



## Determination the influence of liming with oilshale ashes to the changes of water extractable plant nutrients in acidic soils

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The acidification process influences mostly soils used agriculturally. It causes yield decrease and loss of plant nutrients from soil via leaching and also rise in concentration of undesirable, harmful for plant roots ions ( $Al^{3+}$ ) in soil solution.

To overcome the negative effects of acidification to agricultural plant production, liming of agriculturally managed soils is widely in use. 40% of agriculturally used lands in Estonia needs periodic liming and approximately 130 000 tons of liming material will be needed for neutralizing acidic soils every year. Typically different naturally occurring carbonatic materials, as limestone and dolomite, is used for this purpose. In Estonia more than 9 million tons of ash has been produced as waste byproduct in Estonian power plants every year. Only 1,9% of this byproduct has been reused in building materials industry and agriculture. The amounts of oilshale ash used as liming material by farmers is increasing from year to year.

The oilshale fly ash is highly alkaline material with high content of Ca (20 – 33%), K (2,6 – 10%), Mg (2 – 4%) and several microelement (Zn, Cu, Mo, Mn). Due to modernization of powerplants the new burning technology (CFB) was introduced. Therefore the fly ash with new chemical and physical properties appeared on the market of liming agents for farmers.

The aim of the research was to investigate the change of water soluble plant nutrient (P, K, Mg, Ca) content in acidic soils as a result of liming with oilshale fly ash. Experiment was conducted as a pot experiment with five different soils and three fly ashes and two types of granulated ashes and powdered limestone. The influence of soil organic carbon, soil acidity, texture, to the water soluble nutrient gradient in soil was investigated.

The differences between oilshale ashes to the changes in nutrient gradient was found. The Nutrient gradient depends from oilshale ash as well from soil properties.