

## BIOLOGICAL RESOURCES

UDK 581.5:582.711

### Rose-colored (Rosaceae Juss.) flora of Kabardino-Balkaria

Aida Ya. Tamakhina

**Abstract.** In the taxonomic structure of the flora of the Kabardino-Balkarian Republic (KBR), the family Rosaceae Juss. is in the top five. However, a special study of the rose-colored on the territory of the republic has not been carried out so far. In this regard, the purpose of the work was a geographical and biomorphological analysis, assessment of biodiversity and resource potential of the regional flora Rosaceae Juss. At present, the family Rosaceae of the KBR flora unites 29 genera and 145 species. Most of the genera have a weak species saturation (1-2 species). *Potentilla*, *Rosa*, *Alchemilla* are assigned to large genera, *Cotoneaster*, *Crataegus* and *Rubus* to medium ones, *Sorbus*, *Geum* and *Fragaria* to small ones. The distribution of species over the floristic subdistrict of the KBR is not uniform. Growth in different altitudinal zones, noted for 64.8% of the species, indicates the wide ecological plasticity of many Rosaceae. The similarity of the local floras of Rosaceae varies from very low (steppe and mountain zones) to high (alpine regions). The generic coefficient positively correlates with the number of species of floristic subareas and varies from 4.44 (Elbrus subdistrict) to 1.20 (Tersko-Prokhladnensky subdistrict). The originality of the Rosaceae is maximum in the Elbrus floristic subdistrict (3.45% of the total number of species). The flora of the Rosaceae is marked by tertiary and glacial relics, red-listed species, which, along with narrow endemics, need protection. According to the predominant groups of geoelements, the flora Rosaceae Juss. is boreal-common-holarctic-ancient mediterranean. The biomorphological spectrum of the flora belongs to the phanerophytic-hemicryptophytic type. In view of the multi-purpose economic use of a number of Rosaceae species the resource and ecological assessment of wild plants stocks is relevant for their involvement in the economic turnover.

**Keywords:** Rosaceae Juss., biodiversity, floristic subarea, geographic analysis, biomorphological analysis, life form, geoelement, endemic, relic, resource value

## AGRONOMY, FORESTY AND WATER MANAGEMENT

UDK 635.64

### The influence of the use of lignohumate on the yield and quality parameters of tomato in vegetable crop rotation

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**Abstract.** The results of the development of regulations for the use of humic growth stimulants on tomatoes in the vegetable crop rotation fertilizer system are represented in this article. The problem of effective assimilation of mineral fertilizers is central in crop production. The combination of humates with mineral fertilizers is a guarantee of their effective assimilation by the plant. The intensity of growth of tomato plants is considered one of the main indicators of the

impact of agricultural practices on plants. Treatment of tomato plants with preparations Lignohumate AM and Humate +7 promotes a more intensive increase in growth rate. Recalculation of tomato yield showed that the use of growth stimulants gives a significant increase. The most effective was Lignohumate AM, the increase was 23.9%. The effectiveness of Humat +7 and Argolan Aqua were at the same level and amounted to 21.8 and 20.3%, respectively. The use of humic preparations stimulated the accumulation of dry matter in tomato fruits from 4.6-4.7% in the control to 4.9-5.1% in the experimental variants. The studied preparations had a positive effect on the productivity and quality indicators of tomato. The economic efficiency of the use of growth stimulants in tomato is high. The net profit from the application of Lignohumate AM amounted to 1,038 thousand rubles, which is 198 thousand rubles higher than the control variant. The profitability is higher than when using Humat +7 and Argolan Aqua by 30 and 42%, respectively. Based on the results of the research, it is recommended to use the humic preparation Lignohumate AM on tomatoes to increase productivity and quality indicators in the conditions of the Central part of the North Caucasian region.

