AGRONOMY

Original article
DOI 10.48012/1817-5457_2024_1_4-10

YIELD FORMATION OF COLLECTION SAMPLES OF WINTER TRITICALE

Tatyana A. Babaytseva✉, Irina N. Serebrennikova, Elmira F. Vafina
Udmurt State Agricultural University, Izhevsk, Russia
✉ taan62@mail.ru

Abstract. The winter triticale varieties adapted to the agro-climatic conditions of the region are associated with the effectiveness of breeding, for this process to be successful it is important to search for the source material. The research purpose is a comparative assessment of the yield formation in collection samples of winter triticale. The research objectives are: to assess the yield of collection samples; to determine the proportion of influence of its structure elements, winter hardiness, morphological characteristics of plants on the yield; to identify promising samples. Field studies were conducted during 2020–2023 at the experimental field of the instructional research and production complex "Agrotechnopark" of the Udmurt State Agricultural University. The sixty nine samples of winter triticale of various ecological and geographical origin were studied in the collection nursery. The research was conducted in accordance with the VIR methodology for studying the wheat and triticale collection. Meteorological conditions had a significant impact on the research results, it was reflected in a strong variation in yield over the years (V = 55 %). According to the yield capacity, Beta (391 g/m^2), Zimogor (381 g/m^2) and Cornet (378 g/m^2) varieties recommended for cultivation in the Udmurt Republic were distinguished, as well as samples of Torchinsk (350 g/m^2), L.280/12 (340 g/m^2), Mayak, AD 1405 and AD 805 (326 g/m^2 each) with a standard deviation (σ = 67 g/m^2). The correlation analysis has shown that the yield of collection samples is in close positive relationship with winter hardiness (r = 0.75 ± 0.16) and the density of the productive plant stand (r = 0.90 ± 0.11). The samples Beta, Zimogor, Kornet, AD 1405, Markian, Brat had high winter hardiness (7.0 – 7.7 points). An average direct correlation (r = 0.40 ± 0.23) of yield with plant height was established under favorable conditions. The parameters of the ear, its productivity, density, and the unseeded ear did not significantly affect the variability of yield.

Key words: winter triticale, winter hardiness, yield structure, plant height, correlative relationship, variation.

For citation: Babaytseva T. A., Serebrennikova I. N., Vafina E. F. Yield formation of collection samples of winter triticale. The Bulletin of Izhevsk State Agricultural Academy. 2024; 1(77): 4-10. (In Russ.). https://doi.org/10.48012/1817-5457_2024_1_4-10.

Authors:

T. A. Babaytseva✉, Doctor of Agricultural Sciences, Associate Professor, https://orcid.org/0000-0002-3784-0025;

I. N. Serebrennikova, Postgraduate student, https://orcid.org/0000-0001-5983-5860;

E. F. Vafina, Doctor of Agricultural Sciences, Associate Professor, https://orcid.org/0000-0003-3086-2886

Udmurt State Agricultural University, 16 Kirova St., Izhevsk, Russia, 426033
✉taan62@mail.ru

Original article
DOI 10.48012/1817-5457_2024_1_11-18

INFLUENCE OF LONG-TERM CULTIVATION OF PERENNIAL GRASSES AGROPHYTOCENOSES ON THE MICROFLORA OF SOD-PODZOLIC SOIL

Alina Yu. Karpova[1] ✉, Zhanna S. Nelyubina[2],
Nadezhda I. Kasatkina[3], Maria E. Bulda[4]
[1,4]Udmurt State Agricultural University, Izhevsk, Russia
[2,3]Udmurt Federal Research Center of the Ural Branch
of the Russian Academy of Sciences, Izhevsk, Russia
[1]alinap30@yandex.ru

Abstract. Perennial grasses are not only raw materials for the feed production, but also contribute to the preservation and improvement of soil fertility. The purpose of the research was to study the influence of long-term cultivation of single-crop and polyspecies agrophytocenoses of perennial grasses on their fodder productivity and the microflora of sod-podzolic soil. The research was carried out during the experiment with agrophytocenoses based on variegated alfalfa of the fourth year of use, which was established on the experimental field of the Udmurt Research Agricultural Institute, a branch of the UdmFRC UB RAS in 2023. It was revealed that under the dry conditions of the growing season of 2023, perennial grasses formed two cuttings, the total yield amounted to 4.34–6.13 t/ha of dry matter. The agrophytocenoses of alfalfa + bird's-foot and alfalfa + fescue provided a yield of 6.1 and 5.50 t/ha, respectively, which was at the level of a single-species sowing of alfalfa (5.75 t/ha). The main contribution to the their yield formation was made by alfalfa – 62–83 % in the first cutting and 86–95 % in the second. The long-term use of grass mixtures based on legumes and bluegrass promotes the increase of microbiological activity of sod-podzolic soil compared to single-crop sowings. Three-component grass mixtures (alfalfa + bird's-foot + festulolium) have a particularly beneficial effect on the number of microorganisms in the soil, including the number of bacteria mobilizing phosphates of low solubility. The cellulosolytic capacity of sod-podzolic soil under the conditions of dry growing season of 2023 was estimated as weak and medium at the level of 19.0–43.5 %.

