

Modeling the Effect of Buffer Strips on Surface Losses of Particulate Phosphorus

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AIM

To simulate the reducing effect of grass buffer strips (BS) on surface losses of particulate phosphorus (PP) with the ICECREAM model in order to test the applicability to predict PP loss reduction by buffer strips in the estimation of the P load from Swedish agricultural land.

The Model

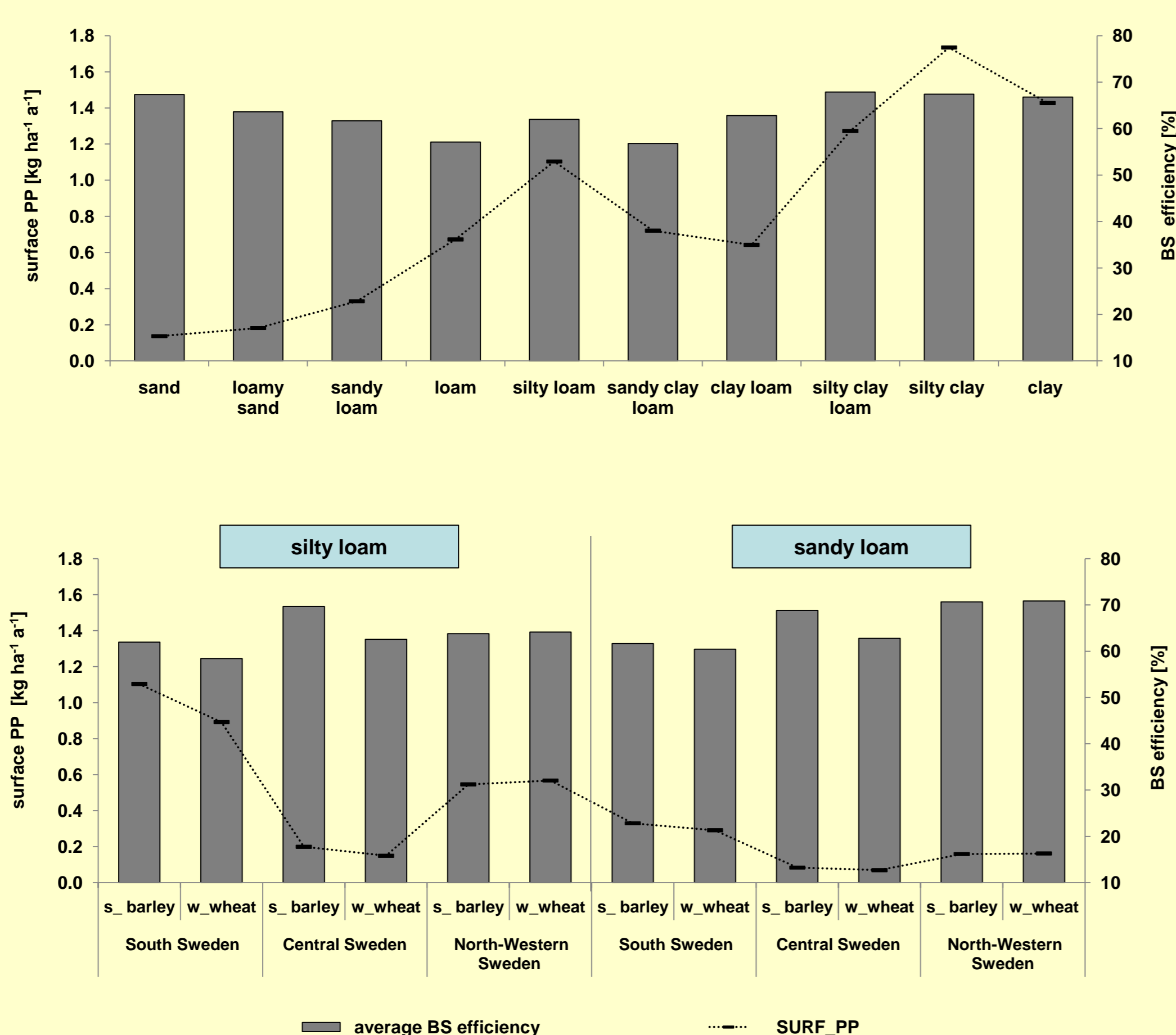
➤ ICECREAM is a field scale model to simulate erosion and nutrient losses. It is mainly an adaption of the CREAMS/GLEAMS models to cold and more humid climate conditions. The model includes an option to simulate several field segments differing in crop, slope, and management in one simulation run.

➤ The parameterisation of the model was in accordance with former ICECREAM applications to simulate P losses from Swedish agricultural land (Naturvårdsverket Rapport 5823).

