GYPSUM

AN EFFECTIVE WATER PROTECTION MEASURE FOR AGRICULTURE

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Background

- Nutrient loads to the Baltic Sea have been reduced considerably since 1980s. Unfortunately, this is not fully reflected in the state of the Sea. Additional reductions are needed, particularly in diffuse loading
- Agricultural loads can be reduced by
    - Imposing nutrient application limits (adjusting fertilisation with plant needs and soil nutrient levels)
    - Transporting manure & other nutrient rich biomasses from nutrient excess areas to nutrient deficient areas
    - Making use of fast-acting soil amendments, such as gypsum

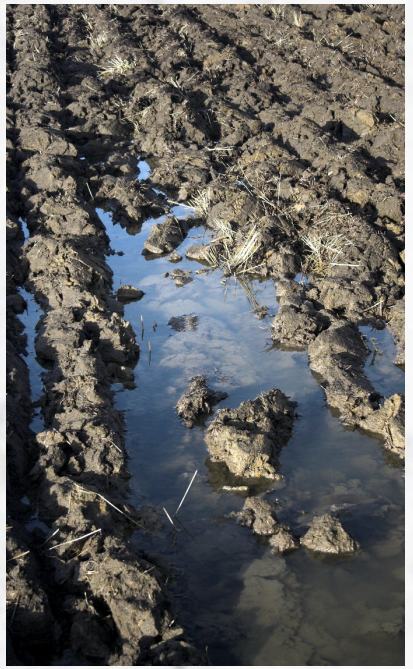
What is gypsum?

- $CaSO_4 * 2\ H_2O$
- Widely used in construction
- In agriculture: used as a fertilizer and in remediation of soil chemical and physical problems, in erosion control
- An environmental application: Gypsum reduces the losses of phosphorus and organic carbon

How does it work?

- Gypsum reduces erosion and leakage of nutrients from agricultural fields
- Gypsum reduces eutrophication, improves water quality and the living conditions of aquatic species
- Gypsum does not affect harvest levels

