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Vsebina / Contents

1. SEKCIJA: Urejanje bivalnega okolja

2. SEKCIJA: Naravovarstvo in okoljevarstvo – različnost pogledov

3. SEKCIJA: Alternativno kmetijstvo

4. SEKCIJA: Menedžment

5. SEKCIJA: Pomen čebel za človeka in naravo

Za to (razpisano) sekcijo nismo prejeli nobenega prispevka.

6. SEKCIJA: Skrite možnosti podeželja

7. SEKCIJA: Sociološki vidik razvoja nove družbe

8. SEKCIJA: Sodobna konjereja

9. SEKCIJA: Inovativnost v pridelavi in predelavi

1. SEKCIJA

Urejanje bivalnega okolja

Spodbujanje mladostnikov k opazovanju in urejanju zelenega šolskega okoliša

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V današnjem času so mnogi mladi vse bolj odtujeni od narave. S fenološkimi opazovanji, ki jih v zelenem šolskem okolišu izvajamo, lahko spodbudimo dijake k neposrednemu opazovanju dogajanj v naravi skozi letne čase. Na naši šoli smo v šolskem letu 2009/10 ustanovili neuradno fenološko postajo Gimnazija Šiška in takrat izdelali tudi fenološko spletno mesto Gimnazije Šiška. Spletno mesto uporabnike in obiskovalce na kratko seznanja s fenologijo, fenološkimi opazovanji in pomenom te dejavnosti. Na njem so predstavljene izbrane rastline, mladi fenologi (dijaki) ter njihov elektronski fenološki dnevnik s fotografijami izbranih rastlin v posameznih fenofazah, kot so brstenje, olistanje, cvetenje, rumenenje in odpadanje listov, zorenje plodov. Večplastnost fenologije učiteljem med drugim omogoča, da lahko temo povezujejo z določenimi vsebinami drugih učnih predmetov, kot so geografija, informatika in matematika. Ugotovili smo, da so fenološka opazovanja lahko eden od načinov, kako pri dijakih krepiti zavedanje pomena zelenega šolskega okoliša. Od opazovanj dreves in grmov smo v nadaljevanju spontano prešli na udejanjanje konkretnih pobud za ureditev manjšega dela šolskega okoliša. Pri tem so bili dijaki vključeni tako pri samem načrtovanju kot pri izvedbi.

Ključne besede: fenološka opazovanja, okoljska osveščenost, urejanje okolja, IKT-orodja

Promoting school neighbourhood observation and design among pupils

Nowadays more and more young people feel alienated from the nature. By performing phenological monitoring in a green school neighbourhood pupils are offered a chance to see what is going on in nature throughout the year and its seasons. In school year 2009/10 we founded an informal phenological station Gimnazija Šiška and created its accompanying website – Phenological station of Gimnazija Šiška. The website provides users and visitors with basic information on phenology, phenological monitoring and its meaning. Selected plants, young phenologists (pupils) and their electronic, on-line phenological diaries showing photos of plants in different phenophases such as budbursting, first leaf, flowering, autumn colouring and fruit maturing are also presented on the website. Due to its interdisciplinary nature we were able to connect phenology with different school subjects such as geography, informatics and mathematics. We can conclude that phenological observations could be one of the methods used to increase pupils awareness about the importance of a green school neighbourhood. We did a step further from simply watching the trees and bushes to making concrete proposals on how to rearrange one part of our school neighbourhood. Our pupils were involved in this project in its design- as well as implementation stages.

Key words: Phenological monitoring, ecological awareness, landscape design, ICT tools

Vpliv drevja na kakovost bivanja v urbanih okoljih

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Obstoj zelenja v urbanih naseljih je za mnoge tako samoumeven, da se skoraj ne zavedajo njegove vrednosti. V mestni krajini je zelenje nepogrešljivo za doseganje določenega nivoja kvalitete življenja. Drevesa znižujejo temperaturo okolice, blažijo učinek tople grede, zmanjšujejo onesnaženost zraka, odtok padavinske vode in vpliv neviht, blažijo erozijo, hrup in svetlobno onesnaženje. Vplivajo na porabo energije, ki je potrebna za hlajenje in ogrevanje stavb. Drevje ima pomembno vlogo pri izboljšanju kakovosti zraka, kar je posebej pomembno v današnjem času, ko onesnažen zrak predstavlja velik družbeni problem. Drevesa v urbanih okoljih nudijo življenjski prostor mnogim živim bitjem in v bližini zelenih površin je vrednost nepremičnin višja. Mesta, ki imajo veliko zelenja, ustvarjajo raznolika delovna in življenjska okolja in so privlačna za prebivalce, obiskovalce in investitorje.

Ključne besede: urbano okolje, urbano drevje, kakovost bivanja

Impact of trees on the quality of life in urban areas

The existence of green spaces in urban areas is for most of us so natural that we take it for granted and we are not always fully aware of their importance and value. In the urban landscape green spaces i.e. grass, shrubbery, and trees are indispensable for achieving a certain level of the quality of life. Trees lower the temperature in their environment, mitigate the greenhouse effect, lessen the air pollution, reduce the outflow of rainwater and the impact of storms, and mitigate the soil erosion, as well as noise and light pollution. Trees affect the consumption of energy which is needed for cooling down and heating buildings. Trees play an important role in improving the quality of air what is especially important today when air pollution has become a big social problem. Furthermore, trees in urban areas provide living space for many living creatures. Last but not least the property value in the vicinity of green spaces is much higher than in the areas without them. We can assert that towns with a lot of green spaces create diverse working and living environments and are therefore attractive not only to their inhabitants, but also to their visitors, and prospective investors.

Key words: urban areas, urban trees, quality of life

Ispitivanje ukorjenjivanja reznica pelargonija u različitim terminima i na različitim supstratima

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Pelargonije su omiljene i vrlo zahvalne ljetne cvjetnice, koje cijelog ljeta ukrašavaju balkone, prozore stambenih, poslovnih zgrada, motela ili hotela. U potražnji balkonskog cvijeća pelargonija zauzima vodeće mjesto, što rezultira sa nastajanjem i uzgojem velikog broja sorata. Najveći dio sadnica pelargonija se dobiva vegetativnim razmnožavanjem reznicama uz primjenu fitohormona i supstrata za ukorjenjivanje. U novije vrijeme se za ukorjenjivanje reznica zbog svojih pozitivnih karakteristika uvode u primjenu inertni supstrati kao perlit, vermikulit ili kamena vuna. Cilj istraživanja je bio ispitati postotak ukorjenjivanja reznica i porast sadnica pelargonija 'Narina' i 'Beach' u dva supstrata: standardni organski supstrat za ukorjenjivanje i kamena vuna u četiri različita termina uzimanja reznica. Istraživanje je pokazalo da se sorta 'Beach' lakše ukorjenjivala u odnosu na sortu 'Narina' i utvrđeno je bolje ukorjenjivanje na kamenoj vuni. Najpovoljniji termini uzimanja reznica za ukorjenjivanje pelargonija su bili početkom veljače.

Ključne riječi: pelargonije, sorte, reznice, ukorjenjivanje, kamena vuna

Examination four different periodes for rooting of geranium's cuttings on different substrates

Geraniums are very popular and grateful summer flowers for decorating windows and balconies of private and business houses, motels and hotels. On the market of balcony summer flowers geraniums takes favourite place which leads to development and cultivation of large number of geraniums varieties. The most of geranium's seedlings are produced vegetative with cuttings using phytohormones and special substrates for rooting. Recently, for rooting of cuttings are used inert substrates like perlite, vermiculite or rock wool. The aim of investigation was to examine a rooting percentage of cuttings and growth of geranium's seedlings 'Narina' and 'Beach' using two substrates: standard organic substrate for rooting and rock wool in four different periods of taking cuttings. Best rooting percentage in this investigation shows variety 'Beach' with better results on rock wool. The preferred period for taking cutting and rooting of geranium was beginning of February.

Key words: geranium, varieties, cuttings, rooting, rock wool

Effect of Growth Retardants and Biostimulators on Annual Potplants

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To reach the habits for market purpose we used alternative biostimulators and retardants such as Regalis, Toprex, Caramba, CCC and Cultar. These are mainly fungicides but contain dwarf-growth influencing components. The species used for the experiment were Coreopsis grandiflora, Godetia grandifolra, Scabiosa atropurpurea, Matthiola incana and Schizanthus wisentonensis. The trial interval was 2010 April to 2011 July. The treatments were started when the plants were in 2-3 true leaf stage. From that time the treatments were repeated in 14-18 days cycle with the substances. We tried to increase the habit, the intensity of blooming and durability with conditioning substances. The results were followed-up by biochemical and histological methods too. Summarizing, all chemicals had effect on the tested species. Regalis and Cultar showed the most effective achievement. With these substances treated plants have more, shorter joints, more and robust leafs, and more compact habit comparing to the control plants. Regarding blooming the treated plants started to bloom 10-14 days later, and 15 % of the treated Scabiosa atropurpurea pots haven't started blooming during the vegetation interval time. Matthiola incana showed very good results, it was a successful trial plant.

Sonaravna hortikultura

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V urbani hortikulturi smo nagnjeni k razmišljanju, da pri hortikulturnem oblikovanju notranjih in zunanjih prostorov ne moremo delovati sonaravno, saj bi pri tem trpela njihova estetika. Tako je sonaravno hortikulturno oblikovanje pri nas premalo poznano. Lahko bi rekli, da je v svetu trajnostna hortikultura sestavni del globalnega trajnostnega gibanja, ki posveča pozornost naravi prijaznemu bivanju. Naš namen je, da opozorimo na možnost razvoja hortikulture v tej smer in prispevamo k razvoju na tem področju, zato smo se pri modulu OUP (Oblikovanje in urejanje prostora z rastlinami) na Šoli za hortikulturo Celje, Višji strokovni šoli, program Hortikultura, odločili, da analiziramo trende na področju sonaravne hortikulture, razvijemo nove ideje in jih predstavimo kot nove možnosti hortikulturnega oblikovanja notranjih in zunanjih prostorov in s tem tudi kot nove priložnosti. V prispevku nakazujemo zgodovinske osnove sonaravnega hortikulturnega oblikovanja, predstavljamo trende in

ideje naših študentov ter razvoj ene izmed njih – od ideje do postopka oblikovanja v prostoru samem. Uporabili smo naslednje metode dela: analiza problema in definiranje ciljev dela, analiza širšega in ožjega okolja, oblikovanje idej, oblikovanje zgodbe projekta in oblikovanje idejne zasnove prostora.

Ključne besede: hortikultura, sonaravna hortikultura, urbana hortikultura, hortikulturno oblikovanje, ideje

Environmental horticulture

In urban horticulture we tend to think that the horticultural establishment of internal and external spaces, can not operate sustainably. The environmental horticultural development is in our country un familiar. In the world is the environmental horticulture integral part of the global sustainability movement which devotes attention to the nature-friendly living. It is therefore our intention to highlight the potential for the development of horticulture in this direction and to give its contribution to the development in this area. So we decided in the module, OUP (Designing of Space and Planning with Plants) at the School of Horticulture Celje, Vocational College, Horticulture program, to analyze trends in environmental horticulture to develop new ideas and present them as new home design options inn Horticultural and external spaces and to give a new opportunity. Our Procject work suggests the historical basis of the sustainable horticultural design, the present trends and ideas of our students, and the development of one of them is shown from the idea to the final process of creating the space. We used the following methods: problem analysis and definition of objectives of the work, analysis of macro and micro environment, search for ideas, creation stories of the project and design concept of the space.

Key words: horticulture, environmental horticulture, urban horticulture, horticultural design, ideas

Applying biostimulators in cut lily production

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In our study we tested the effect of three biostimulators (Kelpak, Ferbanat L, Pentakeep-V) in cut lily production, under greenhouse conditions, on the Oriental hybrid Lilium 'Rialto' variety. Plants were treated fortnightly for 5 times. The control group was untreated. During the evaluation plant height, number of leaves, leaf length, leaf width, the number and length of flower buds, root weight and chlorophyll content of leaves were measured. In the first part of the research we compared the three chemicals and the results showed that in the case of leaf length and leaf width the treated plants reached significantly lower values compared to the control group. However in the case of plant height, the number of leaves and the number and length of flower buds we obtained better results with Ferbanat L in 2 ml/l concentration, compared to the other biostimulators. Therefore, in the second part of the research we examined Ferbanat L in 1-, 2-, 3- and 4 ml/l concentrations. Again the control group was untreated. Considering the development of the plants we got significantly wider leaves with the 3 ml/l concentration treatment, compared to the control plants. In the case of flower buds 4 ml/l treatment resulted more and significantly longer buds, compared to the control group. In addition, 3 ml/l treatment showed significantly lower chlorophyll content, compared to the other groups.

Key words: Kelpak, Ferbanat L, Pentakeep-V, biostimulators, Lilium, flower buds

2. SEKCIJA

Naravovarstvo in okoljevarstvo – različnost pogledov

Toplota iz obnovljivih virov – primer ogrevanja s toplotno črpalko

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Pri ogrevanju s toplotno črpalko, ki izkorišča toploto okolice in jo pretvarja v uporabno toploto za ogrevanje prostorov, elektrika kot primarni vir koristi pri okoljskih prihrankih. Toplotna črpalka odvzame toploto snovem iz okolice na nižjem temperaturnem nivoju ter jo odda v ogrevalni sistem na višjem temperaturnem nivoju. Tak proces omogočimo z dodatnim zunanjim virom pogonske energije – električne energije. Razmerje med pridobljeno toplotno energijo in vloženo električno energijo imenujemo grelno število. Ogrevanje prostorov za podjetje Gorenjske elektrarne, d. o. o. predstavlja velik strošek. Z vgradnjo toplotne črpalke smo bistveno zmanjšali stroške ogrevanja in posledično škodljiv vpliv na okolico, ki zaradi ogrevanja nastane. V prispevku opisujemo izkušnje glede izboljšanja energetske učinkovitosti po vgradnji toplotne črpalke v obdobju 2005–2011, in sicer z vidika proizvodnje toplote iz obnovljivih virov, zmanjšanja porabe fosilnega goriva in znižanih stroškov ogrevanja. Ogrevanje s toplotno črpalko v sedmih letih pomeni zmanjšanje emisij CO_2 za 463,86 ton v primerjavi z elektriko, 382,51 ton v primerjavi z daljinsko toploto, 346,01 ton v primerjavi s kurilnim oljem in 253,51 ton v primerjavi z zemeljskim plinom. Izdelana je ekonomska analiza prihrankov pri ogrevanju s toplotno črpalko v primerjavi z elektriko, daljinsko toploto, EL-kurilnim oljem in zemeljskim plinom.

Ključne besede: toplotna črpalka, ogrevanje, grelno število, elektrika, okoljski prihranek

Heat from renewable sources – example of heating by heat pump

When heating is provided by a heat pump which uses heat from ambient air and transforms it into heat usable for heating premises, electricity as a primary source contributes to environmental savings. A heat pump extracts heat from the environment at a lower temperature level and emits it into the heating system at a higher temperature level. This process is possible if there exists an additional external source of energy – electricity. The relationship between the electrical energy input and useful heat extracted is termed coefficient of performance. Heating of premises at Gorenjske elektrarne, d.o.o. represents a high cost. By installing a heat pump we significantly reduced both heating costs and the harmful impact on the environment due to heating. The paper describes the experience with increasing energy efficiency as a result of heat pump installation in 2005-2011 in terms of heat generation from renewable sources, decreased fossil fuel consumption and lower heating costs. In seven years, heating by a heat pump has brought a reduction in CO_2 emissions by 463.86 tonnes compared to electricity, 382.51 tonnes compared to district heat, 346.01 tonnes compared to heating oil and 253.51 tonnes compared to natural gas. An economic analysis was produced, indicating savings in heating by a heat pump when compared to electricity, district heat, heating gas oil and natural gas.

Key words: heat pump, heating, coefficient of performance, electricity, environmental savings

Pomen lokalnega socialnega in človeškega kapitala za trajnostni razvoj zavarovanih območij narave

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Poleg pravnih okvirov ter nadzornih mehanizmov in finančnih virov sta za ohranitev narave na zavarovanih območjih ključnega pomena človeški in socialni kapital lokalnega prebivalstva oz. njegovih družbenih struktur. Prvega predstavljajo kulturne značilnosti, znanja in kompetence prebivalstva, npr. tudi za tradicionalno in sodobno/posodobljeno trajnostno gospodarjenje, medtem ko drugi vključuje mreže sodelovanja, zaupanje in družbene vrednote/pravila. Še več, ohranjanje, spodbujanje in razvoj tega kapitala so zelo pomembni za širše sprejetje režima zavarovanja v lokalnem okolju ter mobilizacijo naravnih virov za lokalni in širši trajnostni razvoj. V prispevku bodo ovrednotene oblike človeškega in socialnega kapitala lokalnega prebivalstva ter njegov vpliv na uspešen lokalni trajnostni razvoj zavarovanih območij narave. Nekatere od teh vsebin bodo konkretno ilustrirane na primeru krajinskega parka Logarska dolina, katerega lokalno upravljanje predstavlja edinstven primer v Sloveniji.

Ključne besede: zavarovana območja narave, trajnostni razvoj, človeški kapital, socialni kapital, KP Logarska dolina.

Importance of local human and social capital for a sustainable development of nature protected areas – example of Logarska valley landscape park

Human and social capital of inhabitants and their social structures in nature protected areas is together with legislation framework, controlling mechanisms and financial resources of key importance for nature protection. First one include cultural characteristics, knowledge and competences of inhabitants (eg. traditional and modern/modernized sustainable management), while the other include cooperation networks, trust and social values/norms. Furthermore, preservation, promoting and developing of these capitals is very importance for broad legitimation of protection regime and mobilization of natural resources for local and regional sustainable development. The article aims at evaluating importance of human and social capital forms for successful local (sustainable) development) of protected nature areas. Some of these interactions will be concretely demonstrated on the case-study of Logarska valley Landscape Park whose local management represents unique example in Slovenia.

Key words: nature protected areas, sustainable development, human capital, social capital, Logarska valley landscape park

Analiza ustreznosti lokacije vrh Kržišča za namestitev vetrne turbine

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Kržišče je 1.658 m visok hrib poleg Krvavca. Za določitev ustreznosti lokacije smo preverili okoljske in tehnično-ekonomske vidike umestitve potencialne vetrne elektrarne v prostor. Bistven sestavni del raziskovalnega dela je izračun energetskega potenciala vetra na tej lokaciji. Izvajanje meritev je v razgibanem srednjegorskem okolju z ostrimi vremenskimi pogoji vse prej kot enostavno. Izveden izračun je, ob upoštevanju nekaterih predpostavk, pokazal zmerno primernost lokacije za izrabo vetrne energije. Za dokončen izračun energetskega potenciala vetra na lokaciji Kržišče bi bilo treba izvesti meritev vertikalnega profila vetra, ki pove, kako se hitrost vetra z oddaljevanjem od tal povečuje. Pri predpostavki, da je hitrost vetra na višini osi vetrnice zgolj za 6 % višja od izmerjene hitrosti, znaša interna stopnja donosnosti (ISD) 5,08 %. Alternativni izračun za 22 % povečanje hitrosti vetra, ki bi veljal v ravninskem svetu, pa nam rezultat izboljša na 9 %.

Ključne besede: vetrna elektrarna, energetski potencial vetra, meritve, ustreznost lokacije

Analysis of the adequacy of the Kržišče peak as a wind turbine installation site

Kržišče is a hill next to Krvavec that is 1,658 metres high. In order to determine the adequacy of the site we examined the environmental and technical-economic aspects of a potential wind power plant siting. The essential element of research is the calculation of wind energy potential at this location. Measurements in a varied mid-altitude region characterised by harsh weather are anything but simple. Taking into account some assumptions, the calculation showed that this site was moderately adequate for utilisation of wind energy. A final calculation of wind energy potential at the Kržišče site would require measurements of vertical wind profile, showing how wind speed increases with increasing height above the ground. Under the assumption that wind speed at the height of axis is merely 6% higher than the measured speed, the internal rate of return is 5.08%. An alternative calculation considering a 22% higher wind speed that would apply in flatland gives a result of 9%.

Key words: wind power plant, wind energy potential, measurements, adequacy of site

Potencialne nevarnosti hormonskih motilcev v okolju

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Hormonski motilci so telesu tuje snovi, ki vplivajo na delovanje hormonskega sistema. S snovmi, ki se vpletajo v delovanje spolnih hormonov, se znanost intenzivno ukvarja že dve desetletji. Preučuje mehanizme njihovega delovanja, identificira posledice izpostavljenosti (na primer nepopolna maskulinizacija možganov pri moških zarodkih, anomalije v razvoju spolnih organov, manjša plodnost in povečana pojavnost nekaterih vrst raka) in ocenjuje dolgoročen vpliv. Hormonske motilce danes vnašamo v telo predvsem s kontaminirano hrano ali vodo, v preteklosti pa je bil pogost vir tudi onesnažen zrak. Najdemo jih v različnih oblikah. Pesticid DDT je danes v zemlji in vodi še prisoten v sledovih in se v prehranski verigi akumulira v maščobnem tkivu. S PCB-ji je v Sloveniji močno onesnažena reka Krupa v Beli krajini. Plastična embalaža za hrano in pijačo lahko vsebuje bisfenol A in ftalate, vendar motilci niso samo kemijske spojine, uporabljene v industriji, ampak tudi hormonska kontracepcija in fitoestrogeni. Trenutni izsledki znanosti kažejo, da hormonski motilci vplivajo na žive organizme, vendar pri nizkih koncentracijah, ki smo jim običajno v vsakodnevnem življenju izpostavljeni, škodljivi učinki niso dokazani. S to tematiko se tudi v Sloveniji raziskovalno ukvarjajo nekateri vidnejši znanstveniki. Prispevek je pripravljen s povzemanjem različnih virov in je namenjen širjenju splošne osveščenosti o hormonskih motilcih.

Ključne besede: hormonski motilci, plodnost, okoljski estrogeni, ksenoestrogeni, antiestrogeni, antiandrogeni

Potential dangers of endocrine disruptors in the environment

Endocrine disruptors are substances foreign to a body but have an influence on the body's hormone system. Substances which interfere with the functions of the sex hormones have been a subject of extensive research for the past two decades. Science is exploring modes of action, identifying consequences of exposure (e.g. incomplete brain masculinization in male embryos, morphological anomalies of the sex organs, reduced fertility and increased incidence of certain cancers) and evaluating long-term influence. Today endocrine disruptors are introduced into a body predominantly by contaminated food or water. In the past contaminated air was also a possible source. They are present in different forms. At present DDT pesticide is present in soil and water in trace amounts and it accumulates in fat tissues through the food chain. River Krupa in Slovenia's region Belakrajina is highly contaminated with PCBs. The plastic packaging of food and water can contain bisphenol A and phthalathes. But not only chemical compounds used in industry act as disruptors, hormonal contraception and phytoestrogens are also among them. The current scientific findings show that these substances do act on living organisms but at low concentrations we are exposed to in our everyday lives the harmful effects are not proved. There are also some eminent Slovenian scientists doing research work in this field. The article was prepared by summarizing different sources and its aim is increasing general awareness of the endocrine disruptors.

Key words: endocrine disruptors, fertility, environmental estrogens, xenoestrogens

Kazalec učinkovitosti kot merilo tehnične kvalitete sončnih elektrarn

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Lastniki sončnih elektrarn se nemalokrat srečajo z vprašanjem, ali njihova elektrarna obratuje optimalno. Kot merilo tehnične kvalitete sončne elektrarne se uporablja t. i. kazalec učinkovitosti (ang. Performance Ratio, PR). PR določa, kolikšen del realno izkoristljive vpadle sončne energije se dejansko pretvori v električno. PR je univerzalen kriterij, ki je praktično neodvisen od lokacije fotonapetostnega sistema in zato uporaben za primerjavo različnih fotonapetostnih sistemov in konceptov. V članku so predstavljene izgube, ki se pojavijo pri pretvorbi sončne energije v električno, ter fizikalna ozadja izračuna PR. Z uporabo javno dostopnih podatkov o sončnem obsevanju ter z brezplačnimi programskimi rešitvami izračunamo kazalec učinkovitosti za sončne elektrarne podjetja Gorenjske elektrarne, d. o. o.

Ključne besede: sončna elektrarna, kazalec učinkovitosti (PR)

Performance indicator as a measure of technical quality of solar power plants

Solar power plant owners are often faced with a dilemma about whether their power plant is functioning optimally. Technical quality of a solar power plant is measured by means of the so called performance ratio – PR. The PR determines the portion of realistically usable solar energy that is transformed into electricity. PR is a universal criterion that is practically independent of the location of a PV system and can therefore be applied in comparison of various PV systems and concepts. The article presents the losses from conversion of solar energy into electricity and the physics basis for PR calculation. Publicly available data about solar radiation and free software allow us to calculate the performance ratio for solar power plants of Gorenjske elektrarne d.o.o.

