INFLUENCE OF SOME AMINOACIDS ON THE PEROXIDASE AND CATALASE ACTIVITY IN THE FUNGUS *FUSARIUM GRAMINEARUM* SCHWABE (TELEMORPHE - *GIBBERELLA ZEAE* (SCHWEIN.) PETCH) PARASITE ON WHEAT

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Keywords: *Fusarium graminearum*, aminoacids, catalase, peroxidase activity
AbstractIn this paper the authors presents the influence of some aminoacids on the peroxidase and catalase activity in *Fusarium graminearum* (telemorphe - *Gibberella zeae*) parasite an wheat. In laboratory the fungus was cultivated on Brown media (without asparagine), in which was added 1g from the following aminoacids: glutamic acid, serine, methionine, leucine, histidine, lysine, valine, alanine, asparagine, arginine; it was also used a control without aminoacids. The of peroxidase and catalase activity was determined from mycelium and culture liquid at 21 days and 28 days after the inoculation was inffluenced by culture age and by the type of aminoacid from the culture media.

INTRODUCTION

As part of the complex biological, biochemical and biophysical studies accomplished in the Biological Research Institute Iaşi on the *Fusarium* species (*Fusarium graminearum* and *Fusarium moniliforme*), the main efforts have been directed towards the influence of the chemical and physical agents on some enzymes wthin this microorganisms cell.

In a previous paper [16] was presented the data concerning the influence of some aminoacids on the Krebs cycle dehydrogenases in *Fusarium graminearum* parasite on wheat.

In this paper we presented the influence of some aminoacids (glutamic acid, serine, leucine, methionine, histidine, lysine, asparagine, valine alanine) on peroxidase and catalase activity on the *Fusarium graminearum.*

The influence of the different factors on the peroxidase and catalase activity in differend fungi was presented in some papers [5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16]. In the literature there isn't data regarding the influence of the aminoacids upon peroxidase and catalase activity ,,in vitro,, in *Fusarium graminearum,* but there is the generally data about the biology of this species [1, 3, 4, 6, 20].

MATERIALS AND METHODS

The investigations have been performed on the *Fusarium graminearum*, harvested from the experimental field in Podu Iloaiei Agricultural Station, county Iasi.

For the study of peroxidase and catalase activity the fungus *Fusarium graminearum* was cultivated on Brown media (without asparagine) containing 30 g glucose, 0,5g Mg $SO_4 \cdot 7\ H_2O$, 1,5g K_2HPO_4, 1000ml distilled water. In this media was added 1g from the following aminoacids: glutamic acid, serine, methionine, leucine, histidine, lysine, valine, alanine, asparagine, arginine; it was also used a control without aminoacids. The media containing one of the mentioned aminoacids have been inoculated with disks by 0,8 cm in diameter from a 7 days old culture of *Fusarium graminearum*.

The peroxidase was determinated using the iodometric method and catalase activity by spectrophotometric method [2], at 21 days and 28 days after the inoculation.

RESULTS AND DISCUSSIONS

The results of the investigations dealing with the influence of the aminoacids on peroxidase activity in mycelium are presented in the figure 1, concluding that at 21 days after the inoculation, the higheast value was at V_{10} (asparagine) - 0,0020 UP/g/min followed in decreasing order by V_5 (histidine) and V_7 (valine) - 0,0011 UP/g/min., each, V_{11} (control) - 0,0009 UP/g/min., V_8 (alanine) - 0,0008 UP/g/min., V_4 (leucine) - 0,0006 UP/g/min., V_6 (lysine) - 0,0003 UP/g/min; at V_1 (glutamic acid), V_2 (serine), V_3 (methionine), V_9 (arginine) the enzymic activity was zero.

