

AGRONOMY, FORESTY AND WATER MANAGEMENT

General Farming and Crop Production

UDK 633.853.494:664.34(470.64)

Prospects of rapeseed oil production in Kabardino-Balkaria

Boris M. Knyazev, Mukhtar Zh. Ashirbekov, Islam A. Afaunov, Amir A. Sheregov

Abstract. The article presents the results of research on the influence of plant growth regulators on the formation of elements of productivity, oil content and seed quality of various varieties of winter rapeseed in areas of insufficient and unstable moisture in Kabardino-Balkaria. The goal was to develop separate techniques for the cultivation of winter rapeseed, contributing to an increase in plant productivity in 2024–2025. The existing methods for determining the productivity and quality of the products were used. Regardless of the variety and cultivation zone, plant growth regulators significantly affected the productivity of winter rapeseed. They contributed to the strengthening of growth processes, increasing the yield and oil content of seeds of the studied varieties. The formation of elements of productivity of winter rapeseed plants in conditions of unstable and insufficient moisture was also influenced by the density of plants. In those experimental variants where the plant density was 1 million per hectare, the number and weight of seeds per plant averaged 320 pieces and 1.5 grams, respectively, and at a density of 500 thousand/ha – 560 pieces and 3.2 g. The oil content in the seeds should be especially noted, depending on the density of the plants. In those variants where the number of plants per hectare was 500 thousand, the seed weight and oil content are expressed by the best indicators due to plant productivity. That is, on thinned crops, each plant individually developed better, receiving more nutrients and moisture than in thickened crops. The yield and oil yield per unit area are 5–8% higher in sparse crops than in thickened crops, this is observed for all rapeseed varieties in the growing areas.

Keywords: winter rapeseed, cultivation area, growth regulators, stand density, varieties, yield

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The use of modern growth regulators in the cultivation of peas in the foothill zone of the Kabardino-Balkarian Republic

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Abstract. The article presents a study of modern growth regulators and their effect on the productivity of field peas in the foothill zone of the Kabardino-Balkarian Republic (KBR). The aim of the research was to assess the impact of the latest growth regulators and anti-stress agents on photosynthetic activity indicators, yield structure elements, productivity, and grain quality of field peas under the conditions of the foothill zone of the KBR. Field experiments were conducted in 2023–2025 on leached heavy-loam chernozem. The object of the study was the locally adapted field pea variety "Atlant". The research evaluated the effectiveness of pre-sowing seed treatment and plant spraying at the budding stage with the following preparations: "Albit", "Epin-Extra", "Zircon", and "Obereg". The methodology included determining field germination, assessing photosynthetic potential, analyzing the symbiotic apparatus and yield structure, and

evaluating the biochemical composition of the grain. Statistical data processing was carried out using variance analysis. It was demonstrated that growth regulators optimize plant ontogenesis, increasing field germination by 3.2–5.1% and accelerating the onset of phenophases. The preparations stimulated symbiotic nitrogen fixation, increasing the number of active nodules by 22–28%, and enhanced photosynthetic potential by 12–29%. Under abiotic stress conditions (waterlogging and drought), the preparations showed high anti-stress activity. "Albit" proved to be the most effective, providing an increase in marketable yield of 27.8% (2.71 t/ha) and the highest crude protein yield (6.53 c/ha). The protein content in the grain increased by 0.7–2.7% compared to the control. Integrating growth regulators into the pea cultivation technology in the foothill zone of the KBR demonstrates high agronomic efficiency. The optimal application scheme, ensuring increasing productivity, improving grain quality indicators, and economic profitability, is the two-time use of the "Albit" preparation.

