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SEASONAL DYNAMICS OF BROADLEAVED FORESTS VEGETATION UNDER DIFFERENT CLIMATE REGIMES

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The aim of this work was to determine seasonal dynamics of the herbaceous vegetation in the deciduous forests and their relations with climatic factors. The object of the work was Kamsha zoological-botanical reserve situated near Kaunas. Investigations were done during vegetation periods in 1991, 2000, 2006 and 2006. The dates of phenological appearance and projection cover were recorded. The spectra of vegetation and flowering were made. The data on temperature and precipitation was analysed with the purpose to determinate the influence of climatic conditions on the growth and development of plants. It was determined, that vegetation of herbs started at the beginning of April (12th-13th week). Intensive vegetative development started at the 14th week in 1991 and 2007, and at 16th week in 2000 and 2006. In 2006 projection cover of herbs showed two picks – one in spring time and other in August. Projection cover in 2000 decreased during dry period in September. In the coldest spring (2006) flowering of herbs started two weeks later than in years of 1991 and 2000. In the warmest year (2007) flowering of herbs started two weeks earlier than in years of 1991 and 2000. In the warmest year (2007) foliation of trees started and completed 2 weeks earlier than in 2000 and 2006. In 1991 foliation of trees started 2 weeks later, but completed about at the same time like in 2000 and 2006. The majority of plants flowered in spring when trees were without leaves and light conditions were good.

THE PARTICULAR QUALITIES OF EMBRYOGENESIS AND ORGANOGENESIS FOR DIFFERENT GENOTYPES OF RED CLOVER IN VITRO

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Red clover is important forage in Latvia, and because of this it is important to research it more deeply and to complete the knowledge we have. One of the methods of research is observation of embryogenesis and organogenesis in tissue cultures. This method plays an important role in agriculture and its development, because when we use it, we are able to observe increased variability in a short period of time. It gives us an ability to create new sorts with the best requirements. The goal of this research is to understand embryogenesis and organogenesis principles, use their capacity, and create viable and more developed red clover embryos by using the method of tissue culture.

THE SCARABAEIDAE FAMILY (COLEOPTERA: SCARABAEIDAE) IN FAUNA OF LATVIA

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The Scarabaeidae family (Coleoptera: Scarabaeidae) is comparatively rich in species, nevertheless this family in Latvia is not investigated enough. There are 86 species of 37 genus and five tribes (Aphodiini, Psammodiini, Hopliinae, Cetiniinae, Trichiinae) found in Latvia. Some of these species (*Aphodius pictus* Sturm., *A. piceus* Gyll., *A. tomentosus* Müll., *A. obscurus* F., *A. scrofa* F., *A. melanostictus* Schm. etc.) are not noted in Latvia last 100 years, so they can be accounted only theoretically. Several scarabid species in Latvia are specially protected (*Osmoderma eremita* Scop., *Gnorimus nobilis* L. *Gnorimus variabilis* L., *Protaetia marmorata* F.) by Regulations of Cabinet of Ministers No. 396 "List of Specially Protected Species and Species with Exploitation Limits". From these *Osmoderma eremita* Scop., *Gnorimus nobilis* L. *Gnorimus variabilis* L. are species, which requires establishing of micro-reserves (Regulations of Cabinet of Ministers No. 45 "Establishment, Protection and Management of Micro-reserves"). Osmoderma eremita Scop. is included in II annex of Bern Convention and EU Species and Habitat directive (II, IV pielikums, 92/43/EEC) as well.

A. prodromus Brahm., *A. rufipes* L., *A. fimetarius* L., *A. fossor* L., *A.depressus* Kugel., *Serica brunnea* L., *Trichius fasciatus* Fabr., *Cetonia aurata* L. and other scarabid species are widespread in all territory of Latvia and in known localities are found in multitude.

Several scarabid species (*Maladera holosericea* Scop., *Rhyssemus germanus* L., *Polyphylla fullo* L. etc..) reach their limit of distribution area in Latvia, therefore are quite rare.

The genus *Aphodius* is richest in species in Scarabeidae family. There are 44 species represented of this genus in Latvia.

There are 1712 specimen of Scarabeidae family collected, processed and identified. Fifty four species from 21 genera are recognized in these findings and in beetle collection of Systematic Biology Institute of Daugavpils University.

Two of them are specially protected species (*Gnorimus nobilis* L., *Protaetia marmorata* Farb.). There are new locality found for one of these (*P.marmorata* Fabr.) – Aizkraukle district, Mazzalve municipality. The most representative in collection are *A.rufipes* L. (100 specimen), *Cetonia aurata* L. (65), *Serica brunnea* L. (61), *A.fimetarius* L. (54), rare are *Oryctes nasicornis* L. (21), *Copris lunaris* L. (7), *Polyphylla fullo* (1).

SMALL MAMMAL COMMUNITIES IN THE NORTHERN LITHUANIA

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Investigations were done in August – November 2008 in northern Lithuania, Kamanos strict nature reserve, Žagarė Regional Park and in seven other administrative districts. Small mammals were snap-trapped using standard lines of 25 snap traps. In total, 1187 small mammals of 13 species were trapped. Bank vole (*Myodes glareolus*) was dominant species – 28.9% of the total catch, yellow-necked mouse (*Apodemus flavicollis*) and striped field mouse (*Apodemus agrarius*) – subdominants, 20.0% and 15.3%, respectively. Rarest species, with less than 2% share were water shrew (*Neomys fodiens)*, house mouse (*Mus musculus*), pygmy field mouse (*Apodemus uralensis*), harvest mouse (*Micromys minutus*) and northern birch mouse (*Sicista betulina*). In forest and meadow habitats *M. glareolus* and *A. flavicollis* were dominating, 33% and 22% of total catch in mentioned habitats, while in agricultural habitats dominants were common vole (*Microtus arvalis*) and *A. agrarius* – 51% and 34%. All thirteen small mammal species were characteristic to forest and meadows habitats, but just six species were trapped in agricultural habitats. Pygmy field mice were recorded in Žagarė RP and Kamanos SNR only. Another rare species, northern birch mouse (*Sicista betulina*), was trapped in Rokiškis municipality, near the Juodupė village. Our data and literature sources show, that northern Lithuania is characterised by the presence of pygmy field mouse, and absence of the root vole (*Microtus oeconomus*) in the north-eastern part of Lithuania. We have no data if this species was ever found in Latvia, but in Ignalina NP surroundings *M. oeconomus* formed less than 0.3% of trapped small mammals and about 1% in Biržų Giria surroundings (Balčiauskienė, pers. com.).

MOLECULAR IDENTIFICATION OF DIFFERENT PATHOGENS IN *IXODES RICINUS* TICKS

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Ticks are blood feeding wide group of arthropods of utmost medical, epidemiological and veterinary significance throughout the world. They are obligatory external parasites and may bite people. Ticks of the *Ixodes ricinus* group transmit many clinically important pathogens like *Borrelia*, *Ehrlichia*/*Anaplasma* and *Babesia*. These parasites cause disease both in humans and animals. Lyme disease is commonly associated in Europe with three of *Borrelia burgdorferi* s.l. genospecies: *B. burgdorferi s.s., B. garinii* and *B. afzelii.* Human granulocytic ehrlichiosis agent (HGE) is pathogenic for human genospecies of genus *Ehrlichia*. Human babesiosis is caused by one of several *Babesia* species that have distinct geographic distributions based on the presence of competent hosts. Ticks may be infected with two or more infectious agents.
The purpose of this study was to determine the prevalence of Borrelia, Ehrlichia and Babesia parasites, dominant *B. burgdorferi* s.s genospecies and mixed infections in *I. ricinus* ticks collected in Lithuania.

Materials and methods. 243 I. ricinus ticks were collected by flagging method and analysed individually. PCR with specific primers was used for detection of *B.burgdorferi* s.l.and genospecies. Pathogens of *Ehrlichia/Anaplasma* group were detected by using PCR with *Ehrlichia/Anaplasma*-specific primers and reverse line blot hybridization. Real-time PCR method was used to detect *Babesia* divergens.

Results. The overall prevalence of *B.burgdorferi* s.l. infection was detected in 38 ticks (16%). Genospecies *B. burgdorferi s.s, B. garinii* and *B. afzelii* were identified by multiplex PCR. B. afzelii has been found to be the most dominant genospecies - 66% of infected ticks were positive for this pathogen (25 ticks), 31% (12 ticks) for *B. garinii* and 3% (1 tick) for *B. burgdorferi s.s.* Screening for *Ehrlichia* demonstrated positive results for 12 (5%) samples. Species of genus *Ehrlichia – A. phagocytophilia*, HGE variant and *E. schotti* – have been identified by using the reverse line blot assay. Real-time PCR method with primers and probe specific for *B. divergens* showed positive results in 5 ticks (2%). Double infections have been observed. The rate of *Ehrlichia* (5%) and *B. divergens* (2%) infections according to data obtained in our study was low. This prevalence of infections is comparable with the data from other European countries.

Conclusions. Pathogens from genus *Borrelia, Ehrlichia* and *Babesia* which are found in Europe are also present in the host-seeking tick population in Lithuania. Diverse frequency of infectivity by different parasites has been demonstrated: *B.burgdorferi s.l.* – 16%, *Ehrlichia sp.* – 5%, *Babesia divergens* – 2%. Three genospecies (*B. afzelii, B. garinii* and *B. burgdorferi s.s.*) of *B. burgdorferi s.l* have been detected. *B. afzelii* is dominant genospecies in Lithuania. Mixed infections have been demonstrated.

GLUCOSE TOLERANCE TEST IN TURNER SYNDROME PATIENTS AND THEIR RELATIVES

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Chromosome diseases are polymorphic because a chromosome imbalance lowers the threshold of appearance in familial pathology. The stronger phenotypical expression of multifactorially inherited traits was found earlier in Down syndrome patients. For the present investigation families with Turner syndrome (TS) patients were chosen, since they manifest also many extragenital pathologies. The peroral glucose tolerance test (GTT) was made for them as glucose intolerance is a typically multifactorial trait. GTT in capillary whole blood was performed for 131 individual: 37 TS patients, 42 their siblings (21 brother and 21 sister) and 52 parents (32 mothers and 20 fathers). The average age of TS patients was 20.8 years (ranking from 5 to 46 years), siblings 20.0 years (ranking interval 6-56 years), and in parents 48.1 years (ranking between 27 and 76 years). Glucose tolerance was found to be disturbed in 10 (27.0%) probands, in 12 (28.6%) siblings, and in 21 (40.4%) parents. The damaged glucose metabolism was established total in 43 from 131 individual (32.8%), while in the control Lithuanian population these disturbances were found in 38.1% of people (including impaired fasting glycaemia, impaired glucose tolerance and diabetes mellitus). Therefore, the GTT shows a glucose intolerance level that is statistically not different from the general population. The differences between three groups of patients are also not significant.

USING OF INFLATED ENDOFALLUS STRUCTURE IN TAXONOMY OF CHRYSOMELIDAE

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History of genitalia structure study with taxonomic aims, numbers more than a century. Methods used during this period have been improved considerably. In 1929 H. Franz laid the foundations for study internal structure of aedeagus which were caught up and developed by the other investigators (Kurnakov 1962; Meurgues, Ledoux 1966; Sturani 1967). Recently with more frequency are used study of maximum inflated internal sac of aedeagus among different families of Coleoptera (Berlov et Berlov 1996; Berlov 1997, 2000; Shilenkov 1996; Matalin 1998, 1999a, 1999b; Berti, Mariau 1999; Rubenyan 2002; Anichtchenko, Verdugo 2004). In spite of that not all specialists resort to endophallus structure investigation during taxonomical revisions and descriptions of new species.

The first entomologists who suggested inflating an internal sac with the help of a syringe were G. Meurgues and G. Ledoux (1966). They filled up the endophallus with mixture of glycerine and gelatine. Then they put preparation into 4% formalin solution for storing. Much more suitable method was suggested by O. Berlov (1992). The internal sac was filled up with tooth paste and was dried by a glow-lamp during two hours. All modern methods are variations of Berlov's methods. They differ with a type of material which endophallus is filled with. Terminology of internal structure of aedeagus has been worked out not enough and varies by different authors. Taxonomical value of study of internal sac structure in different beetles families and sometimes in some genera of one family is not the same. In some cases extraordinary homogeneity in its structure is observed.

The aim of the current work was to study perspectives of using of internal sac structure in leaf-beetles, in order to solve difficult taxonomical problems. We investigated the endophallus structure of 12 leaf-beetles species from four subfamilies: Criocerinae – *Oulema erichsonii* (Suffrian, 1841), *O. melanopus* (Linnaeus, 1758) and *O. duftschmidi* (Redtenbacher, 1874); Cryptocephalinae – *Cryptocephalus sericeus* (Linnaeus, 1758) and *C. aureolus* Suffrian, 1847; Chrysomelinae – *Chrysomela (s. str.) populi* Linnaeus, 1758, *Ch. (s. str.) tremula* Fabricius, 1787, *Ch. (s. str.) saliceti* Suffrian, 1849; Cassidinae – *Cassida (Odontionycha) viridis* Linnaeus, 1758, *C. (s. str.) denticollis* Suffrian, 1844, *C. (s. str.) sanguinolenta* Müller, 1776 and *C. (s. str.) prasina* Illiger, 1798. The designations for some internal structures of endophallus are suggested.

The results of investigation showed that the structure of endophallus varies greatly according to subfamilies of leaf-beetles. The form of inner sclerites of endophallus is used sometime in determination of species. Study of maximum inflated endophallus let us see spatial position of sclerites on the internal sac and can be used as an extra taxonomical character. Sibling species *Oulema melanopus* (L.) and *O. duftschmidi* (Redt.) external morphologically are very similar and differ only in the form of flagellum. The internal sac structure of studied species from subfamily Cassidinae, *Cassida viridis* L., *C. denticollis* Sffr., *C. sanguinolenta* Müll., *C. prasina* Ill. turned out to be species specifically and various in form and arrangement

of sclerites and protuberances. While clear external distinctive characters in some species are absent.

In other studied close species of subfamilies Cryptocephalinae and Chrysomelinae distinctions in internal sac structure are not clear. Proximity of endophallus structure of such species as *Chrysomela saliceti* Sffr. and *Ch. tremula* F., as well as *Cryptocephalus sericeus* (L.) and *C. aureolus* Sffr. can be explained in such a way that these are young not long ago spread species.

Current investigations showed expediency of study of structure of maximum inflated endophallus in the family Chrysomelidae. Learning to apply this method would let avoid a lot of mistakes during determination or description of new taxons and also could help solve arguable points of systematic and phylogenetic.

BETWEEN SPECIES DIVERSITY OF *HYPERICUM PERFORATUM* AND *H. MACULATUM* BY THE CONTENTS OF BIOACTIVE COMPOUNDS

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Plants with the genus name *Hypericum* are widely known for their use in traditional and modern medicine due to their therapeutic properties. One of the most important and commercially recognized species of the genus is *H. perforatum*, which has been used in herbal medicine, externally for the treatment of skin wounds and burns, and internally for disorders of the central nervous system, for treatment of mild depression. Both, *H. perforatum* and *H. maculatum* are a natural source of a number of medicinally important compounds. The main constituents of the Hypericum species are: naphtodianthrones, primarily represented by hypericin and pseudohypericin; flavonoids, e.g., hyperoside, rutin or quercetin; and phloroglucinol derivatives, e. g., hyperforin. For years, hypericin was believed to be responsible for the antidepressant activity of H. perforatum. However, recent studies indicated that hyperforin is the main compound involved in antidepressant activity.

The objective of the present study was to establish and compare the secondary metabolite contents of two *Hypericum* species, *H. perforatum* and *H. maculatum*, native to Lithuania. The analysis of ethanolic extracts of Hypericum flowering tops was performed using reversed-phase HPLC. The investigated compounds (chlorogenic acid, rutin, hyperoside, apigenin-7-O-glucoside, quercitrin, quercetin, hypericin, hyperforin) were identified by the comparison of their retention times with those of standards. The identity of HPLC peaks was definitely assessed by co-chromatography after spiking the samples with the reference compounds. The HPLC analysis of the ethanolic extracts of investigated species showed similarity in their composition. Both species contained chlorogenic acid, hyperoside, quercitrin, quercetin and hypericin. The presence of rutin, apigenin-7-O-glucoside and hyperforin were proven only in H. perforatum.

The quantitative analysis showed higher content of quercitrin in *H. perforatum,* than in *H. maculatum*, whereas the contents of quercetin, hypericin and chlorogenic acid were the same in both species. *H. maculatum* contained a higher quantity of hyperoside than the other species. The results showed high values of hypericin and flavonoids in *H. maculatum*; hence, this species may find important application, although it is not yet officially considered as medicinal.

LITHUANIA VERSUS LATVIA: CARRYING CAPACITY, NUMBERS AND POPULATION MANAGEMENT OF WOLVES

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Wolves historically were the main large carnivores in Latvia and Lithuania, reaching their second post-war population peak in 1994–1998. Current population fate and management are quite different in both countries. After 2000, population numbers in Latvia are estimated at about 500–700, in Lithuania – 300–400 individuals. According the modified Schaefer model, carrying capacity for wolves is 1066–1092 and 626 individuals, respectively (Kawata, 2008, Balčiauskas, Kawata, in prep.). Numbers of wildlife, regarded as food for wolf, for example wild boar, roe deer and red deer, are high. Both countries also boost extremely high populations of beaver, forming considerable share in wolf diet. Forest area is less in Lithuania, but here wolves get several adaptations to unusual habitats, including former military grounds, abandoned fishponds etc. In both countries there is no state system of damage registration and wolf damage is not compensated, either. For the last decade wolf killed cattle numbers were estimated higher in Lithuania, wildlife kills – in Latvia. Latvian hunters consider wolf an enemy, competing for hunting success. Despite support of NGO's for wolf protection, farmers and village dwellers in Lithuania are the main group, opposing ban on the wolf hunt. Situation is amplified by direct human-wolf contacts. In the 1912–1937 period there were 44 cases of direct human-wolf conflict in Lithuania. In the 1990–2001 period there were 22 cases, all of them related to rabid wolves. Geography of accidents shifted from the east/south Lithuania to the northern/western part of the country. Territorial distribution of wolf bag in Latvia also shows multiplicity of cases near border with Lithuania. In 2000–2005 period wolf bag was 113–146 individuals in Latvia and 48–76 individuals in Lithuania. Hunting quota in Lithuania became limited to 20 individuals in 2005/6-2007/8 and 30 individuals in 2008/9 year; controversially, in Latvia in 2008/9 it reached 200 individuals. After 2005, bag was only 5–7,1% in Lithuania and over 20% in Latvia. Hunting season length is twice longer in Latvia (15 of July – 31 of March) and wolves are hunted relatively evenly throughout the hunting season. Generally, Lithuanian hunters fulfill their limit in the first and second month of the season. What changes should be expected after management on regional population level will be introduced (if ever) as a concerted action? Both countries intend to continue lethal control as a mean of population management. Latvia legitimated wolf hunt in the Species conservation plan. For Lithuania, wolf population modeling results show possibility to double quota for wolf.

WINTER GROWTH DEPRESSION OF COMMON VOLE (*MICROTUS ARVALIS*)

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Growth of common vole (*Microtus arvalis*) was studied in NE Lithuania, 2005–2008. The trapping was done from October to April each year, depending on weather and on the start or end of the vegetative period. Depression of growth was checked on body mass, body length and 17 cranial (eight mandibular and nine maxillary) characters. First two winters were colder (average temperatures were negative in January–March of 2004/5 and December–March of 2005/6), then the last two (average temperature was negative only in February in 2006/7, and only in January in 2007/8). Two dominant species – common vole and bank vole – had different survival: by the end of winter the number of trapped bank voles was decreasing, and the number of common voles increasing. Common vole comprised from 4.1% to 22.2% of monthly bag. Totally, 388 common voles were trapped, age structure – 22% of adult, 14% – subadult and 64% – juveniles. Share of juvenile individuals changed from 95% in November to 16% in April, that of adults – from 0% to 65%, respectively. Changes of age structure show, that maturation of common voles was most evident in March and April.

Wintering juvenile common voles attained the average body mass of 14.5±0.10 g, and the average body length of 82.0±0.34 mm; subadult voles were 17.9±0.34 g and 90.2±0.75 mm respectively. In September-October body parameters were 14.1±0.26 g and 76.5±0.75 mm in juveniles ang statistically did not differ from overwintered voles. In subadult voles body mass in autumn was 19.45±0.47 g and body length 86.44±1.81 mm.

Winter growth depression of the common vole includes reduction of body mass, body length and cranial characters. The depression of growth was more evident in subadults, than in juveniles.

Comparing harsh and milder winters we also find, that in harsh winters growth was more stunted in subadult common voles, as body mass, length and three cranial characters were smaller, than in mild ones ($p<0.01–0.05$).

We found three patterns of cranial growth: (i) characters continued their growth in winter, (ii) growth was stunted or decreasing and (iii) growth was fluctuating. In subadult voles all mandibular characters continued growth till December or January, then decreased till March. Five out of nine maxillary characters exhibited growth depression, rest continued to grow till February. All cranial characters in subadult voles renewed growth in April. Most cranial characters in juvenile voles continued their growth until March and became decreased only in April – so, growth depression occurred later, than in subadult animals.

PRIMARY REVIEW OF PHYLLOBIUS GERMAR, 1824 GENUS IN LATVIAN FAUNA

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The first data about the Curculionidae species of *Phyllobius* Germar, 1824 genus in Latvian fauna appeared in following works: Fisher, 1784 – 1 species (*P.argentatus)*, Groschke 1805 – 1 species, Seidlitz 1872-1875 – 8 species, Seidlitz 1887-1891 – 9 species; and others. Latvian fauna of Curculionidae of this genus has been investigated irregularly. In 1993 A.Barševskis monograph „The beetles of Eastern Latvia" was issued data about 9 species of *Phyllobius* Germar, 1824 genus can be found there. In 1997 A.Barševskis have been published check-list of Latvian Curculionidae and faunistical data about 266 species including 11 species of genus *Phyllobius*. In recent years only separate data about occurrence of some rare species have been published (Leiskina 1999), as well as list of species of Curculionidae of genus *Phyllobius* can be found in published list of Latvian beetles (Telnov et al. 1997; Telnov 2004).

In Latvian fauna a genus *Phyllobius* Gemar is presented by 4 subgenera and 11 species: *Parnemoicus* Schilsky with 1 species, *Subphyllobius* Schilsky with 1 species, *Nemoicus* Stephens with 1 species and *Phyllobius* Germar with 8 species. In adjacent territories the number of the registered species from this genus differs a little: Estonia – 11 species, Lithuania – 13, Fennoscandian parts of Russia – 10.

Nine species (*Ph.arborator, Ph.argentatus, Ph.glaucus, Ph.maculicornis, Ph.oblongus, Ph.pomaceus, Ph.pyri, Ph.vespertinus, Ph.virideaeris)* in Latvia are widely distributed. *Ph.viridicollis* un *Ph.betulinus* are rare and insufficiently known species. P.roboretanus has been recorded from Latvia, but this record is based on misidentified specimens and was deleted from check-list of Latvian beetles. In adjacent territories *P.roboretanus* known from Lithuania and Estonia.

Representatives of genus *Phyllobius* are polyphagous or oligophagous species and feed on deciduous trees and shrubs, herbaceous plants (mostly on *Urtica, Filipendula, Artemisia, Achillea, Rubus, Prunus, Sorbus, Betula, Quercus* and other), rarely on coniferous trees.

Ph.vespertinus and *Ph.pomaceus* is reported as the pest of cultivated plants.

SMALL MAMMALS COMMUNITIES IN MEADOWS ECOSYSTEMS BORDERING WATER BODIES, LITHUANIA

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Small mammals communities were studied in meadows ecosystems bordering with 5 types of water bodies – natural and regulated rivers, lakes, reclamation ditches and swamps. Data were collected using standard snap-trap method in 2005-2008. Trap sessions were performed in 23 districts of Lithuania. Relative abundance as well as diversity indices (Shanon's diversity, Simpson dominance, species richness and evenness) were used to compare communities. Ten small mammals' species were registered: *Sorex araneus, S. minutus, Neomys fodiens, Microtus arvalis, M. agrestis, M. oeconomus, Myodes glareolus, Micromys minutus, Apodemus agrarius* and *A. flavicollis*. Myodes glareolus was dominant species in meadows bordering natural (subdominants *S. araneus, A. flavicollis*) and regulated (subdominant *A. agrarius*) rivers, lakes (subdominants *S. araneus, A. flavicollis*) and swamps (subdominants *M. arvalis, S. araneus)*, meanwhile, near swamps dominant species were *M. arvalis* and *Myodes glareolus*, subdominant – *S. araneus.* Depending on habitat, dominants species constituted 26.5-42.2% of all trapped animals, subdominant – 12.5-25.9%. *S. minutus,* Neomys fodiens and *Micromys minutus* were relatively rare species recorded in several habitats (constituting up to 3.6 % of all trapped animals). The highest relative abundance was recorded in meadows bordering reclamation ditches (17,182±2,540 ind. / 100 trap-nights), the lowest – in meadows near regulated rivers (12,652±1,813 ind. / 100 trap-nights), still, relative abundance's differences were not significant among all habitats. However, number of registered species was the highest near regulated rivers and lakes (10), and the lowest near reclamation ditches (8). No significant differences among habitats were also found comparing all diversity indices.

CEREAL DISEASES AS IMPORTANT RISK FACTOR FOR ORGANIC FARMING

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Spread of organic farming has grown rapidly since 1998 in Latvia. Total certified land area increased from 1426 ha in 1998 till 151505 ha in 2007. Sowing area with small grain cereals occupies 25% of total certified organic land. The proportion of cereals in crop rotation is growing. Cereal diseases are one of most important risk factors affecting not only the amount of the yield but – what is even more significant – also the quality.

Sharp development of snow mould (caused by Microdochium nivale, previous term Fusarium nivale, teleomorph Monographella nivalis) was noticed in 2005-2007. Snow mould affected all winter cereals. Incidence of snow mould fluctuated from 2-95% in winter wheat sowings. There are no effective fungicides for seed treatment restricting the snow mould in organic farming system, and it will definitely be a problem in Latvia's changeable weather conditions also in the future.
Different smuts are another important problem considerably decreasing the yield and quality of grain. For characterization of situation with common and dwarf bunt spreading conventionally grown winter wheat lots were analyzed (harvest year 2007). Results are very shocking because 62.8% of tested samples (86) were contaminated with Tilletia caries, and from those 4.7% also with Tilletia controversa. In situation when organically grown wheat seed material is not available in Latvia (data from the State Plant Protection Service) this is a very high risk for both Tilletia spp. spreading in organic farms. Loose smut of barley (caused by Ustilago nuda) was determined to almost 60% of the grain samples received from the 2004 harvest (data from SPPS). Considering the fact that effective fungicides permitted in organic farming for seed treatment controlling smuts are not available yet, this disease is a very important problem for organic grain production. Use of varieties with true resistance against smuts is one of possible solutions.

Different diseases of cereal leaves decrease yield significantly. Net blotch (*Pyrenophora teres*), mildew (*Blumeria graminis)* and rust (*Puccinia hordei)* in barley; tan spot (*Pyrenophora tritici-repentis),* leaf blotch *(Septoria tritici),* mildew *(Blumeria graminis)* and leaf rust *(Puccinia tritici*) in triticale; rust (*Puccinia coronifera*) and leaf blotch (*Helminthosporium avenae*) in oats were determined in official variety trials in certified organic field. Disease resistance of varieties used in organic farming is not sufficient.

There are today two serious solutions to minimize a risk of disease pressure for organic farming: to involve a seed health testing in seed production management schemes and using of resistant or at least tolerant varieties to main important diseases.

THE CLICK BEETLES OF THE GENUS AMPEDUS DEJEAN, 1833 (COLEOPTERA: ELATERIDAE) IN THE FAUNA OF LATVIA

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The click beetles genus *Ampedus* Dejean, 1833 (Coleoptera: Elateridae, Ampedini) is a cosmopolitan comprises taxa with approximately 330 species, which distributed predominantly in the Holarctic region. In the Palearctic region inhabiting about 190 species. The fauna of this genus is incompletely investigated. The first information about the genus *Ampedus* Dej. in the fauna of Latvia were published in the beginning of the 19th century. In later years 41 articles were published, in which the information about the genus *Ampedus* Dej. in the fauna of Latvia was given.

In Latvia the genus *Ampedus* Dej. are presented with 21 species. One species *Ampedus ziegleri* Zeising & Sieg, 1983 were indicated the first time for the Latvian, Baltic, North & Easteuropean fauna. The finding of *Ampedus bouweri* Schimmel, 1984 is the third known in the Latvia. Three species (*A.vandalitiae* Lohse, *A.nemoralis* Bouwer, *A. ziegleri* Zeising & Sieg) are known for the time being only from one place in Latvia. Four species (*A. bouweri* Schimmel, *A.hjorti* (Rye), *A.suecicus* Palm, *A. cardinalis* (Schioedte)) are very rare in Latvia (2 – 5 findings). Five species (*A. cinnabarinus* Eschscholtz, *A. elongatulus* (Fabricius), *A. elegantulus* (Schoenherr), *A. praeustus* (Fabricius), *A. tristis* (Linnaeus)) are rare in Latvia (6 – 10 findings). One species – *A. erythrogonus* (Mueller) is included in the list of indicator species of natural forest key – habitats.The study of the fauna of the genus Ampedus Dej. in Latvia must be continued.

DIVERSITY OF BEETLE (HEXAPODA: COLEOPTERA) FAUNA IN BURNT FOREST AREAS IN VICINITY OF LEJASCIEMS, NE LATVIA

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Fire is important phenomena in boreal forests of the Northern Europe, which has essential role in maintenance of the biological diversity. Role of the burnt areas in such aspect in Latvia is not widely investigated. We investigated 2 burnt forest areas affected by wild fire in August and September 2002 in the vicinity of Lejasciems, NE part of Latvia. Research was financed by JSC "Latvijas Valsts Me¸i".

Goal of the investigation was to clarify impact of wild fires on faunistic diversity of beetles. Investigations were carried out from April 2003 to September 2006. Sample plots were established in 4 stands: 1) middle aged pine stand without any management, 2) middle aged pine stand which was clear felled leaving 30 trees per ha, groups of fallen trees and small groups of uncut trees, 3) mature pine stand without any management activities, 4) mature pine stand, where all spruces and part of pines was cut and removed. We placed 17 window traps, 35 pitfall traps, as well entomological net was used. In total there were collected 13448 specimens of beetles.

There were identified 796 taxa of beetles, out of which 781 taxa was identified to species level. In large quantities indicator species of burnt areas *Sericoda quadripunctata* (DeG.) (Carabidae) and *Melanophila acuminata* (DeG.) (Buprestidae) were observed. Last one was mostly observed on burnt stems, but not captured in window traps. In addition several pirophylous species and species related to fungy species which are developing on burnt wood - *Laemophloeus muticus* (F.) (Laemophloeidae), *Cryptophagus corticinus* Thoms. (Cryptophagidae), *Platyrhinus resinosus* (Anthribidae) were captured. Among soil inhabiting beetle species in the first season dominated *Pterostichus quadrifoveolatus* Letzn. (Carabidae) – 389 specimens, *Sericoda quadripunctata* (DeG.) (Carabidae) – 375 specimens and *Hylobius abietis* (L.) (Curculionidae) – 402 specimens. Among ksilophytic species in the first season after wild fire dominated *Xylita laevigata* (Hell.) (Melandryidae) – 80 specimens, *Melanotus villosus* (Geoffr.)(Elateridae) – 77 specimens. On the tree trunks in large amounts was observed *Melanophila acuminata* (DeG.) un *Phaenops cyanea* (F.) (Buprestidae).

We observed some rare species for Latvian fauna: *Lacon fasciatus* (L.), *Harminius undulatus* (DeG.), *Ampedus affinis* (Elateridae), *Dircaea quadriguttata* (Pk.) (Melandryidae), *Lepturobosca virens* (L.), *Pachyta lamed* (L.) (Cerambycidae). In the first post fire season we practically did not observed large zoophagos (*Carabus* u.c.) and very few higrophylous species. While in following seasons number of those species increased. From 2003 gradually increased number saproksilophytic species and species which are typical for open biotopes. Because of succession together with plants species as well some phytophaogous species not typical for forest biotopes (mainly Crysomelidae and Curculionidae) were found. We find small differences in local fauna between sample plots.

The authors are grateful to J. Donis (Salaspils, Latvia) for cooperation in research.

LITHUANIAN WILD BOAR (SUS SCROFA) GENETIC VARIABILITY EVALUATED USING RAPD ANALYSIS

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Due to proper management, control of the number of wolves and climatic warming over the last 50 years, the population of wild boar in Lithuania has increased six times. There were no wild boar populational genetics studies done in Lithuania. Where is need to evaluate genetic variability of whole Lithuania wild boar population and populations in different Lithuania regions separately.

To estimate genetic variation of wild boar in Lithuania RAPD analysis were made. Eight primers (ROTH–180-01, ROTH–180–03, ROTH–180–05, ROTH–180–06, ROTH–180–07, ROTH–180–08, ROTH–180–09, and ROTH–180–10) were used for polymorphic fragment amplification. One primer was monomorphic among all populations and three primers were polymorphic and were used for genetic variability analysis, other primers were not informative for genetic variation studies. Material for RAPD analysis was heart homogenate. Total 169 samples were examined from different Lithuania regions and Belarus.

Lithuanian wild boar population was divided into 5 regions: northwest (Mazeikiai), center (Marijampole, Kazlu Ruda, Kedainiai), northeast (Rokiskis), south (Alytus, Lazdijai, Varena), east (Vilnius, Salcininkai, Trakai). Belarus sample were gathered from Voronov region, boarding east side of Lithuania.

Parameters of genetic variability were evaluated (number of polymorphic loci, heterozygosity and genetic differentiation). There were no big genetic differences detected among all 5 Lithuania regions investigated. But location specific alleles were detected in all these regions. Most distinct populations were found in Central Lithuania and Varena region. Genetic distances were estimated using Nei's (1972) genetic distance calculations. Clusterings of wild boars in each population were made using UPGMA analyses and observed in the dendrogram.

THE IMPLEMENTATION OF NATURE MANAGEMENT PLANS FOR SPECIALLY PROTECTED NATURE TERRITORIES IN LATVIA: INDICATORS FOR MANAGEMENT SUCCESS

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Latvia has about 15 years experience of development of nature management plans for the Specially Protected Nature Territories (SPNT). Nature management plans are one of the instruments for governance of SPTN's. This process is regulated by several legal acts (Law and Regulations of Cabinet of Ministers) now. 25-30 these plans are being developed in Latvia each year.

