

AGRONOMY, FORESTRY AND WATER MANAGEMENT

UDK 634.75:631.81.589.2

The use of biologically active substances to increase the efficiency of cultivation of repair strawberries in hydroponics conditions

Elena M. Egorova, Farida D. Taumurzaeva, Elena I. Stepanyan, Adam A. Abregov

Abstract. This work is devoted to the study of the effect of biologically active substances (Vitazim, Etamon, Zircon, Maxifol Rutfarm, Kornevin) on the main indicators of growth and development of remontant strawberries in hydroponics. The main problem of hydroponic cultivation is waterlogging of the substrate, which leads to adverse consequences, in particular to disruption of aerobic respiration of the roots, their rotting and dying, as well as to a shortage of energy to ensure life processes. The use of biologically active substances improves root development, increases stress resistance and increases plant yield. The purpose of the research is to study the efficiency of the use of biologically active drugs, which, according to manufacturers, stimulate root formation, increase yield, increase resistance to stressful conditions that arise when growing strawberries on coconut copra by hydroponics. The use of drugs, and especially Vitazim and Maxifol Rutpharma, led to better development of the root system, formation of optimal, increased yield and yield of standard products compared with control and other variants of the experiment. The worst, but nevertheless reliable results compared to the control variant, were given by the use of drugs Kornevin and Zircon.

Keywords: strawberries, hydroponics, biologically active substances, Vitazim, Maxifol Rutpharm, Kornevin, Zircon, Etamon

UDK 633.853.52:631.432.2

Symbiotic and photosynthetic activities of soybean plants depending on soil moisture in the steppe zone

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Abstract. In the work the influence of the level of moisture supply of soybean plants during the formation of productivity elements was studied. The studies were carried out in the steppe zone of Kabardino-Balkaria in 2020-2022. The yield of soybean depends on the number of productive plants per unit area before harvesting and the weight of seeds per plant. Regardless of the sowing method, when the optimal plant density allows the formation of at least 8-10 g of seeds on each plant, this ensures a yield of 2.4-2.6 t/ha with good technological properties. The more beans are formed on plants, the more seeds characterize the size of the future harvest. When the soil is provided with sufficient moisture, from the moment of sowing, ending with the formation of beans and seeds, high yields should be expected. This is especially evident in areas with insufficient moisture, when during the period of flowering – seed formation there is a lack of moisture, the atmospheric temperature is high, that is, drought can significantly reduce yields. In 2021, when the amount of precipitation provided the moisture needs of soybean plants, the main indicators of productivity elements increased. At the same time, the yield value was 2.2 t/ha at least.

Keywords: soybean, productivity elements, climate, productivity, seed quality

Influence of growth stimulants on plum productivity

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Abstract. The work provides an analysis of the results of studies on the optimization of individual elements of mineral nutrition in plum agricultural technology, taking into account the peculiarities of cultivation conditions and varieties. The studies were carried out from 2020 to 2022 as part of an agreement for the implementation of research work with LIGNOGUMAT LLC, a manufacturer of humic preparations.

In experiments in the course of plum vegetation, four-fold leaf treatment was carried out with Lignogumat AM, Gumat+7 and Argolan Aqua with control by water treatment. In the course of studies, it was found that the first spraying in the flowering phase immediately gives an effect in the form of a significant decrease in the discharge of fruits. This allowed an average increase in the number of fruits from one tree by 12.1-15.4%. Under the influence of the use of growth stimulants, the mass, and therefore the size of the plum fruits, increased. In versions using Argolan Aqua, the mass of plum fruits of the Kabardian early variety increased by 13.4%. Treatment of plum trees with humates significantly influenced the quality indicators of the products. The yield of the fruits of the highest and first varieties at the best version is 7.6% more than the control version. The best effective result of biological stimulants was obtained in the Argolan Aqua variant. The productivity increase is on average 6.0 t/ha compared to the control and 11.7 and 16.4% higher than the variants using Lignogumat AM and Gumat+7. The increase in productivity from the use of growth stimulants is achieved by increasing the number and weight of drains from one tree. Based on the results of the studies, it is recommended to use the humic preparation Argolan Aqua on plums to increase productivity and qualitative indicators in the Central part of the North Caucasus region.