According to Finnish studies, gypsum decreases phosphorus loads by 50%



Photos: Pasi Valkama, VHVSY

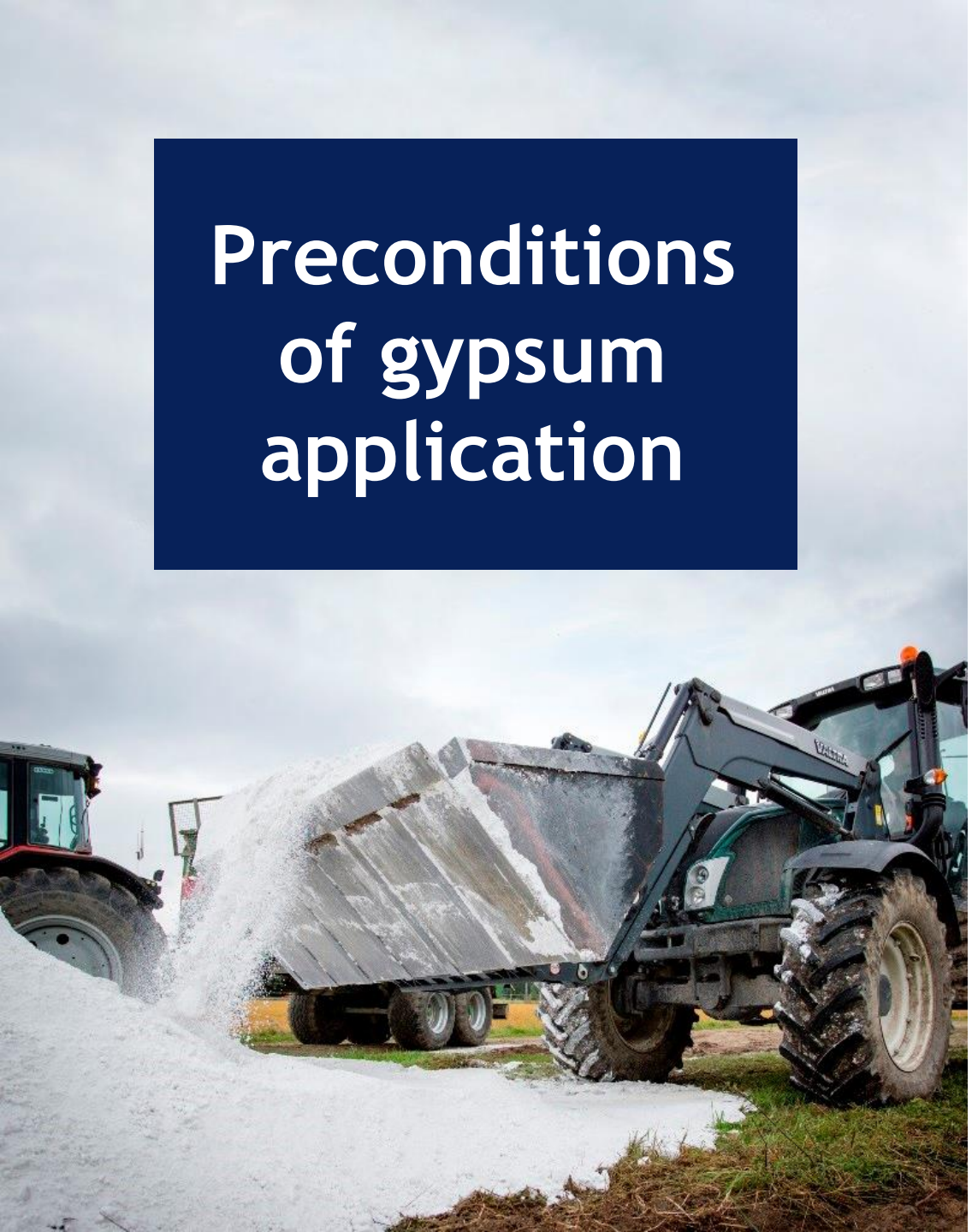
Effect of large-scale gypsum application in the Baltic Sea region

- Rough estimates by University of Helsinki and Finnish Environment Institute (Syke):
  - Agricultural phosphorus runoff to the Baltic Sea from five countries – Denmark, Estonia, Finland, Poland and Sweden – amounts to 8000 tonnes annually
  - By preliminary estimates, gypsum amendment of arable fields could reduce the load by up to 1500–2000 tonnes from these five countries alone
  - This would correspond to approximately 20% of all needed phosphorus reductions called for in the HELCOM Baltic Sea Action Plan
  - Gypsum amendment can provide a promising solution to agricultural phosphorus loads for the Baltic Sea region

Cost-effectiveness

- In a recent project along river Vantaa, the price of a reduced kilogram of phosphorus amounted to 57 €
    - A large part of the gypsum was received as a donation from fertilizer company Yara
- Calculated at the market price of gypsum, the price per kilogram of phosphorus reduced would have been 80 €
- For other agricultural water protection measures, the cost of 30% phosphorus reduction is 220 €/kg P (Source: University of Helsinki)

Preconditions of gypsum application



1. Gypsum needs to be suitable for agricultural use

2. Gypsum is suitable for river catchments, but sulfate may have adverse effects in lakes

3. Selection of field parcels & no direct drilling immediately after gypsum application

Summary of gypsum in Finland

- 2009-2017: Research and pilot projects <2000 ha
- 2018-2020: River Vantaa >3600 ha
- 2020-2023: Public funding ~100 000 ha

Thank you!

More info on gypsum as a water protection measure

- https://johnnurmisensaatio.fi/en/projects/gypsum-initiative/
- Info package prepared by project SAVE
    - In English https://blogs.helsinki.fi/save-kipsihanke/materials/?lang=en
    - Frequently asked questions https://blogs.helsinki.fi/save-kipsihanke/faq/?lang=en