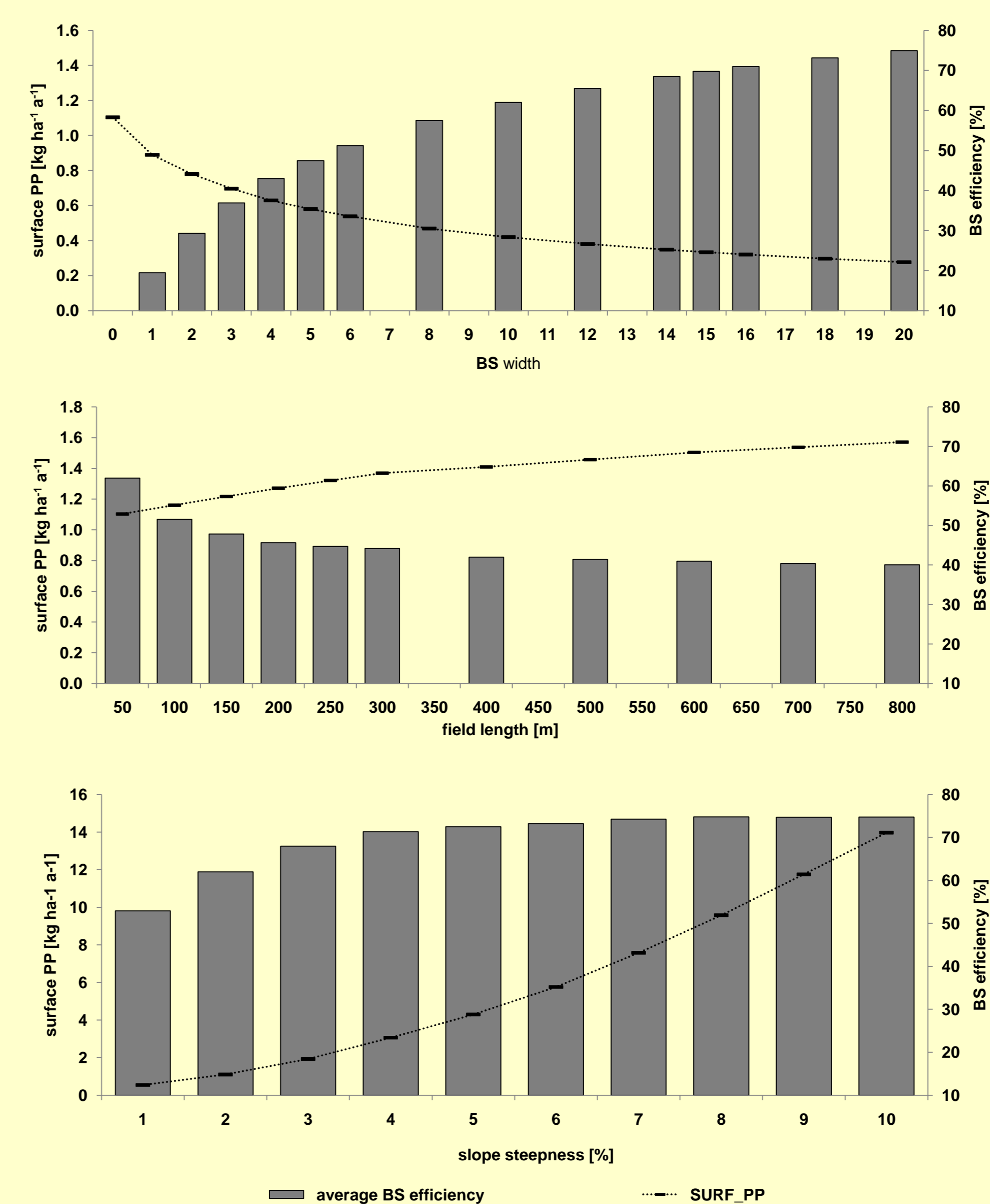
Scenarios

- Ten different soil types
 - Climate input representing three Swedish regions:
 - South Sweden (highest precipitation and temperature)
 - Central Sweden (lowest precipitation)
 - North Eastern Sweden (lowest temperature)
 - Two common field crops (spring barley, winter wheat)
 - Different field geometry (slope, field length, BS width)
- The BS was represented by integrating a second field segment with grass ley into the scenarios

RESULTS



Soil types and climate influenced simulated total surface PP losses strongly. The effect on relative reducing efficiency of the buffer strip was comparatively low. The maximum variation was 10 percent points.



Field geometrical parameters effected both total surface PP losses and the relative reducing efficiency of the buffer strip. The BS efficiency was especially sensitive to changes of the BS width in a range from 1 m to 10 m.

CONCLUSIONS

• The amount of surface PP losses as well as their reduction by the buffer strip were strongly correlated to the amount of erosion. Surface PP loss and sediment yield results showed in relative identical patterns. The changes of the BS efficiency with changing field geometrical parameters can be related to the influence these parameters have on the calculation of sediment yield in the erosion submodel.

• The ICECREAM simulations of the effects of buffer strips on surface PP losses were reasonable and widely in accordance with field observations. The approach will be included in future national estimations for P losses from Swedish agricultural land. However further investigation is required in terms of transferring the results to regional scale.