**Keywords:** tomato, humic preparation, growth stimulant, productivity

UDK 663.21:631.8

## **Impact of combination application of herbicides and mineral fertilizers on the chemical composition of must and wine**

**Madina B. Khokonova**

**Abstract.** The transition of viticulture to an industrial basis requires the widespread use of fertilizers and herbicides, which increases soil fertility and, consequently, the yield of plantations, makes it possible to successfully combat weeds, achieving a significant reduction in labor and equipment costs. The work is devoted to determining the joint effect of herbicides with various types of mineral fertilizers on the quality indicators of must and wine. The studies were carried out on the Isabella grape variety according. The grapes were harvested during the period of technical maturity and processed. The wine was prepared according to the classical technology in compliance with the technological regimes. The data obtained show that the sugar content in most options for the combined use of herbicides with fertilizers is at the control level. There is an increase in the sugar content of the wort in the options for the joint use of nitrate fertilizers with simazine and atrazine, without a significant decrease in yield. According to the obtained data, no significant differences in the content of titratable acids in the wort were determined. However, in wine, there is a slight decrease in titratable acids in the variants with the use of atrazine + NP and atrazine + NRK. In all variants of the experiment, there is a tendency towards an increase in the content of both coloring substances and total phenols, which has a positive effect on the quality of wine. It has been determined that simazine and atrazine, together with mineral fertilizers, do not cause sharp deviations in the content of some of the main components of must and wine, and also does not have a negative effect on the organoleptic properties of the latter.

**Keywords:** grapes, herbicides, mineral fertilizers, must, wine, chemical composition

UDK 631.459(470.64)

## **Methodological bases for studying erosion processes in the conditions of the Kabardino-Balkarian Republic**

**Ludmila Z. Shekikhacheva**

**Abstract.** The assessment of the ecological state of the soil involves determining the correspondence between the processes in the studied soils and their natural counterparts, which makes it possible to identify the permissible value of a particular factor, incl. agrotechnical, established according to the criterion of compliance with the normal functioning of the natural ecosystem. It is shown that the study of erosion processes in areas with an area that in modern land use is similar to the areas of agricultural land of large farms requires taking into account the quantities (factors) that predetermine both the wash itself and its intensity. It has been established that the rate of increase in the humus profile during the formation of various soils is not the same. The characteristics of the erosion threat of soils are given in accordance with the level of their manifestation for the conditions of Kabardino-Balkaria. As a result of the studies, it was found that the determination of the effect of steepness on soil erosion from slopes in its pure form cannot be performed, since such a process is due to the individual characteristics of an additional set of factors that can only be obtained by studying the relief using different approaches. Therefore, it is necessary to analyze the regional features of the experimental area, which will reduce the errors that arise when using existing mathematical models of water erosion, and at the same time correct them, adapting them to regional conditions.

**Keywords:** soil, relief, fertility, humus, technogenic load, erosion, washout, protection, measures

UDK 633.152:631.526.325(470.64)

## **Studying hybrids of sugar corn under the conditions of the foothill zone of the KBR**

**Zalim-Geri S. Shibzukhov, Alim Yu. Kishev, Timur S. Aisanov,  
Zalina S. Shibzukhova, Islam Kh. Gulyazinov**

**Abstract.** This work is devoted to the study of various hybrids of sweet corn of a new selection, recommended for cultivation in the conditions of the South of Russia. The objects of study were the first generation sweet corn hybrids: Spirit, Boston, Royalty, Vega and Overland, with maturation periods from 75 to 85 days. Sowing was carried out at the same time with reference to weather conditions and varied over the years of research. So in 2020, the sowing of all hybrids was carried out on April 25, and in 2021 it was possible to sow only on May 5. The productivity of sweet corn is highly dependent on the choice of grown hybrids, as well as growing conditions. Sweet corn seeds were purchased from trusted suppliers with a certificate of conformity. In all hybrids, under conditions of sufficient humidity, germination was high, which is explained by the simultaneity of seedlings and high germination energy. Later, getting into different growing conditions during the growing season, the shape of plants, the area of leaves, and the yield of cobs changed. The yield of commercial cobs of the studied sweet corn hybrids is closely related to their biometric parameters. The Vega and Overland hybrids showed the highest increments in the yield of commercial cobs and exceeded the control by 3.8 and 4.9 t/ha or by 18 and 23%. Hybrid Spirit, which was the control variant, showed the lowest yield. This is due to the fact that other studied hybrids are more adapted to the soil and climatic conditions of this zone.

