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### AGRICULTURAL SCIENCE

*Konovalov M. P., Bolgov A. E.*

#### BREEDING QUALITY ASSESSMENT OF AISHIRSKY BULLS

*Summary:* The article presents assessment results on the breeding value of Aishirsky bulls. Assessments were carried out by two methods – transmitting ability, differences between indexes of daughters and their herdmates. A group of bulls with high breeding qualities was identified. The milk yield volumes define high compatibility of the two methods of bulls' breeding assessment. Low connection between methods is defined by the level of fat in the milk. It is noted that transmission ability indexes can be viewed as additional criterion for the evaluation of the servicing bulls' breeding value.

*Key words:* Breeding value, transmission ability, correlation, parameters of milk production . . . . . 55

*Egorov A. A., Burtsev D. S., Orlova L. V., Nikolaeva M. A.*

#### PRODUCTIVITY OF SPECIES AND INTRASPECIFIC TAXA OF *PICEA ABIES*, *P. FENNICA*, *P. OBOVATA* IN GEOGRAPHICAL CULTURES OF NORTHWESTERN RUSSIA

*Summary:* Assessment of taxonomic diversity and productivity of spruce plantations grown from seeds of different origin in Tosnensky district of Leningradsky region was carried out. Correlation for productivity and taxonomic affiliation of Siberian spruce, diversity of European spruce, and forms of the Finish spruce was established. The influence of the crown branching on taxation parameters was studied.

*Key words:* Introduction, spruce plantations, productivity, *P. abies*, *P. fennica*, *P. obovata*, taxa spruce . . . . . 59

*Nikiforov A. A., Zhukova A. I.*

#### GIS BASED PRODUCTIVITY CALCULATION AND SPATIAL ANALYSIS OF MUSHROOM GROWING SITES (CASE STUDY OF LESINSKII SCIENTIFIC-EXPERIMENTAL FORESTRY)

*Summary:* GIS technologies are instrumental in collection, storage, analysis, and geographic data visualization of mushroom growing sites located on the territory of Lesinskii scientific-experimental forestry. The analysis of the main types of mushroom growing sites in the existing types of forests is carried out.

*Key words:* Geoinformation systems, forest resources, mushrooms . . . . . 64

*Trishkin M. N., Lopatin E. V., Gavrilova O. I.*

#### ASSESSMENT OF SUSTAINABLE FOREST MANAGEMENT PRACTICES BASED ON EXPLORATION DATA ANALYSIS

*Summary:* The purpose of the study is to assess and test sustainable forest management practices on the territory of Russia. The sustainability criteria were identified based on the principles and criteria of the Russian Federal standards of the Forest Stewardship Counsel (FSC). 1/3 of the standard indicators can be assessed with the help of the remote sensing technique.

*Key words:* Sustainable management, forestry, remote sensing technique, forest certification . . . . . 70

*Cherkashina A. I.*

#### INFORMATION SUPPORT IN REGIONAL LAND MANAGEMENT AND INVENTORY ACTIVITIES

*Summary:* The article deals with the content of the information support for land use planning and cadastral activity. Effectiveness of the information technologies in the process of land management and cadastral activities are shown.

*Key words:* Cadastral activities, cadastral works, land management software, information, communication technology . . . . . 74

### ENGINEERING SCIENCE

*Gerasimov Yu. Yu., Seliverstov A. A., Sukhanov Yu. V., Syuney V. S.*

#### MAJOR FACTORS INFLUENCING PRODUCTION PLANNING OF WOOD FUELS FROM WOODY BIOMASS

*Summary:* The main and most important factors influencing the design of the technological process of woody biomass harvesting and wood fuel production are considered in the article. They are production costs, quality of wood chips, human factors, interaction of machines in the technological chain, and ecological factors.

*Key words:* Bioenergy, logging byproducts, low-grade wood, small-sized trees, stumps and roots, chip fuel . . . . . 77

*Galaktionov O. N., Kuznetsov A. V.*

#### STRUCTURE OF FOREST TRANSPORTATION ROUTES IN CORRELATION WITH FOREST TYPES

*Summary:* The article presents a method instrumental in calculation of the wood wastes volume required for the construction of skid roads. The formation of the logging area in the process of harvesting, depending on the forest type and conditions of its habitat are taken into account.

*Key words:* Forest machines, bearing capacity of soils, skid road, wood types, wood biomass . . . . . 81

*Krupko A. M., Belyi E. K.*

#### MATHEMATICAL MODEL OF VEHICLE FLEET CAPACITY MANAGEMENT

*Summary:* The article proposes a mathematical model instrumental in management of the vehicle fleet productive capacity with due account for seasonal factors.