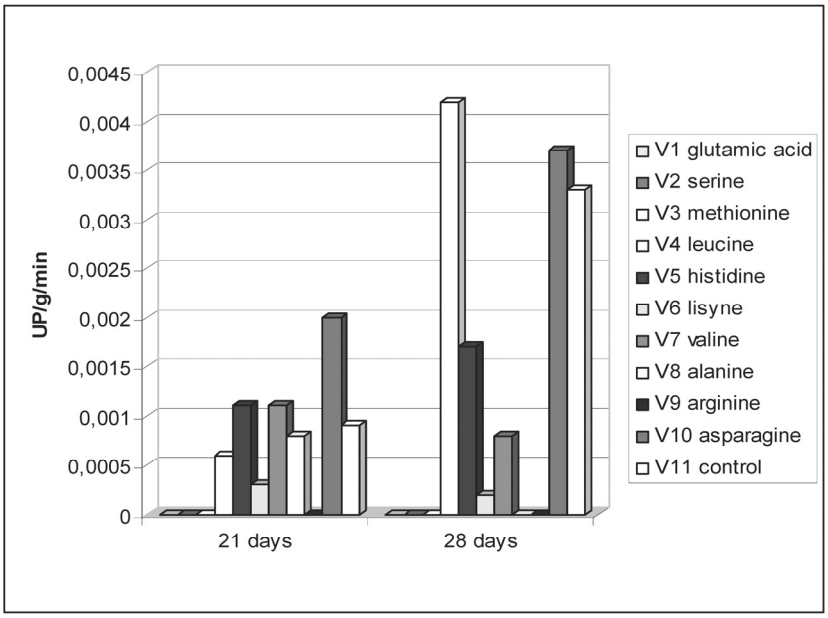

Figure 1. The influence of the some aminoacids on peroxidase activity (mycelium)

At 28 days from inoculation the peroxidase activity have had maximum value at V4 (leucine) - 0,0042 UP/g/min., followed in decreasing order by V_{10} (asparagine) - 0,0037 UP/g/min., V_{11} (control) - 0,0033 UP/g/min., V_5 (histidine) - 0,0017 UP/g/min., V_7 (valine) - 0,0008 UP/g/min., V_6 (lysine) - 0,0002 UP/g/min; at V_1 (glutamic acid), V_2 (serine), V_3 (methionine), V_8 (alanine), V_9 (arginine) the enzymic activity was zero.

Analysing the dynamics of the peroxidase activity at the two intervals studied, 21 and 28 days, it was observed an increasing at: V_4 (leucine) from 0,0006 UP/g/min. to 0,0042 UP/g/min., V_5 (histidine) from 0,0011 UP/g/min. to 0,0017 UP/g/min., V_{10} (asparagine) from 0,0020 UP/g/min. to 0,0037 UP/g/min., V_{11} (control) from 0,0009 UP/g/min. to 0,0033 UP/g/min. and decreasing values at V_6 (lysine) from 0,0003 UP/g/min. to 0,0002 UP/g/min, V_7 (valine) from 0,0011 UP/g/min. to 0,0008 UP/g/min., V_8 (alanine) from 0,0008 UP/g/min. at 0; at variants V_1 (glutamic acid), V_2 (serine), V_3 (methionine), V_9 (arginine) the enzymic activity was zero at two intervals studied.

The data relating of the peroxidase activity in culture liquid are presented in figure 2, from which results that after 21 days from inoculation the highest of the enzyme activity was registred at V_2 (serine) - 0,0182 UP/ml/min. and the smallest value was at V_9 (arginine) - 0,0001 UP/ml/min., between these two values extreme are the other variants: V_1 (glutamic acid) - 0,0072 UP/ml/min., V_3 (methionine) - 0,0035 UP/ml/min., V_4 (leucine) - 0,0055 UP/ml/min., V_5 (histidine) - 0,0012 UP/ml/min., V_6 (lysine) - 0,0039 UP/ml/min., V_7 (valine) - 0,0032 UP/ml/min., V_8 (alanine) - 0,0033 UP/ml/min., V_{10} (asparagine) - 0,0053 UP/ml

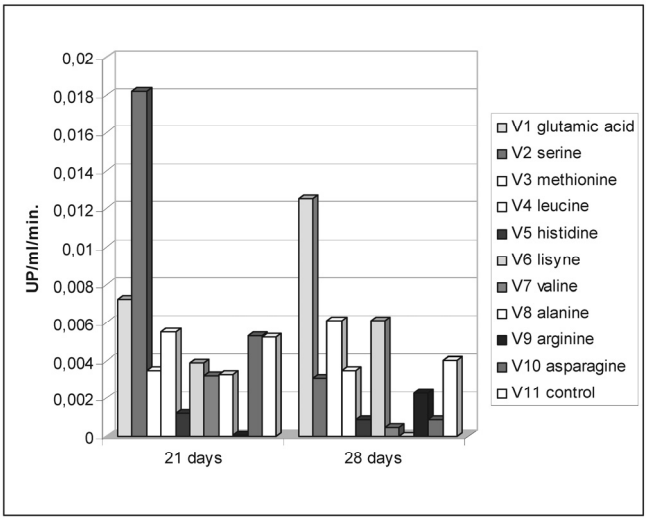

Figure 2. The influence of the some aminoacids on peroxidase activity (culture liquid)

Determining peroxidase activity in culture liquid after 28 days from the inoculation resulted that following values V_8 (alanine) was 0, V_7 (valine) - 0,0005 UP/ml/min., V_{10} (asparagine) and V_5 (histidine) - 0,0009 UP/ml/min., V_9 (arginine) - 0,0023 UP/ml/min., V_2 (serine) - 0,0031 UP/ml/min., V_4 (leucine) - 0,0035 UP/ml/min., V_{11} (control) - 0,0040 UP/ml/min., V_6 (lysine) and V_3 (methionine) - 0,0061 UP/ml/min., V_1 (glutamic acid) - 0,0125 UP/ml/min.

