International Journal of Advance Scientific Research
(ISSN – 2750-1396)
VOLUME 03 ISSUE 06 Pages: 101-106
SJIF IMPACT FACTOR (2021: 5.478) (2022: 5.636) (2023: 6.741)
OCLC – 1368736135

Journal Website: http://sciencebring.com/index.php/ijasr

Research Article

ENZYMATIC ACTIVITY OF IRRIGATED MEADOW SOILS OF THE NORTHEASTERN PART OF THE MIRZACHUL OASIS

Submission Date: June 07, 2023, **Accepted Date:** June 12, 2023,
Published Date: June 17, 2023
Crossref doi: https://doi.org/10.37547/ijasr-03-06-17

S.U.Nurillayev
2nd Stage Master's Degree, Gulistan State University, Uzbekistan

M.R.Obloqulov
Trainee Teacher, Gulistan State University, Uzbekistan

ABSTRACT

The article describes the enzymatic activity of the irrigated meadow soils of the north-eastern part of the Mirzachol oasis. Due to weak salinity of irrigated meadow soils, it was found that catalase, peroxidase, and polyphenoloxidase activity of enzymes belonging to the class of oxidases was high. These indicators were also observed in the activity of invertase and urease enzymes. It was observed that the activity of enzymes was high in all studied cuttings in the spring, and decreased in the fall. The activity of enzymes depends on the humus in the soil, the amount of nutrients, the mechanical composition, the amount of different fertilizers used, and the hydrothermal regime of the area.

KEYWORDS

Soil, microorganism, enzyme, oxidase, hydrolase, catalase, peroxidase, polyphenol oxidase, invertase, urease.

INTRODUCTION

To preserve, restore and increase soil fertility in the world, to study chemical and biological processes that negatively affect the productivity of agricultural crops due to the activity of microorganisms and enzymes in the soil profile, to identify microorganisms and enzymes involved

International Journal of Advance Scientific Research
(ISSN – 2750-1396)
VOLUME 03 ISSUE 06 Pages: 101-106
SJIF IMPACT FACTOR (2021: 5.478) (2022: 5.636) (2023: 6.741)
OCLC – 1368736135

in biological processes, to identify biological processes in the soil It is important to carry out scientific research aimed at regulating and alternative, increasing the efficiency of the use of degraded land and protecting the soil cover.

According to M.A. Galstyan, the activity of enzymes is an effective indicator in determining the biological condition of the soil, and the amount of enzymes changes directly depending on the soil composition, season, and climatic conditions [2; 3].

F.Khaziev found that enzymes are biological catalysts that speed up chemical reactions hundreds and thousands of times in living organisms [8;9].

L.A. Gafurova and her students studied the activity of oxidoreductase (catalase, peroxidase, polyphenoloxidase) and hydrolytic (phosphatase, urease, invertase) enzymes, which are the most important in the biodynamics of southern Aral Bay soils, and found that the seasonal dynamics of enzymatic activity is related to the level of diversity and its activity is highest in spring. found that it has an indicator, gradually decreases in summer and slightly increases in autumn [1].

Catalase enzyme is closely related to nutrition and respiration of plants and microorganisms, as well as CO2 assimilation and soil humus synthesis oxidation-reduction processes.

Agro-ecological factors, agro-technical and amelioration measures, which cause the current processes of soil formation, have a great influence on enzymatic activity.

In section 1 of irrigated meadow soils, catalase activity was 1.2-3.2 cm3 O2 in spring, and 0.7-2.0 cm3 O2 per 1 g of soil in autumn, catalase activity in section 2 in spring was 1 ,5-3.4 cm3 O2, and in autumn 0.8-2.4 cm3 O2 in 1 g of soil for 1 minute, in section 3 catalase activity was 1.5-3.5 cm3 O2 in spring, and in autumn 1, 0-2.5 cm3 O2 was 1 minute in 1 g of soil, catalase activity in section 4 was 1.3-2.8 cm3 O2 in spring, and 0.6-2.4 cm3 O2 in 1 g of soil was 1 minute in autumn . In conclusion, catalase activity was high in spring and decreased in autumn (Table 1).

The conversion of organic matter into humus takes place with the participation of enzymes belonging to the group of phenoloxidases.

Salinity directly affects biochemical processes in the soil. In our results, the activity of peroxidase and polyphenoloxidase in irrigated meadow soils changed mainly in proportion to the amount of humus (Table 1).

