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konferenca VIVUS s področja kmetijstva, naravovarstva, hortikulture in floristike ter živilstva in prehrane

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# »Prenos inovacij, znanja in izkušenj v vsakdanjo rabo«

# »Transmission of Innovations, Knowledge and Practical Experience into Everyday Practice«

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# *Invited lecture*

## *Transfer of Innovation to Agricultural Sector: Example of ZHAW, Institute for Natural Resource Sciences*

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**Abstract**

The Swiss system with its dual-track VET programmes (apprenticeship) differs from most foreign systems of vocational and professional education and training. It is a successful model which is also receiving increased international attention. The final stage of this education are the Universities of applied sciences. The Zürich University of applied Sciences (ZHAW) is one of the leading universities of applied sciences in Switzerland and thus offers a wide range of specialist knowledge. All of its Schools carry out disciplinary and interdisciplinary research. The results of ZHAW research projects are both scientifically sound and practice-relevant.

The Institute of Natural Resource Sciences (IUNR) emphasizes the interdisciplinary approach to the applied research on the sustainable use of natural resources in both urban and rural areas. The applied projects were carried out together with the business community and were funded by Swiss Federal Commission for Technology and Innovation (CTI), Swiss Federal Office for the Environment (FOEN) and Swiss Federal Office for Agriculture (FOAG).

Several projects in which the innovation was transferred from applied research into swiss agricultural practice, and regional development will be presented.

**Key words:** innovation, funding, research, agricultural practice, regional development

1. sekcija:

# *Kmetijstvo*

1st session:

# *Agriculture*

# Eko zeliščarstvo kot dopolnilna dejavnost na kmetiji

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**Izvleček**
Glede na današnje gospodarske potrebe po višanju samooskrbe s hrano v RS, se veča tudi zanimanje in povpraševanje po domače pridelanih zeliščih. Referat obravnava dejansko povpraševanje po določenih zeliščih, glede na analizo izvedene anketne raziskave. Obenem se osredotoča na pogoje ekološke pridelave zelišč v Sloveniji in možnosti izvajanja te dopolnilne dejavnosti na kmetiji. Prispevek daje predvsem odgovor ali je eko zeliščarstvo kot tako smotrno, tržno zanimivo in pod kakšnimi pogoji.

Ugotovitve, do katerih smo prišli z raziskovanjem so, da je potreba po domačih zeliščih visoka. Kupci najbolj pogrešajo ustaljene začimbe, ki so v vsakodnevni uporabi, menijo tudi, da se v Sloveniji ne pridela dovolj zelišč in bi morali podpirati lastno proizvodnjo le-teh. Veliko bi se moralo narediti tudi na izobraževanju in promociji domačih eko zelišč, ter ozaveščati o pomembnosti kupovanja Slovenskih proizvodov. Pri vseh odločitvah v sklopu dopolnilne dejavnosti je treba upoštevati veljavne predpise, dohodninsko lestvico, predviden promet, status kmeta, ter vložiti zahtevane vloge na javnih državnih uradih.

**Ključne besede:** ekološko zeliščarstvo, dopolnilna dejavnost na kmetiji, anketna raziskava, predpisi

# Growing organic herbs as a supplementary business activity on a farm

**Abstract**
Given today's economical need for increasing self-sufficiency of food in Slovenia, the interest for home grown organic herbs is also increasing. This paper deals with actual enquiries for certain herbs, according to a conducted survey research analysis. At the same time, the focus is on conditions for organic herb growing in Slovenia and the possibility of implementing this supplementary activity on farms. The results give answers on whether organic herb growing is rational and interesting for the market and under what conditions. Findings, to which we have come through this research, show that the need for local herbs is high. Customers are mostly missing spices that are used every day, they also believe that Slovenia does not produce enough herbs, and that self-sufficient production should be supported. More effort should be put in education and promotion of home grown organic herbs, and raising awareness about the importance of buying Slovenian products. With decisions concerning supplementary business activities, valid regulations are to be considered, the income tax scale, the forecast of income, the status of the farmer, and the required applications in public government offices must be filed.

**Key words:** organic herb growing, supplementary buissiness activity, questionnaire, regulations

# *Vpliv selena na sadike brokolija*

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**Izvleček**
Preučevali smo vpliv Se(IV) in Se(VI) na fiziološke in biokemijske lastnosti sadik brokolija (*Brassica oleracea var. italica*). Sadike smo gojili v kontroliranih pogojih. Pognojili smo jih z različnimi koncentracijami Se: 2, 5, 10, 20 mg $L^{-1}$ Se(IV) oz. Se(VI), 30 mg $L^{-1}$ Se(IV) in 50 mg $L^{-1}$ Se(VI). Dan po dodajanju Se se je fotokemična učinkovitost sadik brokolija povišala, štiri in osem dni po dodajanju pa ni bilo razlik med kontrolo in sadikami, ki smo jim dodali Se. Po 11. dneh je Se(VI) v visokih koncentracijah (20, 50 mg $L^{-1}$) znižal fotokemično učinkovitost preučevanih rastlin. Štiri do šest dni po dodajanju Se smo opazili pozitiven vpliv Se na vsebnost klorofila a. Povišana vsebnost klorofila a skupaj z nižjo vsebnostjo karotenoidov in nespremenjeno fotokemično učinkovitostjo kaže na trenutno adaptacijo sadik brokolija na dodani Se. Z daljšo izpostavljenostjo 50 mg Se(VI) $L^{-1}$ se je količina karotenoidov in antocianov povišala, kar bi lahko kazalo na stres pri rastlini.

