

AGRICULTURAL SCIENCES

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EXTERIOR FEATURES OF BEE COLONIES IN THE UDMURT REPUBLIC

Productivity, winter hardiness and resistance to adverse environmental factors of bee colonies depend on the complex interaction of internal and external factors. Timely application of dressings enriched with biologically active substances allows to increase the vitality of bees, to obtain ecologically clean bee products. High biological activity has bioflavonoid – dihydroquercetin (unsweetened bark from the Siberian and Daurian larch); being not a substitute for fodder means, it intensifies their use through stimulation of digestive processes thus affecting carbohydrate, protein, lipid and mineral exchanges. The aim of the research is the analysis of exterior and productive characteristics of bee colonies in the Udmurt Republic when you use dihydroquercetin in spring.

This article presents the results of a morphometric analysis of bees by their substantive features, i.e. the length of the proboscis, the length and the width of the right front wing, width of third tergite, by cubital index; positive influence of dihydroquercetin (taxifolin) biocorrective has been determined on the increase of honey productivity of the bee colonies, in different doses – 5, 10, 15 mg/bee family, respectively. It is established that the use of dihydroquercetin for 15 mg in the composition of sugar syrup provides the highest honey productivity: the collection of gross honey proved 38.1 kg per a bee family.

Key words: bee, breed, exterior, honey productivity, top dressing, dihydroquercetin, the length of proboscis, cubital index, gross honey.

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INDICATORS OF VEGETABLE CROP QUALITY DEPENDING ON THE TECHNOLOGIES OF GROWING

The results of research on the quality indicators of vegetable crops depending on the technology of growing under the conditions of the open and protected soil conditions in the soil-and-climatic

conditions of the Udmurt Republic. The objectives of the study were to study the effect of varieties and hybrids of vegetable crops on nutritional value and to determine the dependence of changes in quality indicators on the technology of growing. The research was conducted during the period of 2010-2017 in the conditions of agricultural enterprises of different categories in the Udmurt Republic, according to the "Methodology of field experience" and "Fundamentals of scientific research in agronomy". Different hybrids of tomatoes, varieties of shallots, of winter garlic and leaf radish, leek and leaf lettuce were considered as the objects of the research carried out.

The studied vegetable crops had been cultivated according to the accepted zonal technologies. After harvesting, a qualitative assessment of products had been carried out followed by determination of biochemical parameters: the content of dry matter, vitamin C, water-soluble sugars, and nitrates. The research results had revealed that the varieties of hybrids and growing technologies had an impact on the quality of vegetable products. The best quality of products found at the lowest plant density of radish leaf in the pot; growing varieties of the White Fang leek, of the Lancelot, leaf lettuce, of shallot 3/16 sample-sort, of tomato hybrid F1 Torero; application of organic fertilizers winter garlic.

Key words: vegetable crops, dry matter, vitamin C, water-soluble sugars, nitrates.

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PECULIARITIES OF AGROECOLOGICAL STUDY OF WINTER WHEAT VARIETIES AND VARIETY-SAMPLES IN THE VOLGA-VYATKA REGION

The results of a three-year agroecological test of a collection of varieties and variety-samples of winter wheat of different ecological and geographical origin on light-grey forest soils of the Nizhny Novgorod region are presented. It was found out that the yield of the studied varieties and variety-samples was ranging from 5,39 t / ha (the average in standard variety Moskovskaya 39) to 6,41

