THE INFLUENCE OF SOME ORGANIC ACIDS ON THE
PEROXIDASE ACTIVITY OF STRAINS FLAMMULINA
VELUTIPES, LENTINULA EDODES AND PLEUROTUS
OSTREATUS

ORCID ID: 0000-0002-1423-3361
Fedotov Oleh Valeriiyovych
Doctor of Biological Sciences, Dean of the Medical Faculty 3
Donetsk National Medical University Ministry of Health of Ukraine

Peroxidases (EC 1.11.1.7.) Catalyze the oxidation of various polyphenols, amines, as well as fatty acids, cytochrome, glutathione. Enzymes decompose H₂O₂ with the release of active atomic oxygen, which is used to oxidize a number of compounds. It was found that peroxidases, together with catalases, provide a certain protective role of the antioxidant system of the body against unfavorable conditions of life and infection during the formation of toxic compounds of lipid peroxidation reactions. The widespread use of peroxidases in industry and scientific research necessitates the search for promising producers of these enzymes and further study of the factors of their cultivation [1, 2].

Investigated the effect of vitamins - ascorbic and nicotinic acids on the change of peroxidase activity (PA) of basidiomycete strains Flammulina velutipes, Lentinula edodes and Pleurotus ostreatus.

The strains were cultivated in a glucose-peptone medium at 27.5°C for 20 days. Organic acids in concentrations of 0.5; 1.0; 5.0; 10.0 μmol/dm³ was steriley introduced into the culture liquid (CF) 24 hours before the determination of PA cultures. The concentration of ascorbic acid in the culture fluid and the determination of PA were selected according to previous studies, which showed the absence of a significant effect of PA from these strains with a concentration below 0.5 μmol/dm³, and its suppression at concentrations above 10.0 μmol/dm³ for 24 hours after the addition of the vitamin.

The experimental data of the experiment are presented in table. They show that PA in the mycelium and culture filtrate of the studied strains changes under the influence of vitamin C. The addition of ascorbic acid to the culture liquid causes a reliable individual change in the PA of the research strains in comparison with the control after 24 hours. In all variants of the experiment, two peaks of the maximum PA of strains are observed, corresponding to the concentrations of vitamin C - 0.5 and 10.0 μmol/dm³.

Under similar cultivation conditions, the effect of nicotinic acid PA of the same edible basidiomycete strains was studied (table). Analysis of its data suggests that the peroxidase activity in the mycelium and culture filtrate of research strains changes when vitamin PP is added to the culture fluid. There are two peaks of maximum peroxidase activity corresponding to the concentrations of vitamin PP: 0.5 and 10.0
μmol/dm³ for strain F-vv *F. velutipes* and strain 523 *L. edodes*; 0.5 and 5.0 μmol/dm³ – for strain P-01 *P. ostreatus*.

### Table 1

| Concentration, μmol/dm³ | Vitamin C | Nicotinic acid |
|-------------------------|-----------|----------------|
|                         | Mycelium  | CF             | Mycelium  | CF             |
| **Strain F-vv Flammulina velutipes** |           |                |
| 0.5                     | 59.7 ± 1.03 * | 49.4 ± 0.02 * | 59.7 ± 1.03 * | 67.8 ± 0.11 * |
| 1                       | 21.6 ± 0.02 * | 33.5 ± 0.05 | 21.6 ± 0.02 * | 58.0 ± 0.01 * |
| 5                       | 40.3 ± 0.03 * | 37.5 ± 0.03 * | 40.3 ± 0.03 * | 34.9 ± 0.09 * |
| 10                      | 67.3 ± 0.07 * | 60.2 ± 0.03 * | 67.3 ± 0.07 * | 60.2 ± 0.12 * |
| Control, 0              | 36.6 ± 0.14 | 30.7 ± 0.35 | 36.6 ± 0.14 | 30.7 ± 0.35 |
| **Strain 523 Lentinula edodes** |           |                |
| 0.5                     | 9.8 ± 0.04 * | 5.2 ± 0.05 * | 18.3 ± 0.75 * | 8.3 ± 0.08 * |
| 1                       | 2.9 ± 0.04 * | 2.6 ± 0.01 * | 9.2 ± 0.41 * | 5.1 ± 0.11 * |
| 5                       | 6.3 ± 0.09 * | 3.0 ± 0.13 * | 8.0 ± 0.63 * | 5.1 ± 0.01 * |
| 10                      | 12.0 ± 0.06 * | 6.0 ± 0.01 * | 12.1 ± 0.64 * | 9.1 ± 0.03 * |
| Control, 0              | 5.2 ± 0.06 | 1.9 ± 0.04 | 5.2 ± 0.06 | 1.9 ± 0.04 |
| **Strain P-01 Pleurotus ostreatus** |           |                |
| 0.5                     | 248.5 ± 2.08 * | 5.2 ± 0.01 * | 211.2 ± 0.41 * | 4.1 ± 0.08 * |
| 1                       | 104.8 ± 0.06 * | 2.1 ± 0.01 * | 186.8 ± 1.22 * | 2.0 ± 0.00 * |
| 5                       | 178.8 ± 0.41 | 3.0 ± 0.09 * | 210.3 ± 0.61 * | 3.7 ± 0.09 |
| 10                      | 231.9 ± 0.63 * | 5.3 ± 0.01 * | 188.5 ± 0.67 * | 2.8 ± 0.02 * |
| Control, 0              | 164.6 ± 2.04 | 3.7 ± 0.05 | 164.6 ± 2.04 | 3.7 ± 0.05 |

*Note. «*» – the difference is significant compared to control (p<0.05)*

### Conclusions.

Thus, the results obtained showed that the PA of the studied strains of basidiomycetes *Flammulina velutipes*, *Lentinula edodes* and *Pleurotus ostreatus* changes under the influence of ascorbic and nicotinic acids. The peaks of the maximum enzymatic activity of these strains correspond to the concentration of vitamin C – 0.5 and 10.0 μmol/dm³ and concentration of vitamin PP – 0.5 and 10.0 μmol/dm³ for strain F-vv *F. velutipes* and strain 523 *L. edodes* and 0.5 and 5.0 μmol/dm³ – for strain P-01 *P. ostreatus*. Methods for the induction of peroxidase activity of the studied vegetative cultures of basidiomycetes are protected by patents of Ukraine. Applied vitamins C and PP should be considered as growth factors, because the use of the term "induction" is not always correct. Basically, we can talk about the primary physiological signal. The real (true) inductor is localized in the cell, therefore, an appropriate transport system is required for the transfer of this substance into the cell.

### References:

[1] Voloshko T.E. & Fedotov O.V. (2011). Skrynin shtamiv bazydomitsetiv za aktyvnistju antyoksydantnykh oksyforduktauk [Screening of basidiomycetes strains on the antioxidant activity of oxidoreductases]. Microbiology & Biotechnology, 4(16), 69–81. (in Ukrainian). Available from: http://oaji.net/articles/2017/5931-1520253769.pdf

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