Key words: solar power plant, performance ratio (PR)

Medpredmetno povezovanje v okoljevarstvu s pomočjo eksperimenta

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Eksperiment je pri mnogih predmetih pomembno učno sredstvo, laboratorijsko delo pa je kot učna metoda tudi sredstvo povezovanja tako dijakov med sabo kot tudi dijakov z učiteljem. Na področju okoljevarstva se s pazljivo izbranim in ustrezno vodenim eksperimentom lahko prikaže tesna prepletenost modulov programa Okoljevarstveni tehnik, kot so Materiali in okolje, Varstvo okolja, Gospodarjenje z odpadki, Okoljevarstvene tehnologije in Analizne tehnike in monitoring. Da bi te module čim bolj povezali, sva v pouk uvedli eksperimente, ki so približek postopkov v gospodarstvu. Dijakom prikažejo, da je znanje, ki ga pridobijo, ni medsebojno tesno povezano le v šoli, pač pa tudi v gospodarstvu. Predstaviti želiva primer, ki se začne z eksperimentom bakrenja (je le grob posnetek bakrenja v gospodarstvu, dijaki ga spoznajo pri modulu Materiali in okolje) in ima poleg pobakrenih izdelkov kot rezultat tudi odpadno raztopino za bakrenje. Po določanju količine bakrovih ionov v raztopini (Analizne tehnike in monitoring) dijaki ugotovijo, da je treba te ione iz raztopine odstraniti, ter na podlagi znanja, ki so si ga pridobili pri modulu Okoljevarstvene tehnologije, predvidijo ustrezen postopek za to ter ga izvedejo. Nato ponovno določijo količino bakrovih ionov v obdelani raztopini. Po izvedenem postopku ostane mulj, ki vsebuje veliko bakra in se ga ne sme odlagati na odlagališča (Gospodarjenje z odpadki), saj se snovi lahko izlužujejo v zemljo, kar se prikaže tudi eksperimentalno (Varstvo okolja ter Analizne tehnike in monitoring).

Ključne besede: eksperiment, medpredmetno povezovanje, moduli programa Okoljevarstveni tehnik, Materiali in okolje, Varstvo okolja, Gospodarjenje z odpadki, Okoljevarstvene tehnologije ter Analizne tehnike in monitoring

Intermodular linkage in ecological studies through experiment

In many subjects experiment is an important learning tool, as well as laboratory work as a teaching method is an asset of connection, both among students and students with a teacher. In the field of environmental studies carefully selected and properly controlled experiments can show a close intertwining of modules such as Materials and Environment, Environmental protection, Waste management, Environmental technologies and Analytical techniques and monitoring of the program environmental technician . With the intention of connecting these modules we introduced in class experiments, which are an approximation of procedures in a factory and show students that not only in school but also in the practise, the knowledge that they acquire, are closely linked. We want to present a case that starts with experiment of copper coating (its only an approximation of industrial copper coating that students hear of in module Materials and Environment), which has as a result copper coated products as well as waste solution for copper coating. After determining the quantity of copper ions in solution (Analytical Techniques and Monitoring) students find that these ions must be removed from the solution and

on the basis of skills they have acquired in the module, Environmental Technologies provide an appropriate procedure for this and perform it. Then they determine the amount of copper ions in the treated solution. After completion of the procedure the residue is sludge, which contains a lot of copper and can not be dumped on landfills (Waste Management), as the matter may leach and pollute the soil, which is also shown with an experiment. (Environmental protection and Analytical techniques and monitoring).

Key words: experiment, intermodular linkage, professional module, environmental technician, materials and environment, environmental protection, waste management, environmental technology, analytical techniques and monitoring

Trajnostni načini reševanja problematike padavinskih vod

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Odtok padavinske vode iz neprepustnih površin predstavlja kvantitativno in kvalitativno obremenjevanje površinskih stoječih in tekočih voda. Različni trajnostni pristopi, kot so suhi in mokri zadrževalniki, deževni vrtovi, ponikovalnice itd., omogočajo zadrževanje in čiščenje padavinskega odtoka. Najpogosteje se uporabljajo mokri zadrževalni bazeni, ki omogočajo učinkovito odstranjevanje suspendiranih snovi in vezanih onesnažil. Za odstranjevanje raztopljenih onesnažil (hranila, težke kovine) pa je potrebna nadgradnja zadrževalnikov z dodatnimi tehnologijami, kot so peščeni in adsorpcijski filtri, zasaditev z ustreznimi močvirskimi rastlinami ter dodajanje flokulantov. Nadgrajeni zadrževalniki so bolj učinkoviti pri odstranjevanju raztopljenih kovin in hranil. Poleg tega rastlinska vegetacija, ustrezno razmerje med dolžino in širino zadrževalnika ter razmerje med površino prispevnega območja in prostornino zadrževalnika odločilno vplivajo na učinkovitost čiščenja. Poleg samočistilne sposobnosti sistemi za upravljanje meteornih vod zagotavljajo tudi povečanje biodiverzitete v lokalnem okolju, uravnavajo mikroklimo, omogočajo recikliranje vode, predstavljajo prostor za oddih, rekreacijo in izobraževanje v naravi. Njihova aplikacija je možna tako v urbanem in ruralnem okolju kot tudi v sklopu hišnih vrtov.

Ključne besede: zadrževalnik, deževni vrt, peščeni filter, *Phragmites australis*

Sustainable methods for solution of stormwater problem

Stormwater runoff from impermeable surfaces presents quantitative and qualitative loading of surface standing and running waters. Different sustainable methods such as dry and wet detention ponds, rain gardens, swales etc. enable retention and treatment of stormwater runoff. Most commonly used are wet detention ponds which enable efficient elimination of suspended solids and bound pollutants. For elimination of dissolved pollutants (nutrients,

heavy metals) an enhancement of detention ponds with additional technologies, such as sand and sorption filters, plantation with appropriate wetland plants and addition of flocculants, is needed. Upgraded detention ponds are more efficient in elimination of dissolved metals and nutrients. Besides this, vegetation, suitable length to width ratio and ratio between catchment area and pond volume have significant impact on the treatment performance. Along self-treatment capacity, systems for stormwater treatment enable an increase of biodiversity in local environment, mitigate microclimatic conditions, enable water recycling, they present an area for relaxation, recreation and education in nature. Application of the systems is possible in urban and rural environment as well as in individual house gardens.

Key words: Detention pond, rain garden, sand filter, Phragmites australis, pollutants, treatment, ecosystem services

Rastlinske čistilne naprave na območjih razpršene poselitve: čiščenje odpadnih voda in druge ekosistemske storitve

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Ekoremediacije in metode ekološkega načrtovanja spodbujajo oblikovanje trajnostnih ekosistemov, ki povezujejo potrebe človeka z njegovim naravnim okoljem v korist obeh. Nekatere od takšnih metod so naravna in grajena mokrišča ali rastlinske čistilne naprave. Od leta 1989 je bilo v Sloveniji projektiranih več kot 140 načrtov rastlinskih čistilnih naprav za male čistilne sisteme in mnogi od teh so bili zgrajeni za čiščenje komunalnih, industrijskih in meteornih odpadnih voda ter izcednih voda iz odlagališč odpadkov. Njihovo uspešno delovanje je dokazalo, da lahko nizko cenovna, decentralizirana in na naravnih procesih temelječa infrastruktura za čiščenje odpadnih voda dosega zahtevane standarde izpustov. Poleg tega ti sistemi postajajo vedno bolj smotrni za učinkovito ravnanje z odpadnimi vodami na območjih razpršene poselitve s topografsko razdeljenimi in majhnimi naselji, saj omogočajo čiščenje in ponovno uporabo vode in hranil ter nudijo druge ekosistemske storitve, kot so privzem in vezava ogljika, uravnavanje poplavnih viškov, tvorba novih habitatov itd. V članku je predstavljena učinkovitost čiščenja, možnosti prihranka stroškov v primeru njihove rabe ter druge ekosistemske storitve, ki jih nudijo. Predstavljeni so tudi rezultati analiz večletnega spremljanja delovanja rastlinskih čistilnih naprav.

Ključne besede: ekološko načrtovanje, ekoremediacije, rastlinske čistilne naprave, ekosistemske storitve, decentralizirani čistilni sistemi

Constructed wetlands in areas of dispersed settlement: wastewater treatment and other ecosystem services

Ecoremediations and methods of ecological engineering promote the design of sustainable ecosystems that integrate human needs with its natural environment for the benefit of both. One such methods are natural and constructed treatment wetlands. Since 1989, more than 140 design projects on constructed wetlands for small scale wastewater treatment systems have been elaborated in Slovenia and many of them realised for treatment of municipal, industrial, urban and landfill wastewaters. Their successful operation proved that low-cost, decentralised naturally-based infrastructure for wastewater treatment reaches required outflow standards. Besides, they are becoming increasingly relevant for successful wastewater management in dispersed, topographically divided and small settlements as they promote recovery and reuse of wastewater resources and offer other ecosystem services like carbon capture and sequestration, flood control, new habitat creation, etc. Their treatment performance, cost saving possibilities and different ecosystem services are discussed in the paper. The results from several years operation of constructed wetlands are presented.

Key words: ecological engineering, ecoremediation, constructed treatment wetlands, ecosystem services, decentralised wastewater treatment systems

Virtualna elektrarna v luči obratovalnih lastnosti proizvodnih objektov

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Virtualna elektrarna vsem proizvodnim virom predstavlja alternativo na osnovi proizvodnje obnovljivih virov energije. V prispevku bomo virtualno elektrarno zasnovali s tremi različnimi proizvodnimi viri: z malo hidroelektrarno, s sončno elektrarno in s kogeneracijskim postrojem. Poleg vodne in sončne energije v zasnovo virtualne elektrarne vključujemo soproizvodnjo toplote in električne energije, ki nam ogrevalne sisteme nadomesti s proizvodnim virom električne energije, toplota pa je drugi produkt, ki ga v energetskih postrojenjih potrebujemo. Z virtualno elektrarno smo si prek sumiranja proizvodnje električne energije zamislili oskrbovanje porabnikov v smislu samooskrbe. Poskušali bomo uravnotežiti proizvodnjo in porabo in na podlagi meritev prikazati razlike v porabljeni in proizvedeni energiji, izgube energije in prihranke, ki jih dobimo, če se energija porabi v lokalnem omrežju. Primer proizvodnje in porabe električne energije v lokalnem omrežju je sončna elektrarna v Strahinju.

Energija, ki jo je proizvedla, se je v zadnjih treh letih v 90 % porabila v šoli Biotehniškega centra v Strahinju in tamkajšnji športni dvorani, to pa predstavlja 19,5 % celotne porabe v šoli in športni dvorani.

Ključne besede: virtualna elektrarna, proizvodni viri, merjenje električne energije, izgube, oskrba odjemalcev, prihranki

Virtual power plant in the light of operating characteristics of production facilities

A virtual power plant is an alternative to all production sources, based on production of renewable energy sources. The paper presents the design of a virtual power plant using three different production sources: a small hydro power plant, a solar power plant and a cogeneration plant. In addition to hydro and solar energy, the virtual power plant design includes cogeneration of heat and electricity. In this case, heating systems are replaced by an electricity generation source with heat being the second product needed in energy systems. In the scope of a virtual power plant we summed up the electricity production and outlined consumer supply in terms of energy self-sufficiency. We will try to balance production and consumption and our aim is to use measurements to present the differences in energy consumed and generated, the loss of energy and savings achieved if energy is used in a local network. An example of electricity production and consumption in a local network is the Strahinj Solar Power Plant. 90% of the energy it produced was in the past three years consumed by the Biotechnical Centre School in Strahinj and the local sports hall, accounting for 19.5% of total consumption of these two facilities.

Key words: virtual power plant, production sources, electricity measurement, losses, supply to consumers, savings

Rešitve pri gradnji sončnih elektrarn ob neoptimalnih pogojih

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S prakso izvajanja inženiringa gradnje sončnih elektrarn za lastne investicije in za trg so ugotovljene težave pri montažah modulov na strehah različnih objektov z različnimi kritinami pripeljale do razmišljanja in idejnih rešitev za optimizacijo gradenj na specifičnih strehah. Upoštevaje zakonodajo s področja varnosti, požarne in statične presoje, so predstavljene rešitve montaže solarnih modulov in podkonstrukcije na strehah, ki nimajo optimalnih pogojev. Skozi nekaj primerov dobre prakse želimo predstaviti smiselnost investicije navkljub strožjim pravilom gradnje sončnih elektrarn na objektih, kot so šole, vrtci, gospodarski objekti. S prikazom izvedbe projektov za lastne investicije želimo predstaviti rešitve – postavitev modulov z drugačnim načinom gradnje brez pritrjevanja, postavitev fotovoltaičnih modulov z optimalno pozicijo, »žagasto« dvigovanje modulov za preprečevanje zdrsa

velikih količin snega in podobno. Sončna elektrarna Merkur moči 800 kWp ima zaradi specifike strešne kritine (Sika) onemogočeno pritrjevanje, zato se na takšnem tipu kritine s sistemom Techno Flat in mrežnim povezovanjem podkonstrukcije izvaja montaža sončnih modulov. Sistem žagastega dvigovanja modulov pa zaradi dodatnih zahtev s področja varnosti naknadno onemogoča zdrs snega po površinah modulov. Takšno rešitev smo izvedli pri projektu Sončna elektrarna OŠ Šenčur, kjer je bilo treba poleg postavitve snegolovov upoštevati dodatno varnost zaradi frekvence otrok pod objektom – v takšnem primeru je žagasti način montaže modulov dodatna zaščita pred zdrsom snega z površine modulov.

Ključne besede: sončne elektrarne, zakonodaja, gradnje, tehnične rešitve, optimiranje

Solutions for construction of solar power plants in suboptimal conditions

Through engineering practice in constructing solar power plants as investments for own use or for sale we discovered problems in module installation on roofs of various buildings with different types of roofing, which has lead us to examine and design concept solutions for optimising construction on specific roofs. Considering the legislation on safety, fire and static assessment, the article presents solutions for installation of solar modules and substructure on roofs in suboptimal conditions. Our aim is to present, through some good practice examples, that the investment is reasonable in spite of stricter rules applying to solar power plant construction on buildings such as schools, kindergartens, commercial facilities. We present the implementation of projects as own investments so as to demonstrate the solutions for installing modules by using a different construction method that does not involve fixing, for installing PV modules in an optimal position, for saw-tooth placement of modules to prevent large snow quantities from sliding off and similar. The Merkur solar power plant with the capacity of 800 kWp has a specific roofing (photo) that prevents installation, which is why the Techno Flat system and grid substructure connection are used for installing solar modules on this type of roof tiles. In accordance with additional safety requirements the saw-tooth placement of modules additionally prevents snow from sliding off. Such a solution was applied in the solar power plant project at the Šenčur Elementary School. Besides snow guards, it was necessary to provide for additional safety due to a high frequency of children close to the building. In this case the saw-tooth method of installing modules provides additional protection against snow sliding off the modules.

Key words: solar power plants, legislation, construction, technical solutions, optimisation

Vpliv slanosti odpadnih voda na učinek čiščenja rastlinskih čistilnih naprav in rasti topolov v peščenih filtrih

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Pereči problemi industrijske družbe so velika poraba vode in hkratno nastajanje velikih količin odpadne vode ter zviševanje potreb po pitni vodi. To stanje pelje v obvezno potrebo po zmanjševanju porabe vode in ponovni uporabi prečiščene vode za ohranitev čistih virov pitne vode in zdravega naravnega okolja. V okviru dveletnega raziskovalnega projekta »CLEARH20 – Multifunkcijski pristop k čiščenju komunalne in industrijske odpadne vode in scenariji ponovne uporabe vode« smo se osredotočili na iskanje primernih rešitev čiščenja odpadnih voda v prehranjevalni industriji, kjer se povišana slanost pojavlja kot pogost problem. Problema smo se lotili s pomočjo fitoremediacijskih tehnologij, ki v tem primeru kombinirajo čiščenje odpadnih voda in produkcijo biomase hitrorastočih lesnatih rastlin. Pilotni objekt je bil sestavljen iz vertikalnih rastlinskih čistilnih naprav (V-RČN), ki so bile zasajene z avtohtono vrsto navadnega trsa (Phragmites australis), in iz vertikalnih peščenih filtrov (V-FILTER), v katerih so bile posajene štiri vrste klonov topola (Populus deltoides Bart. cl. I-69/55 (syn. Lux), Populus × canadensis Moench cl. I-214, Populus × canadensis Moench cl. Guardi, Populus alba L. cl. Villa Franca), ti pa so izkazovali toleranco na povišano slanost. Cilj raziskave je bil ugotavljanje učinkovitosti čiščenja odpadnih voda z zmanjševanjem organskih obremenitev (BPK5) v pogojih povišane slanosti. Slanost vode je postopno naraščala od 1,4 do 11 mg/L v V-FILTER in od 4,32 do 30,0 mg/L NaCl v V-RČN do konca avgusta 2011. V času trimesečnega eksperimentalnega obdobja z dodano soljo je bil delež porabe vode v V-RČN (evapotranspiracija in asimilacija) 60,5 % dodane vode, medtem ko je v V-FILTER ta delež dosegel 55,5 %. Stopnja porabe vode se je s povečanjem slanosti vode zmanjševala, kar je bilo najbolj očitno v V-FILTER. V V-RČN, zasajeni s trsom iz neslanega okolja, je bilo v povprečju doseženo 40,1 % zmanjšanje KPK vrednosti, medtem ko smo v eksperimentalni V-RČN, zasajeni s trsom iz slanega okolja, dosegli 37,2 % zmanjšanje vrednosti KPK. Skupna nadzemna suha masa je v povprečju večja pri kontrolnih serijah (F-kontr in RČN-kontr) v primerjavi z eksperimentalnimi cisternami pri vseh topolih in trsih. V kontrolni obravnavi V-FILTER izraža Populus × canadensis Moench cl. I-214 za malenkost višjo suho maso od preostalih klonov, v eksperimentalni F-FILTER pa izraža v vseh cisternah večjo maso Populus alba L. cl. Villa Franca.

Ključne besede: slanost, industrijske odpadne vode, vertikalne rastlinske čistilne naprave, vertikalni peščeni filtri, topol, ponovna uporaba vode, čiščenje odpadnih voda

Effect of wastewater salinity on treatment performance of constructed treatment wetland and growth of poplars in sand filters

The reduction of water consumption is mandatory in the current age and the recycling of treated wastewaters is one of the most obvious and promising options in integrated water resources management. In this view a two-year research project "CLEARH2O - Multifunctional approach to municipal and industrial wastewater treatment and water reuse scenarios" has been applied, where we focused on intensification of treatment processes in wastewater sector of food-processing industry with outflows with high salinity. A phytotechnological solution has been proposed, combining wastewater treatment and reuse for woody plants growth. A pilot experiment has been set-up, combining vertical constructed treatment wetlands (CWs) and vertical sand filters (VFs). Naturally growing Phragmites australis plants from two localities with different water salinity have been planted in CWs and cuttings of four poplar clones (Populus deltoides Bart. cl. I-69/55 (syn. Lux), Populus × canadensis Moench cl. I-214, Populus × canadensis Moench cl. Guardi, Populus alba L. cl. Villa Franca), with expressed salinity tolerance have been planted in VFs. The aim was to compare their role in wastewater treatment performance in terms of reduction of BOD5 and their growth response on conditions with high salinity. The water salinity was gradually increased from 1.4 to 11 mg/L in VFs and from 4.32 to 30 mg/L of NaCl in CWs until the end of August 2011. During the three month experimental period with gradual salt addition, the portion of water used in the CWs (evapotranspiration and assimilation) resulted in 60.5% of added water, while VFs achieved 55.5% of water use. The degree of water use decreased with the increase of salinity what was more evident in VFs. The treatment efficiency of CWs, evaluated by COD reduction, was 40.1% on average in experimental CW planted with Phragmites from non-salt environment and slightly lower, 37.2% in experimental CW planted with Phragmites from salt environment. The VF-contr and CW-contr treatments exhibited on average greater aboveground woody dry mass for all Populus clones and Phragmites plants. Aboveground woody dry mass is on average greater in VF-kontr and CW-kotr compared to VF-exp and CW-exp. Populus × canadensis Moench cl. I-214 exhibited greater mean aboveground woody dry mass in VF-contr treatment compared with other Populus clones. Populus alba L. cl. Villa Franca exhibited greater mean aboveground woody dry mass in all VF-exp units. The reduction of water consumption is mandatory in the current age and the recycling of treated wastewaters is one of the most obvious and promising options in integrated water resources management. In this view a two-year research project "CLEARH2O - Multifunctional approach to municipal and industrial wastewater treatment and water reuse scenarios" has been applied, where we focused on intensification of treatment processes in wastewater sector of food-processing industry with outflows with high salinity. A phytotechnological solution has been proposed, combining wastewater treatment and reuse for woody plants growth. A pilot experiment has been set-up, combining vertical constructed treatment wetlands (CWs) and vertical sand filters (VFs). Naturally growing Phragmites australis plants from two localities with different water salinity have been planted in CWs and cuttings of four poplar clones (Populus deltoides Bart. cl. I-69/55 (syn. Lux), Populus × canadensis Moench cl. I-214, Populus × canadensis Moench cl. Guardi, Populus alba L. cl. Villa Franca), with expressed salinity tolerance have been planted in VFs. The aim was to compare their role in wastewater treatment performance in terms of reduction of BOD5 and their growth response on conditions with high salinity. The water salinity was gradually increased from 1.4 to 11 mg/L in VFs and from 4.32 to 30

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Key words: salinity, industrial wastewater, vertical constructed treatment filter, planted salt filter, poplar, water reuse, wastewater treatment

Problematika veterinarskih zdravil v okolju

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V enaindvajsetem stoletju naj bi v okolju obstajalo več kot 100.000 različnih kemikalij, od tega pa jih danes 30 % predstavlja snovi farmacevtskega izvora. Z večanjem ozaveščenosti glede varovanja okolja se je vzporedno začela razvijati tudi ekotoksikologija – veda, ki še vedno velja za sorazmerno novo znanstveno disciplino. Zdravila za uporabo v veterinarski medicini z ekotoksikološkega vidika še do nedavnega niso predstavljala večjega problema, vendar pa so njihove značilne lastnosti in pogosta uporaba na velikem številu živali pripomogle k temu, da so upravni organi in tudi znanstveniki pristopili k tej problematiki bolj načrtno. Raziskave so pokazale, da so ena izmed bolj uporabljenih skupin zdravil avermektini, ki se uporabljajo v veterinarski medicini kot antiparazitiki. Znano je, da se ti v nespremenjeni obliki z živalskimi iztrebki izločajo v okolje. V študijo smo vključili avtohtono slovensko pasmo ovc – istrsko pramenko, ki smo jo tretirali z avermektini. Po uspešno razviti metodi določanja časovnega profila njihovih zaostankov v iztrebkih in njihove razgradnje pod različnimi pogoji smo določili koncentracije, ki bi lahko škodljivo delovale na koristne organizme v okolju, in na podlagi tega pripravili oceno tveganja. Ekotoksikološke raziskave tako omogočajo razširjen vpogled v možne posledice, ki zaradi nekontrolirane uporabe potencialnih onesnaževal okolja tam nastanejo.

Ključne besede: veterinarska zdravila, istrska pramenka, ekotoksikologija, ocena tveganja, odpadki

Veterinary medicines as an environmental problem

There are over 100.000 chemicals of different origin present in the environment in the 21. Century, among which30 % of them belongs to pharmaceuticals. Widespread concern about the environmental impacts of chemicals led to the development of a new scientific discipline – ecotoxicology. Veterinary medicines posed no threat until recently.

As global livestock industry and also number of companion animals is (still) growing, the usage of mentioned substances is intensively expanding. Due to the increased use and their special chemical character, scientists and governmental institutions started with a more focused approach and in-depth studies regarding the problem. Avermectins are one of most frequently used veterinary medicines. After their use, they eliminate from the body in their active form, end up in the environment and as such interfere with a diverse range of biological systems. Indigenous sheep breed IstrianPramenka treated with therapeutic dosages were used in the study. Time profiles of excretion and concentration of avermectins in faeces were established, using a chemical procedure. Degradation of avermectins under different conditions was also followed. We performed also ecotoxicological studies looking at the effects on soil dwelling organisms with a final conclusion in an environmental risk assessment scheme. Performed ecotoxicological study enables an in-depth view into the possible consequences of such large-scale pharmaceuticals use.

Key words: veterinary medicines, IstrianPramenka, ecotoxicology, risk assessment, pharmaceutical waste

Tehnološke rešitve z napravami za čiščenje turbinskih rešetk v hidroelektrarnah

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Ekonomike obratovanja in racionalizacije obratovalnega osebja narekujejo maksimalno avtomatizacijo hidroelektrarn. Eden od večjih problemov v tem procesu je izvedba avtomatskega mehanskega čiščenja finih rešetk pred turbinami. Rešetka na toku preprečuje, da voda nanese večje naplavine med lopatice turbine, kar lahko povzroči strojelom. Različne tehnične rešitve mehanskega odstranjevanja naplavin so obstajale že prej, vendar so se te naprave ravno v času največjega nanosa naplavin pogosto kvarile. Nova konstrukcija verižnih čistilnih strojev, pri katerih so grablje za čiščenje rešetk vodene prek dveh stranskih verig, zagotavlja zanesljivo delovanje tudi ob težjih pogojih obratovanja, posamična izdelava pa omogoča prilagoditev konstrukcije na rešetke različnih dimenzij. Vklop čiščenja se izvaja avtomatsko glede na stopnjo zamašenosti rešetk. S tehnično izboljšavo na tem področju smo zagotovili nemoteno proizvodnjo električne energije tudi v času večjega nanosa naplavin. Potreba po intervenciji posluževalcev se je bistveno zmanjšala, kar je omogočilo zmanjšanje obratovalnega osebja, obenem pa se je povečala proizvodnja električne energije. Poleg izboljšanja ekonomike obratovanja so te naprave prispevale tudi k humanizaciji dela, saj se je znatno zmanjšal obseg fizično napornega dela ob najbolj neugodnih vremenskih razmerah. Čistilne naprave te vrste je možno koristno uporabiti tudi pri čiščenju komunalnih odplak in pripravi tehnološke vode v industriji.

