

"Nutrient Balanced Fertilization - the fundamental practice to reach nutrient efficiency"

conference "Nutrient-efficient agriculture in the Baltic Sea
Region" 14 June 2021

Gunnar Norén
Senior Advisor
Coalition Clean Baltic

"Nutrient Balanced Fertilization - the fundamental practice to reach nutrient efficiency"

- *Fertilize the crop – not the soil*
- Source for **all nutrient leakage** from agriculture land **come via Over-Fertilization** (except N from air deposition of NOx and ammonia)
- >50 % Nutrient pollution load to the Baltic Sea come from Agriculture sector
- Eutrophication problem of Baltic Sea only solved if Agri sector reduce its Nutrient load significantly. No alternative actions exist, to solve Baltic eutrophication. **Agri sector is the critical nutrient polluter.**

HELCOM requirements – HELCOM Annex III part 2

*“The **application of nutrients** in agricultural land shall be limited, based on a balance between the foreseeable nutrient requirements of the crops and the nutrient supply to the crops from the soil and the nutrients **with a view to minimise eutrophication**”*

- A nutrient balance “with a view to minimise eutrophication” imply that **nutrient leakage shall be minimised at fertilizer application (tackled at source) via *minimised nutrient surplus***
- This **HELCOM requirement is legally binding** for all BSR-countries and farmers
- Balanced Fertilization with ”minimised nutrient surplus” – so far not implemented with most national regulations.

Fertilization practice today:

- **Optimal Economic Fertilization (OEF) practices is applied.**
Farmers fertilize to get as high crop yield as possible.
Farmers-businessmen, primary aim is to optimise their production system to the benefit of themselves.
- *Optimal/Expected yield* is the reference for fertilization calculation. Such procedure can imply heavy overfertilization.
Fertilization applied for expected harvest, for the harvest you want, and not according to the need for the crop planted.
- Profit for the farmer depend on **price on fertilizer** and **expected world price-setting of crops** after the harvest.
Inexpensive fertilizers can make it more profitable to Overfertilize. *Optimal Economic Fertilization practices drives the overfertilization.*
- *Sweden example: when tax on mineral fertilizers was removed , the Swedish Board of Agriculture within 3 months increased N-fertilization advice for main crops +10 kg N/ha. Not because of need for the crops, but because of higher profits for farmers.

Major aspects that control Overfertilization:

- Setting of **Target yield for crops** – realistic expected crop yield
- Nutrient Balanced Fertilization & **Nutrient Surplus calculations**, in line with **Tolerable surplus limits** (National limit values)
- Farmers **declare purchase of fertilizers** – Controlled to fulfil the adopted annual Fertilization Plan (additional fertilization stopped)

Such aspects not only for farmer to decide on

* To control overfertilization: **Nutrient surplus calculation** must be performed for **N and P separately at field level** for each crop and **strict Tolerable surplus values (kg/ha)**

- **Advisory service** should **decide/adopt an Annual Fertilization Plan** regulating fertilizer usage (violations to be punished with fines)

HELCOM ministers 2013

- WE DECIDE to investigate *measures to reduce nutrient surplus* in fertilization practices to *reach nutrient balanced fertilization* with the objective to come to an agreement on national level by 2018;
- WE AGREE applying *by 2018 at the latest annual nutrient accounting at farm level* taking into account soil and climate conditions giving the possibility to *reach nutrient balanced fertilization and reduce nutrient losses* at regional level in the countries

HELCOM countries need develop Mandatory regulations
- apply Tolerable Nutrient Surplus levels to fulfil the decision of HELCOM Ministerial Meeting decision in 2013

Proposals for HELCOM actions in Baltic Sea Region

*Control overfertilization via Nutrient Balanced Fertilization practices (taking into account nutrient soil status), via *mandatory calculation of N and P-surplus (kg/ha) at field level* (for farms > 20 ha and livestock farming with > 20 Animal Units)

Appropriate national surplus limits:

- Tolerable N-surplus – crop production: 20 kg N/ha,y
- Tolerable N-surplus – animal production: 30/35/40 kg N/ha,y
- Tolerable P-surplus levels: 0 kg P/ha,y (not apply more P than the crop can use annually)
- Nutrient status - nutrient soil mapping (P & N) at least every 5 year
- Wintergreen crops only fertilized for plant growth during autumn (no storage fertilization with manure/mineral fertilisers for growing season starting in spring-time)
- *Precision N-fertilizer application* to reduce N-surplus. Nitrogen application 'GPS map' based on crop scanning by a tractor-mounted N-sensor (mandatory all farms >50 ha)

Denmark control of over fertilization (until 2015)

- Fertilization application for Optimal Economic Fertilization **reduced with 15 %**. Farmers fertilizer purchase strictly controlled.

Management requirement for manure fertilizers

- **Full content** of nitrogen and phosphorus in manure shall be applied as **input figures in nutrient balance calculation** (nutrient analyses of manure)
- **Stables**: animals on the bedding and composting - minimize ammonia emissions - Save nitrogen
- **Manure slurry spreading** shall use **injection techniques** and apply it directly into the active layer of soil (farms >30 Animal Units)
- **Precision fertilizer application of manure slurry** to reduce N-surplus. Nitrogen application 'map' based on nutrient soil maps and crop scanning by a tractor-mounted N-sensor (mandatory all farms >50 ha & >50 Animal Unit⁸)

- Manure storage tanks shall always be covered
- * Temporary storage of manure (on farmland) always covered and limited to max. one month
- Manure not allowed to spread on P-saturated soils (high P-class) where farmer has main interest of the N-content. P-application must always balance with P-uptake of crops (P-surplus – Zero)

EU policies & Agriculture

Farm to Fork strategy

Improving nutrient efficiency is a key objective of the

EU policy Farm to Fork set targets for 2030

-reduce nutrient losses with 50% (from Zero Pollution Targets)

-reduce fertilizer use by at least 20%

EC develop Farm Sust Tool for Nutrients – FaST,

www.fastplatform.eu

MS shall apply FaST or existing tools (Minimum requirements)

*a balance on main nutrients at field scale. Variables available i.e yield target

Stronger requirements and control are necessary to reduce Nutrient Surplus in BSR to fulfil coming EU policies and requirements

CONCLUSIONS

- Agri sector advised for "voluntary measures" to control Over-Fertilization and HELCOM has so far not developed "Nutrient Surplus limits".
- Ongoing major Agriculture nutrient load is still 50% - demonstrate the failure to control and limit agri nutrient leakage with voluntary measures during 25 years within HELCOM
- New approach is necessary – Strict limit for nutrient surplus on farmland
- Need control Agri sector nutrient pollution with same approach as society control Wastewater sector and Industry sector, where strict limits for N and P discharge (kg/day) are set and controlled.
- The Agri sector must show willingness for more efficient measures to reduce its Nutrient Pollution at source
... must change attitude; to be credible "Sustainable sector" ready to apply nutrient surplus limits (kg/ha)
- ***The most important Nutrient leakage driver in BSR that create Baltic Eutrophication is Overfertilization practices on farmland.***