

Growth and development of red raspberry

| Modes of soil moisture | Varieties | Average diameter, mm | Average height cm / sprig | The total value of the growth of shoots m / bush | Average leaf area, m ² |
|---|-----------|----------------------|---------------------------|--|-----------------------------------|
| I control | Nagrada | 9 | 131 | 10,48 | 2,36 |
| | Solnyshko | 7,1 | 118 | 9,44 | 1,83 |
| II 60% of the lowest moisture capacity | Nagrada | 10,2 | 158 | 12,64 | 4,03 |
| | Solnyshko | 8,1 | 137 | 10,96 | 2,86 |
| III 70% of the lowest moisture capacity | Nagrada | 11,1 | 171 | 13,68 | 5,04 |
| | Solnyshko | 9,4 | 161 | 12,88 | 4,05 |
| IV 80% of the lowest moisture capacity | Nagrada | 12,3 | 192 | 15,36 | 5,83 |
| | Solnyshko | 10,3 | 179 | 14,32 | 5,23 |

The data obtained from the conducted studies show that plants growing under conditions of insufficient and uneven moisture stand out with the least biological indicators. Based on these indicators of the strength of growth, it can be concluded that the optimal mode of drip irrigation of common raspberries is a variant of the experiment, with the maintenance of the lowest moisture capacity in the range of 80-100%.

References

1. Балакай, Г. Т. Безопасные системы и технологии капельного орошения: научный обзор ФГНУ «РосНИИПМ» [Текст] / Г. Т. Балакай [и др.]. - М.: ФГНУ ЦНТИ «Мелиоводинформ», 2010. - 52 с.
2. Сучкова, С. А. Размножение ягодных культур : учебно-методическое пособие / С. А. Сучкова [и др.]. - Томск: Томский государственный университет, 2014. - 68 с.
3. Dubenok, N. N. Formation of plum seedlings under drip irrigation in Central Non-Black Soil region of Russia / N. N. Dubenok, A. V. Gemonov, A. V. Lebedev, E. V. Glushenkova // RUDN Journal of Agronomy and Animal Industries. - 2019. - Vol. 14, № 1. - Pp. 40-48.

УДК 633.162

CATALASE ACTIVITY IN GRAIN OF BREWING BARLEY VARIETIES

Islamgulova Regina Rafikovna, Post-graduate student of the Department of Agronomic, Biological Chemistry and Radiology of Federal State Budgetary Educational Institution of Higher Education "Russian Timiryazev State Agrarian University", 17regin@mail.ru

English adviser: Fomina Tatiana Nikolaevna, Senior Teacher of the Department of Foreign and Russian Languages of Federal State Budgetary Educational Institution of Higher

Education “Russian Timiryazev State Agrarian University”, tfomina67@mail.ru

Scientific advisers: **Novikov Nikolay Nikolaevich**, Doctor of Biological Sciences, Professor of the Department of Agronomic, Biological Chemistry and Radiology of Federal State Budgetary Educational Institution of Higher Education “Russian Timiryazev State Agrarian University”, tshanovikov@gmail.com; **Seregina Inga Ivanovna**, Doctor of b. D., prof. Department of Agronomic, Biological Chemistry and Radiology of Federal State Budgetary Educational Institution of Higher Education “Russian Timiryazev State Agrarian University”, seregina.i@inbox.ru

Abstract: *In laboratory studies, the influence of the pH of the medium on the activity of catalase in dormant and germinated grains of various varieties of malting barley was studied. It was revealed that the highest activity of catalase in all studied varieties of barley was observed at pH 7.0 and 8.0 that can be used to assess the ability of brewing grain to malt.*

Key words: *catalase activity, dormant and germinated grain, brewing barley.*

Barley is of great national economic importance and is an important fodder, food and industrial crop. Its grain contains on average 9-15% of proteins, which have a higher biological value in comparison with proteins of other forage crops. The dry matter of barley grain includes a large set of chemical elements: carbon, nitrogen, oxygen, hydrogen, sulfur, phosphorus, potassium, calcium, magnesium, iron, silicon, iodine, boron, zinc, manganese, etc. Fodder barley increases the meat productivity of poultry and its flour is widely used for feeding chickens. Barley straw and chaff are good roughage for livestock. Malting barley is grown in relatively limited areas and most of the grain from these regions is used for malting [3, 4].

