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Determination of Relation Between Organic Acids and Amount of Available Phosphorus in Soil

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Abstract: Phosphorus is an essential nutrient for the growth and development of plants. The usefulness level in the soil is significantly affected by many factors, especially the soil properties. In particular, microbial activity in the soil and organic acids secreted by microorganisms have important effects on phosphorus availability. For this purpose, 5 different doses of phosphorus were applied (0, 5, 10, 20 and 40 kg da^{-1}) and the amount of organic acid and available phosphorus in soil samples taken from the phosphorus treated area were investigated. In order to determine the relationship between the amount of phosphorus in the soil and organic acids, the results were statistically tested. As a result of the study, significant increases were determined in the amount of some organic acids and total organic acid depending on the amount of phosphorus fertilizer applied. However, the amount of some organic acids began to decrease with increasing phosphorus dose, while significant increases were observed in the amount of some organic acids.

Key words: Phosphorus, organic acid, soil

1. Introduction

In order to increase the productivity of plants, phosphorus is one of the most deficient elements after nitrogen for the soil of our country. Phosphorus constituting 0.3-0.5% of plant dry matter; It is one of the essential nutrients for plant growth in the structure of plants, key enzymes, nucleic acids, phospholipids and ATP-related reactions (Schachtman, 1998; Raghothama, 1999).

Therefore, interest in phosphorus continues in our country as well as in the world. Although the total phosphorus content in the soils is normal and sometimes high, the farmers are applying phosphorus as fertilizer well above the plant need due

to the lack of useful phosphorus and fixation of the applied phosphorus. This excessive application brings economic damage and environmental pollution.

Due to the climate zone, geological structure and geographic location of our country, soils have high clay, lime, high pH and low organic matter contents. Such chemical properties significantly limit the usefulness of phosphorus to plants in soils (Gallet et al., 2003; Fransson et al., 2003). Unlike other plant nutrients, a large part of the applied phosphorus is held by the soil with great force, and most of the phosphorus fertilizers applied to the soil is transformed into a form that plants can not take (Shin et al., 2004).

2. Materials and Methods

In order to determine the effect of different doses of phosphorus applications on the amount of organic acid in the soil, 5 different doses of phosphorus (0, 5, 10, 20 and 40 kg da^{-1}) were carried out in 25 pots in 5 replications under greenhouse conditions. Following the application of phosphorus in 2 kg pots, it was allowed to incubate for 3 months.

The water needs of the soils were determined by taking into consideration the field capacity and the soil moisture level was kept at the field capacity by continuous controls.

At the end of the incubation period, soil samples were taken from all pots. Organic acid and soil available phosphorus content were determined in taken samples.

3. Results and Discussion

The amount of organic acid in the soil varied significantly depending on the phosphorus doses applied at different doses (Table 1).

Depending on the phosphorus doses, the amounts of some organic acids increased, while the amounts of some organic acids decreased. The highest oxalic, propionic, tartaric, maleic and fumaric acid were obtained from phosphorus application at 10 kg da^{-1}. The highest butyric, malonic, citric and succinic acid were determined from phosphorus application at 40 kg da^{-1}.

When the effect of different doses of phosphorus application on the amount of useful phosphorus in the soil was examined, the amount of useful phosphorus in the soil increased depending on the dose of phosphorus (Table 2). The highest available phosphorus was obtained from phosphorus application at 40 kg da^{-1}.

Table 1.Effects of different phosphorus doses on soil organic acid contents, ng μ^{-1}

P_2O_5 kg da^{-1}	Oxalic acid	Propionic acid	Tartaric acid	Butyric acid	Malonic acid	Malic acid
0	18,12	22,34	14,35	17,68	17,66	11,23
5	19,76	24,12	12,33	19,78	15,44	12,32
10	20,22	25,77	15,46	22,32	18,79	14,55
20	19,89	21,00	13,22	24,55	17,66	17,66
40	17,67	23,45	14,53	26,78	18,90	13,24

P_2O_5 kg da^{-1}	Lactic acid	Citric acid	Maleic acid	Fumaric acid	Succinic acid
0	22,32	13,22	6,57	16,57	21,33
5	24,33	15,46	7,88	17,66	24,35
10	25,46	16,77	11,23	18,79	26,55
20	26,55	18,77	8,79	15,44	27,80
40	24,33	22,32	9,88	16,57	30,11

The amount of available phosphorus in the soil has been obtained at the low control group. In the application of phosphorus in soil, although increasing doses increase the amount of useful phosphorus, the efficiency of use of phosphorus fertilizers has started to decrease.

Table 2.Effects of different phosphorus doses on soil available phosphorus, kg da^{-1}

	P_2O_5 kg da^{-1}
0	1,75
5	3,25
10	5,46
20	6,77
40	8,12

4. Conclusion

In this study, it was determined that the application of different doses of phosphorus on the amount of useful phosphorus in the soil and the amount of organic acid in the soil were determined. It was determined that excessive amount of phosphorus application, especially in soils with low phosphorus content, had no significant effect on increasing the amount of useful phosphorus in the soil. This study was conducted under greenhouse conditions and the results of the study should be supported with field studies.

References

Fransson, A., Aarle, I. M., Olsson, P. A., and Tyler, G., 2003. Plantago Lanceolata L. and Rumex Acetosella L. differ in their utilisation of soil phosphorus fractions. Plant and Soil 248: 285-295.

Gallet, A., Flish, R., Ryser, J., Frossard, E. and Sinaj, S., 2003. Effect of phosphate fertilization on crop yield and soil phosphorus status. J. Plant Nutr. Sci. 166: 568- 578.

Raghothama, K.G. 1999. Phosphate acquisition. Annual Review of Plant Physiology and Plant Molecular Biology 50: 665 – 693.

Schachtman, D.P., Reid, R.J, and Ayling, S.M. 1998. Phosphorus uptake by plants: from soil to cell. Plant Physiology, 116: 447 – 453.

Shin, H., Shin, H. S., Dewbre, G. R., and Harrison, M., 2004. Phosphate transport in Arabidopsis: Pht1;1 and Pht1; 4 play a major role in phosphate acquisition from both low and high phosphate environments. The Plant Journal 39:629-642.