and 6,88 t/ha (variety Nemchinovskaya 57 and variety- samples KS 202). These varieties, as well as Nemchinovskaya 17, KP 597, KS 31 gave a yield significantly higher than the standard variety, respectively, 1,02;0,96; 1,49;0,93; 1,0 t/ha or 18,9; 27,6; 17,2; 18,5 %. It had been revealed that the formation of the crop is significantly influenced by the weather conditions, especially during the germination, overwintering, formation and loading the grain. It had been noted that the differences of the studied varieties by the main elements of the crop structure, such as the number of spikelets in the ear, the number of grains in the ear, the mass of grain from the ear are statistically proved. Maximum number of spikelets per ear were detected in varieties Nemchinovskaya 17, Nemchinovskaya 57, Moscow 39 – of 15,8 and 15,7 PCs High grain content of ears (33,6; 32,9; 32,8 pieces) has different varieties and cultivars Nemchinovskaya 57, KS 202, Moskovskaya 40, which exceeded the variety Moskovskaya 39 11,1; 9,3; 8,6 per cent. The highest grain weight of an earhad been witnessed in the varieties Nemchinovskaya 17, Nemchinovskaya the 57, KS 202 is 1,85 and 1,82 g in which it had exceeded the control of 15,6 and 13,8 %. The grain quality indicators of the studied varieties diversified as follows: the protein content varied from 15,5 % for the variety Memory Fedin to 19,5 % for the variety Moskovskaya 40. In the standard variety, this figure was 17,3 %. According to the content of gluten, as well as protein, only the Moskovskaya 40 variety with the content of the required ingredients 36,1 and 19,5%, respectively, was reliably distinguished. The calculation of the biological yield showed the high potential of the studied experimental breeds – 0,30 t/ha for the Nemchinovskaya 17; of 10,13 t/ha for the Nemchinovskaya 57; of 10,16 t/ha for the Moskovskaya 56; 9,83 t/ha for the variety-sample KS 202, that is above standard grade by 2,03; 1,86; 1,89; 1,56 t/ha or 24,5; 22,5; 22,8; 18,9 per cent. Significant resistance to the winter conditions survival, leaves' diseases and damping off diseases have been manifested in most of varieties mentioned above – the Nemchinovskaya 17; the Nemchinovskaya 57; the Moskovskaya 56; the Moskovskaya 40. In general, according to the primary economic and valuable characteristics (yield, protein and gluten content, resistance to certain diseases), the varieties of the winter wheat Nemchinovskaya 57, Nemchinovskaya 17, and the variety-sample KS 202 have been distinguished.

Key words: winter wheat, varieties, yield, crop structure, protein, gluten, plant diseases.

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LABORATORY RESEARCHES OF MANURE DURING AEROBIC COMPOSTING

The problem of waste utilization on the livestock farms has always been an acute problem. As a result, even those treatment facilities on the farms are in unsuitable condition today. A promising and energy efficient technology is artificial ventilation of the manure (method of enforced aeration of the manure during composting). When the internal volumes of the manure collar are provided

with oxygen, the latter accelerates the development of aerobic bacteria during life period, of which intensive heating of the product occurs up to temperatures of 60...70 °C. Due to this, the destruction of the pathogenic microflora and self-disinfection of manure occurs within 1...2 months. Tasks: to conduct laboratory microbiological studies of the straw-and-manure mixture during enforced aeration of the manure in the composting process; to determine the composition of pathogenic microflora in the straw-and-manure mixture. Research methods: for the helminthological researches of the material the method of successive washings and flotation was used; for helminthoscopy the simplified method of Berman was used. The results of the researches: manure contains many organic compounds, so it is a favorable environment for the development of various microorganisms. In manure there are always microorganisms participating in soil-forming processes, such as ammonifying, nitrifying, denitrifying, cellulose-decomposing or cellulose-decomposing, nitrogen-fixing, actinomycetes, mold fungi. In addition to the listed microorganisms, in manure there are always present representatives of normal microflora of the gastrointestinal tract of animals, such as *E. coli*, enterococci, a large group of lactic acid bacteria, clostridia. Some of them can function as causative agents. Therefore, huge amount of beneficial microorganisms get into the soil with the manure, and that greatly enhances the microbiological processes in the soil. Manure acquires the properties of an organic fertilizer due to the vital activity of microbes. The composition of manure is not stable, it depends on the ratio of solid and liquid excreta, the quantity and quality of food, animal species and other factors.