The size of the yield and brewing indicators of barley grain largely depend on the soil and climatic conditions and the regime of mineral nutrition of plants. Regarding the main indicators of the quality of the grain of barley of brewing varieties, regulatory requirements have been established: the extractiveness of the grain must be at least 78%, the nature must be at least 650 g / l, the mass of 1000 grains must be at least 40 g, the protein content must not exceed 12% [1, 3].

The enzymes peroxidase and catalase, which are components of the plant antioxidant system, catalyze chemical reactions in germinating kernels that protect cell membrane structures from lipid peroxidation, which ensures the stability of biochemical processes occurring in them [1, 3, 6].

The aim of our research was to study the influence of the pH of the medium on the activity of the enzyme catalase in dormant and germinating grains of three varieties of spring barley of domestic selection.

Research methodology: As objects of research were taken spring brewing barley varieties of the Federal Research Center "Nemchinovka" Nadezhny, Vladimir, Znatny, which are included in the State Register of Breeding Achievements of the Russian Federation. The Znatny variety is included in the State Register for the Central Region, the Reliable variety - for the Central and Volgo-Vyatka regions, the Vladimir variety - for the Central and Central Black Earth regions [5].

In laboratory studies, we used a grain of barley of the harvest of 2020, grown on a leveled agricultural background and fully passed post-harvest ripening. Grain germination was carried out for 7 days at a temperature of 12-14 °C. Catalase activity in dormant and germinated grains of various varieties of barley was determined according to Bach and Oparin with some

author's modifications [2]. Statistical processing of the obtained experimental data was carried out by the dispersion method using the computer program "Straz" in the modification of the information and computing center of the of Federal State Budgetary Educational Institution of Higher Education "Russian Timiryazev State Agrarian University" (Version 2.1, 1989–1991).

In laboratory experiments, the activity of catalases was determined at different pH values in order to identify isozymes active under these conditions. To create the required pH of the medium in which the enzymatic reaction was carried out, 0.05 M phosphate buffer was used. At pH = 5.5, all studied barley varieties had a comparatively low activity of catalases and did not differ significantly in the level of activity (Table 1, 2; Fig. 1, 2). A higher activity of catalases was found at pH = 7.0, and in dormant and germinating grains in varieties Znatny and Vladimir by 5–6 times, in variety Nadezhny by 3.7–4 times. An even higher catalase activity in barley grain was observed at pH = 8.0.

Table 1

| Barley varieties | pH = 5.5 | pH = 7.0 | pH = 8.0 | HCP ₀₅ |
|------------------|----------|----------|----------|-------------------|
| Znatny | 0.19 | 1.11 | 1.23 | 0.12 |
| Vladimir | 0.21 | 1.07 | 1.08 | 0.12 |
| Nadezhny | 0.25 | 0.93 | 1.10 | 0.12 |

Catalase activity in resting grain of different varieties of malting barley depending on the pH of the medium (μ kat per 1 g of air dry weight)

Table 2

| Barley varieties | pH = 5.5 | pH = 7.0 | pH = 8.0 | HCP ₀₅ |
|------------------|----------|----------|----------|-------------------|
| Znatny | 0.21 | 1.13 | 1.25 | 0.07 |
| Vladimir | 0.21 | 1.09 | 1.20 | 0.07 |
| Nadezhny | 0.27 | 1.00 | 1.12 | 0.07 |

Catalase activity in the grain of 7-day-old seedlings of different varieties of malting barley, depending on the pH of the medium (μ kat per 1 g of fresh weight)

Of the three studied barley varieties, the higher catalase activity in dormant and germinated grains at pH 7.0 and 8.0 differed in the varieties Znatny and Vladimir, while in the grain of the Nadezhny variety, the level of catalase activity was significantly lower.

