) losses from Swedish agricultural fields (Naturvårdsverket 2008). Since buffer strips are one of the most important farming practices to reduce surface P losses from agricultural land it is important to be able to represent the effects of buffer strips in an accurate way in the simulations. In this study the model option to divide the field into different segments with different slopes, crops, and management was tested to simulate the reducing effects of grass buffer strips (BS) on P losses. The simulations were carried out with two segments of which one represented the cultivated field and the other the BS. Currently several modelled scenarios considering different soil types, climates and buffer strip widths (BSW) have been evaluated. The change of soil types in the simulations led to highly variable surface P losses which amounted e.g. in scenarios with spring barley and a southern Swedish climate from 0.14kg ha-1 (sand) up to 1.7 kg ha-1 (silty clay). Irrespective of soil type, the introduction of a 10m BS halved the surface P losses, with a reduction ranging e.g. from 51% for clay to 59% for silty clay loam. The total reduction of surface P losses increased with the BSW. However the increase in reducing efficiency was lower with each extra meter the BSW was expanded (18% for BSW 1m; 57% for BSW 10m, and 76% for BSW 30m on a silty loam). Amount of precipitation was the most important climatic factor for the annual average surface losses of P, while winter conditions with incidental snow melt events had a lower effect. In the future a further evaluation of the results will be undertaken. Additionally the possibility of transferring the field scale simulation results to catchment and regional scale will be investigated.

References

Larsson et al. (2007). Ecological Modelling 205, 123-134

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