Keywords: plum, humic preparation, growth stimulator, yield

Comparative assessment of the growth and productivity of fruit crops on the sloping lands of the foothill zone of the North Caucasus

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Abstract. In the foothill zone of the Kabardino-Balkarian Republic, orchards are laid not only on the plains, but also on the slopes. In intensive plantings, modern high-yielding varieties on low-growing rootstocks are used, regular pruning of trees, a high agrobacground of mineral nutrition and a set of measures to protect against pests and diseases are provided. In the studies carried out on the slopes in 2018-2021, modern elements of gardening technology were applied. The results showed that the yield of apple and plum under such conditions is up to 25 t/ha and more. The most favorable conditions for fruit plantations, especially a plum orchard, are formed on the slopes of the northern exposure, where the amount of precipitation is 20-30% more than the average annual norm. The average yield of an apple tree on the slope of the southern direction is inferior to the average yield on the northern one by 3.5 t/ha, plum – 2.6 t/ha. This is due to a decrease in the average size of fruits on the southern slope, which leads to a decrease in the commercial indicators of fruits and a decrease in the economic efficiency of the orchard compared to the orchard on the northern slope. The number of fruits of the highest categories in the orchard on the southern slope was 9.2% less for the apple tree and 15.5% less for the plum tree.

Keywords: apple tree, plum, gardening on the slopes, yield, fruit quality

UDK 664.8.03:634.11

Influence of apple delivery time on storage life and storage products

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Abstract. Cultivation, sale and storage of fruits and vegetables are inextricably linked, which in turn affects the fruit growing and storage of crop products. These industries are highly profitable, subject to the production of high quality products. The main criteria for compliance with the conditions of production and storage in this case is the condition and keeping quality of products going for long-term storage. The purpose of the research was to determine the effect of the timing of receipt on the change in quality, storage time and shelf life of apples, depending on the initial state. We studied winter varieties of apples, such as Renet Simirenko, Jonathan and Florina, approved for use in the North Caucasus region. The storage temperature in the chamber ranged from 1 to 30C for all varieties. Varieties Jonathan and Florina were harvested at harvest maturity, and cultivar Renet Simirenko at full maturity. A greater number of standard fruits was noted in apples when stored in containers, compared with storage in boxes. When storing fruits in boxes, the amount of non-standard and waste is large and it is more expedient to remove such fruits from storage earlier. Fruits of apples, which were harvested from the orchard and shipped immediately to storage places in containers, had a higher keeping quality. It has been determined that the keeping quality increases during the storage of fruit and vegetable products in the places of production. Greater profitability is determined before storage of products, i.e. to commodity processing and transportation. A decrease in losses is observed during the sequence of cultivation, storage process, stages of commodity processing and transportation of fruits and vegetables. When stored in containers, a greater number of standard fruits were noted for apples in containers, compared with storage in boxes.

Keywords: apples, shelf life, keeping quality, change in quality

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Influence of turkey compost on the productivity and quality of corn grain in the foothill zone of the Kabardino-Balkaria

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Abstract. The field experiment was carried out in 2019-2021. in the training and production complex of the Federal State Budgetary Educational Institution of Higher Education of the Kabardino-Balkarian State Agrarian University. The soil of the experimental plot is leached chernozem, the mechanical composition is heavy loamy. The content of physical clay in it is 57.2%, the content of humus is 3.4%, total nitrogen is 0.28%, mobile phosphorus is 16.3-18.8 mg per 100 g of soil, exchangeable potassium is 16-18 mg per 100 g of soil (according to F.V. Chirikov). For the first time in the foothill zone of the KBR, the features of the growth and development of corn plants, the yield and quality indicators of corn grain of the zoned corn hybrid Mashuk 175 MV, depending on the use of turkey compost, were established. In the course of the research, it was established that the largest increase from the application of mineral fertilizers was the dose of $N_{90}P_{90}K_{40}$, where 6.12 t/ha, where the difference with the control was 1.83 t/ha, or 42.7%. The use of turkey compost at doses of 10-25 t/ha increased the yield by 1.34-2.63 t/ha compared to the control. A further increase in the dose of manure was ineffective and led to a decrease in yield.