Development of nature management plans is routine practice, nevertheless not allways even the best plan, zoning and even the implementation of these plans can quarrantee conservation of nature values and favourable conservation status for species and habitats. Often the main problem in nature conservation policy implementation is active antagonism of main stakeholders (landowners, local people, municipalities) to management activities and conservation regimes, especially if the economic interests are touched. The governance of SPNT's is complicated system of biological diversity management, public relations, and local socio-economics. Therefore there are raising need for indicator system (biological, social and economic) for evaluation of success af implementation of nature management plans and management of SPNT's as such.

Keywords: nature management plan, favourable conservation status, indicators of management success.

ALLELIC DIVERSITY OF THE BMY1 GENE IN LATVIAN BARLEY BREEDING LINES

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The endosperm specific beta-amylase, a key enzyme involved in the storage starch degradation during malting process, is encoded by the single copy gene Bmy1. Different allelic variants of the structural genes encode enzymes of different thermostability and/or kinetic properties. Genotyping on the trait responsible intron III mutations including 126 bp (MITE) and (1+6) bp insertion/deletion (InDel) events was applied to evaluate genetic diversity of the Bmy1 gene in covered and hulless spring barley breeding lines of State Stende Cereal Breeding Institute and State Priekuli Plant Breeding Institute. Frequency of MITE InDel alleles was similar within breeding lines for both breeding institutes (heterozigosity index 0.4). The diversity of indel (1+6) bp was higher within Priekuli breeding lines compared to Stende material (heterozigosity index 0.03 and 0.48 respectively). Only three from four possible two loci (MITE/(1+6)) haplotypes were observed. Haplotype characterized by the deletion in both loci and associated with high malting quality, was found only in eight Priekuļi lines selected from the cross of Latvijas Vietejie and Inari. Bmy1 structural gene of most middle malting quality breeding lines was shown to have MITE deletion and (1+6) insertion. Insertions in both loci of the gene were detected in the resting breeding material suggesting their low malting quality. Variant with MITE insertion and (1+6) deletion was not revealed in our study. 25% from all investigated breeding lines were heterogeneous. Results obtained in the study confirm usefulness of the molecular marker application in the identification of breeding lines perspective for malting and/or feed barley selection.

METHODOLOGICAL SOLUTION OF PROBLEMS IN INVESTIGATION OF LATVIA'S WILD ORCHID SPECIES IN VITRO

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To establish a useful protocol for successful microtechnique in sterile cultures with Latvia's wild orchid species, the solution of methodological problems was starting to be elaborate. The objectives of this study was to select or to establish the most appropriate methods for effective in vitro technique to estimate the useful stage of fertilization of seeds, to initiate in vitro culture and to develop the prescription of culture media for each species. Seeds for sowing in vitro were excised in different stages of development: immature seeds and ripe seeds. Immature seeds were evaluated by colour and completion. There was approbate the tetrazolium (2,3,5-triphenyltetrazolium chloride) test for determine the viability of embryos and the methods for establishing of colonization with symbionts of regenerants transplanted ex vitro. The preference of using immature seeds consists in characteristics of seed-coat: they were still impervious to water and the inhibitors were not yet accumulate. By ripe seeds, the embryos were fully developed, but the physiological dormancy was set in and the seed-coats interfered imbibition of water and nutrients. In the last case, we had used the wrapping of seeds in filter-paper for sterilization with chlorine (commercial preparation ACE), rinsing with distilled water and subsequently placing onto semi-fluid initial medium for germination. The another fluid medium was dropped atop. This was the most useful variant for initiation a culture because the seeds were not lost in sterilization procedures, the filter-paper discs with seeds was possible to transfer to an other culture vessel with fresh medium or/ and the fluid medium can be dropped over in plain level; the agarized medium don't split when the germination continued for a long time. It was necessary to find the appropriate concentration of ACE and sterilization time for each sample, to eliminate till definite step the seed-coat, take out microflora but preserve viable embryos. Hereof could be understandable that the tetrazolium test had present higher percent of viable embryos then the germinated seeds in culture media. The most applicable culture media for germination were the prescription of Van Waes et al.(1986), Fast (1974), Norstog (1973) with our modification and three our original prescriptions, corresponding for each taxa. There was estimated the most passable methods for initiation of in vitro culture of five orchid species, and for three ones – partially (it means, that the success in one year was not repeated in an other). To develop up a system of aseptic culture methods for Latvia's wild orchid species, rather difficult object for in vitro culture, we can come by substantial way for conservation of rare and threatened species with further aim to reintroduce them when it will be indispensable.

SEASONAL ACTIVITY OF FIVE *CULICOIDES* SPECIES (DIPTERA: CERATOPOGONIDAE) IN LITHUANIA

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Biting activity of *Culicoides* may be so intensive as to cause distress to animal and economic loss may result, prolonged attack may give rise to allergic dermatitis in animals, "summer mastitis" in cattle. Biting midges are known to transmit a variety of blood protozoan parasites and viruses. Biting midges of *Culicoides obsoletus* group is known to be vectors of blue tongue in Europe. Biting midges were collected by light traps in three study sites. Biting midges flying activity was investigated from the end of April till the end of October. Data on *C. obsoletus* group, *C. grisescens* Edwards, 1939, *C. impunctatus* Goetghebuer, 1920, *C. punctatus (*Meigen, 1804) and *C. segnis* Campbell et Pelham-Clinton, 1960 flying activities in Lithuania are present. *Culicoides obsoletus* group was the most abundant biting midges group in study sites and form from 49,5 to 58,5% of all collected *Culicoides* midges. Abundance of biting midges as well as the air temperature in study sites were analyzed.

Culicoides flying activity (*C. obsoletus* group and *C. grisescens*) started in April when the air temperature reached 150C. Flying activity of *C. punctatus* started in the middles of May. Flying activity of *C. impunctatus* and *C. segnis* started in the end of May. *C. obsoletus* group and *C. punctatus* were caught till the end of October when the air temperature was 90C.

The abundance of *Culicoides* adults correlated positively with air temperature during the season and had an abundance curve with four peaks: in April – May, end of June, in August and in September. *C. punctatus* was determined to be polivoltine and *C. grisescens, C. impunctatus* and *C. segnis* were determined to be bivoltine in study sites investigated.

SCREENING AND IMPLEMENTATION OF LATERAL FLOW ASSAYS FOR DIAGNOSTICS OF LATENT INFECTIONS OF *RHIZOCTONIA SOLANI* KŭHN

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Early detection of plant diseases in the latent infection is one of the main measures of plant protection exactly within the period of vegetation when the decision on the plant protection measures should be taken on the field. Global trade and climate changes have the effect on new manifestations of crop diseases which exhibit less typical symptoms compared to the previous years and symptoms of crop diseases cover with dry and moisture-induced stress symptoms, unbalanced fertilizers, insect damage, ozone caused burns, herbicide damage. In different stages of the vegetation period, it is very important not to mistake in diagnosing the disease during the field inspection or visual monitoring. Due to time -saving and financial reasons, in all cases of doubt, it is not feasible to send some material to the laboratory for examination.

For this purpose, in the world a wide offer of express techniques has recently been made available resulting in a response within minutes. These methods open opportunities for rapid screening of latent pathogens. The lateral flow assay or the immunochromatographic assay is a logical and crucial innovation of the previously used latex agglutination test. In contact with juice of the inspected plant, as a result of a positive reaction the tester produces color reaction. Examining 45 potato varieties, both visual diagnostics of R. solani was carried out and the lateral flow tester method was applied. The results were different. Using immunochromatography , R. solani was found in 31 % of samples but visually -22 % of infected samples were detected. It shows that the lateral flow tester method can be used for demonstrating the lateral infection when the visual symptoms of the disease have not yet emerged. Carrying out the visual analysis of the potato samples, the amount of the scab (Streptomyces scabies) infected tubers was also listed. Overall, the usual scab was found only in four samples. It should be noted that the presence of R. solani was not found either visually or by the method of immunochromatography in these samples.

Key words :Immunochromatographic assays, lateral flow assays, potato pathogens

DIVERSITY SURVERY OF SAMPLES OF ROTATORIA GROUP IN LAKES SVENTE AND BRIGENE

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Lake Svente is the tenth deepest lake in Latvia, the average depth of which is 7.8 meters, but the maximal depth reaches 38 meters(www.vdc2.vdc.lv). Lake Brigene is located on Augshzeme elevated plain, 147,9m asl., in the self-governing teritory of Demene, between teritories of Demene (R) and Brigene (A), Daugavpils district. Lake Brigene is the nineteenth deepest lake in Latvia, the average depth of wilich is 10 meters, but the maximal depth reaches 31 meters (www.vdc2.vdc.lv).

For the study of samples of Rotatoria in Lake Svente and Lake Brigene, zooplankton samples were taken in Lake Svente on July 12, August 3 and 30 and September 21 in 2007. And also on May 13 and 30, June 16, July 6, August 7 and 22 and September 3 in 2008. But zooplankton samples the were taken in Lake Brigene on May 12 and 30, June 16, July 6, August 7 and 22 in 2008. The sampling in Lakes was carried out in several different localities of the lakes whitch have different depth. Apstein and Juday plankton nets were used for collecting the samples. During the analysis of the samples, which were collected in Lake Svente and Lake Brigene individual of Rotatoria group the sample were mainly of them Lake. The sampling in Lake Svente was carried out on six different localities of the lake but in Lake Brigene on five different localities of the lake which have different depth. During the analysis of the sample of Lake Svente which were taken in 2007 18 species were determined in Rotatoria group, but 28 species were determined which were taken in 2008 of the samples in Rotatoria group. In its turn, during the analysis of the samples which were taken in 2008 28 species were as well as in Rotatoria group of Lake Brigene. In all localities of the sampling Polyarthra vulgaris, Asplancha priodonta, Keratella cochlearis, Conochilus hippocrepis, Kellicotia longispina and Testudinella truncata were dominant species in the Rotatoria group of Lake Svente which were taken in 2007, but in all localities of the sampling Polyarthra vulgaris, Keratella cochlearis, Conochilus hippocrepis, Kellicotia longispina, Conochilus hippocrepis, Testudinella truncata, Pompholux sulcata were dominant species in the Rotatoria group of Lake Svente which were taken in 2008. In all localities of the sampling Polyarthra vulgaris, Keratella cochlearis, Pompholux sulcata, Trichocerca capucina were dominant species in the Rotatoria group of Lake Brigene which were taken in 2008.

HABITAT SELECTION OF THE RED-BREASTED FLYCATCHER *FICEDULA PARVA* AND RECOMMENDATIONS FOR CONSERVATION

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Red-Breasted Flycatcher *Ficedula parva* is internationally protected species, listed in EC Bird Directive. Census of birds were fulfilled in 2600 ha area, and were identified 46 breeding territories. The birds were observed in the stands dominated by the Norway Spruce and the Birch, less common appeared Aspens, Common Oaks and Black Older, mean height of stands were 24 m (SE±0.19; min-22; max-26), age 59 yrs. (SE±0.77; min 50; max 70). The relative stocking level of stands in the breeding territory were between 0.75-0.9. The stocking level of standing deadwood was: deciduous - 1.3 m²/ha (SE±0.18; min 0; max 4), coniferous 0.4 m²/ha (SE±0.1; min 0; max 3), lying deciduous – 0.7 m²/ha (SE±0.16; min 0; max 5), lying coniferous – 0.47m²/ha (SE±0.13; min 0; max 3). The horizontal density up to 4 m height was very low (about 20%), and in layer more than 10 m - 76% (SE±1.1; min 55; max 90). Undergrowth also was very thin, mean coverage was 4.3% (SE±0.83; min 0; max 25), as well as shrub layer 11.7% of surface area (SE±0.97; min 0; max 30).

Only in the surroundings of 30% of observations open water area was further 60 m. At other territories at least smallest open water bog were closer. The distance from singing male to such habitat component was: up to 10 m - 11%; 11-20 m – 28%, 21-30% - 7%, 41-50 m – 17 %. Open shallow water had positive influence on the distribution. Such habitats are rich by mosquito, other flying invertebrates that are preferred food by flycatchers.

The forest edges had negative influence on distribution of the Red-Breasted flycatcher. 50% of observations were >300 m from old forest / clear-cut edge. More close than 60 m to the edge birds were not observed. Only in 4% of cases observations were in less distance than 75 m from the edge. In the zone of 80-100 m from the edge - were 9 % of observations, as well as 100-150 m – 17 %; 155-200 – 7 %; 205-250 – 9%; 255-300 – 4% of all observations. Very important are micro tree fall gaps of main stand. Only in 6% of observations close to singing male were micro gap.

Red-Breasted Flycatchers are selecting denser areas of mature and premature forest stands, situated further from the edges and tree fall created openings. Undergrowth and shrub layers are less dense than neighboring areas. During the study the importance of small open water bogs for habitat selection were highlighted. Red-Breasted Flycatcher in most of the European countries is threatened species due to intensive forestry created forest edges, thinning of the stands and drainage.

For conservation purposes of this species it is recommended to decrease the amount of clearcut edges in the forest area by cutting more solid shape and larger clearcuts. By this would be created larger fragments of relatively even-aged groups of stands that will be good habitat for this species in the future. Also it is recommended to re-design the drainage systems, some areas leaving for renaturalization.

TREE CANOPY DYNAMICS ON MORICSALA ISLAND

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Moricsala Island, now part of the Moricsala Nature Reserve, has been protected since 1912. The island has been little disturbed by man, with the exception of natural meadows used as hayfields and pasture. In 1909 forests covered 66% of the territory, and the meadow coverage has gradually decreased. The forests are dominated by broadleaved species – oak, lime and maple. In some areas dense cover of spruce has formed, presumably after wind disturbance. It is thought that the spruce woods are self-replacing by continuous regeneration, but this has not been substantiated by age structure. Regeneration of oak in the canopy by replacement from the understorey is not evident, as elsewhere in the nemoral and hemiboreal zones. Since concern has been raised of the loss of oak and replacement by spruce in the reserve, the present study was initiated to examine the age structure of the forests to determine canopy replacement dynamics. In two transects (total area 660 m2), one in a broadleaved dominated area and the other in a pine/oak woodland. In addition, four plots (each 20 m * 20 m) were established in spruce woods. All trees > 10 cm DBH (spruce > 5 cm DBH) were cored to determine age and diameter and length were measured. Smaller saplings and seedlings were counted.

The age structure in the pine-oak forest showed canopy replacement along the series pine to oak to maple. In the oak-dominated woods lime was replacing oak. In the spruce-dominated plots, there was peak of spruce regeneration in the post WWII period. This wave of regeneration has been followed by competition-induced mortality, and there is no evidence that the spruce woods are stable in the sense that subsequent spruce regeneration is successfully entering the canopy. There is a lack of spruce seedlings, and although the diameter structure might suggest continuous replacement, the age structure clearly shows a pulse of regeneration followed by mortality. The data does suggest, however, that broadleaf species are gradually invading the spruce forests. Thus, while spruce is stable in the forest landscape, on a stand level spruce-dominated woods represent a successional stage to broadleaved species.

THE LEAF-BEETLES OF SUBFAMILY GALERUCINAE LATREILLE, 1802 (COLEOPTERA: CHRYSOMELIDAE) IN LATVIAN FAUNA

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There are 43 species and 14 genera of subfamily Galerucinae are known in eastern Europe (Bieńkowski 2004) and 26 species and 10 genera are reported for northern Europe (Silfverberg 2004).

Imago of Galerucinae feed on foliage of herbaceous plants (mostly on *Lythrum, Artemisia, Rumex, Polygonum, Filipendula, Fragaria, Cirsium, Nymphaea, Nuphar, Comarum, Calluna, Galium, Thalictrum, Scutellaria* and other) and deciduous trees and shrubs (mostly on *Salix, Alnus, Populus, Betula, Ulmus, Viburnum, Crategus* and other), rarely on coniferous tree (*Pinus*).

The first information on species of Galerucinae in Latvia was published at the end of the 18th century in a monograph on natural history of Livland (Fischer 1784). Subsequently, more than 50 other works were published where fragmentary information on this subfamily be found.

During the current research 1553 specimens belong to 19 species and 9 genera of Galerucinae were reviewed. Two species, *Galeruca dahlii* (Joann.) and *Luperus luperus* (Sulzer), are deleted from the list of Latvian Coleoptera. Overall, the list of species of subfamily Galerucinae of Latvian fauna includes 22 species and 10 genera.

In adjacent areas the number of recorded species of this subfamily slightly varies: in Belarus – 27 species and 11 genera (Lopatin, Nesterova 2005), in Estonia – 18 species and 8 genera, in Lithuania – 23 species and 10 genera (Silfverberg 2004), in St.-Petersburg and Leningrad region (western Russia) – 22 species and 8 genera (Romantsov 2007).

Three species, *Galerucella sagittariae* (Gyll.), *Xanthogaleruca luteola* (Müll.) and *Lochmaea crataegi* (Forst.), were not confirmed during the research. These species known from few (1-5) localities in Latvia. Records of these species needs confirmation.

Taxonomical status and distribution of *Galerucella aquatica (*Geoffr.) and *G. sagittariae* (Gyll.) are not clear. Both species is very similar to *G. nymphaeae* (L.). Differences in structure of aedeagus, shape of last abdominal sternite in females, size and coloration of body are weak. They feed also on different host plants. *G. aquatica* (Geoffr.) reported also from Byelarus, Leningrad and Moscow regions. The finding of this species in Latvian fauna is possible.

Galeruca interrupta (Ill.), *G. laticollis* Shlb., *Sermylassa halensis* (L.), *Calomicrus pinicola* (Duft.) and *Luperus longicornis* (F.) are rare or very rare (less than 7 known localities each) species in Latvian fauna.

Analysis of the distribution of the Latvian species of the subfamily Galerucinae reveals that the range of chorotypes is rather wide: Palaearctic – two, Asiatic-European – six species, Sibero-European – six species, Centralasiatic-Europeo-Mediterranean – one species, Centralasiatic-European – three specie, European – three species and Centraleuropean – one species.

FAUNA AND ECOLOGY OF GRASS LAYER SPIDERS (ARANEAE) IN HABITATS OF NATURE PARK OF LAKE ENGURE

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Spiders are playing significant role as regulators of invertebrate populations. They were reported by some authors also as good ecological indicators (Maelfait, Maert 1988, Rushton 1988, Maelfait et al. 1989 after Bonte et al. 2000 in dune grasslands) of different habitats. Until now investigations of spiders in Latvia were focused mainly on species composition, there are very few ecological studies on distribution and abundance of spiders in different habitats and their role as insect predators. The aim of our studies was an analysis of spider fauna and ecology in different habitats of the Lake Engure Nature Park. This study was performed as a part of the project "Influence of climatic changes on nature of Latvia" in the framework of the National Long Term ecological research (LTER). The material was collected in 1996 – 2008 by entomological sweep net three times per season in 12 different habitats (dry wooded meadow alongside Lake Engures, calcareous fen, wet mixed forest on mineral soil, dry pine forest on poor mineral soil, white dune vegetation, coastal meadow, wet deciduous forest, flood-plain calcareous fen, moist calcareous meadow, marsh, pine stand on grey dune and pine forest on mineral soil) of the Lake Engure Nature Park. In total 1910 adult spiders belonging to 19 families and 136 species were collected. One new family Uloboridae and species for Latvia Hyptiotes paradoxus (C.L. Koch, 1834) was found. The highest number of species – 51 was recorded in the family Linyphidae. Spider families (total number of spiders) Tetragnathidae, Linyphiidae, Salticidae, Theridiidae, Araneidae and Philodromidae dominated in 12 habitats. The highest number of spiders was collected in a dry meadow near the lake. DCA analysis showed that moisture was the main factor responsible for spider community structure. Cluster analysis also yielded two groups of habitats - dry and wet ones.

PHENOTYPIC DIVERSITY OF WILD CRANBERRY (*VACCINIUM OXYCOCCOS*) IN LITHUANIA

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The natural resources of wild cranberries (*Vaccinium oxycoccos*) decreased mainly because of the land drainage. A few larger cranberry fields were left undisturbed within the state protected areas. Cuttings of ninety-nine clones were collected in the strict nature reserves and planted in the field collection of Kaunas Botanical Garden of VMU for further investigations. A detailed characterization of phenotypic diversity of thirty-four fruiting clones was carried out. Eighteen morphological properties were used for the characterization of the clones. The morphological differences in berry size, berry and leaf shapes, observed among clones in natural habitats, were also confirmed under ex situ conditions. Some new properties valuable from the economic point of view were defined; these are the degree of uprightness of flowering shoots, the yield and the berry ripening time. Biochemical investigations revealed that berries of the selected clones did not differ in titratable acidity and the quantity of dry soluble solids with the content of ascorbic acid fluctuating from 10.0 to 19.9 mg/100g. The biggest difference was observed in anthocyanin contents, varying from 12.8 to 109.8 mg/100g.

A total of eleven clones with largest berries (average weight of berry 1.0-1.5 g) and high yields (2-3 kg/m2) were selected for long-term conservation in the collection ex situ. These clones are of potential value for the breeding as well as for the re-naturalization of harvested peat bogs.

INTRODUCTION OF HORTICULTURAL PLANTS IN LITHUANIA

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The new horticultural plants with valuable decorative and economic properties should be used for landscape gardening at farms of agro-tourism. The seasonal development, winter hardiness, resistance to late spring frosts as well as morphological properties of genera *Actinidia* Lindl *Vaccinium* L., and *Viburnum* L. were investigated. The lianas *Actinidia kolomikta* and *Actinidia arguta* are suitable for planting in arbours and pergolas. Male plants of A. kolomikta are more ornamental because of their intensive leaves variegation, meanwhile female clones are valuable also because of berry yield. A comparison of the both *Actinidia* species revealed high cold tolerance in winter, however the cultivars of *Actinidia kolomikta* were more winterhardy under Lithuanian climate conditions. The bushes of highbush blueberry (*Vaccinium* × *covilleanum*) are very attractive during flowering and berry ripening phases as well as because of their dark purple coloration of leaves in autumn. The early and medium-early cultivars of highbush blueberry 'Chandler', 'Reka', 'Earliblue', 'Nui', 'Toro', 'Spartan' with long period of berry ripening should be used for landscape gardening in agro-tourism farms. American cranberry (*Vaccinium macrocarpon*) and cowberry (*Vaccinium vitis-idaea*) are the evergreen species, which are very popular horticultural plants in Lithuania. The most decorative cultivars of cowberry 'Erntekrone', 'Erntesegen', 'Red Pearl' as well as some clones were selected and recommended for growing in the garden-plots. American cranberry cultivars could be to plant and look it that other dwarf ornamental plants, moreover they produce very valuable berries in autumn. The new varieties of snowball tree appeared in Lithuania in the last decade of XX century. Some of them are good not only for ornamental features but because of very valuable berries too. Collection and evaluation of V. opulus accessions have been carried out at Kaunas Botanical Garden since 1998. The seasonal development, resistance to diseases and insect pest as well as morphological properties, productivity and berry biochemical characteristics of different cultivars and clones was investigated. The investigations of biochemical composition of fruit of different cultivars and clones revealed significant amounts of phenolic compounds (anthocyanins and flavonols), benzoic and ascorbic acids. The cultivars mostly resistant to pests and diseases and distinguish of large fruits can be very attractive during all vegetation season and are good for ornamental gardening. Exceptional cultivars 'Leningradskaja otbornaja' and 'Krasnaja grozd' were typical of large yield and quite good resistant to pests and diseases.

DYNAMICS OF ZOOPLANKTON IN DAUGAVA THROUGH SEASONS IN THE SECTION OF THE RIVER BETWEEN KRASLAVA AND DUNAVA

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80 species of zooplankton 45 of which belong to organisms group Rotatoria, 27 – Cladocera, 8- Copepods have been found in the researched section of the river during spring, summer and autumn of 2008. The biggest diversity of species was established in the beginning of August when the most common Rotatoria species were Rotifers, *Euchlanis dilatata, Brachionus quadridentatus,* number and variety of *Cladocera* species were significantly increased with *Syda crystallina, Chydorus ovalis, Ceriodaphnia reticulata, Chydorus sphaericus* dominating. More widespread Copepoda species were Nauplii, *Cyclops sp.,* Copepodite.

In May 2008 species showing massive spread were *Keratella cochlearis, Polyarthra dalichoptera, Keratella quadrata, Kellicotia longispina* of *Rotatoria* group, *Bosmina longirostris* of Cladocera and Nauplii of Copepods.

In September 2008 variety of species and number of organisms were the smallest, the most common Rotatoria species were *Euchlanis dilatata*, Rotifers, *Trichocerca rattus, Keratella cochlearis,* number and occurrence of Cladocer species were reduced significantly in comparison with August with Alona quadrangularis being the most common. Nauplii and Copepodite of Copepods species can be considered massive.

19 zooplankton species were present in Daugava during all three seasons.
The reproduction of some species is greatly affected by temperature. In 2008 the good observation of reproduction intervals of *Brachionus quadridentatus, Keratella quadrata, Keratella cochlearis, Ascomorpha ecaudis, Kellicotia longispina, Polyarthra dalichoptera, Chydorus sphaericus, Bosmina longirostris were* made.

K. quadrata, K. cochlearis, A. ecaudis were found all year round peaking in spring when water temperature was around 140C.

K. longispina, P. dalichoptera reached maximum in spring but were not found in autumn.

Number *B. quadridentatus* increased as temperature increased up to 200C and reached maximum in August.

B. longirostris had the most favourable environment when temperature in 15-190C. In 2008 this species reached maximum growth in May.

C. sphaericus was observed all year reaching maximum in August. The feed was more important factor then temperature for growth of this species. Species such as *Conochilus unicornis, Euchlanis parva, Lepadella elliptica, Trichocerca tigris, Trichocerca cylindrica, Sida crystallina, Daphnia cucullata, Daphnia cristata, Daphnia longispina, Ceriodaphnia reticulata, Ceriodaphnia affinis, Scapholeberis mucronata, Scapholeberis aurita, Peracantha truncata,*

Kurzia latissima, Pleuroxus truncatus, Eurycercus lamellatus, Polyphemus pediculus, Eudiaptomus gracilis appeared in the plankton only in the second part of summer when water temperature reached 19- 200C. The massive growth of these species depends not only on temperature but also on growth of aquatic plants that served as a good feed base.

During spring and autumn in the terms of quantity predominant organism group in Daugava's zooplankton was Rotatoria, during second part of summer predominant organism group was Cladocera. In the terms of biomass in May dominated Ratatoria, in August – Cladocera, but in September – Copepoda.

During summer and autumn Daugava's left bank was richer with organisms quantity wise, but during spring – right bank. The least amount of organisms was in the middle stream of the river.

Overall the distribution of zooplankton quality wise and quantity wise in length and cross profiles of the river in 2008 was very variable.

INSECT DIVERSITY IN SEMI-NATURAL HABITATS OF ESTONIA: ITS RELATION WITH HABITAT AND LANDSCAPE STRUCTURE

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Insects are considered as key indicators of environmental change due to their diversity in habitat requirements and characteristics. Throughout the existing literature, their role as ecological indicators has been tested and studied (Pywell et al. 2004, Sepp et al. 2004, Billeter et al. 2008, Rundlof et al. 2008).

In our study, we determined species diversity and abundance of butterflies, bumblebees and day-flying moths in 22 meadows situated in North-East Estonia. The field work was carried out during summer 2008 in the region called Ida-Virumaa. The study was done in places with different characteristics and land cover types: some of them were situated in coastal areas; other sites were surrounded mainly by forests or grasslands; some others were located in places affected by mining activities (i.e. oil-shale) and electrical power plants; and few of them were closed to urban and rural areas.

We found a total of 50 butterfly species, 25 bumblebee species and 32 species of moths. Overall results showed that number of individuals was lower in sites with windy conditions, mainly situated in coastal areas. On the other hand, species richness was higher in places surrounded by forests or meadows, or located close to fresh waterbodies. In places situated near power stations we observed some negative impact in the number of day-flying moth species, probably due to the air pollution levels.

GENETIC CHARACTERISTICS OF LOCAL POPULATIONS OF EUROPEAN VENDACE (*COREGONUS ALBULA* (L.)) IN SOME LATVIAN LAKES BASED ON IZOENZYME MARKERS

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Vendace is a widespread fish in waters of the Holarctic. This species is included in the list of specially protected species with limited use in Latvia (rule No 396 of the Cabinet of Ministers, 14.11. 2000).

Vendace needs a high oxygen content of water, maximum depth, water transparency and nutrient content, and it is quite sensitive to water eutrophication and pollution also. Coregonus albula populations in shallow lakes were subject to a lot of the environmental factors, such as changes in incubation temperature of eggs, influence of predators, which disturb a genetic structure of population.

A genetic variation and structure of population with and between populations from four relatively shallow and three deep lakes in Latvia were investigated. The genetic polymorphism and structure of vendace population of some lakes in Latvia, based on the analysis of izoenzyme systems, were evaluated in the present work. Electrophoretic analysis in polyacrilamide gel was used. The computer program "POPGENE" was applied for the analysis of izoenzyme systems and frequencies of genotypes and alleles. The coefficient of similarity among individuals, the interpopulation similarity index, genetic diversity or dissimilarity index was calculated. The genetic parameters of the populations, such as the number of polymorphic loci and mean of heterozygosity of populations, were calculated also.

The analysis of izoenzyme systems shown, that the numbers of loci and alleles are analogical in all investigated populations. The distribution of genotypes in these izoenzyme systems was different in the investigated populations of vendace. The average mean of protein polymorphism in vendace population in Latvia was appropriate to fish population (approximately 40%).

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PRELIMINARY ASSESSMENT OF BLACK ALDER WOODLAND KEY HABITAT MANAGEMENT EFFECTIVENESS IN LATVIA

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Woodland Key Habitat (WKH) concept in forestry Latvia is widely used since 1990'ties. The WKHs are the forest biotopes which are assumed to provide existence of rare and endangered species having highly specific demands for the habitat which could not be maintained under conventional forest management. According to the estimates made by ecologists, some management or creation of buffer zone is necessary for about 40% of the WKHs and potential WKHs of the total area 18,000 ha inter alia in the black alder WKH.

The effect of management activities prescribed by ecologists is "guestiomate" (guess + estimate) and neither ecological nor economical effect is evaluated so far in Latvia. More scientific background is needed to make management in the efficient way.

In 12 Black alder dominated WKHs were established 6-9 sample plots, using BACI (Before - After – Control – Impact) experiment design approach.

In each sample plot stand structure (tree species, dimensions), Coarse Woody Debris, presence of WKH Indicator species & Habitat specialist species: lichens (5 species), polyporous fungi (16 species), vascular plants & bryophytes (8&16 species), mollusks (15 species) were evaluated. In 10 of 12 stands in addition in the 2 plots per stand complex of the above mentioned organism groups was described.

At this stage situation in the sample plots before management is analyzed.

Alfa diversity is assessed using Shannon Wiener index, Simpsons's D and Berger-Parker Dominance index.

Environmental factors are described using Ellenberg, Düll and Wirth indices of species requirements of light, continentality, temperature, moisture, pH reaction and amount of nitrogen. The analysis and comparition of the relationship among species, species diversity, number of specimen and environmental indicators have been done using Detrended Correspondence analysis, Canonical correspondence analysis and Two-way indicator species analysis procedures, as well as linear regression.

A part of the plots is affected by forest drainage, and mean Ellenberg indicator value of moisture do not exceed 6 in such sites. Mesophyte and meso-hygrophyte epiphytic indicator species of bryophytes, more characteristic for broad-leaved forests, are established here.

Species typical for black older swamps, bryophytes as well as vascular plants, occur in natural habitats, where mean Ellenberg indicator value of moisture reach 7 or more. On the black alders 20 epiphytic lichen species inter alia 3 especially protected species - Arthonia leucopellea (Ach.) Almq., Arthonia spadicea Leight., Arthonia vinosa Leight., were found, which indicate suitable conditions for especially endangered species and testify of permanently natural processes in the stand. In single stand max number of WKH indicator species – epiphytic lichens was 4, while usually 1 to 3 species.

Max number of WKH indicator species – molluscs in a single stand was 5, while in 6 stands only 1 species were found, and 2 stands – none.

LATHYRUS LAEVIGATUS (WALDST. ET KIT.) GREN. IN THE LENINGRAD REGION (RUSSIAN FEDERATION)

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L. laevigatus is a Central-European-Mediterranean species. It was previously reported to be found in the western part of the Leningrad Region (LR) in the number of several exemplars on the Izhorskaya height and by old data on the bank of river Oredezh without exact direction of location.
L. laevigatus was founded on the Vepsovskaya height in the number of several hundred exemplars in 2007-2008. This is extreme north-eastern location for this species. Vepsovskaya height is disposed on the eastern boundary of the LR. The territory is characterized by hilly-moraine relief, temperate-continental climate. Carbonate moraine is presented in many places. *L. laevigatus* grows by curtains. The projecting covering reaches 60%. The generative individuals are predominated. Several exemplars have up to 130 cm height (much more than registered in the literature).

L. laevigatus grows on the edgings and lighting parts of the spruce, spruce-birch, spruce-aspen, spruce-birch-aspen, aspen-birch, birch-(grey) alder-spruce, aspen, birch and grey alder forests by the sharp banks of the river Oyat' from tops to foots, by the slopes of the big ravines near channel, by sharp banks of rivers and streams near mouth in the Oyat' (rivers Nizhnaya Kurba, Verkhnaya Kurba etc.). Those species grow rarely on the flat un-high parts by banks including by channel of the streams flows into the Oyat' and on the banks Jandozero and Sondalozero lakes near Oyat'. The broad-leaved trees is absent in the tree story. Tilia cordata were found near 2 location of L. laevigatus only.

*Sorbus aucuparia, Padus avium, Salix caprea a*re usual in the first story of the undergrowth, *Rosa acicularis, R. majalis, Ribes nigrum, R. spicatum, Rubus idaeus,* rarely *Juniperus communis*, the nemoral shrubs are *Daphne mezereum, Lonicera xylosteum, Viburnum opulus* are growing in the second story of the undergrowth. The big herbs are *Geranium sylvaticum, Athyrium filix-femina, Dryopteris expansa, D. carthusiana, Trollius europaeus, Filipendula denudata, F. ulmaria, Calamagrostis arundinacea, C. canescens, Lysimachia vulgaris, Angelica sylvestris, Cirsium heterophyllum* grows in the herbal-dwarf story. *Rubus saxatilis, Vaccinium myrtillus, V. vitis-idaea, Galium boreale, Luzula pilosa, Solidago virgaurea, Equisetum sylvaticum, Phegopteris connectilis, Maianthemum bifolium, Pyrola rotundifolia, Viola palustris, Gymnocarpium dryopteris, Oxalis acetosella, Crepis paludosa* are usual forest species of taiga zone. The more "eastern" species are *Aconitum lycoctonum, Bistorta major, Conioselinum tataricum, Crepis sibirica*. There are nemoral species: *Lathyrus vernus, Stellaria holostea, S. nemorum, Aegopodium podagraria, Convallaria majalis, Viola mirabilis, Actaea spicata, Paris quadrifolia, Melica nutans, Thalictrum aquilegifolium, Poa nemoralis, Pulmonaria obscura, Milium effusum, Carex digitata, Ranunculus cassubicus s*.l.