Keywords: field peas, growth regulators, "Albit", "Epin-Extra", "Zircon", "Obereg", foothill zone, leached chernozem, yield, grain quality, anti-stress activity

ANIMAL SCIENCE AND VETERINARY MEDICINE

Private Animal Husbandry, Feeding, Feed Preparation and Livestock Production Technologies

UDK 636.2.084

The influence of maternal live weight on the productive performance of first-calf heifers

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Annotation. In the Sverdlovsk region, the Holstein breed was obtained as a result of the import of purebred cattle from abroad, as well as absorbing with reproductive elements, crossing the domestic black-and-white breed of the Ural offspring with Holstein bulls of various generations. In this regard, there is a wide variety of both dairy and phenotypic traits in herds, which are known to be influenced by many factors. The research was carried out in a breeding reproducer for the breeding of the Holstein breed of the Sverdlovsk region. The object of research is heifers and first-time cows. The weight growth of repair heifers and the milk productivity of the first heifers were studied. The dynamics of changes in body weight were monitored by monthly individual weighing and key growth indicators were calculated. The milk productivity of the first heifers was analyzed based on the results of control milkings, which were carried out monthly. The aim of the work is to study the effect of the living weight of mothers on the productive qualities of daughters. It has been established that the live weight of mothers influences the productive qualities of daughters. Heifers from mothers with a live weight of over 601 kg grew the most intensively, followed by heifers from mothers with a live weight of less than 500 kg. Heifers born from cows with a live weight of 601–650 kg reached a live weight of 369 ± 3.02 kg at the age of 13 months, which is about 75% of the live weight of an adult animal. The highest milk yield rates for 305 days of lactation were in the group of heifers from mothers with the lowest live weight (up to 500 kg at the first calving). They outperformed the first-born cows from mothers with a different live weight by 1332, 1227 and 135 kg, or by 15.0; 14.2% and 1.6%, respectively, by group. Animals from mothers with the highest

live weight (over 601 kg) were in second place. Cows with a low live weight (less than 500 kg) showed higher reproductive abilities. It is most effective to use cows-daughters from mothers with low body weight for milk production.

Keywords: Holstein cattle, mother cows, daughters, weight growth, milk productivity, reproductive qualities, efficiency of use

UDK 636.2.082

Comparative analysis of the duration of pregnancy of daughters of stud bulls

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Abstract. A comparative analysis of the actual duration of pregnancy after the second calving (468 cows) and after the third calving (355 cows) of the daughters of 10 sires bred in different countries was conducted. The aim of the study was to investigate the effect of using sires of different breeds and bred in different countries on the duration of pregnancy of Red Steppe cows. The average duration of the second pregnancy was 279.7 days, including 279.8 days for the daughters of Red-Pied Holstein bulls; 278.4 days for the daughters of a Red Steppe bull; and 280.9 days for the daughters of a Danish Red bull. The average duration of pregnancy after the third pregnancy for 355 cows was 280.1 days. The average duration of pregnancy for heifers was 279.2 days and for bulls 280.9 days. According to the results of the second pregnancy, the difference in the days of pregnancy of the daughters of the bulls Kulon 1237, Twist 76849, Gir 1883 is 2.1; 2.3; 3.2 days, respectively, and the ratio of heifers and bulls in the offspring according to the results of the third pregnancy was 165:190 heads (46.5/53.5%). According to the results of the third pregnancy, the ratio of heifers and bulls in the offspring according to the results of the third pregnancy was 165:190 heads (46.5/53.5%). When comparing the duration of pregnancy of the daughters of the bull Iman 314 of the Red Steppe breed with the daughters of eight sires of the Red-and-White Holstein breed, the ratio for the second calving is 278.4:279.8 days, and for the third calving 278.9:280.2 days.

Keywords: cow, breeding bulls, duration of pregnancy, sex of offspring, bulls, heifers, limits

Breeding, Selection, Genetics and Biotechnology of Animals

UDK 636.2:636.082

The effectiveness of selection based on the selection index highly productive daughters of bulls with breeding categories, installed using a modified method

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Abstract. The selection of sires based on the quality of their offspring still remains relevant for increasing the milk productivity of cattle, as well as the selection of highly productive cows based on a selection index that takes into account the exterior characteristics of animals. The