Keywords: corn hybrid, Mashuk 175 MV, ammonium nitrate, simple superphosphate, potassium salt, turkey manure

ANIMAL SCIENCE AND VETERINARY MEDICINE

UDK 636.234.1.082.252

Influence of inbreeding on the early maturity of replacement young Holstein breed

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Abstract. The paper considers the features of growth and development of repair heifers obtained as a result of the use of different degrees of inbreeding. Comparison of the intensity of growth of inbred heifers with their outbred peers showed the superiority of inbred young over outbred in live weight at the age of 0, 3, 6, 9, 12, 15 and 18 months by 3.7-7.0% ($P>0.95$; 0.999). In age periods 0-3, 3-6, 6-9, 9-12, 12-15, 15-18 and 0-18 months in inbred heifers, the average daily gain in live weight was higher than that of outbred heifers, by 6,1-8,9% ($P>0.99$; 0.999). At the same time, the differences in relative live weight gain between the experimental groups of animals were almost always insignificant and statistically insignificant ($P<0.95$), except for the period of 9-12 months, when the relative live weight gain in inbred heifers was higher, than in outbred heifers, by 22.7% ($P>0.999$). To determine how effective the selection for a breeding trait, carried out among young animals, will be, it is necessary to calculate the repeatability coefficient, the value of which for such a trait as live weight in inbred heifers was higher than in outbred animals. Having calculated the coefficients of heritability of live weight and the average daily increase in live weight, it was found that in inbred heifers in all age periods they were higher than in outbred peers. The age of reaching the optimal live weight for the first insemination in inbred heifers was 513.5 days, which is 38.7 days ($P>0.99$) less than in outbred peers, which implies that inbred animals have better early maturity than outbred heifers, here.

Keywords: inbreeding, heifer, live weight, growth intensity, age at first insemination

UDK 636.22/28.082

Modern beef production technologies

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Abstract. The influence of breed characteristics on the energy of growth and the formation of meat productivity of bull-calves of meat (Kalmyk, Hereford, Kazakh white-headed, Aberdeen-Angus, Russian polled) and dairy (black-and-white) breeds was studied when they were grown under conditions of stall-pasture technology, as well as under intensive rearing from 8 to 18 months of age with ad libitum feeding from automatic feeders for rough and concentrated feed in the industrial complex LLC "Agropark-Razvilnoye" of the Rostov region. In the conditions of

stall-pasture technology, low values of live weight at birth were noted in animals of the Kalmyk breed, which subsequently lagged behind their peers of other meat breeds by 3-7% in terms of growth energy and live weight. The average daily growth of bulls fluctuated within 782-859. Higher live weight and growth energy were noted in young stock of the Hereford and Russian polled breeds. When placed for rearing, the difference in live weight between bulls of different breeds was 2-8 kg, and daily gains from birth to 8 months of age ranged from 680-705 g. At 18 months, the difference in live weight between bulls fluctuated at the level of 5-47 kg, growth energy for 10 months of rearing was 1285-1414 g per day. The maximum pre-slaughter live weight (605.4 kg), carcass weight (359 kg), slaughter yield (62%) and the most favorable combination of tissues were noted in Aberdeen-Angus bulls, which were 1.2-5.3%, and black-and-white – by 6.1-20.5%. A higher output of bones, cartilage and tendons was noted in the Black-and-White, Hereford and Kazakh white-headed breeds, and the highest coefficient of meatiness was in the peers of the Aberdeen-Angus and Russian polled breeds. At the same time, the highest cost of cultivation, the lowest cost recovery and profitability were noted among peers of the Black-and-White, Kalmyk and Kazakh white-headed breeds.