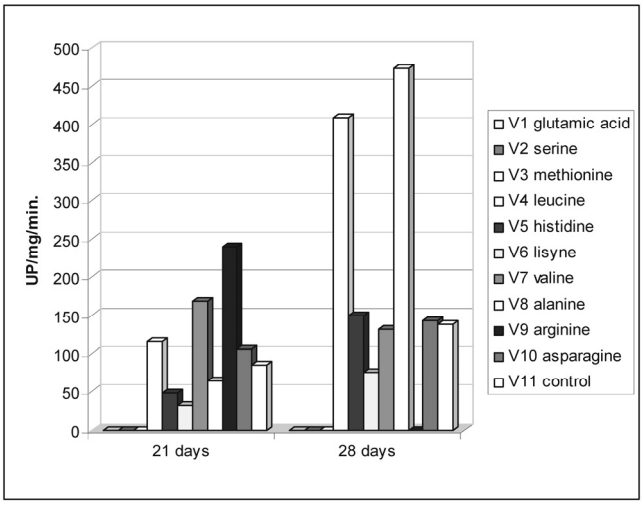

Figure 3 . The influence of the some aminoacids on catalase activity (mycelium)

Analysing this enzyme regarding in connection with the age of the culture (the dynamics), it was observed in increased after 28 days from inoculation in comparison with the value registred after 21 days in V_1 (glutamic acid) from 0,0072 UP/ml/min. to 0,0125 UP/ml/min., V_3 (methionine) from 0,0035 UP/ml/min. to 0,0061 UP/ml/min., V_6 (lysine) from 0,0039 UP/ml/min. to 0,0061 UP/ml/min., V_9 (arginine) from 0,0001UP/ml/min. to 0,0023 UP/ml/min. and an decreasing at : V_2 (serine) from 0,0182 UP/ml/min. to 0,0031 UP/ml/min., V_4 (leucine) from 0,0055 UP/ml/min. to 0,0035 UP/ml/min., V_5 (histidine) from 0,0012 UP/ml/min. to 0,0009 UP/ml/min., V_7 (valine) from 0,0032 UP/ml/min. to 0,0005 UP/ml/min., V_8 (alanine) from 0,0033 UP/ml/min. to 0, V_{10} (asparagine) from 0,0053 UP/ml/min. to 0,0009 UP/ml/min. and V_{11} (control) from 0,0052 UP/ml/min. to 0,0040 UP/ml/min.

The data regarding the influence of the same aminoacids on catalase activity in mycelium are presented in figure 3, from which result that at 21 days after inoculation, the higheast value of this enzyme was registered at V_9 (arginine) - 240 UP/mg/min., followed in decreasing order by V_7 (valine) - 168 UC/mg/min., V_4 (leucine) - 116 UC/mg/min., V_{10} (asparagine) - 106 UP/mg/min., V_{11} (control) - 85,4 UP/mg/min., V_8 (alanine) - 64 UP/mg/min., V_5 (histidine) - 48 UP/mg/min., V_6 (lysine) - 32 UP/mg/min; at V_1 (glutamic acid), V_2 (serine), V_3 (methionine) the catalase activity was zero.

From the data concerning the catalase activity at 28 days after inoculation results that, the highest value was at V_8 (alanine) - 473 UP/mg/min followed in decreasing order by V_4 (leucine) - 408,2 UP/mg/min., V_5 (histidine) - 149 UP/mg/min., V_6 (lysine) - 75,5 UP/mg/min., V_7 (valine) - 131 UP/mg/min., V_{10} (asparagine) - 142,5 UP/mg/min., V_{11} (control) - 137,9 UP/mg/min; at V_1 (glutamic acid) V_2 (serine), V_3 (methionine) V_9 (arginine) the was activity was zero.

Comparing the evolution of this enzyme activity at the two intervals studied - 21 and 28 days - established that the values increasing at V_4 (leucine) from 116 UP/mg/min. to 408 UP/mg/min., V_5 (histidine) from 48 UP/mg/min. to 149 UP/g/min., V_6 (lysine) from 32 UP/mg/min. to 75,5 UC/mg/min., V_8 (alanine) from 64 UP/mg/min. to 473 UP/mg/min., V_{10} (asparagine) from 106 UP/mg/min. to 142,5 UC/mg/mi., V_{11}(control) from 85,4 UC/mg/min. to 137,9 UP/mg/min. and was in decreasing at V_9 (arginine) from 240 UP/mg/min. to zero, V_7 (valine) from 168 UP/mg/min. to 131 UP/mg/min; the enyme activity remained 0 at V_1 (glutamic acid), V_2 (serine), V_3 (methionine).