purpose of the study was to test the method modified by the authors for determining the categories of breeding value of sires of dairy and dairy-meat breeds and to establish the effectiveness of selection based on the selection index of highly productive daughters of sires with different breeding values. The studies were conducted in 2025–2026. in LLC «Malka» Zolsky district of the Kabardino-Balkarian Republic on first-calf cows of the red steppe breed, daughters of three sires – Valet 117 (28 daughters), Napor 905 (28 daughters), Parus 21 (25 daughters). In the course of the study, it was established that among the offspring of sires compared by quality, the sire Parus 21 (A3) showed an improving effect in terms of milk yield, and the sire Napor 905 (B2) showed an improving effect in milk fat content. In terms of milk protein content, the Napor 905 sire turned out to be an improver of the second category (B2), and the remaining sires were neutral (N). The daughters of sire bulls with the highest value of the selection index were superior to their half-sisters with the lowest value of the selection index in terms of milk yield per lactation by 9.8–18.9% ($p>0.95$ – 0.99), in fat milk content – by 0.16–0.33 abs.% ($p>0.95$ – 0.999), in milk protein content – by 0.02–0.04 abs.% ($p<0.95$). Of the two factors studied, the greatest influence on milk yield and fat content was exerted by the selection index (48.4 and 16.0% ($p>0.999$)), the least – by the sire (2.1 and 4.3% ($p<0.95$)).

Keywords: red steppe breed, sire, first-calf cow, breeding value, selection index

UDK 636.32/.38.035

Wool productivity and wool quality of young Gorky breed sheep and their crossbreeds

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Annotation. The article presents research data on quantitative and qualitative indicators of the wool of purebred yares of the Gorky breed and crossbreeds with the Hampshire breed in the conditions of Druzhba LLC of the Lyskovsky district of the Nizhny Novgorod region. The studies were conducted to compare the wool productivity and quality and quantity of the wool of Gorky sheep and their crosses with the Hampshire breed in order to further improve the breed. The parameters of the studied parameters (the cut of unwashed and washed wool, the yield of clean wool, length, tonin and strength of wool) were carried out according to generally accepted methods. A comparative analysis of the qualitative and quantitative indicators of the wool of the ancestors of the experimental yares confirmed the advantage of Hampshire sheep in cutting pure wool and its length by 3.4% and 7.2%. It was revealed that in terms of unwashed wool, crossbred yarns prevailed over purebred ones by 0.14 kg or 4.1%, in washed wool – by 0.09 kg or 4.7%, and in terms of pure wool output – by 2.6 units. It was determined that the average natural coat length of crossbred calves is 0.38 cm longer than that of purebred calves, with a difference in true length of 0.79 cm. It is proved that the greatest equalization in fiber length is inherent in crossbred yarns of 2.80%. It was found that the yarns of both experimental groups had 56% wool. It was revealed that high-strength wool (8.31 mk) of the 1st class of the crossbred type is inherent in half-blooded yarrows, which is due to the breed characteristics of the Gorky breed and the Hampshire breed.

Keywords: sheep, Gorky breed, Hampshire breed, wool productivity, shearing, wool tone and length, strength, yield of pure wool

Age characteristics of the main selection traits of the herd of main and replacement rams of the Salsk breed

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Abstract. This article presents data on the age characteristics of the main selection traits of a flock of Salsk breed rams and replacements raised at Belozernoe LLC. Recent studies confirm a positive trend toward decreasing wool diameter in our sheep. Currently, the share of wool with a diameter of 23 μm or less is 38%, while wool with a diameter of 23 to 25 μm accounts for approximately 41%. Importantly, an analysis of 2026 data revealed a clear decrease in wool diameter in younger animals. For example, in two-year-old ewes, it is 3% smaller, and in yearlings, it is almost 5% smaller compared to rams over 5 years old. This trend toward decreasing wool diameter in young animals is extremely encouraging, as this indicator plays a key role in determining the market value of wool. Laboratory studies conducted over the past year have shown that animals aged 1–2 years exhibit an increased proportion of individuals with more pronounced fine crimping along the entire length of their hair (staple). All age groups of rams exceed the elite animal standard, but the degree of this superiority is uneven and has a distinct peak at age 3, with three-year-olds exceeding the standard by 13.5 kg, and two-year-olds by approximately 4 kg. The superiority of four-year-old rams decreased to 10 kg, while animals aged 5 years and older exceeded yearlings by an average of 3.5 kg. Among adult rams, there are record-breakers capable of yielding 7–8 kg of washed wool. Overall, when averaging across all age groups, the average yield is approximately 5.8–6.1 kg of washed wool.

Keywords: Salsk breed, wool yield, live weight, staple length, crimp, wool diameter, selection traits

Assessment of the effectiveness of development Volgograd breed sheep in different natural-climatic zones and management systems

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This work was performed as part of a state task of the Ministry of Education and Science of Russia (topic No. 125020701763-0).