It's a rare plant (status 1E in the LR) but locations are disposed on the natural park "Vepssky Forest".

STRUCTURE OF PERIPHYTON COMMUNITIES ASSOCIATED WITH SUBSTRATE TYPE IN THE LOWER REACHES OF SALACA RIVER, NORTH VIDZEME BIOSPHERE RESERVE, LATVIA

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Lower reaches of Salaca River are characterised by biotopes formed on boulders, coobles, pebbles, gravel, sand and macrophytes. In summer vegetation period periphytic community formed on hard substratum is rich in red algae *Lemanea fluviatilis* and *Hildenbrandia rivularis.* Small amounts of freshwater rhodophyte *Batrachospermum spp.* are detected on cobbles, pebbles and reeds. In summer period reeds and bulrushes are overgrown by mats of green algae *Rhizoclonium hierogluphicum* and *Cladophora glomerata*. Exposed parts of cobbles are covered by filamentous cyanobacteria *Oscillatoria spp., Lyngbia sp.* but shaded parts of the same cobbles are covered by thalli of red algae *Hildenbrandia rivularis.* In the autumn period Rhodophyte *Chantransia sp*. was detected on the reeds. Diatoms are typical for all type of the substrata. Stems of submerged macrophytes *Butomus umbellatus* and *Schoenoplectus lacustri*s serve as substrata for 20 diatom species dominated by *Gomphonema parvulum* (75% from total number of valves). 25 diatom species are detected on algal mats dominated by *Cocconeis pediculus, Acnanthidium minutissima* and *Rhoicosphaenia abreviata.* 39 species of diatoms are detected on *Potamogeton sp.* substrata where *Cocconeis placentula* dominated (56% from total number of valves). Species of Navicula genus with small cell volume were detected in high amount. Diatom samples from cobbles (sampled in upper part of Salaca River) shows highest biological diversity – 49 diatom species dominated by *Cocconeis placentula, Melosira varians* and *Cyclotella radiosa.* It shows that hard type of substrata would be more representative for diatoms like macrophytes. Zooperiphyton - animal organisms that attach to submerged objects in the bed of a body of water, as certain algae or insect larvae living on submerged plant stems and leaves in lower Salaca reaches is characterised by Chironomidae, Mollusca (*Physa fontinalis, Theodoxus fluviatilis, Ancylus fluviatilis, Valvata piscinalis)*, Oligochaeta (*Stylaria lacustris, Spirosperma ferox, Tubifex ignotus, Nais behningi, Nais barbata, Stylodrilus heringianus*), Malacostraca (*Asellus aquaticus, Gammarus pulex*), Heteroptera (*Aphelocheirus aestivialis*), Simulidae, Trichoptera *(Hydropsyche sp., Brachycentrus subnubilus, Mystacides sp.*), Ephemeroptera (*Serratella ignita, Caenis sp.*, Baetidae) and water mites - Hydrachnidia.

INFLUENCES OF WATER AND SUBSTRATE QUALITY FOR PERIPHYTON AND INVERTEBRATE COMMUNITIES IN SMALL RIVERS OF WESTERN LATVIA AND SLĪTERE NATIONAL PARK

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Three of investigated rivers – River Pitragupe, River Mazirbe and River Ķikāna upe are situated in the territory of Slītere National Park. Two rivers - River Melnsilupe and River Pilsupe flows into the Riga bay in Western part of Kurzeme. Rivers are potamal type and characterised by habitat fragmentation. Investigated biotopes are formed by boulders, coobles, pebbles, gravel, sand, snags, wood, peat, macrophytes and water moss - Fontinalis antipyretica. Rivers are characterised by velocity of stream - 0.09-0,42 m/s; summer water temperature t0 13,02-15,040 C; pH – 7,14-8.24; river depth - 0.2-0.56 m; dissolved oxygen – 4,67-8,64 mg/l; electrical conductivity 180 C – 159-467 µs/cm2; water colour 700Pt/Co (River Pilsupe) -371 0Pt/Co (River Mazirbe); Nitrogen (N-NO3-) - 1,8 mg/l (River Ķikāna upe) -3,8 mg/l (River Mazirbe); Phosphorus - (PO4 3-) – 0,008 mg/l (River Pitragupe) - 0,39 mg/l (River Mazirbe).

Undisturbed shaded river stretches situated in river valleys (River Pitragupe and River Melnsilupe) are characterised by scanty algal flora typical for small forest streams. Periphytic community formed on hard substratum are characterised by diatoms and rich development of red algae Hildenbrandia rivularis. Freshwater rhodophyte *Batrachospermum spp.* and green filamentous algae *Draparnaldia glomerata* are stated in small amounts. Filamentous cyanobacteria are not observed. These stretches shows multiform composition of invertebrate communities formed by Plecoptera (*Leuctra sp., L. digitata, L. hipponus*), Ephemeroptera (*Paraleptophlebia submarginata, Ephemerella ignita, Caenis rivulorum, Baetis sp.*) and Trichoptera.

Typical small forest rivers (Upper stretches of River Pilsupe and River Ķikāna upe) characterised mostly by sand biotopes. Periphytic communities are formed on pebbles, soft sand substrate and on the macrophytes. Periphyton communities are dominated by diatoms, scanty mats of green algae and filamentous cyanobacteria – *Oscillatoria spp.* on sand and wood substrata. Rear red algae *Batrachospermum moniliforme* was found in high amounts in River Ķikāna upe. Invertebrate communities are formed by Plecoptera (*Leuctra digitata, L. hipponus)*.

Brownwater river Mazirbe (water colour 371 0Pt/Co) is impacted by bog environments. Periphyton communities are formed on snags, wood, peat and macrophytes. In sun exposed stretches periphyton is rich in pennatae Diatoms and filamentous blue-greens (cyanobacteria) – *Oscillatoria tenuis.* Red algae *Batrachospermum spp* are detected in shaded biotopes. Invertebrate communities are formed by Ephemeroptera – *Baetis vernus, B. sp.. Syphlonurus lacustris. Asellus aquaticus, Hydropsyche sp., Athripodes sp.* are detected in all the observed rivers. Small rivers of Western Kurzeme and Slītere National park shows high and good habitat

SPECIES OF GENUS LADY'S-MANTLE (*ALCHEMILLA* L.) IN THE FLORA OF DAUGAVPILS CITY

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Genus *Alchemilla* includes more than 1000 microspecies distributed in the Northern hemisphere. Largest number of species is found in Europe and West Asia. In the wild flora of Latvia genus *Alchemilla* consists of 24 species, one of them is known as alien.
Species of genus *Alchemilla* is well-known example of apomixis, polyploidisation and hybridisation, therefore systematic and identification of *Alchemilla* has remained poorly understood, and has led to the description of a large number of (micro-) species.
From E. Lehmann's investigations at the end of the 19th century until today, 920 species from 98 genera have been found here, and authors usually mentioned only one species of Lady's-mantle – *Alchemilla vulgaris* L. s.l. Six microspecies is mentioned in the flora of Daugavpils city after previous inventory of vascular plants, who was carried out from 1975 to 1983 by Ç. Gavrilova and L. Tabaka: *Alchemilla subcrenata* Buser, *A. acutiloba* Opiz, *A. cymatophylla*, Juz., *A. filicaulis* Buser, *A. glaucescens* Wallr., and *A. gracilis* Opiz.
Analysis of herbarium material of *Alchemilla* species collected in Herbarium of Daugavpils University (137 specimens) as well as literature where these species are mentioned in Daugavpils city is carried out. In total 16 *Alchemilla* species were found in the present study. 13 species are known from herbaria (DAU) - *A. acutiloba* Opiz, *A. baltica* Sam. ex Juz. *A. cymatophylla, A. glabricaulis* H. Lindb. *A. glaucescens, A. gracilis, A. lindbergiana* Juz., *A. monticola* Opiz (very common), *A. plicata* Buser, *A. propinqua* H. Lindb. ex Juz., *A. sarmatica* Juz., *A. subcrenata, A. xanthocarpa* Rothm., and three other species: *A. subglogosa, A. heptagona* and *A. semilunaris* are known from from other herbaria material.
Only one previously known species: *A. filicaulis* was not found during the research.

PRELIMINARY STUDIES ON THE GENETIC DIVERSITY OF AN ENDEMIC AND ENDANGERED SPECIES SAUSSUREA ESTHONICA IN LATVIA

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Saussurea esthonica is a perennial species included in the Red Data Book of Latvia, Red Data book of the Baltic Region and EU Habitats Directive Annex II. It is important to maintain genetic diversity within and between populations for conservation of this species in Latvia. There are two known populations of S.esthonica in Latvia – in the protected wetlands in the vicinity of Apšuciems and Pope.

The aim of this study is to evaluate genetic diversity between and within populations to understand the threats to the future existence of these populations. The genetic diversity and structure of these populations were investigated using retrotransposon and AFLP markers.

BORRELIA IN TICKS FEEDING ON MIGRATING BIRDS IN LITHUANIA AND NORWAY

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Birds are known to carry several pathogenic agents of human disease. To define the role of migrating birds as reservoir and disseminators of *Borrelia* pathogens in Lithuania and Norway we analysed immature stage of ticks feeding on different passerine bird species and questing ticks. During the spring-summer 2006-2007 185 birds representing 35 species were live-captured in Lithuania and southern Norway. A total of 668 immature stages of I. ricinus ticks were collected from birds. Ticks were investigated for the presence of *Borrelia burgdorferi, B.* afzelii, *B. garinii* and *B. valaisiana* pathogens by using molecular detection methods (PCR, RT-PCR). The most frequently tick-infested found species was blackbird (*Turdus merula*). Six of these passerine bird species (*T. merula, T. philomelos, T. pilaris, Sturnus vulgaris, Fringilla coelebs, Carpodacus erythrinus*) harboured *Borrelia* infected ticks – causative agent of borreliosis (Lyme disease). The results of the study indicate different role of passerine birds in ecology and epidemiology borreliosis in Lithuania and Norway.

GENETIC DIVERSITY OF SPRING OILSEED RAPE (*BRASSICA NAPUS* L.)

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Oilseed rape (*Brassica napus* L.) is grown all over the world. This crop is the main stock of oil in Lithuania, so its plots are expanding every year. There are 33 cultivars of spring oilseed rape registered in Lithuania. Genetic variability of spring oilseed rape in Lithuania was analyzed by RAPD molecular markers. Five different cultivars of spring oilseed rape ('Masko't, 'Savan', 'Heros', 'Ural', 'Landmark') were collected for research. Also samples were taken from two farmers growing different cultivars of spring oilseed rape. Four RAPD primers: OPA-01, OPA-04, OPA-09, OPA-11 were screened for their ability to produce polymorphic patterns. Tested primers generated different polymorphic fragments ranging from 1 to 9 per reaction, overall 46 polymorphic amplification products in the range of 220-1800 bp. Dendrograms based on UPGMA cluster analysis confirmed the suitability of all the primers for the further analysis and showed a significant genetic variation among individuals of different cultivars.

PHYTOPLASMA SPECIES DETECTED ON CROPS AND WEEDS IN RUSSIA

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During the summer of 2008, potato, tomato, strawberry and coriander plants, as well as several different weeds (dandelion, chicory, bindweed, thistle and ragweed) showing symptoms of phytoplasma disease were collected from locations throughout Russia. A nested PCR using phytoplasma-specific primer pairs P1/R16-SR and R16F2n/ R16R2 was performed to detect phytoplasma in the samples. RFLP (restriction fragment length polymorphism) analysis of nested PCR products was used for identification of the putative phytoplasmas. All phytoplasmas identified in the tested samples were associated with two phytoplasma strains of 16Sr groups: 75% samples were infected with phytoplasma belonging to stolbur group (subgroup 16SrXII-A of group 16SrXII) and 25% samples showed RFLP profiles similar to X-disease group (subgroup 16SrIII-B of group16SrIII).

ALIEN SPECIES IN THE FLORA OF THE ISLANDS OF THE GULF OF FINLAND

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The share of adventive species in the flora of the islands of the Gulf of Finland, which are under slight anthropogenic pressure, is relatively small, averaging about 20 % of the total species number of the flora (3 to 10 % on uninhabited islands). To compare, according to the «Manual of the Vascular Plants of North-West Russia» (2000), 1166 species of vascular plants (about 43 %) of 2730 ones cited in the book, are alien.

Our research on the islands of the Gulf of Finland has shown, that the Kotlin Island, with the town of Kronstadt taking about 60 % of its area, is on the leading position in the number of alien species, including invasive ones. Dislike the other islands, Kotlin is an area very changed by man, with high species richness owing to a great diversity of secondary ecotopes. Alien species comprise about 40 % (363) of the total species number of the island flora (605). Numerous wastelands, abandoned sandpits, dam constructions give habitats to many alien plant species: *Ambrosia artemisiifolia, Corispermum hyssopifolium, Chenopodium strictum, Epilobium tetragonum, Oenothera biennis, O. rubricaulis, Amaranthus retroflexus, Echinochloa crusgalli, Atriplex laevis, A. sagittata, Helianthus tuberosus* etc. A great number of adventive species, many of them being of the North American origin, actively invade half-natural plant communities on Kotlin. Many of them, e.g., *Amelanchier spicata, Epilobium adenocaulon, E. pseudorubescens, Aster novi-belgii, Aster salignus, Lepidotheca suaveolens, Lupinus polyphyllus* have established in the islands of the Gulf of Finland. A North American invasive species *Bidens frondosa* L., recorded by the author on Kotlin in 2004 for the first time in the North-West Russia, now is actively spreading throughout the island. Naturalized and widespread on Kotlin have also become *Echinocystis lobata, Calystegia spectabilis,* and *Impatiens glandulifera,* escaped from cultivation and occurring now at the seashore plant communities. A woody introduced plant *Hippophaė rhamnoides* quite often occurs on Kotlin Island on sandy wastelands and among reed stands near coasts, as well as along the dam. It gives much fruit, propagates well and looks like a naturalized species, which has found acceptable habitats in the island. These habitats are similar to natural ones in the West Europe, where *H. rhamnoides* is known to occur on seaside dunes and sandy-stony beach ridges. Two more introduced woody species, *Elaeagnus commutata* and *Salix acutifolia*, were planted to fix coastal sands, and then began naturalizing in the Leningrad Region on sandy shores of the Gulf of Finland. Completely established and entered into natural communities ha become Rosa rugosa, regarded now as one of the most active invasive species in the Baltic Region.

Many adventive species penetrate to the islands with ballast water. The record of a species new to Russia, *Beta maritima*, on the Small Tuters Island in the Gulf of Finland is among striking examples. The nearest localities of *Beta maritima* in the Baltic region are known 1000 km west, in the southern Sweden and on the Danish Bornholm Island. Dislike findings of *Beta maritima* at the eastern coast of Sweden and in the southern Finland, where the species vanished as soon as after a year, *Beta maritima* on Small Tuters apparently has been existing more than one year and produces viable seeds. It may be supposed that

provided long and warm enough summer, *Beta maritima* will probably settle in this northern part of its range.

The adventive flora is a dynamic system, permanently changing due to introduction of new species, escape of cultivated ones and extinction of some earlier introduced species. The challenge of great importance is a long-term monitoring of the flora of the islands of the Gulf of Finland, to allow distinguish changes in the composition of the flora, record appearing new alien species, including invasive ones.

SPRING WHEAT BREEDING USING DOUBLE HAPLOIDS TECHNOLOGY

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In the last decade of 20th Century spring wheat became most popular cereal in Latvia. Cultivation area of this crop varied around 50 000-60 000 ha per year. In 1990ies, new spring wheat breeding programme was established at the State Stende Cereals Breeding Institute with the goal to create new varieties with the high grain yield and quality, conforming industry requirements, as well with the resistance to lodging and main diseases. Traditional breeding methods are dominant in cereals breeding till nowadays. In conventional breeding selection is practised for several generations, thereby desirable characters can be improved in populations. Nevertheless, traditional breeding methods are slow and could take even 15 years till the developing of a new variety. Another disadvantage of traditional breeding methods is inefficiency of selection in early generations because of the heterozygosity of the breeding material on this stage. Methods of biotechnology, like double haploids (DH) and molecular marker assisted selection could highly contribute to improving efficiency and to speeding up the breeding process. The application of the spring wheat breeding programme started with renovation and evolution of the genetic resources usable as an initial breeding material in Latvian conditions. DH technology and molecular marker methods were used in appropriate breeding stages. The protocol of DH lines obtaining from spring wheat anther culture was modified. As an initial material breeder's F2 hybrids ((Dragon/Aniina)/Fasan) of spring wheat were used. The cold (+4 ºC) pre-treatment of spikes was applied, then spikes were sterilized by 50% solution of bleach for 17 min. Isolated anthers were cultivated on the AMC induction medium with 2.5 mg/l $CuSO_4 \times 5H_2O$. Produced DH lines were multiplied and tested in field conditions. The DH line DH-3 shown very promising results and was passed to the State variety testing as a candidacy for a new spring wheat variety adapted to the Latvian conditions. For molecular certification of new potential variety microsatellite DNA markers were applied.

MICROBIAL DIVERSITY IN FIELDS OF CONVENTIONAL AND BIOLOGICAL AGRICULTURE

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Components of agricultural management regime (crop rotation, tillage, compost, manure, herbicide and fertilizer application) and water regime, are key determinants of microbial community structure in soil. Plant type is also important factor since they are providing microorganisms (MO) with specific carbon sources.

Objectives of the investigation were to determine the microbial diversity in the soil of conventional (C) (potato, winter rye, summer rape, barley with vetch,) and biological (B) agriculture (potato, winter rye, crucifers (oil radish, rape, mustard)) fields.

The amount and diversity of MO was analyzed by conventional plating. The genetic diversity of fungal communities was detected by ARDRA. The quantity of Trichoderma spp. DNA was determined by RT-PCR.

Results showed that in June the amount of microbial CFU/g of soil was higher ($p<0.05$) in B fields in comparison with C fields. There was a tendency in C fields that the decrease of the amount of bacterial-K-strategists is more expressed than the decrease of the amount of bacterial-r-strategists. Main fungal genera were *Absidia, Cephalosporium, Mortierella, Mucor, Penicillium, Trichoderma* and *Verticillium*. In August the amount of maltose using bacteria in C potato field was significantly reduced in comparison with B potato field, and in C winter ray field the amount of actinomycetes is reduced if compared with B field. Other significant differences between C and B fields were not detected. Main fungal genera were the same as in June. The highest fungal diversity in June was detected in B field of crucifers but the lowest in C potato field. In August the highest fungal diversity rates were detected in the C potato field. The average amount of Trichoderma spp. DNA in B fields was slightly higher than in C fields.

Conclusions are that all 7 analyzed fields show diverse results with tendency for B fields to have higher diversity of cultivable MO, higher fungal diversity estimated with ARDRA and higher amounts of *Trichoderma* spp. DNA.

FUNGI ON AESCULUS PLANTS IN VILNIUS CITY GREEN PLANTATIONS

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Six species of the *Aesculus* genus: *A. carnea* Hayne, *A. flava* Sol., *A. glabra* Willd., *A. hippocastanum* l., *A. pavia* L., *Aesculus x carnea* Hayne grow in botanical gardens, homestead popular parks and green plantation in Lithuania. In city green plantations frequent are – A. hippocastanum, infrequent – *Aesculus x carnea.*

Horse chestnut (*A. hipposactanum*), together with other trees, plays significant role in green plantations. These trees are especially sensitive to biotic and abiotic factors.

The main purpose of the work was to explore the horse chestnut's (*Aesculus hippocastanum*) mikobiota structure and the spread of microorganisms over the urban sprouts. The phytosanitary state of green plantations was estimated in Vilnius City in 2005–2008.

It was indicated that in some streets the horse chestnuts are in a bad condition. 24 taxa of pathogenic fungi were identified on horse chestnut (*Aesculus hippocastanum*), and one taxon – on *Aesculus x carnea*.

Advanced decay, mainly caused by *Fusarium* genus fungi, as well as branch breakage caused by *Nectria cinnabarina* were mostly observed on *Aesculus hippocastanum*. In addition, advanced decay caused by *Ganoderma lipsiense, Oxyporus populinus, Laetiporus sulphureus* and *Schizophyllum commune* were the most important reasons for decreased quality of Aesculus trees.

Most dangerous and frequent fungi causing leaf damage of *Aesculus hippocastanum* in green plantations of cities were *Diplodina aesculi, Erysiphe flexuosa (Uncinula flexuosa)*. The *Aesculus* powdery mildew agent (*Erysiphe flexuosa*) has undoubtedly been introduced from North America and is a new disease for Lithuania. Now this fungus is widespread on *Aesculus hippocastanum*. All diseases often occur simultaneously.

In recent years *Phomopsis* damages have been found on more than 7 year-old *Aesculus x carnea* branches. *Phomopsis spp*.i on *Aesculus x carnea* is reported for the first time in Lithuania.

Cameraria ohridella has become the most important pest of the *Aesculus* genus plants in Lithuania in recent years.

INVASION OF *ELODEA CANADENSIS* IN LATVIA

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Canadian waterweed *Elodea canadensis*, a submerged aquatic macrophyte of North American origin, is one of the most successful aquatic plant invaders in Europe.

It was accidentally brought to Europe in the 19th century, and by the mid 20th century it was known as invasive neophyte species in most of European countries. In Latvia, *E. canadensis* was first recorded in 1872 in Riga. Since then, it has rapidly and successfully invaded various water bodies and streams. Up to the beginning of the 19th century, the species occurred mainly in the surroundings of Riga and along the southern coastline of the Riga Gulf and in few sites by the Baltic coast in West Latvia, while by the mid 20th century it was present in all regions of Latvia. In the beginning of the 21st century it was well-naturalized, common species found throughout the country in all types of water bodies and streams often in large abundance as dominating species.

In 1937 K. Starcs emphasized the lack of knowledge on the actual distribution and spreading history of *E. canadensis.* In the 1930's and 1950's the occurrence frequency of this species was roughly estimated as 'common'. However, over more than a century since the appearance of *E. canadensis* in Latvia, there had not been any investigations on its actual distribution and habitat preferences.

In this study we aim to find out the spreading dynamics, historical and current distribution pattern and habitat preferences of *E. canadensis in* Latvia. The work was carried out on the basis of revision of numerous herbaria sheets, literature records, data basis, and field notes. Simultaneously, we tried to find out if *E. canadensis* is the only non-native species of this genus currently being present in Latvia. Considering that the morphologically similar congener species Nuttall's waterweed *E. nuttallii* is presently colonizing other parts of Europe and widely grown as aquarium plant, we suppose that it might already occur in Latvia or will appear in the immediate future.

MICROSATELLITE AND SNP POLYMORPHISM OF THE MYOSTATIN (MSTN) GENE IN LATVIAN BLACKHEAD SHEEP BREED

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Gene region from 5'UTR till MS containing intron I portion of myostatin (MSTN) gene was sequenced in 16 animals of the Latvian Blackhead sheep breed in order to extend limited up today in sheep data on the MSTN gene polymorphism and to provide information useful for conservation of Latvian local breed. Seven SNPs including two in 5'UTR and six in intron I was identified when sequences were compared to GeneBank deposited sheep MSTN gene. Six loci were polymorphic within Latvian breed and could be sorted into nine haplotypes. Results indicate on incomplete linkage disequilibrium between polymorphic loci in consequence of separation by recombination or recurrent mutations during breed history. No variation was identified within exon I as well as within intron I microsatellite (MS) motif or repeat number. Newly described sheep MSTN gene SNPs and haplotypes were submitted in the corresponding NCBI GeneBank databases.

ASSOCIATIONS BETWEEN BACULOVIRUSES AND DENDROPHAGOUS INSECTS RECORDED IN LATVIA

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Institute of Biology has been working on problems, which includeded development of microbiological methods for plant protection in Latvia for many years. Occurrence of baculoviruses and their biodiversity have been studied. Observations of natural epizootics and collecting of infected insects has been done regularly in central and western parts of Latvia.

The aim of studies was to extend the knowledge of baculoviruses and to clarify their role in regulation of pest populations. Attention was paid to registration of associations between baculoviruses and different insect species. The main tasks were: 1) to obtain new isolates and describe their morphological and biological properties, 2) to describe the natural occurrence of viruses in pest populations. New sensitive methods of pathogen detection were used to monitor occurrence and presence of pathogens in the insect populations. The majority of baculoviruses was isolated from important agricultural and forest pests. Different stress factors were used to activate expression of viral infection.

Nuclear polyhedrosis viruses (NPV) were isolated from fruit-tree pests *Orgyia antiqua* L., *Malacosoma neustria* L., Y*ponomeuta malinellus* Zell.; forest pests *Operophthera brumata* L, *Bupalus piniarius* L., *Lymantria monacha* L., *Lymantria dispar* L. *Eriogaster lanestris* L., *Gilpinia pallida* Kl., *Neodiprion sertifer* (Geoffr.) and *Yponomeuta cognatella* Hg. Granuloviruses were isolated from fruit-tree pests *Cydia pomonella* L. and *Yponomeuta padella* L. The presence of NPV was recorded in declining populations of the European tent caterpillar *Malacosoma neustria* in western and central part of Latvia. This research has been financially supported by the grants from the Latvian Council of Sciences and the Foundation of Forest Development.

DEVELOPMENT OF RETROTRANSPOSON-BASED MOLECULAR MARKER SYSTEM FOR ANALYSIS OF GENETIC DIVERSITY IN NORTHERN EUROPEAN POPULATIONS OF SEA HOLLY *ERYNGIUM MARITIMUM* L.

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The genetic diversity of highly endangered plant Sea Holly *Eryngium maritimum* was previously estimated using universal molecular markers of nuclear and chloroplast genome. These marker systems could not resolve relationships between the two Latvian populations of Sea Holly found at Ziemupe and U¸ava. The need for more sensitive molecular marker system was the reason for development of a SSAP (sequence-specific amplification polymorphism) molecular marker system, which is based on insertion polymorphisms of long terminal repeat (LTR) retrotransposons.. SSAP has been referred to as a highly sensitive method for analysis of genetic diversity between and within species. Six LTR sequences of Ty1-copia retrotransposons were isolated from the Sea Holly genome and tested for their usefulness as molecular markers for analysis of genetic diversity. Four of the LTRs were demonstrated as potentially useful for development of SSAP molecular markers. Two of the most useful LTR retrotransposons were applied for analysis of diversity in Eryngium maritimum Northern Europe populations and ten polymorphic bands were derived. The marker data was used to construct a Neighbor Joining dendrogram. Latvian population of Sea Holly appeared as the most homogeneous group among all the populations. Other Northern Europe populations were more genetic diverse but exhibited no specific clustering according to geographical origin. The retrotransposon-based SSAP marker system proved to be a useful new molecular marker system for genetic diversity analysis in Sea Holly.

PRELIMINARY DATA ON A PHYSIOLOGICAL STATUS OF ENDANGERED COASTAL SPECIES *ERYNGIUM MARITIMUM*

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Eryngium maritimum L. is a diminishing species in Northern Europe. The aim of the present study was to search for environmental factors affecting physiological status of *E. maritimum* in two Latvian populations in comparison with other North European populations. Chlorophyll a fluorescence was used as an indicator of plant vitality and photosynthetic productivity. Maximum photosynthetic efficiency of photosystem II (FV/FM) and chlorophyll content in leaves of *E. maritimum* showed a development-related characteristic trend during a growth season. Photoinhibition of photosynthesis due to unfavorable growth conditions was indicated by a severe decrease of FV/FM. Performance of photosynthesis was affected by local environmental conditions. It is concluded that individuals of *E. maritimum* in conditions of Latvia are negatively affected by increased atmospheric precipitation and decreased number of sunny hours per day together with a low average summer temperature.

REGIONAL VARIABILITY OF NATURAL WOODLAND HABITATS IN LATVIA

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Inventory of natural woodland habitats, also called woodland key habitat (WKH), had been conducted since 1997 with the aim to identify biologically valuable stands. The inventory has been mainly focused on State owned forests, and to some extent is being continued. The inventory results have been recorded in the State Forest Service data base "Forest State Register". By definition, WKH are forest areas that contain specific species that cannot sustainably survive in stands managed for timber production. Species of lichens, mosses, liverworts, fungi, invertebrates and vascular plants that are considered to have specific habitat requirements found in natural woodland are used to identify WKH. Other key indicators in the inventory are structural elements, such as coarse wood debris in different decomposition degrees, standing dead trees, snags, and biologically old trees, as these are important in the conservation of biodiversity.

During the inventory, 20 types of WKH were differentiated depending of dominating tree species, hydrology and geological features.

In this study information entered in the database was used to explore the regional variability of indicators of "naturalness" in the WKH.

DATA ON LITHUANIAN ODONATA (INSECTA) FAUNA AND DISTRIBUTION

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According of new and published data 63 species of Odonata were known for Lithuania fauna now. During the research carried out in 36 administrative region and 165 localities of Lithuania in 2008 were established 56 species of Odonata. 43 species were founded in Švenčionys region, 28 – in Panevėžys, 27 – in Marijampolė, 26 – in Vilnius, 24 – in Akmenė, 20 – in Alytus. The widest distributed species were: *Coenagrion puella* (detected in 23 regions and 74 localities), *Enallagma cyathigerum* (24 regions and 51 localities), *Coenagrion pulchellum* (18 regions and 47 localities), *Ishnura elegans* (18 regions and 35 localities), *Platycnemis pennipes* (15 regions and 34 localities), *Lestes sponsa* (17 regions and 31 localities). *Coenagrion puella* (15,24%), *Coenagrion pulchellum* (12,33%), *Lestes sponsa* (10,94%), Enallagma cyathygerum (9,45%), *Ischnura elegans* (6,05%) dominated by number of individuals. 16 species of Odonata without them rare and local distributed *Nehalenia speciosa* making up 5% to 1% of all individuals. Abundance of 7 species making up 1% – 0,5%, 22 species – from 0,5% to 0,1% and 5 species – from 0,1 to 0,03% of all collected individuals. Common species which relative frequency range from 10% to 5% was *Coenagrion puella*, *Enallagma cyathygerum, Coenagrion pulchellum, Lestes sponsa* and *Ischnura elegans.* 28 species relative rate was from 5% to 1%. The rarest species group consist of only 4 species which relative rate was 0,11%.

Most important habitats with high Odonata diversity were lake Amalvas in Marijampolė reg. (15 species), Kretuonas in Švenčionys reg. (15 species), Pukiškis lake in Panevėžys reg. (14 species), Karsakiškis old pit gravel Panevėžys reg. (12 species), Puodžiai village surroundings Alytus reg. (12 species), Žiliai in Kupiškis reg. (12 species). Wetland habitat of Purvinas Telmological preserve in Švenčionys reg. was detected as most important site of Odonata especially for rare species *Nehalennia speciosa, Coenagrion armatum, Sympecma paedisca , Somatochlora flavomaculata, Leucorrhinia pectoralis* and *L. albifrons.*

PRELIMINARY RESULTS ON PYRENOMYCETES AND LOCULOASCOMYCETES (ASCOMYCOTA) OF PAVILNIAI REGIONAL PARK (LITHUANIA)

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The aim of study was to investigate the diversity and ecology of pyrenomycetes and loculoascomycetes in the forest of Pūčkoriai environs (Pavilniai Regional Park). The material was collected during June, July, September and October, 2005-2007 mainly.

As a result of this research 418 herbarium specimens of pyrenomycetes and loculoascomycetes, including 846 samples, were collected. One twig, or branch, or leaf, or a part of stem or stump is called a sample. 99 species of above-mentioned fungi were registered on 16 plant species (*Acer platanoides, Alnus glutinosa, A. incana, Betula pendula, Corylus avellana, Euonymus europeus, E. verrucosa, Fraxinus excelsior, Lonicera xylostei, Padus avium, Pinus sylvestris, Populus tremula, Quercus robur, Salix sp., Tilia cordata, Ulmus glabra, U. laevis*). The greatest number of identified fungi is found on species of unindentified deciduous tree (27), *Acer platanoides* (23) and *Ulmus glabra* (22).

Amphisphaeria millepunctata, Amphisphaeria pusiola, Astrosphaeriella applanata, Byssosphaeria salebrosa, Coniochaeta malacotricha, C. ligniaria, Cosmospora purtonii, Eutypella padina, Flageoletia leptasca, Gnomonia cerastis, Immotthia hypoxylon, Nectria coccinea, Pseudovalsaria ferruginea, Valsa ceratosperma are not recorded before in Lithuania. Registered species of pyrenomycetes and loculoascomycetes belong to 16 orders: Boliniales, Botryosphaeriales, Capnodiales, Chaetosphaeriales, Coniochaetales, Coronophorales, Diaporthales, Dothideales, Hypocreales, Hysteriales, Pleosporales, Sordariales, Trichosphaeriales, Xylariales and two groups of uncertain systematic position (Dothideomycetes incertae sedis and Sordariomycetes incertae sedis). The greatest number of studied fungi species was established in the orders Xylariales (33), Diaporthales (16) and Pleosporales (15).

Collected species of pyrenomycetes and loculoascomycetes were found on such types of substrate: dead attached and dead lying branches and twigs, dead standing and lying trunks and overwintered leaves. It has been established that the most rich substrates with the studied fungal species are wood and bark of dead lying branches. Recorded species of fungi inhabited woody debris, diameter of which varied from 0.1 up to 45.0 cm. The greatest number of samples with studied fungi has the diameter of 0.7 or 1.1 cm.

RESULTS OF *PINUS CONTORTA* DOUGL. *VAR LATIFOLIA* ENGELM. PROVENANCE TEST IN LATVIA

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Demand for wood is rapidly growing in past decade in Latvia and this trend is expected to continue in the context of national and European scale attempts to replace fossil resources with renewable ones. One option to increase wood production is selection of high-yielding species and provenances.

Study material consists of one *Pinus sylvestris* and 9 *Pinus contorta* provenances (1 unknown origin from Latvia and 8 from Canada, latitude 50-600), planted in former nursery area in 18 tree block plots with initial spacing 2x1m in 6 replications. Analysis reveals, that tree height, diameter, stem volume and diameter of thickest branch in first 2 meters of trunk at the age of 25 years are significantly (¡=0.001) affected by choice of provenance. None of the parameters are significantly different between *Pinus contorta* and *Pinus sylvestris,* however, one lodgepole pine provenance has significantly (¡=0.05) higher yield than Scots pine (233 vs. 167m3ha-1 respectively). Number of damaged trees (browsing damages, spike knots, multiple stems) are significantly (¡=0.001) higher for *Pinus contorta* and affects 30% of all trees. Significantly (¡=0.001) more lodgepole pines than Scots pines were up-rooted in windstorm in the year 2005. Choice of provenance could significantly improve the situation, since the least affected ones have only 7% of trees suffering from wind storm and 4% with browsing damages.