Ključne besede: hidroelektrarna, čiščenje rešetk, obratovanje, avtomatizacija, naplavine, komunalne odplake

Technological solutions involving cleaning machines for turbine trash racks at hydro power stations

Operating efficiency and operating staff efficiency call for maximum automation of hydro power stations. One of the main problems in this process is automatic mechanical cleaning of fine trash racks before turbines. These trash racks prevent large water-borne debris from coming in between turbine blades, as that could cause machinery breakdown. Various technical solutions for mechanical removal of debris existed earlier, but such machines often failed when there was most debris. The new design of chain-driven cleaning machines with rakes guided through two side chains ensures reliable functioning even in demanding operating conditions and owing to customised production, these machines can be adjusted to racks of various dimensions. Cleaning is triggered automatically based on how clogged the trash racks are. A technical improvement in this area ensured uninterrupted electricity generation also during heavy debris accumulation. The need for intervention by operators was much smaller, allowing for downsizing of operating staff and increasing electricity production. Besides greater operating efficiency these machines also contributed to humanisation of work as the volume of physically demanding work in the most unfavourable weather conditions decreased substantially. Cleaning machines of this type can be put to good use also for cleaning municipal sewage and preparing industrial water.

Key words: hydro power station, trash rack cleaning, operation, automation, debris, municipal sewage

Tehnologije izrabe deponijskega plina

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V prispevku smo pregledali in primerjali različne tehnologije za energijsko izrabo deponijskega plina. Poleg motorjev z notranjim izgorevanjem, ki so najbolj uveljavljeni, smo primerjali še bolj napredne tehnologije, kot so organski Rankinov cikel, plinska turbina, Stirlingov motor in gorivna celica. Primerjali smo okoljsko sprejemljivost s stališča emisij NO_x, CO ter stopnjo zmanjšanja sproščenih toplogrednih plinov, izkoristek in porabo goriva za proizvedeno energijo in investicijske stroške ter stroške delovanja in vzdrževanja. Primerjava kaže, da so motorji z notranjim izgorevanjem kljub najvišjim emisijam, povprečnim izkoristkom in visokim investicijskim stroškom najbolj razširjeni. Gorivne celice glede na najboljši izkoristek in čisto tehnologijo v bližnji prihodnosti obetajo največ. Investicijski stroški, ki so najvišji, se z bolj množično uporabo počasi znižujejo, kratka življenjska doba pa se z novimi tehnološkimi odkritji in izboljšavami podaljšuje. Plinske turbine za uporabo deponijskega plina zaradi njegove spremenljive sestave in načina delovanja turbin niso najboljša rešitev. Do njihove širše uporabe verjetno ne bo prišlo. Rankinov organski cikel in Stirlingov motor zaradi svojih karakteristik in pomanjkanja raziskav pa trenutno tudi nista primerna načina za energijsko izrabo deponijskega plina.

Ključne besede: deponijski plin, energijska izraba, komunalni odpadki

Landfill gas energy recovery technologies

In the article we reviewed and compared different technologies for energy utilization of landfill gas. In addition to internal combustion engines, which are the most established, we compared some more advanced technologies such as organic Rankine cycle, gas turbine, Stirling engine and the fuel cell. We compared: the environmental performance in terms of NOx, CO releases, the rate of reduction of greenhouse gases emitted in the air, the fuel efficiency of produced energy, the costs of investment, operation and maintenance. The comparison shows that the internal combustion engine is the most widely used, despite the highest emission rates, the average yield and high investment costs. Fuel cells show the best efficiency and the most clear technology. Investment costs for the fuel cells are the highest but slowly decrease with more widespread application. Their low life expectancy is increasing with new technological advances and improvements . Gas turbines are not the best solution for the use with landfill gas due to its variable composition and method of operation of the turbines. Their use for biogas energy recovery probably won't become widespread. Organic Rankine cycle and Stirling engine are currently not suitable method for the energy utilization of landfill gas because of its characteristics and the lack of research. We can summarized that the fuel cells are the most promising technology in the near future.

Key words: landfill gas, energy recovery, municipal wast

Akumulacijska hidroelektrarna Lomščica – pozitivni učinki po rekonstrukciji

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Na podlagi štiriletnih izkušenj ob različnih hidroloških pogojih so se pokazale tehnične rešitve rekonstrukcije zajetja in obnove akumulacijskega bazena kot ustrezne. V prispevku bomo predstavili investicijski projekt in analizirali učinke po rekonstrukciji s tehnološko-sociološkega, gospodarsko-ekonomskega (letna proizvodnja) in okoljskega (primerna vključenost v gorsko krajino) vidika. Rekonstrukcija zajetja akumulacijske hidroelektrarne Lomščica instalirane moči 2 MW je bila največja investicija Gorenjskih elektrarn, proizvodnja elektrike, d. o. o. v zadnjem desetletju. Obstoječe »tirolsko« zajetje hidroelektrarne Lomščica se je pri obratovanju od leta 1991 izkazalo kot neustrezno. Prisotne so bile težave z vzdrževanjem vtočnih rešetk ter vnašanje ogromnih količin peščenih frakcij vodotoka Lomščica. Zaradi usedlin je bil akumulacijski bazen čiščen trikrat. Načrtovana srednja letna proizvodnja električne energije hidroelektrarne Lomščica je 2.980.000 kWh vršne električne energije. Je obnovljiv vir energije – hidroelektrarna Lomščica izkorišča padavinsko območje 20 km^2 in ima z vidika sezonskosti največjo proizvodnjo v jesenskih mesecih, kar je posledica deževja, in v spomladanskih mesecih, ko se tali sneg v gorah. Posodobitev zajetja hidroelektrarne Lomščica pomeni izboljšanje varnosti obratovanja in povečanje

povprečne letne proizvodnje električne energije v letih 2008–2011 za 17,92 % v primerjavi z načrtovano. V najbolj vodnatem letu je bila proizvodnja za 43,1 % večja od načrtovane, v najmanj vodnatem letu pa je bila od načrtovane za 11,0 % manjša.

Ključne besede: hidroelektrarna, letna proizvodnja, vršna energija, elektrika, akumulacijski bazen

Lomščica hydro accumulation power station – positive post-reconstruction effects

Four years' experience involving varying hydrological conditions showed that the technical solutions of catchment reconstruction and accumulation reservoir renovation are adequate. The paper presents the investment project and includes an analysis of post-reconstruction effects from a technological-sociological view, economic view (annual production) and environmental view (suitable integration in mountain landscape). The reconstruction of the catchment of the Lomščica Hydro Accumulation Power Station with the nominal capacity of 2 MW was the largest investment made by Gorenjske elektrarne, proizvodnja elektrike, d.o.o. in the past decade. The existing "Tyrolean" catchment of the Lomščica Hydro Accumulation Power Station proved to be operationally inadequate since 1991. There were problems with maintenance of intake trash racks and input of huge quantities of sand fractions from the Lomščica water course. Due to deposits the accumulation reservoir was cleaned three times. The planned mean annual electricity generation by the Lomščica Hydro Accumulation Power Station is 2,980,000 kWh of peak electricity. A renewable energy source – Lomščica Hydro Accumulation Power Station is utilising a precipitation area covering 20 km^2. Of all seasons, its production is the highest in the autumn months due to rainfall and in the spring due to mountain snow melting. The modernisation of catchment of the Lomščica Hydro Accumulation Power Station results in safer operation and a 17.92% higher mean annual electricity production in 2008-2011 compared to the plan. In the year with the highest water discharges the production exceeded the plan by 43.1%, while in the year with the lowest discharge it was 11.0% lower than planned.

Key words: hydro power station, annual production, peak energy, electricity, accumulation reservoir

Učinki ekonomije obsega v razvoju sončnih elektrarn

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Razvoj tehnoloških sistemov in industrijska proizvodnja fotovoltaičnih modulov sta imela za posledico dosežke pri izboljšanju izkoristkov in množično gradnjo. V Sloveniji sta se interes in gradnja fotovoltaičnih sistemov povečevala z eksponentno funkcijo. Konec leta 2011 (do 31. januarja 2012) je bilo po podatkih Registra deklaracij za proizvodne naprave električne energije iz obnovljivih virov registriranih 1.280 sončnih elektrarn s skupno instalirano močjo 84,183 MW. Investiranje sončnih elektrarn v letih 2010 in 2011 je rezultiralo v povišanju finančnih kvot za spodbudo, kar je Vlado RS vodilo v odločitev, da je napovedane odkupne cene za sončne

elektrarne v letih 2011–2013 dvakrat dodatno znižala. S projektno nalogo, opredeljeno s tehničnimi elementi, smo na konkretnem primeru naložbe v sončno elektrarno izbrali optimalno rešitev, finančno ovrednotili vlaganja in podali oceno ekonomskih učinkov s kazalniki uspešnosti in učinkovitosti. V analizi tveganja smo izpostavili problematiko spremenjenega subvencioniranja in prognozirali razvoj in ekonomske učinke pod spremenjenimi pogoji. Zaradi tehnološkega napredka in ekonomije obsega prihaja do zniževanja cen fotovoltaičnih modulov kot bistvenih elementov v strukturi investicijskih stroškov. Ekološki prihranek proizvodnje električne energije iz sončnih elektrarn prikažemo z zmanjšanjem izpustov emisij CO_2.

Ključne besede: sončne elektrarne, razvoj, tehnološki sistemi, gospodarjenje, ekonomski učinki, ekološki prihranki

Effects of economies of scale in the development of solar power plants

The development of technological systems and industrial production of photovoltaic modules brought about achievements reflected in higher efficiency and mass construction. In Slovenia the interest in and the construction of PV systems grew exponentially. According to the data (until 31 January 2012) from the Register of Declarations for Electricity Generation Plants from Renewable Sources there were 1,280 solar power plants registered at the end of 2011 with a total nominal capacity of 84.183 MW. Investments in solar power plants in 2010 and 2011 resulted in higher financial incentive quotas that led the Government of the Republic of Slovenia to twice increase the projected purchase prices for solar power plants in 2011–2013. The project task defined by technical elements presents, on a concrete example, an optimal solution selected for the solar power plant, a financial evaluation of investments and an estimate of economic effects according to performance and efficiency ratios. The risk analysis highlights the issue of modified subsidy system and projects development and economic effects under changed conditions. Owing to technological progress and economies of scale, the prices of PV modules – the essential elements in the structure of investment costs – have been declining. Environmental savings arising from electricity generation by solar power plants are expressed as a decrease in CO_2 emissions.

Key words: solar power plants, development, technological systems, management, economic effects, environmental savings

Spodbude za proizvodnjo električne energije iz obnovljivih virov energije

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Spodbujanje za naložbe je zagotovljeno s prispevkom za obnovljive vire energije (OVE) v višini 0,8 %, ki ga plačujejo vsi odjemalci električne energije. Sredstva za spodbude se vračajo investitorjem prek sistema odkupnih cen električne energije od leta 2002. Politika odkupnih cen in obratovalnih podpor za obnovljive vire energije se je spreminjala glede na velikostne razrede in vrsto virov. Od leta 2008 je bila politika spodbud usmerjena v bioplin v kmetijstvu in lesno biomaso. S sprejeto novo metodologijo leta 2009 so se popravila razmerja med spodbudami odkupnih cen pri bioplinu na komunalnih deponijah, pri geotermalni energiji, vetrni energiji, hidroenergiji in lesni biomasi. S statistično analizo smo primerjali proizvodnjo električne energije iz obnovljivih virov energije in sredstva za podporo po posameznih proizvodnih virih. Največji delež OVE so leta 2010 s 67,2 % predstavljale proizvedene elektrike, ki so bile upravičene do 31,7 % deleža skupnih podpor OVE. Najmanjši, 1,4 % delež elektrike so proizvedle sončne elektrarne, ki so imele v sredstvih za podpore 10,2 % delež. Proizvodnja električne energije za obnovljive vire energije se je v obdobju 2004–2010 povečala za 74,4 %, izplačana sredstva za podpore pa za 82,7 %. Z vidika energetsko-okoljskih perspektiv in EU zaveze za dosego 20 % oz. 25 % deleža OVE v končni rabi energije do leta 2020 bo treba ustvariti pogoje bolj intenzivne izgradnje OVE za izkoriščanje hidroenergetskega in vetrnega potenciala.

Ključne besede: obnovljivi viri energije, subvencije, politika spodbud, statistična analiza, EU

Incentives for producing electricity from renewable sources

Investment incentives are provided by a fee for renewable energy sources (RES) equalling 0.8%, which is paid by all electricity consumers. The incentive funds have been systemically reimbursed to investors through the electricity purchase prices since 2002. The policy of purchase prices and operating incentives for renewable energy sources has changed depending on size classes and type of sources. Since 2008 the incentive policy has focused on agricultural biogas and wood biomass. The new methodology adopted in 2009 improved the ratio between purchase price incentives for biogas at municipal dumping, geothermal energy, wind energy, hydro energy and wood biomass. A statistical analysis was used to compare electricity production from renewable sources with the financial support to individual production sources. In 2010, the largest share of electricity produced from RES, i.e. 67.2%, was accounted for by RES power plants, which were entitled to 31.7% of total incentives for RES. The smallest share of electricity, i.e. 1.4%, was generated by solar power plants, which received 10.2% of incentive funds. In the 2004–2010 period electricity production from renewable energy sources increased by 74.4% and incentives by 82.7%. Considering the energy and environmental perspectives and bearing in mind the EU commitment to achieve a 20% or 25% share of RES in final energy consumption by 2020, it will be necessary to create conditions for a more intensive construction of RES that will allow exploitation of hydro and wind energy potential.

Key words: renewable energy sources, subsidies, incentive policy, statistical analysis, EU

Nadzor in upravljanje proizvodnih virov energije

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Gorenjske elektrarne so se v razvojni politiki usmerile v tri obnovljive proizvodne vire električne energije, in sicer: hidroelektrarne, sončne fotovolatične elektrarne ter soproizvodnjo električne energije in toplote. Glede na intenzivna vlaganja v izgradnjo sončnih elektrarn so se pokazale težnje in zahteve po nadzoru naprav zaradi zagotavljanja nemotenega obratovanja in vzdrževanja. Z informacijsko-komunikacijskimi tehnologijami je bila ustvarjena aplikacija GE-monitoring proizvodnih virov električne energije. Izdelan je bil učinkovit sistem za nadzor in upravljanje proizvodnih virov energije, ki sproti javlja ažurne podatke iz proizvodnega objekta. Koncept deluje na osnovi operacijskih sistemov Windows, v katerih so posamezni moduli: FTP-strežnik za zajem podatkov iz naprav, SQL-strežnik za obdelavo podatkov za potrebe diagnosticiranja ter izdelave poročil in WEB-strežnik za posredovanje podatkov uporabnikom spletnih strani. Na osnovi posredovanih vhodnih podatkov iz posameznih elektrarn in primerjalnih podatkov s strani sistema le-ta diagnosticira ter javlja operaterju oziroma vzdrževalcu trenutno stanje naprave s sledečimi parametri: trenutna proizvodnja, diagnosticiranje napak na posameznih nizih, vezanih na razsmernik, ter javljanje napak samega razsmernika. Program sprejete podatke zadolženim osebam in skrbniku sistema javlja prek SMS-a in e-maila. Nadzor iz daljinskega centra proizvodnih objektov se izvaja prek GE-monitoringa proizvodnih virov električne energije ter prek WEB-aplikacije na samem terenu. Na podlagi pridobljenih podatkov se pripravljajo mesečna poročila proizvodnje električne energije in prihodkov ter preračunavajo se prihranki zmanjšanih emisij toplogrednih plinov.

Ključne besede: obnovljivi viri energije, proizvodnja električne energije, nadzor, upravljanje, monitoring, informacijsko-komunikacijske tehnologije

Supervision and management of electricity generation sources

The development policy of Gorenjske elektrarne focuses on three renewable sources of electricity, namely: hydro power plants, solar PV power plants and electricity/heat cogeneration. The intensive investments in solar power plant construction gave rise to the demand and requirements for supervision of machines to ensure uninterrupted functioning and maintenance. Information and communication technologies were used for creating the GE-monitoring application for electricity generation sources. An efficient system was designed for supervising and managing electricity generation sources. This system promptly forwards the latest data from the production

facility. The concept is based on the Windows operating system, involving several modules: FTP server for capturing data from machines, SQL server for processing data for diagnostics and report generation and WEB server for submitting data to website users. On the basis of input data submitted from individual power plants and based on comparative data provided by the system, the system is able to diagnose and report to the operator the current status of the machine according to the following parameters: current production, error diagnostics for individual series connected to the inverter and reporting inverter defects. The application forwards the data received via SMS or e-mail to the persons in charge and to the system administrator. GE-monitoring of electricity generation sources allows for supervision from a remote centre of production facilities or on-site supervision via a WEB application. The data obtained are used for preparing monthly reports about electricity generation and revenue and for calculating the savings arising from reduced greenhouse gas emissions.

Key words: renewable energy sources, electricity generation, supervision, management, monitoring, information and communication technologies

Odstranjevanje neprijetnih vonjav iz odpadnega zraka

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Pri kompostiranju, čiščenju odpadne vode, vzreji živali, v kanalizaciji in pri proizvodnji bioplina stalno ali občasno potekajo anaerobni procesi, pri katerih ob prisotnosti žveplovih in dušikovih spojin nastajajo tudi vodikov sulfid, amonijak, merkaptani in/ali amini. Te spojine imajo že v majhnih koncentracijah zelo neprijeten vonj in so zato neprijetne za okolico, poleg tega pa so pri določeni koncentraciji tudi nevarne za zdravje ljudi in živali. Običajno jih odstranjujemo s pralniki zraka, biofiltri in/ali kemijskimi filtri. Izbira je odvisna od pretoka zraka in koncentracije snovi v njem. Namen raziskave je izdelava modela, ki omogoča izračun najbolj optimalnega načina čiščenja zraka za odstranjevanje spojin z zelo neprijetnim vonjem (merkaptani). V prispevku je predstavljen model za čiščenje zraka z biološkim in kemijskim filtrom. Model omogoča izračun ekonomsko najbolj ustreznega načina čiščenja. Na podlagi raziskave je ugotovljeno, da je za zelo visoko stopnjo čiščenja (> 99 %) pri nizkih koncentracijah onesnaževalcev najustreznejši kemijski filter, pri višjih koncentracijah pa kombinacija biofiltra in kemijskega filtra. Zaključujemo, da smo razvili učinkovit in uporaben model, ki omogoča optimizacijo v procesu sprejemanja odločitev na področju odstranjevanja neprijetnih vonjav iz odpadnega zraka.

Ključne besede: neprijetne vonjave, čiščenje odpadnega zraka, sistem za podporo odločanju

Removing odors from waste air

At composting, waste-water treatment, livestock farming, in the sewer systems and at biogas production there are anaerobic processes taking place all or most of the time. When sulphur and nitrogen compounds are present, compounds such as hydrogen sulphide, ammonium, mercaptans and/or amines are being formed during these processes. The odors of these compounds are highly unpleasant, even at low concentrations. These odors are

unpleasant for the residents of the surrounding area and above a certain concentration they are also harmful for the health of humans and animals. Usually the odors are removed by wet scrubbers, biofilters and/or chemical filters. The selection depends on air flow and the concentration of the compound in the air. The aim of the research is to create a model which enables a calculation of the most optimal process for removing the compounds (mercaptans) with very intensive odor from air. The article presents a model of air cleaning by biological and chemical filters. The model enables a calculation of the economically most efficient way of odors removal. Based on the research it was determined that for the highest cleaning level (>99 %) at low odors concentrations the use of a chemical filter is most the appropriate. At higher concentrations a combination of biofilter and chemical filter proved to be the optimal selection. In conclusion: an effective and useful model was developed, which allows decision making process and optimization of the removing odors from waste air.

Key words: odor, waste air cleaning, decision support system

Bioetanol iz odpadnega kruha

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V iskanju čistih in obnovljivih virov energije se je razvila druga generacija biogoriv, kot je bioetanol, ki se poskusno pridobiva iz različnih rastlinskih ostankov in lesne biomase. Bioetanol pridobivamo z razgradnjo kompleksnih ogljikovih hidratov do fermentabilnih sladkorjev in nato fermentacijo le-teh do etanola. Bogat vir ogljikovih hidratov je tudi odpadni kruh. Količina neprodanega kruha se giblje okrog 10 % in večina ga konča v bioplinarnah. Namen raziskave je bil ugotoviti, ali je škrob odpadnega kruha mogoče hidrolizirati do fermentabilnih sladkorjev z uporabo ječmenovega slada kot vira hidrolitskih encimov. V vsak vzorec, v katerem je bilo 80 g kruha in 500 ml vode, je bilo dodanega 10 g, 20 g, 30 g, 40 g in 50 g ječmenovega slada. Encimska hidroliza se je začela pri temperaturi 50 °C in končala pri temperaturi 80 °C. Dvema vzorcema so bili naknadno dodani tehnični amilolitični encimi. Alkoholna fermentacija je potekala 7 dni pri sobni temperaturi s kvasovkami Saccharomyces cerevisiae. Povprečna koncentracija alkohola kruha v suspenziji je bila 4,2 vol. % oz. 319 g alkohola/kg suhega substrata. Po količini alkohola sta izstopala vzorca z dodanimi tehničnimi encimi, v katerih je bilo izmerjenega 7,6 vol. % alkohola kruha oz. 563 g alkohola/kg suhega substrata in 6,5 vol. % alkohola kruha oz. 512 g alkohola/kg suhega substrata.

Ključne besede: bioetanol, hidroliza, ječmenov slad, odpadni kruh, škrob

Bioethanol production from bread waste

In search for pure and renewable sources of energy a second generation of biofuels has been developed; one of such biofuels is bioethanol, which is experimentally gained from different plant residues and wood biomass. Bioethanol is gained with breaking complex carbohydrates into fermentable sugars which are fermented into ethanol. Bread waste is also a rich source of carbohydrates. The amount of unsold bread is about 10 % and most

of it ends up in biogas plants. The goal of the research was to find out if the starch in bread waste can hydrolyse into fermentable sugars with the use of barley malt as the source of hydrolytic enzymes. 10 g, 20 g, 30 g, 40 g, and 50 g of barley malt were added to every sample (80 g of bread and 500 ml of water). Hydrolysis started at the temperatue of 50°C and ended at the temperature of 80 °C. Two samples also received technical amylolytic enzymes after that. Alcohol fermentation lasted for 7 days in a room temperature, with yeasts Saccharomyces cerevisia. The average alcohol concentration of bread in the suspension was 4.2 vol % or 319 g of alcohol / kg of dry substrate. The samples which received technical enzymes stood out – they had 7.6 vol % of alcohol in bread or 563 g of alcohol / kg of dry substrate and 6.5 vol. % of alcohol in bread or 512 g alcohol / kg of dry substrate.

Key words: barley malt, bioethanol, bread waste, enzyme hydrolysis, starch

Voda – vir življenja in vzrok smrti

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Voda je najpogostejša tekočina na Zemlji s tipičnimi fizikalnimi in kemijskimi lastnostmi, ki ji določajo biološke značilnosti. Zaradi dipolne narave molekule je učinkovito topilo za različne snovi in tako omogoča življenje in obenem predstavlja nevarnost zanj, če se raztapljajo strupene snovi. Voda oblikuje vodne ekosisteme, tekoče ali stoječe, ki imajo značilno strukturo in posledično funkcijo. Na celinah je celinska voda, površinska in podtalna, ki se od morske razlikuje po vsebnosti in vrsti soli. Vsa vodna okolja so torej slana, na celinah so predvsem karbonatni in silikatni ioni, v morjih pa kloridni in natrijevi ioni. Zaradi različne ionske sestave življenjskega okolja so različni tudi organizmi. Najbolj slana okolja niso morja, ampak slana jezera na celinah. Vodni ekosistemi so življenjski prostor, glavni dejavnik razlik pa je gibanje vode. V jezerih in drugih stoječih vodah je gibanje skoraj neopazno, v rečnih sistemih pa glavni fizikalni dejavnik za življenjske združbe. Vodno okolje ni le voda, pomembne so tudi usedline, v katerih je koncentracija snovi vedno večja in posledično skrita nevarnost strupenosti. Vodni ekosistemi so povezani s kopnimi, s katerih prihaja zaradi spiranja in erozije največ ionov, zato je pomembno mejno območje med kopnim in vodo, ki deluje kot biološki filter. Voda pa je tudi dobrina in strateška surovina, imenovana modro zlato. Je dobrina za človeštvo in povod za številne meddržavne konflikte, zato je pravilno razumevanje vode kot medija in vodnih ekosistemov kot življenjskih prostorov osnova za trajnostno gospodarjenje z vodnimi viri.

Ključne besede: voda, celinske vode, mokrišče, organizmi, cianobakterije, onesnaževanje, toksini

Water – the source of life and cause of death

Water is the most common liquid on our planet with specific physical and chemical properties which directly influence its biological characteristics. Due to its dipolar molecular structure water is the effective solvent for various compounds. Water enables life but also represents hazards and dangers if it dissolves toxins. Water forms running or still aquatic ecosystems with specific structures and functions. On the continents, two forms of water systems can be distinguished, surface water and ground water, which can be differentiated from sea water by the

content and type of salts. All water ecosystems are thus salty, continental water mainly contains carbonate and silicate ions, and sea water chloride and sodium ions. Due to different ionic composition of the living habitats, specific organism can be found in water ecosystems. The most salty environments can be found on continents (salt lakes) and not in the sea. Water ecosystems are natural habitats which can be differentiated by the movement of water. In lakes and other forms of still water the movements are almost imperceptible, in river ecosystems they represent the main physical factor for communities. Water habitat is not just water but also sediments, where the concentration of toxins can be extreme and characterize hidden dangers. Water ecosystems are intricately connected to the mainland. From the surface and soil the majority of ions are transported to the water systems due to leaching and erosion. Therefore the boundary zone is especially important as it acts as a biological filter. Water is also a strategic good for mankind and therefore often called blue gold. It causes many inter-states conflicts. Understanding water as a medium and water environment as a living space is crucial for sustainable management with water resources.

Key words: water, fresh waters, wetland, organisms, cyanobacteria, pollution, toxins

Kako pomembna so stališča dijakov do biologije?