**Keywords:** sweet corn, hybrids, survival rate, yield structure, cob yield

# ANIMAL SCIENCE AND VETERINARY MEDICINE

UDK 636.234.1:636.03

## **Productive features of holstein cows with intra-linear selection and reciprocal cross of lines**

**Rustam Z. Abdulkhalikov, Timur T. Tarchokov, Zaurbek M. Aisanov,  
Madina G. Tleynsheva, Zaira S. Khasanova**

**Abstract.** In dairy cattle breeding, in order to maintain the level of productivity of cows of a certain line, intra-linear selection is used, which allows consolidating valuable genes of the ancestor of the line in the resulting offspring. At the same time, in order to identify the manifestation of the heterosis effect by the leading breeding characteristics, it is necessary to study the compatibility of lines. The purpose of the conducted research was to study and identify the most effective variant of interlinear crossing and intra-linear selection of animals of the Vis Idial 933122 and Reflection Sovering 198998 lines, which increases the productivity of Holstein black-and-white cattle bred in Agro-Soyuz LLC. Four groups of cows were formed for the research, with a total number of 210 heads. Analysis of the data obtained showed that the highest milk yield for lactation, milk fat yield, milk protein yield and milk content index were characterized by cows obtained as a result of in-line selection of animals from the Vis Idial 933122 line, whose superiority over cows of other experimental groups was, respectively, 132-668 kg; 1.5-26.4 kg; 1.7-22.0 kg and 2.8-49.6 kg. Thus, in order to opt for one of the breeding techniques to increase the dairy productivity of cattle, it is recommended that a comparative assessment of the productive qualities of cows obtained on the basis of in-line selection and line crossing be carried out in each dairy herd.

**Keywords:** Holstein cow, breeding selection, cross lines, milk productivity, live weight, milk index

UDK 636.2:636.087.7

## **Economic efficiency of using high energy of bulls' growth**

**Rustam Z. Abdulkhalikov, Mukhamed M. Shakhmurzov,  
Timur T. Tarchokov, Anatoly F. Shevkhuzhev**

**Abstract.** The article presents the results of research on the comparative assessment of the growth, development and meat productivity of calves and castrates of Kalmyk and Simmental breeds under the same conditions of feeding and maintenance and identification of ways to increase the profitability of beef production by using the physiological state of young animals. The experimental young animals received the same amount of feed by volume and the composition of the diet was the same. As a result of the conducted studies, it was found that the live weight of bulls of both breeds with their intensive cultivation exceeded the mass of castrates in all age periods. After weaning, there was no significant difference in the live weight of calves of the Kalmyk and Simmental breeds, which had a live weight of 255.6 and 253.9 kg, respectively, and by the age of 15.5 months, many bulls of both breeds reached from 500 to 520 kg. Castrates of both breeds grew less intensively. However, in the final period of fattening, they gave a high average daily increase (more than a kilogram). The Kalmyk castrati were less demanding of coarse feeds and used them better. According to the indicators of the control slaughter, it can be noted that the mass of carcasses of bulls of both breeds is the same, and

castrates had such a mass of carcasses only at the age of 18 months. At the same time, the carcass mass of castrates of the Simmental breed was 7.6 kg lower than the carcass mass of Kalmyk castrates. Bulls and castrates of both breeds gave an exceptionally high slaughter yield. At the same time, animals of the Kalmyk breed have a higher slaughter yield due to the large accumulation of internal fat. An analysis of the data on the efficiency of beef production when selling one head of bulls at 15-16 months of age compared with castrates shows that the level of profitability per sold head is higher for both breeds by 1.8 and 4.3%, respectively. Thus, due to the peculiarities of the hormonal status of bulls, compared with castrates, they have an increased ability to grow, protein synthesis and reduced fat formation. However, castrates can also be grown extensively and for a longer time in less favorable conditions and receive high-quality beef, steers – only intensively and for a limited period (up to 16-18 months).

**Keywords:** cattle, breed, bulls, castrates, growth, average live weight, profitability

UDK 636.271:636.082.12

## **Hanges in the occurrence of alleles of the EAB-locus of blood groups in cattle of the kholmogorsky breed due to holsteinization**