Thus, the laboratory analysis of manure samples, a study of the humidity content in it, the helminthological and bacteriological studies of manure was carried out. During the damping off process, in the manure there appear many pathogen microorganisms. However, when airborne microorganisms in the manure are provided with the air self-heating of the straw-and-manure mixture to temperatures of 60 ...70 °C occurs, that, in turn, leads to self-disinfection of the manure. To ensure the high quality of the product, it is proposed to implement a system for automated control of parameters (humidity and temperature), and control of the air injection process.

Key words: manure, microbiology, laboratory analysis of samples, aeration, enforced ventilation, microflora, bacteria, mold fungi.

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PECULIARITIES OF MODERN LABORATORY DIAGNOSTICS FOR A CHRONIC DISEASE OF THE KIDNEY

This article describes various methods of diagnosis of chronic kidney disease for cats and dogs. Features of diagnostics by this or that method, merits and shortcomings are given. The features of different diagnostic methods, such as urine analysis, including chemical examination of the sample and microscopy of urine sediment and protein/creatinine ratio in urine, have been analyzed. Different causes for proteinuria, leukocyturia and cylindruria have been also designated. The study of blood serum for the “indicators of renal” creatinine, urea, cystatin C. had been done. The reasons of increase and decrease of creatinine and urea have been designated; particulars of change of level of creatinine and urea depending on the breed of a dog, possible decrease in its body weight, presence of the accompanying pathologies have been given. A study on such a parameter as cystatin C has indicated rather scanty data on it. Therefore, additional research in this direction is necessary. Also there was considered and justified a completely new diagnostic test for a chronic kidney disease – the test for symmetrical dimethylarginine (SDMA), that is strictly specified for kidney tissue, and which is non-influenced by any animal breed, its weight, possible loss of muscle mass and other physiological aspects of an animal. A clinical example of a dog is exemplified with a normal level of creatinine and, as it turned out, an increased level of symmetrical dimethylarginine, which with absolute accuracy indicates a chronic kidney disease.

Key words: chronic disease of the kidney, kidney, kidney disease, urine analysis, proteinuria, cylindruria, creatinine, urea, cystatin C, SDMA.

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THE IMPORTANCE OF THE SIBLING SELECTION IN THE IMPROVEMENT OF PRODUCTIVE AND GENETIC QUALITIES OF THE CATTLE

The experience acquired in our time has accumulated the use of inbreeding in the breeding work with many kinds of farm animals allowed us more comprehensive and objective access to

breed estimation, to determination of its place in modern industrialized breeding system of modern breeding work. To obtain a correct efficiency assessment of inbreeding, primarily, the results of breeding studies of the inbred species should be researched. Studies were conducted in a herd of the cattle breeding plant “Put’ Ilyicha”, Zavyalovsky District, Udmurt Republic. The material for the research was analyzed from the registration cards 2-MOL for brooding cows, namely, the data of zootechnic and breeding records. Among the studied population, there were animals, obtained by using related and unrelated mating (inbreeding and outbreeding). Inbred species were classified according to the type and degree of inbreeding. The degree of inbreeding was determined according to the method Push – Shaporuzh and inbreeding coefficient formula Wright – Kislovsky. Depending on the type of inbreeding, the animals were divided into groups obtained by simple, complicated and complex inbreeding. Depending on the types of inbreeding animals were divided into the resulting intra-line inbreeding, inbreeding on a mother line and inbreeding to an intermediate. The research results have revealed that the cows received after sibling mating, outperform their outbred peers in the yield of milk by 197,3 kg, or 3,9 % ($P \geq 0,95$), but are inferior to outbred half-sister animals by 25,2 kg or 0,5 %. Complex and combined inbreeding has proved a positive effect on milk yield, depending on the type of inbreeding. Animals of this group exceed cows obtained by simplified inbreeding by 218,7 kg or 4,6 % ($P \geq 0,95$), and 669,5 kg or 13,6 % ($P \geq 0,999$), respectively. Coefficient of heritability of milk yield for outbred specimen was 0,44, whereas heritability of milk yield coefficient have proved significantly higher for the inbred individuals and their outbred half-sisters – 0,68 and 0,72, respectively.