Keywords: intensive rearing, bulls, breeds of meat and dairy productivity, ad libitum feeding from automatic feeders, pre-slaughter weight, carcass morphology, profitability

UDK 636.52/.58:637.4

Comparative characteristics of eggs with floor and cellular content of laying hens

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Abstract. Bird eggs are one of the types of livestock products obtained in poultry farms and used in the food industry. The study was carried out in order to investigate the veterinary and sanitary quality of eggs in different ways of keeping. The physicochemical parameters were studied on the basis of organoleptic, physical and chemical research methods. The indicators of the quality of eggs obtained taking into account various methods of keeping are determined. Their physicochemical parameters and nutritional values of eggs have been established. Due to characteristics of eggs obtained from laying hens with floor and cage-tier content, it can be concluded that the organoleptic characteristics of the compared samples do not have any special distinguishing features, with the exception of contamination. With cage content - the mass fraction of egg protein increases, therefore, the proportion of other components decreases. Besides a greater number of damage to the shell of eggs was observed in eggs obtained from laying hens contained in cages-tiers, as well as single cases of 3rd degree of contamination of eggs in the same group were noted. While eggs obtained from floor keeping of laying hens were characterized in single cases as eggs of the 2nd degree of contamination.

Keywords: eggs, fatty acids, quality assessment, veterinary and sanitary examination

UDK 678.742.2

Application of concept of rubber high elasticity for description of heat shrinkage of polymerisationally filled composites

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Abstract. The aim of the work is to describe quantitatively and elucidate the structural basis of thermal shrinkage of polymerization filled composites. This purpose is realized in this article with the example of ultra-high molecular weight polyethylene filled with dispersed particles of aluminum and bauxite. It has been shown that information on the type and characteristics of the macromolecular framework involved in orientation processes can be obtained from the results of thermal shrinkage measurements. As a characteristic of molecular orientation, the degree of molecular stretch corrected for the presence of filler in oriented materials is used. Within the framework of the theory of rubber high elasticity, Kuhn-Green, Rach-Bowden models and a cluster model of the amorphous state of polymers were used. A comparison of experimental and theoretical dependencies of the thermal shrinkage of filled composites shows that the heat shrinkage process of ultra-high molecular weight polyethylene based polymerization filled composites can be described within the framework of the theory of rubber high elasticity as a "frozen" deformation of a macromolecular framework. Theoretical calculations allow us to specify the type of this framework, i.e. its nodes cannot be macromolecular "overlaps" (their density is constant) or crystallites (the degree of crystallinity increases with increasing degree of extraction). It is shown that this framework can only be a cluster grid of macromolecular meshes, whose density decreases as the degree of molecular extraction increases.

Keywords: solid-phase extrusion, ultra-high molecular weight polyethylene, filler, draw ratio, heat shrinkage, clusters, molecular orientation

UDK 631.316.44

Searching for a method of bypassing a tree stone when processing ground strips of permanent fruit plants

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Abstract. Due to various restrictions and requirements in orchards on terraced slopes, a soddy-humus soil maintenance system is recommended, which provides for periodic mowing of weeds growing in the aisles and tree trunks of fruit plantations, with its simultaneous crushing and distribution on the soil surface as mulch. The near-trunk strip is the most difficult part of the garden, since when the working body is located in the near-trunk strip and it periodically contacts with the boles of fruit trees, it is necessary to ensure the high-quality implementation of the technological process, ensuring that the working organ bypasses the tree trunk, while eliminating the likelihood of mutual damage of the tool and the processing object. For mowing grass vegetation in the near-stem strips, mowers are used that have various design and technological differences. However, the existing designs of mowers do not allow to remove completely vegetation in the near-trunk lane of fruit plantations with a single pass of the unit along the row line, which negatively affects the efficiency of their use on terraced slopes, where the row line can only be approached from one side. In connection with the foregoing, the development of a new method for bypassing a tree stem in terraced gardening and a mower

design based on it is relevant. A method of bypassing the tree trunk has been developed, which allows not to remove the rotary section from the row line when processing the trunk strips. The optimal design and operating parameters of the mower have been determined, ensuring the processing of the zone of the trunk circle without injuring the tree trunk.

