



## **About possibility of use of smartphones for determination of plant available phosphorus in soil**

Tonis Tonutare (1), Aldo Oras (1), Arno Ratas (2), and Tõnu Tõnutare (1)

(1) Estonian University of Life Sciences, Tartu, Estonia (tonu.tonutare@gmail.com), (2) Tartu Vocational Education Centre, Tartu, Estonia (arno.ratas@gmail.com)

Phosphorus is one of the most limiting elements in agriculture. Most agricultural areas need fertilization with additional amounts of P fertilizer for good yield. The high tech varieties are especially demanding for soil P reserves. At the same time there is a risk for environment contamination from high inputs of P into soil due leaching to groundwaters and into waterbodies. The P from agriculture is one of the main source of nutrients caused eutrophication of rivers, lakes and seas. For these reasons it is very important to determine the amount of plant available P in soils.

From the viewpoint of farmers, the method for analysis must be quick and precise. At the moment determination of P content in soils and growing medias have several instrumental methods in use. In commercial labs the main methods are Vis- spectrometrical by molybdene blue and ICP-OES. All laboratory methods are time consuming and all procedure from taking samples on the field to obtaining results by farmers takes at minimum several days. Therefore there is a need for fast and simple methods for estimation of soils fertility status.

The development of electronic devices gives us the potential possibility to use digital cameras and smartphones technology for spectrometric analysis. Principially the time consuming laboratory analysis can be done today with smartphone on the field conditions.

The aim of our work was to check the possibility and develop the method for soil plant available P determination using the smartphones. In our work we used smartphones from diferent producers for taking photos from molybdate blue soil extracts and processing the images with special software. For comparison the analysis of extracts were performed with Vis-spectrometry and with microwaveplasma atomic emission spectrometry.