FEDERAL AGENCY OF EDUCATION
BULLETIN OF TOMSK STATE UNIVERSITY. BIOLOGY
SCIENTIFIC JOURNAL
Certification of registration: PI № FS 77-29499 of September 27, 2007

ANNOTATIONS

BIOTECHNOLOGY

Alekseeva Tatiana P., Burmistrova Tatiana I., Stakhina Larisa D., Tereschenko Natalia N. *Siberian Scientific Research Institute of Agriculture and Peat of SB RAA, Tomsk, Russia; Institute of Petroleum Chemistry SB RAS, Tomsk, Russia; The Department of Agricultural Biotechnology, Biological Institute of Tomsk State University, Tomsk, Russia.* **PEAT-BASED AMELIORANTS FOR PURIFICATION OF SOIL FROM OIL POLLUTANTS.** Laboratory trials revealed that the ameliorants which contain the peat and nitrogen and phosphorus fertilizers are able due to active stimulation of microflora to increase the rate of decomposition of oil in soil by 1,5–2 times. The influence of carbamide and ammonia nitrate contents and their ratios to others components on the rate of destruction of oil pollutants in soil have been studied.

Key words: crude oil; soil; peat; ameliorant; ferments; microorganisms.

Golovatskaya Irina F., Karnachuk Raisa A. *The Department of Plant Physiology & Biotechnology, Biological Institute of Tomsk State University, Tomsk, Russia.* **THE EFFECT OF BRASSINOLIDE ON ARABIDOPSIS SEEDLINGS GROWTH AND HORMONAL BALANCE UNDER GREEN LIGHT.** Studied the effects of brassinolide (BL) and green light (GL) on the content of endogenous phytohormones (IAA, cytokinins, and ABA) and morphogenesis of 7-day-old *Arabidopsis thaliana* (L.) Heynh seedlings of wild type (Col) and its det2 mutant with disturbed synthesis of brassinosteroids. In darkness the mutant det2 contained considerably less free IAA and both forms of ABA, but much more cytokinins (zeatin and zeatin riboside) and bound IAA, as compared to the wild-type seedlings. Level of free ABA and area of cotyledon increased under action of factors GL+BL. The conclusion is that green light and brassinolide signals interact in the control of the cotyledon growth in A. thaliana seedlings.

Key words: *Arabidopsis thaliana* (L.) Heynh.; photomorphogenesis; green light; brassinolide; IAA; zeatin; zeatin riboside; ABA.

Salamatova Julia A., Minaeva Oksana M., Akimova Elena E. *The Department of Agricultural Biotechnology, Biological Institute of Tomsk State University, Tomsk, Russia; The Laboratory of Biokinetics and Biotechnology, Research Institute of Biology and Biophysics of Tomsk State University, Tomsk, Russia.* **EFFECTIVENESS OF STORING SOME BACTERIAL PREPARATIONS IN LIQUID FORM.** One of the most dynamically developing directions of agrobiotechnology is creation and usage of complex action biopreparations on the basis of microorganisms enriching root nutrition of plants, stimulating their growth and protecting them from diseases and pests. The most widespread group of biopreparation microorganism agents are *Pseudomonas.*

The modern market presents a number of preparative forms, a liquid one being the most widespread.

In laboratory experiments dynamics of the number of agents and biological effectiveness of some biological preparations in liquid form on the basis of pseudomonades was evaluated for a period of 6 months. During the experiment agent titer decreasing was observed, however complete death of bacteria was not the case. Bacteria titer decreasing is connected not so much with the depletion in the energetic substrate medium and accumulation of cell exchange product as with oxygen supply limitation in the biopreparation packing. Despite bacterial titer falling biological effectiveness of the majority of biopreparations, fungistatic in particular, not only maintained at a high level but continued growing during almost all storage life. It is shown that in the dynamics of biological effectiveness of preparations a great role is played by secondary bacteria metabolites whose concentration is maximum in stationary phase of culture development and it can increase in destruction phase if these metabolites are not substrates for microbes themselves.

Key words: agrobiotechnology; biological activity of biopreparations; biofungicide; *Pseudomonas;* biopreparation storage.