Systematic thinning, removing every second tree, was carried out at age 13 years in part of the experiment. Natural mortality (27%) was equal in the thinned and un-thinned part, also tree height and diameter of thickest branch does not differ significantly. Average diameter for *Pinus contorta* was higher in thinned part of experiment, but yield – in un-thinned (13.9 vs. 11.5cm and 192 vs. 255m3ha-1 respectively). Thinning has a significant (¡=0.001) effect on frequency of browsing damages, with the un-thinned part being least affected, but not on other damage types. Also frequency of trees suffering wind storm damages is not affected by thinning.

Results underline the considerable gains in different traits that can be obtained by selection of appropriate provenances. *Pinus contorta* has high productivity, but also high frequency of different damages, therefore could be recommended only for short rotation energy-wood plantations, established in relative high densities. Analyses of a larger set of experiments and traits as well as possible environmental considerations are necessary to draw definite conclusions about the suitability of particular Pinus contorta provenances for introduction into Latvia.

BEAVER SITES SPATIAL CHARACTERISTICS AND DISTRIBUTION IN DIFFERENT TYPE OF MELIORATION CHANNELS IN FLATLAND AND HILLY LANDSCAPES

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Beaver (*Castor fiber* Linnaeus, 1758) is considered as an ecosystem engineer or as a key-stone species in ecosystem creating favourable conditions for a number of other mammal, bird, amphibian and insect species. More than 80 % of hydro-graphical network in Lithuania is composed of drainage channels. More than 30 % of beaver populations in Lithuania inhabit drainage channels. Research was done in hilly morainic landscape of Molėtai district and flatlands of Panevėžys district. Spatial characteristics of beaver sites and their distribution in different type of melioration channels were assessed.

In Panevėžys district, in 75.9 km length section of drainage channels 77 beaver sites were registered. Thus, linear density in these sections was 1.01 beaver sites/km. In to Molėtai district, channels were investigated in 27.5 km length section. 25 beaver sites were found. The linear density in these sections is 0.91 bs/km.

The beaver site stability is different in Molėtai and Panevėžys districts. Just 1 beaver site (4 % of all beaver sites) in Molėtai district was derelict. In Panevėžys district the frequency of derelict beaver sites was significant higher - 36 cases, that forms 46.7 percent.

Beaver sites arranged in the open channels survive for the shorter time. For example in forests channels of Panevėžys district derelict beaver sites formed 31% of the total, and in the open melioration channels – 42.1%.

Investigated beaver sites occupied quite different area: of 0.14 to 7.2 ha (average – 2.2 ha). In Panevėžys and Molėtai districts occupied areas was similarly sized (t – test; $p = 0.6905$). Different beaver sites occupied different length of channels: least – 97, mostly 1762 metres (average – 556 m). In Panevėžys and Molėtai districts occupied length of channels was similarly sized (t – test, $p = 0.5059$). It was found, that about half of linear lengths of irrigation systems is influenced by beaver activity.

The number of beaver sites did not change in a ten-year period (1995-2005).

OBSOLETUS COMPLEX MIDGES AS MAIN VECTORS FOR BLUETONGUE IN LATVIA

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There are known more than 1000 to 1400 species of midges, from which 90% are obligatory bloodsuckers. Midges (Diptera: Ceratopogonidae) are the smallest bloodsucker insects in the world. The size of the insect varies from 1to 3 mm. Usually there can be found lighter and darker spots on their wings, adult midges are light brown. Adult females lay eggs in the water, wet soil or in similar substrates, where it is possible for larva to develop. The most appropriate places (biotops) where the reproduction of midges takes place are still waters, wet soil, wet cattle manure and small puddles in the vicinity of cattle sheds, their reproduction can take place even in cattle watering places and waterlogged hollows of trees. Only the adult female midges suck blood, it is very similar to mosquitoes.

Several closely related species are combined in the following complexes of species: *Obsoletus* and *Pulicaris*, since it is not always possible to define a precise species of adult females. The midges of *Obsoletus* and *Pulicaris* complex are the species inhabiting in the moderate climate area. *Obsoletus* complex midges are distributed in temperate zone and they are main vectors for bluetongue virus in Latvia.

Adult midges were caught by using ultra violet light traps. There were placed 14 black light traps in Latvia during the period of time between March and November. The traps were arranged evenly in the area. Traps were place in the penthouses of cow-sheds and sheep-shed, so that it gives the possibility to observe the influence of climate conditions (the strength of wing, precipitation, night temperature) on the activity of midges. Adult midges were caught once in a week in darkness. During these nights there was taken minimum and maximum air temperature and observed the strength of wind, precipitation in the vicinity of the trap.

Analyzing samples there was determined the total number of insects for each sample, and separately there was determined the number of midges. It was detected that the midges belong the complex of *Obsoletus* species or *Pulicaris* species, or determined as other midges of *Culicoides spp.*

Analyzing 517 samples *Obsoletus* complex midges were detected in all traps, so we can infer that *Obsoletus* complex midges are distributed in all territory of Latvia. The count of midges depends of biotope around the animal shed.

72% of all midges were from *Obsoletus* complex and only 28% were other midges. The maximum of midge flight was observed in the end of May, in the beginning of June and July. In the first five catching weeks from 24th March till 27th April, there were approximately 31 adult female midge from *Obsoletus* complex. Already in first catching weeks there were observed blood feeding adult midge females.

There were observed positive correlation ($r = 0,44$; $p<0,05$) between count of *Obsoletus* complex midges and night average temperature and negative correlation ($r=-0,43$; $p<0,05$) between count of *Obsoletus* complex midges and wind speed.

A STUDY OF AN ECOLOGICAL CONDITIONS OF THE RIVER DAUGAVA FROM PIEDRUJA TO PLAVINAS

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Faunistic structure of zoobenthos organisms in the River Daugava from Piedruja to Plavinas was analysed. Data from the surveys made by the Hydrobiology laboratory of the LU Biology faculty in August 1980 and July 2007 were used.

Two indices were used to estimate ecological conditions of the river in different sites: the saprobic index (S) as a biological determination of water quality and levels of organic pollution, and biodiversity index (H) of Shannon-Wiener Index. Shannon-Wiener Index is one of several diversity indices used to measure diversity in categorical data. The advantage of this index is that it takes into account the number and evenness of the species. The index increased as a result either of additional species, or a greater evenness of species.

Analysis of the obtained data showed that the saprobic index of the middle Daugava in August 1980 is S= 2.69 and in July 2007 S= 2.34, which correspond to Beta-alfa mezosaprobity, that is why we can draw the conclusion that in 2007 the water quality in Daugava was higher. Comparing saprobity in different sites it was established that the largest oscillations of saprobity index (from S= 3.1 to S=2.04) were in the stretch Druja – Daugavpils. The highest sabrobity index S= 3.1 was found out in this stretch in 1980, which indicates a poor quality of water. It was established, that the average index of biological diversity was H=1.31 in 1980 and H=2.26 in 2007, i.e. it increased by 58%, which indicates a higher level of biological diversity.

SPREAD OF METABOLICALLY BENEVOLENT ADIPOSITY AMONG HEALTHY AND ACTIVE YOUTHS

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The goal of the present research is investigating the proportion of metabolically benevolent adiposity (MBA) among healthy and active youths (18 – 25 years of age) by making out the characteristic biochemical, morphometrical (localization of fat), and functional (reaction to load) manifestations of the MBA syndrome. The initial task of the research is setting correlations between the MBA syndrome and the peculiarities of the somatotype and lifestyle of youths in order to acquire justification for the hypothesis of MBA persons as a specific risk group of the syndrome of insulin resistance.

VARIATION IN REPRODUCTIVE MODES OF *ALLIUM OLERACEUM, A. SCORODOPRASUM* AND *A. VINEALE* IN FIELD COLLECTION

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A. oleraceum L., A. scorodoprasum L. and *A. vineale* L. growing wild in Lithuania possess the ability of generative as well as vegetative propagation which occurs with the participation of underground daughter bulbs and aerial bulbils. The objective of the current study was to clarify the interspecific and infraspecific variation of the reproductive modes in three *Allium* species under similar growing conditions. Four accessions of each species and 30 mature plants of each accession were studied in the field collection. The accession in this study is meant a group of plants transferred from one population and grown on a separate collection plot. In order to obtain the data on the effects of cross polination for seed setting 15 inflorescences in each accession were isolated from pollinators.

The number of flowers per plant was the feature in which the interspecific and infraspecific differences were the highest in all three studied species. Floral development without bulbils formation was not recorded while plants with bulbils and without flower are common in all species studied. Even 74.5 % of *A. vineale* plants were without flowers and two accessions consisted of such plants entirely. The number of flowers in *A. vineale* as well as *A. scorodoprasum* had no correlations with plant size, namely, stem height, bulb diameter and mass, etc. However, statistically significant correlations were observed between the number of flowers and almost all vegetative characters in *A. oleraceum*.

The real seed production in studied species depended on number of flowers and was rather low. Only 0.9 % of ovules developed into the seed in *A. oleraceum* and 4.8 – in *A. vineale* while all *A. scorodoprasum* plants did not set any seeds at all. The cross pollination are required for *A. oleraceum* seed production while some A. vineale covered plants produced mature seeds.

Great interspecific variation was observed in production of vegetative propagules: daughter bulbs and aerial bulbils. *A. oleraceum* plants produced sporadically only single daughter bulbs (0.1 on average) while *A. scorodoprasum* formed 2.3 and *A. vineale* – 3.2 daughter bulbs on average. *A. scorodoprasum* produced bulbils 2 and 1.7 times as much as *A. vineale* and *A. oleraceum,* respectively did. However, the mean mass of an aerial bulbil was the only feature in which there were no interspecific differences observed but it differed distinctly among accessions in all three species.

The results of the present study show that the number of bulbils in the inflorescence usually exceeds that of flowers and even more the number of seeds. Although *A. scorodoprasum* did not produce any seeds, two ways in allocation of reproductive modes among accessions of this species were observed, with one group of plants producing bigger bulbils (48 mg on average) and fewer flowers (5 on average) and a second group producing smaller bulbils (23 mg on average) and much more flowers (19.5 on average).

SEQUENCE DIVERSITY OF RUSSIAN ISOLATES OF POTATO SPINDLE TUBER VIROID

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Of 55 Russian isolates of PSTVd sequenced in 2006-2008, 16 isolates were identical to a typical mild strain previously reported from Germany and deposited in GenBank as PSTVd.004 (#M14814). These isolates contain only two changes - an A310U substitution and a U313a insertion - in the pathogenicity domain as compared to type (intermediate) strain (PSTVd.018, GenBank #M18626). A second PSTVd variant which is represented to date by 13 isolates from different regions of Russia was first identified by us in 2006 and deposited in GenBank as PSTVd.125 (#EF044303). This variant is likely to be endemic to Russia and can be considered as intermediate between PSTVd.018 and 13 other Russian variants (in this case 'intermediate' does not refer to the severity of symptoms induced in plants). The distinguishing feature of these endemic isolates is an A120C substitution that has no influence on symptom expression. Several variants of PSTVd were presented by 2 or 3 isolates. Thus, 23 variants of PSTVd primary structure were determined in all. Four PSTVd variants were deposited in GeneBank in 2006; fourteen were submitted to GeneBank in 2008, and five have not been previously described. The majority of Russian isolates (16) exhibit no more than 2-5 changes in primary structure with regard to PSTVd.018, but one isolates from Northwest region of Russia contains 14 changes, three isolates – 9 changes, and two isolates 8 changes.

SOCIOECONOMIC ASPECTS OF NATURA 2000 IMPLEMENTATION IN LITHUANIA

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The network of Natura 2000 territories is the basic instrument of EU biodiversity policy. The aim of Natura 2000 is to induce sustainable development by integrating economic, nature conservation, cultural and social fields. After Lithuania entered the Community, implementation of those territories was started and is still ongoing in our country. However, administration efficiency of process is unclear as well as public opinion and knowledge about it. The objective of this research was to ascertain the procedure of implementation as well as investigation the general knowledge about Natura 2000 and socioeconomic dimension of the process.

The study was carried out on the basis of a survey questionnaire. During the survey 332 questionnaires filled by respondents of local communities (living close to Natura 2000 or owning landed property inside of those territories) and 196 questionnaires filled by respondents of control group (not related to Natura 2000) were received.

Results showed the process of implementation Natura 2000 is not smooth – running, not all requirements that should be applied to establishment of protected areas are taken into account. Usually local communities are not involved into the process. The level of knowledge about Natura 2000 both of local people and control group respondents is low. Compensatory mechanism partly maintains existing state of territories however it doesn't assure their development. In some certain cases the principle of "table ecology" could be applied to the implementation process.

INVENTORY OF RARE ALLOCHTONOUS PLANT SPECIES AT TERRITORY OF DAUGAVPILS CITY

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The inventory data about Latvia's flora shows that 633 alien species (33% of all plant species) are found in Latvia's wild flora nowadays. Nevertheless most of these species are rare and distribution of them in Latvia is uneven. There are necessary to determine the state of these plant species for the evaluation of present distribution of them in Latvia, the estimation of potential probability of following distribution and anticipation of possible changes in ecosystem structure and landscapes.

The alien species traditionally are divided in archaeophytes (species found before 16th century) and neophytes (after 16th century). The archaeophytes are naturalized usually and are considered as autochthonous species. Most of the alien species in Latvia are entered during 19th century. Most of species, entered in Latvia at 20th century, especially the end of century, are rare and unevenly distributed (Priede 2006).

In total 35 rare alien plant species are found in Daugavpils after collecting data from literature and inventory during 2007-2008. Twenty nine rare alien species are found during two vegetation seasons, nine of them are found first time (mainly in ruderal habitats). Six species sometimes emerge in flora in Daugavpils, nevertheless they are fluctuating and quickly disappear. These are *Cerinthe minor* L., *Plantago arenaria* Waldst. et Kit., *Potentilla bifurca* L., *Potentilla supina* L., *Stachys recta* L., *Vaccaria hispanica* (Mill.) Rauschert. The rarity of these species I reviewed in „Flora of the Baltic countries", part 1, 2, and 3 and "List of alien species of Latvia" (http://biodiv.lvgma.gov.lv). For estimation of geographic distribution of species the system of squares where the taxon is found is applied – very rare (1-10 squares), rare (11-30), rarely (31 -100), not often (101 -250), quite often (251 – 500), often (501 -750), very often (>751). The estimation of distribution relates to whole territory of Latvia (Fatare 1992).

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LONG-TERM TRENDS IN THE FISH PARASTIE FAUNA IN DAUGAVA MOUTH

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The mouth of Daugava is only one place there were investigated fish parasites after long time period. S.S. Schulman in 1949 was investigated 14 fish species and 11 fish species were studied during the period of 2000-2007. The investigation was carried out using to standard methods. A total 136 parasite species were found. It is demonstrated that mostly there is fresh water parasite fauna; marine water parasites amount is negligible. The proportion of common parasite species is 37.7 % (50 species). Structure of common parasite species is following: Protozoa – 27.6 % (8 species), Monogenea – 27.3 % (9 species), Diginea – 53.8% (14 species), Cestoda – 37.5 % (6 species), Nematoda – 41.7% (5 species), Acanthocephala - % (6 species), Crustacea – 33.3 % (2 species). Hirudinea and Mollusca didn't included the common species.

An increase of parasite species recorded in the species richness of parasites specific to three-spined stickleback (*Gasterosteus aculeatus*) and bream (*Abramis brama*). Eight parasite species wasn't found during our investigations.

The structure of ichtiofauna, slow flow, water plants overgrowing, fluidity of water salinity, structure of fish eating birds, anthropogenic factors and other conditions have an impact on parasite fauna of fish in mouth of Daugava.

INVESTIGATION OF PARASITE FAUNA OF CARP (*CYPRINIS CARPIO*) IN LATVIA

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The parasite fauna of carp was studied in different regions of Latvia (Kurzeme, Latgale, during the time period 2007-2008. Samples of the marketable size carp were collected in fish farms in Kurzeme, Latgale and Zemgale. In all, 177 specimens of carp were examined by the total parasitological dissection method. Twenty four species of parasites of following groups have been found: Protozoa (6 species), Monogenea (6), Diginea (4), Cestoda (5), Nematoda (1), Hirudinea (1), Crustacea (1), were found.

Results of study show that most parasite species were detected in carp from Zemgale region (18). In Kurzeme and Latgale carp parasite fauna was presented with 15 and 14 species respectively. Invasion rates ranged between 11.3% and 100%. Parasite fauna and quantitative invasion indexes were not similar in different areas. The rates of invasion were considerably higher for monogenean *Dactylogyrus extensus* (Prevalence – 100%, Intensity – 2-56 specimens and *D. achmerovi* (P - 100%. I – 3-65, respectively) in Kurzeme and Latgale.
Larvae cestoda *Valipora campylancristrota* in high prevalence (45.7%) were detected in Latgale but in Kurzeme in low prevalence (2.8%).

Prevalence of nematoda *Philometroides cyprini* was less than 11%.
First time for carp from Latvian farms was found metacercaria of trematoda *Apharyngostrigae cornu* in fish musculature.

In general differences of parasite fauna of carp between different regions of Latvia is negligible.
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INVESTIGATION OF PARASITE FAUNA OF SOME PREDATORY FISH IN LATVIA

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Parasitological investigation of predatory fish has been carried out in 2004-2008. In all, 419 specimens mainly of marketable size fish from 4 regions of Latvia were studied: 77 pike (*Esox lucius* L.), 289 perch (*Perca fluviatilis* L.), and 53 zander (*Sander lucioperca* L.).
Total of 54 parasite species belonging to following groups: Protozoa (13 species), Monogenea (5), Diginea (16), Cestoda (4), Nematoda (9), Acanthocephala (3), Crustacea (3), Glochidium larvae (1) were found.

Results of study shows that most parasite species were detected in pike (31). The most abundant were monogenea *Tetraonchus monenteron*, metacercarie of *Diplostomum sp,* T*ylodelphys clavata*, cestode *Triaenophorus nodulosus,* nematode *Raphidascaris acus,* and copepods *Ergasilus sieboldi.* Last case of *Diphyllobothrium latum* in pike was in 2004.

In perch we found 30 species of parasites, the main of them was protozoa *Trichodina urinaria* (91.5%), adult and larva stages of *T. nodulosus* (70%), metacercarie of *Posthodiplostomum brevicaudatum* (97.1%), *P. cuticola* (max 83.%), *Ichthyocotylurus variegatus* (98.2%), trematodes *Bunodera luciopercae* (51.6%) and *Azygia lucii* (22.5%), nematode *C. lacustris* (77.4%). Perch from lakes were more infected then perch from rivers.

Cestode *Cyathocephalus truncates* were seldom detected in pike and perch.

Parasite fauna of zander was presented with 25 parasite species. Frequently found were monogenea *Ancyrocephalus paradoxus*, trematode *Rhipidocotyle campanula,* metacercarie of *Diplostomum sp*, and copepods *Achtheres percarum*. Rarely were found protozoa *Myxobolus sandrae*, metacercarie of *Hysteromorpha triloba*, nematode *Rhabdochona denudate* and *C. truncates.* Marine species of acanthocephalans *Corynosoma strumosum* and *C. semerme* were found in migrated to Riga Gulf zander.

Eight of parasite species were common for all investigated fish species included metacercarie of *Paracoenogonimus ovatus* detected in fish musculature.

Parasitofaune of fish from lakes and rivers has differences and explained by life and breeding conditions in different type of water bodies.

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INCREASED SEXUAL ATTRACTIVENESS AS TERMINAL INVESTMENT DOES NOT HAPPEN AT THE EXPENSE OF IMMUNITY IN INSECTS

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It has been suggested that secondary sexual ornamentations honestly reflect males' immunocompetence to the choosy female due to trade offs between sexual signaling and immunity. In this study we tested whether immune system activation and immunological priming has an effect on the female's choice in (Tenebrio molitor). We found that males did not suffer from increased mortality but their ability to attract a mate was reduced after a single activation of their immune system, suggesting a trade off between immunity and sexual signaling. However, after a second immune challenge the females significantly more often chose the treatment males although these males later suffered a high mortality rate, suggesting terminal investment on sexual signaling. The encapsulation response against the nylon monofilament was also higher with the second immune challenge while their locomotor activity significantly decreased. So it seems that increased sexual attractiveness as terminal investment did not happen at the expense of immunity. Interestingly, preferred males had stronger encapsulation response than non-preferred males, supporting the hypothesis that females prefer males with strong immune defense. Thus, in the light of our study it seems that the resource allocation between life-history components and sexual signaling is much more complex than previously considered.

THE RESEARCH OF BIOTOPES OF BOMBINA BOMBINA IN THE SOUTH PART OF LATVIA, FOR THE AIMS OF THE SPECIES PROTECTION AND ENVIRONMENTAL MANAGEMENT

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The fire bellied toad (*Bombina bombina*) (Linnaeus, 1761) is protected species in Latvia and other countries, and it is included in the 1st categories of the Red Book of Latvia as endangered species (Berzins, 2003). There are worked laws and regulations in the Latvian legislation, which control the main human activities in these territories, and protect this species like individual. The Bern convention admits it for endangered animals in Europe (Ministru kabinets 2000). The results of research shows that in central Europe the populations decrease and in some places even disappear in all (Pupins, Pupina, 2006). This small number of *Bombina bombina* in Latvia is the most important reason to protect this animal. There are just couple of suitable biotopes for the *Bombina bombina* in Latvia (Pupina, Pupins, 2007). The toad is found in the South part of Latvia, last years just about two reģions were sure as the fields of *Bombina bombina* – regions of Bauska and Daugavpils (near to Lithuania) (www.latvijasdaba.lv). Now we are sure, that most biotopes are situated in Southlatgale, in Daugavpils district (Pupins, Skute 1999; Pupina, Pupins 2007). In Latvia *Bombina bombina* is very rare species, but in some countries it is very common species, like in Byelorussia. Therefore it is important to describe the environment of *Bombina bombina* in Latvia, to found key factors' optimal values for the using in the management of environment in Latgale. The territory of this research is the South part of Latvia – Latgale, where are the most part of established fields of *Bombina bombina.* There were inspected seven biotopes, which situated in three districts – Skrudaliena, Eglaine, Medumi, in Daugavpils region. Skrudaliena district includes biotope "Ilgas ditch"; Eglaine district includes biotope "Mežmaļi", and Medumi district include two biotopes – "Ozolaine 1" and "Ozolaine 2". The main methods of this research are: 1) Field research methods; 2) Summarization of information – during the field research, all parameters was registered in special protocol of the biotopes inspection (Pupina, Pupins, 2008). This method includes very wide characterization of each biotope and its parameters; 3) Statistical methods – using Microsoft Excel to get results of this research and make charts and tables for demonstrative results. Comparing all biotopes and the amount of toads, can see, that chemical parameters are not the main reasons of amount decreasing of toads, but physical are, because the temperature is very important factor. Also anthropogenic activities are important, as the results shows, that in the biotopes of anthropogenic load, the amount of toads are smaller. But not always anthropogenic activities are threat, sometimes they are even needed, cause there are many reed in biotope – Ilgas, and if people will cultivate this territory, maybe the amount of toads will increase. Very important are biotic factors like fishes. The biotope – Ozolaine 1, were was introduced a raptorial fish - Perccottus glehii is no more good place for *Bomnina bombina*, because this fish eats all spawn of toads, new individuals and also is threat for adults.

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SOME BIOLOGICAL CHARACTERISTICS OF HYBRIDS (*SUS DOMESTICUS X SUS SCROFA* L.)

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As wild boars (*Sus scrofa* L.) are progenitors of pigs (*Sus domesticus*), they can capulate reciprocally and give prolific progeny. However, wild boar and pig not only have different appearance, but also different biological features. In 2004 – 2008, in A. Vaitkevičius stockyard, located in Telšiai district (Lithuania), two groups of investigated animals were formed: I – Lithuanian Whites copulated with a wild boar, striving to receive hybrids of the first generation (F1), having 50 % of wild boars blood, and II – female hybrids, one more time copulated with wild boar, striving to receive hybrids of the second generation (F2), having 75 % of wild boars blood. It was determined that when increasing a part of wild boar genes (till 75 %), litter size of pigs are decreasing and approaching the prolificacy typical to wild boars. When copulating white homozygous pigs of Lithuanian White breed with wild boars, in the first generation (F1) white colour is dominating, and when copulating white, but heterozygous in respect of colour female hybrids with wild boars, in the second generation (F2) hybrids of white colour and striped (torched) ones are distributing in proportion of 1.25: 1.

The aim of this study was to investigate the growth rate, meatiness and meat quality of F1 hybrids. It was indicated that in the period of control (approx. from 30 to 80 kg weight) average daily gain of hybrids (n=12) was 474g. Entire boars grew faster (490g), gilts - longer (457g). Five entire boars (approx. 100kg weight) were slaughtered for evaluation meatiness traits and meat (musculus longissimus dorsi) quality, while gilts were left for further breeding. Average half carcass length of hybrids was 95 cm, backfat thickness at 6-7 and last ribs, respectively, 29 and 16 mm, lean meat content 50.7 %. Their meat pH48 was 5.48, redness 18.16 ext. u., water holding capacity 58.15 % and cooking loss 27.35 %. In the dry matter of the meat there was 23.62% of protein, 1.54% of fat and 1.13% of ash. In comparison with Lithuanian White pigs, the hybrids grow slowlier, their carcass have lower meatiness traits. However, meat of F1 hybrids has more intensive red colour, less cooking losses and is characterised by good chemical composition in respect of nutritive value. Besides, the meat of male hybrids has very good palatability without negative specific aroma.

HERITABILITY COMPARISON OF SPRING BARLEY (*HORDEUM VULGARE* L.) TRAITS IN ORGANIC AND CONVENTIONAL GROWING CONDITIONS

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The success of crop breeding programs depends upon the heritability and genetic variability of desired traits. Plant breeding for organic farming is developing direction and it is substantial to choose the most appropriate growing conditions for selection. The aim of the study was to compare the broad-sense heritability of spring barley traits important for organic agriculture and their genotypic variability in organic and conventional growing conditions. Ten various barley varieties were evaluated for three years in two organic and two conventional environments. Traits which are connected with weed suppression ability: development speed in tilling stage, plant height in the beginning of stem elongation stage, length and width of flag leaf and plant height before harvest as well as yield, lodging, grain quality parameters were assessed. Results of the study showed that mean broad-sense heritability estimate (h2) was greater in organic conditions than in conventional conditions for most of the investigated traits. Similar tendency was observed for genetic coefficient of variation. Highest mean values of heritability and genetic coefficient of variation in organic growing conditions were observed for plant development speed in tilling stage (0.96 and 68.7) and for plant height in the beginning of stem elongation stage (0.90 and 33.64 respectively). This shows that selection for these traits would be more effective on organic conditions than in conventional conditions.

USING OF MORPHOLOGICAL AND MOLECULAR DATA IN SYSTEMATICS OF GENUS *NOTIOPHILUS* DUMERIL, 1804 (COLEOPTERA: CARABIDAE)

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External structure, male genitalia and DNA sequences from two genes (28 rDNA and 18S rDNA) were studed for 4 taxons of genus Notiophilus (*N. aquaticus* (Linnaeus), 1758; *N. semenovi* Tschitscherine, 1903, actually syn. of *N. aquaticus*; *N. jakovlevi* Tschitscherine, 1903 and *N. semistriatus* Say, 1823). Specimen were collected from different parts of distribution areal of this species. DNA was extracted using DNA Tissue Kit and the Standart Protocol for Animal Tissue. Fragments for 28 rDNA and 18S rDNA were amplified using the Polymerase Chain Reaction on Applied Biosystems Veriti™ Thermal Cycler. The amplified products were sequenced using Applied Biosystems 3130xl Genetic Analyser. Molecular data were analysed separately and in accordance with morphological data.

BIOCENOTIC SIMILARITY AND A NEW METHOD OF ITS EVALUATION

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An index of biocenotic similarity is proposed which is intended to evaluate structural similarity of biocenoses. Mathematical algorithm necessary to calculate this index is described.

Key words: biocenosis, feature, difference, similarity index

I propose a new index of biocenotic similarity (IBS) based on the well-known Jacquard index (a very good overview of existing indexes can be found in Boyce, Ellison 2001). The problem with Jacquard index is that it recognizes as similar all features shared by both biocenoses – even if their values are dramatically different.
The methodology used to build up this index is as follows: logically, an ISB should be calculated according to the following formula:

$$ISB = \frac{2Z}{N_x + N_y}, \qquad (1)$$

Z – number of features whose value is the same for both biocenoses;
N_x – number of features of the biocenosis X;
N_y number of features of the biocenosis Y.
Let us suppose that M is the number of features that both biocenoses have in common. Then the following formula will apply:

$$Z = M - \sum_{i=1}^{M} f(x_i, y_i),$$

x_i – value of the i-th feature of the biocenosis X;
y_i – value of the i- th feature of the biocenosis Y;
$f(x_i, y_i)$ – a function that meets the following requirement:

$$f(x_i, y_i) = \begin{cases} 0, & x_i = y_i \\ 1, & x_i \neq y_i \end{cases}. \qquad (2)$$

In order to write down the function $f(x_i, y_i)$ in an explicit form we will use the function sign (x):

$$\operatorname{sign}(x) = \begin{cases} -1, & x < 0 \\ 0, & x = 0 \\ 1, & x > 0 \end{cases}.$$

Therefore,

$$f(x_i, y_i) = \operatorname{sign}|x_i - y_i|. \qquad (3)$$

If we combine the formulae (1) and (3) then

$$ISB = \frac{2\left(M - \sum_{i=1}^{M} \operatorname{sign}|x_i - y_i|\right)}{N_x + N_y}. \qquad (4)$$

Unfortunately, the formula (4) has a very important problem – it recognizes as similar only those features whose value is the same for both biocenoses. However, for practical reasons it is sometimes logical to consider as similar the features that have different values but this difference does not exceed a certain limit. Therefore, it would be logical to transform the formula (4) in order to take into account this practical possibility:

$$\Psi(x_i, y_i) = \begin{cases} 0, & |x_i - y_i| \le \Delta_i^{xy} \\ 1, & |x_i - y_i| > \Delta_i^{xy} \end{cases},$$

Δ_i^{xy} – accepted value of difference between the values of the *i*-ćī feature for biocenoses *X* and *Y*.

The explicit form of the function $\Psi(x_i, y_i)$ is

$$\Psi(x_i, y_i) = 1 - \operatorname{sign}\left(1 - \operatorname{sign}\left(|x_i - y_i| - \Delta_i^{xy}\right)\right). \qquad (5)$$

The final formula of ISB:

$$ISB = \frac{2\left(M - \sum_{i=1}^{M} 1 - \operatorname{sign}\left(1 - \operatorname{sign}\left(|x_i - y_i| - \Delta_i^{xy}\right)\right)\right)}{N_x + N_y}. \qquad (6)$$

In order to completely formalize the methodology of calculation of ISB it is necessary to give an algorithm of calculation of *M*.

Obviously the number of common features cannot exceed the number of features that the biocenosis with the lesser number of features has:

$$M \le \min(N_x, N_y).$$

Let us suppose for simplicity sake that

$$\min(N_x, N_y) = N_x.$$

The text description of each feature of the biocenosis *X* must be compared with the text description of all features of the biocenosis *Y*. Obviously, text description of any feature of the biocenosis *X* can be equal to no more than one feature of the biosenosis *Y*. In order to formalize this comparison the text function $\mathrm{EXACT}(x, y)$ can be used:

$$\mathrm{EXACT}(x, y) = \begin{cases} 1, & x = y \\ 0, & x \ne y \end{cases}.$$

Therefore,

$$M = \sum_{i=1}^{N_x} \sum_{j=1}^{N_y} \mathrm{EXACT}(x_i, y_j) .$$

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MOBBING IS SELFISH IN A MALE CHAFFINCH: A TRADE-OFF BETWEEN SAFETY AND REPRODUCTION

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Behavior can be viewed as having costs and benefits and a conflict over time allocation to resource use arises when different activities contributing to fitness cannot be performed concurrently. In such situations animals are predicted to optimize fitness payoffs by trading off the benefits of performing one act against the costs of not performing the other. In this experimental field study we investigated whether males of the chaffinch (*Fringilla coelebs*) adjust mobbing of predators to the fertile period of the female. First, we found that male chaffinches did not predators resting near their nest before the start of incubation until the penultimate egg is laid by its female. Secondly, it was shown that male chaffinches started mobbing predators just after the fertile period of their mates was over. This study shows that the risk of paternity loss has a significant effect on the nest defence behavior of male chaffinch.

FLEAS (INSECTA: SIPHONAPTERA) ON LITHUANIA SMALL RODENTS

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Infestation rates and indices of infestation by fleas in small rodents in Lithuania were studied. Six species (*Apodemus agrarius, Apodemus flavicollis, Myodes glareolus, Microtus agrestis, Microtus arvalis, Sciurus vulgaris*) of 163 speciments rodents were caught in 5 location. A total 259 fleas identified on rodents belong to three families: Ceratophyllidae, Ctenophthalmidae and Hystrichopsyllidae. A few species *Ctenophthalmus agyrtes, Megabothris turbidus, M. walkeri* and *Hystrichopsylla talpae, Ceratophyllus sciurorum* was described. The rodents infestation of fleas was different depending on rodents species and district of capture.
Key words: fleas, rodents, Lithuania

RARE TERRESTRIAL MOLLUSCS SPECIES OF RESERVES OF KAUNAS' AND KAIŠIADORIAI' DISTRICTS

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The diversity and distribution peculiarities of rare and other snail species in Kaunas' and Kaišiadoriai' districts were the objective of research work that was carried out in 2007 July and September in different types of 15 reserves. 64 terrestrial molluscs' species belonging to 22 families were collected during this research. The biggest variety of species was in landscape reserves. Only one species of Lithuanian Red Data book was found – Vertigo angustior Jeffreys, 1830. Reality is so that only four terrestrial molluscs' species are included to Lithuanian Red Data book. There are more rare molluscs' species in Lithuania, and some of them were found during this study. They were Acicula polita (Hartmann, 1840), Acanthinula aculeata (Müller, 1774), Vertigo alpestris Alder, 1838, Clausilia cruciata Studer, 1820, Macrogastra latestriata (A. Schmidt, 1857), Ruthenica filograna (Rossmässler, 1836), Isognomostoma isognomostomos (Schröter, 1758). Rare species were more common in botanical-zoological reserves.

Generalizations regarding the causes of the rarity were made. The main conservation measures necessary for improving the status of these species are discussed.