The data concerning the activity of the catalase acticity from liquid culture are presented in figure 4, from wcich results that at 21 days from inoculation the smallest value was at V_5 (histidine) - 6 UC/ml/min. and higheast value was at V_7 (valine) - 100 UC/ml/min between this two values extreme are the other variants: V_{10} (asparagine) - 90 UC/ml/min., V_3 (methionine) - 68 UC/ml/min., V_2 (serine) - 40 UC/ml/min., V_{11} (control) - 37,8 UC/ml/min., V_6 (lysine) - 18 UC/ml/min., V_1 (glutamic acid) V_8 (alanine) and V_9 (arginine) - 16 UC/ml/min. each, V_4 (leucine) - 8 UC/ml/min.

Determining catalase activity after 28 days from the inoculation result that the highest value of this enzyme was registered at V_7 (valine) - 206 UC/ml/min. followed in decreasing order by V_6 (lysine) - 196 UC/ml/min., V_3 (methionine) - 132 UC/ml/min., V_2 (serine) - 126 UC/ml/min., V_{10} (asparagine) - 104 UC/ml/min., V_{11} (control) - 89,4 UC/ml/min., V_4 (leucine) - 46 UC/ml/min., V_1 (glutamic acid) and V_9 (arginine) - 40 UC/ml/min. each, V_5 (histidine) - 4 UC/ml/min., at V_8 (alanine) catalase activity was zero.

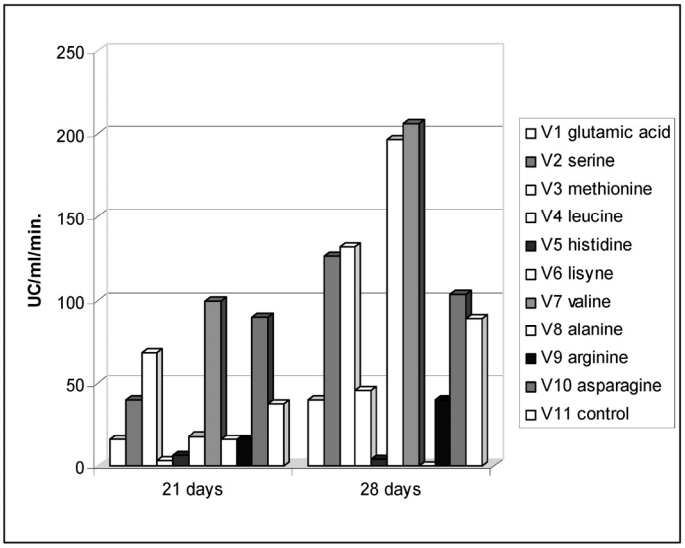

Figure 4. The influence of the some aminoacids catalase activity (culture liquid)

Watching this enzyme in its dynamics, it was registered in increasing value for V_1 (glutamic acid) from 16 UC/ml/min. to 40 UC/ml/min., V_2 (serine) from 40 UC/ml/min. to 126UC/ml/min., V_3 (methionine) from 68UC/ml/min. at 132 UC/ml/min., V_4(leucine) from 8 UC/ml/min. to 46 UC/ml/min., V_6 (lysine) from 18 UC/ml/min. to 196 UC/min/ml., V_7 (valine) from100 UC/ml/min. to 206 UC/ml/min., V_9 (arginine) from 16 UC/ml/min. to 40 UC/min./ml., V_{10} (asparagine) from 90 UC/ml/min. to 104 UC/ml/min., V_{11} (control) from 37,8 UC/ml/min. to 89,4 UC/ml/min. and a decreasing value at V_5 (histidine) from 6 UC/ml/min. to 4 UC/ml/min., V_8 (alanine) from 16 UC/ml/min. to zero.

CONCLUSIONS

The peroxidase activity from mycelium at 21 days after inoculation was stimulated by: serine, leucine, valine, asparagine.

At 28 days after inoculation, the paroxidase activity was stimulated by the presence of the following aminoacids: leucine and asparagine.

The peroxidase activity from liquid culture at 21 days was stimulated by the presence of the followind aminoacids: glutamic acid, serine, methionine, leucine, lysine, asparagine.

At 28 days after inoculation, the peroxidase activity was stimulated by the presence of the following aminoacids: methionine, lisine.

The catalase activity from mycelium at 21 days after inoculation was stimulated by of the following aminoacids: leucine, valine, arginine, asparagine.

At 28 days after inoculation the catalase activity was stimulated by the presence of the following aminoacids: leucine, histidine, alanine, asparagine.

The catalase activity from liquid culture at 21 days after inoculation was stimulated by of the following aminoacids: serine, methionine, valine, asparagine.

At 28 days after inoculation the catalase activity was stimulated by the presence of the aminoacids: serine, methionine, lysine, valine, asparagine.

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