ZOOLOGY

Konusova Olga L., Pogorelov Yuri L., Ostroverkhova NadezdaV., Rasseykina Svetlana A., Nechipurenko Anastasia O., Vorotov Aleksandr A., Klimova Elena A., Prokopjev Aleksey S. *The Department of Invertebrate Zoology, Biological Institute of Tomsk State University, Tomsk, Russia; Siberian Botanical Garden of Tomsk State University, Tomsk, Russia.* **BIOLOGICAL AND BUSINESS ASSESSMENT OF HONEY BEE COLONIES (*APIS MELLIFERA L.*) IN SOME AREAS OF THE TOMSK REGION.** One of critical goals of today's bee-farming is to increase efficiency of bee colonies, as their main features are winter survival and honey productivity. In order to achieve this goal, it is necessary to conduct biological and business assessment of honey bee colonies, identification of purebred bee colonies and breeding of high-productive queens. In order to examine honey bee strains and locate reservation areas of dark forest bees, we studied basic exterior traits of bees from farms located in several areas of Tomsk. In integrated assessment of bee colonies the study took into account economically important features and the morphological features that show bee strain belonging.

Bees with the Mid-Russia bee's features were only found in the south of the oblast. Average values of morphological features (cubital index and proboscis length) are as follows: 62,29±1,33% and 6,05±0,05 mm in the Dubrovka village; 58,21±1,86% and 5,76±0,08 mm in the vicinity of the Kornilovo village; 59,80±1,40% and 5,69±0,01 mm respectively around the station «41 km». The short proboscis is a distinctive feature of bees in the Tomsk Oblast. It is typical of species with the Mid-Russia bee's features, as well as mongrel bees.

Economically important features of bees such as production of honey, winter survival and swarming were studied at bee farms in the Podgornoe village (Chainsky District) and the Kornilovo village (Tomsk District). In Podgornoe the integrated assessment revealed a bee colony suitable for breeding. The research demonstrated the influence of meteorological conditions and colony strength on honey yield. It is intended to

cultivate purebred Mid-Russia bees that are suitable for natural conditions of Siberia, which will increase bee-farming efficiency.

Key words: honey bee; *Apis mellifera L.;* Tomsk region.

Ravkin Yuri S., Bogomolova Irina N., Moskvitina Nina S. *Institute of Animal Systematics and Ecology SB RAS, Novosibirsk, Russia; Biological Institute of Tomsk State University, Tomsk, Russia.* **CLASSIFICATIONAL DIFFERENCES OF SMALL MAMMALS COMMUNITIES OF WESTERN SIBERIA.** Classifications of the small mammal communities flat and mountain parts of Western Siberia by results of the accounts, preliminary average on vegetation map portions, to their groups and the parameters transformed into shares of variety coefficients are made and analysed. The small mammal communities are less mosaic, than amphibious and reptiles, but are multiple continuous, than birds. Thus penetration of the small mammal communities of different type does not go like displacement of borders in relation to zonal and subzonal boundaries like birds, but wide tongues. First of all, similar interpenetrations dominate in forest-tundra and northern taiga where some communities concern to forest-tundra type, others to wood. Also it is peculiar for forest-steppe at the expense of wood and meadow-steppe interpenetration. Thus the wood type grasps significant amount of mosaic and open habitats with sufficient humidifying. Besides the forest-tundra, wood and meadow-steppe communities penetrate on mountain lands not only on landscape analogues, but also inclusions of other habitats. Thus, heterogeneity of the small mammal communities is defined by macro-specificity of environment, it means they are distributed less precisely, than birds, but it is more natural in the landscape plan, than poikilothermal animals, localness of their distribution is very great, their abundance is less homogeneous, than birds and small mammals.

Key words: small mammals; communities; structure; classification; Western Siberia; biodiversity.

SOIL SCIENCE AND FORESTRY

Vasilieva Galina V., Zhuk Eugenia A., Popov Aleksandr G. *Institute for Monitoring of Climatical and Ecological Systems SB RAS (IMCES SB RAS), Tomsk, Russia.* **FLOWERING PHENOLOGY OF THE SIBERIAN STONE PINE (*PINUS SIBIRICA* DU TOUR), JAPANESE STONE PINE (*PINUS PUMILA* (PALL.) REGEL.) AND THEIR HYBRIDS.** Male and female cones development was studied to assess an opportunity of phenological isolation of hybrids between Siberian stone pine and Japanese stone pine from their parental species. Subject was vegetative progeny of Siberian stone pine, Japanese stone pine and hybrids grown under the same plantation conditions. Phenological observations were carried out from 2005 to 2007 y. during the whole flowering period. The development of Siberian stone pine female cones has three main stages, namely compact bud, flower bud and open cone. Eight phenological phases that characterized by physiological and morphological changes and receptivity to pollen were observed during open cone stage. Times of pollination start, peak and finish were registered. Flowering period continued about 10–15 days. Species have significantly different times of phenological phases and hybrids were intermediate. There is range of phenological phase times within each species and hybrids. All female cone phenological phases of Siberian stone pine started on average 5 days