Abstract. This article presents the results of an analysis regarding the impact of natural and climatic factors on the productivity of the Volgograd breed sheep, depending on the agro-climatic zones of their breeding. In the context of the modern market, characterized by high demand for lamb and declining profitability of wool production, analyzing the adaptive potential and productive qualities of the breed has become increasingly relevant. The study provides a comparative analysis of economically useful traits (live weight, wool clip, and fertility) of livestock bred in the Volgograd and Rostov regions, as well as the Republic of Bashkortostan. Based on data from the 2025 Yearbook of Breeding Work in Sheep and Goat Farming in the Russian Federation, it was established that the Volgograd breed sheep meets breed standards and demonstrates high adaptability, currently ranking third among fine-wooled breeds. A differentiation in productive indicators was identified based on the constitutional-productive type of the animals: the meat-wool type is characterized by higher milk yield and live weight

compared to the wool-meat type. The study confirms the potential for further improvement of breeding work with the breed, taking into account regional characteristics and modern market requirements. The analysis revealed that sheep productivity varies significantly depending on the zone of maintenance. In particular, the Trans-Volga region (Zavolzhye) showed the highest indicators for live weight, wool quality, and fertility.

Keywords: Volgograd breed, breeding lines, natural and climatic zones, productivity

AGROENGINEERING AND FOOD TECHNOLOGIES

Technologies, Machines and Equipment for the Agro-industrial Complex

UDK 631.353.73

Modeling the technological process of recycling fruit tree branches

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Abstract. Pruning produces a byproduct – cut fruit branches – that clutters the orchard's row spacing and interferes with subsequent maintenance work. Therefore, pruning fruit trees and disposing of the resulting waste is a pressing issue. An analysis of the current state of fruit tree pruning disposal revealed that existing chippers can be classified by design into the following groups: stationary, positional, and mobile. Stationary chippers are most often used in horticulture when the chipped wood is subsequently used in the processing industry. Mobile chippers significantly reduce labor intensity. A mounted system ensures the unit's transport position and allows for adjustable penetration of the chipper's working parts into the soil. Modeling the fruit tree branch disposal process revealed the relationship between cutting force and the work of the cutting force on the key parameters of the fruit tree branch chipping process using a knife disk. Two-layer knives with a 9Kh5VF steel cutting edge, a grade 15 steel body, or solid knives made of U8A tool steel with a cutting edge hardness of HRC=50-55 are recommended. It has been shown that the greater the sharpening angle, the greater the cutting force. This leads to greater deformation of the material in front of the knife, resulting in greater pressure. This increases the specific cutting force. An expression has been derived for determining the optimal sharpening angle for the knife blade, which ensures the minimum knife wear coefficient and the lowest specific cutting force. These expressions can be used in the design of shredding machines.

Keywords: fruit orchards, pruning, recycling, branches, shredder, knife, cutting force

UDK 635.13:635.18

Technological justification for herbicidal treatment of vegetable crops using the side spray method

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Abstract. The spraying process is an important element of crop technology. By the method of ground spraying, plant nutrition and protection agents are introduced. When cultivating vegetables using comb technology, it is important to have the technical ability to apply pesticide solutions both in a continuous way and along the surface of the comb, or only in the interband

space between the ridges. Most often, serial sprayers are used in the fields, where such treatment is provided by a vertical method of continuous spraying with overlapping spray flares from neighboring sprayers. An innovative approach is proposed to carry out crop care by spraying by side spraying according to patent for the invention of the Russian Federation 2785465 with an improved technical solution according to patent for the invention of the Russian Federation 2817070 (developed by scientists of the FSBEI HE Volgograd SAU). The side spray strip spraying method enables ground spraying to be performed with high quality properties and saving processing costs. The disclosed technical solution can be used in growing vegetable crops, particularly potatoes using comb technology, as well as on cotton crops. The article describes technological approaches and technical solutions for the complex use of the lateral spraying method, both for caring for crops in strips, and a continuous method for treating crops with herbicides. Method makes it possible to set minimum height of spraying for continuous treatment with herbicides in phase "to shoots" by 35% less than minimum values for height of spraying when vertical method is used. The method of side spraying makes it possible to apply plant protection and nutrition agents more evenly, which increases efficiency of the technological operation in the technology of cultivation.