Keywords: mower, trunk strip, trunk circle, tree trunk

UDK 634.1-13

Justification of the main structural and technological parameters of the twin-roll rotary grinder

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Abstract. Regular pruning of fruit trees is an essential prerequisite for increasing the yield and quality of fruits. At the same time, phytomass waste during pruning of fruit trees, depending on the age and biological characteristics of the variety, can range from 3 to 20 or more tons per hectare. Alienated wood when pruning fruit trees is dragged outside the garden, burned or dumped into ravines. Harvesting and disposal of cut woody material in orchards are mandatory operations in the technological process of fruit production. At the same time, they are associated with high material and labor costs due to the low level of mechanization and the low efficiency of the technologies used. Of particular difficulty is the utilization of wood waste on sloping lands in terraced gardening. Therefore, the problem of utilization and rational use of alienated fruit wood is relevant. The most simple, rational and promising is the use of cut branches in crushed form for soil mulching. This contributes to the accumulation and conservation of moisture in the soil, its enrichment with organic matter, mineral nutrition elements, improvement of agrophysical properties and, ultimately, the involvement of alienated wood in the cycle of substances without harming the environment. In the article, based on a comparative multi-criteria (labor costs, fuel consumption, given operating costs and environmental impact) of the analysis of existing technologies for the utilization of branches, the feasibility of using the technological process of chopping branches with subsequent spreading of chopped wood pulp over the soil surface has been proved. The main design and technological parameters and operating modes of a two-roll rotary grinder are established: sharpening angles of the front ($-5-15^\circ$) and rear ($60-70^\circ$) edges of the knife; radius of rotation of the cutting edge of the knife: 0.125 m; branches feed rate (1.4-2.1 m/s); circumferential speed of the cutting edge of the knife (8-12 m/s).

Keywords: wood mulch, two-roll rotary grinder, cutting speed, result, theoretical and experimental investigations

UDK 631.354.2

Determination of the parameters of the kinematics of the vibrator of the conveyor cleaning of the combine

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Abstract. Conveyor cleaning is a possible alternative to wind screen cleaning, which is used as a working body in modern combine harvesters, both in domestic and foreign ones. One of the

elements of conveyor cleaning is a vibrator (shaker), which provides low-amplitude oscillations (vibrations) of various sections of the upper (separating) branch of the conveyor sieve of this cleaning, which contributes to the intensification of the separation process on this sieve. The article derives an analytical expression that allows you to determine the magnitude of the impact force impulse, under the influence of which each vibration (shaking) occurs. The resulting expression made it possible to establish that three parameters influence the formation of the magnitude of the mentioned force impulse: the mass of the conveyor sieve section, the speed of this sieve and the angle formed by the direction of movement of the separating branch of the sieve and the normal to the tangent drawn to the circles of a pair of rollers (sieve chain and vibrator) at the moment of their contact at the point of this contact. The article considers the influence of each of these parameters on the formation of the magnitude of the impact force impulse. It has been established that the greatest influence on the magnitude of the force impulse is exerted by the mass of the sieve section with the heap located on it, directly adjacent to the roller of the sieve carrier chain at the moment of its contact with the vibrator roller.

Keywords: harvester, cleaning, heap, vibrator, roller, chain, separation, intensification, speed, mass, angle, momentum, force, vector

UDK 637.146.32/.131.8

The use of vitamin premix in the production of sour cream

Amina S. Dzhaboeva, Petr V. Skripin, Anzhelika A. Baeva, Lada A. Vityuk

Abstract. Insufficient provision of the human body with vitamins is explained by a significant decrease in their intake with food, systematically consumed by all age groups of the population of the Russian Federation. In the nutrition of children and adults, fermented milk products are most widely used, so enriching them with vitamins can be considered as a reliable way to eliminate the deficiency of these nutrients in the human body. One of the traditional fermented milk products most often consumed by the population is sour cream. The results of the study of the chemical composition of homemade sour cream showed that it is characterized by a low vitamin value, and therefore there is a need for its fortification. To increase the vitamin value of sour cream, it is advisable to use a vitamin enricher – premix 730/4 manufactured by "F. Hoffmann-La Roche Ltd" (Switzerland). It has been established that when consuming 100 g of sour cream enriched with water – and fat-soluble vitamins, which are part of the 730/4 premix, the daily physiological need of the human body for them is covered by more than 15%. Thus, the introduction of a vitamin preparation into sour cream contributes to the transition of a traditional mass consumption product to the group of functional foods. The obtained experimental data on the content of sanitary-indicative, conditionally pathogenic, pathogenic microorganisms and spoilage microorganisms in vitamin-enriched sour cream testify to its safety for consumers. A package of technical documentation has been developed for the production of homemade sour cream enriched with vitamins.

