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Summary of experiences from the gypsum pilot project

Gypsum treatment of fields is a new and promising method for reducing phosphorus loading into waterways. An extensive pilot project of gypsum application is being implemented in Southwest Finland to study its suitability as a general water protection method to be used in the whole Southern Finland area. The results of the pilot project will help determine the social, environmental and logistical requirements for large-scale gypsum treatment and draw up a plan for promoting the use of gypsum.

The University of Helsinki is in charge of implementing the gypsum pilot project. The gypsum pilot project is part of the NutriTrade project, funded by the EU Central Baltic programme, where it functions as an example of cost-efficient methods for reducing the phosphorus load of the Baltic Sea. A comprehensive research setting has also been built around the gypsum pilot project to study the impacts of gypsum application on water quality, aquatic biota, soil and crops. Through the joint SAVE project of the University of Helsinki and the Finnish Environment Institute, the pilot project and the relevant study also receive funding from the Ministry of the Environment. SAVE is part of the circular economy, a key project of the Government of Juha Sipilä.

The middle and upper parts of the catchment area of the river Savijoki were selected as research sites. The selection was made based on the criteria set by the water quality study of the Finnish Environment Institute. The target area extends to the areas of the municipality of Lieto and the town of Paimio. From the local farmers it required a positive attitude towards the study and active participation in the project to have the gypsum pilot project carried out and the water quality study enabled. This was important with a view to including a sufficiently continuous area of the catchment in the gypsum application experiments.

Farmer participation in the pilot project

The recruitment of farmers to the gypsum experiment began in February 2016. The farmers living in the target area, a total of 107 people, were first contacted with a letter. Information about the project was disseminated at the same time through the municipal board of Lieto and local newspapers. Soon after this, a round of telephone interviews was launched. They offered the farmers an opportunity to express their thoughts about the project and ask questions. At the same time, they were also asked whether they were interested in participating in the gypsum pilot project or not. In addition, in March, an event for farmers was organised in Lieto town hall, which offered a forum for common discussion.

The viewpoints brought up by the farmers in the early stages of the gypsum pilot project helped the researchers clarify the preconditions for carrying out the study, identify the risks and prepare for problems. The most important issues included the limited liquidity of the farms, preparedness for adverse weather conditions and organisation of the large logistical process. These issues had to be solved before engaging any farmers in the experiment, as they needed to be taken into account in both the gypsum application agreement and the planning of the supply chain.

Most of the gypsum treatment costs arise from the supply and carriage of gypsum. Paying these, particularly in the case of large areas of application, would have required major financial investment from the farms and constituted an obstacle to participation in the study. As a solution, it was arranged that the costs of gypsum

and carriage were invoiced directly to the University of Helsinki. Therefore, the farms were to take care of the application costs only, and these were compensated for against an invoice.

Regarding the autumn, preparations needed to be made for very rainy circumstances as well. Under wet conditions, the carrying capacity of the fields, on one hand, and the gypsum getting wet, on the other, would have had an effect on how gypsum deliveries, storage and application succeeded. Therefore, the project was also prepared for postponing the application until next spring and storing the gypsum under rainproof cover by the side of the field over the winter. On the other hand, farmers also had concerns over the capacity of private roads to carry delivery trucks. This was solved in such a manner that the farmers were advised both to take into account any challenging sites in the planning of gypsum application areas and to inform the delivery chain of any factors affecting the routes when they were placing the order. They were asked to place the gypsum orders 1.5 months prior to the proposed time of application, so that there would be enough time for making the overall logistical plan and other preparations.

The engagement of farmers in the process continued through visits to the farms, during which a farm consultant (from ProAgria) familirized with the matter filled in the agreement template drawn up by the University of Helsinki with the farmer. During the visit, the suitability of the sites selected for gypsum application was inspected from the viewpoints of fertility analysis data, location and cropping plans, and the sites to be treated with gypsum were recorded in the agreement. Gypsum treatment was regarded as suitable for fields tilled in autumn and fields sowed directly with spring cereals, whose Ca-Mg ratio allowed for the additional load of calcium coming with gypsum. The negotiations with the farms ended in May. In total, 55 farms agreed to join the project, covering 1,559 hectares of farmland to be treated with gypsum.

Gypsum supply chain

In early summer 2016, farmers ordered the gypsum through an agricultural supply store (Hankkija) and the supply chain was prepared for the deliveries. The logistics company Movere drew up the delivery plan in accordance with the delivery times and quantities proposed by the farmers. The Yara plant at Siilinjärvi prepared the loading site for gypsum. Gypsum was loaded on trucks there and delivered directly to the farms.

The first loads were delivered to the target area in July, but it was not until in August that the threshing and gypsum deliveries could be launched after the weather turned dry and fair. Half of all the gypsum was delivered during the first two weeks of September. All deliveries had been made by the beginning of October. Gypsum deliveries were mainly made using full-trailer trucks, with the capacity to carry 40–50-tonne loads of gypsum. Some of the deliveries were made using smaller container and cassette trucks according to the farmers' wishes with a view to ensuring the carrying capacity of the roads, for example.

Logistically, the gypsum pilot project worked well. In spite of the early date for placing the gypsum orders, the farmers were able to flexibly arrange the delivery times with the logistics company as the application time approached. The loads were delivered directly to the application sites, since the fields could carry the weight of trucks. Only a few isolated problem situations arose in the early phases of the deliveries where trucks stuck in the fields required towing. The contractors, who applied gypsum over large field areas, were left with a positive image of the experiment, and the planning of the contract work in the area did not cause any problems for them.

Experiences of the farmers

The experiences of the farmers were collected through a survey conducted in December and January. In the survey, the farmers were asked to assess the success rate of the various work phases and to report any problems they had encountered. In addition, they were also asked about which factors had affected their

decision to participate. Responses were received from 48 of the farmers who participated in the gypsum experiment (87%). They applied gypsum on a total field area of more than 1,400 hectares. The analysis of the material collected through the survey continues, but some preliminary results are already available.

More than 90% of the respondents were of the opinion that all the work phases had gone well. In other words, the delivery, storage and internal carriage of gypsum on the farm as well as its application had gone as planned. Approximately every sixth farmer had applied the gypsum personally, and the rest had ordered a local contractor to do it. Gypsum was mainly spread using dry manure and moist lime spreaders. On the basis of the responses given, gypsum application had not caused much disturbance to other work in the fields, since approximately 70% of the respondents estimated that integrating gypsum application as part of other work had succeeded well or very well.

A majority of the farmers estimated that the handling of gypsum in terms of delivery, storage and spreading would be more difficult if the autumn was very rainy. However, in the autumn of 2016, the weather conditions for gypsum treatment of fields were exceptionally good, so none of the difficulties the farmers anticipated came true.

For about one third of the respondents gypsum treatment had been a totally unknown water protection method before the pilot project, and the rest had heard or read about it before. On the basis of the feedback received through the survey, the farmers were mostly satisfied with the way the project was implemented. Most of the farmers were of the opinion that they had received enough information on the project, that they had been listened to, and that they trusted the project to be able to collect the data received through the pilot project and to disseminate it.

Conclusions

In summary, we can conclude that the gypsum pilot succeeded very well. The key factors for the success were good interaction, careful planning, and the fair and dry autumn. On the other hand, all those involved in the gypsum pilot project were also capable of identifying the challenges and issues related to the handling of gypsum during a rainy autumn or on a larger scale. These are the starting points from which we will continue the planning work aimed at promoting the use of gypsum.