

AGRONOMY, FORESTY AND WATER MANAGEMENT

UDK 635.21:578.2:579.64

PCR diagnostics of pathogens of potato varieties (*Solanum tuberosum*)

Alexander E. Kalashnikov, Yana A. Kabitskaya

Abstract. When creating technological schemes for the improvement of potatoes, PCR methods are currently actively used, in particular, amplification with hybridization-fluorescence detection in the "real time" and "end point" modes. In this work, both of these methods were applied and the diagnostics of cultivated potato varieties and lines for the presence of viral pathogens A, M, S, X, Y, Andean mottle viruses and latent potato thymovirus (APMV, APLV), as well as tuber spindle viroid (PSTVd) and potato panicle top virus (PMTV) was carried out. The analysis for the presence of parasitic diseases of pale *Globodera pallida* and golden cyst nematodes *Globodera rostochiensis*, bacterial ring and brown rot *Clavibacter michiganensis subsp. sepedonicus* and *Ralstonia solanacearum*, as well as fungal cancer *Synchytrium endobioticum*. As a result of PCR analysis, parasitic, fungal and bacterial diseases were not detected 44% of the total number of samples were healthy from viral diseases, while 25% were initially infected and underwent sanitation operations. For the first time, the PCR diagnostic system was introduced into the technological processes for obtaining varietal crops of the Tyumen region, free from diseases, to adapt to growing conditions in Western Siberia.

Keywords: pathogen, variety, viruses, material, crop loss, PCR, biotechnology, meristems, recovery, cloning

UDK 633.34(470.64)

Productivity, indicators of the structure of the crop and the efficiency of the symbiotic apparatus of soybean plants in different climatic regions of Kabardino-Balkaria

Khazhset A. Khamokov

Abstract. The article analyzes experiments on the study of the symbiotic activity of leguminous crops. The studies were carried out in the foothill and steppe zones of Kabardino-Balkaria, which differ in climatic conditions and the level of soil moisture supply. Early-ripening and late-ripening soybean varieties were studied. The early sowing date was carried out in the third decade of April, the middle one – in the first decade of May, and the late one – in the second decade of May. The sowing rate ranged from 300 to 500 thousand seeds per 1 hectare. As a result of the study, it was found that the conditions of the foothill zone are more favorable for the photosynthetic activity of soybean plants than the conditions of the steppe zone, which results in higher yields. In the foothill zone, a late-ripening soybean variety formed a leaf area of 45-50 thousand m²/ha, which is more than that of early-ripening varieties. The indicators of net productivity of photosynthesis in early ripe varieties are higher and are in the range of 2.2-3.2 g/m². In the work, agrotechnical practices were used that influenced the height of the attachment of beans, the number of beans, plant height, branching, seed weight, which shows the degree of adaptation of cultivated varieties to the climatic conditions of the region. The results of the study

showed that the activity of the symbiotic system of soybean plants turned out to be more effective in those periods when the moisture supply of the soil was the best. The smallest number of nodules on the roots of plants and their "underdevelopment" were noted in arid regions, in comparison with the favorable conditions of the foothill region. At the same time, there is an increase in the number of nitrogen-fixing nodules by 20-22%, and an increase in their mass by 30-32%.

Keywords: cultivation area, cultivation conditions, soybean, symbiotic activity, photosynthesis activity, productivity, yield, moisture supply

UDK 633.34:631.559

Influence of soil tillage methods on yield indicators and results of soybean plant symbiosis activity under conditions of moisture deficiency (in areas of insufficient soil moisture)