**Alexander E. Kalashnikov, Vladimir L. Yaluga**

**Abstract.** The aim of the research was to analyze the allele pool and its changes in the EAB locus of blood groups of cattle of the Kholmogory breed using absorption crosses with bulls of the Holstein breed. The study was carried out by the method of immunological testing according to the agglutination reaction. The choice of locus is not accidental, because it is currently the most informative in terms of the nomenclature of alleles. The predominance of alleles of the Kholmogory breed ( $A_2'O'$ ,  $E_3'G'G''$ ) is noted with an increase in the frequency of occurrence ( $G_2Y_2E_1'Q'$ ) and the appearance of new alleles specific of the Holstein breed ( $O_1A_2'J_2K'O'$ ,  $B_2Q'G'G''$ ,  $E_3'G'Q'$ ,  $B_1O_2B'$ ,  $O_4Y_2A_2'$ ,  $O_4D'E_3'F_2'G'O'G''$ ). Over the past 5 years, the index of genetic similarity between herds of Kholmogory cattle in the Komi Republic has twofold. It was revealed that in the population of Komi Republic introduced new alleles of the Holstein breed, but at the same time, part of the alleles of Kholmogory cattle, originally obtained from the breeding reserve, are conserved. Such alleles are transferred between generations of animals and may indicate the preservation of the genome structure of the original mother breed under conditions of intensive selection. As well as alleles are transmitted when using purebred, as well as Holsteinized sires of the Pechora type of breed. The gene pool of the native Kholmogory breed is unique and requires further study. Groups of antigens form a unique genetic structure of herds, which can serve to identify animals by relationship, as well as breed affiliation, as it is similarly made by microsatellite loci and SNP markers (ISAG standard). Testing was carried out as sires in the amount of >30 heads, and their breeding reserve for more than 5 years (>5925 cows of breeding herds). Groups of antigens make it possible to evaluate the change in the genetic structure of the population of the Kholmogory breed and other breeds of cattle in time slices and obtain information about the breeder's actions when focusing on specific genetic traits and their genetic variability, breeding traits and evaluate inbreeding (antigenic similarity), and not only to determine the relationship of animals.

**Keywords:** animal genetics, identification, selection, breeds, Kholmogory, Holstein, cattle, pedigree, allele pool

## **Qualitative indicators of the longest back muscle of bulls of different genotypes**

**Vladimir I. Kosilov, Yusupzhan A. Yuldashbayev, Ilmira A. Rakhimzhanova,  
Olga A. Bykova, Tatiana A. Sedykh**

**Abstract.** The article presents the results of determining morphometric indicators, biological usefulness, physico-chemical properties and technological features of the longest back muscle of Red steppe (group I), Simmental (group II) and Kazakh white-headed (group III) breeds under intensive cultivation. The obtained data were processed by the method of variation statistics according to N.A. Plokhinsky with the determination of the reliability of the indicators using the Student's criterion. It was found that Kazakh white-headed bulls surpassed their peers of the Red steppe and Simmental breeds in depth of the longest back muscle by 11 mm (22.45%) and 8 mm (15.38%), respectively, in width – by 7 mm (8.24%) and 4 mm (4.55%), the cross-sectional area - by 13.63 cm<sup>2</sup> (33.53%) and 10.47 cm<sup>2</sup> (23.90%). The muscle tissue of Kazakh white-headed bulls was distinguished by a higher biological value. At the same time, the content of the essential amino acid tryptophan in their muscle tissue was 360.35 mg%, the value of the protein quality index was 5.97 units. In the Red Steppe and Simmental bull calves, the value of the analyzed indicators was at the level of 350.02 mg%, 352.40 mg% and 5.62 units and 5.70 units. The advantage of meat products of Kazakh white-headed bulls in terms of moisture capacity was noted. At the same time, the muscle tissue of the red steppe bulls was characterized by a darker color.

**Keywords:** cattle breeding, red steppe, Simmental, Kazakh white-headed breed, bulls, the longest back muscle, measurements, biological usefulness, physico-chemical properties, technological indicators, environmental safety

## **Indicators of protein metabolism of heifers during pregnancy and under the influence of biotechnical treatments**

**Ibragim Kh. Taov, Amir T. Tarchokov, Ismail A. Bittirov**

**Abstract.** The problem of the reactivity of the organism and ways of its increase, the features and significance of immune reactions in all stages of reproduction, from gametogenesis to postnatal development, attracts great attention of scientific and practical workers in animal husbandry. In this regard, it is extremely important to know the state of a pregnant female in a particular period of her ontogenesis. Therefore, the study of biologically active substances (BAS), which can act on biological systems, regulating their vital activity, is of fundamental importance. In particular, it was important to find out whether under the influence of vitamin A and trivitamin (vitamin A, D3, E) a change in the antigenic structure of proteins already present in the blood serum of animals occurs. Blood serum proteins, as well as other biochemical and physiological constants, undergo various changes in the animal body depending on the action of external and internal factors; they are directly dependent on the function of the organs of reproduction. The nature and direction of metabolism, especially protein metabolism, change during pregnancy with the development of the embryo in the mother's body is investigated. As it is now known, along with the nervous and endocrine systems, the immune system also participates in all links of the reproductive potential, but its changes in this case and under the influence of biotechnical means