Table 1

Activity of oxidase enzymes in irrigated meadow soils

Segment №	Layer depth, cm	Catalase, 1 minute in O2 /1g soil	Peroxidase, mg purpurgallin / 100 g	Polyphenoloxidase, mg purpurgallin / 100 g

International Journal of Advance Scientific Research
(ISSN – 2750-1396)
VOLUME 03 ISSUE 06 Pages: 101-106
SJIF IMPACT FACTOR (2021: 5.478) (2022: 5.636) (2023: 6.741)
OCLC – 1368736135

				30 minutes		30 minutes	
		Spring	Autumn	Spring	Autumn	Spring	Autumn
1	0-30	3,2	2,0	3,20	2,80	3,50	3,20
	30-50	2,2	1,4	2,20	1,90	2,40	2,10
	50-70	1,2	0,7	1,40	1,20	1,30	1,20
2	0-30	3,4	2,4	3,30	3,00	3,52	3,19
	30-50	2,4	1,5	2,25	2,10	2,35	2,20
	50-70	1,5	0,8	1,42	1,22	1,35	1,25
3	0-30	3,5	2,5	3,32	2,90	3,55	3,25
	30-50	2,4	2,0	2,25	2,00	2,30	2,10
	50-70	1,5	1,0	1,35	1,20	1,25	1,20
4	0-30	2,8	2,4	3,20	2,95	3,40	3,20
	30-50	1,8	1,3	2,25	1,95	2,30	2,15
	50-70	1,3	0,6	1,30	1,20	1,25	1,15

In the irrigated meadow soils, peroxidase activity in section 1 was 1.40-3.20 mg in the spring period, and 1.20-2.80 mg purpurgallin/100g of soil in 30 minutes in the autumn period, polyphenoloxidase activity in the spring period was 1.30 -3.50 mg, and in autumn 1.20-3.20 mg purpurgallin/100g of soil in 30 minutes, peroxidase activity in section 2 was 1.42-3.30 mg in spring and 1.22-3 ,00 mg purpurgallin/100g of soil for 30 minutes, polyphenoloxidase activity was 1.35-3.52 mg in spring, and 1.25-3.19 mg of purpurgallin/100g of soil for 30 minutes in section 3, peroxidase activity in section 3 1.35-3.32 mg in spring and 1.20-2.90 mg purpurgallin/100g of soil in 30 minutes in spring, and 1.25-3.55 mg in spring and 1.20 in autumn -3.25 mg purpurgallin/100g of soil for 30 minutes, peroxidase activity in section 4 was 1.30-3.20 mg in spring, and 1.20-2.95 mg purpurgallin/100g of soil for 30 minutes in autumn. polyphenoloxidase activity was 1.25-3.40 mg in the spring period, and 1.15-3.20 mg purpurgallin/100g soil in 30 minutes in the autumn period (Table 1).

Due to weak salinization of the soils of the experimental area, the activity of peroxidase and polyphenoloxidase was high, the reason for this is the active inclusion of humus substances in the soil. Humus formation is a complex biochemical process, the high activity of this process depends on the activity of phenoloxidase enzymes and the amount of different fertilizers used (Table 1).

Among the enzymes belonging to the group of hydrolases, invertase and urease are among the most common enzymes in the soil.

The main source of invertase in the soil is plant root exudates. Silty and powdery fractions absorb

International Journal of Advance Scientific Research
(ISSN – 2750-1396)
VOLUME 03 ISSUE 06 Pages: 101-106
SJIF IMPACT FACTOR (2021: 5.478) (2022: 5.636) (2023: 6.741)
OCLC – 1368736135

ISSN-2750-1396

the enzyme in such a way that all the structural compounds in its molecule, which determine the catalytic properties of the enzyme, are preserved. In some sense, this situation is proved by the higher activity of invertase in layers with more humus [1;2;3;4;5;6;7;8;9;10].

In irrigated meadow soils, the fluctuation limits of invertase enzyme activity in section 1 were 0.55 - 3.08 mg of glucose per 1g of soil in the spring period, and 0.28 - 2.12 mg of glucose per 1g of soil in the autumn period. , the fluctuating limits of invertase enzyme activity in section 2 were 0.57 - 3.20 mg of glucose per 1g of soil in the spring period, and 0.30 - 2.36 mg of glucose per 1g of soil in the autumn period, in the interval of 1 hour in the 3rd section of invertase enzyme The fluctuating limits of the activity of invertase enzyme were 0.56 - 3.11 mg of glucose per 1g of soil in the spring period, 0.28 - 2.15 mg of glucose per 1g of soil in the autumn period. .55 - 3.15 mg of glucose was in 1 g of soil, in the autumn period 0.28 - 2.19 mg of glucose was in 1 g of soil within 1 hour (Table 2).

Urease hydrolyzes the breakdown of the bond between nitrogen and carbon in the molecule of organic matter. It is a single-component enzyme, that is, it consists only of protein. The action of urease is strictly directed, it hydrolyzes only urea. Urea hydrolysis products serve as food for microorganisms and plants. As a result of hydrolysis, carbon monoxide and ammonia are formed.