Khazhset A. Khamokov, Irina M. Khanieva, Aliy L. Boziev

Abstract. The article reveals the dependence of the symbiotic activity of soybean plants on the ongoing methods of tillage. The studies were carried out in the steppe zone of Kabardino-Balkaria in the period from 2015 to 2019. on ordinary chernozems. During the experiments, three variants of soil cultivation were used: moldboard plowing to a depth of 20-25 cm, flat-cut plowing to a depth of 20-25 cm and shallow loosening to a depth of 10-12 cm. Soybean varieties were studied: early-ripening – Avanta, late-ripening – Vilana. The predecessor for soybean plants was corn for grain, the sowing method was wide-row with a row spacing of 45 cm. As a result of the study with the use of moldboard plowing, the yield was 12-14% higher than with flat-cut plowing. During periods of sufficient moisture supply (2016 and 2018), soybean plants formed the best yield relative to the indicators obtained under conditions of insufficient moisture (2015, 2017 and 2019). When using moldboard plowing, the soybean yield was 17.2 c/he under conditions of sufficient moisture supply, and with moisture deficiency – 15.8 c/he. Favorable conditions for the effective passage of photosynthesis and the work of the symbiotic apparatus of soybean plants are created while minimizing tillage, which affects the value and indicators of the yield structure. Studies have shown that early sowing periods have advantages over late ones, which is confirmed by high yield structure indicators and indicate a more efficient use of soil moisture reserves by soybean plants in spring.

Keywords: soybeans, basic tillage, symbiotic activity, crop structure, productivity, predecessors, plowing, cultivation, weeds, nodules

UDK 633.162

Influence of the location of the grain in the ear on the quality of barley and malt

Madina B. Khokonova

Abstract. In this article studied the qualities brewing and malting of barley grain depending on its location in the ear. The varieties of spring barley Priazovsky 9, Vikont, approved for use in the North Caucasus region, were studied. In our studies, the ears of spring barley were divided into 3

parts, the grains of which were then analyzed for brewing quality indicators and germinated for malt. The quality of barley grain from the ear of the middle part of the Getman variety had higher indicators compared to the upper and lower parts and reached 94% in size and 47.5 g in weight of 1000 grains. The quality of barley grain from the ear of the lower part is less by 2.0% and 1.2 g, but had a greater nature by 1.2%, more protein by 0.1% and starch by 1.4% than from the middle part of the ear, and the extractivity was slightly less. Such important indicators for brewing as starch content and extract were also lower by 1.4 and 2.2%, respectively. Variety Priazovsky 9 was distinguished by higher rates. So, in the middle part of the ear, a grain size of 96% was noted, the starch content was more than 59%, with a protein content of 11% and extractivity, i.e. the amount of dry matter passed into the aqueous solution of 79.8%. According to the results of research, it is noted that high quality indicators of barley and malt were observed in grains from the middle, then the lower and finally the upper part. Deterioration of grain quality from the lower to the upper part of the ear is also observed. The quality of barley grain from the ear of the middle part of the Hetman variety was high compared to the upper and lower parts. Priazovsky 9 is the best from analyzed varieties.

Keywords: different quality of the ear, spring barley, varieties, malt, brewing properties

UDK 633.16

Influence of precursors on phytosanitary state of crops and yield of winter barley grain

Madina B. Khokonova, Ruslan A. Tiev

Abstract. The aim of the study was to study the effect of various predecessors on the phytosanitary condition of winter barley crops and its yield. The varieties of winter barley Master, Mikhailo, Kozyr, Dobrynya 3, approved for use in the North Caucasus region, were studied. The data obtained showed that winter barley, especially its yield, is highly dependent on its predecessors. Desirable are those predecessors that vacate the field early and provide an opportunity for early soil preparation and sowing at the optimum time. Peas, early potatoes and barley itself are noted as such precursors. These predecessors also increase the field germination of seeds, which amounted to 71.8-79.4%, lower rates were obtained for row crops, which amounted to 62.4-63.6%. It is established that the best technological indicators, ie the number of grains and the weight of the grain of the ear and 1000 grains after such precursors as peas and potatoes were obtained by 11.7%; 2.0 and 14.5%, respectively, and the same figures for corn for grain and sugar beet were minimal. The purest crops are marked by the predecessors of early potatoes, corn for grain and peas. The earlier development of root rot was the predecessor of early potatoes and peas, and the powdery mildew of corn is not grain and peas. The maximum yield was obtained from the predecessor of peas, which amounted to 4,28 t/ha in the winter barley variety Master. The lowest yield was observed in the predecessor of corn for grain in all considered varieties. Based on all indicators, the best precursors for winter barley are peas and early potatoes.