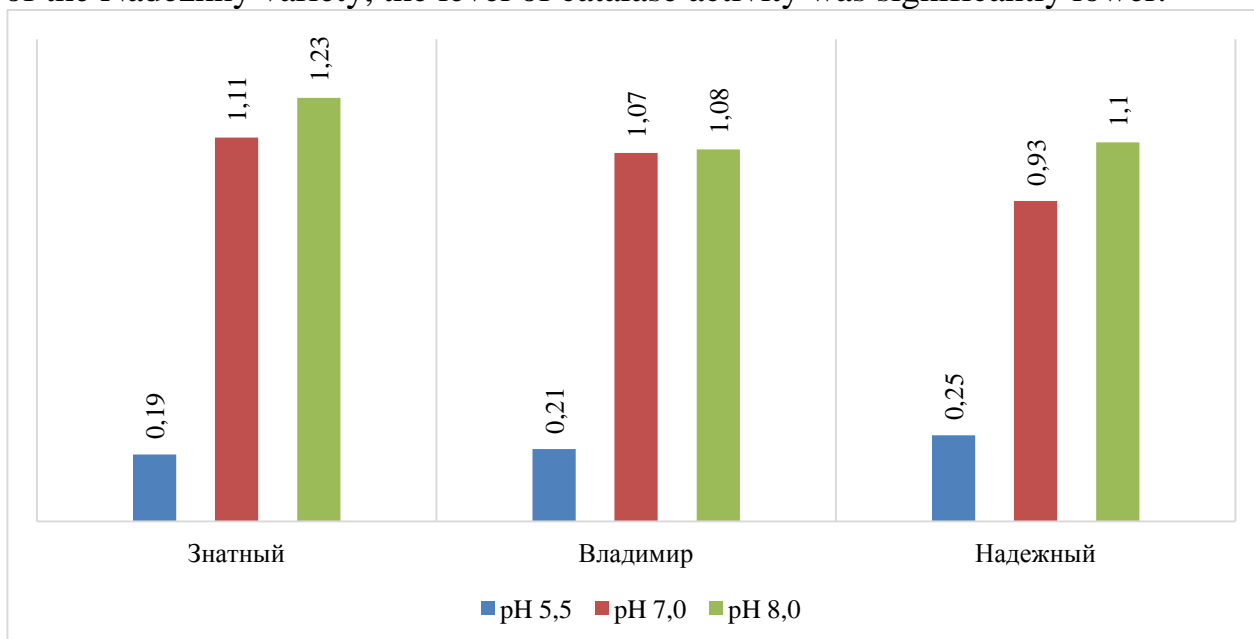


Figure 1. Activity of the enzyme catalase in dormant grain of spring barley of brewing varieties, μ kat per 1 g of air dry mass

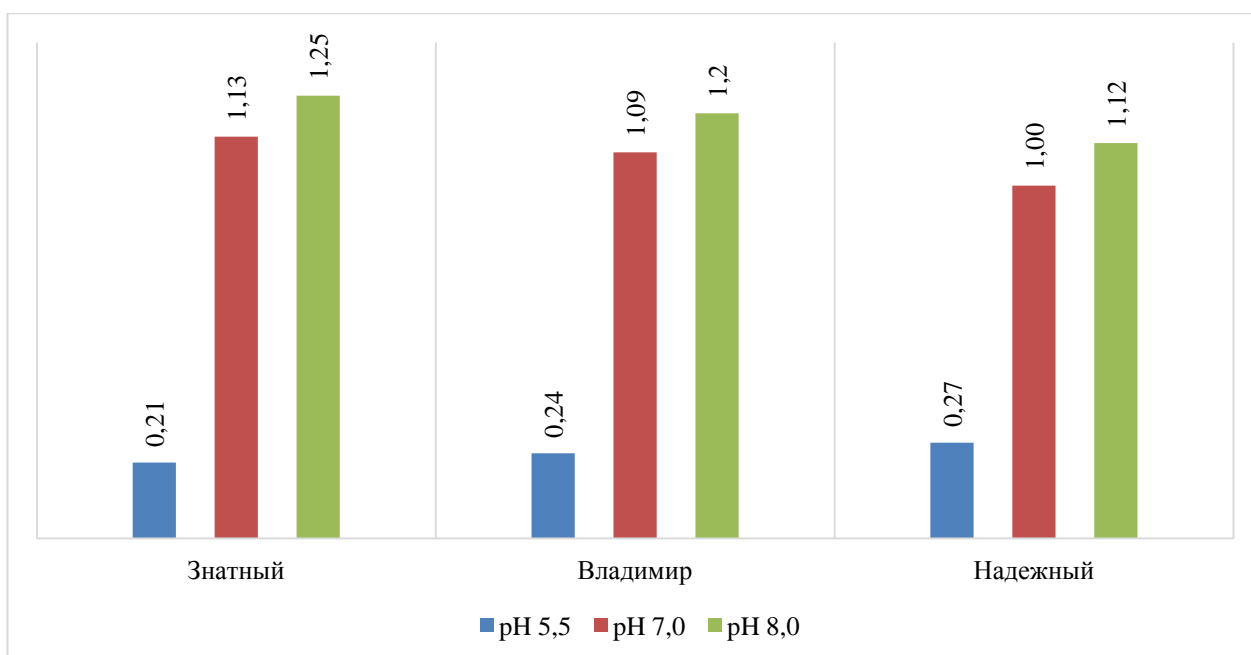


Figure 2. Activity of the enzyme catalase in the grain of 7-day-old seedlings of spring barley of brewing varieties, µkat per 1 g of fresh weight

