



## CAUSES OF SOIL FERTILITY

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### Abstract

The article examines the activity of enzymes in black soil and gray soil zones and the characteristics of specific enzymes. Also, unfavorable conditions for the strong functioning of substances with biological activity (air temperature, soil pH indicator, influence of humidity. In addition, the amount of humus substances in gray soils is low, that is, in the upper layer, it is only 1-1.5% In this zone, the activity of enzymes, particularly peroxidase, was found to be 3-3.5mg/g, and the activity of polyphenoloxidase was 0.50-0.70mg/g.

**Keywords:** polyphenoloxidase, perioxidase, protease and urease, nitrification and aminification.

### Introduction

Soil fertility is directly dependent on its physico-chemical properties, humus layer, organic mineral substances contained in its composition, and especially the collection, amount and biological activities of various beneficial microorganisms in its composition. Organic and inorganic substances in the soil are very important for the growth, development, and fruitfulness of plants, especially the wide distribution, diversity, and especially the fermentation activity of microorganisms. Therefore, it is one of the most important and urgent tasks to study and manage the cultivated areas of our country, the quality of the soil composition, the chemical and biological, especially microbiological processes that take place in them, to improve the structure of the soil, and to increase its productivity. [2, 3].

Despite the fact that the organic matter reserves of the soils found in Central Asia are very low, it has been proven in the experiment that the activity of enzymes in them is at a high level. Enzymes in black soil zones, especially perioxidase enzyme, were found at 0-1.7 mg/g of soil, and polyphenoloxidase enzyme at 0.70-0.95 mg/g. Therefore, the decomposition and mineralization of the reserves of organic matter residues of the soils in this zone continues slowly. That is, the process of assimilation of organic material residues by plants is very low.[2, 4].

Because unfavorable conditions (air temperature, soil pH, humidity) have a negative effect on their biological activity. At the same time, the amount of humus in gray soils is low, that is, in the upper layer, it is only 1-1.5%. In this zone, it was determined that





the activity of enzymes, particularly peroxidase, is 3-3.5 mg/g, while the activity of polyphenol oxidase is 0.50-0.70 mg/g. These numbers indicate that the accumulation of organic matter reserves in saliva is at a very low level. The mineralization of organic matter in the gray soil zones is several times stronger than the synthesis process. So, taking into account the accumulation of humus in this soil, it is noted that adding mineral fertilizers along with lime and applying them to the soil every year along with planting crops has a good effect. [2, 3].

The activity of enzymes in the soil is directly dependent on the metabolism of microorganisms and soil conditions, as well as the synthesis of enzymes involved in metabolism. For example, protease and urease carry out the processes of mineralization of organic nitrogen in the soil, that is, as a result of the process of nitrification and aminification in the soil, it leads to the formation of nitrogen compounds that are quickly absorbed by plants. The importance and activities of these enzymes, which act as catalysts in these reactions, which are very important for the soil, are incalculable. At the same time, the function of this enzyme changes constantly, depending on the connection of the catalase enzyme with oxygen and other elements released from it, as well as the amount or lack of organic matter in the soil. For example, in the conditions of Uzbekistan, the activity of the catalase enzyme in the soil is diverse, and the amount of fertilizer directly depends on the small or large reserves of humus in the soil. is completed by the hydrolysis and mineralization of organic compounds. These two processes continue interdependently. [2, 3].

Invertase enzyme ( $\alpha$ -fructofuranosidase) catalyzes the splitting of various carbohydrates into glucose and fructose molecules. Many data confirm the relationship between invertase activity and biological activity of the soil, the content of organic matter in it, the yield of field crops and changes in the soil during agricultural use (Khaziev F.Kh., 1972; Galstyan A. Sh. , 1978; Vasilieva L.I., 1980). As the depth of plowing increases, the activity of invertase in the upper layer of the soil decreases slightly, which is explained by the reduction of this soil layer, because during deep plowing, the main amount of plant residues is placed in the lower layers. Accumulation of most of the post-establishment residues in the upper soil layer during no-till plowing leads to a 5-15% decrease in invertase activity in the 30-40 cm layer by the end of the growing season of plants. [1, 3].