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Biologija je eno od naravoslovnih področij, ki je v zadnjih desetletjih doživelo največji razcvet. Sočasno z njenim skokovitim razvojem pa se soočamo z upadanjem zanimanja dijakov za ta predmet. V prispevku predstavljamo stališča dijakov Gimnazije in veterinarske šole Ljubljana do poučevanja biologije, biologije kot šolskega predmeta ter biologije kot vede. V ta namen smo uporabili vprašalnik, ki je temeljil na 5-stopenjski Likertovi lestvici. Primerjali smo stališča dijakov gimnazijskega programa s stališči veterinarskih tehnikov glede na spol in leto šolanja. Rezultati so pokazali, da imajo dijaki na začetku izobraževanja enaka stališča ne glede na smer šolanja, saj so se v vseh treh kategorijah stališč opredeljevali enako. Razlike med njimi so se pojavile v drugem letniku, in sicer pri dveh kategorijah stališč. V tretjem letniku pa so bile razlike statistično pomembne pri vseh treh kategorijah stališč. Dijaki gimnazijskega programa so se namreč do biologije opredeljevali bolj pozitivno kot veterinarski tehniki. Pri dijakih gimnazijskega programa so se ocene stališč od prvega do tretjega letnika znižale le pri komponenti poučevanja biologije, pri dijakih veterinarske smeri pa pri vseh treh komponentah. Znotraj posameznih smeri šolanja razlik med ocenami fantov in deklet skoraj nismo zaznali. Pomen rezultatov študije je v diskusiji.

Ključne besede: biologija, poučevanje, stališča

How important are students' attitudes toward biology?

Biology is one of the disciplines of science that has flourished in the past decades. At the same time, however, there has been a shortfall of interest among prospective students to study biology. This paper presents the attitudes of secondary school students of two programmes (baccalaureate v. veterinary sciences) toward 1) biology as a school subject, 2) biology as a science discipline, and 3) biology instruction. The questionnaire used was based on a 5-point Likert Scale. The data was contrasted according to the education programmes, students' gender, and the year of study. Results show that as they begin their studies, students of both programmes have similar attitudes toward biology, as their answers in all three of the above-mentioned categories were similar. The differences between the two education programmes appeared among second year students and in two of the three categories, but they only became statistically significant among third year students. Third year students of the baccalaureate programme displayed more positive attitudes in all three categories than their veterinary counterparts. As they progressed from the first to the third year their attitudes showed lower values in the third category, i.e. biology instruction, while the veterinary students' attitudes deteriorated on all three attitudinal dimensions. There were almost no differences in attitudes between genders. The implications of the study are discussed.

Key words: biology, teaching, attitudes

Kaj osnovnošolci vedo o nevarnosti odpadkov?

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Informacij o tem, kaj osnovnošolci (od 6 do 15 let) vedo o nevarnosti odpadkov, ni dosti. V ta namen smo pripravili vprašalnik. Učenci so najprej s pomočjo 5-stopenjske Likertove lestvice odpadke ocenili kot (ne)nevarne, nato pa so zapisali, kako z odpadki ravnajo doma in kaj naredijo, če odpadek vidijo v naravi. Rezultati raziskave so pokazali, da kljub temu da učenci vedo, kateri odpadki so nevarni, z njimi redko ravnajo tako, kot narekujejo priporočila o ravnanju z odpadki. Ugotovili smo še, da le redki učenci odstranijo odpadek, ki ga opazijo ležati v naravi. Glede na rezultate raziskave menimo, da bi morali biti učenci vključeni v različne dejavnosti, v sklopu katerih bi nadgradili znanje glede odpadkov in sočasno razvijali pozitiven odnos do okolja.

Ključne besede: prookoljsko delovanje, ravnanje z odpadki, odpadki, osnovna šola

How primary school pupils perceive waste hazardousness?

There exists little information about how primary school pupils (aged 6–15) perceive waste hazardousness. We therefore designed the questionnaire. First, the pupils were required to rate waste as predominantly hazardous or non-hazardous on a 5-point Likert scale. Then they were instructed to indicate how they usually dispose of waste at home, and they wrote what they did if they saw discarded waste outdoors. Results of the study show that although pupils know which waste is hazardous they seldom act in accordance with the recommendations for waste treatment and disposal. We also found that when pupils come across litter in the nature only some of them adopt a proactive approach to environmental protection. According to the results we believe that pupils need to be engaged in activities that would help them to improve their knowledge on the matter and at the same time develop positive attitudes toward the environment.

Key words: pro-environmental action, waste management, waste, compulsory education

Velikost genoma je povezana z uspešnostjo preživetja rastlinskih vrst v ekstremnih okoljih

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Velikost jedrnega genoma se med evkarionti razlikuje za več kot pet velikostnih razredov. Spremenljivost velikosti genoma ni povezana s kompleksnostjo organizma. Izvor in biološki pomen spremenljivosti še vedno porajata številna vprašanja. Eno od vprašanj je povezano tudi s tem, ali velikost genoma vpliva na preživetje organizma. Geografska porazdelitev rastlin z znanimi velikostmi genoma nakazuje, da so na ekstremne razmere v okolju bolj občutljive vrste z velikim genomom kot tiste z majhnim. V raziskavi smo preverili hipotezo, ali je velikost genoma rastlin povezana z uspešnostjo preživetja na mestih z močnim gradientom ekoloških dejavnikov, ki so nastali zaradi emisij plinov topilnice. Velikost genoma smo izmerili s slikovno denzitometrijo po barvanju s Feulgenovo reakcijo. Opazili smo statistično značilno negativno povezavo med koncentracijo kovin v tleh in deležem vrst z velikimi genomom. Z raziskavo dokazujemo, da so rastlinske vrste z velikimi genomi neuspešne v ekstremnih ekoloških razmerah.

Ključne besede: velikost genoma, evkarionti, onesnaženje s kovinami

Genome size is associated with differential survival of plant species in extreme environmental conditions

In eukaryotes, nuclear genome sizes vary by more than five orders of magnitude. This variation is not related to organismal complexity, and its origin and biological significance are still disputed. One of the open questions is whether genome size has an adaptive role. Geographical distribution of plants with known genome sizes suggests that species with large genomes are more sensitive to extreme environmental conditions than those with small genomes. Here we assess the adaptive value of genome size with a comparative study of grassland communities occurring on a gradient of environmental conditions caused by pollution from a smelter. We measured genome size with image densitometry after staining with the Feulgen reaction. We demonstrate a negative correlation between metal pollution and the proportion of species with large genomes in plant communities. We thus provide direct evidence that genome size is associated with differential survival of plant species in extreme environmental conditions.

Key words: genome size, eukaryotes; metal pollution

Imamo le eno Zemljo – okoljski in vodni odtis ter učinkovita raba virov skozi naravoslovno perspektivo

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Prispevek predstavi eno od osrednjih usmeritev pri spremljanju okoljske komponente razvoja – porabo razpoložljivih virov in nastajajočih odpadkov. V zadnjem času stanje trajnostnega razvoja spremljamo z novimi kazalci. Eden od teh je okoljski odtis, ki primerja potrebe človeštva z ekološko obnovitveno sposobnostjo Zemlje in predstavlja površino zemljišča, ki ga prebivalstvo potrebuje za ohranjanje svojega načina življenja. Trenutno stanje kaže, da bi za sedanji način potrošnje svetovnih surovin potrebovali več kot tri Zemlje, vendar se to močno razlikuje po posameznih predelih. Pomembni novi kazalci snovne izrabe so še vodni odtis in domača poraba snovi (DPS). Naravoslovne vede ponujajo zelo kompleksno znanje o kroženju snovi in energije v naravi, kar omogoča globalno oceno snovnih tokov in oceno naravnega recikliranja oz. biološke zmogljivosti za samoobnovitev. Učinkovita raba virov je postala vodilna politična strategija EU za nadaljnji gospodarski in družbeni razvoj. Prekinila naj bi neposredno povezanost med rabo virov in gospodarsko rastjo, obdržala okoljske vplive v naravnih mejah našega planeta in omejila tveganje za pomanjkanje virov.

Ključne besede: kazalec trajnostnega razvoja, razpoložljivi viri, okoljski odtis, vodni odtis, kazalec domače porabe snovi, biološka zmogljivost Zemlje, krožni tok snovi, meje planeta, učinkovita raba virov

We only have one Earth - Ecological and Water Footprint and efficient use of resources viewed from the natural-sciences perspective

The article addresses one of the key trends in monitoring the environmental component of development – the use of available resources and emerging waste. Recently, the status of sustainable development is being monitored by new indicators. One of them is the Ecological Footprint, which compares the needs of mankind to the ecological recovery capability of the Earth and presents the surface area needed for the population to preserve its modus vivendi. The existing situation indicates that the current mode of the world raw material consumption requires more than three Earths, however, this in practice differs greatly according to individual Earth regions. Important new indicators of the material's use are also the Water Footprint and Domestic material consumption (DMC). Natural sciences provide complex knowledge of matter and energy cycles, which enables global assessment of material flows and the assessment of natural recycling and/or biological capability of re-supply. The efficient use of resources has become the EU leading political strategy for future economic and social development. It should discontinue a direct link between the use of resources and economic growth, maintain environmental influence within the natural limits of our planet, and reduce the risk of resources shortage

Key words: sustainable development indicator, available resources, Ecological Footprint, Water Footprint, indicator of domestic materials consumption, biological capability of the Earth, matter and energy cycle, planetary boundaries, efficient use of resources

Razvojni potenciali izbranih zavarovanih območij

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S pregledom podatkov o razvojnih potencialih preučevanih zavarovanih območij (Triglavski narodni park in Kozjanski park), to je o okoljskem, kulturnem, socialnem in človeškem potencialu, smo želeli odgovoriti na vprašanje, ali preučevani zavarovani območji omogočata razvoj. Rezultati kažejo, da je med razvojnimi potenciali preučevanih zavarovanih območjih človeški potencial pomanjkljiv, kar se kaže predvsem v primeru Kozjanskega parka. Kozjanski park namreč izstopa po nizki izobrazbeni strukturi prebivalstva, kar vsekakor ni pozitiven razvojni dejavnik. Zanj tudi v večji meri velja, da se število prebivalcev zaradi pomanjkanja delovnih mest na tem območju zmanjšuje. V Triglavskem narodnem parku pa zelo veliko delovno aktivnega prebivalstva dnevno emigrira na delo v druge občine ali celo regije. Glede Triglavskega narodnega parka velja poudariti, da ima turizem zanj že sedaj velik pomen.

Ključne besede: zavarovana območja, narodni park, regionalni park, razvoj, razvojni potenciali, podeželje, Slovenija

Development potentials of chosen protected areas

By checking the data on development potentials within treated protected areas (the Triglav National Park and the Kozjanski Park), namely environmental, cultural, social and human potential, we sought to answer the following question: Do treated, protected areas enable the development? The results show that among the development potentials within treated protected areas, human potential is insufficient. This is especially noticeable, or denoted, in the case of the Kozjanski Park. Namely, the Kozjanski Park has low educational structure of the inhabitants, which is certainly not a positive developmental factor. For the Kozjanski Park it also true that the population is decreasing due to the lack of work places in the area. On the other hand, within the Triglav National Park the number of active working inhabitants, who daily migrate to work in other municipalities or even regions, is quite high. n. However, tourism in the Triglav National Park already has an important role.

Key words: protected areas, national park, regional park, development, development potentials, rural areas, Slovenia

Gospodarske dejavnosti v zavarovanih območjih

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Na primerih Triglavskega narodnega parka in Kozjanskega parka smo preučevali povezave med zavarovanimi območji, gospodarskimi dejavnostmi in razvojem podeželja. Na vsakem območju je bilo anketiranih 200 lokalnih prebivalcev. Izkazalo se je, da anketirani prebivalci Triglavskega narodnega parka v velikem deležu podpirajo razvoj turizma na tem območju (86,5 %), poleg tega pa ga postavljajo na prvo mesto po pomembnosti razvoja, torej pred vse ostale gospodarske panoge. V primeru Kozjanskega parka pa je moč opaziti, da se anketirani prebivalci najbolj strinjajo z usmeritvijo območja v kmetijstvo ter razvoj malega podjetništva in obrti. Vseeno ni zanemarljivo dejstvo, da se kljub temu visok delež anketiranih prebivalcev strinja, da bi se območje usmerilo v razvoj turizma (74,5 %).

Ključne besede: zavarovana območja, narodni park, regionalni park, razvoj, gospodarske dejavnosti, podeželje, Slovenija

Economic activities in protected areas

Connections between protected areas, economic activities and development of the countryside were studied in the examples from the Triglav National Park and the Kozjanski Park. 200 local inhabitants were interviewed in each area. Most of the interviewed inhabitants of the Triglav National Park support the development of tourism in the area (86.5 %) versus all other industries, whereas this is not true for the interviewed inhabitants of the Kozjanski Park. The latter agree the area should be oriented in agriculture and the development of small business and craft.

Nevertheless it is not insignificant that a large part of the interviewed inhabitants from the Kozjanski Park agree upon focusing upon the development of tourism (74.5 %).

Key words: protected areas, national park, regional park, development, economic activities, rural areas, Slovenia

3. SEKCIJA

Alternativno kmetijstvo

Pridelava mlečnih izdelkov na kmetiji – primer dobre prakse

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V prispevku opisujemo kmetijo Cotelj, kjer so se v želji po dodatnem zaslužku odločili za dopolnilno dejavnost proizvodnje mlečnih izdelkov. Članek je nastal na podlagi intervjuja z gospodarjem in primerjave z ustreznimi podatki, dobljenimi v literaturi. Na kmetiji, ki je usmerjena v intenzivno mlečno proizvodnjo, je razmeroma malo proizvodnih, reprodukcijskih in zdravstvenih problemov. Občasno se v mleku pojavlja povečano število somatskih celic, kar pa ne vpliva na proizvodnjo sira, ker takega mleka ne uporabijo za izdelavo mlečnih izdelkov. Opravljene analize kažejo, da so vsi izdelki zdravstveno ustrezni. Mlečnost črede je solidna, ni pa še optimalna. Omejeni so z mlečno kvoto 110.000 litrov na leto. V zadnjih petih letih se je proizvodnja sira v gibala med 8.000 in 9.000 kg. Izdelujejo poltrde sire z dodatki in brez njih ter mehke sire tipa feta, sir Cotko pa je njihov značilen proizvod. Večino sira (kar 80 %) prodajo na domu, svojih izdelkov posebej ne oglašujejo, pač pa sta vsa prodaja in promocija posledici zadovoljnih kupcev. Opisan primer kaže, da je z dobro poslovno idejo, znanjem, voljo in vztrajnostjo mogoče uspešno kmetovati tudi v času krize.

Ključne besede: pridelava mlečnih izdelkov, trženje, dobra praksa

Production of dairy products on the farm – an example of good practice

In this article Cotelj farm is described, owners of which decided to start supplementary production of dairy products with an aim to increase their earnings. This article is based on an interview with the master of the farm and on the comparison that was carried out using the data in the corresponding literature. Dairy production on the farm is rather intensive, but relatively few production, reproductive and health problems were detected. Occasionally it occurs, that somatic cell count in milk is increased, however it does not affect the production of cheese, as such milk is not used to manufacture dairy products. The conducted analyses have shown that all the products are wholesome. Herd milk yield is suitable, but not yet optimal. The farm is limited with the milk quota of 110.000 liters per year. In the last five years, the production of cheese ranged between 8.000 and 9.000 kg. They are specialized in production of semi-hard cheeses with and without supplements, as well soft feta-type cheese, while Cotko cheese is their typical product. Most of the cheese (80%) is sold on the farm, their products are not specifically advertised, but all sales and also advertising are generated by their satisfied customers. The described example shows that with a good business idea, knowledge, determination and endurance, farming can be successfully also in the period of crisis.

Key words: production of dairy products, marketing, good practice

Karakteristike bosiljka *Ocimum basilicum* L. sa područja Oprtlja u Istri

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Bosiljak *Ocimum basilicum* L. je od davnina poznata začinska i aromatična biljka koja svojom mirisom i aromom, začinskom vrijednošću, atraktivnim habitusom, ljekovitošću i atraktivnim bojama izaziva interes i zauzima posebno mjesto u kulinarstvu a istovremeno posjeduje značajnu ekološku funkciju jer privlači kukce oprašivače kojima služi za ispašu. U ovome istraživanju su ispitivane mogućnosti uzgoja različitih sorata bosiljka u okolici Oprtlja/ Istra na 378 m nadmorske visine. Ispitivane su sorte koje se razlikuju po boji, veličini lista, sadržaju eteričnih ulja i namjeni: 'Krupnolisni', 'Sitnolisni', 'Dark opal' i 'Rubin'. Najbolja sorta iz ovog ispitivanja je 'Krupnolisni' sa signifikantno višim prinosima svježe i suhe herbe kao i čistog suhog lista u odnosu na ljubičaste sorte 'Dark opal' i 'Rubin'. 'Rubin' i 'Dark opal' su sorte koje se koriste u uređenju vrtova ali po sadržaju eteričnog ulja se signifikantno ne razlikuju od zelenih začinskih sorata bosiljka 'Krupnolisni' i Sitnolisni'.

Ključne riječi: bosiljak, *Ocimum basilicum* L., sorte, prinos, eterično ulje

Basil (*Ocimum basilicum* L.) Characteristics in the Area of Oprtalj in Istria

Ocimum basilicum L. basil is a well known aromatic herb with a typical fragrance and flavour, high spice content and medicinal value, attractive appearance and colours. Basil has a special place in cooking and an additional ecological function in nature since it serves as pasture for bees and other pollinators. In this investigation we tested the possibilities of growing different varieties of basil near Oprtalj/ Istria at 378 meters above sea level. The varieties investigated were 'Krupnolisni', 'Sitnolisni', 'Dark opal' and 'Rubin'. They differ in colour, leaf size, ethereal oil content and their purpose. The best variety in this investigation was 'Krupnolisni' with statistically significant higher yield of fresh and dried matter as well as dried leaf compared to the violet varieties 'Dark opal' and 'Rubin'. 'Dark opal' and 'Rubin' are often used in parks and gardens but as for their ethereal oil content they are not inferior to 'Krupnolisni' and Sitnolisni' varieties.

Key words: basil, *Ocimum basilicum* L., varieties, yield, ethereal oil

Vpliv različnih rastišč na pridelek in kakovost nekaterih pomembnejših zdravilnih zelišč

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Pred pridelavo zelišč v praksi je treba raziskati primernost za pridelavo tržno zanimivih zelišč v različnih habitatih v naših razmerah. V raziskavo možnosti pridelave v naših razmerah smo vključili žajbelj (*Salvia officinalis* L.), vrtni timijan (*Thymus vulgaris* L.) in slezenovec (*Malva silvestris* L.), ki smo jih pridelovali v skladu z ekološkimi smernicami v letih od 2009 do 2011 na štirih različnih poskusnih lokacijah. Določili smo pridelek ter kakovost pridelka (vlaga, celotni pepel, v kislini netopen pepel, količina eteričnega olja) v skladu z evropsko farmakopejo (EUPh). Na nobeni lokaciji v nobenem letu ni bilo težav zaradi napada bolezni ali škodljivcev in tudi ne drugih problemov pri pridelavi, razen težav z ušmi v pridelavi slezenovca. Žajbelj in timijan sta na vseh lokacijah lepo uspevala, tudi na nadmorski višini 670 m, je pa imela lokacija vpliv na število žetev in pridelek (vpliv nadmorske višine in vremenskih razmer). Vsebnost eteričnega olja in pepela pri žajblju je bila odvisna od lokacije. Kakovost vrtnega timijana je na vseh lokacijah ustrezala zahtevam EUPh, vsebnost eteričnega olja se je razlikovala med lokacijami in v okviru iste lokacije tudi med leti. Zelo ekstenzivna pridelava za žajbelj in vrtni timijan s stališča pridelka ni ustrezna. Pridelava slezenovca zahteva veliko ročnega dela (pobiranje cvetov dvakrat tedensko od julija do septembra), zato večjega zanimanja za pridelavo zaenkrat ni. Rezultati pridelave na eni lokaciji pa so pokazali skladnost z zahtevami evropske farmakopeje.

Ključne besede: zdravilna zelišča, *Salvia officinalis* L., *Thymus vulgaris* L., *Malva silvestris* L., pridelek, kakovost pridelka, vpliv lokacije

The impact of habitat on the yield and quality of some important medicinal plants

Prior to the production of medicinal plants in a large scale it is needed to explore the suitability for their production in different habitats in our pedoclimatic conditions. In the research *Salvia officinalis* L., *Thymus vulgaris* L. and *Malva silvestris* L. were included. They were produced according to organic farming rules in the years 2009 to 2011 at four different locations. Yield and its quality (moisture content, total ash content, in acid insoluble ash, quantity of essential oil) were determined and compared among locations and to the European Pharmacopoeia. There were no problems due to disease or pests and no other problems in the production at any location in any year, except problems with aphids in the production of mallow. Sage and thyme thrived well at all locations, even at an altitude of 670 m, however, the location had an impact on the number of harvests and yield (effect of altitude

and weather conditions). Essential oil content and ash content at sage were dependent on the location. Quality of garden thyme at all locations met the requirements of European Pharmacopoeia, essential oil content varied among locations and within the same location among years. Very extensive cultivation of garden sage and thyme from the standpoint of yield is not appropriate. Mallow production requires a lot of manual work (collecting flowers from July to September twice weekly), therefore there is not much interest for its production. Results of production at one location, although demonstrated compliance with the requirements of European Pharmacopoeia.

Key words: medicinal plants, *Salvia officinalis* L., *Thymus vulgaris* L., *Malva silvestris* L., yield, yield quality, impact of location

Uporaba biotske raznovrstnosti rastlin ob planinski poti v zdravilne in kulinarične namene

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Predstaviti želimo biotsko raznovrstnost rastlin (predvsem zelišč) ob Gaberškovi planinski poti na Resevno z vidika zelišč, uporabnih v zdravilne in kulinarične namene. Spremljanje rasti in popis rastlin je potekalo celo koledarsko leto, bolj intenzivno pa od marca do oktobra, to je v dobi intenzivnega razvoja in rasti rastlin. Glede na število rastišč posameznih rastlin smo ugotovili, da so sama pot in rastišča zelišč ob njej zelo dobro ohranjena ter biotsko raznolika. Na več kot 230 rastiščih smo popisali 24 rastlin, ki jih lahko uporabimo v zdravilne in kulinarične namene.

Ključne besede: zelišča, biodiverziteta, planinska pot, zdravilnost, gastronomija

Use of plant biodiversity at the mountain path for healing and culinary purposes

We aim to present biodiversity of plants (mainly herbs) at Gaberškova mountain path on Resevna in terms of useful herbs for healing in culinary purposes. Monitoring of plant growth and inventory held throughout all calendar year, more intensely from March to October, this is the period of intensive development and growth of plants. We found that the path itself and number of plant habitats are very well preserved and have great biological diversity. At more than 230 habitats we recorded 24 herbs that can be use for healing and culinary purposes.

Key words: herbs, biodiversity, mountain path, healing, gastronomy

Ocena vnosa nitratov z uživanjem solate (*Lactuca sativa*) v različnem letnem času

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Intenziven način kmetovanja je prispeval k povečani akumulaciji nitratov v pridelkih. Nitratni ion ima nizko stopnjo akutne toksičnosti. Zdravstveni problem vnosa nitratov predstavlja transformacija nitrata do nitrita, ki se lahko v človeškem organizmu pretvori do nitrozirajočih agensov; ti s sekundarnimi amini tvorijo kancerogene nitrozamine. Visok vnos nitratov je povezan s tveganjem gastrointestinalnega raka. Leta 1995 določen sprejemljiv dnevni vnos nitrata je v naši prehrani pogostokrat presežen. Z zelenjavo zaužijemo od 70 do 80 % vsega nitrata. Najvišje koncentracije nitratov so bile določene v listnati zelenjavi – v solati in špinači. V raziskavi smo spremljali spreminjanje vsebnosti nitratov v zeleni solati (*Lactuca sativa*) na lokalnem tržišču v različnih letnih časih. Vsebnost nitratov smo določali z metodo segmentne analize konstantnega pretoka in z reverzno-fazno HPLC z UV detekcijo na 71 vzorcih zelene solate konvencionalne in ekološke pridelave. Ugotovljene so bile velike razlike glede vsebnosti nitratov v solati v različnih letnih časih in pri različni vrsti pridelave. Vsebnost nitratov v solati je znašala od 85 do 3.280 mg nitrata/kg. Dnevni vnos nitratov s 100 g solate lahko znaša manj kot 5 % in vse do 150 % sprejemljivega dnevnega vnosa. Nujna je večja osveščenost potrošnika o možnostih zmanjšanja vnosa nitratov v človeški organizem in upoštevanje načel dobre kmetijske prakse (GAP).

Ključne besede: nitrati, solata, *Lactuca sativa*, letni časi, vnos

Assessment of nitrate intake with lettuce consumption (*Latuca sativa*) in different seasons

Intensive agriculture has contributed to the increased accumulation of nitrates in crops. Nitrate ion has a low acute toxicity. Health problem represents the transformation of nitrate to nitrite, which can be converted to nitrosating

agents; with secondary amines these may form carcinogenic nitrosamines. A high nitrate intake is associated with risk for gastrointestinal cancer. The acceptable daily intake (ADI) for nitrate, established in 1995, is often exceeded in our diet. We may consume 70 – 80% of the nitrate intake by vegetables. The highest nitrate concentrations were determined in leafy vegetables, namely lettuce and spinach. In this study we followed changes in nitrate concentration in lettuce (*Latuca sativa*) on local market in different seasons. Nitrate levels were determined using continuous flow analysis and reverse-phase HPLC with UV detection in 76 samples of conventionally and organically cultivated lettuce. A high variation in nitrate content in lettuce has been found according to different seasons and different types of cultivation. Nitrate content in lettuce ranged from 50 to 3250 mg/kg. Consumption of 200 g of lettuce may result in daily nitrate intake, ranging from less than 5% to 290 % of ADI. Therefore increased consumers' awareness of ways for nitrate intake reduction, as well as GAP (Good Agriculture Practice), is of great importance.