Keywords: spraying, side spraying method, herbicides, vegetable crops, potatoes, comb technology, resource saving

UDK 620.22

Percolation models for describing the thermal conductivity of polymer structural materials

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Abstract. The article is devoted to the problem of thermal conductivity of structural polymer materials used in friction units of agricultural machinery. During operation, the working bodies and movable joints experience excessive heat. As a result, destructive processes can develop in their volume, leading to the failure of mechanisms and structures. Therefore, without a quantitative description of the thermal conductivity of polymer composites, their practical application is impossible. For this purpose, the percolation model is used in this work. Within the framework of percolation theory, models of a random superconducting grid (RSG) and a random grid of resistors (RGR) are proposed. It is shown that the first model is applicable to the description of thermal conductivity of carbon fiber plastics based on phenylene below the percolation threshold, and the second above the percolation threshold. It turns out that in both cases the coefficient of thermal conductivity agrees fairly well with the theoretical estimate, i.e. their linear correlation is observed. The results obtained make it possible to clarify the physical nature of the heat transfer mechanisms corresponding to the RSG and RGR models. In the case of RSC, heat transfer through the fibers is realized instantly and therefore the amount of thermal conductivity is limited by heat transfer through the sections of the polymer matrix separating the fibers. In the RGR model, heat transfer is realized through the contact points of the fibers.

Keywords: thermal conductivity, percolation theory, phenylene, carbon fibers, modulus of elasticity, fractal dimension

Justification of dynamic parameters of a crescent-shaped cutter blade for a vine shoot trimming machine

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Abstract. The article addresses the problem of drive dynamic instability in a vine shoot trimming machine, which occurs when cutting green grape shoots due to cyclic impact loads. Traditional stabilization methods – installing an additional flywheel or phase misalignment of the blades – complicate the design and increase metal consumption. As an alternative solution, a method of rotation stabilization is proposed that uses the crescent-shaped cutter blade itself as an inertial stabilizer (integrated flywheel) on the drive shaft to smooth the torque, thereby eliminating the need for a separate inertial element. The cutting force for a vine shoot with a diameter of 14 mm was experimentally determined to be 171.3 N. For a blade with a diameter of 215 mm and a minimum technological thickness of 6 mm, rotating at a frequency of 52.33 s^{-1} , the moment of inertia was calculated. Energy balance calculations showed that with a blade mass of 0.86 kg, the rotation irregularity coefficient of the drive shaft is $\delta=0.180$, which significantly exceeds the permissible limits. When the mass is increased to 3.8 kg, δ decreases to 0.0300, which corresponds to the industry-recommended range of 0.02–0.04. The obtained results confirm that targeted selection of the working element's mass and moment of inertia makes it possible to smooth effectively the impulse technological loads, simplifying the design, reducing its metal consumption and cost without deteriorating the drive's dynamic characteristics. The proposed approach eliminates the need for a separate flywheel, simplifying the kinematic scheme and reducing the design cost without compromising the drive's dynamic performance. The practical significance of the work lies in developing a methodology for parametric calculation of the cutting elements of vine shoot trimming machines that perform the combined function of a flywheel.

Keywords: cutting apparatus, vine shoot trimming machine, crescent-shaped blade, dynamic loads, rotation irregularity, flywheel, moment of inertia, irregularity coefficient, inertial accumulator

Justification for the arrangement of rotors in the working parts of a garden rotary tiller

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Abstract. The use of knives with inclined cutting edges in vertical-axis garden tillers improves uniformity of tillage and enables targeted soil movement. This creates an axial milling force, absent with straight knives, which leads to significant reactive forces pushing or pressing the rotor vertically. This negatively impacts the tillage process. Twin-rotor tillers make it possible to compensate for the total axial force. The objective of this study is to systematically analyze all theoretically possible rotor configurations for a twin-rotor tiller and develop a methodology for selecting a rational design. A complete matrix of 16 ordered combinations is constructed, determined by the direction of rotor rotation, the orientation of the cutting edges, and the axial force vector. All variants are divided into two classes: those with zero total axial force (resulting in a moment of a force couple) and those with a non-zero total axial force. Ten physically feasible combinations were identified, including four designs with identical rotors. For each unique design, the soil removal pattern, the degree of blade standardization, and the drive complexity were determined. A hierarchical method for selecting rotor layouts is proposed,

enabling informed decisions at the design stage based on agrotechnical requirements and production constraints. Designs with identical rotors are appropriate when it is necessary to minimize soil scattering or maximize downforce.