Key words: variegated alfalfa, grass mixtures, productivity, dry matter, structure, botanical composition, sod-podzolic soil, soil microflora, cellulosolytic capacity of soil.

For citation: Karpova A. Yu., Nelyubina Zh. S., Kasatkina N. I., Bulda M. E. Influence of long-term cultivation of perennial grasses agrophytocenoses on the microflora of sod-podzolic soil. The Bulletin of Izhevsk State Agricultural Academy. 2024; 1(77): 11-18. (In Russ.). https://doi.org/10.48012/1817-5457_2024_1_11-18.

Authors:

A. Yu. Karpova[1] ✉, Candidate of Agricultural Sciences, Associate Professor, https://orcid.org/0000-0002-6438-4838;

Zh. S. Nelyubina[2], Candidate of Agricultural Sciences, Leading researcher, https://orcid.org/0000-0001-5751-9557;

N. I. Kasatkina[3], Doctor of Agricultural Sciences, Leading researcher, https://orcid.org/0000-0003-0725-2254;

M. E. Bulda[4], Master's degree student, https://orcid.org/0009-0008-6336-9784
[1,4]Udmurt State Agricultural University, 16 Kirova St., Izhevsk, Russia, 426033
[2,3]Udmurt Federal Research Center of the Ural Branch of the Russian Academy of Sciences, 34 Tatyany Baramzinoy St., Izhevsk, Russia, 426067
[1]alinap30@yandex.ru

Original article
DOI 10.48012/1817-5457_2024_1_19-25

CURRENT STATE OF RECREATIONAL BIRCH STANDS IN TYUMEN (BY THE EXAMPLE OF THE PARK 'GILEVSKAYA GROVE')

Anastasia V. Dancheva[1], Sergey V. Zalesov[2] ✉, Ksenia A. Poltorak[3]
[1,3]Nothern Trans-Ural State Agricultural University, Tyumen, Russia
[2]Ural State Forest Engineering University, Yekaterinburg, Russia
[2]zalesov@usfeu.ru

Abstract. The article analyses the current state of the birch stands in the park 'Gilevskaya grove' in Tyumen based on the indicators of the sanitary state, trees damages and their viable state. According to the analyzed indicators, the state of birch forests in the all temporary sample plots is estimated as weakened. The common correlation of an increase in the number of severely weakened and dying trees and a decrease in the number of healthy trees with an increase in recreational impact has been observed. The severely weakened and dead standing trees are characterized by the smallest diameter and volumetric indicators. It has been revealed that the trees with mechanical damages, top-dry trees, trees with holes and wood-destroying fungi are found more frequently. The viable capacity of birch stands in the park 'Gilevskaya grove' is decreased significantly by the age factor, according to this indicator they are characterized as over-mature trees. The long-term recreational use of these stands – more than 50 years, worsens this process. A number of silvicultural operations including disposal weakened trees, trees with bad growth and potential mortality, and also damaged and unaesthetic trees during landscape tending, have been suggested in order to prevent degradation and to increase the environmental resistance of the birch stands in the park 'Gilevskaya grove'. The introduction of woody invasive species for biological diversity and moving limitations of recreational visitors, for instance, shrubs planting along the pathways, deserve consideration.

Key words: urban forests, birch stands, recreational impact, state of forest stand.

For citation: Dancheva A. V., Zalesov S. V., Poltorak K. A. Current state of recreational birch stands in Tyumen (by the example of the park 'Gilevskaya grove'). The Bulletin of Izhevsk State Agricultural Academy. 2024; 1(77): 19-25. (In Russ.). https://doi.org/10.48012/1817-5457_2024_1_19-25.

