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INFLUENCE OF GROWING CONDITIONS OF CULTIVATED AND WILD SOYBEANS ON THE ACTIVITY OF ACID PHOSPHATASE OF ITS SEEDS

***Abstract.** The article considers the influence of growing conditions of soybeans of various phylogenetic origins on the specific activity and multiple forms of acid phosphatase in its seeds. It has been established that agro-climatic conditions have a greater effect on cultivated soybeans, which is manifested in significant differences in specific activity and multiple forms of acid phosphatase. Wild soybeans characterized by lower specific activity and high stability of multiple forms of the enzyme.*

***Key words:** Glycine max, Glycine soja, meteorological conditions, acid phosphatase.*

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ВЛИЯНИЕ УСЛОВИЙ ВЫРАЩИВАНИЯ КУЛЬТУРНОЙ И ДИКОЙ СОИ НА АКТИВНОСТЬ КИСЛОЙ ФОСФАТАЗЫ ЕЕ СЕМЯН

***Аннотация.** В статье рассмотрено влияние условий выращивания сои различного филогенетического происхождения на удельную активность и множественные формы кислой фосфатазы ее семян. Установлено, что агроклиматические условия в большей степени влияют на культурную сою, что проявляется в значительных различиях удельной активности и множественных форм кислой фосфатазы. Дикая соя при этом*

характеризовалась более низкой удельной активностью и высокой стабильностью множественных форм фермента.

Ключевые слова: *Glycine max*, *Glycine soja*, метеорологические условия, кислая фосфатаза.

Abiotic stress factors, such as an overabundance or lack of moisture supply, prolonged dry conditions, frosts, etc., are spontaneous, and their impact causes significant damage to plants [1]. The climate of the Amur region is sharply continental with monsoon features, the region belongs to the zone of risky agriculture and is characterized by an unstable hydrothermal regime with a short frost-free period, sharp fluctuations in daytime and night temperatures, late cold in spring and early temperature drop in autumn, uneven distribution of heat and moisture and a high infectious background [2]. To determine the resistance of plants to various environmental factors, a variety of methods are used, which are based on changes in the physiological and biochemical processes occurring in plants, for example, changes in the activity of enzymes. In this paper, the effect of environmental factors on the specific activity and multiple forms of acid phosphatase of soybeans of various phylogenetic origin grown in 2016-2018 in the Amur region was studied.

The material for the study was soybean seeds (*Glycine max* (L.) Merrill) of the Lydia variety and wild soybeans (*Glycine soja* Sieb. & Zucc.) form KA-1344. The experiments were carried out in 2016-2018 by staging field small-scale experiments on Dospekhov [3].

The growing season of 2016-2018 was characterized by a sufficient amount of precipitation – from 428 to 634 mm and an abundance of heat – the sum of active temperatures – from 2290 to 2350 °C, which slightly differed from the norm (2301 °C). In 2016, the sum of active temperatures (2350 °C) was higher than normal (2301 °C), and the year was also characterized by an abundance of precipitation (almost 1.5 times higher than the average annual values). In 2017 and 2018, the average air temperature was slightly lower than the long-term average by 1.7 and 1.1 °C. The amount of precipitation in this period was also lower than the average annual by 45 and 34 mm, respectively.

Extracts of soluble soybean proteins were prepared for biochemical analysis [4]. The protein content was determined by the biuretic method [5]. The specific activity of acid phosphatase was determined by the spectrophotometric method on the spectrophotometer KFK-3 (Russia) by changing the optical density. p-nitrophenyl phosphate was used as a substrate. Specific activity was expressed in units/mg of protein. Multiple forms of enzymes were detected by electrophoresis in 7.5% PAAG at 4 °C according to the Davis method in modification for soluble soybean proteins, followed by staining of the zones by appropriate histochemical methods [4, 6]. The standard criterion for the characterization of multiple forms of enzymes was their relative electrophoretic mobility (Rf). Statistical processing of the obtained data was carried out using Microsoft Excel software. The analysis was carried out in two biological and three analytical repetitions.

The profile of changes in the specific activity of acid phosphatase of cultivated and wild soybeans seeds during the study period (2016-2018) is similar ($r = 0.992$). The maximum specific activity and high heterogeneity of the enzyme in the seeds of cultivated and wild soybeans were recorded in 2016, which may be due to the abundance of precipitation and a high level of active temperatures. The minimum specific activity of acid phosphatase, detected in 2017, correlates with a low temperature and sufficient humidity relative to the long-term average values. This was manifested in minimal differences in specific activity and the number of multiple forms of the enzyme (three, two of which have the same electrophoretic mobility – AP2 and AP6). In 2018, only one form of the enzyme was detected in the seeds of cultivated soybeans (AP4). The most common form of the enzyme – AP6, identified in both cultivated and wild soybeans, has been established. Earlier, Ivachenko L. E. established a high occurrence of the form AP6 in seeds of zoned soybean varieties [7].

Thus, it should be noted that agro-climatic conditions have a greater impact on cultivated soybeans, which is manifested in significant differences in specific activity (from 0.090 to 0.175 u / mg of protein) and multiple forms of acid phosphatase (from one to six). Wild soybeans was characterized by lower specific activity (from 0.071

to 0.116 u/mg of protein) and high stability of multiple forms of acid phosphatase (AP2, AP3 and AP6).

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