Keywords: winter barley, varieties, predecessors, productivity, weediness of crops, field germination

ANIMAL SCIENCE AND VETERINARY MEDICINE

UDK 636.082

Dairy productivity of cows with different forms of inheritance of milk yield and fat content

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

Annotation. In the course of the research conducted at Agro-Soyuz LLC (Kabardino-Balkarian Republic, Chegemsky district), the goal was to study the productivity of 69 first-calf cows of the Gomitinsky black-and-white breed, the daughters of three breeding bulls, depending on the forms of inheritance or the leading breeding characteristics of dairy productivity (milk yield, fat content), for the definitions of which were used by a new methodology, which is a modified version of the methodology widely used in breeding work with dairy cattle. As a result of determining the forms of inheritance of milk yield in experimental first-calf cows, it was found that the largest share among them fell on animals with milk yield due to such a form of inheritance as regression of the mother (44.9%), the smallest share – on first-calf cows with milk yield due to the dominance of the father (7.3%). When determining the forms of inheritance of fat milk, the same trend was observed as when determining the forms of inheritance of milk yield, that is, among 659 first-heifer cows, the most animals were from the mother regression group (42%), and the least were animals from the father dominance group (4.4%). The established difference between groups of first-calf cows with different forms of inheritance of the breeding trait turned out to be quite significant and reached, in some cases, 2368 kg in milk yield per lactation ($p > 0,999$), 0,32% in fat content ($p > 0,99$).

Keywords: holstein breed, bull-sire, first calving cow, yield of milk, milk-fat, trait's heritability

UDK 636.5

The influence of the use of a growth stimulant of plant origin on the productivity of broiler chickens of the "Ross-308" cross

Astemir S. Duduev, Rustam Z. Abdulkhalikov

Annotation. In the course of the scientific and economic experience and production check carried out in the conditions of the Veles-Agro Limited Liability Company (Kabardino-Balkarian Republic, Prokhladnensky district), the goal was to study the productivity and quality of broiler meat using a natural plant growth stimulant. titelnogo origin "Kifey Poultry" as a feed additive. The object of the study were chickens-broilers of the cross "Ross-308". In the process of conducting scientific experience and production testing, productivity indicators, meat qualities, as well as economic indicators of broiler meat production were studied. Zootechnical, biometric and economic research methods were used. As a result of the study, it was found that the use of the growth stimulator "Kifei Poultry" in the feed composition contributed to the fact that the broilers of the experimental group had a live weight of 7.7% ($P \leq 0.001$) more than the control. The safety of the experimental group was 2.0% higher. The productivity index of the experimental chickens was 428 units, which is 16.3% more than the control. Feed costs per unit of growth in broilers of the experimental group were 6.9% lower. In broilers of the experimental group, the indicator: the yield of meat after slaughter was 7.0%, the yield of carcasses of the 1st

category was 5.0% more in comparison with the control. The production verification of the results of the experiment made it possible to make sure that the use of the "Kifey Poultry" preparation on poultry on an industrial scale also made it possible to increase the productivity and meat quality of broilers. At the same time, the level of profitability of the new variant is 4.7% in comparison with the basic variant of floor cultivation.

Keywords: broilers, growth stimulants, feed additives, productivity, meat quality, "Ross-308" cross

