WINTER HARDINESS OF WINTER WHEAT DEPENDING OF CATALASE ACTIVITY

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The dependence between activity of catalase in leaves and tillering node of winter triticale, wheat, rye and barley and their winter hardiness was analyzed. A straight correlation between winter hardiness and activity of catalase was established.

Winter grain crops, catalase, hydrogen peroxide, ferments, winter hardiness.

A winter grain crops growing occupies a main place in grain production balance and is an important factor in Ukraine production safety formation. Forthetime being squares of winter grain crops is becoming greater in dependence on increasing of country export potential. [4].

Deep physiological changes are taking place in plants during their wintering. Herewith, a physical-chemical and physical-biological properties of resting state of different cultures sorts are not the same and depend on lots of factors and are in close dependence on redox processes with participation of active forms of oxygen (AFO). One of AFO which activates plant cell antioxidant protection processes is hydrogen peroxide (H_2O_2), which in high concentrations has a toxic effect on cytoplasm[8]. Intracellular content of H_2O_2 is regulated by antioxidant ferments like catalase, peroxidase [2, 7].

Catalase is a ferment of oxidoreductase class which regulates hydrogen peroxide content in plant organism, preventing its toxic effect [9, 10]. It catalyses hydrogen peroxidedecay and neutralizes its toxic effect, decomposing it to water and molecular oxygen by equation:

$$2H_2O_2 \xrightarrow{\text{(catalase)}} H_2O+O_2$$

The activity of catalase can be determined by volume of oxygen released in result of hydrogen peroxide decomposition.

An objective of experiment was to find out a connection between winter hardiness of winter triticale, wheat, rye and barley and activity of catalase in plant tillering node and leaf sheath.

Materials and methods of experiment. Studyof catalase activity and winter hardiness of winter triticale, wheat, rye and barley took place on typical low humus chernozem with humus content in arable layer 4,2 % (by Tyurin) and with soil thinness of 77 points. The soli provision of easily hydrolyzed nitrogen, mobile phosphorus and exchangeable potassium is average. Hydrothermal coefficient is 1, 2.Growing technology of triticale, wheat, rye and barley technology is one which is generally used for this zone.

A square of seeding area - 100 m^2, the accounting one - 50 m^2.A repetition is four times. The activity of catalase was determined by gasometric method [5,6] .

The static study of results was conducted with MSExcel according to methodics which have been written by B.A. Dospehoff.

Results of research and their analysis. By works of many researchers were determined the direct connection between the activity redox enzymes and winter hardiness. In particular, the most winter hardiness plants have increased activity of catalase [8].

The activity of catalase in separate plant organs of winter grains (cubic centimeters) of exuded oxygen / 1 gram of crude matter (average of 2008-2012 years).

Culture, sort	Tillering in autumn		Sustained cold snap		The start of restoration of vegetation	
	Disks	tillering node	Disks	tillering node	Disks	tillering node
Winter triticale	18,5	16,2	47,4	40,9	41,0	35,3
Winter wheat (Myronivska 65)	16,9	13,4	43,6	37,5	38,2	32,8
Winter rye (intensive 95)	19,7	16,4	47,9	42,9	39,9	31,1
Winter barley (Mironovsky 87)	13,4	12,7	35,3	32,7	31,8	24,4

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The data of our research shows that an activity of catalase in autumn in leaves and in tillering nodes depends on biological characteristics of studied crops and

temperature conditions in autumn and winter period. In approaching of winter and decreasing of atmosphere temperature the activity of catalase increases. In general, in considerable falling of temperature, winter rye and triticale have a high level of catalase, less level have wheat and significantly less in barley.

The activity of catalase increases when the temperature falls. With the increasing of temperature, which is observed while renewal of spring vegetation, it decreases. There is a close correlation between the winter hardiness and the activity of catalase. The coefficient of correlation between the activity of catalase in tillering nodes and hardiness , in our researches, had such results : triticale - 0,87; wheat - 0,95; rye - 0,96; barley - 0,78; between the activity of catalase in leaves and winter hardiness accordingly - 0,58; -0,64; -0,45; - 0,39.

Conclusions. The analysis of correlation gives grounds to say, that the winter hardiness of all winter crops(triticale AMD 11, wheat Myronivska 65, rye Intensive 95, barley Mironovsky 87) are in direct dependency on the activity of catalase in leaves and tillering nodes of hibernating plants. More winter hardiness crops have the higher level of catalase activity. Received results of research can be advisable used in selection process while creation winter hardiness crops of winter grains resistant to adverse conditions in period of wintering.

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