



DRAFT FOR SuMaNu Policy recommendation

The Baltic Sea Regional Nutrient Recycling Strategy aims to decrease eutrophication by reducing nutrient inputs to the Baltic Sea. SUMANU has developed a series of Policy Briefs to support the development of this strategy. This policy brief focuses on achieving sustainable use of manure nutrient and reducing nutrient loss at the farm-level. Please note that this is a draft. The final version will be published later.

Phosphorus fertilization planning measures

Currently, farmers in the Baltic Sea region (BSR) generally lack information, tools and incentives to plan sustainable use of phosphorus (P) for crop fertilization, especially that contained in manure. The following measures are recommended to improve the situation:

1. BSR cooperation to develop norms for phosphorus (P) fertilization (i.e. P fertilizer norms), including their adjustment according to soil type, soil P level, soil pH, expected yield, crop P need, field history and P-index.
2. Development of a joint P-index model, with modules that the different countries can use according to their needs, sharing relevant data and experiences with the practical implementation, including mapping fields.
3. P fertilization policies to ensure that farmers have incentives for planning sustainable fertilization with manure P in all BSR countries, including for the use of P-indices, P fertilizer norms and standard values for manure.



Background

The consumption of phosphorus in crop fertilizers according Eurostat was approximately 310,000 t in the eight EU Member States of the Baltic Sea Region in 2017. Compared to this, the P content in the livestock manure in the same countries was estimated to be almost 480,000 t (Foged, 2011a), but its effective use as crop fertilizer is currently sub-optimal due to the segregation of animal and crop production. Around 45,000,000 ha of land is used for agriculture in the eight EU Member States of the BSR (Eurostat 2019) and the amount of P in the livestock manure thus corresponds to 10.5 kg P per ha in average.



A sustainable use of P in farming is complex, and it entails especially measures to be introduced concerning crop fertilization planning. The crops require P as a major nutrient. The use of mineral P fertilizer is easier to account for than the use of manure P. Currently, the situation varies in the BSR countries regarding crop P norms for fertilization, standard values for manure P or policies on P in general. HELCOM has an annual flat rate maximal manure P fertilization of 25 kg per ha, which is not implemented by all countries.

Phosphorus fertilizer norms

P crop fertilizing norms are determined by fertilizer trials (e.g. Valkama et al. 2009; 2011). The norms for different crops are much influenced by the P content of the crop and the productivity, meaning the amount of P removed with the harvest. The norms are higher than the needs as not all

phosphorus fertilizer is taken up by the crop, being influenced by factors like soil pH, positioning and chemical composition of the P fertilizer, and the balance with other mineral plant nutrients.

In fertilizer planning, P fertilizer norms are determined based on standard norms for the crop and adjusted on based on information about the field history (P balance in the previous year, ploughed down previous crop, catch crop or straw), soil pH, soil type, soil P content, and expected yield. Optimally, from the environmental point of view, P fertilization planning should finally be adjusted according to the P-index for the field in question.

Use and advantage of P-indices

Although P fertilizer norms and standard values for manure would be used and respected, there is still the risk that the fertilization with P would lead to P losses, which depends on circumstances like field slope, P saturation, geological characteristics and cultivation systems. Therefore, norms and standards are optimally used in combination with a P-index that sets the limits for the amount of P, or manure P that the fields can accommodate while minimising the risk for losses. In other words; P-indices are meant for adjusting otherwise planned P-fertilization, and P-indices therefore **give little meaning** without (trustworthy and updated) P fertilizer norms and standard values for manure.

Development of P-indices

P-indices are developed to express the risk for P loss from a field to surface waters. The risk of P loss from an area depends on given and permanent conditions, such as soil type, geology and slope, as well as cultivation methods, that may change frequently.

A P-index usually includes at least the following parameters:

- Soil P level
- Erosion risk
- Soil structure
- Soil cover

There are various versions of the P-index developed around the world and in the Baltic Sea region and, in these P indices, some components are comparable, while others are different

(Foged, 2011b). The choice of components in a P-index should be based on consideration of factors that are most correlated with the risk for P loss in a given country. The Baltic Sea countries could join forces for development of a joint P-index model, with modules that the different countries can use according to their needs, sharing relevant data and experiences with the practical implementation, including mapping fields.

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