UDK 636.082.2

Meat productivity of bulls of different breeds

**Vladimir I. Kosilov, Yusupzhan A. Yuldashbaev,
Ilmira A. Rakhimzhanova, Olga A. Bykova**

Abstract. The article presents the results of the evaluation of the slaughter qualities of bulls of different breeds and the directions of productivity. The object of the study were bulls of the red steppe (group I), Simmental (group II) and Kazakh white-headed (group III) breeds. When studying the slaughter qualities of bulls during the control slaughter, the pre-slaughter live weight, the mass and yield of the paired carcass, as well as the internal raw fat, slaughter weight, slaughter yield were established. The obtained experimental material was processed by the method of variation statistics according to N.A. Plokhinsky with the determination of the reliability of the difference using the Student's criterion. It was found that the absolute and relative mass of the paired carcass of Red steppe bulls was 229.6 kg and 53.8%, respectively, young Simmental breed – 269.5 kg and 56.2%, Kazakh white-headed breed animals – 259.2 kg and 57.1%. At the same time, the absolute and relative mass of intracavitary raw fat in group I bulls was 10.6 kg and 2.5%, group II – 13.9 kg and 2.9%, group III – 13.2 kg and 2.9%. As for the slaughter weight and slaughter yield, the value of these indicators was at the level of 240.2 kg and 56.3% for red steppe bulls, 283.4 kg and 59.1% for young Simmental breed, 272.4 kg and 60.0% for Kazakh white-headed breed animals %.

Keywords: cattle breeding, red steppe, simmental, Kazakh white-headed breeds, bulls, slaughter qualities

UDK 636.082

Genealogical structure of the Tatarstan population of black mottle cattle by belonging to promising branches

Chulpan A. Kharisova, Radik R. Shaidullin, Takhir M. Akhmetov

Abstract. A study was made of the genealogical structure of black-and-white cattle, taking into account new promising branches in the breeding herds of KrasnyVostok Agro JSC. The data of 14554 heads of breeding cows, which originated from 217 Holstein bulls, were studied. It has been established that the herd has eight promising branches from three lines, while the largest share in the population of dairy cattle is given to the branches of HANOVERHILLSTARBUCK 352790 (28.3%), ROCKALLI SON OF BOVA 1665634 (20.5%) from the line of Vis BekIdial and WALKWAY CHIEF MARK 1773417 (16.5%) from the line Reflection Sovering. A small group of cattle comes from the branch S-W-D VALIANT 1650414 (1.2%). The animals of the

TO-MAR BLACKSTAR-ET branch with a milk yield of 13059 kg, the mass fraction of fat in milk – 4.21% and the mass fraction of – 3.29% are characterized by a high bull parent index of the bull and branch WALKWAY CHIEF MARK (12213 kg – 4.28% – 3.25%). Animals of the R. Sovering line with the best genetic potential for milk yield are not observed to have a sufficiently high degree of its implementation. Thus, all lines have a low realization of the genetic potential of milk yield, which is primarily associated with a large number of young cows in the herd and a low age at calving.

Keywords: line, branch, genealogical structure, animals, bull, genetic potential

AGROENGINEERING AND FOOD TECHNOLOGIES

UDK 631.316.44

Substantiation of the design and technological parameters of the working body of the cutter for tillage around the tree stem in a terrace

Aslan K. Apazhev, Artur M. Egozhev, Asker A. Egozhev

Abstract. Gardening in the conditions of mountainous and foothill zones with the use of new technologies is a promising direction of agriculture. Terra-sizing in mountainous and foothill zones contributes to the development of new areas for fruit crops, which are not suitable for gardening without this event, which is a priority in conditions of limited land use areas. The main direction of improving soil care technologies in gardens, in the conditions of the foothill zone, is the introduction of mechanization tools for processing the trunk strips of terraces, ensuring the effective use of the root system of fruit plantations. The problem faced by farmers in these conditions is the lack of modern equipment for the care of the trunk strips of fruit plantations. The introduction of new machines and units for the mechanical processing of the barrel circle in one pass of the unit, contributing to the increase of soil fertility in the conditions of terraces, is relevant. A constructive and technological scheme of the working body of a garden cutter is proposed, the technical result of which is to perform a high-quality processing process in the area of the trunk circle by ensuring the bypass of the rotors around the tree stem, in one pass of the unit along the row line, for which a utility model patent was obtained. Analytical dependences have been obtained that allow us to determine the influence of the main design parameters, as well as the operating modes of the new milling cutter design, on the quality of the technological process.