Authors:

A. V. Dancheva[1], Doctor of Agricultural Sciences, https://orcid.org/0000-0002-5230-7288;

S. V. Zalesov[2] ✉, Doctor of Agricultural Sciences, Professor, https://orcid.org/0000-0003-3779-410X;

K. A. Poltorak[3], Master's degree student

[1,3]Nothern Trans-Ural State Agricultural University, 7 Respubliky St., Tyumen, Russia, 625003

[2]Ural State Forest Engineering University, 37 Sibirskiytrakt St., Yekaterinburg, Russia, 620100

[2]zalesovsv@m.usfeu.ru

Original article
DOI 10.48012/1817-5457_2024_1_26-32

CHARACTERISTICS OF UNDERGROWTH OF ACCOMPANYING GENERATION DURING ALTERNATE STRIP GRADUAL FELLINGS IN SECONDARY BIRCH STANDS

Natalia M. Iteshina[1] ✉, Irina V. Bezdenezhnykh[2], Sergey V. Zalesov[3], Nikolay N. Terinov[4]
[1]Udmurt State Agricultural University, Izhevsk, Russia
[2,3,4]Ural State Forest Engineering University, Yekaterinburg, Russia
[1]n.iteshina@yandex.ru

Abstract. The article deals with the quantitative and qualitative indicators of undergrowth under the canopy of tree stand in the final strips of two-stage alternate strip gradual felling. The study was carried out in the secondary birch plantations of the southern taiga forest region, the European part of the Russian Federation within the Udmurt Republik. The sample plot method was used within the research process. The sample plots were laid in strips of tree stands left for the final method of alternate strip gradual felling. The width of the strips varied from 10 to 35 m. It has been established that despite the lateral light the canopy of strips of tree stands left for completion of growing practically lacks the coniferous undergrowth of the accompanying generation. The reason for the lack of coniferous undergrowth of the accompanying generation is explained by the high canopy density of the compound two-storied forest stand. The first level is represented by soft-wooded broadleaved species dominated by birch and the second – by spruce and fir. The basis for the second storey formations was the undergrowth and young stands of the above mentioned species of preliminary generation. It has been experimentally established that the silvicultural effectiveness of the alternate strip gradual felling in the secondary birch stands in the area under study can be achieved if under their canopy there is viable undergrowth, pre-generation of spruce and fir and its preservation during logging operations. The implementation of the provision will provide the conversion of secondary soft-wooded broadleaf plantings into native coniferous trees by means of alternate strip gradual fellings without using artificial forest restoration.

Key words: felling of mature and over-mature stands, alternate strip gradual fellings, secondary birch stands, undergrowth, reorganization.

For citation: Iteshina N. M., Bezdenezhnykh I. V., Zalesov S. V., Terinov N. N. Characteristics of undergrowth of accompanying generation during alternate strip gradual fellings in secondary birch stands. The Bulletin of Izhevsk State Agricultural Academy. 2024; 1(77): 26-32. (In Russ.). https://doi.org/10.48012/1817-5457_2024_1_26-32.

Authors:

N. M. Iteshina[1] ✉, Candidate of Agricultural Sciences, Associate Professor, https://orcid.org/0000-0002-2003-2005;

I. V. Bezdenezhnykh[2], Candidate of Agricultural Sciences, doctoral student, https://orcid.org/0009-0003-6806-8968;

S. V. Zalesov[3], Doctor of Agricultural Sciences, Professor, https://orcid.org/0000-0003-3779-410X;

N. N. Terinov[4], Doctor of Agricultural Sciences

[1]Udmurt State Agricultural University, 16 Kirova St., Izhevsk, Russia, 426033

[2,3,4]Ural State Forest Engineering University, 37 Sibirskiy trakt St., Yekaterinburg, Russia, 620100
[1]n.iteshina@yandex.ru

Original article
DOI 10.48012/1817-5457_2024_1_33-41

UNDERGROWTH DEVELOPMENT UNDER PINE PLANTATION CANOPY AFTER SELECTIVE FELLING

Andrey S. Novozhilov, Leonid A. Belov✉, Petr N. Suraev, Irina A. Mishkina
Ural State Forest Engineering University, Yekaterinburg, Russia
✉ bla1983@yandex.ru

Abstract. The research is devoted the study of the silvicultural efficiency of even gradual felling. The research objects were mature Scots pine stands of lichen-cowberry, berry-field and berry-linden forest types growing on the territory of the Ural educational experimental forestry enterprise of Ural State Forest Engineering University. On the basis of 11 plots, the number of seedlings and undergrowth was analyzed 1–4 years after the first even gradual felling. It has been established that the process of development of Scots pine undergrowth is slow. The reason is the practical absence of pre-generation undergrowth of the species. Moreover, after carrying out the first even gradual felling and reducing the relative forest stand density to 0.5–0.6, the understory starts to grow actively. The forest understory is represented by the Russian groom, rowan-tree, small-leafed linden and Prickly wild rose. The density of the understory in 1 and 4 years after the first felling reaches 31.7 th.p/ha on skidding trail and 19.6 th.p/ha on apiaries. Besides the understory, root shoots of aspen and linden actively appears. As a result the aspen trees and dark coniferous species predominate in the undergrowth in the most of the sample plots. Relying on data obtained we can draw the conclusion that in order to ensure the silvicultural effectiveness of even gradual felling in pine forests it is necessary to mineralize the soil 3–5 years before the first felling or immediately after it for the purpose of forming the undergrowth of preparatory and accompanying generation.