Keywords: sour cream, chemical composition, vitamin premix, enrichment, physiological need, epidemiological safety

Use of products of plant raw processing in sugar biscuit technology

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Abstract. Nutrition is one of the factors of social well-being of a person, contributing to the preservation and improvement of his health. An analysis of the nutrition structure of the Russian population showed that flour confectionery products, including sugar cookies, are in great demand among the population. Due to the high content of sugar and fat in the recipe of flour confectionery products, they are classified as high-calorie food products. A significant disadvantage of these products is the lack of such nutrients as vitamins, minerals, dietary fiber. As an enriching component in the biscuit recipe, we can recommend chickpea and pumpkin processed products – powder and paste. Vegetable raw materials processing products are rich sources of vegetable protein, fiber, vitamins (ascorbic acid, tocopherols, β -carotene, group B), minerals (potassium, zinc, selenium, sodium, calcium, magnesium, phosphorus, iron), pectin and fiber. They lower cholesterol levels, improve the condition of blood vessels, contribute to the normalization of the gastrointestinal and liver. The article presents data on the influence of vegetable raw materials processing products on the structural-mechanical, physico-chemical and organoleptic indicators of the quality of sugar cookies. A recipe and technology for sugar cookies using chickpea powder and pumpkin paste have been developed. It has been established that the use of vegetable raw materials processing products in the recipe of sugar cookies improves the consumer properties of finished products.

Keywords: chickpea powder, pumpkin paste, sugar cookies, technology, nutritional value

UDK 664.681.1

Development of technology for the production of biscuits enriched with dietary fiber

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Abstract. The article presents the possibility of using green pea flaps for the production of dietary fiber with a high content of fiber, hemicelluloses, lignin and pectin substances, the introduction of which will create products for preventive purposes. The influence of dietary fibers on the autolytic activity of wheat flour has been determined. It is shown that the addition of dietary fiber in the amount of 1.1 and 2.2% to the weight of wheat flour leads to an increase in its autolytic activity. Based on the data obtained, recipes and technology of biscuits with dietary fibers from the leaves of green peas have been developed. The influence of dietary fibers on the physico-chemical properties of the biscuit dough is investigated. It has been established that the introduction of dietary fibers into the recipe of biscuits leads to an increase in the moisture content of the dough and finished products, the acidity of the dough; to a decrease in the alkalinity and wetness of biscuits. When conducting an organoleptic assessment of the quality of biscuits, it was found that the addition of an additive does not affect the organoleptic quality indicators of experimental products. The degree of coverage of the daily needs of the human body in dietary fibers when eating biscuits enriched with dietary fibers is calculated.

It is shown that the consumption of 100 g of biscuits enriched with dietary fiber in an amount of 1.1 and 2.2% by weight of flour leads to an increase in the degree of coverage of the daily needs of the human body in dietary fiber compared with the control by 4.7 and 9.7%.

Keywords: green pea leaves, dietary fiber, biscuits, recipe, technology, quality

UDK 631.243.3

Study of the dynamic processes of heat and mass transfer of drying by active ventilation

Artur M. Sokhrokov

Abstract. Active ventilation units, widely used in agricultural production, are used for temporary preservation of seeds that have undergone primary cleaning by cooling with outside air (when dryers are overloaded), drying seeds (especially crops that require mild drying modes), ventilating seeds during long-term storage, and pre-sowing heating. Automation of active ventilation bunkers is designed to conduct the drying process with automated control.

Atmospheric air used as a drying agent, heated by an electric heater and forced by a fan, is fed into the central pipe and blows the seeds in the radial direction. The control circuit in the drying mode provides regulation of the relative humidity of the incoming air at a grain moisture content of 15-22%. Humidity of the outside air should not exceed 65%. If the air humidity is more than 65%, the electric heater automatically turns on. When the relative humidity drops below 65%, the electric heater switches off. When operating in the grain drying mode, the process is controlled and managed by the regulation of the drying agent (heat carrier) and the regulation of the temperature and humidity of the grain mass. The article considers a technique for representing differential equations that characterize the dynamics of heat and mass transfer processes during drying in active ventilation bunkers in the form of transfer functions.