Keywords: milling cutter, trunk strip, mountain gardening, tree trunk, terrace

UDK 631.331.5

Investigation of the driving resistance of a seeder with upgraded coulters

Aliy Kh. Gabaev

Abstract. This paper presents the results of a study of the traction resistance of grain seeders with disc coulters with a zero angle of attack and hydrophobic furrow-forming pads. The change in the geometric dimensions of the working bodies, due to contact with the abrasive medium, is the main reason for the multiple increase in the value of traction resistance, laid down by the manufacturer. External factors affecting the increase in traction resistance of the machine are:

climatic conditions in which the machine is operated, soil properties, quality of repairs and maintenance. The internal factors that cause a change in the characteristics originally set by the manufacturer are the imperfection of the design (the properties of the structural materials of the parts) and the technology of their manufacture. As the analysis of the condition of the seeding units shows, in a number of farms the discs of the sowing coulters are so worn out that their diameter is only 29-30 cm and even less, with a factory output of 35 cm. for sowing grain crops. The duration of operation of the sowing unit with factory performance depends on the properties of the soil, especially when working in difficult conditions, the loads on the working surfaces of the organs of agricultural machines increase by 1.5-3 times, and the number of failures increases sharply. The conducted studies of the modernized coulters with zero angle of attack show good performance with low traction resistance. The value of traction resistance at a stroke depth of 30 mm varied between 7-8.5 kg and 14-16.8 kg at a coulters stroke depth of 60 mm. Which is 20-25% lower than that of serial double disc coulters.

Keywords: the soil, disk, coulters, traction resistance, attack angle, furrow, stroke depth, friction, collapse, an effort

UDK 633.853.494:664.723

Innovative drying method of oilseeds on the example of rapeseed

**Alim Yu. Kischev, Irina M. Khanieva,
Aslan Kh. Erzhibov, Zaira M. Zhirikova**

Annotation. This article discusses the issues of drying oilseeds, which is characterized by a decrease in their moisture content to the level of persistent germination and other biological properties that determine the potential yield. The humidity of stable storage of seeds is such a humidity at which biological processes in them are minimized. Water is lost by the seed from the surface by evaporation or diffusion (during contact drying). The intensity of water evaporation from the seed surface largely depends on environmental conditions. Water flows from the inner parts of the seed to the surface as a result of the formation of a moisture gradient. Therefore, in accordance with the scientific principles of drying technology, the method of carrying out the process and its optimal mode should be chosen depending on the properties of the seeds as the object of drying. In this work, thermoradiation incandescent lamps were used as generators of infrared radiation. The essence of infrared radiation during drying is the awakening of atoms and molecules, which occurs during their thermal movement. Methods for using infrared irradiation for drying and increasing the germination of rapeseed seeds in obtaining seed stock have been studied and the choice of the type of seed heating radiator under various process modes has been substantiated.

Keywords: grain crops, drying, seeds, humidity, infrared radiation

UDK 631.3.076(470.64)

Mode factors and adjusting parameters of automobile engines when operating in the conditions of the Kabardino-Balkarian republic

Vladimir S. Koichev, Vladimir I. Batyrov, Anzor L. Bolotokov

Abstract. In the article, based on the analysis of the parameters of automobile engines during operation in the conditions of the Kabardino-Balkarian Republic, it is shown that the operating time of engines in unsteady modes, depending on the purpose of the power plant, can be up to

95% of their working time. It has been established that the magnitude of the torque developed by the engine in the transient mode is mainly influenced by the conditions for organizing the working process, which depend on the consumer of the engine power. The links between the influencing factors, operating modes and output indicators of the car, recommended speed modes during acceleration and relative fuel supply depending on driving conditions for trucks and buses are given. Studies have shown that with a short driving cycle path, fuel consumption increases sharply and, as a result, the efficiency of the car deteriorates. Therefore, every accidental stop contributes to the deterioration of the efficiency of the car. The research results indicate that there is a need for a differentiated consideration of these conditions in the design, testing and operation of vehicles, as well as an in-depth study of the speed and load modes of their operation in order to establish their qualitative and quantitative relationship with indicators of speed properties and fuel efficiency. For automobile rolling stock of the Kabardino-Balkarian Republic, it is recommended to supplement the standard operating route conditions with mountain-flat condition