Key words: felling of mature and over-mature stands, even gradual felling, pine forests, undergrowth, understory.

For citation: Novozhilov A. S., Belov L. A., Suraev P. N., Mishkina I. A. Undergrowth development under pine plantation canopy after selective felling. The Bulletin of Izhevsk State Agricultural Academy. 2024; 1(77): 33-41. (In Russ.). https://doi.org/10.48012/1817-5457_2024_1_33-41.

Authors:
A. S. Novozhilov, Master's degree student;
L. A. Belov✉, Candidate of Agricultural Sciences, Associate Professor, https://orcid.org/0000-0002-6397-3681;
P. N. Suraev, PhD student, https://orcid.org/0000-0001-7842-9219;
I. A. Mishkina, PhD student
Ural State Forest Engineering University, 37 Sibirskiy trakt St., Yekaterinburg, Russia, 620100
✉ bla1983@yandex.ru

Original article
DOI 10.48012/1817-5457_2024_1_41-48

FEATURES OF THE 2023 FIRE SEASON IN THE FOREST FUND OF THE SVERDLOVSK REGION

Ilya M. Sekerin
Ural State Forest Engineering University, Yekaterinburg, Russia
sekerinim@m.mail.ru

Abstract. The dynamics of forest fires in the forest fund of the Sverdlovsk Region for the 2023 based on the monitoring of the actual fire rate indicators was analyzed. It is noted that 2023 was an extreme year in terms of weather conditions, which caused an increase in both the number of forest fires and the area covered by them. The number of large fires especially increased. However, the introduction of emergency situation regimes of various levels and the transfer of firefighting forces and equipment ensured the situation being kept under control despite delaying in extinguishing individual fires. An analysis of the forest fires causes has shown that despite a decrease in the number of fires violations of fire safety rules by the population, this reason remains the main one, which generates the necessity to strengthen preventive work with the population. Lack of precipitation has led to an increase in the number of forest fires, including peat fires in wetlands. This necessitates closer attention to the latter and equipping fire brigades with specialized equipment to bring fires under control. In conclusion the recommendations are given to prevent an extreme situation with forest fires in the future.

Key words: forest fire rate, fire season, emergency situation regime, fire extinguishing.

For citation: Sekerin I. M. Features of the 2023 fire season in the forest fund of the Sverdlovsk region. The Bulletin of Izhevsk State Agricultural Academy. 2024; 1(77): 41-48. (In Russ.). https://doi.org/10.48012/1817-5457_2024_1_41-48.

Author:
I. M. Sekerin, Candidate of Agricultural Sciences, Associate Professor
Ural State Forest Engineering University, 37 Sibirskiy trakt St., Yekaterinburg, Russia, 620100
sekerinim@m.mail.ru

Original article
DOI 10.48012/1817-5457_2024_1_49-56

STATISTICS OF DOGS BABESIOSIS SPREADING IN CONDITIONS OF SCIENTIFIC AND EDUCATIONAL CENTER OF VETERINARY MEDICINE AND ITS THERAPY FOR THE PERIOD 2021–2022

Alexey V. Zagumennov, Ivan D. Gengin ✉
Penza State Agrarian University, Penza, Russia
✉ brovko.gengin@gmail.com