earlier than those of Japanese stone pine. Although hybrids were intermediate between species they were obviously close to Japanese stone pine. Phenological phases of hybrids and Japanese stone pine partially overlapped during almost whole flowering period. Time interval between receptivity phases of Siberian stone pine and hybrids was on average 4 days. Time interval between pollen release peak of Siberian stone pine and hybrids was 2–3 days. There is no complete phenological isolation both between hybrids and parental species and between parental species. Nevertheless, the opportunity of reproductive isolation due to another inner ways is not excluded.

Key words: Siberian stone pine; *Pinus sibirica; Pinus pumila*; Japanese stone pine; natural hybrids; flowering phenology.

Danchenko Anatoly M., Beh Joseph A. *Biological Institute of Tomsk State University, Tomsk, Russia; Institute for Monitoring of Climatical and Ecological Systems SB RAS (IMCES SB RAS), Tomsk, Russia*.

Nikolaeva Svetlana A., Klimova N.V. *Institute for Monitoring of Climatical and Ecological Systems SB RAS (IMCES SB RAS), Tomsk, Russia.* **SEASONAL DYNAMICS OF HERBACEOUS STOREY IN DECIDUOUS-PINE COMMUNITIES OF FORESTS NEAR TOMSK.** During the growing season the parameters of the herbaceous storey in the deciduous-pine communities of the forests near Tomsk (West Siberia, Russia) increase, become maximum for some period of time, and then increase. The maximum of the number of flowing species is first (June), of cover is second (the first decade of June – the first half of July), and of height (mid-June–mid-August) is third in the herbaceous storey. This time sequence of development of the storey is because of prevailing the flowering species in late spring and early summer and biomass of the mid- and the late-summer flowering species. Parameters of all forest storeys change synchronously during three periods in the seasonal dynamics of the herbaceous storey. The differences in this dynamics are during early and late growing season. The effect of weather on the dynamics is more significantly. Changes of form of the flowering curves, cover and height and duration of some portions of these curves demonstrate this effect.

Key words*:* the herbaceous storey; seasonal dynamics; deciduous-pine communities.

Panevin Valentin S., Debkov Nikita M. *Biological Institute of Tomsk State University, Tomsk, Russia.* **NEED OF THE SCIENTIFIC STUDIES IN PLANTINGS, FORMED FROM PRESERVED UNDERGROWTH.** The Conservation undergrowth economic-valuable stocks at lumbering, at this moment, is one of the effective measures of the assistance of the natural renewal, in taiga chiefly. In presented article is motivated need of the scientific studies in plantings, formed on overcast slashes from preserved undergrowth, which only within taiga of the champaign part West Siberia more than 0,5 million hectare. They are also offered main trends of such studies, having big practical importance both in the purview of reforestation, and lumbering.

Key words: plantings from undergrowth; structure of forests; timber's forests.

Chitorkin Vladimir V., Chitorkina Olga Yu. *Institute for Monitoring of Climatical and Ecological Systems SB RAS (IMCES SB RAS), Tomsk, Russia.* **REFORESTATION ON FELLED AREAS OF DARK CONIFEROUS SIBERIAN STONE PINE FORESTS IN THE SOUTHERN SUBZONE OF TAIGA IN WEST**

SIBERIA. Reforestation on felled areas of dark coniferous Siberian stone pine forests in the southern subzone of taiga in West Siberia is successful and satisfactory. Differentiation of regeneration on tree story and undergrowth is finished in 30 years after cutting. The dark coniferous with Siberian stone pine and deciduous stands are formed depending on disturbance of site and undergrowth preservation.

Key words: reforestation; secondary stands; potential Siberian stone pine forests.