CONSERVATION BIOLOGY OF SPECIALLY PROTECTED NATURE TERRITORIES USING GIS TOOLS

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Geographic information system (GIS) technology is an effective tool for managing, analyzing, and visualizing wildlife data in order to target areas where conservation practices are needed. Historically, studies of ecology, have concentrated on changes through time, but patterns across spatial dimensions remain largely unexplored. The major impediment to research on spatial processes in ecology has thus been the lack of adequate analytical and data management tools. Recent development of two technologies has opened up new facilities for analyzing spatial patterns in populations and habitats: GIS and geostatistics. A GIS is a computer system capable of assembling, storing, manipulating, and displaying geographically referenced information.

Habitat geospatial analysis is an important key to understanding the prevalence of a species. Monitoring change in habitats is feasible with ESRI's suite of ArcGIS software, a tool for managing, analyzing, and depicting statistical and geographic data. GIS helps to monitor and visualize - population and distribution; habitat use and preferences; progress of conservation activities; historical and present regional biodiversity. Target areas are Specially protected nature territories (SPNT) – Nature park "Daugavas loki", Raznas National park, Protected landscape area "Kaucers", Nature park "Dridzis Lake".

Most of the habitats in SPNT are vulnerable to recreational pressure and commercial activities. These habitats are not mapped and evaluated in all SPNT's. Therefore the activities of lake owners, renters, water users, landowners and municipalities threaten these habitats. For example, houses, car parking places and camping sites can be accidentally built in the areas of endangered habitats. Less valuable habitats could be chosen for building thus leaving the endangered habitats untouched.

GIS tools and mathematic methods help to show nature values and possible threats and impacts to them in easy accessible way. That helps to visualize scientific information and to involve people to discussion. A GIS is a technological tool for comprehending geography and making intelligent decisions.

PHENOTYPIC DIVERSITY OF *JUNIPERUS COMMUNIS* AS INFLUENCED BY DIFFERENT LIGHT CONDITIONS

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The common juniper (*Juniperus communis*) has the widest geographical distribution range among the woody species in the world (Rook, 2006). That is one of the reasons of the morphological diversity (Featherstone, 2004) as well as quantitative and qualitative diversity of essential oils (Adams, 1998; Cavaleiro et al., 2003) of the species. High ecological amplitude is also typical for the common juniper growing in Lithuania: it is frequent in dry pinewoods, on river valleys, however, occurs on wet soils, too. Although *J. communis* is light demanding species, it tolerates shade as well (Čibiras, 1959; Navasaitis et al., 1979; Smaliukas et al., 1992). It is reported (Butkienė et al, 2006) that in Lithuania junipers accumulate about 0.35% of essential oils, as estimated in needles. However, the intraspecific diversity of *J. communis* is still underestimated. The objective of this work was to assess the phenotypic diversity of *J. communis* by the morphological properties and essential oil contents of needles.

Needles of annual shoots of *J. communis* have been collected from 6 shaded (i.e. forest) and 4 open (i.e. plain meadow or slope) habitats. In each habitat needles were collected from 6–10 randomly selected female individuals. The further studies were carried out with the air-dry material. The length of needles (mm) was assessed for each sample as well as the mass of 100 needles (g). Randomly selected 300 needles were used for the length measurements in each sample. For the establishment of mass 3 samples of 100 needles each were weighed. The essential oils of needles were isolated by hydrodistillation in a European Pharmacopoeia apparatus during two hours. The contents of essential oils were evaluated by percent (%).
The study showed, that *J. communis* varied by all of the studied properties as between habitats of different light conditions, as well as within the each habitat. Open and shaded habitats of *J. communis* differed significantly by needle length ($F=1189$, $p<0{,}0001$) and needle mass ($F=12{,}43$, $p<0{,}032$). In open habitats the length of needles varied from 9.8–11.7 mm (11.1±0.02 mm on average), while in shaded habitats – from 11.2–14.9 mm (12.1±0.02 mm on average). However, an average mass of needles in shaded habitats was lower than that in open sites (0.14±0.003 and 0.16±0.003 g/100 needles, correspondingly). The lengthier but lightweight needles in shaded habitats could be preconditioned by the lack of light. Although contents of the essential oils were higher in needles from open habitats than those from shaded ones (0.58% and 0.49%, respectively), no significant differences were observed between the habitats of different light conditions by this property. The higher contents of essential oils in needles from open habitats could be also determined by better light conditions. All the properties of *J. communis* studied varied very much within habitats. This variation depended possibly on genetic properties of individual plants.

TEMPORAL AND SPATIAL CHANGES OF FOREST HABITATS STRUCTURE IN THE NATURE PARK "DAUGAVAS LOKI"

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Territory of the Nature Park "Daugavas Loki" is unique not only for biodiversity reason, but also for outstanding landscapes. The main characteristic mark of the territory is the river Daugava and its ancient valley. This valley is the only such feature in Latvia with regard to its configuration; it has unique scenery with its 8 river meanders, steep slopes dissected by gullies and wide terraces covered by forests. Present diversity of landscapes and process of landscape formation are tightly connected with the Daugava, which for long period was important political and administrative border. Cultural and historical heritage of this region, long-term interaction between society and nature are reflected in landscapes of the river valley. Forest communities cover more than 40 % of the entire territory of the Nature Park and besides the geomorphological features is important element of landscape. However, taking into consideration long history of agricultural activities in this region, as from slash-and-burn agriculture in Iron Age verified by archaeological data, it is obvious that forests cannot be 'millennial' formations and forest habitats were destroyed by man and then naturally or artificially renewed a lot of times. In respect of that, functionally more permanent features are forest lands as land use type. Authors examined temporal and spatial changes of forest habitats patterns in relation to landscape changes in the Nature Park, and addressed two questions: (1) how old are forest lands in the nature park? (2) what are the main factors that affect the development and changes of forest habitats?

To elucidate that, analysis of existing data about geological structure and geomorphology of the territory was carried out simultaneously with examination of historical documents (e.g. forest surveys, economical statistics, estates' parcelling cases a.o.) and maps. Using of GIS allows to combine maps of different scale published in Russia Empire, Germany and USSR from 1917 to 1980 and to digitize thematic layers of forest lands and settlements. Obtained historical data were combined with the aerial photographs flown 2005 in scale 1:10,000 and digital orthophoto maps to measure changes in the extent and spatial pattern of forest habitats. Obtained results show that along general lines contemporary location of forests comply with forests depicted in historical maps of the end of XVIII century. Forests at the study territory were strongly cleared between 1917 and circa 1935; next period of intensive clearance was connected with planned building of Daugavpils hydro-power station in 80-ies. It is necessary to note, that spatial distribution of many protected plant species within the valley coincides with forest habitats, where forest land as land use type is presented for period more than 80 years. However, it is need for more detailed study of spatial changes of forest habitats structure considering fragmentary form of available information.

MEAT QUALITY DIFFERENCES BETWEEN PUREBRED AND CROSSBRED NEW ZEALAND RABBITS

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Two experimental groups of rabbits were formed: group 1 – purebred New Zealand (NZ), group 2 – Hyplus hybrid and French Lop and New Zealand crossbreds ((HHxFL)xNZ). The rabbits were raised under the same feeding and housing condition. The rabbits have been fattened for on average 64 days. The purpose of the study was to analyze the meat quality of purebred and commercial crossbred rabbits. The physicochemical indicators of meat and content of fatty acids were determined at the Analytical Laboratory of the Institute of Animal Science of LVA. The analysis was carried out on samples of the M. Longissimus dorsi.

Meat quality of crossbred rabbits was of higher value with lower fat content and higher quality of protein and intramuscular fat.

Lean meat analysis indicated that the content of myristoleic (C14:1) and heptadecenoic (C17:1) acids were significantly lower and those of linoleic (C18:2) and ¡-linolenic (C18:3) higher in the meat of (HHxFL)xNZ crossbred rabbits in comparison with purebred rabbits. The ratio of n-6/n-3 fatty acids in the crossbred group was 3.1% lower.

THE SEASONAL DEVELOPMENT PECULIARITIES OF SOME DECIDUOUS RHODODENDRONS IN BOTANICAL GARDEN OF ŠIAULIAI UNIVERSITY

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This publication presents the research results on seasonal development of some taxa of deciduous generative maturity rhododendrons performed in the Botanical Garden of Šiauliai University. During the research, the following peculiarities of the seasonal development of rhododendrons were recorded: a) annual increase of shoots when the segment from the last year bud basis up to a new terminal bud basis is measured; b) beginning and end of leafing and flowering. Beginning of leafing is the period when leaves start growing, leaf surface becomes visible, leaf, even not reaching final size, becomes of the shape characteristic to the taxon. The criterion for the end of leafing – seasonal loss of 50 % of plant leaves. Duration of flowering is the period from the opening of the first flower till withering of the last flower.

This kind of research allows to state that the majority of deciduous rhododendrons fully develop leaves at the end of May or beginning of June. Beginning of the vegetation period directly depends upon the positive temperatures. It should be mentioned that late spring frosts, which are typical in Lithuania, are extremely hazardous to rhododendrons. During the periods of frosts the damaged leaves, generative buds or early blooming flowers are frequently encountered. The end of leafing for majority of rhododendrons is recorded at the end of October. Development of shoots in majority of rhododendrons starts in the first half of May and ends at the end of summer when generative and vegetative buds form. Annual increase of rhododendron shoots differs in separate years depending on meteorological conditions. The largest annual increase of shoots is characteristic of the representatives of *R. luteum* Sweet (17 cm), *R. vaseyi* A. Gray (17 cm), *R. japonicum* (A. Gray) Suring. (16 cm).

Evaluation of the time of rhododendron flowering reveals *R. canadense* (L.) Torr, *R. canadense* var. album plants as the earliest flowering among deciduous rhododendrons, i.e. on first days of May. Mass flowering of the studied rhododendrons is recorded in the second half of May or beginning of June. The latest (middle of June) to start flowering are *R. viscosum* (L.) Torr. plants; their flowering lasts till the middle of July. The longest period of flowering (3–4 weeks) was determined for *R. luteum, R. molle* (Blume) G. Don, *R. vaseyi, R. viscosum* plants. Sometimes secondary flowering of rhododendrons is observed. Secondary flowering of *R. camtschaticum* Pallas is recorded every year in the Botanical Garden.

Summarizing the research results it could be stated that microclimatic conditions in the Botanical Garden are favourable for the investigated taxa of deciduous rhododendrons, and the plants are successfully adapting. Every year these plants demonstrate considerable increase of shoots and rather long flowering period.

FLOWERING FENOSPECTRUM DIVERSITY OF *VICIA SEPIUM*

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Flowering is a quintessential adaptive feature in plants: its correct timing ensures, for example, that plants do not produce seeds when they will not find favorable conditions for dispersal or germination. Befitting its importance, flowering is affected by several different environmental variable.
Bush vetch (*Vicia sepium*) by the amount of proteins in grass takes the one of the first place between leguminous grass. The previous studys shows, that bush vetch is one of the most perspective leguminous fodder grass in Lithuania. The seeds of 14 V. sepium cenopopulations from different places of country were sown in spring in mixture with Phleum pretense ant Festuca pratensis and investigated in the collection of LUA Experimental Station (Central Lithuania, medium loam, pH - 7) in 2004-2007. The aim of work was to investigate diversity of flowering spectrum and environmental impact on time of flowering *V. sepium*. One and two times flowering cenopopulation were found, early and late flowering forms of bush vetch were distinguished by the experimental season. The greatest influence on flowering term and span had amount of precipitation.

VARIATION OF PRODUCTIVITY TRAITS IN FANWEED (*THLASPI ARVENSE* L.) IN SITU

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Fanweed (*Thlaspi arvense*) is an annual or winter annual species which reproduces solely by seeds and is known for its specific odour and as persistent crop weed. The species exhibits a high degree of ecotypic variation and many biotypes recorded indicate that differences in the species phenology have been reported from various parts of its geographic range. The studies have evaluated the potential of fanweed as a source of oil rich in erucic acid. Fanweed was rated as having an excellent potential as a new industrial crop.

Samples of 22 fanweed plants with seeds were collected from different habitats and districts of Lithuania. The objective of this work was to evaluate the variation of seed and oil yield and other productivity traits of fanweed in situ. Plant assessment was based on measurements of stem height, number of inflorescences and flowers, number of silicles, seed number per silicle, and oil content in seeds.

Productivity traits – seed and oil production is an essential characteristic for breeding commercially viable varieties. The average seed number of one plant in samples varied from 2.62 to 29.0 thousands, the oil content in seeds – from 20–33.5%.

The plasticity of fanweed is demonstrated by the morphological responses of investigated samples to soil and environmental conditions. A total number of inflorescences per plant was the most unstable feature and varied from 7.8 to 61. In favourable sites plants reached 86 cm (12–86 cm) stem height and formed lateral productive branches. The most stable and genetically determined feature of T. arvense was the number of formed seed per silicle (9–13.6).

ECOGEOGRAFICAL DISTRIBUTION OF COMMON CARAWAY (*CARUM CARVI* L.) HABITATS IN LITHUANIA

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Caraway is the most widely used spice and medicinal in Lithuania. Together with the decline of natural meadows caraway habitats shrink, species biodiversity and genetic resources become sparse. Investigations and observations in situ underlie the basis for caraway preservation in natural environment Aims of work were to investigate phytocenological and ecological variation of *Carum carvi* habitats.

In 1996-2000 during expeditions were found and described 123 *Carum carvi* habitats. The highest number of caraway habitats was found in South and Southeast Lithuania. In this region because of hilly and laky relief there are a lot of natural meadows while intensively cultivated ones are scarce. The number of habitats in Central and North Lithuania is limited because of intensive agriculture. In the western part habitats are limited by wetlands and heavy and rather acid soils.

Non-anthropogenic meadows are not numerous. 168 plant species were identified in habitats. Most of *Carum carvi* L. habitats belonged to the widely spread in all Lithuania confederation community *Molinion-Arrhenatheretea elatioris* R. TX. 1937 class *Cynosurion cristati* R.. Tx. 1947 - 48%, to *Arrhenatherion elatioris* (Br.-Bl. 1925) – 36.6%, to *Molinion caeruleae* W. Kotch 1926 – 2.4%. To the confideration *Trifolio-Geranietea sanguinei* (Th. Müller 1961) class *Trifolion medii* belonged 6.5% of described communities. To relict Festuco-Brometea erecti Br.-Bl. Et R.Tx. 1943 class communities were ascribed 4.9% of habitats.

Soil analyses of habitats show that most often caraway grew in neutral – alkaline and close to neutral, light and medium light loam, fertile, humus, potassium and phosphorus rich soils. Meanwhile there were found habitats in cohesive sandy and peat soils (pH 5.3-6.5) with low levels of mobile potassium and phosphorus, and humus.

DISTRIBUTION OF CARAWAY (*CARUM CARVI* L.) HABITATS ACCORDING MORPHOLOGICAL AND PRODUCTIVITY PARAMETERS

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Natural cenopopulations form is affected by genetic and environmental factors. The structure of plant organs and habitat are inherited. These parameters can vary in changing environment conditions. The amplitude of trait variability allows prognosing species survival possibility.
In 1996-2000 during expeditions were found and described 123 *Carum carvi* habitats, morphological and productivity parameters of caraway plants were performed. Investigation results show high variation of *Carum carvi* cenopopultions in morphological and productivity parameters. After hierarchic cluster analysis of cenopopultions there were identified four clusters, which substantially reflected growth conditions of cenopopulations. Cluster I (9.8% of investigated habitats) cenopopulations grew in more or less shaded areas, which directly affected their parameters. Predominantly pastures in fertile soils belonged to cluster II (30.1%). Habitats of fertile hayfield and unkempt meadows (no economic activities) belonged to cluster III. Most significant were cluster IV cenopopulations, which made up 26.8% of all cenopopulations. Here prevailing were *Cynosurion cristati* (65.7%) communities and other confederation communities in less fertile soils, mostly used as pastures. This is the only cluster which cenopopulations had partial geographic preference. Most of them (57%) were described in East and Southeast Lithuania.

The habitat of a single-stalker concise caraway was formed in many cenopopulations of such lengthy grasses. In pastures systematic grazing provided more favorable philosphera conditions for less cropped caraway. Due to increase of philosphere space in some habitats formed a specific, procumbent, multistalk or „pasture" caraway habitat.

MICROARTHROPOD COMPLEXES IN THE SOIL OF EAST LITHUANIAN CONIFEROUS FOREST

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The Ąvinčiai old forest (N55°26'49.53" E26°04'05.17") is an example of classic ecosystem typical of East Lithuania with prevailing continental climate. It is a reserve with maximally limited human activity. It is classified as a cowberry pine forest (*Peucedano-Pinetum*) with scanty spruce. The grass cover is predominated by bilberry (*Vaccinium myrtillus)*, reed grass (*Calamagrostis arundinacea*) and mosses: glittering wood-moss (*Hylocomium splendens*) and big red stem moss (*Pleurozium schreberi*). The soil belongs to the group of calcaric arenosols.

The dynamic monitoring of microarthropods in the reference area of Aukštaitija National Park (ANP) has been carried out since 1993. The present work contains the data of observations carried out in 2002 – 2006. As the peak of microarthropod abundance in the soils of middle latitude forests occurs in autumn the samples in this relatively natural ecosystem were taken once a year: in autumn (September).

In 2002 – 2006, the total microarthropod abundance in the soil of Ąvinčiai old forest was 235.7±130.15 thou ind. m-2 on the average. Oribatid mites were dominant accounting for 76 % of the total. The abundance of gamasid mites ranged from 7.3 % to 12 % (average of 9.3 %), acarid mites from 1.5 % to 4 % (average 2.5 %), unidentified mites from 1.3 % to 4.1 % (2.7 %), and collembolan from 5 % to 14 % (9.2 %).

The total of 95 species of microarthropods was detected in the studied soil: oribatid mites 55, gamasid mites 21 and Collembola 19. The index of species diversity (d) ranged from 9.5 to 12.4. The average Shannon-Wiener Diversity Index in the analysed communities equalled to 4.12. The even distribution index ranges within 0.63 – 0.78.

Analysis of species structure of microarthropod complex showed that three dominant species of oribatid mites, *Oppiella nova, Suctobelbella sp.* and *Tectocepheus velatus,* comprise the nucleus of the complex.

The total of oribatid mites detected in five years of investigations (2002 – 2006) equalled to 183.1±111.0 thou. ind. m-2. The nucelus structure of oribatid coenosis is comparable to the common nucleus of microarthropod coenosis with dominant *Oppiella nova, Suctobelbella sp., Tectocepheus velatus* and *Brachychthonius sp.*

The average abundance of gamasid mites in the soil of Ąvinčiai old forest was 20.1±8.17 thou ind. m-2. *Parazercon sarekensis, Veigaia nemorensis* and *Prozercon kochi* species are most widespread and persistent in this biotop.

The average abundance of collembola was 20.0±16.33 thou. ind. m-2. The total of 19 species was detected. The most persistent and abundant species were: *Isotomiella minor, Mesaphorura krausbaueri* and *Parisotoma notabilis.*

HELMINTHS OF HOUSE MOUSE (*MUS MUSCULUS*) AND OTHER RODENTS CAUGHT IN PREMISES IN LITHUANIA

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The house mouse (*Mus musculus*) is the most numerous species of rodents living in close proximity to humans. Helminths of this species in Lithuania are less studied than helminths of rodents living in natural habitats. House mice can transmit diseases and parasites harmful to humans and domestic animals. This makes the species an interesting object of parasitological studies.

We studied helmiths of house mouse in Mažeikiai, Telšiai, Šakiai and Klaipėda districts. Rodents were caught in inhabited and business premises. Besides house mouse (*M. musculus*) rodents of three other species - yellow necked mouse (*Apodemus flavicollis*), striped field mouse (*A. agrarius*) and bank vole (*Myodes glareolus*) were caught.

In house mice nematodes *Syphacia obvelata, S. stroma, Aspiculuris tetraptera, Ganguleterakis spumosa, Mastophorus muris, Trichocephalus muris,* unidentified nematodes; larvae of cestodes *Hydatigera taeniaeformis,* unidentified cestodes and unidentified trematodes were found. Some of these species were found also in other rodents.

In all localities of study helminths *S. obvelata* and *A. tetraptera* were found. These species are characteristic parasites of house mouse with simple life cycles parasitizing also laboratory mice.

PARASITIC INFESTATION OF DEER GARDENS ANIMALS IN LATVIA

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A wild animal popullation is tipically host to a whole community of parasites of different species. Some species of wild animals such us deers, wild boars and others were breeding in deer gardens. There are no circumstantial investigation of infection of animals of deer gardens. Epidemiological situation was investigated of parasitic infestation of animals from gardens of deer's in Latvia. In 2008 were examined fecal samples of 487 red deer, 213 fallow deer, 24 moufflon, 180 wild boar, 19 pheasant for gastrointestinal and pulmonary parasits by the ovoscopic and larvoscopic methods.

Strongyloides spp., Paramphistomum spp., Trichostrongylus spp., Protostrongylus spp., Dictyocaulus spp. and *Coccidia spp*. were found out in investigated animals. Gastrointestinal strongiloides were most commonly found parasite in red deer, fallow deer and moufflon. The most important of the gastrointestinal parasites in wild boar was coccidia.
Extensity of red deer infection by gastrointestinal parasites was 73,3 %, fallow deer 63,0 %, moufflon 87,5 % , pheasant 26,3 %, but wild boar 100 %.

FIN NECROSIS OF BALTIC SALMON IN HATCHERIES AND THE BALTIC SEA

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Salmon (*Salmo salar*) is grown to smolt stage in hatcheries and released in the estuaries, from which it goes to the feeding areas in the Baltic Sea. Fin necrosis occured in most of salmon of fish farms. This problem first appeared in July, progressed till November and than decreased. In most of cases acute fin necrosis healed from November to May. We have not information about fin healing after releasing smolts in the Baltic Sea. Data about fin necrosis clinical characteristics in smolts in Latvian hatcheries and in adult salmon in Daugava estuary are summarized.

DENDROLOGICAL AUDIT IN THE PARK OF KALUPE

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Kalupe is placed in East Latvia, Jersikas level ground, 35 kilometers from Daugavpils. Kalupe's area is 11 905 ha. 1 651 number of inhabitants.Relief of Kalupe is even and rich with ditches, rivers, lakes and swamps. Biggest river is river Kalupe, biggest lake is the Little lake of Kalupe.

The park of Kalupe lays one kilometer to west from center of civil parish Kalupe. In 20 century there was manor house with park. Nowadays there is only the park. The park of Kalupe is about 7 ha large. The park of Kalupe is one of the local sense nature monuments. There are local trees and shrubs and foreigners. The park is resting ground to Kalupe's civil parish people and to tourists.

Last dendrological audit was in 1975, when there were 10 local specifics and 13 foreigners. But in 1998 landscape architect Ilze Janelis performed an inspect in the park of Kalupe

Dendrological audit is process when all of trees and shrubs in park are counted.
Introduction is a process when some of species representative is transferred out of natural area. Many species of introduction are called by foreigners.

Dendrological audit was performed on July in 2008. Author used the method with two forms. First form: description of territory - name of object (park); date of audit; address; area; economic indices; geographical situation. Second form: description of trees and shrubs – Latin name; number of specimen; highness; diameter.

Results: Dendrological audit. After dendrological audit, author computed all local trees and shrubs and all foreigners. There were 17 local specifics and 9 foreigners in the park of Kalupe on summer of 2008. It means, that since 1975 there were disappeared 6 foreigners – *Populus longifolia* Fisch, *Populus x 'Marilandica', Rosa pimpinellifolia var pimpinellifolia 'Plena', Rosa rugosa* Thunb. *'Plena', Thuja occidentalis 'Columna', Thuja occidentalis* L.. Appeared 2 foreigners - *Sambucus racemosa* L. and *Tilia x vulgaris* Hayne.. Appeared 7 local specifics - *Corylus avellana* L., *Lonicera xylosteum* L., *Padus avium* Mill, *Picea abies* (L.) Karst, *Populus tremula* L., *Ulmus laevis* Pall, *Viburnum opulus* L. The reason of disappearance is mismanagement, because there isn't any person who garden the park territory.

The tree round compute were performed to: *Larix decidua* Mill. I (2,87m), *Larix decidua* Mill. II (2,40m), *Tilia x vulgaris* Hayne I (0,64m), *Tilia x vulgaris* Hayne II with two bole (bole I 1,03m, bole II 0,80m), *Alnus glutinosa* (L.) Geartn. (2,63m).

The tree highnesses were performed to: *Larix decidua* Mill. I (32 m), *Larix decidua* Mill. II (31m), *Tilia x vulgaris* Hayne I (15m), *Tilia x vulgaris* Hayne II (both of the bole 19m), *Alnus glutinosa* (L.) Geartn. (28m), *Quercus robur* I (33m), *Quercus robur* II (35m).

Unfortunately the biggest *Alnus glutinosa* (L.) Geartn. and *Quercus robur* II were perished in winter 2008. The reason – storm.

PLANNING AND MANAGEMENT OF HABITATS AND VEGETATION IN LITHUANIA

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Lithuania belongs to Boreal biogeographical region and coniferous-deciduous forest climatic sub-zone. Ecosystems of Lithuania Republic could be divided to natural and semi-natural ones. The latter includes forests, bogs and wetlands, meadows, water ecosystems (lakes, rivers, Baltic Sea and Curonian Lagoon), Baltic sea coastal zone and sands as well as anthropogenic (agrarian and urban) ecosystems. Natural and semi-natural vegetation covers approximately 1/3 of state. Forest ecosystems occupy 32.5% of the Lithuanian territory.
The aim of this study is to analyze the state and the management of vegetation (threatened species, plant communities, habitats and ecosystems) in Lithuania, indications of the already performed measures (legislation, laws related to biodiversity protection and conservation, the protected territories, the Red Data Books (species and communities) and implementation of EU legislation related to habitats and vegetation conservation. Strategic attitudes of biodiversity conservation were stated in UN Sustainable Development Strategy (Agenda 21) and were detailed in related conventions, EU and Lithuania Republic legislation. Legislation on nature management and progress made in this field are discussed too.

MORPHOLOGIC STRUCTURE OF THE LABRUM AND APPLICATION OF IT IN THE TAXONOMY OF THE GENUS *NOTIOPHILUS* DUMERIL, 1804 (COLEOPTERA: CARABIDAE)

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In world fauna genus *Notiophilus* Dumeril, 1804 (Coleoptera: Carabidae) is represented by 58 species, which are distributed in almost whole Holarctic region and northern part of Nearctic. Hitherto the species determination key for all species of the genus has not been made, because many species can be found rarely and locally, they are seldom represented in the collections of museums, their descriptions are short and have been made according to one or several specimens. The characteristics used for determination of some species are very inconsistent. All these peculiarities testify the need for review of this genus.

The aim of our research was to investigate the morphology of the labrum of genus *Notiophilus* Dum., fluidity of its shapes and to clarify potentialities to use this feature for determination of species of this genus.

In the result of researches more than 5000 specimens of 43 species were processed. The morphology of the labrum was researched with the stereo microscope Zeiss Stereo Lumar V12 and confocal laser scanning microscope Zeiss LSM 5 Pascal.

2 main groups were divided according to the shape of the front side: 1) front side deeply cleft - *N. aeneus* (Herbst, 1806), *N. specularis* (Bates, 1881), *N. impresssitrons* (Morawitz, 1863), *N. chenesis* Barševskis, 2003 u.c.; 2) front side rounded - *N. aquaticus* (Linnaeus, 1758), *N. palustris* (Duftschmid, 1812), *N. biguttatus* (Fabricius, 1779). In the last group we can select those, which have almost straight front side of the labrum. The shapes of upper lip can be used as a good and permanent feature in determination of species.

CHARACTERIZATION AND AMPLIFICATION PATTERNS OF SIXTY RAPD PRIMERS IN THE EUROPEAN VENDACE (*COREGONUS ALBULA* (L.))

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Vendace (*Coregonus albula*) is a representative of the genus Salmo can be found in many Latvian lakes. Its share in the fishery though is not big; the catch is insignificant and unstable. Taking into account the high degree of variability of the vendace and the fact that it belongs to valuable marketable fishes presents a scientific interest to make an attempt to determine the major factors that impact its variability. A lack of precise scientific data regarding the local vendace populations and its biology hinders rational exploitation of this fish and does not allow an opportunity for its reproduction in Latvian lakes. Information on the genetic structure of fish species is useful for optimizing identification of stocks, stock enhancement, management for sustainable yield and preservation of genetic diversity.

Molecular markers derived from polymerase chain reaction (PCR) amplification of genomic DNA are an important part of the toolkit of evolutionary geneticists. PCR based multi-locus DNA fingerprints represent one of the most informative and cost-effective measures of genetic diversity and are useful population-level biomarkers of toxicologic and other anthropogenic impacts. It's widely use in environmental biology. RAPDs (randomly amplified polymorphic DNA) also have the advantage that no prior knowledge of the genome is necessary for successful application.

The RAPD technique was chosen to evaluate genetic affinities among individuals of vendace from some populations in Latvian lakes to assess intra-specific genetic variation. Estimated intraspecific variation may be more pronounced with RAPD markers than with allozymes when the two approaches are applied on the same populations. We assessed reproducibility of RAPD technique to derive general rules for selective removal of problematic fingerprint bands. Sixty decanucleotide primers from A, B and F sets (Carl Roth) were tested.

We report the results of RAPD analyses performed on DNS samples of vendace to assess the degree of polymorphism and reproducibility of this methodology. Characteristics of reproducible and anomalous DNA fingerprint bands were compared. 38% of the tested primers were reproducible and about 87% of them have highly reproducible bands, others primers produced diffuse bands or were difficult to screen. 25% of highly reproducible primers have one or two monomorphic bands, so they were excluded from analysis. This information will be invaluable for selecting a highly informative subset of bands for genetic analysis of vendace populations.

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DETECTION OF PLANT STATUS IN DIFFERENT VEGETABLE STAGES FROM CHANGES ON DISTRIBUTION OF CHLOROPHYLL FLUORESCENCE PARAMETERS

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Chlorophyll fluorescence in vivo is used as early stress indicator, as early indicator of plant organs senescence, as susceptible early stress indicator responding to changes in environmental conditions. The intrinsic chlorophyll fluorescence measurements are being applied in plant physiology and ecology to provide numerously valuable information about plant response and adaptation.

The basic chlorophyll fluorescence parameters (Fo, Fm, Fp, Fs) and its ratios (Fv/ Fm, Fv/ Fo) were investigated in some organs (first leaf, coleoptile) of wheat seedling in different stages of development and senescence in vivo. Fluorescence emission spectrum of leaf or coleoptile segments at wavelength 500-800 nm was monitored by fluorescent microscopy using spectrometer USB 4000.The nuclear DNA methyation level (ML=100mC/(mC+ C) is changes in development and senescence and under the environmental conditions also. The nuclear DNA methylation level in different parts of first leaf and coleoptiles during development and senescence was investigated by spectrophotometry of separated nucleotides.

It was found that observed fluorescence characteristics correlate with nuclear DNA methylation levels in these organs and can used for early diagnostic of changes in molecular physiological process in these stages.

TAXONOMICAL DISTRIBUTION AND DIVERSITY OF ZOOPLANKTON IN THE DAUGAVA RIVER AND THEIR FLOODPLAINS (LATVIA)

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Samples of zooplankton have been collected in the floodplain lakes of Daugava River and in two places in Daugava River (near Krauja and near mouth of Berezovka River) in a time period from year 2004 till 2007. An aim has been defined following: to rate stated taxons distribution of zooplankton. Completely have been stated 110 taxons of zooplankton – 73 taxons of Rotatoria, 32 taxons of Cladocera and 5 taxons of Copepoda. Distribution of zooplankton taxons was both cosmopolitan and endemic according to world geographical region. 91% of Rotatoria taxons are cosmopolitan taxons, represented Palearctic region, Nearctic region, Afrotropical region, Australian region, but the rest 9% are endemic taxons, like *Ascomorpha minima, Lecane elsa, Notholca acuminata* and others. 67% of Cladocera are cosmopolitan taxons, distributed all over the world: *Daphnia longispina, Alona affinis, Chydorus ovalis* and others. 33% of Cladocera are endemic taxons of zooplankton in limited distribution: *Bosmina longispina, Alonella exiqua, Leptodora kindtii* and others.

GENETIC DIFFERENCES AMONG *ELACHISTA* SPECIES OF THE *E. ARGENTELLA, E. BEDELELLA* AND *E. BIFASCIELLA* SPECIES GROUPS (LEPDOPTERA: ELACHISTIDAE: ELACHISTINAE)

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The *Elachista* Treitschke, is the largest genus in the subfamily Elachistinae. Moths are small, with a wingspan from 5 to 14 mm. Forewing pattern mainly consist either a white fascia and spots on dark background or fuscous marks on light background or moths unicolour (white, yellowish or cream). Larvae of *Elachista* are typical leaf-miners, trophically connected with Monocotyledonous grasses. Elachistinae moths largely have been investigated using traditional entomological methods. In the current study we examined *Elachista* species using traditional entomological methods (making of morphological preparations, species identification, and documentation of morphological structures) and DNA analysis. DNA was extracted from head or thorax of pined specimens and specimens which were stored in 96% ethanol. The extraction was made using the Nucleospin Tissue Kit (Machery-Nagel, Düren, Germany). One specific COI primer was used for polymerase chain reaction, which amplified mitochondrial DNA sequences. Both strands of the PCR products were sequenced using 3130xl Genetic Analyzer (Applied Biosystems) at the Institute of Biotechnology (Vilnius, Lithuania). Mitochondrial DNA sequence of the COI gene was tested as the tool for analysis of intraspecific and interspecific genetic variation. The polymorphism of sequenced mtDNA segments of the COI gene were assessed in 8 species from different species groups: *Elachista argentella, E. bedelella* and *E. bifasciella*.

COMPARISON OF DEER WINTER YARDS IN THE BROAD-LEAVED AND PINEWOOD FORESTS

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Capacity of the hunting area, as territory, for Cervine animals is highly dependent on winter yards. Condition of winter habitats was estimated by using method, adopted from S.E.Aldous. According to this method we estimated frequency of the occurrence of every species of trees and shrubs, abundance, browsing intensity, utilization factor and share of the food by each species in winter forage.

The aim is to compare condition of winter yards and determination factors in the pinewoods (Kazlų Rūda forest) and broad-leaved forests (Bukta forest). The research was executed in 2007. Total area of Kazlų Rūda and Bukta forests where research was executed is 27888ha. Condition of winter yards was estimated by surveying 951 sampling plots. Each surveying plot was circle of 100m2. The results showed that condition of the winter yards in both sites is good. The winter yards are not exhausted. Because of the differences between species composition in Bukta and Kazlų Rūda forests, species browsed by Cervine animals are different (hazel, ash, aspen and honeysuckle in Bukta forest and oak, rowan, wahoo elm, hornbeam in Kazlų Rūda forest.

Keywords: winter yards, condition, browsing intensity, pinewoods, broad-leaved forest, Aldous's method.