Keywords: car, engine, operation, parameters, mode, cycle, route

UDK 621.548

To the assessment of wind power resources of the Kabardino-Balkarian republic

Boris B. Temukuyev, Timur B. Temukuyev

Abstract. The article is devoted to the problems of wind energy in the Kabardino-Balkarian Republic. Significant preparatory work is required to design a wind farm. The site is selected in a mountainous area, since the readings of any metrological station located in the gorge will be valid only for the area where it is installed. In the region, local wind flows have not been studied for the use of their energy for the needs of the national economy. To assess the wind energy resource in one of the side gorges in the Baksan river valley, UMEK-Communal Service LLC installed a certified automatic temporary metrological station Bylym, the results of which are given in this article. For 18 months, at hourly intervals, in particular, atmospheric pressure, temperature and relative air humidity, maximum and average wind speed, wind direction, as well as wind speed in gusts were measured. The readings of the instruments were processed and presented in the form of tables - the direction of the wind in points and the duration of the wind, presented in points on the Beaufort scale. The presence of access roads suitable for transporting wind turbine blades and the proximity of a high-voltage line will reduce the cost of delivery and connection to the power grid. It is proved that the site, located on the outskirts of the rural settlement Bylym, is promising.

Keywords: atmospheric pressure, air temperature, relative humidity, wind speed, wind gusts, wind direction

UDK 631.331

Investigation of parameters and operating modes of a seeder for sowing small-seeded crops

Akhmat B. Chapaev

Abstract. One of the main problems when sowing seeds of small-seeded crops is their injury, as a result of which the yield decreases. The aim of the scientific work is to increase the efficiency of

the production of small-seeded crops by reducing seed injury through the use of a modernized seeder. A new constructive-technological scheme of the sowing apparatus of a seeder for sowing small-seed crops has been developed, the principle of operation of which is based on the use of electron-ion technologies of an electrostatic field through friction electrification. The proposed sowing machine is designed to improve the technology and technical means for growing small-seed crops. Experimental studies were carried out according to standard methods, taking into account the fact that in order to improve the design of sowing machines, it is necessary to consider holistically the quality of the device itself with the distribution of seeds in the soil, and the results were processed using a PC. The possibility of reducing the energy intensity of sowing seeds by reducing the traction resistance of the tractor has been established. Thus, the use of a modernized seeder contributed to a decrease in traction resistance by 13%. As a result of the research, it was found that when sowing seeds with a modernized seeder using electrification, contact with foreign objects is reduced, and, consequently, their injury is reduced by almost 30 times. Due to this, the yield of sown crops increases by an average of 10-11%.

Keywords: sewing machine, seeds, traction resistance, technological processes, seeding machines, energy, seeder, small-seeded and agricultural crops

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Mathematical modeling of the process of vegetation removal during reclaim work

Yuri A. Shekikhachev, Fakhretdin M. Magomedov

Abstract. In the article, based on the analysis of the process of removing vegetation during reclamation work, it is shown that in order to perform them at the lowest amount of current and capital costs, it is necessary to take into account the limited nature of certain types of resources, the requirements for certain types of work, and other factors. In the course of mathematical modeling, it was taken into account that the number of technical means for performing the planned work should not exceed the amount of machines available on the farm, bought again and attracted from other farms, minus those to be withdrawn from the balance sheet and leased during this period. When establishing the amount of fuels and lubricants for a specific period when performing mechanized work, it is necessary to keep in mind the intensity of use of machines. When planning the number of machines and their use, it is necessary to take into account the seasonal nature of the work and the limited reserves for replenishing the staff of machine operators. Specific restrictions are formulated that allow for a comprehensive planning of the use of machines and the labor of machine operators. As a result of the research, it was found that the development of a plan for the optimal distribution of the fleet of machines allows you to establish the best option for using machines, the efficiency of performing specific operations of the technological process by individual machines, ensuring that the existing machines perform work in the optimal time, which ultimately helps to increase the profitability of operating machines on 15-35%.

Keywords: meliorative channels, vegetation, mowing, mowers, modeling, optimization