of reproduction control have not been studied enough. In this regard, it is of theoretical and practical interest to provide the breeding stock with vitamins and increase the metabolism of the main substrate of life - protein, change its biological functions, as well as to study some issues of the relationship between the mother's organism and the nascent offspring when exposed to the body of pregnant animals with biologically active substances. The results obtained in our experiments indicate that the state of pregnancy has an impact on the nature of the protein metabolism of pregnant animals, in this case – in the direction of strengthening the processes of assimilation in the body of animals of the experimental groups, which, in our opinion, takes place especially in the first half of pregnancy (up to 6 months).

**Keywords:** heifers, pregnancy, proteins, vitamins

UDK 636.2.636.082

### **Exterior features of beef bulls in Primorsky krai**

**Vasily V. Tolochka, Vladimir I. Kosilov,  
Dylgyr Ts. Garmaev, Yusupzhan A. Yuldashbayev**

**Abstract.** The article presents the results of studying the linear growth of calves of Kalmyk (group I), Aberdeen-Angus (group II) and Hereford (Group III) breeds. It was found that already newborn young stock had certain differences in the main measurements. At the same time, Hereford bulls surpassed their peers of the Kalmyk and Aberdeen Angus breeds in height at the withers and rump by 4.9-9.9 cm (6.52-14.12%), oblique trunk length – by 3.3-5.7 cm (5.43-9.76%), measurements characterizing the development of the posterior third of the trunk by 1.1-3.9 cm (6.01-27.86%). Similar intergroup differences were observed in later age periods. So at the end of cultivation at the age of 18 months, young Kalmyk and Aberdeen-Angus breeds were inferior to Herefords in height at the withers and sacrum by 1.1-3.1 cm (0.91-2.60%), oblique trunk length – by 8.3–12.0 cm (6.20-9.22%), depth, width and chest girth behind the shoulder blades – by 3.1-21.8 cm (4.78-13.28%), width in the flaps and hip joints – by 3.1-7.2 cm (6.92-18.51%), half-girth of the butt – by 3.8-21.3 cm (3.38-22.47%). The minimum value of all body measurements was distinguished by Calmy bulls.

**Keywords:** beef cattle breeding, kalmyk, aberdeen-angus, hereford breeds, bulls, body measurements

## **AGROENGINEERING AND FOOD TECHNOLOGIES**

UDK 631.372:621.372:621.436.1

### **Optimization of the composition of a three-component biofuel mixture**

**Aslan K. Apazhev, Yuri A. Shekikhachev, Vladimir I. Batyrov, Anzor L. Bolotokov**

**Abstract.** The article analyzes the problem of reducing the dependence of diesel engines on petroleum fuels and improving their performance through the use of alternative renewable fuels.

It is shown that at this stage of the development of domestic alternative energy, it is more rational to use vegetable fuels in internal combustion engines. A procedure for optimizing the composition of a three-component biofuel mixture based on the results of studying the effect of its use in the D-240 diesel engine is presented. Regression equations for the dependence of the properties of three-component mixtures on their composition are obtained and isolines are constructed in barycentric coordinates of the triangular diagram "composition – property". It has been established that when the supply of a three-component biofuel mixture is changed, the diesel power changes from 31 to 55 kW. At the same time, significant differences in the compositions of the mixtures are noticeable when obtaining the same power range. Changing the ratio of ethanol and water at the inlet and vegetable oil into the combustion chamber changes the content of nitrogen oxides in the exhaust gases of a diesel engine in the range from 1.32 to 1.95 mg/l. When ethanol and inlet water and vegetable oil are supplied to the combustion chamber, the content of hydrocarbons in the exhaust gases varies from 0.01 to 0.1 mg/l. An analysis of the isolines plotted together on the simplex shows that at a power above 45 kW, the power and toxic performance of a diesel engine are primarily affected by nitrogen oxides. Increasing the permissible concentration of nitrogen oxides by only 0.07 mg/l significantly increases the area for obtaining power above 45 kW. The second in terms of the severity of imposing restrictions on obtaining high powers, and, consequently, on the composition of mixtures, is carbon black. The power range above 45 kW sharply increases with an increase in the allowable opacity of exhaust gases from 0.21 to 0.27 mg/l.