HOW MUCH FOREST AGE STRUCTURE AND BIRD ABUNDANCE HAS BEEN INFLUENCED BY THE DEVELOPMENT OF THE ROAD NETWORK?

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Over the past two decades forestry in Latvia has intensified making the amplification of forest road network an important part of forest management. It increases the accessibility to forest resources and intensifies structural changes in forest ecosystems. The main question of the present study is how much forest stand age structure and bird abundance has been influenced by the development of the road network. The spatial analysis of the forest age structure was performed by GIS in four road relevant belts: in 100m (belt A), 100-200m (B), 200 – 300m (C) and in more than 300m (D) distance from all the roads. Overall 278 981 ha of forest were examined in northwestern Latvia. Follow-up the abundance of breeding birds was studied by using the point-count method in all types of forests, obtaining the distribution models of age structure for pine, spruce, birch and broadleaved forests for each belt. Similar models were made for habitat of 50 most abundant forest bird species. Most forest was found in belt A: 41% (pine stands), 30 % (spruce), 25% (birch), 35% (broadleaved), the lowest percentage was found in belt C, respectively – 15%, 17%, 18%, 16%. Notwithstanding to difference of forest ratio in road relevant forest belts, the distribution models of forest age structure for all the belts are very similar, dominated by 50-80 year old pine, 30-40 year old spruce, 50-70 year old birch and 50-80 year old broadleaved forest stands. A test comparing the distribution models of forest age shows that there is no significant gap between bird habitats in different road relevant forest belts. Consequently, it cannot affect habitat selection for most of common breeding birds in forest.

Key words: forest age structure, road network, birds, habitat selection.

SEASONAL MIGRATION OF GULLS ON THE LITHUANIAN BALTIC SEA COAST

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There are four breeding species of gulls in the zone of Lithuanian sea cost. Most numerous breeding species are the Black-headed Gull (8000-15000 pairs) and the Little Gull (50-280); other two species – the Common Gull (2-3 pair) and the Herring Gull (3-10 pair) are very rear. Roof nesting phenomenon is common for the Herring Gull in Klaipėda and Palanga cities.

Climate change may affect the timing of arrival in breeding areas and survival opportunities during winters, prolong average lifespan, increase a competition between long- and short-distance migrants and thus affect on abundance of gulls during the year.

Anthropogenic activities have extended food availability and quantity of alternative feeding and breeding habitats that have led to gulls population explosion in urban areas and less winter mortality.

Due the contaminants, such heavy metals and organochlorine, adult gulls may gather food longer, chicks may show very high levels of diseases and mortality, and that determine low breeding success of gulls.

Decreased numbers of some gull species may lead to increased numbers of other species. Thus it is not possible to determine an exact cause of changes in abundance of gulls because the birds are affected by the combination of various factors, occurring in different periods and places of gulls' life.

CARABID BEETLES (COLEOPTERA: CARABIDAE) OF LATVIAN AGROCENOSES

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Ground beetles are one of the fauna components of agrocenosis and play an important role among natural enemies of agricultural pests. Many carabids species are entomophages. Only some phytophages from the genera *Ophonus* Steph., *Harpalus* Latr. and *Amara* Bon. can damage agricultural cultures.

The species composition and stucture of carabid beetles species in different Latvian agrocenoses in the period 1960-2008 were summarized. Some publications on the ground-beetles in Latvian agrocenoses were used (Stiprais 1958; Cinītis 1962, 1975; Svikle 1970, 1975; Ozols 1973; Skaldere 1981; Spuris 1995, 1997; Barševskis 1987, 1993, 2003; Piedītis1995; Bukejs 2005; Petrova et al. 2006; Bukejs, Telnov 2007; Bukejs, Balalaikins 2008). For the first time the full list of carabids species of 15 types of Latvian agrocenoses was prepared.

In total, 153 carabids species belonging to 41 genera were reported in fifteen different types of agrocenoses: potatoes – 81 species, fodder beet – 60, barley – 55, oats – 37, wheat – 44, winter rye – 68, winter rape – 56, strawberry – 27, clover – 51, clover-barley mixture – 43, clover-tymothy grass mixture – 72, field pea-oats mixture – 42, mixed Cruciferae cultures (cabbage, rape, garden radish, horse radish, swedish turnip) – 69, sandy agrocenosis with mixed cultures – 73, orchards – 40.

Species composition and the number of ground beetles in different agrocenoses differ and depend on edaphic factors, the cultures grown and the neighbouring habitats.

The analysis of species composition shows, that the genera *Amara* Bon. (with 32 species), Bembidion Latr. (with 20 species) and Harpalus Latr. (with 16 species) are most richly presented in different agrocenoses. The representatives of these genera mostly occur in open habitats, therefore they prevail in the carabid fauna of agrocenosis.

In different agrocenoses, 14 species of carabid beetles were eudominants (>10% of all community specimens): *Bembidion properans* Steph., *B. lampros* Hrbst., *Blemus discus* F., *Broscus cephalotes* L., *Callatus erratus* Ill., *Carabus cancellatus* Ill., *Clivina fossor* L., *Harpalus rufpes* Deg., *H. affinis* Schrnk., *Loricera pilicornis* F., *Poecilus cupreus* L., *P. versicolor* Strum, *Pterostichus melanarius* Ill. and *Trechus quadristriatus* Schrnk.
41 carabids are established as typical species of Latvian agrocenoses.

COMPARISON OF MALACOFAUNA IN HABITATS OF *ENA MONTANA* (DRAPARNAUD, 1801) IN GAUJA NATIONAL PARK (LATVIA) AND BIRŽAI FOREST (LITHUANIA)

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Ena montana is a protected species in Latvia but not in Lithuania. This species has a high indicator value in natural forests and is known as a mainly montane species in West Europa. It attain over 2000 m in the Alps. *E. montana* is found in Vidzeme Upland Gauja River basin and Latgale Upland (north eastern part of Latvia) and in the North of Lithuania - in Biržai forest. Gauja National Park (GNP) and Biržai forest (BF) are sites of Natura 2000.

There are four known *E.montana* habitats within the territory of GNP and one within BF. All habitats in GNP are situated on the hills by the riversides or valleys about 100 m.a.s.l. BF habitat is located in the north part of Lithuania's middle lowland in Mūša-Nemunėlis plain about 40 m.a.s.l. Snails were found in deciduous forests of different ages with predominant lime, elm, grey alder trees, as well as in mixed spruce forests in GNP and with predominant black alder or elm in BF. Similar propotions of deciduous trees, underbrush density and pH between the habitats of GNP and BF were found although BF habitats were moisten, with more abundant shrub stage, more hazel-trees, litter and more N and P in the soil.

In the end of 19th century there were pastures instead of present forest habitats of *E. montana* in GNP, except one. By contraries, BF is an old forest. It is known that BF belonged to counts Radvilos for about 360 years and since 19th century - to counts Ti□kevičiai. It become intensively exploitable after the Second World War, and since 1960 till 2004 land amelioration took place in large tracts of Biržu forest together with many other forest harming activities.

Two euribiont species *Arianta arbustorum* (23%) and *Punctum pygmaeum* (19%), wetland species *Carychium tridentatum* (10%) and steppe species *Vallonia costata* (12%) were found together with *E. montana* in GNP. Majority of dominant snails in BF belong to wetland species as *Carychium tridentatum* (21%), silvicolous species *Ena montana* (13%) and euribiont species *Punctum pygmaeum* (9%).

Total of 37 terestrial snail species were found in the GNP, but 33 species were found in Bir˛ai forest.. The population density of *E.montana* is 0,5 individuals/1 m2 in the GNP and 3,7 individuals/1m2 in BF.

DISCOVERY OF THE NORTHERN BIRCH MOUSE (*SICISTA BETULINA*) FAR IN THE NORTH OUTSIDE THE KNOWN DISTRIBUTION RANGE

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In July 2007 several individuals of *Sicista betulina* were caught by pitfall traps in NW part of Kanin peninsula at the mouth of Pescovaja River (East coast of White Sea). New-found locality of the species is situated more than 200 km to the North from Arctic Circle which is regarded as northern limit for *S.betulina* distribution in European part of Russia. Animals were caught in shrubland of *Salix sp*. in river valley – habitat typical for tundra vegetation. Besides, lot of logs washed out of the sea was laying between bushes in particular spot.

DIVERSITY OF WEED FLORA IN ORGANIC CROP ROTATION

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The investigation on diversity of weed flora was carried out at State Priekuli Plant Breeding Institute in Latvia (57Ś19´ N, 25Ś20´ E). Weed taxa (at species or a family level) and weed abundance (plants per m-2) were determined in the 6-field organic crop rotation twice per annum in the years 2007 and 2008, – first time in the early crop growing stage and second time before crop harvesting. Crop rotation was: spring cereals-spring cereals/clover-clover-winter cereals-potato-oilseed radish or rape.

The objective was to study the weed population dynamics and diversity in the organic crop rotation, to build the base of knowledge for making weed control recommendations for organic farming in the upland regions of NE Europe.

The amount and diversity of weeds differ among the years 2007 and 2008. Data show more favourable agroecological conditions for weed growth – larger amount of weeds in total and more dominant (e"10 plants m-2) weed taxa – in 2007 compared with 2008. In regard to weed diversity, 38 different weed taxa (22 annual and 16 perennial) were registered in total. Among 11 dominant weeds were annual weed taxa: *Capsella bursa-pastoris, Chenopodium spp., Fumaria officinalis, Lamium spp., Matricaria spp., Polygonum aviculare, Stellaria media, Thlaspi arvense, Veronica spp.* and *Viola arvensis*, and only one perennial weed species – *Sonchus arvensis*.

To clear the environmental and management factors that caused differences in the weed flora between the years, additional analysis of the data is required for interpreting the results gained from field observations. There is a necessity to continue the investigation to evaluate the influence of full crop rotation. Results of this investigation build the base for further data analysis and conclusions to make the recommendations for effective weed management measures.

MOLECULAR CHARACTERIZATION OF *SARCOCYSTIS SPP*. FROM SOME BIRD SPECIES BASED ON SSU RRNA GENE SEQUENCE ANALYSIS

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Protists of the genus *Sarcocystis* are parasites of mammals, birds, reptiles and fish with an obligatory prey-predator, two hosts life cycle. Birds can serve both as intermediate or definitive hosts for many *Sarcocystis* species. For a long time these parasites were considered to show intermediate host specificity. In comparison to other groups *Sarcocystis* species infecting birds as intermediate hosts are poorly investigated using complex traditional morphological and DNA analysis methods.

The aim of this study was to investigate the taxonomic status of several *Sarcocystis spp.* isolated from birds using the ssu rRNA gene sequence analysis and to determinate phylogenetic relationships between *Sarcocystis* from birds and other Sarcocystis species.

In the period between 2003 and 2008, a total of 607 birds from the orders Anseriformes, Passeriformes and Charadriiformes were investigated and six types (I, II, III, IV, V and VI) of cysts were distinguished by light microscopy. Cysts were differentiated on the basis of their shape, thickness and structure (presence or absence of protrusions) of their walls, and the shape and size of cystozoites. Some cyst isolates were investigated by transmission electron microscopy. Several cysts of each species were isolated from muscle tissues for DNA extraction. Four pair of primers for the entire ssu rRNA gene were designed from conserved regions detected by the alignment of published sequences of *Sarcocystis* species. The phylogenetic tree was constructed using the neighbour-joining method.

The comparative DNA sequences analysis was performed for *Sarcocystis spp*. (cyst types I and III) from the white-fronted geese (*Anser albifrons*); *Sarcocystis spp.* (cyst types II and IV) from the mallard (*Anas platyrhynchos*); *Sarcocystis sp. (*cyst type V) from the hooded crow (*Corvus cornix*); *Sarcocystis spp.* (cyst type VI) from the blackbird (*Turdus merula*) and the fieldfare (*T. pilaris*). According to the cyst wall ultrastructure and DNA analysis, new *Sarcocystis* species *S. cornixi* was described in the hooded crow. The genetic investigation revealed that in some bird species, cyst types I and IV should be attributed to the same *Sarcocystis* species. To confirm this conclusion further exhaustive examinations are required. Ssu rRNA gene sequences of sarcocysts from the blackbird and the fieldfare showed 100% identity. This indicates that this species of *Sarcocystis* is not strictly host specific. Higher sequence identity values have been determined in *Sarcocystis* species from birds in comparison to *Sarcocystis* species parasitizing in other intermediate hosts. The phylogenetic analysis also revealed that all *Sarcocystis* species from birds are placed in one group of the phylogenetic tree. In conclusion, the DNA analysis provide a useful tool in the genus *Sarcocystis* describing new species, identifying morphologically complicated isolates, investigating host specificity and deducing phylogenetic relationships.

CHANGES IN NATURAL GRASSLAND AREAS AND GRASSLAND FLORA OVER THE 20TH CENTURY IN ĶEMERI NATIONAL PARK

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Ķemeri National Park (ĶNP), a NATURA 2000 site, was established in 1997 and covers 38165 ha of land. It is located on the southwest part of the Riga Gulf to the west from Riga. The territory represents a landscape with relatively low anthropogenic and agricultural impact. Most of lands including grasslands are owned by the state; in the marginal areas the lands are private-owned and parcelled into small land units. In ĶNP, the conservation of natural grasslands is related to similar threats to biodiversity as in most of the territory of Latvia and Europe, where species extinctions and population declines are greatly related to ongoing changes in land use practices and landscape structure.

The study was aimed to find out the changes in landscape pattern related to grassland areas and grassland flora. According to the analysis of cartographic materials and aerial photos from the previous decades, in the course of the 20th century the total area of natural grasslands decreased ca. 3.5 times from total cover 7 % to 2 %. Two opposite processes, fragmentation and homogenization, affected the grassland cover and configuration. The most pronounced process is fragmentation of grasslands. Due to gradual abandonment of agricultural lands, considerable areas of natural grasslands were overgrown. The total number of natural grassland patches has significantly increased, while the average patch size has decreased. Namely, the formerly large meadows and pastures have gradually overgrown and split into smaller units negatively affecting the species migration ability and extending the ecotone zones. The opposite process, homogenization, was characteristic for the Soviet time. Intentional transformation of landscape due to rationalization of agriculture included construction of drainage systems and straightening of small lowland rivers and forest edges decreasing the landscape diversity. Though drainage impact was critical only in a relatively small part of ĶNP, it caused transformation of a large floodplain meadow complex. Cultivation, ploughing and afforestation, though less pronounced in ĶNP than in neighbouring areas, contributed to the loss of natural grassland areas.

The distribution of many vascular plant species is tightly related to landscape pattern. According to provisional flora list and species records from various sources documented over the 20th century, the grassland-related native vascular plant species comprise 23 % (207 species) of the total number of vascular plant species in ĶNP from which 196 are present with different frequencies and conservation status, while at least five Red Book species are extinct and several considered as probably extinct or declining.

Over the last few years, regular grassland management is re-established in ca. 700 ha of both natural and formerly cultivated grasslands, ensuring maintenance of open landscape by mowing, grazing and mixed management as well as removal of shrubs.

THE QUANTITY AND NUMBER OF NEW LOCALIZATIONS OF *BOMBINA BOMBINA*, REGISTERED SINCE 2004 YEAR IN LATVIA

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Bombina bombina is the rare amphibian which dwells on the northern European edge of the area in Latvia. *B.bombina* is listed among the protected animals of Latvia. During many years only 2 extremely small in number localizations of *B.bombina* from the southern and southeastern part of Latvia were known: "Bauska" (Bauska district, Islice pagasts) and "Ilgas" (Daugavpils dictrict, Skrudaliena pagasts) with ~9 vocalizing males in each localization only.

The practical need for the realization of the official Plan on *B.bombina* protection in Latvia makes actual the study of *B.bombina* distribution in Latvia and a maximally complete registration of all existing localizations, which allows also to determine the north boundaries of *B.bombina* area in Europe and to estimate the probability of metapopulation of *B.bombina* existence in the region.

This study was carried out by the methods: 1) interview of the local people; 2) field researches by a) audio recording of vocalizing males; b) visual search for *B.bombina*; c) control catching by net and the determination of tadpoles; d) the play - back method. The coordinates of the new obtained localizations of *B.bombina* were determined with the Magellan Explorist and Google Earth program. All the localizations were mapped out according to the squares of 5x5 km of the standard map of Latvia.

As a result since 2004 year till 2008 year were registered 66 new *B.bombina* localizations with 294 vocalizing males in sum in Latvia. The new localizations are:
Aizkraukle district: Kurmene pagasts: 2 localizations, 3 vocalizing males;
Daugavpils district: Kalkune pagasts: 1 localization, 1 vocalizing male;
Daugavpils district: Eglaine pagasts: 4 localizations, 8 vocalizing males;
Daugavpils district: Medumi pagasts: 14 localizations, 34 vocalizing males;
Daugavpils district: Demene pagasts: 45 localizations, 248 vocalizing males.

In spite of new obtained localizations, at present *B.bombina* continues to remain extremely rare species in Latvia. Possibly, at present the subpopulations of *B.bombina* in Latvia are enlarging and colonizing new biotopes creating new localizations, most of them are located in Daugavpils district, the most southern district of Latvia.

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THE PECULIARITIES OF *E.ORBICULARIS* DISTRIBUTION AND ZONES OF CLIMATIC FACTORS IN LATVIA

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European pond turtle *Emys orbicularis* (Linnaes, 1758) is a rare Reptile of Europe, Latvia is situated on the northern edge of the species distribution. The number and the quantity of *E.orbicularis* populations decrease from south to north. One of the main limitative factors for *E.orbicularis* distribution to the north is a cold climate, which disturbs the successful incubation of *E.orbicularis* eggs and retards the development of turtles.

In this research the comparison of finding points of *E.orbicularis* with zones of climatic factors was investigated in Latvia. The distribution of *E.orbicularis* in Latvia was researched by oral interview of local people (specialists, biologists, teachers etc.) and special pamphlet questionnaire carried out among the Latvian inhabitants. The locations (squares 5x5 km) of repeated (2 or more) findings (n=15) were analyzed according temperature zones (°C, middle temperatures in July, January); frost-free period (days); precipitation level (mm) etc.

Middle temperatures in July: 53% of repeated findings of *E.orbicularis* in Latvia are located in the zone of middle temperatures in July t°>17°C; 7% in the temperature zone of 16,5°C<17°C; 40% in the zone with t°<16,5°C. Middle temperatures in January: 47% of localizations are located in the zone with the middle temperatures in January -6°C>t°>-7°C; 40% in the zone with the middle temperatures in January -5°C>t°>-6°C; 13% in the zone with t°>-3°C. Frost-free period in the air: 13% of all localizations of repeated findings are situated in the zone with the frost-free period more than 170 days, 47% of findings in the zone with the frost-free period in the air 150-160 days, 40% - 140-150 days. The precipitation level: 20% of localizations are situated in the zone with the precipitation (rain, snow) level of h<600 mm; 20% of localizations are situated in the zone of 600<650 mm, 47% of localizations are situated in the zone of 650<700 mm and 13% in the zone with 700<750 mm.

Localizations of the repeated findings of *E.orbicularis* are located predominantly in the Southeastern and Southern-central zones of Latvia, also on the northwest of the coast in the zones with the different complex of specific climatic parameters. This indicates on the complex influence of climatic, physiogeographical and other factors on the distribution of *E.orbicularis* in Latvia.

The research has been executed owing to support of European Structural Funds, Daugavpils University (Project # 2004/003/VPD1/ESF/PIAA/04/NP/3.2.3.1./0003/0065), Latvian Environmental protection fund, Daugavpils municipality, Latgale Zoo, Latgale Ecological Society.

INSPECTION OF DEPOSITS OF THE PROTECT PLANTS AND ANALYSIS IN THE DAUGAVPILS CITY DRY FORESTS

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The Latvia landscape does not remember without the forests. The forest is nature system, which form microorganism, grow and animal publics and their inhabited environment and where trees are the determining life kind. All, what takes place in the forest, there is explanation. Also inculcate of kinds of concrete plants or disappearance, forest capability or inability to restore after substantial interfere in it there is a direct answer on environment changes. In the forest are much vegetable kinds, which protect. There is a various protective status them, beginning from commercial imperiled and up to on disappearance border being kinds.

Many factors and processes, which result of the direct or mediated impact can be the biological varieties exist, as also in occurence of vegetable kinds diminish forests, or even their complete disappearance. A large part from the being impacted factors is human action result, less correlated natural factors. Building, animals, pasture of animals, dumps of abandoners, activities of the free time are only a few from the protect kind deposit impacted factors, but their action can be shattering.

Beginning the work making and planning researches, a hypothesis was pulled out, that both the natural factor and human action correlation creates threats the biological varieties and occurence of vegetable kinds diminish in the forests namely in the Daugavpils city dry forests. Data is obtained, executing researches in the Daugavpils city dry forests in a time link from the 2008. year April beginning to the 2008. year September end. A territory of researches inspection is executed two times in period of this vegetation time, which first time is planned from the April beginning līdz the June end and second – from the July beginning till the September end.

In the analysis of the accessible material was work frames executed, that find out, what for the explore territory already collected before. Met with DU database and herbarium collection of the Institute of Systematic biology protected plants. After a material analysis was found out, that for the explore territory are comparing little data. Remark, that an explored part is from territory, however necessary to investigate of this deposit is again, becase data have pretty grown old.

Prepare and data analysis of the necessary research cartographic material utillized GIS and squares of the geobotanical network, where kind deposit - the field, where information is included for a deposit finding place;

In a few deposits of kinds of the two protect plants were inspection of first biotops of the dry forests time established: Pulsatilla patens and Lycopodium clavatum.

In a few deposits of kinds of such protect plants were the second territory inspection time established as *Gypsophila fastigiata, Diphasium complanatum, Armeria maritime, Silene tatarica, Helianthemum nummularium, Trifolium alpestre, Pulsatilla patens, Lycopodium clavatum.*

INVESTIGATION INTO THE HAPLOTYPIC STRUCTURE OF THE EUROPEAN EEL *ANGUILLA ANGUILLA* (L.) POPULATION BASED ON MTDNA D-LOOP SEQUENCE ANALYSIS

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Information about the *Anguilla anguilla* genetic variability derived from mtDNA D-loop region sequences is limited. Thus our research group updated 80 European eel mtDNA D-loop region sequence database created 10 years ago by adding 37 unique sequences. A total of 45 newly determined sequences represent the European eels recently cought in the Lithuanian territorial waters, i.e. the Baltic Sea and the Curonian Lagoon, as well as inland lakes Dringis and Siesartis. Using our results in combination with the data submitted to GeneBank by the previous investigators 115 polymorphic sites (S), a total of 132 mutations (ē), 0.9965 (± 0.002) overall haplotype diversity (H) and 0.02523 nucleotide diversity (š) were determined. The fact that we found no significant clustering related to sample locations in the most parts of phylogenetic tree constructed using 125 European eel mtDNA D-loop region sequences confirm the results of the previous investigators. Nevertheless, limited genetic differentiation has become evident, expecially after construction of the haplotypic network. Based upon current knowledge about the A. anguilla genetic differentiation this species is supposed to occur in a genetic mosaic consisting of isolated groups.

Key words: A. anguilla, European eel, mtDNA, D-loop, haplotype

VASCULAR PLANTS SPECIES' RATE IN THE SLOPES OF DESERTED SAND AND GRAVEL QUARRY OF BERŽUPIS

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Quarry of Beržupis is located in the field of the continental dunes of the Lithuanian Southeast sandy plain, at disctrict of Varėna. The mine was conserved in January 1st, 1977 year. During the exploitation period there about 1038 thousands cubic metres of sand were mined. After the exploitation the part of the quarry territory was recultivated.

Flora of the slopes of Beržupis quarry was examined from 2005 to 2007 year using route - survey method. Species' rate was estimated using route – spot method. According the characters of main relief forms' orientation, the slopes of the quarry were divided into Southern, Eastern, Western and Northern parts. Route directions in the limits of each slope were twofold: (1) from the top of the slope downward until the bottom of the quarry and (2) from the bottom of the slope upwards until the top of the slope. The area of the species' record – visually fixed 1 square metre. Distance between points of record in one route – 10 metres, distances between routes – 20 metres. Eco-zones were not included into the routes. Rate of Ber¸upis quarry slopes' species was evaluated 311 points, among them: in the Southern slope – 73, in the Eastern slope – 101, in the Northern slope – 77, in the Western slope – 60. During the study 114 vascular plants' species were indentified. In all quarry 198 vascular plants' species were diagnosed.

Examination of the Beržupis quarry slopes' flora revealed the biggest rate of species in the slope of Southern orientation – there 81 vascular plants' species were fixed. The least rate of species – 35 – was fixed in the slope of Northern orientation. Conversely, we did not discovered substantial differences in species' number and rate between the vascular plants growing in the slope of Easthern orientation and in the slope of the Western orientation. In the slope of Easthern orientation 63 vascular plants' species were found, and in the slope of Western orientation 51 vascular plants' species were diagnosed. There are no doubts, that the changes of relief forms have the influence on the vascular plants' species' distribution and rate in the slopes of deserted sand and gravel quarry of Beržupis.

Species, which were found in the Southern orientation slope of Ber¸upis quarry the most frequently, are: *Pinus sylvestris* (rate – 32,8%), *Artemisia campestris (*36,9%), *Astregalus arenarius* (26%), *Calamagrostis epigejos* (53,4%). Some species, specifically *Pimpinella saxifraga* (1,4%), *Silene pratensis* (1,4%), *Sedum acre* (10,9), *Hippophae rhamanoides* (5,5%), *Vicia cassubica* (4,4%), *Acinos arvensis* (2,7%), *Fragaria vesca* (4,4%), *Physocarpus opulifolius* (8,2%) and etc., are specific to the slope of Southern orientation, as in the slopes of other orientation they were not found at all. There were some vascular plants' species (*Equisetum variegatum, Achillea millefolium, Antennaria dioica, Helichrysum arenarium, Hieracium umbellatum, Oenothera biennis, Euphrasia stricta*), that were recorded not only in the Southern, but also in the Easthern as well in the Werstern orientation slopes, but they were not fixed in the slope of Northern orientation. In comparing with the slopes of other orientations, the slope of Northern orientation is generally characterised by the least number

of species and the minimal rate level. Species dominating in this slope were: *Pinus silvestris* (49,3%), *Solidago virgaurea* (23,3%), *Melampyrum pratense* (36,3%), *Calamagrostis epigejos* (27,2%). However, several species (*Urtica dioica* (1,3%), *Populus trichocarpa* (1,3%)) were recorded only in the slope of the Northern orientation. The reasons for the lesser number of vascular plants species in the Northern slope are: (1) specific regimes of isolation and warm, and (2) formation of solid cover of moss. Meanwhile in the slope of Southern orientation moss are almost absent.

In the examined territory of Beržupis quarry five species of the Lithuanian Red Book were found: *Silene lithuanica, Epipactis atrorubens, Huperzia selago, Malaxis monophyllos* and *Dactylorhiza incarnata.* The rate of *Silene lithuanica i*n the Southern slope was 3,9 %, and in the Western slope – 1,6 %. The rate of *Epipactis atrorubens* in the Southern slope was 1,4 %. Other species of the Lithuanian Red Book were identified at the bottom of the quarry.

RESEARCH ON WINTER AND SPRING ACTIVE MYCETOPHILIDAE (DIPTERA) IN LITHUANIA

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In the course of the year, the flying activity of adult fungus gnats of different genus and species varies. The largest flying period has Mycetophila fungorum De Geer. Adults of this species have been registered during the all warm period, since early spring to late autumn and during winter thaw. Adults have been observed in December, February and March during the soft winter in 2006-2007. During the winter hibernation can found most often the accumulation of fungus gnats *Exechia fusca, E. spinuligera, Allodia sp., Execheopsis sp., M. fungorum.* Adults of *A. ornaticolis* has long activity period also, adults of this fungus gnats have been found from spring to late autumn. *E. fusca* had been observed during the all year, the adults hibernate and flying during winter thaw. E. fusca and *E. spinuligera* made often a mixed group during the hibernation. Breviciornu sericoma had prolonged flying activity (April - December).During the research established that fungus gnats of all in Lithuania registered Anatella species were spring activ. Adults of *Allodia alternans, A. anglofennica, A. barbata, A. silvatica* also have been found in spring only. In spring, the greatest species diversity is observed in the second decade of April - first decade of May. The greatest species diversity adults of genus Boletina is observed from the second decade of April to the first decade of June. Fungus gnats of genus Boletina predominated among spring active fungus gnats.

SYSTEMATIC STRUCTURE OF GENUS *CARDAMINE* L. IN FLORA OF LATVIA

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First records of the genus *Cardamine* L. in flora of Latvia are mentioned in the 18th century by natural scientist J. Fischer (1778, 1784), who described two species – *C. pratensis* L. and *C. amara* L. In 1830 E. Eichwald mentioned *C. sylvatica* Link., now it is synonym of *C. flexuosa* With. Later in 1839 J. Fleischer and E. Lindemann described one more species *C. impatiens* L. and in 1882 Klinge noted *C. hirsuta* L. Other species *C. dentata* Schult. first is recorded in 1853 by J. Fleischer as indefinite subtaxon of *C. pratensis* – *C. pratensis ā dentata.* In the species grade in flora of Latvia it is describe in 1946 by J. Bickis. In literature there are uncertainly define taxonomic grade of species *C. dentata.* For a long time it has been include as one of the subtaxon of species *C. pratensis* – *C. pratensis var. dentata* (Schult.) Neilr., *C. pratensis subsp. dentata* (Schult.) Čelak. or as species.

As shows study of systematic structure, in Latvia six species are represented of genus *Cardamine* – *C. pratensis, C. dentata, C. amara, C. impatiens, C. hirsuta* and *C. flexuosa.* These species occur in moist, wet grasslands, banks of rivers and lakes, deciduous and coniferous forests. The genus *Cardamine* contains more than 100 species and is widespread in all continents except the Antarctica. *C. pratensis, C. amara, C. dentata* and *C. impatiens* occur in all Latvia. Two of species are include in Red Data Book of Latvia and also in the Red Data Book of Baltic Region. *C. hirsuta* is an endangered species and is know only in two localities in Coastal Lowland. Second species *C. flexuosa* is vulnerable species, spread in the Coastal Lowland of western Latvia. Both reach the eastern boundary of European area and grow close to the northern boundary.

TEMPORAL SPECIES TURNOVER IN HERB LAYER ACROSS DIFFERENT HABITATS IN THE LAKE ENGURE NATURE PARK

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The aim of the present research was to assess the dynamics of species richness and temporal turnover across different habitats in Lake Engure Nature Park. We established permanent plots in several habitat types in Lake Engure Nature Park and monitored them from 1997 to 2008.

Species turnover was defined as a difference in composition between two communities in time or space. We measured species turnover as a number of disappearances plus number of appearances divided by total number of species per both compared years (Milberg, Hansson, 1993). The total species accumulation was determined as difference between species richness in the first year of monitoring and cumulative species richness in the last year (van der Maarel, Sykes 1993).

Species richness differed considerably among habitat types ranging from 3 (dune forest) to 26 (coastal grassland) species per 4 m2 (2x2 m) plot in 1997. Combined 16 m2 plots (3 replicates of 2 x 2 m) contained more species ranging from 6 (dune forest) to 40 (coastal grassland). Significant decrease in species diversity was observed in beach, dune forest, and mesic forest. Species diversity increased continuously in dune slack, fen, and coastal grassland. Other habitats experienced fluctuations in species richness and Shannon-Wiener diversity index.

Cumulative species richness did not differ from the actual species richness in mesic forest and dune forest because only one new species appeared in these habitats during 12 years (*Listera cordata* and *Pinus sylvestris*, respectively). Other habitats experienced considerable divergence between number of species in the first year and cumulative species richness (total number of species in monitoring period) indicating that new species immigration was intensive over 12 years. The accumulation of species was in range from 1 species (dune and mesic forest) to 36 species in coastal grassland. If expressed in per cent – cumulative species richness increased from 11 % in dune forest to 147 % in beach. Moreover, new species appearance did not followed by old species disappearance in fen and moist forest in the first three-four years, indicating diversification of herb layer of these habitats.

Magnitude and course of species turnover differed crucially among habitat types. The highest species turnover was observed in beach community where it reached up to 70 % (if compared the first and the last year). Rather high species turnover (up to 50-60 %) was observed also in moist and mesic forest, and in both grassland habitats. Less dynamic species composition was in dune slack, fen and dry forests – turnover reached only 40-50 %.

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SPATIAL DISTRIBUTION OF SEPARATE WIDELY SPREAD INVASIVE PLANT SPECIES. A CASE OF THE RUĢEĻI AND GRĪVA HOUSING ESTATES OF DAUGAVPILS

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Invasive species have become a serious problem in the protection of natural ecosystems and species, and in preservation of the traditional look of landscape. It is considered that they inflict a considerable damage on national economy. In Latvia, a proportion of foreign plant species is growing every year. Untill now, the spread of invasive plants, composition of species, etc. in Latvia in general, and in Daugavpils in particular, have been investigated only fragmentary. The present research looks at the spatial distribution of six invasive plants (*Rumex confertus* Willd., *Asparagus officinalis* L., *Bunias orientalis* L., *Malus domestica, Impatiens glandulifera* Royle, *Salix daphnoides* Vill.) in the territories of two housing estates of Daugavpils, Ruģeļi un Grīva. The territories under examination differ from the point of view of their respective historical development and age. A feature in common for both is their location on the Daugava banks.

Grīva, one of the oldest housing estates in Daugavpils, is situated on the left bank of the River Daugava. Its history goes back to the beginning of the 18th century. The river Laucesa runs through Grīva; it has an open type valley, which can be considered a valuable ecological element. Lowlands with meadowy spots are situated along its both banks. There are no forests in Grīva. One-storey houses dominate the housing estate; before the construction of the rampart, this territory used to be devasted during flood periods. Straight outside the housing estate, agricultural cabbage-patches are located.

Ruģeļi is the youngest of the Daugavpils housing estates and is situated on the right bank of Daugava. It was initially designed as a "bedroom community". Mixed coniferous forests, meadows, reservoirs, agricultural allotments/cabbage-patches, one-storey houses and blocks of flats are situated in Ruģeļi.

In course of the research, it was concluded that *Rumex confertus* Willd., *Asparagus officinalis* L., *Bunias orientalis* L., *Malus domestica, Impatiens glandulifera* Royle, and *Salix daphnoides* Vill. are the species that have naturalized in Daugavpils. The historical evolution of the territory is not an essential factor of the disposition/placement of the above mentioned species. A much more influencial element, the one that determins the distribution of species is the existing transport corridors and the presence of ruderal biotopes.