Keywords: vertical garden rotary tiller, twin-rotor rotary tool, inclined cutting edge, axial force compensation, identical rotors, rotor layout

Food Systems

UDK 664:658.562.3

Allergen management challenges in food service establishments

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Abstract. In the 21st century, food allergies have become a significant and challenging issue in healthcare, the food industry, and the catering industry. Although food allergies may affect a relatively small percentage of the population, allergic reactions can be severe and potentially fatal. Therefore, relevant regulations specify that food safety hazards include allergens. Furthermore, ingredients that can cause allergic reactions are listed in food products, regardless of their quantity. Currently, the negative impact of allergens on consumer health is primarily minimized through warning labeling of packaged food products. A specific feature of catering establishments is the inability to label each prepared dish before serving. Furthermore, the risk of cross-contamination with allergens during the preparation of cooked dishes in catering establishments increases due to the fact that dozens of different dishes are prepared simultaneously in a single room within a short time. Minimizing the risk of negative impact on consumer health from the presence of allergens in food prepared in catering establishments will be achieved by updating mandatory preliminary measures programs, which are implemented by HACCP-based safety management systems, using the VIAL® methodology, and by using a risk-based approach to allergen management.

Keywords: allergens, catering, cross-contamination, safety, food product, risk assessment, consumer health

UDK 664.7:633.15:577.15

Effects of biocatalytic and physical soaking factors on phytic acid content in BAZOKA hybrid maize grain

Diomed Nzeyimana, Natalya A. Bugaets, Olga V. Rudenko

Abstract. Phytic acid in maize grain forms stable complexes with mineral elements, which necessitates technological approaches to reduce its content during raw material preparation for food processing. The study aimed to evaluate the effects of phytase, organic acids, a bacterial consortium, and ultrasonic treatment on phytic acid content in the grain and the pH of the soaking medium for BAZOKA hybrid maize grown in the Republic of Burundi. The grain was soaked for 4 h at a grain-to-liquid ratio of 1:3. The treatments included exogenous phytase, a mixture of ascorbic and citric acids, a consortium of lactic acid and propionic acid bacteria, and preliminary ultrasonic exposure at 40 kHz and 60 W for 15 min. Phytic acid was determined spectrophotometrically with Wade reagent at 510 nm. The control contained 2.5% phytic acid. Phytase reduced the value to 2.2%, whereas phytase combined with organic acids reduced it to

1.9%. The lowest content, 0.9%, was obtained with phytase and the bacterial consortium; this corresponded to a 64% reduction relative to the control, while medium pH changed from 6.42 to 4.40. Preliminary ultrasonic treatment did not enhance the biocatalytic effect: phytic acid contents in the corresponding treatments were 2.3 and 2.5%. Under the experimental conditions, soaking with phytase and the bacterial consortium without ultrasonic treatment was the most effective combination.

Keywords: maize, BAZOKA hybrid, phytic acid, phytase, soaking, bacterial consortium, organic acids, ultrasonic treatment, grain biomodification