*Key words:* Mathematical model, motor car park, productive capacity . . . . . 85

*Panov N. G., Rozhkov S. S., Pitukhin A. V.*

#### WATER RESISTANCE INCREASE IN THREE-PLY PARTICLEBOARDS BASED ON CARBAMIDE-FORMALDEGYDE RESIN RESULTING FROM INJECTION OF NANOSTRUCTURED SCHUNGITE FILLER INTO ADHESIVE

*Summary:* The article presents the research results on the influence of nanosized schungite filler modifying the adhesive based on carbamide-formaldehyde resin and tests results on three-ply particleboards manufactured with the use of carbamide-formaldehyde resin. The tests results on water resistance (swelling and water absorption) and on physical and mechanical properties are presented.

*Key words:* Wood-chip boards, nanosized schungite filler, physical and mechanical properties . . . . . 88

*Shapiro V. J., Grigor'ev I. V., Gul'ko A. E.*

#### CALCULATION METHOD ANALYSIS AND SUBSTANTIATION OF MATHEMATICAL MODEL OF BARK DESTRUCTION FOR GROUP DEBARKING

*Summary:* The article provides analysis of the results on debarking process modeling in drums. Possible ways of refinement of the mathematical model of the process are specified.

*Key words:* Debarking, shock interaction, group debarking, friction debarking . . . . . 92

*Shilovsky V. N., Kil'pelyaynen S. A., Kyal'viyaynen V. A.*

#### ON ESTIMATION METHODS OF WORKABILITY MAINTENANCE OF LOGGING MACHINES

*Summary:* The article is concerned with the estimation methods of the logging machines' workability. The troubleshooting technique is offered; the regression equation for calculation of operational labor intensity needed for maintenance is received; the method of the value analysis is considered.

*Key words:* Workability, average time for troubleshooting, correlation, labor intensity of maintenance, function cost, production cost . . . 97

*Vasil'ev V. V.*

#### PERFORMANCE INDICATORS OF RAFT SECTIONS WITH STABILIZED BUOYANCY

*Summary:* Correlation indicators for the calculation of performance indicators for raft sections with stabilized buoyancy are shown: buoyancy reserve coefficient and draft. In raft sections with stabilized buoyancy intensity of water absorption by timber does not influence the draft of the raft section, while at the same time, the coefficient of raft section density helps to reduce the draft.

*Key words:* Raft section, coefficient of raft section density, draft, buoyancy stabilization, flexible waterproof material . . . . . 100

### PHYSICS AND MATHEMATICS

*Zaika Yu. V., Kostikova E. K.*

#### PARAMETRIC IDENTIFICATION OF THERMAL DESORPTION MODEL OF HYDROGEN

*Summary:* Degassing of the plate saturated with hydrogen is considered. The experiment is based on the thermal desorption spectrometry method. The model is a boundary-value problem with nonlinear boundary conditions. The main physical and chemical processes, such as diffusion and desorption, are taken into account. The parameters assessment method based on measurement results and numerical simulation results are presented.

*Key words:* Hydrogen permeability, nonlinear boundary-value problems, parameters' identification . . . . . 103

*Sidorov Yu. V., Kirikov P. V., Rogov A. A.*

#### COMPARISON DENDROGRAMS WITH EQUAL NUMBERS OF NODES

*Summary:* The article describes probabilistic approach to comparing the distances between dendrograms with equal numbers of nodes based on a number of classical metrics.

*Key words:* Distance between dendrograms, probabilistic approach, distance comparison . . . . . 108

*Pechnikov A. A., Chirkov A. V., Chuiko Yu. V.*

#### RESEARCH OF SCIENTIFIC AND EDUCATIONAL WEB CONNECTIVITY

*Summary:* The paper presents the study of the academic and university web-subsets connectivity. We determine and analyze the structure of connections inside and between web-subsets and estimate the connectivity degree and subsets' influence on it.

*Key words:* Webometrics, web-graph, reliable connectivity component . . . . . 111

*Aleshina L. A., Lyukhanova I. V., Budaeva V. V., Zolotukhin V. N., Mitrofanov R. Y., Sakovich G. V.*

#### RESULTS OF X-RAY STUDIES OF NON-WOOD CELLULOSE

*Summary:* The structure of Chinese miscanthus and oat hulls cellulose samples were studied by x-ray scattering. The crystallinity of the cellulose was determined by the Ruland method, and the sizes of the cellulose crystallites were calculated by the Scherrer equation. The unit cell parameters were refined by the full-profile analysis. It was determined that the method of producing cellulose from the untreated samples does not have any significant impact on the atomic structure of the derived cellulose.

*Key words:* Cellulose, x-ray studies, sodium hydroxide delignification, miscanthus, oat hulls . . . . . 114

*Pergament A. L., Boldin P. A., Kolchigin V. V., Stefanovich T. G.*

#### BI-STABLE SWITCHING AND MEMORY EFFECTS IN OXIDES OF TRANSITION METALS

*Summary:* The article is concerned with the current problems of oxide electronics. The research results on electrophysical properties and switching effects in thin-film structures based on transition of metal oxides are presented. It is shown that V and Nb oxide structures are instrumental in the development of new memory elements.

*Key words:* Switching effect, memory, transition metal oxides . . . . . 118

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