

ACID PHOSPHATASE ACTIVITY IN SEEDS OF ZONED SOYBEAN VARIETIES OF AMUR BREEDING AND VARIOUS WILD SOYBEAN LINES

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АКТИВНОСТЬ КИСЛОЙ ФОСФАТАЗЫ СЕМЯН РАЙОНИРОВАННЫХ СОРТОВ СОИ АМУРСКОЙ СЕЛЕКЦИИ И РАЗЛИЧНЫХ ЛИНИЙ ДИКОЙ СОИ

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Abstract. As a result of the studies, a high variability in the specific activity of acid phosphatase in soybean seeds of different varieties (from 0.057 to 0.190 units/mg of protein) and different lines of wild soybeans (from 0.063 to 0.104 units/mg of protein) was shown. The most common multiple forms of acid phosphatase of cultivated (AP4) and wild soybeans (AP4, AP7 and AP9) have been identified.

Аннотация. В результате проведенных исследований показана высокая изменчивость удельной активности кислой фосфатазы семян сои различных сортов (от 0,057 до 0,190 ед/мг белка) и различных линий дикой сои (от 0,063 до 0,104 ед/мг белка). Выявлены наиболее встречающиеся множественные формы кислой фосфатазы культурной (КФ4) и дикой сои (КФ4, КФ7 и КФ9).

Key words: Glycine max, Glycine soja, acid phosphatase, specific activity, multiple forms.

Ключевые слова: Glycine max, Glycine soja, кислая фосфатаза, удельная активность, множественные формы.

Soybeans are a plastic crop, but modern varieties require certain agroecological conditions, so it is necessary to create their own adaptive varieties for each region. According to tests of various soybean varieties, it is possible to predict a genetically determined degree of yield stability (adaptability to growing conditions) [1].

The use of molecular markers in genetics and breeding increases the efficiency of breeding work and reduces the time for the creation of new varieties. Polymorphism of proteins, including enzymes, refers to a widely used marker in genetic research. Protein differences in electrophoretic mobility can be used in the analysis of changes in the genotypic composition of populations as well as morphological differences associated with marker locus [2].

On the basis of these markers, biochemical certification of various agricultural crops is carried out [3]. Studies of enzyme polymorphism of various crops are actively conducted: soybeans [4, 5], wheat [6], barley [7], etc. It was found that the change in the composition of the electrophoretic spectra of soybean enzymes is an indicator of the adaptability of soybean varieties to growing conditions [4].

The purpose of the research is to determine the specific activity and multiple forms of acid phosphatase in seeds of zoned soybean varieties of amur breeding and various wild soybean lines.

The material for the study was the seeds of the collection of cultivated soybeans of the amur breeding and the seeds of wild-growing forms of soybeans obtained from the All-Russian Research Institute of soybeans (Blagoveshchensk, Amur Region). Soybean varieties have been studied: Lydia, Sonata, Harmony, Evgenia, Kitrossa, Dauria, Persona, Alena, Bonus. Seeds of wild soybeans forms of various agro-climatic zones of the Amur region (A – Arkharinsky district, M – Mikhailovsky district, B – Blagoveshchensky district, Z – Zeysky district, T – Tambovsky district): KA-1413, KA-1396, KM-705, KM-695, KT-156, KZ-671, KZ-6337, KB-29, KB-95, KB-104.

Extracts of soluble soybean proteins were prepared for biochemical analysis [8]. The protein content was determined by the biuretic method [9]. The specific activity of acid phosphatase was determined by the spectrophotometric method on the KFK-3 spectrophotometer (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 [8, 10]. 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.

In the course of our studies of the specific activity of acid phosphatase, it was shown that from various wild soybeans lines growing in the Amur region, seeds of the KB-104 and KM-695 forms have high enzyme activity. The minimum specific activity was noted in a sample of wild soybeans from the Tambovsky district (KT-156).

Analyzing the electrophoretic spectra of acid phosphatase of various wild soybean lines, the maximum heterogeneity of the enzyme in wild soybean lines from the Arkharinsky district (KA-1396) was established. The most common forms of acid phosphatase have been identified in seeds of various wild soybean lines – AP4, AP7 and AP9. During the study of seeds of cultivated soybeans of the amur breeding, the maximum specific activity of acid phosphatase was recorded in seeds of varieties: Sonata, Eugenia and Harmony. The minimum specific activity of the enzyme was noted in the Dauria variety. Nine forms of acid phosphatase were detected in the seeds of cultivated soybeans of the amur selection. The form of AP4 is the most common.

Thus, as a result of our studies, a high variability in the specific activity of acid phosphatase in cultivated soybean seeds of different varieties (from 0.057 to 0.190 units/mg of protein) and different lines of wild soybeans (from 0.063 to 0.104 units/mg of protein) has been shown. The most common multiple forms of the enzyme in cultivated (AP4) and wild soybeans (AP4, AP7 and AP9) have been identified.

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