AGRICULTURE

Babenko Andrey S., Wang Jianing. *Biological Institute of Tomsk State University, Tomsk, Russia; Biology Research Institute of Shan Dong Academy of Science, Shan Dong Province, China.* **THE PROSPECTS OF VERMIN-COMPOST USING IN PLANT PROTECTION.** The review of scientific research concerning vermin-compost using as a suppressor of pests, nematodes and diseases are presented. It is well-known that production of biological pesticides increased significantly last years, but in Russia there is a serious shortage of biological pesticides among others. There is a lot of information about using bio-organic fertilizer produced by some species of earthworms for agricultural purposes. Vermin-compost is very rich in soil micro-flora, which in the case of exhausted soil restores natural biological processes. Vermin-composts usually support a much greater variety and size of microbial communities than others composts, hence they probably have a much greater potential for general pathogen suppression based on microbial competition.

On vermin-compost application the agricultural crops productivity increases 30–70%. Also it has the capacity to speed up the germination and the development of different agricultural crops and ensures their protection against diseases and pests. There are some experimental evidence that vermin-compost suppressed attacks by some soil-borne plant diseases, such as *Pythium*, *Fusarium* and *Phytophthora*. There are also a few reports of suppression of soil-borne pathogens such as *Plasmodiophora brassicae*, *Phytophthora nicotianae*, *Fusarium lycopersici*, *F. oxysporium* and *Rhizoctonia solani* by vermin-composts. The possibilities of vermin-compost application in the integrate pest and plant diseases management are discussed.

Key words: plant diseases; vermin-compost; agricultural crops.

Borilo Galina A., Sibagatov Viktor A., Semyonov Sergei Yu., Minaeva Oksana M., Akimova Elena E., Pisarchuk Anna D. *Research Institute of Biology and Biophysics of Tomsk State University, Tomsk, Russia; Tomsk Agriculture Technique, Tomsk, Russia; The Department of Agricultural Biotechnology, Biological Institute of Tomsk State University, Tomsk, Russia.* **EFFECTIVENESS OF USING ACETIC AND CITRIC ACIDS AND BAKING SODA TO CONSERVE WATER HYACINTHS WATER EXTRACT.** The studies examine the influence of acetic and citric acids and baking soda on the effectiveness of conserving eichhornia water extract. The effectiveness of conservation was estimated according to mass gain of laboratory mice held in vivarium and fed on preserved extract with their usual food at the rate of 0,3 ml of extract per an individual. The experiment lasted for one month, each variant including from 11 to 23 individuals. The results of the experiment were processed with the help of «STATISTICA 6.0» and are presented as an average with confidence interval subject to t-Student's test for 95% significance level ($p<0,05$)

The experiment data showed that most mice mass gain was when the diet of the animals was added with eichhornia water extract with acetic acid. Mass gain rate in this variant 30–50% exceeded control parameters. Other variants of the experiment did not show a significant increase in mass gain of the animals against the variants where the diet was added with preservative solutions without extract. Thus, it is suggested that 1% solution of acetic acid should be used to conserve water hyacinths water extract.

Visual analysis of mice viscera did not reveal pathological changes in any experimental group. Weight factors of inner organs (liver, spleen, intestine) were normal. Blood values (leukocytes, blood cells, hemoglobin amount) were normal and did not significantly differ from control group parameters in all groups during the experiment, which indicates the absence of discernible pathological changes in the organs of the animals after their being fed on plants extracts in used doses.

Key words: water hyacinth; feed production; extract; conservation

ECOLOGY

Volkova Irina I., Volkov Igor V., Kosykh Natalie P., Mironycheva-Tokareva Nina P., Kirpotina Lydia V., Zemtsov Valerie A, Kolmakova Maria V., Kouraev Aleksey V., Zakharova Elena A., Kirpotin Sergey N. *Biological Institute of Tomsk State University, Tomsk, Russia; Tomsk State Pedagogical University (Tomsk); Institute of Soil Science and Agrochemistry SB RAS, Novosibirsk, Russia*; *Universite de Toulouse; UPS (OMP-PCA), LEGOS, Toulouse, France*. **LAND ESHTYKYOL LAKE-MIRE SYSTEM (MOUNTAIN ALTAI).** The integrated landscape-environmental description of unique Eshtykyol lake-mire system of Mountain Altai (Altai Republic) is given. In particular, cryogenic and destruction-production processes are characterized, as well as hydrochemical parameters. High indication characteristics of the highlands frozen mound mires are indicated in terms of climatic changes. The common tendencies of cryogenic processes in the lowland part of subarctic region of Western Siberia and highlands of Altai, related to the recent climate changes, are revealed. It is shown that due to the compactness of highland mire systems thermokarst processes are more intensive there in comparison with the vast West-Siberian lowlands.

Key words: mountain mires, climate, thermokarst, production, carbon cycle.