**Keywords:** diesel engine, biofuel, ethanol, mixture, efficiency, exhaust gases, smoke

UDK 656.137

## **Improvement of the method of classification characteristics of vehicle operating conditions**

**Vladimir I. Batyrov, Vyacheslav B. Dzuganov, Timur M. Apkhudov**

**Abstract.** Knowledge of the operational properties of cars allows them to be effectively operated in various road and weather-climatic conditions and to develop an optimal strategy for the transportation of goods, taking into account their characteristics, as well as maintaining the operational properties of rolling stock, laid down in the design and production. Until now, there is no unified classification of working conditions for road transport. In this regard, various norms and standards (with an accuracy of  $\pm 30\%$ ) take into account the operating conditions. The absence of a single criterion for assessing working conditions and mechanized methods of their accounting largely hinder the process of optimizing the performance of road transport. Without solving this problem, it is impossible to improve significantly the management of road transport and create a system of calculated (scientifically based) norms and standards. On the basis of theoretical and experimental studies, the previously proposed classification was significantly improved. Its main difference is that as a single criterion that quantifies specific operating conditions, the average technical speed of the car is adopted and a mechanized method of accounting for road and transport conditions is proposed. According to this classification, the whole variety of working conditions is divided into four classes: road, transport, atmospheric-climatic conditions and culture of operation.

**Keywords:** cars, roads, mode, speed, classification



UDK 631.331

## **Reel seeding unit of a grain seeder and factors affecting seeding of set rates**

**Aliy Kh. Gabaev, Vladislav Kh. Mishkhozhev**

**Abstract.** Sowing is very important in the general complex of technological operations and methods in the cultivation of grain crops. It is known that the yield of agricultural crops by 25-30% depends on the quality of sowing. The main purpose of sowing is to provide optimal conditions for seed germination, and further development of plants, which mainly depend on the optimal combination of three factors: water-air, air and heat. The study of the process of sowing seeds with reel sowing machines is a very urgent task considering the widespread use of row sowing. It is not enough to judge the uniformity of sowing seeds only by the uniformity of the grain stream leaving the apparatus, because when moving along the seed tube and the coulter tube, the seeds somewhat change their relative position. The influence of the seed tube affects the alignment of the jet, if it comes out unevenly from the ejector. But in both cases, it is necessary to have some criterion for judging the uniformity of the grain streams coming out of the apparatus directly and from the coulter. This article discusses the factors influencing the uniformity of the given norms of seed material by coil sowing machines, carried out in the research laboratory of the Department of Agricultural Mechanization of the Kabardino-Balkarian State Agrarian University. The determination of these factors makes it possible to identify the main patterns of movement and fall of seeds, the speed of seeds necessary to solve the problem of choosing the main design parameters of the sowing machine, seed tube, seed distributor. Bulk material can be thrown out in a continuous stream or discontinuously, that is, in large or small portions or individual grains. The reel metering unit with a shiftable reel, which we have chosen, has received the greatest distribution. GOST provides for the production of several types (sizes) of devices for sowing grain seeds and small grass seeds. The rotating grooved coil captures and ejects from the device not only the seeds located in the grooves, but also the seeds lying nearby, entraining them due to friction forces. The article presents the results of a study of the uniformity of sowing by coil sowing machines when sowing given norms.

**Keywords:** sowing machine, reel, coulter, grain, seed material, bulk density, swelling, yield, seeding rate

UDK 631.51

## **Some features of soil cultivation with a cutting wedge**

**Mukhamad Kh. Misirov, Asker A. Egozhev**

**Abstract.** Currently existing soil cutting models do not explain all available experimental results. When modeling the process of cutting soils, the models developed for cutting metals were taken as a basis. But the automatic transfer of the principles of cutting metals to the theory of cutting soil without sufficient grounds leads to contradictions and errors. Soil cutting has its own characteristics that do not occur when cutting metals and which must be taken into account when modeling the destruction process during cutting. When cutting brittle materials, as well as when cutting soils and soils, a number of phenomena are observed that are not present when cutting plastic materials, for example, the formation of advanced cracks in front of the cutting wedge. The purpose of the study is to establish the features of soil cultivation with a cutting wedge that are not typical for metal processing, but which take place during mechanical tillage and which