Key words: Nitrate, *Lactuca sativa,* season, intake

Pridelava konoplje (*Cannabis sativa* L. *var. sativa*) za seme in pomen semena v prehrani

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Številne zdravstvene težave so vzrok, da se vse več ljudi odloča za bolj zdrav način življenja in prehranjevanja. Konoplja (*Cannabis sativa* L. *var. sativa*) je alternativna poljščina, ki lahko prispeva k dnevnim potrebam po esencialnih snoveh, ki jih potrebuje človeški organizem. Zaradi velike prehranske vrednosti semena konoplje smo leta 2006 na eksperimentalnem polju Biotehniške fakultete v Ljubljani preizkušali pet sort konoplje (beniko, bialobrzeskie, juso-11, novosadska konoplja in unico-B), pri katerih smo z odstranjevanjem rastnih vršičkov terminalnih socvetij povečali pridelek semena na rastlino in na enoto površine. Velikost osnovne parcele je bila 5 m^2. Pridelek semena pri vršičkanih rastlinah smo primerjali s pridelkom normalno rastočih rastlin. Pokazalo se je, da je bila najdonosnejša sorta novosadska konoplja, saj je imela pri preračunanem pridelku na hektar 1.007 kg semena pri vršičkanih rastlinah in 800 kg semena pri nevršičkanih. Najmanjši pridelek vršičkanih rastlin je dala sorta beniko, 415 kg semena/ha, kar pa je še vedno več kot pri normalno rastočih rastlinah s 372 kg semena/ha. Z rezultatom smo potrdili, da lahko prihodnji pridelovalci dosežejo večji pridelek semena ne le s pravilno izbiro sorte, ampak tudi s pomočjo odstranjevanja rastnega vršička terminalnega socvetja.

Ključne besede: konoplja *Cannabis sativa*, sorte, pridelek, seme, prehrana

Hemp Growth and the Significance of Seeds in our Nutrition

Numerous health problems are the reason that more and more people decide for healthier lifestyle and eating habits. Hemp (*Cannabis sativa* L. *var. sativa*) is alternative field crop that can contribute to daily human needs for essential substances that are needed for normal functioning of the human organism. Because of enormous nutritional value of hemp seeds we tested five cultivars of hemp ('Beniko', 'Bialobrzeskie', 'Juso-11', 'Novosadska konoplja' and 'Unico-B') an experimental field of Biotechnical faculty in Ljubljana in year 2006. We increased yield of the hemp seed per plant and per unit by removing growing tips of terminal inflorescences. The size of basic parcel was 5 m^2. We compared yield of plants with removed terminal growing tips with yield of normal growing plants. Comparison showed that 'Novosadska konoplja' is the most productive cultivar, because it had in calculated yield 1007 kg seeds per hectare from tipped plants and 800 kg seeds from plants that were not tipped. The smallest yield of tipped plants gave the cultivar 'Beniko' (416 kg seeds per hectare), which is still more then the normal growing plants with 317 kg seeds per hectare. The results show that future producers can have bigger yield of seeds not just with the right selection of sort but also with the help of removing the growing tip of terminal inflorescence.

Key words: hemp, Cannabis sativa, cultivars, yield, seed, nutrition

Pomen prosa (*Panicum miliaceum* L.) v pridelavi in uporabi

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Članek obravnava razloge za ponovno umestitev navadnega prosa (*Panicum miliaceum* L.) v pridelavo in uporabo pri prehrani ljudi in domačih živali ter daje napotke za to. Podobno kot drugje v Evropi je tudi v Sloveniji prosena kaša (oluščeno proseno zrnje) kljub ugodni biokemični sestavi marginalno živilo v današnji prehrani ljudi. Proseno zrnje, zelinje in slama so izginili tudi iz prehrane domačih živali, z izjemo ptic, zlasti papagajev in kanarčkov, ki jih krmimo s plevnatim zrnjem čistega prosa ali z mešanicami različnih semen, večinoma uvoženih. S ciljnim ozaveščanjem pridelovalcev in porabnikov prek predavanj, delavnic, anket in pokušin številnih okusnih slovenskih etničnih jedi iz prosa bi lahko v sodobno kulinariko vključili nekoč pomembno žito, ki ima zaradi kratke rastne dobe in odpornosti na sušo agrotehnični pomen tudi v pridelavi. Za potencialne pridelovalce so sestavljeni predlogi kolobarjev, v katerih je proso glavni ali strniščni posevek, predstavljeni pa so tudi rezultati poljskih poskusov s prosom domače avtohtone sorte sonček na eksperimentalnem polju Biotehniške fakultete v obdobju 2009–2011. S pomočjo rezultatov o pridelavi prosa sorte sonček v preučevanem obdobju smo ugotovili, da so bili pridelki največji pri gostoti 500 kalivih semen/m^2, za primeren čas setve pa se je pokazal junij in prva dekada julija. Iz anket je razvidno, da je možnost povečanja pridelave prosa, ki v Sloveniji poteka na okoli 200 ha njiv, prvenstveno odvisna od povpraševanja po jedeh iz prosa in po lokalno pridelani hrani.

Ključne besede: navadno proso, *Panicum miliaceum*, pridelava in uporaba, ankete, poljski poskusi, domača avtohtona sorta sonček

Importance of proso millet (*Panicum miliaceum* L.) in crop production and consumption

In this article we discuss the reasons why and present the guidelines for the reintroduction of proso millet (*Panicum miliaceum* L.) into the production in order to increase the consumption of millet in human diet and as animal feed. Like in other European countries the millet groats (hulled millet grains) despite its favourable biochemical composition is still only a marginal food in Slovene diet. Millet grains, green matter and straw have also disappeared from animal feed with the exception of bird feed, mostly used for parrots and canaries that are being fed by pure chaffed millet grains or with mostly imported mixtures of different grains. Our goal is to raise the awareness of producers and consumers through lectures, workshops, questionnaires and tastings of numerous delicious ethnic millet dishes that they could rediscover this sometimes very important grain. Due to short growing period and its resistance to drought proso millet also has a great agro-technical importance for the agricultural production. For potential producers we have prepared proposals of different field crop rotations where millet can be grown as a main or as a stubble crop; in addition we have presented the results of the field trials that have been conducted at the experimental field of the Biotechnical faculty of Ljubljana with the autochtonious domestic millet cultivar 'Sonček' in the period 2009-2011. For the research period the results of the field trials on cultivation of millet cultivar 'Sonček' showed that the highest grain yields were produced at the highest sowing density of 500 germinative seeds/m^2; June and the first decade of July was determined as the best sowing time. The survey questionnaires revealed that the possibilities to increase the production of millet in Slovenia, presently cultivated on about 200 hectares of fields, primarily depend on the demand for millet dishes and locally produced food.

Key words: proso (common) millet, *Panicum miliaceum*, production and use, questionnaires, field trials, domestic autochtonious cultivar 'Sonček'

Stanje na področju biološko dinamičnega načina kmetovanja v Sloveniji

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Biološko dinamični način kmetovanja je način dela z naravo, ki temelji na doslednem upoštevanju načel ekološkega ravnovesja. Zagovornik in utemeljitelj takšnega načina kmetovanja je bil Rudolf Steiner. Inovativnost metode je v

uporabi biološko dinamičnih preparatov. Za preučitev biološko dinamičnega kmetovanja v Sloveniji smo sestavili anketo, s pomočjo katere smo opazovali velikostno strukturo kmetij, proizvodno usmeritev, izdelavo in uporabo preparatov, organiziranost in povezanost med biodinamiki, mnenja anketirancev o ceni biološko dinamičnih izdelkov in o prednostih biološko dinamičnega kmetovanja v primerjavi z ekološkim kmetovanjem in ekološkimi izdelki ter prihodnje načrte biodinamičnih pridelovalcev. Anketni vprašalnik smo poslali na 18 naslovov imetnikov certifikatov Demeter. Podatke smo obdelali z metodo opisne statistike. Temeljno prednost biološko dinamičnega kmetovanja v primerjavi z ekološkim vidijo anketiranci pri preparatih, ki so popolnoma naravni, z njimi pa skrbimo za čistost okolja, zdravje živali in ljudi ter ne onesnažujejo podtalnice. Menijo, da so biodinamični pridelki visoko kakovostni in so nadgradnja pridelkov ekološkega kmetijstva. Vsi anketiranci bodo še naprej kmetovali po smernicah Demeter, ker si želijo pridelovati zdrave in kakovostne pridelke in rediti zdrave živali.

Ključne besede: biološko dinamični način kmetovanja, Rudolf Steiner, preparati, Demeter

Status of Biodynamic Agriculture in Slovenia

The biodynamic method of agriculture has been understood as working with nature in accordance with strict respect of the principles of ecological balance. The founder of this complex approach to agriculture was Rudolf Steiner. The basic innovation, characterising his method is the usage of biodynamic preparations. In order to identify the status of bio-dynamic farming in Slovenia, a survey had been carried out giving useful findings about the size structure of farms, production orientation, manufacture and use of preparations. Our additional aim has been to find out the type of organization and the relationship between biodynamic people, opinions about the price and bio-dynamic products and the benefits of bio-dynamic farming compared with organic farming and organic products. We were also interested in future plans of biodynamic farmers. The survey was sent to 18 holders of the Demeter certificate in Slovenia. The farmers feel that the most important advantage of bio-dynamic farming compared to organic farmers are the preparations which are completely natural. These preparations preserve the environment, animal and human health and they do not pollute the groundwater. They also comfirmed the fact that biodynamic products are high-quality and that they are an upgrade to organic farming. The majority of them are going to continue with farming according to Demeter guidelines in order to ensure quality products and breed healthy animals.

Key words: biodynamic agriculture, Rudolf Steiner, preparations, Demeter

The optimization of the medical herb growing

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New knowledges about Si, plant physiology and non-traditional methodologies give opportunity for huge progress in resolving of the aging problem. Today many government and private organization investigate the possibility to increase the time-period for active human life. It was found many natural and artificial substances, which can help

for resolving of this problem. One of the most important problem is increasing the efficiency the intensive growing medical herb. The preliminary studies has showed the possibility to increase the content of active substances in medical plants via reinforcement the biochemical processes. Several medical plants were using in the experiment: bamboo, green tea, Astralagus and Fallopia. The special treatment was used and the content of active substances (resveratrol, epigallocatechin gallate, polysaccharides and monosilicic acids) were tested in dynamic. The obtained data has demonstrated that the application of the activated Si and special substances for activation of the biochemical processes has double positive effect. First the biomass of the tested plant was increased on 10-35% during 3-6 months of the experiment compare with controls. Secondary the content of active substances in the simplast of the cultivated plants also was increased on 20-50%.

Key words: (aging, bamboo, green tea, astralagus, fallopia)

Teoretični model izdelave in delovanja biodinamskih homeopatskih energetskih preparatov in njihova uporaba v kmetijstvu

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Prispevek povzema prikaz hipoteze obstoja bioenergetskega polja, ki prežema vesolje in s tem tudi vso živo in neživo naravo. V prispevku je predstavljenih več modelov, kako se s pomočjo bioenergetskega polja izdelujejo energetsko aktivni preparati. Tako je predstavljen model prenosa energetskih informacij z energetskega preparata na vodo kot škropivo za širitev energetskih informacij v poljedelstvu.

Ključne besede: energetsko polje, življenjska energija, biodinamika, homeopatij, energetske informacije

Theoretical model for function and production, of biodynamic homeopathic energy preparations and their aplication in agriculture

The article describes hypothesis of the existence of bio-energy field that permeates the universe and thus all living and inanimate nature. This paper describes several models that show how to produce energy-active preparations by means of bio-energy fields. Paper describes the model of energy information transfer from energy-active preparation on energy carrier such as water which has the function for energy distribution. This mode of action can be used in spraying media, for distribution of energy information in the agriculture.

Key words: Energy field, life force, life energy, biodynamic, homeopathy, energy information

Kratka predstavitev homeopatskih, biodinamskih in energetskih pripravkov ter njihova uporaba v kmetijstvu

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Prispevek kratko predstavlja homeopatske pripravke, biodinamske pripravke in energetsko katalitske proizvode firme Plocher. Z nekaj primeri iz prakse prikazuje in potrjuje njihovo učinkovitost v poljedelstvu. Ti pripravki ne povečujejo samo »notranje energetske kvalitete« hrane, ampak omogočajo tudi večji donos. Pridelki se lahko povečajo tudi do 30 %.

Ključne besede: energetsko polje, življenjska energija, biodinamika, homeopatij, energetske informacije, Plocher

Brief presentation of homeopathic, biodynamic and energy preparations and there use in agriculture

This article shows a short presentation of homeopathic, biodynamic preparations and catalytic energy products company Plocher. With several case studies which shows and confirms their effectiveness in agriculture. These products not only increase the ''internal energy quality'' of food, but also allow a higher return. Yields may be increased up to 30%.

Key words: Energy field, life force, life energy, biodynamic, homeopathy, energy information, Plocher

Antimicrobial and determination of DPPH free radical scavenging activity of *Satureja hotensis* L

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This study was aimed at evaluating the antioxidant activity and efficacy of the ethanolic extract of the plant species in *Satureja hotensis* L inhibiting the development of selected fungi and bacteria. The highest susceptibility to the ethanolic extract of O. aucherianum among the bacteria was exhibited by B. subtilis and S. aureus (MIC = 15.62 µg/ml). Among the fungi, A. niger (MIC = 15.62 µg/ml) showed the highest susceptibility. Total phenolic and flavonoid contents were 106.46±1.68 mg GA/g, 25.91±0.88 mg RU/g, respectively. The results showed that the ethanolic extract of Satureja hotensis IC50 values were determined for each measurement: 21.45±1.55 µg/ml for DPPH free radical scavenging.

Key words: antimicrobial activity, antioxidant activity, *Satureja hotensis* L

Antimicrobial activty of ethanol lettuce exctracts as a potential natural conservancy

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Antimicrobial activity was tested using broth dilution procedure for determination of minimum inhibitory concentration (MIC). MICs were determined for 8 selected indicator strains. This study has been to research antimicrobial activity of lettuce *Lactuca sativa* L, variety Neva extracts, provided from two types of green houses: glass and plastic house in controlled conditions. Extracts from lettuce leaves have been prepared by cold maceration 50 % ethanol. Antimicrobial activity of leaf extract, has been tested with microorganisms from clean cultures *Staphilococcus aureus* ATCC 25923, *Klebsiella pneumoniae* ATCC13883, *Escherichia coli* ATCC 25922, *Proteus vulgaris* ATCC13315, *Proteus mirabilis* ATCC14153, *Bacillus suptilis* ATCC6633, *Candida albicans* ATCC10231, *Aspergillus niger* ATCC16404. Antimicrobial activity has been determined by microdilution. Antimicrobial reaction of extracts with referral antibiotics: nystatin for fungi and amracin for bacteria, have been compared in order to research possibility of applying it in food industry. Researched lettuce extracts have significant antimicrobial power.

Key words: lettuce, extracts, antimicrobial activity

Permakulturna načela na slovenskih ekoloških kmetijah, njihov pomen in uporaba

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Permakultura kot način dela in razmišljanja v trajnostnem kmetovanju je na slovenskih ekoloških kmetijah premalo uporabljena možnost, ki lahko prispeva k čim bolj samozadostnemu kmetovanju ter k ponudbi kakovostnih pridelkov in izdelkov za domače potrošnike. S pomočjo njenih dvanajstih načel bi lahko pomembno zmanjšali zapleveljenost in škodo zaradi škodljivcev in povzročiteljev bolezni na posevkih, zmanjšali energijske izgube kmetije ter povečali tržnost rastlinske pridelave in reje domačih živali. Ugotovili smo, da ekološki kmetje uporabljajo preozek kolobar in da se le redki odločajo za združene posevke. Z uporabo nekaterih alternativnih poljščin, kot so zrnate stročnice (soja, bob, fižol, grah), lan, konoplja, dišavnice in zelišča, bi lahko pomembno popestrili in podaljšali kolobar. Na ta način bi sočasno poskrbeli za zdravje posevkov, večjo samooskrbo in za lokalno ponudbo kmetijskih proizvodov rastlinskega pa tudi živalskega izvora. Rezultati ankete kažejo, da bo treba ekološke kmete spodbuditi k pridobivanju generacijsko odmaknjenega znanja prednikov o kolobarju in združenih setvah ter jim predstaviti nova znanja o izkoriščanju zelene energije na kmetiji. Velik pomen v permakulturi ima tudi usmeritev v medsebojno povezovanje, ki je temelj skupnega nastopa na zahtevnem trgu ekoloških živil in neprehranskih ekoloških proizvodov.

Ključne besede: permakultura, trajnostno kmetijstvo, anketirani ekološki kmetje, alternativne poljščine, kolobar, združene setve, izobraževanje, Slovenija

Permaculture principles on the Slovenian organic farms, the meaning and the use

Permaculture as the way of working and thinking in sustainable agriculture is rarely used option on Slovenian organic farms. Its use may contribute to a more self-sufficient farming and supply quality crops and products to domestic consumers. Through its twelve principles they could significantly reduce weeds and damage on crops caused by pests and pathogens, reduce energy losses and increase the marketability of plant produce and animal husbrandy. We found that organic farmers use too narrow crop rotation and very few of them decide for intercropping. Using some alternative crops such as grain legumes (soybean, broad bean, bean, pea), flax, hemp, spices and herbs, could significantly enrich and extend crop rotation. This would simultaneously provide for healthy crops, for higher self-sufficient and for local supply of agricultural products of plant and animal origin as well. Survey results indicate that we should encourage organic farmers to obtain distant knowledge of ancestors

about crop rotation and intercroping, and present them the new knowledge of using green energy on their farm. Great importance in permaculture has focus on the interconnection, which is the basis for colective participation in difficult market of organic food and non-food organic products.

Key words: permaculture, sustainable agriculture, surveyed organic farmers, alternative crops, crop rotation, intercroppings, education, Slovenia

Biofumigacija kot alternativen ukrep zatiranja talnih škodljivih organizmov

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Talni škodljivi organizmi spadajo med najpomembnejše omejujoče dejavnike rastlinske proizvodnje, saj intenzivna pridelava v poljedelstvu in vrtnarstvu povzroča naraščanje njihovega infekcijskega potenciala in prerazmnožitve. Kot odgovor na prepovedi večine kemičnih fumigantov in potreb pridelovalcev je v zadnjem obdobju v svetu prišlo do razvoja alternativnih tehnologij, med katerimi se zaradi učinkovitosti in odsotnosti nezaželenih stranskih učinkov najbolj uveljavlja biofumigacija. Tehnologija temelji na vnosu rastlin iz družine križnic (Brassicaceae) in rastlin iz rodu Sorghum v tla, pri čemer ob razgradnji ostankov prihaja do sproščanja patogenom toksičnih substanc. V prispevku predstavljamo metodologijo, rezultate večletnih poskusov in izkušnje pridelovalcev z biofumigacijo.

Ključne besede: biofumigacija, varstvo rastlin, bolezni in škodljivci rastlin

Biofumigation as alternative technology to control soil borne pathogens

Soil borne plant pathogens present one of the most important limited factors in plant production, since standard and intensive agricultural practices causes constant increasing of their infection potential. As an answer to phase-out of majority of chemical soil fumigants alternative technologies have been developed, among which biofumigation presents one of the most successful and adopted technologies by the farmers. The biofumigation is based on incorporation of specific *Brassica* and *Sorghum* plants into the soil, where plant remains during breakup release biocidal compounds, which are toxic to the pathogens. The presentation will present biofumigation methodology, results of different trials and experiences of the farmers.

Key words: biofumigation, plant protection, plant diseases and pest

Vpliv pridelave in predelave grozdja na kakovost vina

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Na kakovost vina poleg geografskega porekla kraja, lege, vremenskih in talnih razmer odločilno vplivata tudi sorta vinske trte in tehnološki postopki predelave grozdja. Enaka sorta grozdja ima lahko popolnoma različno sestavo, če so sestava prsti in vremenske razmere različne. Izrednega pomena za kakovost vina je tudi gostota rasti, obremenitev vinske trte in pridelava grozdja z uporabo mineralnih gnojil ali brez njih. Grozdje, pridelano brez fitofarmacevtskih pripravkov, je ob redno in vestno opravljenih vinogradniških delih lahko odporno, zdravo in bogato s avtohtonimi hranilnimi, še posebej pa mineralnimi snovmi, ki bistveno vplivajo na značaj vina. Trajnostni pristop do pridelovanja grozdja je bistvenega pomena tudi v vseh nadaljnjih postopkih predelave grozdja ali vinifikacije. V vseh fazah pridelave vina je pomembna ustrezna tehnološka shema predelave grozdja za bela in rdeča vina. Upoštevati je treba dinamiko stiskanja grozdne drozge pri belih vinih in uporabo različnih postopkov maceracije grozdne drozge za prehajanje barvil pri rdečih vinih. Bistveno za kakovost vina je, da preobrazbi mošta v vino posvetimo dovolj časa brez uporabe grobih tehnoloških posegov in z minimalno uporabo enoloških sredstev. Če se kakovost vina rodi v vinogradu in zori v vinski kleti, se oplemeniti pri zadovoljnem potrošniku.

Ključne besede: vinogradništvo, vinarstvo, vzročno-posledična povezanost, kompleksnost, pridelava grozdja, kakovost vina

The impact of grape production and processing on the quality of wine

Apart from the origin of the grapevine, topography, climate and soil structure of the vineyard, the vine variety and the technology of wine making also play a decisive role in the quality of wine. The same grape variety may have a markedly different composition due to the chemistry of soil and climate conditions. The density of planting, the vine load, and the grape production with or without mineral fertilizers is also central to the quality of wine. Provided that all types of vineyard tasks are regularly and meticulously performed, wine grapes produced without the use of phytopharmaceuticals can be resistant, healthy, and rich in autochthonous nutrients and especially minerals that greatly influence the character of wines. A sustainable approach to the grape production is essential to all further procedures of the grape production or vinification. Appropriate technological schemes of grape processing for white and red wines are very important at all stages of wine production. The dynamics of pressing in white wine making, and various maceration procedures for extracting the colour in red wine making should also be taken into account. One of the most vital stages for the quality of wine is allowing enough time for the must to turn into wine without any extreme technological interventions and with the minimal usage of enological agents. If the quality of wine is born in the vineyard, and matured in the wine cellar, it is finally enriched by the satisfied consumer.

Key words: Viticulture, wine making, causative-consecutive relation, complexity, grape production, quality of wine

Dušikovi izotopi v zelenjavi glede na način gojenja

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Uporaba različnih gnojil ima vpliv na ostanek nitratov v rastlinah. Pri uporabi organskih gnojil pretvorba amonijskega dušika v nitrat poteka počasneje kot pri mineralnih lahko topnih gnojilih. Zaradi počasnejše pretvorbe ne prihaja do presežkov nitrata v rastlinah, kar pa se lahko zgodi pri predoziranju lahko topnih mineralnih gnojil. V gnojilu, v tleh in v rastlini se pojavljajo različni izotopi dušika (glede na vrsto gnojila), kar nam pomaga pri preverjanju izvora zelenjave. To je pomembno pri preverjanju ekološke zelenjave. Prisotnost težjih izotopov v rastlinah kaže na zelenjavo ekološkega izvora, prisotnost lažjih izotopov kaže na prisotnost gnojil anorganskega izvora. Pri raziskavi smo uporabili deskriptivno metodo in komparativno metodo dveh načinov pridelovanja zelenjave. Organsko gnojilo je bil kompostiran prašičji gnoj, urea pa je bila mineralno gnojilo. Rastline, ki so rasle na s kompostom pognojenih tleh, so vsebovale 27,2 ‰ iz NH4+ dušika, z ureo gnojene pa 8,7 ‰ iz NH4+ dušika. Z merjenjem dušikovih izotopov ne moremo sklepati o načinu gojenja. Visoke pozitivne vrednosti δ15N sicer kažejo na gnojenje z organskimi gnojili, nizke vrednosti δ15N ali celo negativne vrednosti δ15N pa kažejo na močno gnojenje z lahko topnimi dušikovimi gnojili, ki vsebujejo večjo količino lažjih izotopov dušika.

Ključne besede: gnojilo, dušik, nitrat, nitrit, izotop dušika

Nitrogen isotopes in vegetables with regard to the cultivation method

The usage of different fertilizers has an influence on the content of nitrate residues in plants. The conversion of ammoniac nitrogen into nitrate is slower by using organic fertilizers than using synthetic ones. Due to slower conversion there is no nitrate abundance in plants, which may occur when overdosing synthetic fertilizers. Various nitrogen isotopes can be traced in a fertilizer, the soil and plants after using a certain fertilizer, which helps verifying the plants growing location. This is important for authenticating organic vegetables. The usage of organic fertilizers is confirmed by the presence of heavier isotopes in plants. On the other hand, the usage of synthetic fertilizers shows the presence of lighter isotopes. In our study we used the descriptive method and the comparative method of two cultivation method. The pig manure was the organic fertilizer and urea was the mineral fertilizer.Plants growning soil fertilized with compost contained 27,2‰ from $NH4^+$ nitrogen, but plants fertilized with urea contained 8.7‰ from$NH4^+$nitrogen.By measuring the isotopes of nitrogen we cannot conclude in the manner of cultivation. High positive values δ15N indicate fertilization with organic fertilizers, low or even negative values δ15N shows the usage of synthetic fertilizers, which contain a larger amount of lighter isotopes of nitrogen.