Key words: inbreeding, outbreeding, breeding selection, method Push – Shaporuzh, formula Wright – Kislovsky, exponent of inbreeding, coefficient of homozygosity, population, panmixia, breed, black-and-white cattle.

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TECHNICAL SCIENCES

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IMPROVEMENT OF SYSTEMS FOR AUTOMATIC REGULATION OF LIGHTING IN POULTRY FARMING

The article delivers a brief overview of the development of lighting systems on poultry farms. The choice of using automatic lighting control systems on the poultry farm on the basis of LED lamps has been substantiated. An example is given of the implementation of an automatic lighting control system on the poultry farm for a particular variant of birds' growing (cross ROSS 308), the system that provides an automated mode for controlling the lighting in the process of growing and keeping birds. In the developed automatic system, stabilizing and software algorithms of functioning have been introduced. The first algorithm maintains a targeted value of lighting, the second – the desired change in lighting in the process of growing birds. PLC 63 is chosen as a microcontroller, thus providing a wide range of additional functions allowing to control a large number of LED installations and to use a sufficient number of illumination sensors to ensure uniform distribution of the light flux over the entire area of a poultry farm. The program of the microcontroller is described in detail. To check the functioning of the program there has been developed its visualization. The programs are also presented in the mode of a gradual increase in illumination and a change in the light mode. Visualization thus allows the operator to follow the light readings at a given time, as well as to monitor other parameters displayed on the monitor screen. High accuracy of illumination control and its smooth change in sunset / dawn modes is provided by using a block with PID control. The LEDs of the luminaires are controlled by a sequence of PWM pulses. The proposed approach to building the system allows it to be used to create many other systems of automatic control of lighting, including complex intermittent lighting algorithms in accordance with the variety of modern technologies for growing poultry.

Key words: lighting control, PID control, poultry house, parent flock, automatic control system, intermittent lighting algorithms, lighting mode.

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DEVELOPMENT DYNAMICS OF MODERN ANTIFRICTION MATERIALS FOR SLIDING BEARINGS IN RUSSIA

The paper analyzes the Russian segment of sliding bearings production based on antifriction materials. As a result, the main producers of these products, the range of marketable products, and their application in mechanical engineering have been identified. It is determined that over the past five years in Russia the production of plain bearings reduced, which is largely determined by the decline in machine-building production and economic restrictions imposed by foreign countries. At the same time, there is an increase in the dynamics of ready-made sliding bearings imported into the country from Asia and Europe. Over the past three years, the share of imported products based on anti-friction materials has increased from 16 % in 2015 to 24 % in 2017. The dynamics of increase in imported products from abroad from year to year is steadily growing, despite the attempts of the Ministry of Industry to strengthen the import substitution work. The explanation lies behind the lack of demand for products produced by domestic enterprises, largely using the technology of obtaining anti-friction materials of the Soviet era. In particular, anti-friction coatings based on metal alloys in the form of babbitts and bronzes are used for Russian sliding bearings, which have high tribotechnical characteristics in a narrow range of properties. That limits their use in most machine components and mechanisms operated under significant dynamic, kinematic and thermal loading. However, in recent years, Russia has been implementing technologies for producing thin antifriction coatings for bearing units of machines and mechanisms based on metal polymer compositions, thus using highly concentrated energy sources. According to the latest data, the physical-mechanical and operational properties of the created coatings have significantly exceed the standard coatings.

Key words: antifriction material, sliding bearing, sliding bearing market, product range, metal composition, laser processing.

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