INFLUENCE OF CROP MANAGEMENT AND METEOROLOGICAL CONDITIONS ON MINERAL NITROGEN UTILIZATION IN WINTER WHEAT

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Grain farming in Latvia is an economic sector which meets the requirements of grain processing enterprises and baking industry in the necessary amount of grain and flour. In Latvia, almost one third of all area sown to cereal crops is under wheat. Definite crop yield level is reached utilizing corresponding amount of nutrients available to plants from the soil nutrient stock and applied fertilizers. For that reason, the use of nitrogen fertilizers is constantly increasing. Cereals at seedling growth utilize about 8% of total nitrogen used, 28% at tillering stage, 36% at stem elongation stage, 12% at heading stage and 16% at ripening stage. Therefore objective of the long-term research was to study out how crop management and meteorological conditions influence nitrogen utilization in wheat to secure grain and flour quality to meet the requirements of consumers.

It has been stated, that the increase of incorporated nitrogen fertilizer rate up to N180 results initially in increased nitrogen removal with yield at the cost of yield increase, but subsequently at the cost of protein increase, however for different varieties and between separate years changes in nitrogen removal are different. Nitrogen use efficiency significantly decreases with the increase of the incorporated fertilizer rate. At lower nitrogen fertilizer rates plants utilize half or even more of the required nitrogen from the existing soil nitrogen stock, but with the increase of the mineral nitrogen rate the utilized nitrogen amount for separate varieties or in a specific year is equivalent or even lower than the nitrogen amount incorporated into soil. Wherewith, the soil nitrogen stock, obviously, is not completely utilized.

Average yield data in specific years practically smooth down annual deviations, which result from the influence of variable meteorological conditions. Under variable meteorological conditions also the expression of separate yield affecting factors is different and it is indicated by yield variation coefficients. Applying sufficient fertilizer rates crop yield is dependent on the conformity of meteorological conditions to plant requirements during development of yield forming structural elements (the number of ears per area unit, the number of spikelets per ear, the number of grains per ear, size of grain), but grain nitrogen (protein) content – by meteorological situation at the end of vegetation period (Growth Stage or GS 72-85).

Production of comparatively high winter wheat grain yields of corresponding quality require annual determination of the needed nitrogen fertilizer rates and their splitting during vegetation period in accordance with the character of the vegetation period – vegetation renewal in spring, rainfall distribution as well as variety grown and plant development status.

THE HABITATS OF SPONTANEOUS FLORA AND FAUNA OF VILNIUS UNIVERSITY BOTANICAL GARDEN IN KAIRėNAI AND THEIR EDUCATIONAL ASPECT

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Information system of Vilnius University Botanical Garden was set up with the support of the European Union in 2008. Considerable attention to natural plant and animal habitats was paid in this system

Vilnius University Botanical Garden is a suburb of Vilnius and occupies 193 ha territory. Garden's area is very heterogeneous. There are outlying slopes, low hills, ravines, ditches, ponds and springs where spontaneous flora and fauna habitats remained. Here are forest, grassland, still or flowing water and theirs strands. Some of them are small (up to 100 square meters), the other are bigger (up to several hectares). Although some of them were modified by human activity but the Vilnius University Botanical Garden's flora and fauna habitats are still very rich. There are about 400 vascular plant species (nearly 30% of Lithuania's flora), of which 88% found in Lithuania frequently or very frequently, 12% of mid-frequency, rare or very rare. 120 species of vertebrate animals also live in the garden, within about 80 species of birds (almost 25% of species found in Lithuania). Thirteen species of vertebrate animals, found in Garden, are in the Lithuanian Red Book.

The information board with highlights of the most interesting plant and animal habitats and their location at Vilnius University Botanical Garden was build near the Garden's entrance. This way we demonstrate, not only introduced, but spontaneous flora, which is possible in our garden not only by creating an artificial environment but in natural habitats. The six smaller information boards in which we characterizing and describing the specific habitat (dry downhill, pond, swamp woods, broad-leaved forest, pinewood, overgrown pond), a widespread species, their adaptability to grow in the specific habitat and taking photography's of most important species.

In dry downhill habitat we introduce to visitors species which are typical for steppe (*Festuco-Brometea erecti*), outer wood, the forest glade and slopes (*Trifolio-Geranietea sanguinei*) meadows. Spread of these habitats in Lithuania, thermophilous plants and succulents as well as their morphological adaptation were described also.

The distribution of the aquatic plants along a depth gradient, fish and plants species found in ponds were described in "Pond" board.

In swamp woods habitat we focus on diversity of birds. For instance the best known singing bird species: the nightingale (*Luscinia megarhynchos* Brehm) and golden oriole (*Oriolus oriolus* L.). Some of the swamp woods plants noted too. There were species of birds from the Lithuanian Red Book observed in garden introduced also.

Diversity of trees, shrubs, early spring flowering and shady herb species are introduced to visitors in broad-leaved forest. Bat species which live in Garden presented also. Typical species of pinewood habitat and temporality of this habitat is described on "Pinewood" board. Amphibian fauna is highlighted in overgrown pond habitat.

SPHAGNO WARNSTORFIANI-TOMENTHYPNION DAHL 1957 - A NEW HIGHER VEGETATION UNIT IN MIRES OF LATVIA

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The sociological species group of slightly calcareous mires in Latvia was derived by means of JUICE software. From 1777 mire and lakeshore vegetation releves sixty-six releves were classified as slightly calcareous mires and assigned to the alliance Sphagno warnstorfiani-Tomenthypnion, order Caricetalia davallianae, class Scheuchzerio-Caricetea nigrae. Six diagnostic species of this alliance in Latvia were obtained by calculating the u-value. Slightly calcareous mires are found throughout Latvia and they represent boreal variant of calcareous mires. It is proposed to assign association Chrysohypno – Trichophoretum alpini to this alliance in Latvia.

THE STATE OF TREES - NATURE MONUMENTS IN KAUNAS COUNTY

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Trees – nature monuments are exclusive because of their age and size as well as their cultural, historical and esthetical value. The condition of such trees is important for preservation of landscape and biological diversity. The condition of trees – nature monuments and factors that influence this condition have been researched in Kaunas County in 2006 – 2007. The condition of trees was estimated by both physiological and biomechanical approach. Physiological state was evaluated by three factors, while nine factors and proximity of the surrounding wild trees in respect of the preserved object were used to evaluate biomechanical state.

It was estimated that the state of 50 % of trees – nature monuments in Kaunas County was satisfactory, while the state of 31 % of trees was good and the rest 19 % of trees were in unsatisfactory state. The biggest influence on the condition of trees was made by damage of entomophytes, tilt of tree's centre of gravity and presence of hollowing (rot, hollow). Anthropogenic damage, number of dry branches, the surrounding plants, branch and trunk bifurcation with ingrown bark had less influence on the condition of trees.

Tilt of tree's centre of gravity was observed for all analyzed species. Entomophytes damage was typical for both oaks and pines, where oaks had exceptionally hollow damage, holes and bifurcation with ingrown bark was characteristic for lindens. And ligneous surrounding plants were typical for pines. The positive correlative relation between vitality and leafiness of crown as well as crown vitality and number of dry branches was obtained on average. The highest crown height and trunk girth were obtained for lindens and the highest crown projection was obtained for oaks. The negative correlative relation between crown height and tree's centre of gravity was estimated on average.

SUPEROXIDE DISMUTASE AND CATALASE ELECTROPHORETIC ACTIVITY AND LIPID PEROXIDATION IN WHEAT SEEDLINGS (*TRITICUM AESTIVUM* L.) AFTER HEAT STRESS

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Impact of elevated temperature on some antioxidant (SOD, CAT) electrophoretic activity and lipid peroxidation in etiolated seedlings was examined for characterizing the response of wheat (*Triticum aestivum* L., cv. *Harmonia*) seedlings to heat stress. Etiolated wheat seedlings were transferred to 42°C for 15 min, 30 min, 60 min and 24 h in the dark at the early stages of development (4 day-old) and at the late stages (7 day-old) of seedling development. Plant material was sampled for analysis immediately after heat shock and in two days after high-temperature exposure.

An enhanced level of lipid peroxidation, as indicated by MDA content, was observed in wheat organs in response to high temperature in the present study, which clearly indicates that oxidative stress has occurred under high temperature. The influence of high temperature on MDA content differs not only for the stages of development, but also for particular organs of the wheat. Our data show that long-term high-temperature exposure has the most powerful influence on the root system, i.e. if the concentration of MDA in roots of the control seedlings almost doesn't differ at the early and late stages of development then in experimental roots it increased twice. Short-term high-temperature exposure led to a significant increase of MDA concentration immediately after exposure in all organs of wheat and a gradual decrease of MDA concentration in two days after the experiment. This trend remained at the late stages of seedling development too.

Electrophoresis indicated two SOD isoforms (CuZnSOD and MnSOD) and three CAT isoforms. The electrophoretic activity of SOD in the wheat organs increased during the development and did not change after short-term high-temperature exposure. The CAT activity increased in wheat organs after high-temperature exposure. An insignificant increase in SOD activity was indicated in leaves after heat stress. However, inhibition of SOD activity after long-term (24h) high-temperature exposure was reported in roots and coleoptiles of wheat seedlings.

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HISTORICAL AND ECOLOGICAL OVERVIEW OF AGRICULTURAL LANDSCAPE MANAGEMENT IN LITHUANIA

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The area and the management of Lithuanian landscape have been changing with the development of agriculture, land reforms and historical events. The earliest written documents dealing with land management in Lithuania come from the 14th century. These documents set down legal rules regarding relationships between landowners and the use of natural resources. In the 16th century landowners demanded that peasants should take care of good condition of meadows and pastures: proper haying and pasturage, removal of shrubs, etc. The event of great importance was the Valakas reform (1557–1570), which affected all aspects of land management and contributed significantly to changes in the landscape: more intensive land cultivation system with 3 field crop rotations was introduced. In 1560 arable lands covered 40 %, whereas meadows – 13 % of the former Lithuanian territory. During the Great Northern War (1700–1721), especially after the plague (1708–1711), certain area of formerly cultivated land overgrew with trees and shrubs. The reform that was executed in the 2nd half of the 18th century aimed to restore Lithuanian agriculture: young people were sent to England to study agronomy, the fields were reclaimed, the amount of cattle was intensively increased, the demand for fodder was satisfied by extending and fertilizing meadows. Unfortunately, the planned progress of agriculture was stopped by the uprisings against the czar's government. After the repressions following the uprising of 1863–1864 and mass migration of workers from Lithuania since 1868, a striking reduction of the area of arable lands was observed (in 1868 – 50 %, 1888 – 39 %), however, the areas of meadows and pastures increased (in 1868 – 14 %, 1888 – 27 %).

Owing to the land reform at the beginning of the 20th century (division of villages into individual farms) the country's territory under human cultivation reached the highest proportions: agriculturally cultivated land occupied more than 2/3 of the territory (67 %). During World War II, unsettled economic activity in Lithuania conditioned expansion of meadows to the account of arable lands: from 20 % (1940) to 25 % (1945). Since 1955, intensive land-reclamation, expansion of arable areas, afforestation have predetermined regular decrease of meadows and pastures (1955 – 20 %, 1960 – 18 %, 1970 – 16 %, etc.). In 1960s–1970s a wide-range land reclamation was performed, aiming to drain lands and create large agricultural fields. On intensively reconstructed areas, landscape was transformed and biological diversity impoverished. In 1990 land ownership restitution started and large-scale land use changes triggered. Now meadows and natural pastures cover 7.6 % of the country's territory. Alterations of land-use and farming traditions stimulated, on one hand, naturalization of abandoned agricultural lands and increase in their biological diversity, and, on the other hand, rapid degradation of abandoned natural or semi-natural meadows.

EVALUATION OF RAPD METHOD FOR SOME POPULATION OF CLADOCERA GROUP IN LAKE SVENTE FROM LATVIA

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Cladocera is of great importance in aquatic food chains. Some cladocera genera have been utilized as a model organisms in ecotoxicology and ecological genetic. These uncertainties are caused by the high phenotypic plasticity of species, the occurence of local rase and natural interspecific hybridization. Morphological characters thus may not be sufficient to distinguish between intra- and interspecific variation. Molecular genetic surveys of continental aquatic invertebrates (cladocerants, anostracants, rotifers, copepods, ostracods, etc.) have yielded valuable insights into the evolutionary forces shaping their genetic structure and are helping to characterize the cryptic biodiversity of these groups.

We used RAPD (Random Amplificed Polymorphic DNA) to test genetic diversity between some population of Daphnia and Bosmina in Lake Svente from Latvia. Previous taxonomic studies Daphnia and Bosmina have been based on morphological characterable. During the analysis of samples from Lake Svente , which were taken in 2007and 2008 years approximately 15-20 species were determined in Cladocera groups. In all localities of the sampling Daphnia cucullata and Bosmina crassicornis were domined species in Cladocera group.

The cosmopolitan Cladocera genus Daphnia cucullata and Bosmina crassicornis are regarded as being taxonomically complex. The primers GAAACGGGTA (A-07), AATCGGGCG (A-04), CCTTGACGCA (B-12), GTCCACACGG (B-08) were used in RAPD analysis. These primers were selected because they provided distinct band that were easy to score. Using the RAPD technique were examine whither there is any extensive gene flow between the Bosmina and Daphnia forms. RAPD analysis is based on the polymerase chain reaction (PCR) technique; it requires only a small amount of DNA, making it particularly suitable for small organisms. We have demonstrated that RAPDs are relatively easy method for revealing genetic differentiation among Bosmina and Daphnia populations confirming earlier classifications based on morphological traits.

HUMAN CHROMOSOME DISEASES: POPULATION FREQUENCY AND DISTRIBUTION INTO CLINICAL STREAMS

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The part of karyotype anomalies causes in carriers less or more characteristic congenital defects enabling to suspect chromosome disease, the other anomalies don't influence upon the phenotype. The frequency of chromosome pathology in human population would be most fully evaluated by mass consecutive karyotype investigation in newborns. Such chromosome investigation of unselected newborns made in our laboratory, was the seventh in the world. We have investigated the karyotype in 4032 newborn babies and found the anomalies in 31 (0.77%) of them. However the most chromosomal syndromes are very rare accident and the view concerning the frequency of chromosome anomalies could be evaluated only by assuming population investigations made in many laboratories. So far, there have been investigated more than 100.000 karyotypes in unselected newborns, and the frequencies of anomalies are ranging from 0.47% to 0.83%, in average 0.61%. According to phenotype as well as karyotype the chromosome patients could be divided into three equally groups. The first group (about 0.2% of all newborns) is accompanied by multiple congenital malformations. All patients are severely mentally retarded. The karyotypes of patients show autosomal trisomies (Down syndrome, Edwards syndrome, Patau syndrome) also partial monosomies and trisomies. Second group of patients (about 0.2% of all newborns) are phenotypically healthy infants and children. The karyotype of these patients show additional sex chromosome X or Y (or both). About 25-30% of patients are mildly mentally retarded. The patients suffering from Klinefelter syndrome (karyotype 47,XXY) are infertile, the patients suffering from Jacobs syndrome (karyotype 47,XYY) have behavioral problems. Third group (0.2% of all newborns) is healthy in all respects but their karyotype possesses balanced translocations. These patients usually are detected when in their offsprings are found unbalanced chromosome rearrangements. The proportions between the three above mentioned groups of patients could be slightly changed in the future because of demographical changes and spreading of reciprocal translocations also due of prenatal diagnostics.

PECULIARITIES OF THE BLACK STORK *CICONIA NIGRA* AND LESSER SPOTTED EAGLE *AQUILA POMARINA* NEST SITES LOCATION IN THE FOREST LANDSCAPE

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The aim of our research work was the determination of peculiarities of the Black Stork *Ciconia nigra* and Lesser Spotted Eagle *Aquila pomarina* nest sites location in the forest landscape. The study in all Lithuania covered 255 nest sites of Black Stork and 249 nest sites of Lesser Spotted Eagle. Location of these nest sites was analyzed by GIS methods and compared with analog forest landscape data from random control points. Habitat selection of Black Stork and Lesser Spotted Eagle nest sites were analyzed on statistically significant impact of preference and avoidance factors. We determinate the factors mostly negative and positive influenced nest sites selection in the forest landscape by both bird species. The Black Stork were significantly negatively influenced of the distance of neighboring various size settlements, higher density of roads, edges of the forest as well as pine stands proportion. The Lesser Spotted Eagle significantly avoided of territories with transformation of grasslands to arable land near the forest edges, forest interior area, pine and spruce stands proportion. Areas of cuttings and open areas in the forest were not avoided by both species if forest cuttings were executed during non breeding time and outside the nest protective zones. There were found that Black Stork significantly preferred forest interior area, protected territories, woodland key habitats, availability of oaks, spruces and pines 100 and more years old. The Lesser Spotted Eagle significantly preferred forests with highest proportion of forest edges, areas of mixed broadleaved with spruce forest as well as availability of oaks 100 and more years old, protected territories and woodland key habitats. Optimal protecting radius around the nest of Black Stork in Lithuania is 200 meters and around the nest of Lesser Spotted Eagle is 100 meters. Additional quietness zone around the protecting radius of both species could be 100 more meters.

RESULTS OF MONITORING OF POTABLE WATER'S MICROBIOLOGICAL QUALITY IN JĒKABPILS IN 2007-2009

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The modern society has reached the standard of the well-being. The system of communications, science and opportunities for movement around the world develops. But all of us face the global environmental problems: reduction of biological variety, pollution of the nature, famine and overpopulation. Not only environment, but also human lives are in danger. Every year 3 million people perish because of using poor-quality water. According to the World Health Organization 120 million people do not receive microbiologically pure water. The information about methods of definition of potable water's microbiological quality is resulted in this message. Brief characteristics of pathogenic microorganisns living in water are described. The purpose is to receive ang process data about microbiological quality of potable water in Jēkabpils.

ANALYSIS OF SPATIAL DISTRIBUTION OF THE SEDGE *CAREX PILOSA* SCOP. WITH RESPECT TO EROSION LANDFORMS IN SOUTH-EASTERN LATVIA: ECOGEOMORPHOLOGICAL ASPECTS

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Field studies of the sedge *Carex pilosa* Scop. was performed in 5 sites situated in south-eastern Latvia. 3 of these sites are located in the Daugava Valley within the Nature Park "Daugavas Loki", one in the Lazdukalna brooklet valley (left tributary of the Daugava in NP "Daugavas Loki"), another one in spillway valley Pilskalnes Siguldiņa near Ilūkste town, and the last one in the upper reaches of the Ilūkste valley in Raudas meži.

This species of sedge belonging to the family Cyperaceae, is rare in Latvia (1st category of the Red Data Book of Latvia), and, according to Ellenberg (1974), is hemicryptophyte species of the thermophilic – close to partially thermophilic group, with moderate demands on nutrients. In order to elucidate ecogeomorphological aspects and abiotic factors affecting spatial distribution of this perennial evergreen sedge, analysis of location of *Carex pilosa* populations in relation to landforms, slopes exposure and inclination, canopy vegetation and soil type was done.

Obtained results, first of all, show direct interconnectedness between location of *Carex pilosa* populations and erosion network, in fact the greatest part of the sedge growing places are concentrated exactly within valleys and gullies. Canopy vegetation in the sites under study mainly are represented by broad-leaved forests. The main stand-forming tree species in the Daugava valley and Pilskalne study sites are linden (*Tilia cordata* Mill.), wych elm (*Ulmus glabra* Huds.) and oak (*Quercus robur)*, hazel (*Corylus avellana* L.) occur only in undergrowth, whilst in the Raudas meži site prevails aspen (*Populus tremula* L.) with admixture of wych elm (*Ulmus glabra* Huds.), ash (*Fraxinus excelsior* L.) and oak (*Quercus robur* L.). GIS analysis of digital elevation models of the study sites show that to a great extent distribution of the sedge is related to the sunniest and warmest wood habitats on southern, south-eastern and south-western slopes of river valleys and gullies in the region under study. The influence of dryness and warmth can be well observed by comparing similar canopy vegetation with that of the slopes of north-spacing aspect, where *Carex pilosa* does not grow. Inclination of slopes, where the sedge was found, varies from 5° to 20°, soil type mainly is luvisol, developed on stony and gravelly sandy loam of glacial origin (moraine).

Analysis of data shows that spatial distribution of *Carex pilosa* can be explained as result of interaction of indirect and direct controlling factors. On the one hand, growing of the sedge within erosion forms is a result of preservation of forest habitats due to steep slopes. On the other hand, development of erosion landforms within landscape causes formation of environment favourable for existence of *Carex pilosa* due to slope aspect, slope gradient, soil properties and amount of solar radiation. Hence results highlight the positive role of fluvial erosion in formation of different habitats and increasing of biodiversity.

CULTIVATION OF THE INTRODUCED *SALIX* PLANTS IN PLANTATIONS

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Cultivation of the introduced *Salix* L. varieties in a short rotation coppice was studied at the Field Experimental Station of the Institute of Botany established in 2006. *'Gudrun'* (*Salix dasyclados 'Helga'*×*S. viminalis*), *'Tora' (S. schwerinii* ×*S. viminalis)* and *'Tordis' (S. schwerinii*×*S. viminalis)* ×*S. viminalis)* cuttings prepared from refrigerated shoots were planted in sod-podzolic sandy loam soil and sod-podzolic sandy loam fertilized with sewage sludge compost, while *'Tordis' (S. schwerinii*×*S. viminalis)* ×*S. viminalis)* – also in analogous soils using cuttings prepared from freshly cut shoots. Sewage sludge compost prepared from Vilnius city sewage was used for fertilization; it was introduced into soil in autumn of 2005; fertilization rate was 60 t/ha.

Analyses of sod-podzolic sandy loam soil as well as changes of pH, amounts of nitrogen, mobile phosphorus, potassium and humus after its fertilization with sewage sludge compost are presented. The growth of *'Gudrun', 'Tordis', 'Tora'* plants during the first year of cultivation, as well as during the second year after cutting in spring, was influenced not by just edaphic but also by hydrothermal parameters.

The height of the investigated shrubs, lengths and numbers of annual shoots and new shoots were evaluated. The effects of sewage sludge compost application, cutting preparation time and hydrothermal conditions upon growth of different *Salix* varieties were evident.

Under meteorological conditions of 2006, in soil fertilized with sewage sludge compost '*Tora'* and *'Tordis'* plants were higher and produced more annual shoots. In 2007 in this soil plants of all varieties formed 5 new shoots each, but the tallest were still *'Tora'* and *'Tordis'*. It could be presumed that these two varieties are more promising for cultivation in Lithuania.

PLANTS OF RIBES GENUS INFECTED BY GALL FORMING *CECIDOPHYOPSIS* MITES IN LATVIA

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Gall mites of the *Cecidophyopsis* are recognised as a problem almost in the all countries where red and black currants are an important fruit plants. By several authors already in the middle of 20th century virus diseases transmitted by gall mites are mentioned as a serious problem for Latvia. Plant grower's light attitude to the importance of healthy planting material necessity is a conductive factor for spread of virus like organisms and their vectors in Latvia. Totally 6 species of the gall mites in Europe are known.

For a gall mite diversity research in March and April 2007 from all regions of Latvia totally 1200 samples (one sample per one shrub) are collected. The gall mite species identification not yet carried out but big galls symptoms allow recognise the amount of infected currant species and cultivars.

Big galls are observed mainly on *Ribes* plants in synantropic biotopes – old gardens and plant collections. In farm plantations gall symptoms are much less. Main infected plants are different black currant species and cultivars but infected red currants are found only in some places. In wild biotopes (mainly in open areas) the big galls are found on *Ribes nigrum, R. spicatum* and *R. alpinum.* Plants of *R. spicatum a*re observed only in Valley of Gauja River (near Sigulda) and large amount of big buds are recognised on many shrubs. Almost the all commercially important black currant cultivars are recognised as infected by gall mites. The research of gall mite diversity will be continued and the identification of gall mite species from collected sample material is provided in this year.

GENETIC VARIABILITY OF *A. FLAVICOLLIS*

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DNA polymorphism were analyzed by a randomly amplified polymorphic DNA polymerase chain reaction (RAPD - PCR) technique studied in 99 specimens of *Apodemus flavicollis* from eight different populations from four different countries of Europe (Norway, Finland, Latvia, Lithuania), using ten primers (ROTH – 180 -01, ROTH – 180 – 02, ROTH – 180 – 03, ROTH – 180 – 04, ROTH – 180 – 05, ROTH – 180 – 06, ROTH – 180 – 07, ROTH – 180 – 08, ROTH – 180 – 09, ROTH – 180 – 10) seven of them gave specific patterns and could be used as genetic markers for the species analyzed. Visual examination of electrophoresis gels showed that the number af polymorphic loci are 127. PopGene3.2, TREECON was used for the estimation of genetic variability. The genetic polymorphism among populations varied from 13,39 % to 77,17 %. Genetic similarity between the population based on RAPD data varied from 0,7515 to 0,8806. These data compared with lithuanian populations (Muižė, Kintai, Kaunas), the genetic polymorphism varied from 20% (Hinnebu2) to 85,71 % (Rosef). Between Lithuanian populations genetic polymorphism varied from 48,57 % (Muižė) to 82,86 % (Kaunas). The highest genetic similarity was between lithuanian populations 0,9661 (Muižė and Kaunas), the lowest genetic similarity was between Hinnebu2 and Muižė populations – 0,4879.

ISOENZYME ANALYSIS OF THE COMMON MOLE (*TALPA EUROPAEA* L.) FROM DIFFERENT REGIONS OF LITHUANIA

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In Lithuania there is only one species of moles – the Common Mole (*Talpa europaea*) of the genus *Talpa* Linnaeus that includes 6 species of the Old World moles of the subfamily Talpinae: the Siberian Mole (*Talpa altaica*), the Mediterranean Mole (*T. caeca*), the Caucasian Mole (*T. caucasica*), the Europaean Mole (*T. europaea)*, the Roman Mole (*T. romana*), and the Persian Mole (*T. streeti)* (Gorman & Stone, 1990). The Common Mole is distributed in Europe and West Siberia. In Lithuania Talpa europaea is a very common and widespread species. It is more abundant in Central Lithuania, and less abundant in the sandy soils of Southeast Lithuania (Balčiauskas, 1997).

Isoenzyme variation and differentiation of the Common Mole (*Talpa europaea* L.) from 14 different localities of Lithuania were studied. A total of 290 specimens of the Common Mole examined. Genetic variability of liver non-specific proteins (Np) and esterase (Est) was investigated by means of vertical polyacrylamide gel electrophoresis. Nine polymorphic loci were detected: Est–1, Est–2, Est–3, Np–1, Np–2, Np–3, Np–4, Np–5, Np–6. Genetic differences between subpopulations were detected using UPGMA (Unweighted pair – a group method with arithmetic averaging) cluster analysis (Nei, 1972).
The cluster analysis (Nei, 1972) and the test of the authenticity of genetic differentiation between populations (Raymond, Rousset, 1995) showed the explicit genetic differentiation of mole in Lithuania (Table. 1), which does not depend on geographical distances ($R=0.08$, $r> 0.05$) (Mantel, 1967).

Scarcity of heterozygote showed the mosaic type of the genetic variability in moles subpopulations from Lithuania.

Genetic differences between the Common Mole subpopulations depend on a complex of ecological factors and epigenetic processes in ecologically different localities of Lithuania.

Key words: Common Mole, *Talpa europaea*, isoenzyme, genetic variability, population genetics

BRYOPHYTE SPECIES COMPOSITION OF DIFFERENT FOREST STANDS ON MORICSALA ISLAND

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Moricsala Nature Reserve was established in 1912 and is the oldest Nature Reserve in the Latvia. The most typical habitat on the Moricsala Island is old-growth broad leaved forest with *Quercus robur* and *Tilia cordata*.

To compare bryophyte species composition in various forest types, five different forest stands were studied in the south-west part of Moricsala Island in October 2008. Eight sample plots were established, in which occurrence of epiphytic, epixylic and epigeic bryophyte species was described using the Braun-Blanquet cover-abundance scale.

In total 57 bryophyte species were found, four of them are Red listed species in Latvia (*Barbilophozia attenuata, Metzgeria furcata, Neckera complanata, N. pennata*), and three species are specially protected in Latvia (*Barbilophozia attenuata, Jungermannia leiantha, Neckera complanata*).

The highest species richness of the bryophyte species was found in a deciduous-*Picea abies* forest stand (35 species) and in a deciduous-*Alnus glutinosa* forest stand (33 species). The highest bryophyte species richness from all studied substrates was found on decaying trees (41 species).

A statistically significant ($P<0.05$) factor affecting both epiphytic and epixylic bryophytes was value of substrate tree bark pH. Distance to nearest tree, value of soil pH, and content of organic matter in soil were significant factors influencing the epigeic bryophyte species community.

There was no statistically significant difference between most of forest stands using Mann-Whitney U test after comparing species richness, except the deciduous-*Picea abies*-1 plot, which showed a significant difference from five other plots.

MACROPHYTES AS INDICATORS OF ECOLOGICAL QUALITY IN THE STREAMS OF LATVIA

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Macrophytes are one of the group of aquatic organisms which could be useful for estimating the ecological status of rivers and streams in accordance with Water Framework Directive. The aim of this study was to evaluate the suitability of macrophytes and indexes based on macrophytes communities for assessing ecological status of streams in Latvia.

Estimation of macrophytes was performed at 18 sites on 15 streams during August and September 2007. The survey of Abuls (3 sampling sites) was carried out during August and September in 2005, and repeatedly in 2007. The presence of each macrophytes species and their cover (in percent) were determined in a 100 m long stretches of streams.

Saprobity index, The Macrophyte Biological Index for Rivers (IBMR), Mean Trophic Rank (MTR) and Mean Trophic Rank for Poland (MTR_P) indexes were calculated for characterizing river stretches according macrophytes composition and their covering. Trophic index IBMR is used for assessing the trophic status and organic pollution in rivers in France. MTR index was developed in the United Kingdom, it is used for assessing eutrophication in running waters. MTR_P is Polish index based on MTR and fitted for Poland.

Values of Saprobity index were similar for all stream stretches that were described as medium polluted with organic matter. Values of MTR, MTR_P and IBMR indexes characterized trophic status of streams as medium to high. These indexes partially conformed to water chemical quality that was quite similar. At the same time most flexible in regard with streams ecological water quality was MTR_P index as the natural situation in Poland is comparatively more similar with situation in Latvia.

One of the problems for the use of macrophyte trophic metrics should be that these indexes are developed on the basis of species list representative for particular countries. The other problem should be that macrophytes slowly respond to changes in water chemical quality. The studies in the stream Abuls in 2005 and 2007 showed that trophic indices did not change significantly.

In general, results of the study showed that IBMR, MTR and MTR_P of macrophytes indexes are pertinent for a routine application in a biological monitoring. For the more appropriate assessment of ecological quality by macrophytes indexes in Latvia, it is necessary to evaluate macrophytes species scores according to Latvia's conditions and to compose consistent species list.

CONSERVATION OF BIOLOGICAL DIVERSITY OF MEADOW BIOTOPES EX SITU IN NATIONAL BOTANIC GARDEN

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In conformity with Global Strategy for Plant Conservation, European Plant Conservation Strategy and International Agenda for Botanic Gardens in Conservation, wild plant species research, conservation and management ex situ is one of major tasks of botanic gardens.

The activities to conserve and increase native plant species biodiversity of National Botanic Garden (NBD) of Latvia are presented in this paper.

In 2008 the inventory of meadow biotopes in NBD was started. The aim of this work is to locate valuable biotopes in NBD to make up measures of management for conservation and increase biodiversity. Meadow biotopes are located in both phyletic part (area 20 ha) and phytogeographic part (area 25 ha) of NBD arboretum. The plantings make mosaic thereby areas with ecotone have developed. There are plant species typical for forests, borders of forests and meadows occurred in these contact zones of biotopes. In NBD arboretum regular grass cutting (at least once a year) is applied. The fertilizers are not used at all.

The first results of inventory show that due to regular grass cutting in NBD arboretum plant communities with high botanical value have developed. Plant species typical for non-fertilized meadows are occurred – *Briza media* L., *Anthoxanthum odoratum* L., *Achillea millefolium* L., *Galium album* Mill., *Polygala vulgaris* L., *Dianthus deltoides* L., *Plantago media* L., *Medicago lupulina* L., *Anthyllis vulneraria* L., *Thymus ovatus* Mill., *Solidago virgaurea* L., *Cerastium holosteoides* Fr., *Vicia cracca* L., *Prunella vulgaris* L. and others.

A further task of this research is to make and maintain models of non-fertilized meadows and do monitoring as well as make overgrowing study in less significant meadow biotopes.

National Botanic Garden (total area 129 ha) has status of specially protected nature territory. The activities planned in future will increase value of this territory.

MACROPHYTE FLORA AND VEGETATION OF LAKE SILA

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Lake Sila is the fourth largest lake of the Ilūkste Lakeland (comprising about 200 lakes of the Augšzeme Highlands and the adjacent territory) behind Lake Riču, Lake Sventes and Lake Meduma and being under state protection since 1977 (Silene Nature Park – Natura 2000 place). It is a shallow (non-stratified), dyseutrophic brownwater lake of glacial origin with a flowing water regimen situated at 146.3 m a.s.l. in a predominantly forested area and belonging to the catchment area of River Daugava. Its area is 261.0 ha comprising 260.7 ha of water area as well as a small island with the area 0.3 ha. The maximum length of the lake is 4.0 km, the maximum width – 1.0 km, the length of the shoreline – 15.7 km, the maximum depth – 6.8 m and the mean depth – 4.1 m. The catchment area of the lake comprises the territory of 47 km2 with 14 more lakes in it. There are about 16 watercourses flowing into the lake and just one – River Silica flowing out of it and after 2.2 km reaching the nearby Lake Riču. The water volume of the lake reaches 10.4 millions m3 and its renewal period lasts, on average, for 405 days. The water colour is yellowish brown and its transparency reaches 1.5 m (6.9.2008.). The littoral of the lake is usually 3 – 20 m wide (in some places up to 90 m) with mostly sandy sediments at its shallowest part that are being covered with the increasing layer of mud towards the depth. There are 3 shallows in the open part of the lake. Quagmires are forming in some places at the SW and S parts of the lake. Macrophytes are growing up to the depth of 2.5 m and their total overgrowth constitutes 18% of the lake water area. Botanical investigations of the lake were carried out by the author in 1989-1990 (45 macrophyte species – 1 charophyte, 4 aquatic mosses and 40 vascular plants detected) and repeated in 2007-2008 (47 macrophyte species – 3 charophyte, 4 aquatic mosses and 40 vascular plants detected). As compared with the first investigations, 5 species have disappeared because of the increased anthropogenic eutrophication – *Nuphar pumila, Nymphaea alba, Potamogeton filiformis, P. gramineus* and *Ranunculus reptans* (also *Fontinalis hypnoides, Lemna minor* and *Potamogeton friesii* were not detected repeatedly). On the contrary, 8 species were recently found in the lake for the first time – *Drepanocladus sendtneri, Lemna trisulca, Najas minor, Nitella mucronata, Nitellopsis obtusa, Potamogeton compressus, P. crispus* and *Utricularia vulgaris.* The macrophyte flora of the lake is rich, on the whole, and it is represented by 3 charophyte species from 3 genera and 3 families (*Chara globularis, Nitella mucronata, Nitellopsis obtusa*), 4 aquatic moss species from 3 genera and 2 families (*Drepanocladus aduncus, D. sendtneri, Fontinalis antipyretica, Leptodictyum riparium*) as well as by 40 vascular plant species from 29 genera and 19 families. The richest one among them is Potamogetonaceae with altogether 7 species (*Potamogeton acutifolius, P. compressus, P. crispus, P. lucens, P. natans, P. perfoliatus, P. praelongus*). Other richest families are Hydrocharitaceae (4 species, 4 genera), Cyperaceae (4 species, 3 genera) and Gramineae (3 species, 3 genera). The littoral is characterized by a belt of emergent macrophytes stretching along there shore and dominated by *Phragmites australis*, sometimes also by *Scirpus lacustris* as well as by a mixed belt of floating-leaved and submerged macrophytes dominated by *Nuphar lutea* as well as by *Potamogeton lucens* behind it. Lake Sila is valuable as a rich habitat of 5 rare and endangered macrophyte (some of them relict) species – *Hydrilla verticillata,*

Najas marina, N. minor, Potamogeton acutifolius and *Scolochloa festucacea*. It represents one of the three localities of *Najas marina* outside the Coastal Lowlands as well as one of the ten known localities of *Najas minor* in Latvia. The lake also represents a protected European habitat „Natural eutrophic lakes with Magnopotamion or Hydrocharition – type vegetation" as well as a protected Latvian habitat „Lakes with Najas stands". The increasing anthropogenic eutrophication of the lake due to intensive recreational activities and the building of new recreation centres at shores of the lake pose a real threat to the preservation of the important biodiversity values of the lake. In order to preserve the biodiversity values of Lake Sila it is necessary to reduce the negative impacts arising from the undue anthropogenic influence on the lake by restricting the construction of new recreation centres and decreasing recreational activities.