Key words: fertilizer, nitrogen, nitrate, nitrite, nitrogen isotope

Ugotavljanje prisotnosti pokalic (*Agriotes lineatus* L.) in njihovih ličink strun na šolskem posestvu BC Naklo v letu 2011

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V letu 2011 smo na šolskem posestvu Biotehniškega centra Naklo spremljali prisotnost poljskih pokalic (*Agriotes lineatus* L.) in njihovih ličink – strun. Odrasle poljske pokalice smo lovili s pomočjo dveh tipov feromonskih vab, YARb tipa za leteče vrste in YATLOR tipa za plezajoče vrste, ki nerade letijo; strune pa s pomočjo lončnih vab s kalečim semenom pšenice in koruze ter substratom za zadrževanje vlage – vermikulitom. Skupno smo nastavili 4 feromonske vabe (dve vabi tipa YARb in dve vabi tipa YATLOR) in 3 lončne vabe. Nastavljene vabe smo tedensko pregledovali v obdobju od 30. 3. 2011 do vključno 4. 10. 2011. Feromonske kapsule v vabah smo menjavali

mesečno, lončne vabe pa tedensko. Vse vabe smo postavili ob njivi koruze. V celotnem obdobju spremljanja smo s feromonskimi vabami ujeli 222 odraslih osebkov poljske pokalice. V YARb tip feromonske vabe se je ujelo 118 osebkov, v tip YATLOR pa so se ujeli 104 osebki. Pregled ulova po mesecih je pokazal, da se je največ pokalic ujelo v mesecu maju (123 oz. 55,4 %). V lončne vabe s kalečim semenom se je v času celotnega obdobja spremljanja ujela samo 1 struna. Ugotavljanje velikosti populacije škodljivca je osnova za odločanje o nujnosti varstvenih ukrepov na osnovi gospodarskega praga škodljivosti, v ekološkem kmetijstvu pa z lovom zmanjšujemo številnost škodljivih osebkov.

Ključne besede: poljska pokalica (*Agriotes lineatus* L.), struna, feromonska vaba, lončna vaba s kalečim semenom pšenice in koruze

Monitoring of the Presence of Lined Click Beetles and Their Larvae at the School Property of Biotechical Centre Naklo

In year 2011 we monitored the presence of Lined click beetle (*Agriotes lineatus* L.) and their larvae´s – so called strings, at the school property of Biotechnical centre Naklo. We hunted full-grown lined click beetle with the help of two types of pheromone baits, YARb type for flaying species and YATLOR type for climbing species, that hate to fly. Strings were hunted with the help of pot baits with sprouting seeds of wheat and corn and with substratum for retaining moisture – vermiculite. All together we set four pheromone bates (two bates of type YARb and two bates of type YATLOR) and three pot bates. All employed bates were examined weekly for the period from 30. 3. 2011 till 4. 10. 2011 inclusive. Pheromone capsules in bates were alternated monthly while pot bates were alternated weekly. All bates were standing right by their corn. In the whole examination period we trapped 222 full-grown subjects of Lined click beetle with pheromone bates. YARb type of pheromone bates trapped 118 subjects while YATLOR type of bates trapped 104 subjects. The overall review by months showed, that the majority of Lined click beetle got caught in May (123 or 55,4 %). Only one string was caught by pot bate with sprouting seeds in the whole examination process. Estimating the size of pest population is the foundation for decision making on urgent environmental provisions on the basis of economic threshold of harmfulness. On the other hand by hunting we reduce abundance of harmful subjects in ecologic agriculture/farming.

Key words: lined click beetle (*Agriotes lineatus* L.), string, pheromone bate, pot bate with sprouting seeds of wheat and corn

4. SEKCIJA

Menedžment

Pomen senzoričnega testiranja na potrošnikih v procesu razvoja novega živilskega izdelka

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Pomemben del pri razvoju novega živilskega izdelka je poznavanje potrošnikovih želja in pričakovanj. Namen prispevka je prikazati, kako začetno navdušenje nad novim izdelkom v zgodnjih stopnjah razvoja odstopa od rezultatov bolj objektivnih raziskovalnih tehnik. Predmet raziskave je nov živilski izdelek, sladek desertni preliv iz tradicionalnega slovenskega vina teran. V prvem delu raziskave smo s kvalitativnima metodama, delno strukturiranimi intervjuji in fokusnima skupinama pridobili pozitivne odzive od potrošnikov. Osrednji, kvantitativni del raziskave je zajemal anketni vprašalnik in senzorično analizo s potrošniki, ki je vključevala hedonski test in test preferenc. Pridobili smo podatke za strategijo trženja in informacije glede nakupovalnih navad in pričakovanj potrošnikov v tem ciljnem tržnem segmentu. Ugotovili smo, da je trg sladkih prelivov v fazi visoke zrelosti, zato potrošniki posegajo po ustaljenih proizvodih in okusih. Ocena sprejemljivosti izdelka nakazuje, da ne dosegamo pričakovane začrtane strategije razvoja. Poslovni uspeh je tvegan, zato na podlagi ugotovitev predlagamo redefiniranje koncepta izdelka.

Ključne besede: razvoj novih živilskih izdelkov, senzorično ocenjevanje s potrošniki, študije potrošnega vedenja

Consumer sensory tests in new food development process

Important component of new food development process is identification of consumer preferences and expectations. In this paper we empirically show that findings form preliminary researches differ when more objective research techniques are applied. The new food product is dessert topping based on traditional Slovenian wine teran, which is perceived as a national speciality. The research involving consumers combined semi-structured interviews, focus groups and questionnaire with consumer sensory test. First two stages gave us qualitative data and the expected market potentials were substantial. The third phase aimed at product fine-tuning, applying consumers' sensory tests; hedonic evaluation and preference testing. Questionnaire gave important inputs to the marketing strategy, elucidating the purchasing behaviour and consumer expectations regarding the products in target market segment. We found out that the market is in highly mature phase. Market acceptance of the new product is below the threshold to continue the outlined product development strategy without risking business failure, which is why we suggest product concept redefinition.

Key words: new food product development/ consumer sensory/ consumer behaviour

Vpliv uspešne investicije na celotno poslovanje podjetja

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V prispevku je namen prikazati vpliv uspešne investicije dogradnje sob pri turistični kmetiji X na celotno poslovanje podjetja. Cilji, ki jih investitor od investicije pričakuje, so, da bo z dogradnjo sob pridobil dodaten prihodek, ki bo prispeval k izboljšanju pomembnejših poslovnih kazalcev celotnega podjetja. Pri izdelavi same analize si je investitor pomagal z naslednjimi metodami raziskovanja: uporaba načela vzročnosti, metoda komparacije, eksplorativna metoda. Za ugotavljanje finančne upravičenosti investicije so se kot izhodišče uporabili podatki iz prejšnjih let poslovanja podjetja. Na podlagi teh podatkov se je naredila primerjava z investicijo in brez nje, pri čemer se je upoštevalo, da se bo s to investicijo obiskanost turistične kmetije povečala za cca. 20 %. To je povprečen delež povečanja, ki ga v podobnih primerih beležijo na Turistični zvezi Slovenije. Glavni del prispevka, ki je vezan na finančni del, je pokazal, da se pomembnejši ekonomski kazalci (donosnost na kapital, donosnost sredstev, donosnost prihodkov …) z investicijo v vseh pogledih izboljšajo, kar vpliva na celotno poslovanje podjetja. Tudi glavni kazalec, vezan strogo samo na investicijo (interna stopnja donosa – ISD), prikaže, da je le-ta upravičena.

Ključne besede: investicija, turistična kmetija, poslovni kazalci, donosnost na kapital, donosnost sredstev, donosnost prihodkov, interna stopnja donosa – ISD

A succesful investment`s impact on the entire company`s business

This article aims to show how a successful investment in additional rooms at a random tourist farm can impact the entire company`s business. The expected objectives set by the investor are that aditional rooms at the tourist farm will yield additional income that will contribute to the improvement of major business indicators of the entire company. Previous data of the company`s business were used as an outline to determine the financial viability of the investment. Based on these data, the comparison was made with and without accounting for the investment, taking into consideration that this investment will increase the number of visits to the farm by approx. 20%. This equals the average percentage increase, recorded by the Tourist Association of Slovenia in similar cases. The main part of the contribution, related to the financial part, showed that all the major economic indicators (return on equety, return on assets, return on sale ...) will improve in all aspects by the investment, which affects the entire business enterprise.

Key words: an investment, a tourist farm, business indicators, return on equety - ROE, return on assets - ROA, return on sale – ROS

Tržno obnašanje slovenskih ekoloških kmetij v razmerah slovenskega trga ekoživil

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Rastoče povpraševanje po ekoloških živilih v Sloveniji je tržna priložnost za kmete. Namen prve obsežne raziskave trga ekoživil v Sloveniji je bil ugotoviti stanje in perspektive, s poudarkom na domači ponudbi, ter predlagati ukrepe za izboljšanje. Prispevek na osnovi izbranih rezultatov raziskave opisuje tržno uspešnost in tržne načrte slovenskih ekoloških kmetij. Izvedeno je bilo neposredno anketiranje reprezentativnega vzorca ekoloških kmetij (256), popisane so bile ekološke tržnice in opravljeni pogovori z 1/3 prodajalcev na njih ter opravljeni poglobljeni intervjuji s ključnimi trgovci ekoživil. Ugotovljeno je bilo, da je neposredna prodaja s 85 % deležem daleč najpomembnejša oblika trženja slovenskih ekoloških živil. Prevladuje prodaja na kmetiji, približno 110 ekoloških kmetij pa ustvari v povprečju 70 % svojih tržnih prihodkov na ekoloških tržnicah. Po drugi strani pa trgovci poročajo o pomanjkanju oziroma nedosegljivosti domačih ekoloških pridelkov, čeprav potrošniki povprašujejo po njih. Celoten promet z ekološkimi živili v Sloveniji v l. 2010 je ocenjen na približno 1 % vsega prometa z živili, od tega pa je slovenskih ekoloških živil le približno 20 %. Prispevek podaja nekatere predloge za povečanje domače tržne ekološke pridelave, še zlasti v luči dodatnega povpraševanja po ekoživilih (zelena javna naročila).

Ključne besede: neposredna prodaja, partnersko kmetijstvo, prodaja na kmetiji, tržni delež

Market Performance of Slovenian Organic Farms in the Context of Slovenian Organic Market

The growing demand for organic products in Slovenia is creating market opportunity for the farmers. The aim of the first comprehensive research of Slovenian organic market was to establish status quo and perspectives, focusing on domestic supply, and to suggest measures for improvement. The article is describing market performance and market plans of Slovenian organic farms, based on selected results of the research. Face-to face interviews of a representative sample of 256 Slovenian organic farms were used, an inventory of organic farmers' markets was established and 1/3 of sellers interviewed; in-depth interviews with key retailers of organic foods were performed. It was established that direct sales have by far the most important role for domestic organic products, accounting for over 85 percent of sales. On-farm sales account for the largest share, while about 110 organic farms realise on average 70 percent of their sales on the farmers' markets. On the other hand, the retailers reported a lack of availability of domestic organic products, in the contrast to a high interest of consumers. The estimated total volume of organic food sales is 1 percent of the total food sales (2010), where domestic organic products account only for about 20 percent The article is giving some proposals for increasing domestic organic market production, especially from the viewpoint of additional demand for organic foods (green public procurement).

Key words: direct food sales, on-farm sales, market share, partnership farming

Trženjska raziskava ponudbe cvetličarn v Sloveniji z vidika potrošnikov

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Temelj razvoja vsakega podjetja je raziskava trga. Tako je tudi za razvoj cvetličarn pomembno, da raziščemo trg in ugotovimo, kaj o ponudbi v cvetličarnah meni potrošnik in kakšne so njegove potrebe glede okrasnih rastlin. Tako smo z anketno metodo opravili raziskavo mnenj slovenskega potrošnika. Ugotovili smo, da so se nakupne navade iz leta 2011 v primerjavi z letom 2012 spremenile. Potrošniki, ki pogosto kupujejo okrasne rastline, v zadnjem letu pogosteje kupujejo v večjih trgovskih centrih, zato je izredno pomembno, da cvetličarji ugotovijo, kje je njihova konkurenčna prednost in kako lahko to izkoristijo.

Ključne besede: raziskava trga, anketiranje, cvetličarne, potrošniki, nakupne navade

Market research on Slovenian florist shops supply from the consumers' perspective

Market research is the basis of companies' development. This is a fact even when we speak about florist shops; we have to reevaluate consumers' thinking and neeeds when it comes to decorative plants. Therefore we've carried out a survey and have come to a conclusion that consumers' habits have changed during the last year. Regular consumers of decorative plants have moved to bigger shopping centres; that 's why it is of utmost importance that florists find their comparative advantages on the market and use them.

Key words: market research, surveys, florist shops, consumers, consumers' habits

Dejavniki izbire prehrane: študija primera študentov Fakultete za organizacijske vede UM

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Pomen pravilne izbire prehrane vpliva na zdravje, počutje in delovno uspešnost vsakega posameznika. Predstavljamo raziskavo o dejavnikih, ki vplivajo na izbiro prehrane študentov Fakultete za organizacijske vede Univerze v Mariboru. Na podlagi pregleda literature s področja izbire prehrane smo identificirali devet dejavnikov, ki vplivajo na izbiro prehrane, in to so: zdravje, razpoloženje, primernost, privlačnost (videz), naravne sestavine, cena, nadzor teže, poznavanje in etična skrb. Anketa, ki smo jo izvedli med dodiplomskimi študenti Fakultete za organizacijske vede Univerze v Mariboru, je bila sestavljena iz devetih trditev, ki predstavljajo devet dejavnikov. Študenti so svoje strinjanje z odgovori podali v obliki štiristopenjske lestvice. Na osnovi analize rezultatov so podane ključne ugotovitve, ki se nanašajo na dejavnike izbire prehrane študentov.

Ključne besede: prehrana, izbira hrane, študenti

Factors of Food Choice: a Case Study of University of Maribor's Faculty of Organizational Sciences' Students

The importance of proper food choices affects the health, wellbeing and job performance of each individual. We present a survey on the factors that affect dietary choices of students of the University of Maribor's Faculty of Organizational Sciences. Based on the review of literature in the field of food choices, we have identified nine factors that affect dietary choices, namely: health, mood, convenience, sensory appeal, natural content, price, weight control, familiarity and ethical concern. The survey, which was conducted among undergraduate students of the Faculty of Organizational Sciences, University of Maribor was composed of nine claims, which represent the nine factors. Students gave their consent to the answers in the form of four-point scale responses. Based on the analysis of the results we give the key findings relating to the factors of food choices of students.

Key words: food, food choice, students

Management sprememb na področju naravovarstva in hortikulture

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Vsakodnevno smo priča spremembam v okolju, ki se odražajo v kvaliteti življenja vsakega posameznika. Spremembe na področju naravovarstva in hortikulture se z razvojem inovacij vpeljujejo v razvoj človeka in njegovega odnosa do okolja. V prispevku je predstavljena raziskava vpliva sprememb na področju naravovarstva in hortikulture v Sloveniji. Izdelana je analiza povezave med hortikulturo, naravovarstvom, samooskrbo s hrano v Sloveniji in zdravim načinom prehranjevanja.

Ključne besede: management sprememb, naravovarstvo, hortikultura

Change management in the field of nature protection and horticulture

Every day we are witnessing changes in the environment, reflected in the quality of life of each individual. Changes in the field of nature protection and horticultural are introduced with the innovation in human development and its relationship to the environment. This paper presents a survey of changes impact in the field of nature conservation and horticulture in Slovenia. Made is an analysis of the correlation between horticulture, nature protection, food self-sufficiency in Slovenia and a healthy diet.

Key words: change management, nature protection, horticulture

5. SEKCIJA

Pomen čebel za človeka in naravo

Za to (razpisano) sekcijo nismo prejeli nobenega prispevka.

6. SEKCIJA

Skrite možnosti podeželja

Analiza senzoričnega ocenjevanja kakovosti kruha na Škofjeloškem

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Kakovost pekovskih izdelkov je pomemben argument, s katerim proizvajalci skušajo pridobiti kupce. Na škofjeloškem podeželju proizvajalci z območja občin Gorenja vas - Poljane, Škofja Loka, Železniki in Žiri tržijo svoje izdelke pod blagovnima znamkama Babica Jerca in Dedek Jaka – Naravni izdelki iz škofjeloških hribov. Izdelki, ki so vključeni v blagovno znamko ali se vanjo nameravajo vključiti, se s senzorično analizo kot osnovno metodo za vrednotenje kakovosti pekovskih izdelkov redno preverjajo. Cilj ocenjevanja pekovskih izdelkov je spodbujati proizvajalce za doseganje visoke kakovosti, hkrati pa je visoka ocena izdelka na senzoričnem ocenjevanju eden izmed pogojev za vključitev izdelka določenega proizvajalca v blagovno znamko. Analiza senzoričnega ocenjevanja kruha v letih 2002–2011 kaže na dobro kakovost izdelkov. Kljub dobrim ocenam večine ocenjevanih vzorcev se pri izdelkih pojavljajo napake, ki lahko negativno vplivajo na odločitev potrošnika za nakup. Proizvajalci, ki pečejo kruh na tradicionalen način, tudi v krušni peči, imajo težave pri dodajanju ustrezne količine soli, zamesu, fermentaciji in peki kruha. Glede teh vsebin je zanje treba organizirati dodatna strokovna izobraževanja.

Ključne besede: kruh, senzorična ocena, napake kruha

Sensory evaluation analysis of bread quality in the region of Škofja Loka

Quality of bakery products is important in search of new customers. Manufacturers from the counties of Gorenja vas – Poljane, Škofja Loka, Železniki and Žiri, situated in the rural area of Škofja Loka are marketing their products under the brand names “Babica Jerca” and “Dedek Jaka – naravni izdelki iz škofjeloških hribov.” Products that are or are intended to get under the brand name are regularly tested by sensory analysis as the basic method of evaluating the quality of bakery products. The objective of the evaluation of the bakery products is encouragement of manufacturers to achieve high quality, while a high score on the sensory evaluation of product may be a prerequisite for the inclusion of a particular manufacturer’s product in the brand. The sensory evaluation analysis of bread in the years 2002 to 2011, presents a high quality product. Despite the good scores of most of the evaluated samples, flaws may appear which could have a negative influence on the consumer. Manufacturers who prepare bread in a traditional manner, which includes baking it in a brick oven, have difficulties adding adequate amounts of salt, kneading, fermentation and baking. Therefore, additional formal educative courses need to be held for the manufacturers.

Key words: bread, sensory analysis, bread flaws

Prepoznavnost tematskih (učnih) poti na gorenjskem podeželju

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Iz leta v leto se število tematskih (učnih) poti, predvsem na podeželju, povečuje. Vzrok temu so vključevanja le-teh v različne projekte in finančne spodbude raznih razpisov. Od začetnih gozdnih učnih poti so se do sedaj razvile tematske poti z naravoslovno, kulturno-zgodovinsko, športno-rekreativno in kombinirano tematiko. Ob tem se postavljajo vprašanja, kdo so pravzaprav uporabniki tematskih poti, ali so le-te dovolj prepoznavne v svoji širši in ožji okolici, ali služijo svojemu namenu, kako jih popularizirati in ali jih je treba posodobiti. Večinoma ustanovitelji in vzdrževalci tematskih poti razpolagajo s podatki o obisku le tistih skupin, ki so najavljene in imajo na razpolago vodiča. Prepoznavnost tematskih poti med učenci oz. dijaki, ki so ena od ciljnih skupin, se je ugotavljala z anketo. Dejstvo je, da z naraščanjem ponudb tematskih poti sorazmerno ne narašča tudi prepoznavnost in uporabnost le-teh, zato bo v prihodnje treba dejavnosti in finančna sredstva usmeriti predvsem v popularizacijo in posodobitev tematskih poti.

Ključne besede: tematske (učne) poti, Gorenjska, podeželje, prepoznavnost, dijaki

Recognition of themed (educational) tracks in Gorenjska countryside

Every year the number of themed (educational) tracks is increasing, especially in the countryside. The reason for the increase is the incorporation of these tracks into various projects and financial incentives. Natural, cultural, historical, recreational and combined theme tracks have developed from the initial educational forest tracks. All these themes propose questions like who are the users of thematic track; are the tracks recognized enough in their broader and narrow community; do they serve their purpose; how to popularize them and are they in need of an update. Most of the founders and maintainers of thematic tracks have visiting information for only those groups that are pre-announced and require a guide. Recognition of themed tracks among pupils and students, which are one of their target audiences, was tested with a survey. The fact that with the increase of variety of themed tracks, there is no proportional increase in their recognition and usage only means that, in the future, all action and resources will have to be channelled in modernization and popularisation of these tracks.

Key words: themed (educational) tracks, Gorenjska, countryside, recognition, students

Učinkovitost izvajanja programa LEADER na območju Spodnjega Podravja

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Za izvajanje programa LEADER, ki je del Programa razvoja podeželja v obdobju 2007–2013, so bile v Sloveniji ustanovljene lokalne akcijske skupine (LAS). Te povezujejo občine, ustanove, gospodarske družbe, društva in posameznike s ciljem učinkovitega pridobivanja evropskih sredstev za različne razvojne projekte. Cilj prispevka je ugotoviti, ali izvedeni projekti na območju treh LAS v severovzhodni Sloveniji uresničujejo cilje lokalnih razvojnih strategij za podeželje. V ospredju preučevanja je podrobna vsebinska analiza projektov ter njihovih vplivov na demografske, gospodarske in okoljske spremembe v podeželskih naseljih obravnavanega območja.

Ključne besede: podeželje, regionalni razvoj, lokalna razvojna strategija, LEADER, LAS, Haloze, Slovenske gorice, Dravsko polje, Ptujsko polje

Efficient implementation of the programme »LEADER« in the area of Spodnje Podravje

In Slovenia, local action groups (LAG) were established within the LEADER programme, which is a part of the Countryside Development Programme between 2007 and 2013. Local action groups connect municipalities, institutions, companies, associations and individuals with the purpose of effective acquiring of the European funds intended for different development projects in the countryside. The aim of the article is to establish whether the projects executed in the areas of three LAG groups in north eastern Slovenia realize the aims of the local development strategies for the countryside. The article has mainly concentrated on a detailed analysis of the projects and their influences on the demographic, economical, and environmental changes in the countryside settlements of the studied area.

Key words: countryside, regional development, local development strategy, LEADER, LAG, Haloze, Slovenske gorice, Dravsko polje, Ptujsko polje

Pomen javno-zasebnih partnerstev pri spodbujanju turističnega razvoja na podeželju (primer občine Cerkno)

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V prispevku obravnavamo pomen javno-zasebnih partnerstev in povezavo med turističnim razvojem in vlogo socialnega kapitala v občini Cerkno. Izhodišče pri preučevanju teh zvez so bila vprašanja, kakšna je vloga partnerstev na lokalni (mikro), regionalni (mezo) in državni (makro) ravni, kakšne so možnosti za razvoj turizma na preučevanem območju in ali je turističen razvoj pomembno povezan s socialnim kapitalom. Preučevanje je temeljilo na sekundarnih virih, kot so poročila projektov Celostnega razvoja podeželja in obnove vasi (CRPOV), delovanju razvojnih agencij in lokalne akcijske skupine (LAS), statističnih podatkih za obravnavano območje ter na primarnih virih, pridobljenih v obdobju 2006–2011: strukturiranih intervjujih, rezultatih delavnice Odprti prostor in anketni raziskavi med prebivalci in nosilci razvoja turizma na območju. Z analizami ugotavljamo, da obstajajo notranji (endogeni) razvojni potenciali in možnosti za turističen razvoj v občini Cerkno in da delovanje lokalnih agencij in LAS spodbujajo turističen razvoj podeželja in predvsem vezivni socialni kapital. Ugotavljamo, da sodelovanje na lokalni in regionalni ravni ni zadosten pogoj za turističen razvoj, če ni tudi medsebojnega učinkovanja kapitala (človeškega, gospodarskega in okoljskega), povezovanja obeh pristopov (od zgoraj navzdol in od spodaj navzgor) in uspešnejšega usklajevanja na državni ravni (premostitveni socialni kapital).

Ključne besede: javno-zasebna partnerstva, turistični razvoj, socialni kapital, občina Cerkno

Significance of the public-private partnerships at encouragement of tourism development of rural areas (case municipality of Cerkno)

The paper discusses the significance of the public-private partnerships and connection between tourism development and social capital in Municipality of Cerkno. In studying this relationship a few questions were addressed: What is the role of the partnerships on the local (micro), regional (meso) and national (macro) level?,What are the opportunities for tourism development in the analysed region? Is the tourism development notably connected with the social capital? The study was based on the secondary sources: reports of Integrated Rural Development and Village Renewal (IRDVR) projects, activity of development agencies and local action group (LAG) and statistical data of the region and primary sources acquired in the period 2006-2011: structured interviews, the workshops results of Open Space and through surveyes among the dwellers and key stakeholders in the region related to tourism. The analyses of all these sources show that internal (endogeneous) development potentials exist and opportunities for tourism development in Municipality of Cerkno and activity of development agencies and LAG encourage the tourism development of rural areas and above all bonding social capital. We are coming to a conclusion that cooperation on the local and regional level cannot sufficiently promote tourist development without interrelational effect of human, economic and environmental capital, interconnection

of both approaches ("from bottom to top" and "from top to bottom") and also without creation of social ties on national level (bridging social capital).