Keywords: active ventilation, drying, heat transfer, mass transfer, grain layer, humidity, temperature, transfer function, automation

UDK 631.348

Acoustic liquid spraying: design features of sprayers and plants for processing agricultural crops

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Abstract. Acoustic liquid spraying is one of the new methods that finds application in agricultural production for the chemical protection of crops. This method provides a low consumption of the working fluid with a high degree of crushing and generally leads to a reduction of energy consumption when crushing the working fluid. The most widespread in agricultural production are atomizers with a Hartmann emitter, which use generators with nozzles and resonating cavities of various shapes and in various combinations: annular nozzles and cylindrical resonating cavities; nozzle free from stem, etc. The most promising is the supply of liquid to the zone of acoustic vibrations in the form of a film. This method makes it possible, at low liquid supply pressures, to create a sufficiently thin film that breaks down at low power consumption. Taking into account this method, samples of new equipment were developed, in which the executive body is a pneumoacoustic liquid sprayer, and the following were also developed: an automatic humidity maintenance unit, a sprayer for strawberry plantations and an individual fogger. The design features of technical means with pneumoacoustic sprayers do not allow them to be used for chemical protection of low-growing fruit plantations. In this regard, the development of a new constructive-technological scheme of a pneumoacoustic sprayer, which makes it possible to process the crowns of undersized fruit plantations, is relevant. The article discusses the design and technological scheme and a prototype of a pneumoacoustic sprayer: the device and the principle of its operation. To study the quality indicators of the pneumoacoustic sprayer, a laboratory-bench

installation was equipped. The influence of the resonator rotation frequency (0; 500 and 1000 rpm), air pressure (0.08; 0.01; 0.20 and 0.25 MPa), distance between the nozzle and the resonator (6; 10 and 14 mm) was studied. on the dispersity of the decay of raindrops. The results of studies of the qualitative indicators of the operation of a pneumoacoustic atomizer are presented: integral curves for the distribution of drops of the working fluid are constructed and the technical characteristics of the proposed pneumoacoustic atomizer are determined. The material of the article is of scientific and practical interest to Russian farmers, since the use of the proposed pneumoacoustic sprayer in the processing of crops will save expensive drugs.

Keywords: agricultural crops, processing, acoustic spraying, pneumoacoustic sprayer, sprayer, working fluid, dispersion of decay, drop diameter

UDK 663.422

Development of beer technology using wheat grain products

Madina B. Khokonova

Abstract. Features of the introduction of energy-saving technological processes of brewing and fermentation products in general is the main task for many branches of the beer and non-alcoholic industry. The essence of which is to reduce energy costs and improve the quality of finished drinks. In this case, used raw material is the basis, since it primarily affects organoleptic characteristics, such as taste and aroma. As the main raw material for this group of drinks, malt, prepared drinking water, hops, yeast are used; unmalted materials in the form of flour, syrups, etc. can also be used.

The aim of the research was to develop a technology for beer from malt and unmalted wheat using enzyme preparations. When mashing, enzyme preparations – Cytrosemin Px, Amylosubtilin, Amylosubtilin G10x were used. The indicated consumption rates of enzyme preparations are given taking into account their activities in accordance with approved standards. When using other enzyme preparations, their consumption rates were determined by recalculation, taking into account their activities and the consumption rate of these preparations. When processing barley malt of the 1st class, the infusion mode of mashing was used at an initial temperature of 37-40°C. When processing class 2 barley brewing malt, a separate single-decoction mashing method was used at an initial mashing temperature also of 37-40°C, the maximum portion of the dose of wheat malt and 10-15% of the total weight of the mashed barley brewing malt grain products were used for the first decoction. It was determined that the analyzed finished beer from unmalted wheat and wheat malt complies with the regulatory documentation. When using unmalted wheat, we recommend infusion mashing as less time-consuming and labor-intensive.

Keywords: beer, wheat raw materials, recipe, enzyme preparations, mashing method