Abstract. Babesiosis (piroplasmosis) of dogs is an urgent problem for animal owners, as well as for veterinarians and veterinary assistants in Eurasia and America. Every year hundreds of thousands of dogs around the world are infected with babesias and spread them through intermediate hosts of the parasite. Babesiosis can be classified as a disease of moderate severity, it is relatively difficult to treat, and the cases of chronic sequel are common. The article presents epizootological statistics on the spread of blood parasites Babesia Canis and Babesia Gibsoni in the Zheleznodorozhny district of Penza for the period 2021 and 2022; it also gives a comparative description of the treatment of cyanocobalamin-deficiency and hemolytic anemia in canine babesiosis, a comparison and analysis of the first and the control results of a general blood analysis and a biochemical analysis of serum peripheral blood. The key objective of the article was to predict the future epizootic outbreak of babesiosis in the Zheleznodorozhny district of Penza in order to have a definite plan to combat the disease in the future. The results of the general analysis of the epizootic Babesia Canis and Babesia Gibsoni in the conditions of the Scientific and Educational Center of Veterinary Medicine at the Penza State Agrarian University are as follows: puppies and adult animals have a more severe form of the disease compared to young animals; purebred individuals are more susceptible to severe disease; in contrast to the invasion with large babesias, the invasion with small babesias has a tendency to subclinical manifestation of babesiosis, which allows the animal to be preserved as an incubator for new schizogonts; the exit of a wide range of insectoacaricides from the market had a negative impact on the blood parasite control.

Key words: parasitology, babesiosis, dogs, veterinary medicine, epizootology, clinical diagnosis, laboratory research, statistics; hematopoiesis.

For citation: Zagumennov A. V., Gengin I. D. Statistics of dogs babesiosis spreading in conditions of Scientific and Educational Center for Veterinary Medicine and its therapy for the period 2021–2022. The Bulletin of Izhevsk State Agricultural Academy. 2024; 1(77): 49-56. (In Russ.). https://doi.org/10.48012/1817-5457_2024_1_49-56.

Authors:

A. V. Zagumennov, Candidate of Veterinary Sciences, Associate Professor, https://orcid.org/0000-0001-9064-9660;

I. D. Gengin ✉, applicant, https://orcid.org/0009-0001-3378-6973

Penza State Agrarian University, 30 Botanicheskaya St., Penza, Russia

✉ brovko.gengin@gmail.com

Original article
DOI 10.48012/1817-5457_2024_1_56-64

LINEAR PROFILE OF FIRST-CALF COWS UNDER INTENSIVE MILK PRODUCTION TECHNOLOGY

Elena I. Kulikova[1], Galina Yu. Berezkina[1] ✉, Yulia V. Isupova[1], Raushania R. Zakirova[2]
[1]Udmurt State Agricultural University, Izhevsk, Russia
[2]Udmurt State University, Izhevsk, Russia
✉ g-berezkina@mail.ru

Abstract. The emphasis on the milk productivity level is placed in modern breeding of dairy cattle. The organization of highly productive herds is impossible without assessing the external appearance of animals and their body type.The purpose of the work is to evaluate the exterior profile of first-calf cows depending on the level of milk productivity. The objectives are as follows: to study the conditions of feeding and keeping cows; to evaluate the exterior profile of cows in comparison with reference values for the Holstein breed; to identify the influence of the productivity level of cows on their exterior characteristics.To conduct the research, five groups of first-calf cows were formed depending on milk yield: Group I up to 5000 kg, Group II – 5001–6000 kg, Group III – 6001–7000 kg, Group IV – 7001–8000 kg and Group V 8001 kg and higher. The cows were divided according to their genealogical lines in order to study the impact of their origin: Group I – cows of V. B. Ideal line, Group II – cows of M. Chieftain line, Group III – cows of R. Sovering line, Group IV – cows of S. T. Rokit line, Group V – cows of P. Governer line. The teat length in cows of Groups IV and V turned out to be significantly longer compared to Group I by 0.3–0.5 points. The position of the udder bottom is the highest in first-calf heifers of Group I and corresponds to 8.4 points on average for the group. The animals of other groups had this indicator less by 0.6–0.9 points, the difference is statistically significant. Such indicators as body depth, body strength, milk type, rump length, pelvic position, pelvic width, muscularity, rear leg position, hoof angle, location of teats, height and attachment of the foreudder are either at the same level in all groups of first-calf heifers under study, or have no statistical difference. First-calf cows of the V. B. Ideal and S. T. Rokit lines have a significantly high overall score for exterior. Thus, first-calf cows with a higher level of milk productivity have better conformation indicators, namely higher growth, longer anterior lobes of the udder, a deep udder furrow and wide posterior lobes of the udder.

Key words: Holstein breed, first-calf cows, milk productivity, linear assessment of exterior, origin.

For citation: Kulikova E. I., Berezkina G. Yu., Isupova Yu. V., Zakirova R. R. Linear profile of first-calf cows under intensive milk production technology. The Bulletin of Izhevsk State Agricultural Academy. 2024; 1(77): 56-64. (In Russ.). https://doi.org/10.48012/1817-5457_2024_1_56-64.