Thus, the highest level of catalase activity in dormant and germinated grain of the studied varieties of brewing barley was observed at a pH of 8.0, which can be taken into account when assessing the ability of barley to malting, since catalase and other enzymes of the antioxidant system stabilize biochemical processes during germination. Weevils. Based on the data obtained, it can be assumed that barley varieties Znatny and Vladimir are characterized by a higher malting ability, since they have a higher activity of catalases in dormant and germinated grain.

Results

1. The highest activity of the enzyme catalase in the grain of the studied varieties of spring malting barley is observed in a weakly alkaline medium (pH = 8.0), on average it is 5-6 times higher than in a moderately acidic medium (pH = 5.5).

2. The existence of varietal specificity in terms of catalase activity in dormant and germinated grain of the studied barley varieties was noted. It was revealed that in the grain of the barley varieties Znatny and Vladimir there is a higher activity of catalase at pH 7.0 and 8.0 in comparison with the variety Nadezhny.

3. On the basis of the obtained results of the study, it can be recommended to determine the activity of catalase at pH = 8.0 when assessing the ability of malting barley kernels to malt.

References

1. Verkhoturov, V. V. Activity of some oxidoreductases during storage and malting of barley / V. V. Verkhoturov, V. K. Toporishchev. - 2004. - No. 2. - Pp. 82-84.
2. Novikov N. N. Laboratory workshop on plant biochemistry: Textbook / N. N. Novikov, T. V. Tarazanov. - Moscow: Publishing house of the Russian State Agrarian University - Moscow Agricultural Academy named after K.A. Timiryazev, 2012. - 114 p.
3. Solovyova N. E. Formation of the quality of malting barley grain depending on the diet and the use of phyto regulators in the conditions of the Central region of the Non-Chernozem zone: dis. ... Candidate of Biological Sciences: 03.01.05 Solovieva Nyurguyana Egorovna. -

Moscow, 2019. - 203 p.

4. Yusova, O. A. Formation of grain quality in brewing barley varieties depending on the conditions of the growing season / O. A. Yusova, P. N. Nikolaev, P. V. Popolzukhin // Agriculture. - 2015. - No. 5. - Pp. 44-46.

5. State breeding committee - Spring malting barley. [Electronic resource]. - <https://reestr.gossortrf.ru/search/vegetable/>

6. Mahmoudi, T. Antioxidant activity of Iranian barley grain cultivars and their malts // T. Mahmoudi, M.R. Oveisi, B. Jannat et al. // African Journal of Food Science. - 2015. - Vol. 9 (11). - Pp. 534-539.

УДК 37.091.33

MAIN ASPECTS IN THE FORMATION OF COMMUNICATIVE COMPETENCE OF STUDENTS OF A TECHNICAL UNIVERSITY

Kizilova Natalya Igorevna, Associate Professor of the Department of Foreign Languages, FSBEI HE SSAU, natali0403_87@mail.ru

Abstract: *The article provides an overview of aspects in the formation of communicative competence among students of technical universities. Special attention is paid to the main aspects. Their definition and brief description are given.*

Key words: *pronunciation and intonation, reading, oral speech, writing, lexical and grammatical aspects.*

Recently, there have been changes in our country that have put many graduates of technical universities in front of the need to know a foreign language. With the development of international relations, the demand for specialists who speak a foreign language is expanding every day. Many enterprises and companies work closely with foreign colleagues, which forces employers to form new requirements for their employees, including the requirement for knowledge of a foreign language.

With the strengthening and expansion of economic ties with foreign countries, there is a need for qualified specialists with good knowledge of a foreign language. Along with this, the humanistic orientation of the education reform and the change of priorities - from the preparation of a set of narrow specialists necessary for the state to study in higher education as a way of personal self-development, the formation of widely educated and thinking citizens of a democratic society - forces us to look for ways to satisfy the educational needs of students in accordance with their personal aspirations. Thus, the study of a foreign language can be not only a goal, but also a means of development, education of the personality of a future specialist.

Many non-linguistic universities develop individual programs for teaching future specialists in foreign languages. But, as a rule, there are a number of main tasks that teachers face in the learning process:

- teaching pronunciation and intonation;
- teaching to read;
- development of oral speech;