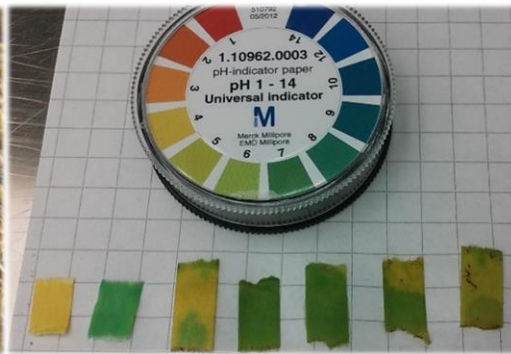


## 1.2. Maintaining Correct Soil pH level



**Summary:** In neutral pH range 6-6,5 most of the nutrients are available for the plants and microfauna thrives. Liming with  $\text{CaCO}_3$  increases soil pH and improves cation balance and structure of the soil. Optimal pH assure also a rich microbe population thus improves granular structure of the soil.

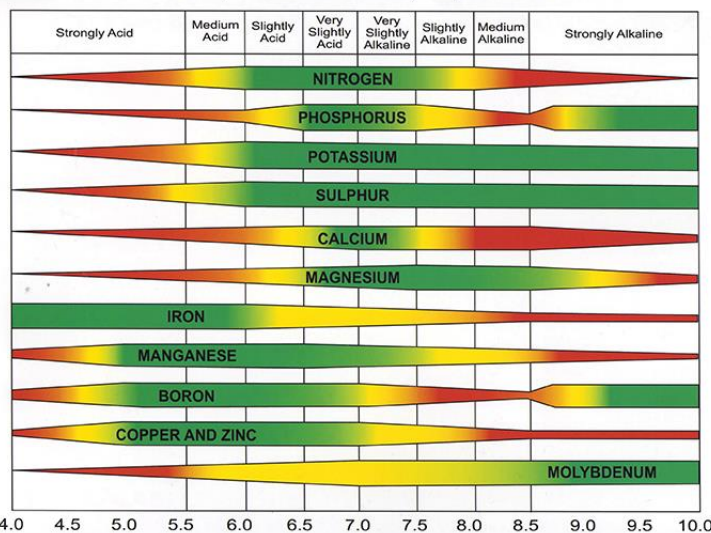
**Operation and Applicability:** Lime is applied on the field surface before soil tilling. Suits for all soil types. Especially good for the cation balance in the clay and silt fields.

**Efficiency:** Increase of the soil pH to the neutral level improves nutrient utilization of the plants, increases the crop yields and prevents cation leachate.

Efficiency and functionality   Costs of the Practice  Ease of Operation  Potential for nutrient recovery  

- The soil acidity is a common problem in non-calcareous lands.
- Rainfall, nitrogen fertilizers, cation intake of the plants, intensive tilling of the soil and temporarily uncultivated fields increase acidity of the soil.
- The suitable soil pH is 6-6,5.
- Most of the nutrients are available in neutral pH range e.g. phosphorus.
- Though, some crops e.g. potatoes, grass and oats manage in lower pH level (even in 5,6).
- Good soil pH improves the granular structure and internal drainage of the soil and well-being of the microfauna.
- In neutral pH cation exchange capacity of the soil is increased and reserved nutrients are released more easily.
- Under pH 6 e.g. aluminum is in dissolved form and harms plant roots.

How soil pH affects availability of plant nutrients.



**Costs of the Practice:** The spreading and application equipment is needed, cost of labour and lime  $\approx 30$  €/tn

**Ability for climate change mitigation:** When the soil structure and nutrient utilization is improved it decreases the risk for unforeseeable changes due to climate change e.g. less soil erosion in torrential rains.

**Potential for nutrient recovery:** The neutral soil pH level improves nutrient availability and reduce usage of chemical fertilizers.

## Evidence of Success: Liming with $\text{CaCO}_3$



*When one kilogram of nitrate is added on the field it needs two kilograms of lime ( $\text{CaCO}_3$ ) to neutralize the acidic effect of the fertilizer. Regarding to that, the soil might need 500-1000 kg lime/ha/year.*

*The common application amount of lime is usually 5–10 tons/ha depending on the pH in the field. The pH level can be increased 0,4 pH-units with 2–10 tons/ha of lime depending on the soil type being lowest in the coarse mineral soils with low organic matter content and being highest in the clay soils with high organic matter content.*

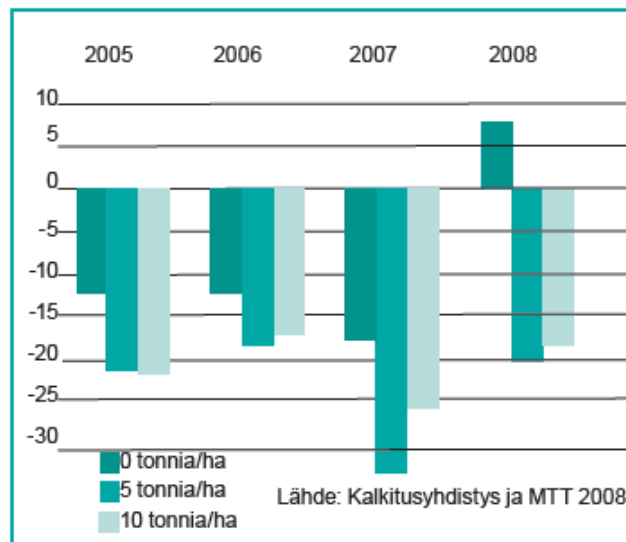
### Benefits of the liming

- 💧 Improves soil and granular structure and conditions for a good microbes
- 💧 Nutrient availability increases root growth and nutrient intake (positive cycle) → crop yield
- 💧 Increases cation storages in the ground
- 💧 Especially good method for clay and silt soils → changes cation balance
- 💧 On a dry season keeps moisture in the ground
- 💧 pH increase lowers toxicity of the metals (Al, Mn & Fe)

### Investigate product content

- 💧 Take a look at the neutralization effect of the product (Ca %)
- 💧 Also pay attention to Mg:  
Does the field need it?  
Low Ca:Mg-ratio is unfavorable

### The effect of the lime application (tons/ha) on nitrogen balance in the mineral soil



Picture: N-balance of the grass field in the mineral soil. If value is below zero, the plants have taken more nitrogen from the ground than what's been added.

### MORE INFORMATION:

[https://www.hankkija.fi/Liitetiedostot/Docs/agri\\_esite\\_2012\\_fiqkqj.pdf](https://www.hankkija.fi/Liitetiedostot/Docs/agri_esite_2012_fiqkqj.pdf)

[https://www.agric.wa.gov.au/soil-acidity/soil-ph?page=0%2C1#smartpaging\\_toc\\_p1\\_so\\_h2](https://www.agric.wa.gov.au/soil-acidity/soil-ph?page=0%2C1#smartpaging_toc_p1_so_h2)