UDK 664.8

Assessment of the content and structure of polyphenols in non-cultivated plants

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Abstract. Polyphenols are organic compounds found in wild plant materials that possess strong antioxidant properties. The aim of this study was to identify the polyphenolic composition of uncultivated plants and evaluate its changes during drying and storage. Wild plants were collected in the Digor Gorge of the Irafsky District of the Republic of North Ossetia-Alania. The study subjects were white lupine, yellow lupine, chicory, orach, and modified products obtained from them (dried, ground plant parts and extracts obtained from these products). Polyphenol levels (2.8–6.7%) vary significantly depending on the type of plant material and its specific part. The highest polyphenol content is characteristic of the underground parts of chicory (roots and rhizomes). In the vegetative parts of orach (stems and leaves), polyphenols are present only in small quantities. Polyphenols include oxybenzoic, gallic, ellagic, o-protocatechuic, ferulic, n-coumaric, and caffeic acids. Flavonols are the predominant class of compounds in polyphenols. Their content (%) is 30 in the leaves and inflorescences of yellow lupine, 57 in white lupine and orach, 58 in the leaves and stems of chicory, and 59 in the roots and rhizomes of chicory. The content of anthocyanins varies from 0 to 53%, and the total alkaloids range from 9.3 to 45.7% depending on the type of raw material. The highest mass fraction of the total alkaloids was found in the leaves and stems of chicory. During IR drying of raw materials, the amount of polyphenols decreases by 11–50%. Storage of wild plant powders for 24 months at a temperature of 20 ± 5 °C leads to a decrease in the concentration of flavonoids by 9–21%.

Keywords: uncultivated plants, yellow lupine, white lupine, quinoa, chicory, polyphenols, flavonoids

UDK 663.31

Development of a technology for producing cider from winter-ripening apple variety mixtures

Madina B. Khokonova

Abstract. This study focuses on developing a technology for producing cider with high organoleptic properties using a mixture of apple varieties and malolactic fermentation bacteria in the Kabardino-Balkarian Republic. The research was conducted at Elbrus-Spirits LLC and at the Department of Agricultural Production and Processing Technology of the Kabardino-Balkarian State Agrarian University in 2024–2025. The study subjects were winter-ripening apples Idared, Red Delicious,

Golden Delicious, and Granny Smith, as well as a 25% mixture of apple varieties by weight, Lactoenos 450 PreAc bacteria, and finished cider. Lactoenos 450 PreAc bacteria were used at a dosage of 50 g/hl of must. Fermentation was carried out at a temperature of 16–18 °C for 3–4 days. The finished wine material was aged for 4–5 days. A cider production process using malolactic fermentation bacteria is described. The data presented demonstrates that the resulting cider is low-alcohol, with an alcohol content of 1,6% vol. It has been established that apple varietal characteristics significantly influence the assessment of technical maturity, must yield, and its organoleptic and physicochemical properties. The highest juice yield was obtained from processing Idared apples and a prepared variety mix. Antioxidant activity decreased during fermentation in all samples. The highest antioxidant activity values were observed in the fermented wort of the mixed variety. In terms of organoleptic and physicochemical properties, the proposed cider complies with regulatory and technical documentation.

Keywords: apple fruits, variety mix, cider, antioxidant activity, lactic acid fermentation, quality indicators

ECONOMY

Management

UDK 349.23+004.056+342.721

Protection and processing of employee personal data in the digital age: legal and organizational aspects

Irina L. Kudzaeva, Leonid P. Suzhaev

Abstract. The digitalization of personnel records management, the implementation of video surveillance systems, biometric identification, geolocation, and remote performance monitoring have dramatically expanded the volume of employee data collected and created new channels for data leakage. The relevance of this study is determined by the fact that, since 2022, penalties for the disclosure of employee personal data have become stricter. Moreover, with the advent of new technologies, leaks of employee personal data have significantly increased and expanded in scale. Therefore, the objective of the study is to systematize the legal and organizational mechanisms for protecting employee personal data in the context of the computerization of organizational processes and to identify the actual risks that employers may face. The study applies a combination of general scientific and specialized legal methods: formal legal analysis of regulatory legal acts; comparative legal method (comparison of Russian and foreign regulations); systems analysis of judicial practice and law enforcement acts of Roskomnadzor; case analysis of real data leakage incidents; statistical analysis of data on violations in the field of personal data. The conducted research revealed that effective protection of employees' personal data requires the development of a multi-layered system combining legal (regulatory laws, contractual protection, consent management), organizational (access control, staff training), and technical (encryption, DLP systems, audit) measures. No single layer can be replaced by another. Practical recommendations for employers have been formulated: conduct an audit of the existing system for processing employees' personal data; update local regulations in accordance with the 2022–2023 reforms; establish a procedure for notifying Roskomnadzor of leaks; include provisions for the protection of personal data in all contracts with outsourcers and cloud providers; and ensure regular training for HR and IT staff.

Keywords: personal data, organizational approaches to protection, occupational safety, system management, computerization, biometric data, personal data, liability