Authors:

E. I. Kulikova[1], Postgraduate student;

G. Yu. Berezkina[2] ✉, Doctor of Agricultural Sciences, Associate Professor, https://orcid.org/0000-0002-5704-5571;

Yu. V. Isupova[3], Candidate of Agricultural Sciences, Associate Professor, https://orcid.org/0000-0003-3753-3188;

R. R. Zakirova[4], Candidate of Agricultural Sciences, Associate Professor
[1,2,3]Udmurt State Agricultural University, 11 Studencheskaya St., Izhevsk, Russia, 426069
[4]Udmurt State University, 1 Universitetskaya St., Izhevsk, Russia, 426034
✉g-berezkina@mail.ru

Original article
DOI 10.48012/1817-5457_2024_1_64-72

DEGREE OF ACTIVATION OF NATURAL MECHANISMS OF HUMORAL AND CELLULAR DEFENSE BY BEE PRODUCTS IN BIRDS CANDIDAMYCOSIS

Ramziya T. Mannapova[1] ✉, Dmitriy V. Svistunov[2], Rustem R. Shaykhulov[3]
[1,2,3]Russian State Agrarian University – Timiryazev Moscow Agricultural Academy, Moscow, Russia
[3]Bashkir State Pedagogical University n.a. M. Akmulla, Ufa, Russia
[1]ram.mannapova55@mail.ru

Abstract. The incidence of candidamycosis of the avian digestive tract (CDT) is infrequent. They occur unexpectedly, but the mortality rate in young animals reaches up to 95–100 %. The aim of the work was to study the degree of formation and development of natural immune defense mechanisms under the influence of biologically active bee products and the nature of restoration of the birds digestive tract during the candidamycosis. The object of the study was Japanese meat quails from 10 to 90 days of age. The application of extracts of wax moth, bee drone homogenate and propolis contributed to an increase in the activity of the genetic capabilities of the natural humoral and cellular of immunity in healthy quails and during CDT. An increase in the lysozyme activity of blood serum under the influence of extracts of wax moth, bee drone homogenate and propolis was found to be maximum, within the limits of physiological values, in healthy quails by 1.65; 3.44 and 2.13 times, in sick birds with CDT – 3.44; 5.38 and 4.93 times. The activation of bactericidal activity of blood serum increased in healthy birds – by 1.40; 1.98 and 1.92 times, in sick birds with CDT – 2.18; 2.84 and 2.28 times; phagocytic activity of alveolar macrophages increased in healthy quails by 1.23; 1.38 and 1.31 times, in sick birds with CDT – 1.85; 2.67 and 1.88 times. The extract of bee drone homogenate has more significant immune-stimulating properties, followed by propolis, and the extract of wax moth is not significantly inferior to them.

Key words: extract, wax moth, drone homogenate, propolis, natural resistance, alveolar macrophages, phagocytosis.

For citation: Mannapova R. T., Svistunov D. V., Shaikhulov R. R. Degree of activation of natural mechanisms of humoral and cellular defense by bee products in birds candidamycosis. The Bulletin of Izhevsk State Agricultural Academy. 2024; 1(77): 64-72 (In Russ.). https://doi.org/10.48012/1817-5457_2024_1_64-72.

Authors:

R. T. Mannapova[1] ✉, Doctor of Biological Sciences, Professor, https://orcid.org/0000-0002-9092-9862;

D. V. Svistunov[2], Postgraduate student, https://orcid.org/0009-0008-4277-9709;

R. R. Shaikhulov[3], Doctoral candidate, Candidate of Biological Sciences, Senior Researcher, https://orcid.org/0009-0001-6085-0811

[1,2,3]Russian State Agrarian University – Moscow Timiryazev Agricultural Academy, 49 Timiryazevskaya St., Moscow, Russia, 127434

[3]Bashkir State Pedagogical University named after K. Akmulla, 3-a Oktyabrskoy revolutsiy St., Ufa, Russia,450008

[1]ram.mannapova55@mail.ru

Original article
DOI 10.48012/1817-5457_2024_1_72-78

DETERMINATION OF EFFICIENCY LEVEL OF BIOCIDAL AGENTS IMPACT ON BIOFILM WITH HIGH DEGREE OF CONTAMINATION OF DAIRY EQUIPMENT

Ekaterina A. Mikheeva[1] ✉, Konstantin L. Shklyaev[2], Alexander V. Shishkin[3], Evgeny V. Kurteev[4], Artem L. Shklyaev[5]

