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Application of continuous flow analysis for determination of exchangeable magnesium in the basic types of russian soils

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Abstract

It is not possible to obtain a high yield of crops of good quality in the absence of balanced nutrition including sufficient supply of magnesium. Such imbalance also is a bad influence on the efficiency of fertilizers use.

Magnesium is a multifunctional element of the plants nutrition. This element is included in the molecules of chlorophyll, pectines, phytin, cells membranes. It takes a part in synthesis of aminoacids, proteins, and more than 300 ferments. Magnesium also takes a part in biochemical reactions during the cellular respiration and increases plant resistance to unfavorable growing conditions. Unlike for other macronutrients, magnesium deficiency doesn't lead to the death of plants but it causes a decrease of crops properties and an increase of yield losses during the storage period. Magnesium is a low-renewable because of its high capability to migration along the soil profile and its removal with the harvest. Thus the constant soil magnesium supply control is of great importance for high quality of crops and for the ecologically and economically proved application of magnesium fertilizers. At present, to determine the content of exchangeable magnesium in soils there are a few methods widely used – photometry, atomic absorption spectroscopy and chelatometry according to the standard method GOST 26487-85. There are automated analytical systems, such as continuous flow analyzer San^{++}. The metrological characteristics of such system are not inferior to the modern analytical instruments, such as atomic absorption and atomic emission spectrometry, without, in most cases, the negative impact of interference cations and anions present in the soil and plant extracts. The aim of this research was to investigate the opportunity of applying of the classical method modification to the flow analysis system.

As our findings demonstrate modification we proposed exceeds the conventional technique, possessing at the same time high automation potential. The values resulting from the analysis of reference samples were within the error margins of a standardized method (GOST 26487-85).

As our research has shown the modified method is can be considered as promising in terms of applicability for practice of agrochemical soil analysis in Russia for purposes of exchangeable magnesium determination. Capability to apply method to the instrument for continuous flow analysis has significant meaning in relation of the productivity rate rise of routine laboratory practice.

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