



Impact of soil sampling on phosphorus determination results

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Introduction

Soil is a special natural body, transient between living and nonliving nature. Its fertility is one of the main factors for plant life. Phosphorus composition is a significant parameter among the chemical characteristics of soil, as it is one of the main nutritional elements of plant, playing a principal role in metabolism.

Low concentration of phosphorus in a liquid fraction of the soil limits its uptake by plant. Lack of the element destroys interchange of energy and metabolism in plant; the period of maturation is prolonged, quality of the production falls, leaves change their color and grow slowly.

The aim of the project was to study the concentration of phosphorus in different type soils and to select the corresponding method for the element determination according to soil type; as well as to set replicate experiments for the evaluation of method accuracy; to determine the relation between sampling, processing and final results.

Results

Content of phosphorus was different in various type soils. Tables 1 and 2 demonstrate that phosphorus concentration in the upper layers of soil was higher compared to lower one. Significant role played the soil pH as well, as it regulates the ions concentration in a liquid fraction of soil and affects the phosphorus retention and correspondingly its existence in the soil.

Conclusions

Reliability of the obtained results depends on many other parameters, besides the fair analysis. One of the important factors is right sampling in field conditions and laboratory processing corresponding to standard.

Investigation of the influence of environmental conditions on the accuracy of analysis and final results is planned in future.

Materials & Methods

Soil samples from different sites of Georgia were selected for the experiment. Phosphorus was determined after Olsen and Machigin. Applied methods differ by the preparation of soil extracts, which depends on the soil type. In the case of acid soils the solution of sodium bicarbonate was used for extraction, while for alkali soils – ammonium carbonate did. Phosphorus in extracts was revealed by the ammonium molybdate. The optical density of the received blue color solution was measured at 700 nm wave length.

Sample	1		2		3		4		5	
Depth of a layer (cm)	0-20	20-40	0-20	20-40	0-20	20-40	0-20	20-40	0-20	20-40
pH	7.76	7.86	7.88	8.03	7.88	8.15	7.70	7.85	7.88	7.70
P ₂ O ₅ (mg/100 g)	6.09	2.97	2.95	0.99	1.74	1.22	2.02	1.74	2.87	2.06

Table:1 Phosphorus determination in the soil after Machigin

Sample	1		2		3		4		5	
Depth of a layer (cm)	0-20	20-40	0-20	20-40	0-20	20-40	0-20	20-40	0-20	20-40
pH	6.41	6.59	6.01	5.97	5.02	4.74	5.69	5.83	5.50	5.29
P ₂ O ₅ (mg/100 g)	19.06	16.28	10.72	9.14	9.36	6.38	13.50	13.24	15.66	10.78

Table:2 Phosphorus determination in the soil after Olsen

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