[1,2,5]Udmurt State Agricultural University, Izhevsk, Russia

[1,3,4]Production company Izhsintez-Khimprom, Izhevsk, Russia

[1]mikhkatia@yandex.ru

Abstract. One of the main factors of effective washing and disinfection of equipment at processing plants is the rational choice of detergents and disinfectants that provide not only an effective impact on the microflora, but also the most complete removal of protein and fat depositions from the treated surfaces. One of the problems of the production process is the formation of microbial biofilms on abiotic surfaces of equipment. It is reasonable to use wetting agents, surface active agents and complexons in the composition of disinfectants for the effective destruction of biofilms. However, it is necessary to take into account that not all disinfectants can be used for cleaning dairy equipment due to their toxicity. The aim of the work was to determine the efficiency level of the impact of certain biocidal agents on the biofilm with a high degree of contamination of dairy equipment. The biofilm was grown on 10×10 cm stainless steel plates using microflora taken from existing dairy equipment and milk, which ensured a high degree of contamination of the prototypes. Disinfection of the plates was carried out by immersion in a working disinfectant solution at a temperature of 26 °C for 15 min. without pre-washing, followed by rinsing under running tap water. A number of products manufactured by Izhsintez Khimprom were used as disinfectants in various concentrations. To determine the disinfection effectiveness the flushes from the surface of the plates and meat-and-peptone agar plating were carried out. According to the results of the study, preparations containing sodium hypochlorite and alkali, as well as glutaraldehyde in combination with quaternary ammonium compounds revealed the best effectiveness. The peroxide of hydrogen with peracetic acid showed an effect at mass concentrations of 1.33 % and 0.67 % of the solution by the medium. Such concentrations of solutions can be used for “shock” washing of heavily contaminated equipment and surfaces. Mixtures of acids, alkaline agents with quaternary ammonium compounds (without other active components) did not give the expected result.

Key words: biofilm, dairy equipment, disinfectants.

For citation: Mikheeva E. A., Shklyaev K. L., Shishkin A. V., Kurteev E. V., Shklyaev A. L. Determination of efficiency level of biocidal agents impact on biofilm with high degree of contamination of dairy equipment. The Bulletin of Izhevsk State Agricultural Academy. 2024; 1(77): 72-78. (In Russ.). https://doi.org/10.48012/1817-5457_2024_1_72-78.

Authors:

E. A. Mikheeva[1] ✉, Candidate of Veterinary Sciences, Associate Professor, microbiologist engineer, https://orcid.org/0000-0002-9274-5856;

K. L. Shklyaev[2], Candidate of Technical Sciences, Associate Professor, https://orcid.org/0000-0003-2458-7267;

A. V. Shishkin[3], Doctor of Medical Sciences, Leading chemical developer, https://orcid.org/0000-0001-9720-5042;

E. V. Kurteev[4], Leading process engineer;

A. L. Shklyaev[5], Candidate of Technical Sciences, Associate Professor, https://orcid.org/0000-0001-5531-1859

[1,2,5]Udmurt State Agricultural University, 11 Studencheskaya St., Izhevsk, Russia, 426069

[1,3,4]Production Company Izhsintez-Khimprom, 2 Ordzhonikidze St., Izhevsk, Russia, 426063

[1]mikhkatia@yandex.ru

Original article
DOI 10.48012/1817-5457_2024_1_79-85

TECHNOLOGICAL PROCESS OF SYNTHESIS OF ANTIFRICTION COATINGS USING THE FABO METHOD AND ANALYSIS OF COATING PROPERTIES

Alexey G. Ipatov✉, Sergey N. Shmykov, Vladimir I. Shirobokov
Udmurt State Agricultural University, Izhevsk, Russia
✉Ipatow.al@yandex.ru

Abstract. The work proposes an original technological process for obtaining an anti-friction coating using the technology of finishing antifriction abrasive-free treatment (FABO). A brass rod LS-59-1 is used as an additive material to form an antifriction coating. To implement the technology for synthesizing an antifriction coating using the FABO method, based on preliminary empirical data, kinematic modes and the force of pressing the filler material to the surface of the product were obtained. To increase the efficiency of forming an antifriction coating, a technological medium based on glycerin and 10% hydrochloric acid was proposed. The technology for the synthesis of antifriction coating is implemented on the basis of selective transfer with a wear-free effect. The coatings were obtained in laboratory conditions. For this purpose, a laboratory installation has been developed that provides fixation of the filler material to the surface of the steel product with a mechanism for changing the force of pressing the brass rod to the surface of the sample. The resulting laboratory samples were subjected to tribological studies in comparison with standard antifriction alloys. To determine the phase composition, X-ray diffraction studies were performed. X-ray diffraction studies of laboratory samples showed the presence of iron and copper components in the synthesized coating. The oxide content on the coating surface is insignificant, the internal structure is dense with no visible porosity. The coating consists of 95% copper; the synthesis process occurs without oxidation, which gives the coating high adhesive and cohesive strength. The thickness of the coating is uniform and ranges from 3 to 5 microns. Comparative tribological studies have shown high resistance to wear and seizure of contacting surfaces under oil starvation conditions. The friction coefficient is stable and low and ranges from 0.08 to 0.15.