In the fertilized background, invertase activity increased by an average of 5% only after plowing. Fertilizers did not affect the activity of this enzyme according to non-mold tillage methods. The effect of urease is related to the hydrolytic splitting of the bond between nitrogen and carbon (CO-IN) in the molecules of nitrogenous organic





compounds. Therefore, many researchers noted a positive correlation between urea activity and the amount of nitrogen and humus in the soil. The activity of urease depends not only on the total amount of humus, but also on its quality, which is mainly related to the ratio of carbon to nitrogen (C: 14). Organic matter with the highest ratio of carbon to nitrogen corresponds to the highest activity of urease; as the value of the ratio of carbon to nitrogen decreases, the activity of the enzyme also decreases. This is V.D. Mukha and L.I. Vasileva shows the regulating effect of urea on the processes of conversion of nitrogenous organic compounds in the soil. In our research, among the mold processing options, the highest activity of urease was shown by plowing at a depth of 20-22 cm, deepening the processing led to a significant decrease in the activity of this enzyme. Thus, at the beginning of the growing season, after plowing 35-37 cm in the 0-40 cm soil layer, ammonia is released 20% less than when plowed to a normal depth of 20-22 cm (average for the 1980s). 1982, mg YH 3 for 1 g of air-dry soil. The intensity and direction of the processes of changes in organic matter in the soil, as well as the activity of redox enzymes polyphenoloxidase and peroxidase are determined. Polyphenol oxidase is involved in the conversion of organic compounds of the aromatic series into humus components (Mishustin E.N. and others, 1956, Kononova M.M., 1963, 1965). Peroxidase and catalase play an important role in the decomposition of substances (Nikitin D.I., 1960). Researchers noted a high positive correlation between decomposition of humus and peroxidase activity and almost functional negative relationship with polyphenol oxidase activity (Chunderova A.I., 1970, Dulgerov A.N., 1981). The opposite direction of the functions of peroxidase and polyphenoloxidase and the only object of their application A.I. Chunderova proposes the concept of "humus accumulation coefficient", the value of which is determined by the ratio of polyphenol oxidase activity to peroxidase activity of the soil.

### **Results and their Analysis**

Our research has shown that the plowing depth can be increased from 20-22 cm to 35-37 cm and the straight-cut, furrowless plow, cutter, "paraplow"-type tool, and mold-free cultivation with SibIME. stands, as well as "noil" increased peroxidase activity by 4-6% and polyphenol oxidase activity decreased by 4-5% (Table 1). At the same time, the humus accumulation coefficient decreased by 8-10%. Activity of peroxidase and polyphenol oxidase in the soil layer 0-40 cm below the pea.

Studies have established a relationship between the coefficient of humus accumulation and the ratio of the number of microorganisms assimilating mineral nitrogen to the number of microorganisms assimilating nitrogen from organic





compounds (KAA: MPA). The correlation coefficient between both indicators is  $-0.248 \pm 0.094$ . An increase in the first indicator in most cases leads to a decrease in the second, and vice versa, which confirms the existence of a relationship between the structure of the microbial senosis and the direction of the process of biochemical transformation of soil organic matter.

## Conclusions

It can be seen that the ratio of these two coefficients can describe the direction of the cultural and soil formation process.

This allows us to conclude that changes in soil organic matter caused by the activity of peroxidase and polyphenoloxidase, plowing and cultivation lead to an increase in humus decomposition without turning the bed.

Effects of different methods and main treatments on peroxidase activity in the 0-40 cm soil layer during the period of 2-4 pairs of true leaves in sunflower, mg purpurgallin in 1 g of air-dry soil. (1989-1991)

Catalase enzyme occupies a clear place in the direction and intensity of biochemical processes occurring in the soil. As a result of the activating action, hydrogen peroxide is divided into water and free oxygen. Catalase, along with peroxidase, is believed to be involved in peroxidase-type reactions in which reduced compounds are oxidized. In the experiments of the Agricultural Research Institute, TsChP them. V.V. Dokuchayev did not determine the dependence of catalase activity on the depth or the main methods of soil cultivation. However, a significant increase in catalase activity was noted when the plowing depth was greater than 25-27 cm, as well as when the soil was treated without tillage, compared to plowing at a depth of 20-22 cm and 25-27 cm.

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