THE IMPACT OF PHYTOHORMONAL INDUCTION ON *PULSATILLA* REGENERATION IN VITRO

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Pulstatilla is a perennial ornamental and medical plant belonged to Ranunculaceae Juss. family. Some species are endangered and are included into Red Data Books of all European countries in which it occurs. The one of the pathway for protection of *Pulstatilla* gene fund is to conserve plants ex situ. In this way botanical gardens are among the leaders. At the same time germoplasma banks with cultures in vitro can be the alternative choice. The aim of this research was to establish the phytohormonal ratio for *Pulsatilla* regeneration and proliferation in vitro. Murashige&Skoog (MS) media was chosen to induce the pasqueflowers regeneration. Impact of the different ratio (1:1; 1:2; 1:5) of phytohormones 6-benzylaminopurine (BAP) and indole-3-acetic acid (IAA) was analysed.

Final experiments results showed that the biggest number of regenerants can be gotten when *Pulsatilla* cultivates in MS media supplemented by phytohormones with ratio 1IAA:2BAP. Despite casual rhizogenesis, the process of root formation was not induced after various manipulations. Root formation by literature sources is conditioned by mycorrhiza. However transferring of this process in vitro is a question for discussion and future researches.

A STUDY OF THE EFFECTS OF PREDATOR-PREY INTERACTIONS IN THE LAKE RAZNA FISH COMMUNITY

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Interaction of biomasses Predator-Prey is described with Lottki-Volterra equations which have periodic solutions. The present research aims at finding combined periodic components of Shannon-Wiener diversity index for Predator and Prey, with the search being complicated by a considerable influence of temperature.

Spectral analysis is an effective tool that allows exclusion of particular Time Series on the studied pair Time Series of observations. One of the objectives of spectral analysis is to find the variance associated with various harmonics. Coherence analysis, or cross-spectral analysis, may be used to identify variations which have similar spectral properties i.e. if the variability of two distinct time series is interrelated in the spectral domain.

In order to evaluate the relationship "Temperature- Shannon diversity index of Prey", their spectra of squared coherence per each of the 12 months were calculated, based on the data for the 50-year long Time Series of Temperature and Time Series of Shannon diversity index of Prey. For tracing a possible influence of "Shannon diversity index of Predator" on each of the 12 spectra of squared coherence, spectra of squared partial coherence were calculated on the basis of the 50-year observations.

If spectra of squared coherence of "Temperature- Shannon diversity index of Prey" sufficiently differ from spectra of squared partial coherence of "Temperature- Shannon diversity index of Prey", with the influence of "Shannon diversity index of Predator" excluded, it indicates that there is a connection between Predator and Prey in those spectral harmonics where a noticeable difference exists.

The research has shown that the spectrum of squared coherence between a monthly temperature and biodiversity indicator of non-predator fishes in the Lake Razna varies most evidently for/in the harmonics with the 2-4 year periods. A noticeable influence in the Predator-Prey pair of biomass is observed from April to August in the frequency range with the 3-5 year periods.

DETECTION OF PINE ROOT ROT FUNGUS HETEROBASIDION ANNOSUM IN FOREST STANDS BY A POLYMERASE CHAIN REACTION ASSAY

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Scots pine (*Pinus sylvestris* L.) is a forest tree species of very high economic importance for Latvia. Scots pine is the main species in forests managed by JSC "Latvijas Valsts Meži" (approximately 47%). Further more, 74% of pine stands are pure stands which is a facilitating factor for disease spreading.

Pine root rot is considered to be a very economically important disease in northern hemisphere. The causative agent of pine root rot is the fungus Heterobasidion annosum (Fr.) Bref. It is known that many visually healthy looking trees can in fact be infected with H. annosum. An infected Scots pine tree can remain healthy-looking even if half of it's root system has been damaged by the root rot fungus. Recently we started studies on genetic aspects of Scots pine resistance to H. annosum. For this study we needed to establish a method for characterization of individual trees in regard to infection with H. annosum because such information would be of great importance for resistance studies on forest stand trees.

We used a polymerase chain reaction method for detection of H. annosum in wood samples to characterize individual tree infection. We conclude that use of five samples per tree gives sufficient information about the infection level of trees for further experiments. This method could also be used to characterize the sanitary situation in whole tree stands.

NOSTOC GENUS DIVERSITY, DISTRIBUTION AND ECOLOGY IN LITHUANIA

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The *Nostoc* genus diversity in Lithuania is investigated since 1980's. Totally nine *Nostoc* species is recorded by now: *N. caeruleum, N. carneum, N. commune, N. ellipsosporum, N. linckia, N. pruniforme, N. punctiforme, N. spongiaeforme,* and *N. verrucosum. Nostoc* mainly occurs in aquatic (lakes, ponds, streams) habitats with wide range of environmental conditions: water pH fluctuated – 6.0–8.8, temperature – 12.0–26.0 oC, and conductivity – 148–475 ģS cm-1. Only two species (*N. commune, N. ellipsosporum*) are terrestrial, obtained in their typical habitats: on unconsolidated well-drained and heat-storing substrata and on moss carpets. Two species (*N. commune, N. caeruleum*) are widely distributed in Lithuania, mainly in southeastern part, and obtained respectively in 27 % and 10 % of the studied areas. Whereas other - are rare species in territory, obtained only in 1–5 % of the studied areas.

OSTEOMETRY OF WOLVES SCULLS IN LITHUANIA

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J. Prūsaitė was researching morphology of Lithuanian wolves in 1961 years. It wasn't found more wolves' craniometrical researches in Lithuania.

It was researched sculls of adult wolves, which were hunted during 2005/2006-2008/2009 years game season. 30 sculls were measured according A. von den Driesch methodic. It was evaluated, that total length of wolves sculls varied from 235,4 till 269,8 mm. Zygomatic breadth varied from 128,6 till 150,0 mm, the mean – 139,3 mm.

The results of research show, that recently the craniometrical data are very similar between Lithuanian, Latvian, Belarusian and Polish wolves' populations. However, sculls of Lithuanian wolves, hunted in this century, was smaller than these, which were hunted in the middle of last century.

The aim of this study was to give an osteometrical description of wolves' sculls and to compare the results.

Key words: wolf, scull, osteometry.

THE STUDY OF GENETIC STRUCTURE OF EUROPEAN POPULATION OF WOODPIGEON *COLUMBA PALUMBUS* AS THE TOOL FOR CONSERVATION AND WISE MANAGEMENT OF THE SPECIES

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Evaluation of distribution patterns of different mtDNA D-loop haplotypes of more than 200 breeding, migratory and wintering Woodpigeons *Columba palumbus* was performed using DNA sequencing and phylogenetic analysis methods. Tissue samples of harvested birds were collected in Lithuania, Russia, Belarus, France, Spain and Portugal in 2005 – 2008. Among overall 53 different haplotypes detected during this study the highest number of unique haplotypes (19) has been found among breeding population inhabiting Kaliningrad region of Western Russia. Southern Portugal was characteristic as second exclusive region with 8 unique haplotypes detected. A dendrogram constructed based on mtDNA D-loop sequences data revealed close phylogenetic relationships between Woodpigeons representing wintering and breeding populations from Portugal and breeding Kaliningrad population. The results of the study have confirmed that the Iberian Peninsula is the key wintering area of Woodpigeons of Eastern Europe origin and that the Baltic Sea – North Sea flyway is the most important for breeders from the Baltic region. The genetic analysis indicates that part of Woodpigeons breeding in the Baltic region are only short distance migrants, wintering in the neighbouring countries, while some birds breeding in this region also use the Mediterranean flyway and migrate to the wintering areas located along the coast of Mediterranean Sea. A distinct genetic structure with certain unique haplotypes is characteristic of sedentary Woodpigeons breeding in Balearic islands. Genetically these birds are most similar to those breeding in the nearest territories located in the continent, but the results of this study indicate the genetic isolation of Woodpigeons inhabiting certain islands of the Mediterranean Sea. The distinct defined group of haplotypes with certain unique set of sequences found in Woodpigeons sampled in southern Portugal can be probably linked with ancestral population of Woodpigeon in Europe, remaining since the last glacial period. The approach based on identification of population genetic structure comparing mtDNA D-loop sequences could be successfully used for conservation and wise management of the European population of Woodpigeons due to identification of different populations with various genetic structures and because of possibility to determine main flyways used by birds breeding in different parts of the continent. Even for such widespread species as Woodpigeon appropriate conservation and management measures should be based on the flyway concept.

A REVIEW OF THE CLICK BEETLES (COLEOPTERA: ELATERIDAE) FAUNA IN LITHUANIA

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The first data about Lithuanian click beetles (elaterids) have been published in the beginning of last century. The first check list have been published in the 1960 by S. Pileckis, there were 45 elaterids species included. The base of this check list was previous published or unpublished data about elaterids fauna from the territory of Lithuania: (Heyden, 1903), (Roubal, 1910), (Ogijewicz, 1939), (G. & E. Mazurowie, 1939), (unpublished data form A. Palionis' cards). More detail data about elaterids fauna we can find in the latest publications – two monographs: "The beetles of Lithuania (Pileckis, 1976)" and „Fauna of Lithuania. The beetles. 1. (Pileckis & Monsevičius, 1995)". There were 66 species of elaterids have been mentioned in the latter monograph. At present 69 species of elaterids are already known from Lithuania and 36 are presumptive. By the biogeographical character the fauna of elaterids in Lithuanian consists from 15 Holarctic, 40 Palearctic and 14 European species. Most species are associated with forests (33 sp.) as well as meadows (21 sp.). Extremely psamophilous species: *Negastrius* (3 sp.), *Cardiophorus* (2 sp.) and *Paracardiophorus* (1 sp.) prefer sandy dunes, sunshiny and dry forest edges. 9 species are indifferent for habitats and can live in the open as well as partly shaded habitats. The larvae of most species develop in the soil (47 sp.); others are ksilophilic or saproxilic (22 sp.). Only 25 elaterids species are common in Lithuania, others are local and rare. Two species: *Stenogostus rufus* (DeGeer, 1774) and *Anostirus purpureus* (Poda, 1761) are included into Lithuanian Red Data book.

INFLUENCE OF CANOPY STRUCTURE TO DUNE FORESTS SUCCESSION IN PĀVILOSTA

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The aim of this preliminary study was to determinate a relationship between spatial structure of tree layer and herb and cryptogam layers of the dune forest. The study area was located on wooded coastal dunes near the Baltic Sea coast in Pāvilosta where a former Soviet army base was located (1940 – 1993). Sparse growing pines and glades with grey dune vegetation are typical for this territory. This mosaic structure has been developed by disturbances due to the past military activities. Regular trampling stopped the regeneration of the tree layer.

Data were collected in 2008. The location, diameter, height and age of all over 5 m high trees were taken in 20 m x 50 m sample plot. Vegetation was described according the Braun-Banquet method in 50 relevés (1 m x 1 m) placed along the transect in the middle of the sample plot. Number and age of young pine trees were evaluated in each relevé. Eleven hemispheric photos of the canopy were taken along transect using camera with a fish-eye lens. The WinSCANOPY program was used to get estimate openness and solar radiation amount for each hemisphere in 90°, 80°, 60° and 30° elevation zones from the zenith. Vegetation data was classified by Twinspan.

Two vegetation groups were found with structural and floristical differences. The first group was typical for open dune areas and represents the first stage of dune forest succession. Characteristic species are *Polytricum piliferum, Cetraria aculeata, Cladonia phyllophora, Cl. floerkeana, Racomitrium ericoides* and *Corynephorus canescens,* which indicate former disturbances. The second group contained *Lerchenfeldia flexuosa, Pleurosium schreberi* and *Dicranum scoparium*, which are typical for oligotrophic dry pine forest and characterised by a higher herb layer cover.

We observed a strong correlation among all parameters of openness and solar radiation amount. All these parameters explain structure and plant species composition of both vegetation groups quite well. However differences between both vegetation groups were better correlated with distance to nearest tree.

Most of pines in the tree layer except three 60-years-old trees are 80-90-years-old. Regeneration of pine trees began approximately before 13 years. Most of the young pines were found in relevés of the second vegetation group. However three to five-years-old seedlings were found also in relevés of first vegetation group.

Our findings suggest that canopy structure and disturbances are important ecological factors on dune forest succession. To determine the influence of these factors on dune forest regeneration dune forests with different tree density should be studied.

GENETIC DIVERSITY OF GARGANEYS (*ANAS QUERQUEDULA*) REVEALED WITH RANDOM AMPLIFIED POLYMORPHIC DNA MARKERS

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The aim of this study was to define genetic variation within and between Garganeys populations from different East Europe regions (Latvia, Kaliningrad region of Russia, Novgorod region of Russia, and Belarus) and Garganeys wintering in Senegal (Africa). The technique of random amplified polymorphic DNA-polymerase chain reaction (RAPD-PCR) was applied using four random primers (ol-2, ol-9, ol–11, ol-12). Genetic variability was measured for all Garganys investigated and for different populations from various regions. The data of the DNA fragments analysis showed that ol-2, ol-9, ol-11, ol-12 primers fits for investigating the intraspecies genetic variety. Molecular variance (AMOVA) among populations with these primers was 35 % (p d" 0.01). Genetic diversity, determinate by individual genetic variability in populations was 65 % (p d" 0.01).

The mean level of genetic polymorphism was 98 % for all Garganeys (varied from 39 % in Western Belarus population to 64 % in Southern Belarus population). Genetic differentiation was evaluated among four Belarussian populations and between Belarussian and other East European populations: the highest genetic differentiation was detected among both Russian (Kaliningrad and Novgorod) and Latvian populations (FST = 0.537 ± 0.052). The genetic differentiation among four Belarus populations was also high (FST = 0.331 ± 0.057). The genetic structure of all Belarus populations in compare to other East European populations was similar, so the genetic differentiation between these regions was very low (FST = 0.077 ± 0.027). Nei's genetic variability index for all Garganeys examined was 0.354 (varied from 0.130 in Latvian population to 0.248 in Southern Belarus population). In compare with other populations investigated in Eastern Europe wintering Garganey population in Senegal distinguished for lower means of genetic variability parameters: the mean level of genetic polymorphism was 57 %, Nei's genetic variability index was 0.212.

According to the results obtained from RAPD fragments analysis, the birds sampled from breeding areas differs in specific genetic structure. The intensive migration in the East European region (from Scandinavia, middle Russia, East and Central Asia) leads to high genetic variability evaluations in compare to wintering population.

GENETIC DIVERSITY OF TUFTED DUCK (A*YTHYA FULIGULA*) EAST EUROPEAN POPULATION REVEALED WITH RAPD MARKERS

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The aim of this study was to define genetic variation within and between Tufted duck populations from different European East regions (Latvia, Kaliningrad, Novgorod region of Russia, and Belarus). The technique of random amplified polymorphic DNA-polymerase chain reaction (RAPD-PCR) was applied using six random primers (ol-1, ol-2, ol-9, ol–10, ol–11, ol-12). Genetic variability was measured for all Tufted ducks investigated and for different populations from various regions. The mean level of genetic polymorphism was 81 % for all Tufted ducks (varied from 22 % in Belarus-KO population to 63 % in Latvian-AFU population). Genetic differentiation was evaluated among three Latvian populations and between Latvian and other East European populations: the highest genetic differentiation was detected among Kaliningrad-KTD, Novgorod-FNK and Belarus-KO populations (FST = 0.437 ± 0.061). The lowest genetic differentiation was detected between two Latvian populations – AFU and SS (FST = 0.135 ± 0.039). Molecular variance (AMOVA) among populations with these primers constitutes 19 - 41 %. Interspecific genetic diversity with all primers ranged from 2 to 35%. The data of the DNA fragments analysis showed that ol-10, ol-11, ol-12 primers are suitable for investigating the intraspecies genetic variety. Nei's genetic variability index for all tufted ducks examined was 0.282 (varied from 0.087 in Belarus-KO population to 0.226 in Latvian-AFU population). The lowest genetic distance (according to Nei's minimum distance (1972) calculations) was estimated between Latvian-AFU population and: Latvian-SS (0.057), Kaliningrad-KTD (0.089), Belarus-KO (0.091) populations. The highest genetic distance was estimated between Latvian-AY population and: Kaliningrad-KTD (0.232), Novgorod-FNK (0.239), Belarus-KO (0.224) populations.

Keywords: RAPD-PCR, Tufted duck, polymorphism, genetic variability.

CRUCIATA GLABRA (L) EHREND. (RUBIACEAE A. L. JUSS.) IN LITHUANIA: IN SITU AND EX SITU

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There are more then 14 species in the genus of *Cruciata* Mill growing to the south from Lithuania. In the country two species can be found and since 1976 one of them, *Cruciata glabra* L., is involved in the Red Book of Lithuania. Furthermore, this latter species is found only in two Baltic countries, namely Lithuania and Estonia. *Cruciata glabra* blows in may and june, grows in pinewoods, rarefied firwoods, bright leafy forests. This species grows in the bright areas only and if is grown in even slightly shadow it does not propagate and has just vegetative stems. This very rare and not numerious population is particularly endagered by spontaneous changes and economical use of forests and woods. The survival of this plant is also negatively affected by too great density of the forests. *Cruciata glabra* is perennial herb with very thin, repent and branchy rootstock, the leaves in the whorls are foursome, mostly three-veined, oblong, obtuse, the top side is bare with hairy edges and lower side along veins. The blossoms are grouped by five into shorter then leaves and umbelliferous trusses without bracts. Blossoms are polygamous, fruits are bare with smooth surface is a little bit crooked. Two growth places in Lithuania are known and described, it is in Romainiai and Juodšiliai. But since 2003 the third one is observed in Vanagiai (Šiauliai district). This latter place is sparse, every year only 5 to 7 plants or propagated stems are found there.

The purpose of this study is to describe adaptation of *Cruciata glabra* in Siauliai university Botanic garden. The plant is grown here since 2000 when transfered from growth place in Romainiai (Kaunas district). Till 2007 this plant was grown in the shady place, in almost neutral soil (pH 7,26). It propagated by the vegetative way only, blew not profusely. In the spring of 2007 Cruciata glabra was moved to the collection of rare plants in the section of plant geography and systematics. Here is sunny place, the soil is a little alkaline (pH 7,6). The plant adapted very well, blew profusely in may and june, procreated in vegetative way and nurtured seeds. Since 2007 information about *Cruciata glabra* growing in Botanic garden is included in Index Seminum publication designed for international interchange of seeds.

FLORISTIC STRUCTURE OF MOUNTAIN PLANTS COLLECTION AND THE PRESENT SITUATION IN BOTANICAL GARDEN OF SIAULIAI UNIVERSITY

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Presently plant introduction is characterized as a broad ecological and fitogeographical experiment, which explains plant adaptation possibilities, ecological needs, potential habitat boundaries of species.

Botanical gardens have good possibilities to make scientific researches and it is important to biodiversity conservation, floriculture, landscape gardening etc. Mountain flora introduction in Botanical garden of Siauliai University began in 2001.

The subject of research is to summarize mountain flora introduction process and perspectives. Current collection structure of species and taxonomical dependence was analyzed. In the year 2009 there were 902 plant taxas and cultivars in mountain flora section of Botanical garden. These plant taxas belongs to 249 botanical genus and 53 families. Most numerous families are these: Asteraceae Dumort. – 41 genus (16.5 %), Brassicaceae Burnett 20 (8.03 %) Lamiaceae Lindl. 15 (6.02 %). Most numerous genus in species: *Gentiana* 39 (4.3 %), *Saxifraga* 26 (2.9 %), *Campanula* 25 (2.8 %), *Draba* 19 (2.1 %), *Dianthus* 18 (2.0 %), *Androsace* 16 (1.8 %). 125 plant cultivars (13.9% of all mountain plants in collection) are included in the list of collection. Most numerous in cultivars are genus of *Sedum, Saxifraga, Sempervivum, Campanula* and *Dianthus* genus.

Collection increases intensively through the seeds exchange with botanical gardens all over the world. On purpose to form collection of high quality there are ordered more and more seeds collected in their natural habitat. The collection consists mainly of sub-alpine and alpine level species. In this collection there are representatives from mountains all over the world (Alps, Pyrenees, Caucasus, Altai, Himalaya, Rocky Mountains, New Zeland) and also from arctic zones.

The general condition of plants in collection is estimated and the selection of perspective species is made every year. Attention is paid to decorativeness and endurance of the plant (resistance to cold, drought, diseases, pests, moisture resisting), intensity of species reproduction (vegetative, by seeds and self-sow). Species with high adaptation potential successfully introduces in different regions as well as in our Botanical garden. A part of plant species of collection is short-life and vegetates only 2 – 3 years.

Substantial place of collection is taken by rare and endemic species of mountain flora and medicinal plants. Tasks of global biological strategy for botanical gardens indicate the necessity and significance of retaining rare species and medicinal plants.

GENUS *OMOPHRON* (COLEOPTERA: CARABIDAE) IN ENTOMOLOGICAL COLLECTION OF SWISS FEDERAL INSTITUTE OF TECHNOLOGY ZURICH

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The biggest value of entomological collection of Swiss Federal Institute of Technology Zurich is the collection of beetles made by the famous German entomologist M. Bänninger. The famous entomologist made significant contribution in the researches of genus *Omophron* Latr. as well. In 1921 Bänninger united all species known in the world at that moment in one single genus *Omophron* Latr., till that time genus *Omophron* was divided in several taxons – *Omophron, Homophron, Epactius* a.o. M. Bänninger described also several new species of this genus, three of which (*O. affinis, O. distinctum, O. lunatum*) are valid nowadays as well.

In the entomological collection of Swiss Federal Institute of Technology Zurich genus *Omophron* Latr. is represented by 49 species, it makes 75 % of up to date known species of this genus. In the collection *Omophron* Latr. subgenus is represented by 43 species, but *Phrator* Sem. subgenus – by 6 species.

In the collection extensive material about types of ground beetles is kept as well, including 21 types from 11 species of genus *Omophron* Latr.: *O. tanneri tanneri* Chand. – Paratypes (2), *O. tanneri proximum* Chand. - Paratypes (2) (*O. americanus* Dej. synonyms); *O. affinis* Bänninger, 1918 – Syntypes (2); *O. congoense* Deleve, 1924 – Syntype (1); *O. dissimile* Deleve, 1924 – Syntype (1); *O. distinctum* Bänninger, 1918 – Holotype, Syntype (1); *O. lunatum* Banninger, 1918 – Syntypes (3); O. testudo Andrewes, 1919 – Syntype (1); *O. stictum* Andrewes, 1933 – Paralectotype (1); *O. baenningeri* Dupuis, 1912 – Syntype (2); *O. mexicanum* Dupuis, 1912 – Syntype (3); *O. oberthueri* Gestro, 1892 – Syntype (1).

In the result of the work with the collection one new species for world fauna was detected (the species will be described in a separate publication), for many other species (*O. baenningeri, O. gemmeum, O. mexicanum, O. oberthueri,* a.o.) the distribution areas were defined more accurately.

THE ANALYSIS OF CHANGES OF CLIMATE AND PHYTOPHENOLOGICAL VARIABLES

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Nowadays climate change is one of the most important issues for research and studies. Analysis of the influence of climate system on biodiversity has essential applicable and scientific consequences. Flowering period is substantial for plant reproduction cycle and genetic variety. The changes of abiotic factors can influence the changes occurrence of some plant species if conditions became uninhabitable. Consequently the analysis of plant flowering variables and climate is significant. It's difficult to describe the extent of variations, whereas the phenological observation is conceptual. However the evaluation of potential changes is required.

The research is based on thirty years phytophenological variation in Lithuania. Focal attention has been given to variation of flowering phase for selected plant species (Corylus avellana L., Betula pendula Roth and Tilia cordata Mill.). In study for past conditions analysis we were used the observed temperature data from meteorological stations. Lithuanian Hydrometeorological Service provided phenological and meteorological data. The outputs of several climate models (HadCM and ECHAM) where used for abiotic factors analysis on phytophenological variables. For calculations were used different base temperatures adjust to plant species considering to species accumulated heat requirements. Statistic analysis of the interaction of photoperiod and temperature on flowering dates was made. Limited potentialities of interpretation of phenological dates caused to give more attention to averaged data than to case study. Therefore the results are based on average of long-term data. The results showed that day length and temperature are important factors for plant development, especially for flowering. The changes of meteorological variables influence different response of species. Early spring species is more sensitive to temperature changes compared with summer species; however the proportion of day length restricts the extent of variation.

GENETIC DESCRIPTION OF OATS ORIGINATED IN LATVIA

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Ratification of Rio de Janeiro convention (5.06.1992) in 1995 in Latvia was the start of purposeful work to preserve, maintain and investigate genetic resources of crop plants. Genetic resources diversity in Latvia is due to crop plant varieties and breeding lines which were recognized long ago and have been developed nowadays, and which are characterized with traits important for national economy.

Oats as one of economically most valuable species of cereals are highly diverse on a world-wide scale yet less investigated compare to wheat, barley, maize and other species. Genetic resources of local origin oats have gradually developed since 1921, when oat breeding was started in Latvia. The State Stende cereals breeding institute is regarded as oat breeding centre in Latvia, where over a period of more than eighty years 16 oat varieties have been registered. 'Stendes mazas agras' is the first oat variety of Latvian origin registered in 1930. These oats were obtained from Nereta local oat population by individual selection method. Seed samples of 12 varieties of Latvian origin, 13 local oat populations and 53 valuable breeding lines are currently in preservation in Latvia Crop Plant gene bank. All varieties and breeding lines belong to oat species *Avena sativa* L., and 85% out of preserved material is obtained through hybridization. In accordance with "Genetic resources long-term preservation and sustainable utilization program 2007-2009 provided for plants and animals, forests and fish used in agriculture and food" descriptors have been developed to establish unified Latvia crop plant genetic resources data base. From 2007, investigation and description of sampling units preserved in gene bank have been started. Description of oats includes assessment of 13 morphological and biological traits, seven economic traits as well as variety resistance against five most devastating oat diseases. In future, information about cytological characteristic and description using molecular markers will be included in oat descriptors. Investigation results of 2007 and 2008 on genetic resources of Latvian origin oats have been summed up in the report.

SHORT-TERM MONITORING OF FIRE-RELATED COLEOPTERA IN BURNT PINE FOREST OF NORTHERN ESTONIA

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Fire is a disturbance agent that drastically changes habitats for all living organisms in the forests affected. The destructive impact of fires on microorganisms, fungi, plants and animals is obvious. Depending on the intensity and duration of fire, many of them lose their life and habitat. However, there are also species which are favoured by fire. Some of them are strongly attracted to newly burnt areas and colonize the free space (e.g. some Carabidae), others are searching for burnt trees or those weakened by fire for suitable breeding sites (bark and wood boring or saproxylic insects). About 40 species, mostly beetles, are regarded as fire-related species in northern Europe.

Relatively large-scale forest and wildland fires occurred in Estonia in 2006. Altogether, 250 forest fires were registered affecting a total area of 3,096 hectares. Big forest fires occurred in the vicinity of Agusalu and Kurtna villages (Ida-Viru County) and near Lake Mähuste (Harju County) in northern Estonia. Both managed forests and protected woodlands, including private and state-owned forests, were affected. The largest forest fire took place at Agusalu in July 2006, covering an area of 1,235 hectares.

The assemblages of Coleoptera were studied in the burnt pine-dominated (*Pinus sylvestris*) forests in the first two years after the fire. Ten window traps attached to the trunks of trees and 20 pitfall traps set up in soil surface were used for collecting insects in 2007 and 2008. Altogether, 22,194 specimens of Coleoptera were caught in window intercept traps (75% of the specimens trapped) and by pitfall traps (25%). 135 species of Coleoptera were collected from pitfall traps and 263 species from window traps in 2007. In 2008, the respective numbers were 155 and 370.

The following species, regarded by many authors as fire-related, were caught in the study areas: *Melanophila acuminata* (Deg.) (Buprestidae), *Pterostichus quadrifoveolatus* Letz. and *Sericoda quadripunctata* (Deg.) (Carabidae), *Arrhenopeplus tesserula* (Curtis) (Staphylinidae), *Sphaeriestes stockmanni* (Bistr.) (Salpingidae), *Denticollis borealis* (Pk.) (Elateridae), *Stephanopachys linearis* (Kug.) (Bostrichidae), *Laemophloeus muticus* (F.) (Laemophloeidae), *Platyrhinus resinosus* (Scop.) (Anthribidae), *Acmaeops marginata* (F.) and *A. septentrionis* (Ths.) (Cerambycidae). Burnt areas are also preferred habitats of the following three relatively rare species: *Drapetes mordelloides* (Host) (Elateridae), *Acritus homoeopathicus* Woll. (Histeridae) and *Clypastraea pusilla* (Gyll.) (Corylophidae).

Epigeal species such as carabid beetles *Pterostichus quadrifoveolatus* and *Sericoda quadripunctata* and a rove beetle *Arrhenopeplus tesserula*, as well as xylophagous buprestid beetle *Melanophila acuminata*, another species characteristic of fire sites, were more numerous in the first year after the fire, while most of the xylophagous and saproxylic species occurred more abundantly in the second year after fire. Eleven species of Coleoptera new to Estonian fauna were recorded in the first year after fire (Süda, Voolma, 2007).

RETROTRANSPOSON VARIABILITY IN SCOTS PINE (PINUS SYLVESTRIS L.) GENOME

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The impact of environmental change on species and ecosystems is a vital area of research. This includes the study of adaptation to unpredictable environment conditions and survival mechanisms. In species with long generation period, phenotypic plasticity plays a significant role in adaptation and survival. Scotch pine (Pinus sylvestris L.) belongs to gymnosperms (Pinophyta) that is one of the ancient's plant groups. Pine is characteristic to North hemisphere and is common to Europe. Pines are growing in different conditions and can survive in drought, same as in damp. The evaluation of their genome structure specialties could be important in understanding of plant adoption mechanisms. Pine family representatives usually has large genome size (circa 50 pg), stable diploid (2n=24), and 70-75 % from genome comprise repetitive sequences. Lately is formed a sense about non-coding genome sequences as functionally important in genome, as in general they shape chromosome structures, and therefore define structure stability or instability initiation in stress conditions. Presently active mobile genetic elements weren't identified in conifers. Retrotransposon mRNA transcripts were isolated only for magnoliophyta in stress conditions. The genome of Scotch pine was not studied in relation to retrotransposition and adoption to environmental conditions, response to stress conditions or genome size variation. For organisms with low DNA sequence information like pine, for retrotransposon evaluation it is common to use PCR-based methods with markers complementar to known retrotransposon sequences. As a result in pine genome were found several ortologs of some active retrotransposons (TPE1, Spcl, Spdl). Recently highly disperse retrotransposon Gymny was identified in Pinus taeda genome and several other gymnosperms and evolutionary importance of these elements is accented. The copy number in pine of retrotransposons were extremely high, but activity of these sequences are under the question, as a detailed studies of sequence revealed modifications critic to functional protein synthesis. The information of the presence of active or confirmation of presence non-transcribed fossil sequences, could give broader insights in retrotransposon function in plant genome response to stress conditions. The aim of our study is to identify active retrotransposons in Scotch pine (Pinus sylvestris L.) genome and characterize its transcriptional rate during different stressors in controlled conditions.

GENETIC VARIATION IN NATURAL POPULATIONS OF VACCINIUM OXYCOCCUS AND VACCINIUM MICROCARPUS IN NORWAY USING RAPD MARKERS

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This study characterized the genetic diversity of two populations of cranberries, using random amplified polymorphic DNA (RAPD) markers. Genetic variation among and within two V. oxycoccus and V. microcarpus populations with RAPD profiles was investigated. Twenty two clones were sampled in one Norwegian region. RAPD analyses of 9 primers have shown 160 polymorphic loci in the total sample. Polymorphism level in V. oxycoccus population was 86.88%, in V. microcarpus 77.50%. High genetic variability was detected within population 98% and among populations was only 2%. Shannon's Information Index was 0.3. Nei's gene distance 0.013 indicating a low divergence between population. Most bands were common to all populations. Both populations were found to exhibit low levels of genetic variation, e.g., expected heterozygosity (Hexp = 0,011 and 0,010). Clusterings of plants in each population were made using UPGMA analyses and observed in the dendrogram.

The 14th European Carabidologist Meeting

will be held in Westerbork - a typical "brink" village
in the province of Drenthe in the Netherlands.

The theme of the meeting will be:

Carabid beetles as bioindicators

The use of ground beetles in ecological and environmental studies; the usefulness and threats of methods used for monitoring species and populations.

This meeting will mark the 50th anniversary of long-term research in the Dwingelderveld and the 40th anniversary of the first Carabidologist Meeting in Wijster (a village 9 km from Westerbork) in 1969.

September 14th-18th 2009
Westerbork, The Netherlands

http://www.biological-station.com/ecm/index.html

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