must be taken into account when modeling the processes of cutting mechanics. On the basis of the comparative analysis, a significant difference between the geometry of the cutting part of the tillage wedge and the geometry of the wedge for processing plastic metal materials was revealed. The loading model of the cutting part of the tillage wedge is obtained. It is shown that during the operation of the tillage wedge the angle of action of the cutting force is positive. When modeling the processes of soil cutting mechanics, in order to obtain a correct model of the cutting process, it is necessary to take into account this fact: the angle of action of the cutting force is positive. Loading of the material being machined with a cutting wedge according to the scheme, when the angle of action of the cutting force is positive, is the most optimal in terms of the energy intensity of the cutting process compared to others.

**Keywords:** tillage, soil cutting, tillage wedge, action angle, tillage wedge geometry

UDK 633.256

## **Biochemical processes during secondary fermentation of apple juice and storage of sparkling wines**

**Alim B. Khokonov, Madina B. Khokonova**

**Abstract.** Apple sparkling wines are characterized not only by the foamy and sparkling properties common to all wines of this type, but also by freshness and lightness of taste, which are the result of a harmonious combination of the taste qualities of fruit juice and its fermentation products against the background of low alcohol content and low oxidation. The aim of the study was to change the main physical and chemical parameters and the number of yeast cells during fermentation – deaeration and fermentation of apple juice and wine. The objects of research were winter varieties of apples Idared, Jonathan, Renet Simirenko, Florina, apple wine materials and finished wine. The chemical composition and quality of fruits and wine materials were determined according to generally accepted methods in winemaking. It has been established that during the day, the decrease in the R potential during deaeration of the fermentation mixture for apple cider occurs within the range of 8-20 mV, and the higher the initial potential, the more effective its reduction. In the first 3-5 days, a decrease in the R potential by an average of 50-71 mV was observed in all samples. Then the potential basically remained at this level without changes. Studies have shown that when fermenting natural fermented juice with freshly introduced wine yeast, the number of cells after 2 days increases by more than 2.7 times, and after 5 days – almost 4.5 times, reaching 31 million/ml. The most intensive reproduction of yeast is observed on the 2nd-3rd day of fermentation. At the same time, there is a sharp decrease of ammonia nitrogen, amine nitrogen and oxygen in the content. A decrease in the content of oxygen and peroxides, in turn, is accompanied by a significant decrease in the R potential of the fermenting must. After 5 days of fermentation, the number of yeast cells increases by 4.4 times with the full use of nitrogen nutrition, especially ammonia nitrogen, as well as oxygen. The increase in the initial alcohol content of the fermented juice to 8.5% vol. reduces the rate of yeast growth.

**Keywords:** redox potential, apple wine materials, fermentation, deaeration, assimilation rate, yeast propagation

# ECONOMY

UDK 332.64

## **Structural analysis of the cadastral value of land plots in settlements on the example of the Kabardino-Balkarian Republic**

**Valery M. Kaziev, Indira R. Mikitaeva, Dzhamilya S. Gyppoeva**

**Abstract.** The structure of the cadastral value, as a fact of the taxable base, has been studied, and an optimal approach has been developed for assessing the value of a land plot within a settlement in order to achieve a balance between the tax rate and the normal financing of local budgets, ensuring the most accurate determination of the tax base, which is the most important condition for improving the quality of control of tax legislation. The article presents an analysis of the structure of the cadastral value, which is the value in use, while it is predetermined by the usefulness of the real estate object, reflecting certain operational capabilities of the object for a particular owner, not associated with the sale and other market transactions. According to the guidelines, the valuation method used by the appraisal budgetary organization is based on the market value, which is characterized by the ability of real estate to be exchanged for money and goods. The determination of the cadastral value is carried out according to similar characteristics of the sale and purchase and is determined as the average market price of a typical object, built on a generalization of the market prices of real estate objects within the selected price zones. Contradictions in the practice of determining the value of land predetermine the need to develop proposals and recommendations for reducing the unit of the tax base within the framework of the minimum value for a settlement when determining the cadastral value of a land plot.

**Keywords:** land, real estate, cadastral value, market price, average, minimum