Key words: public-private partnerships, tourism development, social capital, Municipality of Cerkno

Sodoben pouk v gimnazijskem kurikulu

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V prispevku opisujemo možnosti uporabe izbranega učnega gradiva, ki se nanaša na učno temo kmetijstva Slovenije s poudarkom na rabi tal. Izbrali smo nekaj aktualnih podatkov, ki omogočajo, da se dijaki seznanijo z najnovejšimi trendi v kmetijstvu in pouku, ki predpostavlja aktivno učenje. Gre za učenje z razumevanjem, kjer dijaki sklepajo oziroma ugotavljajo temeljne razvojne probleme kmetijstva. V šoli je namreč idealna možnost, da spoznanja iz stroke prehajajo v prakso, dijaki pa lahko ta spoznanja dodatno preverijo s krajšimi raziskovalnimi nalogami. Pri izbranih primerih učnega gradiva (slikovno, grafično in pisno) so kratko opisane možnosti uporabe pri pouku tudi z vidika razvijanja veščin. Dodana so še ključna vprašanja, na katera naj bi dijaki ob vsaki učni temi oz. ob izbranem gradivu odgovorili, niso pa natančneje zapisane oblike in metode dela, ki so vsakokrat prepuščene izbiri učitelja.

Ključne besede: kmetijstvo, raba zemljišč, učno gradivo

Possible ways of learning about agriculture at grammar school

The paper describes some of the possible ways of using the selected materials as a basis for learning about the latest trends in Slovenian agriculture, focusing on land use. Students learn through active engagement – they find out for themselves about the basic problems/principles of agricultural development. Research oriented classes are an ideal opportunity for students to gain deeper understanding, make connections between agricultural science and the school subject. Selected examples of learning materials (images, graphics and written materials) and possibilities of their use for developing students' learning skills are presented. Examples of key questions to be answered by students at the end of each unit are also included. Teaching methods are not specified - they depend on the decision of each individual teacher.

Key words: agriculture, land use, learning material

Potencialne možnosti za zaščito tradicionalnih kmetijskih pridelkov in živil s Kozjanskega in Obsotelja

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V zadnjem času je v Sloveniji dan velik poudarek na zaščito tradicionalnih kmetijskih izdelkov in živil, kar je pomembno za ohranjanje naše identitete in značilnosti prehranjevanja v naših pokrajinah, še posebno sedaj, po vstopu Slovenije v EU. V tej raziskavi smo se osredotočili na regiji Kozjansko in Obsotelje, ker smo mnenja, da bi morali iz posameznih regij v postopke certificiranja vključiti še več naših tradicionalnih kmetijskih izdelkov in živil, kar seveda terja veliko dela in organiziranosti posameznih regij. V teh dveh regijah smo s pomočjo institucije Kozjanskega parka in posameznikov, ki že uspešno tržijo tipične izdelke, raziskali prehrano ljudi na tem območju, primerjali recepte, preverili avtentičnost izdelkov, prepoznavno kakovost, pomembnost za trg, povpraševanje in na koncu donosnost za vse udeležence. Zaščitni znaki za označevanje kmetijskih pridelkov oz. živil bi v teh regijah pripomogli k lažjemu razlikovanju na trgu glede izvora, kakovosti in slovesa kmetijskih pridelkov oz. živil in doprinesli dodano vrednost vsem zaščitenim izdelkom. Potrošniku sta vedno bolj pomembna poreklo in način pridelave oz. predelave izdelka. Ugotavljamo pa, da je pri vsem tem velikega pomena tudi nadzor nad izvajanjem postopkov pridobitve zaščitnih označb in nadzor nad spremljanjem kakovosti izdelkov, ki bi zaščitno oznako pridobili.

Ključne besede: zaščita živil, zaščitna oznaka, tradicionalni kmetijski izdelek, tradicionalno živilo, Kozjansko in Obsotelje

Possibilities for protection of agricultural products and food preparations in theregions of Kozjansko and Obsotelje

Recently, a big emphasis is given to protection of traditional agricultural products and food preparations in Slovenia. That is very important for preservation of our identity and characteristics of nutrition in our regions, especially after the Slovenia's entry into the EU. In this research we focused on the regions Kozjansko and Obsotelje because we believe that more agricultural products and food preparations of the individual regions of Slovenia should be included in the processes of certification. That would of course require a lot of work and organisation in individual regions. With the assistance of public institution of Kozjanski Park and some individuals, who already successfully market typical products, we researched what has already been made in the past in this field in these two regions, we compared the receipts, examined the authenticity of the products, identifiable quality, importance for the market, the inquiry and finally the profitability of all the participants. Trademarks for indicating agricultural products orfood preparations would assist a simplified research of the origin, quality and reputation of agricultural products or food preparations on the market and contribute an additional value to all the protected products. Consumers attach even greater importance to the origin of a product and the method of production

and processing. We established that it is very important to supervise the execution of the procedure of obtaining trademarks and to control the quality of products, which would gain a seal.

Key words: protection of food preparations, trademark, traditional agricultural product, traditional food preparation, Kozjansko and Obsotelje region

7. SEKCIJA

Sociološki vidik razvoja nove družbe

Zaupanje potrošnikov v varno hrano

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V luči aktualnih pojavov prehranskih problemov v državah Evropske unije smo s študijo želeli pridobiti trenutno mnenje potrošnikov o vsebinah, vezanih na varnost hrane, zaupanje v lokalno pridelano hrano, nakupovalne navade v času izbruha prehranskih afer, pomembnost upoštevanja zakonskih določil, spremljanje informacij iz drugih držav in to, ali so kot potrošniki dovolj obveščeni o vsebinah s tega področja. Uporabili smo metodo spletnega anketiranja na naključno izbrani populaciji 200 oseb obeh spolov v starosti od 18 do 60 let. Lokalno pridelana živila redno kupuje 65 % ljudi, 25 % jih tovrstna živila kupuje redko in 10 % anketirancev jih ne kupuje. Da so živila, ki so kupljena neposredno pri kmetu ali na tržnici, bolj zdrava, varna in kakovostna od kupljenih v trgovski verigi, jih meni 52 %, 24 % se jih s tem ne strinja, 17 % jih tega ne ve, 8 % pa jih meni, da so živila enaka. Informacije o problemih s hrano v ostalih državah EU redno spremlja 40 % anketiranih, včasih jih te informacije spremlja 57 % in nikoli 3 %. Prehranske afere ne vplivajo bistveno na odločitev za nakup slovenskih izdelkov, saj je 42 % anketirancev odgovorilo z da in včasih, 14 % pa jih zaradi tega ne izbere slovenskega izdelka. Vsem se zdi zelo pomembno upoštevanje zakonskih določil na področju varne hrane (90 %), da pa kot potrošniki niso dovolj obveščeni, jih meni 48 %, 23 % jih ne ve in 17 % jih je dovolj obveščenih. Rezultati kažejo, da se potrošniki zavedajo pomena varne hrane, da so še vedno premalo obveščeni in da prehranske afere v drugih državah ne vplivajo bistveno na spremembo nakupovalnih navad.

Ključne besede: potrošniki, varna hrana, zaupanje

Consumer confidence in food safety

In the light of the current food-related difficulties in the EU, the intention of the study was to obtain consumers' opinions on topics related to food safety, confidence in locally produced food, shopping habits during the outbreak of food scandals, the importance of compliance with statutory provisions, the monitoring of information from other countries and whether consumers were well-informed about issues in this field. We used the method of online surveys on a randomly selected population of 200 persons of both genders, ranging in age from 18 to 60 years. Locally produced foods are regularly bought by 65% of participants, rarely by 25%, and 10% do not buy these foods. 52% of the participants believe that products purchased directly from the farmer or at the market are healthier, safer and of higher quality than those purchased in retail chain, 24% believe to the contrary, 17% do not know, 8% think that food is the same. Information about issues concerning food in other EU countries is regularly monitores by 40% of respondents, sometimes by 57% and never by 3%. Food scandals do not significantly affect the decision to buy Slovenian products, since 42% of respondents replied yes and sometimes, 14% however do not choose Slovenian products because of this. It seems that it is important to everyone that legal provisions on food safety (90%) are complied with, but 48% believe that as consumers they are not sufficiently informed, 23% do not know and 17% is sufficiently informed. Based on the results, consumers are aware of the importance of food safety, they are however still poorly informed, and food-related issues in other countries do not significantly affect the change in shopping habits.

Key words: consumer, food safety, confidence

Za prihodnost (človeške) vrste: narava in kultura v brezšivni vezi

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Soočamo se z zelo aktualnimi problemi žive narave, ki jih ne moremo misliti, ne da bi preizpraševali sodobne pogoje in možnosti nadaljevanja (človeške) vrste; še posebej izpostavljamo problematiko rojevanja v naši civilizaciji. Porod je vzorčni primer medsebojnega presevanja kulture in narave, podobno kot smrt in umiranje. Z analitično raziskovalno metodo razčlenjujemo koncepte in vsakdanje prakse rojevanja, luščimo sporočilne plasti do tistih bistvenih o živem in človeškem, ki potrebujejo kritični premislek tako z vidika naravoslovja kot humanistike. S sintezo ugotovitev sodobnih avtorjev različnih strok in s kritičnim premislekom odpiramo priložnost za preseganje omejujočih konceptov in tistih praktičnih izpeljav, ki ne delujejo (več) v dobrobit žensk, otrok, družin in družbe, ter tako trasiramo poti za prihodnost. Rezultati analize razkrivajo poudarjeno pozitivno vrednotenje tehnologije in zahtev po nadzoru nad telesom in njegovim delovanjem, obvladovanjem njegovih funkcij od zunaj, podrejanjem normam in narekovanjem tempa, cenitvijo samonadzora in objektivacijo telesa. Temu se pridružuje prevladujoč način življenja s temeljnim nezaupanjem do narave, nerazumevanjem njenih ritmov, strahom pred »kaosom«: našteto v makrovzorcu najde odraz v organizaciji in izvedbi posamezne porodne pomoči in samorazumevanju porodnice na mikroravni. V sodobni porodni pomoči imajo tehnologija, medicinski posegi in zdravila prednost pred potrpežljivostjo in zaupanjem. Z medikalizacijo, tehnologizacijo in institucionalizacijo poroda se prepričanja o nemoči žensk, da spontano rodijo, na individualni in kulturni ravni krepijo; vednost o modrosti ženskega telesa v biološki in kulturni preteklosti pa je zapostavljena. Ugotavljamo, da je kritičen pretres rezultatov analize prevladujoče porodne paradigme nujen za zagotavljanje pogojev celostnega zdravja ljudi v prihodnje. V planetarno krizo, s katero se soočamo, so vpeta prijemališča vzvodov za možen obrat: vera v primat tehnologije pred naravo ne prežema celotne družbe brez preostanka. Predstavljene ugotovitve fenomenološkega preleta so temelj vabila k ponovnem premisleku o modrosti rojevanja, ki je vpisana v presečno množico narave in kulture; tistim najboljšim, kar lahko zagotavlja kultura, in tistim dobrim, kar je zapisano v naravne zmožnosti žensk in otročičev in omogoča porod. To so tudi nastavki za spremembe praks, povezanih z reprodukcijo vrst(e). Da sklenemo: paradigmatska sprememba v razumevanju porodnega procesa pomeni zagotavljanje možnosti, da fiziologija v kulturi polno deluje; je korak k novi družbi – čas je za njeno udejanjenje.

Ključne besede: materinstvo, babištvo, porodne paradigme, celostna materinska skrb

For the future of (human) species: Nature and Culture in the seamless link

We are faced with actual problems of the living nature; one can't think about them without questioning the current conditions and possibilities for continuation of (human) specie(s). We have to highlight the issue of giving birth

in our civilisation in particular.˝Childbirth is an example par excellence of mutual interconnectedness of culture and nature, as death and dying. With the analytical research method we deconstruct concepts and everyday practices of childbirth; we peel of those layers to recognise essential messages about "the living" and "the human", needed critical consideration in terms of both, natural sciences and humanities. The synthesis of the findings of contemporary authors of various disciplines and critical reflection open the opportunity to go beyond the limiting concepts and practices they aren't in the welfare of women, children, families and society anymore, therefore make new path for the future. Analysed results reveal that our civilization places a positive stress and value on technologies and demand control over the body and its functions, submission to norms and dictates a tempo, requires the management of its functions from the outside, the subjugation of norms and self-objectification and body. This is combined by the prevailing way of life characterized by the fundamental distrust of nature, the incomprehension of its rhythms and the fear of "chaos": macro pattern finds its reflection on the micro level with the organization of the particular birth event and self-understanding of individual birthing woman. In modern birth care technology, medical procedures and medication are given advantage over patience and trust. With medicalisation, tehnologization and institutionalization of childbirth, women's beliefs about the impossibility to spontaneously give birth are strengthened on the individual and the cultural level, too; and knowledge about the wisdom of the female body in the biological and cultural past is neglected. The critical examination of the results of the analysis of the prevailing birth paradigm is essential to ensure holistic health of the people in the future. In the planetary crisis we are facing there are leverage points we recognise as places to intervene in the system: faith in the primacy of the technology over nature does not permeate the entire society without exceptions. Presented findings invite us to rethink the wisdom of childbirth, which is entered in the intersection of nature and culture, of the best what culture can give and the good which is written in the natural abilities of women and babies and enables childbirth; and then change practices, connected with reproduction of specie(s). To conclude: a paradigm shift in the perception of birth processes provides opportunities for physiology in a culture being fully operational; and this as an important step towards a new society – it's time for its implementation.

Key words: maternity, midwifery, childbirth paradigms, holistic maternity care

Inovativni pristopi v izobraževanju – uporaba socialnih omrežij v programu Naravovarstvo

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Namen članka je ugotoviti, kako so cilji višješolskih strokovnih programov lahko doseženi z inovativnimi izobraževalnimi pristopi, kamor sodi tudi uporaba socialnih omrežij. V članku je obravnavana uporaba socialnih omrežij v izobraževanju v višješolskih strokovnih programih Upravljanje podeželja in krajine ter Naravovarstvo, zlasti za pridobitev kompetenc pri predmetu Poslovno sporazumevanje in vodenje. Izvedena je bila kritična analiza uporabnosti nekaterih socialnih omrežij ter anketiranje med študenti višješolskega študija o uporabi socialnih omrežij. Ugotovitve se nanašajo na prednosti, kot so povezava z zabavo, možnost hitrega kontaktiranja želenih oseb, krepitev lastnega profesionalnega omrežja oz. socialnega kapitala, možnost pridobitve zaposlitve,

izmenjava mnenj, delitev svojih razmišljanj, člankov, videoposnetkov, bolj sproščena komunikacija in bolj zanimiv študij. Kot slabost so izpostavljene trditve, da je tovrstna komunikacija neosebna, povzroči pomanjkanje osebnih stikov in tudi pomanjkanje rekreacije v naravi. Socialna omrežja uporabnikom omogočijo oblikovanje skupin, v katerih lahko komunicirajo med sabo javno ali zasebno. Predstavljajo sodelovalno omrežje, v kateri se udeleženci znajdejo v vlogi ustvarjalcev, kar tudi spodbuja vseživljenjsko učenje.

Ključne besede: socialna omrežja, inovativni izobraževalni pristopi

Innovative Approaches – the Use of Social Networks in the Programme Environmentalism

The purpose of this article is to find out in what ways the aims of the Higher Vocational College programmes can be achieved with innovative educational approaches. One of such approaches can also be the use of social networks, which is presented here, especially in the context of educational programmes Countryside Management and Environmentalism, with emphasis on competence building at the subject Business communication and management. A critical analysis of some social networks usability has been conducted and a questionnaire on the same topic has been carried out among the Higher Vocational College students. The results refer to advantages, such as, entertainment, possibilities of quick contacts, building up of our own professional networking and social capital, possibilities of getting new jobs, exchange of opinions, thought sharing, exchange of article and videos, more interesting studies and relaxed communication. Some disadvantages have been also pointed out: claims that such a type of communication causes a lack of personal contacts and a lack of recreation in nature. Social networks enable formation of groups for public and private communication. They function as collaborational network of creative participants, which encourages lifelong learning process.

Key words: social networks, innovative educational approaches

Uspešna komunikacija z dijaki, ki izostajajo od pouka

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V članku obravnavamo način uspešne komunikacije z dijaki, ki zaradi različnih razlogov izostajajo od pouka. V okviru inovacijskega projekta smo izvedli več aktivnosti, s katerimi smo želeli analizirati pogovore z dijaki, ki izostajajo od pouka. Naš namen je bil izboljšati pogovore do te mere, da bo dijak poiskal zanj sprejemljivo rešitev in jo tudi izpeljal. Pri akcijski raziskavi smo upoštevali moralna načela ter etiko ravnanja. Raziskali smo vzorce svojih pogovorov z dijaki ter študirali literaturo po LTD-metodi. Izoblikovali smo devet načel dobrega profesionalnega pogovora. Upoštevanje kriterijev za dober pogovor, ki smo jih dopolnjevali skozi celo leto, je večinoma prineslo pozitivne rezultate pri ravnanju dijakov. Opazna je bila boljša komunikacija z dijaki, ki se naučijo bolj odgovorno ravnati, posledično pa tudi zmanjšajo izostajanje od pouka. Intervencije so bile pri nekaterih učencih zelo

učinkovite – privedle so do občutnega zmanjšanja izostankov in izboljšanja učnega uspeha. Pri nekaterih pa se stanje ni bistveno izboljšalo. Negativni vplivi iz njihovega življenjskega okolja so bili premočni. Pogovori o tem so nam pomagali, da smo postopoma začeli razmejevati svojo odgovornost za učinek svojih prizadevanj (določen del odgovornosti oz. ključni del nosi dijak).

Ključne besede: izostajanje od pouka, uspešna komunikacija, profesionalni pogovor

Successful communication with students who skip class

In this article I shall discuss the ways of successful communication with students who skip class for various reasons. In the context of innovational project several activities were undertaken in order to analyse the results of communication with such students. Our purpose was to improve the quality of this communication, so that the students would be capable of finding and implementing the solutions acceptable for them. Within the process of the research moral and ethical principles were being taken into consideration. We analysed the samples of our communication with students following the literature in accordance with the LCD method. We formulated nine principles of good professional communication. Bearing in mind all the criteria of good communication, which had been complemented all year round, most of them resulted in improved students' attitudes. Better communication with students, who got aware of their responsibilities, decreased the amount of class skipping. In some cases these interventions proved indeed efficient and let to considerable decrease of skipping and general improvement of students' work. In other cases this did not happen as the negative influences of their outside environment prevailed. Talking about this helped us to find the limits of our responsibility for the impacts of our endeavours (the key part of responsibility is on each student).

Key words: class skipping, successful communication, professional communication

Predstavitev narečij in uporaba sodobnih tehnologij

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Slovenščina ima posebno mesto v učnem procesu. To je edina kompetenca z dvojno naravo, saj je učni jezik in učni predmet obenem. V sestavku sem predstavila Slovarski kotiček govora naselja Dramlje - Šentjur. V današnjem času se e-izobraževanje uporablja na vseh področjih, zato smo se z dijaki 2T odločili, da pri pouku slovenščine uporabimo sodobno računalniško tehnologijo za zapisovanje bogate kulturne dediščine. Pri delu smo uporabljali diktafon, digitalni fotoaparat in digitalno kamero. Zbrano gradivo smo nato vnesli v Slovarski kotiček (najprej smo zapisali knjižno besedo, dodali smo narečni zapis in ga obogatili s sliko s terena in z zvočnim zapisom). Ugotovili smo, da se na področju Šentjurja govori srednještajersko narečje ter da narečje ne pozna intonacij. Naglas je dinamičen in v vseh besedah enak. Šentjurčani ne ločijo kratko- in dolgonaglašenih zlogov. Mnenja smo, da boljše poznavanje pravil slovenskega jezika in govorne sposobnosti različnih zvrsti jezika omogočajo večjo kompetentnost dijakov pri implementaciji poklica ter pri nadaljnjem izobraževanju.

Ključne besede: narečne skupine, narečje, govor, glas, besedilo, narečni zapis, pravopis, slovar, slika

The Presentation of Dialects and the Usage of Modern Technologies

Slovene has a special place in the learning process This is the only competence with a dual nature, for it is the language of instructionand a subject at the same time. In the article I presented The dictionary corner of speech in the settlement of Dramlje-Šentjur. Now a days, e-learning is being used in allareas, so I and the students of 2nd T class decided to use in Slovene lessons modern computer technology to record rich cultural heritage. At work, we used a voice recorder and a digital camera. The collected material was the nenteredinto The dictionary corner (first, we wrote the standard word, then weadded the dialectre cordanden riched it with a photo from the terrain and the soundtrack). We found out that in the area of Šentjur the middle-styrian dialect is spoken and that the dialect does not know the intonations. The accent is dynamic and the same in all words. The inhabitants of Šentjur do not distinguish between short and long stressedsy llables. We believe that a better understanding of the rules of the Slovene language and the mastering of speech skills in different variations of the language allows a greater competency of students at the implementation of the irprofession and at further education.

Key words: dialectgroups, dialect, speech, sound, text, dialectrecord, spelling, dictionary, photo

Smernice učiteljem za konstruktivno reševanje sporov v šoli ter uspešno medgeneracijsko povezovanje

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V šoli se vse pogosteje pojavljajo konflikti, a jim vpleteni še vedno posvečamo premalo pozornosti, zato sem s pomočjo raziskave v letu 2010 osvetlila nekatere neizrabljene možnosti, ki jih ponuja šolski prostor, ter izdelala predlog osnovnih usmeritev, namenjen učiteljem za učinkovitejše reševanje konfliktov ter s tem boljše medgeneracijsko povezovanje. Smernice sem oblikovala na osnovi raziskovanja stališč učiteljev in učencev o njihovem odnosu do sporov ter o strategijah ravnanja. Izbrala sem empirično neeksperimentalno raziskavo (primerjalno obliko). Med smernicami izpostavljam pomen vzajemnega zaupanja in spoštovanja med učitelji in učenci. Učitelji lahko s svojim vedenjem pomembno vplivamo na to, da do spora sploh ne bi prišlo. Če pa do konflikta pride, je v prvi fazi reševanja pomembno skupno definiranje problema. Negativen predznak konflikta naj tako učitelji kot učenci preokvirimo v pozitivnega. Ves čas je treba negovati sposobnost empatije in vživljanja v vlogo drugega udeleženca v konfliktu. Učencem moramo ponuditi čustveno varno okolje, kar pomeni, da upoštevamo njihova čustva in jih tudi sami pokažemo. Pri reševanju sporov je zelo pomemben način – torej pot do cilja in ne samo cilj. Prispevek zaključujem s strategijami pogovora, restitucije in mediacije ter nasploh s poudarkom učenja socialnih veščin.

Ključne besede: medgeneracijsko povezovanje, vzgoja, konflikti, komunikacija, konstruktivno reševanje konfliktov, vseživljenjsko učenje

Guidance to teachers for constructive conflict resolution in schools, and successful intergenerational interaction

There are a lot of conflicts at school but people involved still do not pay enough attention to solve them. Therefore I highlighted through the research in 2010 some of the untapped opportunities offered by school room and made a proposal of basic guidelines for teachers for more effective conflict resolution, and thus better intergenerational interaction. I have developed guidelines based on research of the views of teachers and pupils about their relation to disputes and management strategies. I chose a non-experimental empirical research (comparative form). Among the guidelines I highlighted the importance of mutual trust and respect between teachers and pupils. Teachers can significantly influence with their behavior on the prevention of a dispute. However, if a conflict occurs, it is important to define the problem together in the first stage of problem resolution. The negative sign of the conflict should be transformed to the positive one by teachers as well as by pupils. Throughout the conflict resolution it is important to feel empathy with another person involved in the conflict. Teachers have to offer pupils emotionally safe environment. This means that teachers have to consider pupils' feelings and also show their own. In resolving conflicts it is a very important way - the path to the destination and not just the aim. My article is ended by discussion strategies, restitution and mediation and, in general, with an emphasis on learning social skills.

Key words: intergenerational interaction, education, conflicts, communication, conflict-solving strategies, lifelong learning

Šolski vrt kot didaktični pripomoček za izobraževanje srednješolcev

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V devetdesetih letih prejšnjega stoletja zasledimo močno gibanje za ponovno oživitev šolskih vrtov v evropskih državah in ZDA. Namen, vrsta in ureditev teh vrtov so se skozi različna obdobja spreminjali in se prilagajali

potrebam časa. Na začetku formiranja so bili ti vrtovi namenjeni izključno izobraževanju, v šestdesetih letih dvajsetega stoletja pa so se uporabljali bolj v rekreacijske in sprostitvene namene.Tudi iz tega razloga je bil šolski vrt kot didaktično sredstvo iz predmetnika izpuščen. V informacijski družbi je namreč uporaba virtualnih pripomočkov bistveno bolj zanimiva in enostavna. Tudi pri nas beležimo v zadnjih desetih letih povečano zanimanje za oživitev različnih vrtov, ki naj bi bili uporabljani pretežno za spoznavanje in krepitev biološkega in ekološkega znanja ter za usposabljanje za pridelovanje hrane. V Biotehniškem centru Naklo smo izdelali načrte za več različnih šolskih vrtov, ki jih bomo uporabljali v didaktične namene za poučevanje praktičnega in teoretičnega dela. Tako bomo imeli za izobraževanje: vrt medovitih rastlin, biodinamični, kolekcijski, okrasni in predstavitveni vrt. Prispevek govori o možnosti uporabe šolskih vrtov pri splošnih in strokovno teoretičnih predmetih pri dve-, tri- in štiriletnih programih biotehniške usmeritve ter pri tehniški gimnaziji. Pri analizi predmetnikov in katalogov znanja smo ugotovili največ možnosti uporabe pri Naravoslovju pri dve- in triletnih programih in Varovanju okolja z osnovami trajnostnega razvoja pri triletnih programih. Pri štiriletnih programih je možnost uporabe pri predmetu Trajnostni razvoj in biologija. Z medpredmetnim povezovanjem je uporaba šolskih vrtov za didaktične namene bistveno širša in omogoča dober razvoj naravoslovnih kompetenc pri dijakih.