Key words: wear resistance, brass plating, FABO, low coefficient of friction, wear-free effect.

For citation: Ipatov A. G., Shmykov S. N., Shirobokov V. I. Technological process of synthesis of anti-friction coatings using the FABO method and analysis of coating properties. The Bulletin of Izhevsk State Agricultural Academy. 2024; 1(77): 79-85. (In Russ.). https://doi.org/10.48012/1817-5457_2024_1_79-85.

Authors:

A. G. Ipatov✉, Candidate of Technical Sciences, Associate Professor, https://orcid.org/0000-0003-2637-4214;

S. N. Shmykov, Candidate of Economic Sciences, Associate Professor, https://orcid.org/0000-0002-2103-8695;

V. I. Shirobokov, Candidate of Technical Sciences, Associate Professor, https://orcid.org/0000-0002-5091-1190

Udmurt State Agricultural University, 9 Studencheskaya St., Izhevsk, Russia, 426069
✉Ipatow.al@yandex.ru

Original article
DOI 10.48012/1817-5457_2024_1_86-91

INVESTIGATION OF THE FIELD MICRORELIEF DURING POTATO HARVESTING

Vladimir F. Pervushin✉, Alexey G. Ivanov, Alexander V. Kostin,
Marat Z. Salimzyanov, Vladimir I. Shirobokov
Udmurt State Agricultural University, Izhevsk, Russia
✉pervushin54@mail.ru

Abstract. The existing technical means for profiling the soil surface have a number of drawbacks: they are not suitable for studying its microrelief, they do not provide sufficient measurement accuracy, they are poorly adapted for working in the field. In this regard, the purpose of the work was to study the microrelief of a row of a potato field according to the parameters of the height of the ridge and the size of the inter-rows in an unlimited area, as well as the nature of its change directly during the movement of the top harvesting machine. To study the field microrelief in an unlimited area, a profiler was developed and manufactured, providing continuous copying of a row of potatoes, recording not only the magnitude, but also the nature of the change in the height of the ridge relatively to the support-copying wheel of the top harvester. The profiler can also be used to profile the field microrelief when working with other agricultural machines, for example, for foraging (segment-finger and rotary mowers). The article notes that the main parameters of the transverse microrelief of the field are the size of the inter-row and the ridge height of the row of the potato field. Cross-profiling is made at the distance corresponding to the width of grip of a potato haulm chopper. The results of the study established the average height of the ridge, width along the top and base of the ridge and their standard deviations. The average height of the ridge was 18.1 cm, and its deviation σ_H = 2.4 cm on potato plantings with inter-row value B = 0.70 m. The length of the cutter knives is established by the ridge height and the inter-row value, and also their minimum distance above the surface of the ridge which is equal to the three-time standard deviation ($h = 3\sigma_H$) so that the working tools do not touch the soil surface.

Key words: profiler, potato haulm chopper, potato field, ridge height, inter-row size.

For citation: Pervushin V. F., Ivanov A. G., Kostin A. V., Salimzyanov M. Z., Shirobokov V. I. Investigation of the field microrelief during potato harvesting. The Bulletin of Izhevsk State Agricultural Academy. 2024; 1(77): 86-91. (In Russ.). https://doi.org/10.48012/1817-5457_2024_1_86-91.

Authors:

V. F. Pervushin✉, Doctor of Technical Sciences, Professor, https://orcid.org/0000-0003-0572-2080;

A. G. Ivanov, Candidate of Technical Sciences, Associate Professor, https://orcid.org/0000-0001-7111-7642;

A. V. Kostin, Candidate of Technical Sciences, Associate Professor, https://orcid.org/0000-0002-0589-3448;

M. Z. Salimzyanov, Candidate of Technical Sciences, Associate Professor, https://orcid.org/0000-0002-0877-4372;

V. I. Shirobokov, Candidate of Technical Sciences, Associate Professor, https://orcid.org/0000-0002-5091-1190

Udmurt State Agricultural University, 9 Studencheskaya St., Izhevsk, Russia, 426069

✉pervushin54@mail.ru