Table 2.

Activity of hydrolase enzymes in irrigated meadow soils

Segment №	Layer depth, cm	Invertase, mg glucose in 1g soil 1 hour		Urease, mg NH3 in 1g of soil in 24 hours	
		Spring	Autumn	Spring	Autumn
1	0-30	3,08	2,12	1,91	1,36
	30-50	1,91	1,45	1,46	1,14
	50-70	0,55	0,28	0,84	0,56
2	0-30	3,20	2,36	2,09	1,59
	30-50	2,12	1,63	1,52	1,21
	50-70	0,57	0,30	0,85	0,58
3	0-30	3,11	2,15	1,98	1,42
	30-50	1,93	1,47	1,51	1,19
	50-70	0,56	0,28	0,84	0,56
4	0-30	3,15	2,19	2,05	1,54
	30-50	1,93	1,48	1,51	1,21

International Journal of Advance Scientific Research
(ISSN – 2750-1396)
VOLUME 03 ISSUE 06 Pages: 101-106
SJIF IMPACT FACTOR (2021: 5.478) (2022: 5.636) (2023: 6.741)
OCLC – 1368736135

	50-70	0,55	0,28	0,85	0,58

In the irrigated grassland soils, the fluctuating limits of urease enzyme activity in section 1 were in the range of 0.84-1.91 mg NH3 in the spring period, and in the range of 0.56-1.36 mg NH3 in the autumn period. , the fluctuating limits of urease enzyme activity in section 2 were in the range of 0.85-2.09 mg NH3 in the spring period, in the range of 0.58-1.59 mg NH3 in the autumn period, urease enzyme in the 3rd section fluctuating limits of urease activity were in the range of 0.84-1.98 mg NH3 in the spring period, in the range of 0.56-1.42 mg NH3 in the autumn period. It was in the range of .85-2.05 mg NH3, in the autumn period it was in the range of 0.58 - 1.54 mg NH3 (Table 2).

In our study, according to our observations, the activity of hydrolases was the same as the activity of oxidases. So, the activity of enzymes depends on humus in the soil, the amount of nutrients, mechanical composition, the amount of different fertilizers used, and the hydrothermal regime of the area.

REFERENCES

1. Gafurova L.A., Nabieva G.M., Ergasheva O.Kh., Makhkamova D.Yu. Monitoring of degraded lands using bioindicators // International Scientific and Technical Conference "Environmental Control Systems-2016". - Sevastopol, 2016. - P.86.
2. Galstyan A.Sh. Enzymatic activity of Armenian soils. Tr. Issue. VIII. - Yerevan: Ayastan, 1974. - 275 p.
3. Galstyan A.Sh. Unification of methods for determining the activity of soil enzymes. Soil science. - 1978. - No. 2. - S. 107-114.
4. Zvyagintsev D.G. Biological activity of soils and scales for shading some of its indicators // Eurasian Soil Science. 1978. - No. 6. - S. 48-54.
5. Kadirova D.A., Nabieva G.M., Saidova M.E., Makhkamova D.Yu. Biological activity as a diagnostic indicator of soil fertility // International scientific conference HV Dokuchaev youth reading. "Soil as a natural biogeomembrane" - St. Petersburg, 2012. S. 87-89.
6. Kazeev K.Sh., Kolesnikov S.I., Akimenko Yu.V., Dadenko E.V. Methods for biodiagnostics of terrestrial ecosystems. Rostov-on-Don. Publishing House of the Southern Federal University, 2016. 356 p.
7. Makhkamova D.Yu. Microflora of saline gypsum soils of Zarbdar district, Jizzakh region // Ways of effective use of land resources, preservation, restoration and improvement of soil fertility. Collection of lectures of the republican scientific and practical conference. Tashkent, 2012.-B.164-166.
8. Khaziev F.Kh. Functional role of enzymes in soil processes / Zh .: Bulletin of the Academy

International Journal of Advance Scientific Research
(ISSN – 2750-1396)
VOLUME 03 ISSUE 06 Pages: 101-106
SJIF IMPACT FACTOR (2021: 5.478) (2022: 5.636) (2023: 6.741)
OCLC – 1368736135

of Sciences of the Republic of Belarus - 2015, volume 20, no. 2 (78) .- P. 14-24.

9. Khaziev F.Kh. Ecological connections of the enzymatic activity of soils // Zh .: Ecobiotech, 2018, volume 1, no. 2. - P. 80-92.
10. Yuldasheva Kh.E. Microbiological processes and properties of soils of the Karshi steppe, their changes during long-term irrigation and ways of biological restoration of fertility. Abstract of Dr. diss. for the degree of Doctor of Biological Sciences. Tashkent, 2008. - 42 p.