Ključne besede: šolski vrt, biotehniški program, predmetnik, katalog znanja

School Garden as a Didactic Tool in Secondary Education

Since the 1990s, the movement for revival of school gardens has gained strength in the European countries as well as in the USA. In response to the demands of a particular era, the purpose, type and arrangement of these gardens have been changing through time. At their beginnings, school gardens served educational purposes exclusively, whereas later, in the 1960s, they have been predominantly perceived as valuable means of recreation and relaxation. This perception has been one of the reasons why school gardens as didactic tools were ultimately left out of the curricula. Furthermore, virtual didactic tools in the information society have become significantly more interesting and easier to use. Since the last decade, considerable efforts to revive school garden as a means of acquiring and improving knowledge of biology, ecology and food production have been detected in Slovenia as well. At Biotechnical Center Naklo, we have designed various school gardens as didactic tools for teaching theory as well as practice. For educational purposes, the following types of garden were designed: honey plants garden, biodynamic garden, plant collection garden, ornamental and demonstrative garden. In this article, we discuss the possibility of using school gardens as didactic tools for general, technical and theoretical subjects in two-, three- and four-year secondary vocational and technical programs of biotechnical orientation and technical upper secondary programs (technical gimnazija). The analysis of curricula and catalogs of knowledge has shown that school gardens were mostly applicable for “Science” in two- and three-year programs and for “Environmental Protection with Fundamentals of Sustainable Development” in three-year programs, whereas in four-year programs, school gardens were highly suitable for “Sustainable development” and “Biology”. The application of cross-curricular teaching methods further extends the use of school garden as a didactic tool and enhances the development of students’ science competences.

Key words: school garden, biotechnical program, curriculum, catalog of knowledge

Pregled dejavnosti, ki spodbujajo socialno vključenost na podeželju v občini Šentjur

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Vse pogosteje slišimo in beremo, da današnja družba doživlja krizo smisla in krizo duha, ki se kažeta skozi pojave družbenih anomalij, osamljenosti in indiferentnosti do drugih ljudi. Večina ljudi je postala brezbrižnih do te mere, da drugih ne vidijo in do njih ničesar ne čutijo ter se le resignirano umikajo v svoj svet. Kljub temu da je na podeželju socialnih stikov več kot v mestih, pa jih je tudi tu manj kot jih je bilo nekoč. Zmanjšuje se socialna vključenost v posamezne dejavnosti. Človek je naravno in družbeno bitje. Že od pradavnine se je glede na interes, potrebe, spol, starost povezoval v skupine. Na podeželju se pogosto formirajo skupine, bodisi formalne bodisi neformalne, kjer ljudi združujejo enaki interesi, in četudi je skupina formalno organizirana, so njeni člani prijatelji. To pomeni, da razvijajo socialne stike, odnose, se vključujejo v dejavnosti in pomembno prispevajo k razvoju podeželja. S svojo raziskavo sem ugotovila, da je socialna vključenost v občini Šentjur na podeželju dobra, saj se ljudje povezujejo v številna društva z zelo različnimi dejavnostmi. Na podeželju je še toliko bolj izrazito, da se v enem društvu ukvarjajo z več dejavnostmi in je takšna formalna skupina gonilo povezovanja, druženja in socialne vključenosti posameznikov v kraju. V dejavnosti se vključujejo tako mladi kot starejši, moški in ženske, na zelo različnih področjih. Torej na podeželju je socialna vključenost še vedno zelo dobra, morda pa malo izginja neformalno druženje in socialno vključevanje na popolnoma neformalni ravni.

Ključne besede: socialni stiki, socialna vključenost, podeželje, zadovoljstvo, skupnost

Review of activities that promote social inclusion in rural areas in the comunity of Šentjur

We increasingly hear and read that today's society is experiencing a crisis of meaning and crisis of the spirit, which is reflected through the phenomena of social anomalies, isolation and indifference to other people. Most people became indifferent to such an extent that one does not see another and do not feel anything, and they are only resignedly withdrawing into his own world. Even though, we have more rural social relations than in cities, there are also less than it once was. We have increased reduction of the social integration of individual activities. Since ancient times man has been connected in groups, depending on the interest, needs, gender, age. In rural areas there are often formed of either formal or informal groups, where people combine the same interests and even though the group is formally organized, its members are friends. This means that they develop social contacts, relationships and are involved in activities and contribute significantly to rural development. In my research, I found that social inclusion in the rural municipality of Šentjur is good, because people associate the number of societies with very different activities. In rural areas is even more pronounced that in one society are involved and the driver of such a formal group is integration, socialization and social inclusion of individuals in the city. The activities include both young and old, men and women, in very different fields. So the rural social inclusion is still very good, maybe a little fading informal gathering and social integration in a completely informal basis.

Key words: social contacts, social inclusion, rural, satisfaction, community

8. SEKCIJA

Sodobna konjereja

Osnovni pristopi pri selekciji konj v majhnih populacijah

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Pogoji odbire konj za medsebojno razmnoževanje se v kobilarniški reji in pri pasmah, kjer je številnost populacije majhna, bistveno razlikujejo od selekcije pri obsežnih populacijah domačih živali. Pri reji živali v obsežnih populacijah (npr. za prehrano ljudi) se rutinsko uporabljajo moderna računalniška orodja za napovedovanje plemenske vrednosti in tudi za pripravo paritvenih kombinacij. Ta orodja so posebej učinkovita v populacijah, kjer je na voljo veliko število živali, selekcijski parametri pa so omejeni na majhno število preprosto merljivih lastnosti. Nasprotno pa je pri pripravi paritvenega načrta v majhnih populacijah konj treba upoštevati veliko število subjektivno določljivih lastnosti. Kombinacije med njimi narekujejo uporabo specifičnih selekcijskih pristopov, pri katerih je aplikativna uporabnost računalniških orodij prilagojena predvsem sistematičnemu urejanju mnogovrstnih podatkov o konjih, njihovih značilnostih ter rodovniških povezavah. Po predhodni odbiri žrebcev in kobil, ki zadostujejo minimalnim kriterijem za plemensko namembnost, igrajo bistveno vlogo sistematični postopki določanja optimalnih paritvenih kombinacij. Sistematično načrtovanje paritvenih kombinacij, ki temelji tako na podrobnem poznavanju vsakega osebka kakor tudi na planiranju možnih kombinacij v prihodnjih generacijah, igra pomembno vlogo za dolgoročno doseganje rejskega napredka.

Ključne besede: konjereja, selekcija, majhna populacija, rejski napredek

Basic approaches to the selection of horses in small populations

In stud farms and in horse breeds, where animals are bred within small populations, the conditions of breeding and selection differ significantly from those in large populations of farm animals. Modern computer tools are routinely used to predict breeding values and to prepare mating combinations for farm animals in large populations (e.g. for food production). These tolls are efficient for the populations that contain large number of animals and the selection is based on a small number of easily measurable parameters. On the other hand, the preparation of a breeding plan at a small equine population requires simultaneous selection on a large number of subjectively assessed properties. The combinations among them require the use of specific selection approach where the application of the computer tools is mainly adjusted to assist with the systematic tracking of various information about the horses, their characteristics and the pedigree connections. Following the preliminary selection of the stallions and mares according to the minimal breeding standards, a crucial role is played by the systematic procedures of defining the optimal breeding combinations. Systematic preparation of breeding combinations that is based on detailed knowledge of each individual specimen as well as on preplanning of combinations over future generations, demonstrates important impact on the breeding progress, long-term.

Key words: horse breeding, selection small population, breeding progress

Možnosti konjeniškega turizma v Sloveniji

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V Sloveniji imamo veliko možnosti za konjeniški turizem, ki pa niso izrabljene. Danes se na kmetijah ponuja odprtje dopolnilne dejavnosti s šolo jahanja, za katero ni treba imeti posebnih dovoljenj, le ljubezen do dela s konji in ljudmi. Poleg klasične ponudbe osnovne jahalne šole se malo bolj izkušenim ponujajo tudi izvedba terenskega jahanja na krajše ali daljše razdalje, uvajanje otrok v svet oskrbe živali, ujahovanje konj, vožnja z vprego, terapevtsko jahanje in rehabilitacija oziroma resocializacija konj, fitnes in varstvo za konje, lahko pa se osredotočijo tudi na oskrbo žrebcev. Poleg naštetih možnosti bi se jih našlo še kar nekaj, predvsem v povezavi s turistično kmetijo. S pridobitvijo nacionalne poklicne kvalifikacije Strokovni sodelavec za konjerejo in konjeništvo bodo obiskovalci dobili zaupanje, da gre za strokovno usposobljene ljudi, kar pa jim bo olajšalo najti mesto med ponudniki podobnih storitev.

Opportunities in equestrian tourism in Slovenia

We have a lot of opportunities in Slovenia for equestrian tourism, which are not utilized. Today is on farms a chance to open complementary activity on farms with riding school, for which are not required any special permits, just love to work with horses and people. In addition to classical riding school is for more experienced offering implementation of field riding on short or long distances, introduction children in world of working with animals, basic riding of horses, carriage driving, therapeutical riding and rehabilitation or resocialization of horses, fitness and caring for horses, they can even decide for caring of stallions. Beside that listed possibilities we can find a lot more, mainly in connection with tourist farm. With obtaining National Vocational Qualification Technical Assistant for horse breeding and horse riding would make visitors trust in their vocational qualification and make easier for them to find place among providers of similar services.

Fizična in psihična priprava konja na terapevtsko dejavnost z uporabo Parelli Natural Horsemanship metode

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Terapija s pomočjo konj se uporablja kot terapevtska, rekreacijska in sprostitvena dejavnost za ljudi s posebnimi potrebami ter poteka tako na konju kot ob njem. Vprašanje, ki se ob tem pojavlja, je, kako varna je terapevtska dejavnost s pomočjo konj, zlasti za osebe s slabšo motoriko in slabšimi komunikacijskimi sposobnostmi. Za varno

izvedbo terapevtske dejavnosti, ki uporabniku nudi pozitivno izkušnjo, je bistvenega pomena pravilna izbira konja, ki mora imeti dobro gibanje v vseh treh hodih, nežen in ne plašljiv značaj ter je fizično in psihično pripravljen. V članku bomo opisali pravilno izbiro konja, namenjenega terapevtski dejavnosti, fizično in psihično obremenitev konja v času terapije in pripravo konja na terapevtsko dejavnost s pomočjo metode Parelli Natural Horsemanship.

Ključne besede: terapevtsko jahanje, priprava konja, fizična in psihična obremenitev konja, metoda Parelli Natural Horsemanship

Preparing the horse physically and mentally for therapeutic riding

Equine-assisted therapy is used for therapeutic, recreational as well as a leisure activity for persons with disabilities and take place either on horseback or beside the horse. The issue in question is if equine-assisted therapy, and in particular, riding the horse, is safe for those with poor motor and communication skills. In order to ensure safe performance while engaging in therapeutic activity, as well as one that offers the participant a positive experience, it is essential to choose the right horse. The ˝right˝ horse is one that is sound at every gait, has a sweet temperament and low flight response and is prepared mentally and physically. In our paper we will discuss the process of choosing the proper horse for therapeutic activities, the physically and psychologically burdening of the therapeutic horse, and the process of preparing the horse for therapeutic activity with the aid of the Parelli Natural Horsemanship training methods.

Key words: therapeutic riding, preparation of the horse, physically and psychologically burdening of the horse, the Parelli method

9. SEKCIJA

Inovativnost v pridelavi in predelavi

Vzgoja odpornih slovenskih sort krompirja na Kmetijskem inštitutu Slovenije

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Kakovosten in ekološkim razmeram prilagojen sortiment predstavlja osnovo za konkurenčno pridelovanje katerekoli kmetijske rastline. Na Kmetijskem inštitutu Slovenije, kjer obstaja dolga tradicija vzgoje lastnih sort, smo pred 19 leti začeli z novim programom žlahtnjenja. Do zdaj je bilo vzgojenih 7 novih slovenskih sort krompirja Pšata, Bistra, KIS Sora, KIS Mirna, KIS Kokra, KIS Sotla, KIS Mura. Poznamo dve vrsti odpornosti: vertikalno, ki jo povzročajo dominantni R-geni, in horizontalno, ki je poligenična in zato trajnejša. Ta je imela v preteklosti v večini programov žlahtnjenja krompirja prednost pred vertikalno, vendar v zadnjih letih ugotavljajo, da ni več dovolj učinkovita tako proti virusom kot proti novim sojem krompirjeve plesni. Na Kmetijskem inštitutu Slovenije smo v genfonda lastnih sort doslej vnesli vertikalno odpornost proti virusu Y, proti virusu zvijanja listov, cistotvornim ogorčicam, krompirjevemu raku in krompirjevi plesni, pri kateri smo s križanji začeli v letu 1998, ob tem pa smo se odločili za vnos vertikalnega tipa odpornosti. Nekatere nove sorte so primerne tudi za ekološko pridelovanje.

Ključne besede: Solanum tuberosum, PVY, nematode, krompirjeva plesen, odpornost, R-geni

Breeding of resistant Slovenian potato varieties at the Agricultural Institute of Slovenia

Quality and ecologically well adapted assortment of varieties is the basis for successful production of any agricultural crop. It has been a long tradition of potato breeding at the Agricultural Institute of Slovenia. A new potato breeding programme started 19 years ago. Seven new varieties Pšata, Bistra, KIS Sora, KIS Mirna, KIS Kokra, KIS Sotla and KIS Mura have been bred since. Two different types of resistance are known for years: vertical and horizontal one. Vertical resistance is caused by dominant R genes, while horizontal resistance is encoded by several minor genes working together. Due to its durability most of the breeding programs used horizontal resistance in the past, but it became less effective against new virus strains and aggressive new races of the late blight. Resistance genes for potato virus Y, potato leafroll virus, potato cyst nemathodes, potato wart disease have been successfully introduced into our gene pool at the Agricultural Institute of Slovenia. Breeding for late blight resistance started in 1998 using vertical type of resistance. Some new varieties are suitable also for organic production.

Key words: Solanum tuberosum, PVY, nemathodes, late blight, resistance, R genes

In vitro kalitev in zorenje peloda črnega bezga (*Sambucus nigra* L.)

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Med obetajoče biotehnološke postopke žlahtnjenja rastlin sodi tudi in vitro zorenje peloda. Z namenom, da bi vzpostavili uspešen protokol za in vitro zorenje črnega bezga (*Sambucus nigra* L.), smo opravili postopno optimizacijo različnih faz samega procesa zorenja in kalitve peloda. V sklopu optimizacije postopka in vitro kalitve zrelega peloda z uporabo spremenjenega gojišča po Brewbaker-Kwacku (BK) smo dosegli visoko stopnjo kalivosti (77 %) po samo enourni inkubaciji. Razvili smo tudi učinkovito metodo inokulacije enojedrnih mikrospor za in vitro zorenje, pri kateri smo dosegli visoko živost inukuliranih mikrospor in nizko stopnjo kontaminacije kulture. Za gametofitni razvoj mikrospor, nastanek dvoceličnega in troceličnega peloda ter končno kalitev se je kot najbolj primerno izkazalo BK-K gojišče, ki je vsebovalo BK-minerale, glutamin, dva nukleozida, visoko koncentracijo saharoze, pri pH vrednosti 5.1. Pelod je dozorel v 10–12 dneh s 56,1-odstotno končno kalivostjo.

Ključne besede: črni bezeg (*Sambucus nigra*), in vitro zorenje mikrospor, kalitev zrelega peloda

In vitro germination and maturation of elderberry (*Sambucus nigra* L.) pollen

Establishing protocols for in vitro pollen maturation has recently been proposed as a promising biotechnological approach that can be utilized for breeding purposes. In order to establish efficient in vitro pollen maturation of elderberry (*Sambucus nigra* L.), the protocol was elaborated in several stages. Optimization of germination of mature pollen procedure was well established by modification of Brewbary and Kwak medium (BK). In an optimal treatment, a high pollen germination rate (77.4%) was achieved after only 1 hour incubation. An efficient inoculation procedure was developed for maturation, which resulted in the inoculation of viable unicellular microspores at a low contamination rate. A BK-K medium consisting of BK salts, two nucleosides, glutamine, high sucrose and adjustment of pH to 5.1, was found to be suitable for initiation of gametophytic development of microspores, formation of bicellular and tricellular pollen and final germination within the same medium. The whole maturation process was performed within 10-12 days and the final germination rate of in vitro matured pollen was 56.1%.

Key words: elderberry (*Sambucus nigra*) – in vitro microspore maturation – pollen germination

Breztalno gojenje kolerabice (*Brassica oleracea* L. var. *gongylodes*) v zavarovanem prostoru

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V raziskavi smo preučevali rast in razvoj kolerabice (Brassica oleracea L. var. gongylodes) na hidroponskem sistemu. Polipropilenska korita (20 cm globoka in 40 cm široka) smo napolnili z različnimi substrati. Poskus, ki je trajal od 18. julija do 10. septembra 2009, je potekal v rastlinjaku – plastenjaku na Laboratorijskem polju Biotehniške fakultete. V raziskavo sta bili vključeni dve sorti kolerabice, in sicer dunajska bela in dunajska modra. Gojenje kolerabice smo preučevali na sledečih substratih: glinopor, perlit, vermikulit in šota. Sadike kolerabic smo presadili v substrate na stalno mesto v fazi razvoja od 3. do 4. pravega lista. Razdalja med rastlinami je znašala 35 cm x 30 cm. Pri obdelavi podatkov smo primerjali povprečne vrednosti za posamezne ponovitve pri različnih substratih in sortah. Rezultati so pokazali, da so imele največje število listov rastline, gojene v glinoporju (16,0), najmanj pa so jih imele tiste, ki smo jih gojili v vermikulitu (11,5). Tako pri višini kot pri masi celih rastlin smo ugotovili, da je najboljši izbor vermikulit. Tudi pri povprečnem pridelku gomoljev je dal najboljše rezultate vermikulit. Najslabše rezultate je dalo gojenje v glinoporju. Ugotovili smo tudi, da je dala sorta dunajska bela povprečno večji pridelek gomoljev (192,1 g) kot sorta dunajska modra (116,9 g). Na koncu poskusa smo izmerili tudi sušino rastlin. Največji delež suhe snovi so vsebovali gomolji, gojeni v perlitu (13,7 %), najmanj pa so je vsebovali gomolji, gojeni v vermikulitu (9,6 %).

Ključne besede: kolerabica, substrati, sorte, značilnosti pridelka, odstotek sušine

Soiless production of kohlrabi (Brassica oleracea L. var. gongylodes) in protected area

Growth and development of kohlrabi (Brassica oleracea L. var. gongylodes) have been studied on hydroponics system in plastic greenhouse on the Laboratory field of Biotechnical Faculty, University of Ljubljana. The polypropylene troughs (20 cm in depth and 40 cm width) were filled with different substrates. The trial lasted from 18th of July till 10th of September 2009. The experiment was included 2 kohlrabi cultivars 'Dunajska bela' and 'Dunajska modra'. Four different substrates have been used: expanded clay pellets, perlite, vermiculite and peat. The plants (when the seedlings have developed 3-4 true leaves) were transplanted in respective substrate. Seedlings were transplanted at distance of 35 cm x 30 cm. Average values for each repetition were compared in terms of respective substrates and cultivars. Results have shown that the biggest number of leaves per plant have grown on expanded clay pellets (16.0) and the smallest number on vermiculite (11.5). As the height of plants,

sush as the weight of whole plants we found out, that the best selection is vermiculite. The highest average yield of tubers was also given from vermiculite. The production in the expanded clay pellets gave the worst results. Results also showed that cultivar 'Dunajska bela' had higher average yield of tubers (192.1 g) than the cultivar 'Dunajska modra' (116.9 g). The final measurement was the dry matter contents. The highest dry matter content of tubers was found in kohlrabi on perlite (13.7%) and the lowest grown on vermiculite (9.6%).

Key words: kohlrabi, substrates, cultivars, yield components, percentage of dry matter

Kvasna biomasa – uporaben stranski proizvod živilske industrije

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Kvasno biomaso, ki je stranski proizvod pivovarske industrije, lahko po ustrezni obdelavi uporabimo kot pekovski ali krmni kvas ali kot celostni prehranski dodatek, s katerim izboljšamo biološko vrednost drugih živil. Minerali v obliki umetnih dodatkov k hrani so pogosto neučinkoviti ali toksični in so manj primerni kot organska prehranska dopolnila – na primer z minerali obogatena kvasna biomasa. V raziskavi smo med preučevanimi kvasovkami izbrali najprimernejšo s stališča maksimalnega prirasta in akumulacije železa v kvasni biomasi. S kvasovko Kluyveromyces marxianus smo postavili in optimizirali bioproces za proizvodnjo z železom obogatene kvasne biomase. Z referenčno faktorielno metodo smo določili izkoristljivost mikroelementov iz testne krme za laboratorijske podgane. Rezultati so pokazali, da je biološka dostopnost železa iz kvasne biomase boljša kot iz anorganskega vira železa (Fe-sulfata). Kvasovke K. marxianus bi se zaradi dobre bioakumulacije železa, varnega statusa in možnosti asimilacije laktoze iz odpadkov mlekarske industrije lahko uporabljale za proizvodnjo kvasne biomase, obogatene z železom.

Ključne besede: odpadki, stranski proizvodi, živilstvo, kvasna biomasa, minerali

Yeast biomass - usable by-product from food industry

Yeast biomass is as a by-product in brewing industry and could be used as food or feed yeast or as a complex dietary supplement to improve nutritional value of other foods. Artificial supplements often proved to be ineffective, toxic and are less suitable when compared to organic dietary supplements, such as mineral enriched yeast biomass. In present research different yeast strains were tested for maximal growth and accumulation of iron in yeast biomass. Yeast Kluyveromyces marxianus was chosen and further used in optimization of bioprocess for iron enriched yeast biomass production. The bioavailability of microelements from the feed for laboratory rats were

determined by reference factorial method. The results showed higher biological availability of iron from yeast biomass comparing to inorganic iron source (Fe-sulphate). Yeast Kluyveromyces marxianus has a good potential to be used for production of iron enriched yeast biomass, since it's GRAS status, ability to assimilate lactose from dairy waste products and good iron bioaccumulation capacity.

Key words: waste, by-products, food industry, yeast biomass, minerals

Antioxidants Of Vegetable-Potential Natural Preservatives

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Cabbage (Brassica oleracea var. capitata forma rubra) was cultivated under controlled plastic-covered greenhouse conditions using standard production methods. During harvest maturity, cabbagehead sampling was performed for chemical analysis. The objective of this study was to investigate the correlation between total phenolic content and antioxidant activity of ethanol extracts of cabbage. Total phenols were evaluated by the Folin-Ciocalteu spectrophotometric method. Antioxidant activity, defined as the DPPH radical neutralizing ability, was also determined by spectrophotometry. Results show that the total phenolic content was higher in cabbage macerate (E1) (0.0577±0.0001 g GAE/100g sample) than in (E2) ultrasonic extract (0.0811±0.0001 g GAE/100g sample). High values of antioxidant activity were identified (91.67 % for E1 and 92.67 % for E2).

Key words: cabbage, antioxidant, extract

Žlahtnjenje hibridnih sort zelja (Brassica oleracea var. capitata L.)

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Zelje je ena izmed najpomembnejših vrtnin tako v svetu kot pri nas. Je dvoletnica in tujeprašnica, kar močno vpliva na žlahtniteljski postopek. Žlahtnjenje lahko poteka na klasičen način, ki je dolgotrajen in delovno zahteven, ali pa z uporabo novejših biotehnoloških pristopov, ki skrajšajo število let, potrebnih za nastanek novih sort. V prispevku so podani problemi, ki se pojavljajo v postopkih žlahtnjenja, ter to, kako jih je z biotehnološkimi metodami možno premostiti, in trenutno stanje na področju žlahtnjenja zelja v Sloveniji. V biotehnoloških postopkih žlahtnjenja zelja smo preučevali metode pridobivanja dihaploidnih linij s kulturo mikrospor. V poskus odzivnosti smo vključili 27 rastlin 8 različnih genotipov, ki vključujejo dednino udomačenega kultivarja »Varaždinsko«. Na indukcijo haploidov s pomočjo kulture mikrospor (Lichter, 1982) je bilo odzivnih 20 rastlin. Skupno se je v različnih poskusih razvilo 4.554 embrijev. Regeneracija embrijev v rastline je bila 7,7 %. Iz embrijev se je razvilo 350 rastlin, od teh se jih je 130 (37 %) spontano podvojilo. Na ta način smo dobili 62 dihaploidnih linij, ki smo jih samooprašili. Čiste linije smo v letu 2011 ocenili v poljskem poskusu. Najbolje ocenjene linije bomo v rastni sezoni 2012 križali in v letu 2013 križance testirali ter se tako približali požlahtnitvi prvega slovenskega hibrida zelja.

Ključne besede: zelje, žlahtnjenje, kultura mikrospor, dihaploidi

Breeding of cabbage hybrids (*Brassica oleracea* var. *capitata*)

Cabbage is one the most important vegetables in the world and also in Slovenia. It is a biannual and open-pollinated crop; therefore the classical breeding procedure is time consuming and labour intensive. On the other hand, biotechnological methods speed up the development of new varieties. The aim of the present paper is to present the problems arising during breeding procedure and possible solutions to overcome these difficulties. The present situation of cabbage breeding in Slovenia is also discussed. The biotechnological procedures of breeding cabbage via microspore culture were investigated. Twenty plants were responsive to haploid induction by microspore culture (Lichter, 1982). In different experiments 4554 embryos were developed. Regeneration of embryos into plants was 7.7 %. From total of 350 regenerants 130 (37%) were doubled spontaneously and 62 lines were acclimatized and then self-pollinated. Inbred lines were evaluated in the field trial in 2011. The most promising lines will be crossed in the year 2012 and in 2013 the evaluation of hybrids will be done. So, we will come near to the production of the first Slovene cabbage hybrid.

Key words: cabbage, breeding, microspore culture, dihaploids

Abecedno kazalo / Alphabetical Index