**Ključne besede:** selen, brokoli, fotokemična učinkovitost, barvila

# *Selenium effect on broccoli transplants*

**Abstract**
The effect of Se(IV) and Se(VI) on physiological and biochemical characteristics of broccoli (*Brassica oleracea var italica*) transplants under controlled conditions were studied. Transplants were fertilized with various concentrations of Se: 2, 5, 10, 20 mg $L^{-1}$ Se(IV) or Se(VI), 30 mg $L^{-1}$ Se(IV) and 50 mg $L^{-1}$ Se(VI). The addition of Se increased the photochemical efficiency of transplants the day after treatment, in days 4 to 8 after the treatment, the photochemical efficiency was unchanged, while after 11 days at high Se(VI) exposures (20, 50 mg $L^{-1}$) this parameter decreased. A positive effect of Se on chlorophyll a in days 4 to 6 after the treatment was observed. This, together with lower content of carotenoids and unaffected photochemical efficiency, points to current adaptation of broccoli transplants to Se exposure. The increase in amount of carotenoids and anthocyanins with longer exposure to Se(VI) was observed in broccoli transplants, treated with 50 mg Se(VI) $L^{-1}$ which could be an indication of stress.

**Key words:** selenium, broccoli, photochemical efficiency, pigments

# *Dopolnilne dejavnosti na kmetijah v občini Ormož in njihovo vključevanje v turistično ponudbo severovzhodne Slovenije*

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**Izvleček**
Razvitost turizma na posameznem območju je pogojena z naravnimi, družbenimi in gospodarskimi razmerami. Na območju SV Slovenije so prisotne tako občine z izrazito turistično usmeritvijo kot turistično nerazvite občine brez možnosti prenočitev in brez prisotnosti kmetij s turistično dejavnostjo. Cilj raziskave je bila analiza sedanjega stanja in ocena možnega razvoja dopolnilnih dejavnosti na kmetijah v občini Ormož ter njihovo vključevanje v turistično ponudbo. V ta namen smo izvedli 50 anket na območju občine Ormož. Zbrane podatke smo obdelali z DEXi metodo, ki temelji na večparametrskem modeliranju in daje temelje za odločanje o možni usmeritvi v dopolnilne dejavnosti. Z raziskavo smo potrdili, da pokrajinsko pestrejša območja nudijo več možnosti za usmeritev kmetij v dopolnilne dejavnosti, ki so zanimive za turizem. Vinogradništvo je pomembnejša gospodarska panoga v občini Ormož, ki se izkorišča tudi v turistične namene. Po ormoških goricah poteka ormoška vinska turistična cesta, na ponudbo katere se vežejo tudi kmetije z dopolnilnimi dejavnostmi peke kruha, svežega peciva, slaščic in s ponudbo suhomesnatih izdelkov. Z večjo povezanostjo med turističnimi kmetijami bi lahko ponudbo v prihodnje nadgradili in odprli nove možnosti zaposlovanja.

**Ključne besede:** turizem na kmetijah, dopolnilne dejavnosti, naravna dediščina, kulturna dediščina

# *Integrating supplementary activities on farms in the Ormož municipality into the tourist offer of northeast Slovenia*

**Abstract**
The development of tourism in a given area depends on natural, social and economic circumstances. In northeast Slovenia, some municipalities are strongly orientated towards tourism whereas others are not; they do not offer overnight accommodation and there are no tourist farms. The aim of our research was to analyze the current situation and to assess the possibility of advancing supplementary activities on farms in Ormož and integrating them into the tourist offer. Fifty surveys were conducted in the area of Ormož. The data was analyzed with DEXi, a method based on multi-parameter modelling, which

provided the foundation for making decisions about introducing supplementary activities to farms. The study confirmed that more diverse landscapes offer more opportunities for farms to develop supplementary activities that are of interest to tourism. Viticulture is a major industry in the Municipality of Ormož that is also exploited for tourism purposes. There is a wine road on the hills in this area that is complemented by the products offered on surrounding farms: homemade bread, fresh pastries, cakes, and a range of meat products. Greater interaction between tourist farms could result in an upgrade in the tourist offer and new employment opportunities.

**Key words:** farm tourism, supplementary activities, natural heritage, cultural heritage

# *Agentni model spreminjanja rabe tal na podeželju občine Izola*

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**Izvleček**
Podeželje v občini Izola doživlja izjemno hitre in skokovite demografske, gospodarske, okoljske spremembe, kar je razvidno iz spreminjajoče se rabe tal. Pri spremembah sodelujejo različni akterji, a se v agentnih modelih spreminjanja rabe tal na podeželju večinoma modelira odločanje kmetov. Za zasnovo agentnega modela (agentov, okolja, spremenljivk, procesov, parametrov in pravil) smo uporabili vzorčno usmerjeno modeliranje, model pa izdelali v programskem okolju NetLogo. Za začetno nastavitev modela smo uporabili 549 agentov (kmetij), ki so sprejemali odločitve o rabi tal pod različnimi prostorskimi omejitvami. Model je pokazal, da imajo najmanjši kmetje velik vpliv na videz podeželja v občini Izola, saj so številčno najbolj zastopani.

**Ključne besede:** agentni model, raba tal, podeželje, občina Izola

# *Agent-based model of land use change in rural areas of Izola municipality*

**Abstract**
Rural areas in Izola municipality are experiencing extremely rapid demographic, economic, and environmental changes that are reflected in changing land use. Agent-based modelling is frequently used for modelling land use change. Different actors are involved in these changes, but agent-based models of rural land use usually model farmers' decisions. We used pattern-oriented modelling to define the model structure (agents, environment, variables, parameters, processes, and rules) and implemented the model in NetLogo programming environment. The model was initialised with 549 agents (farms), who made decisions about land use under different spatial constrains. The model revealed that the high number of the smallest farms have a high impact on the appearance of the rural landscape in Izola municipality.

**Key words:** agent-based model, land use, rural areas, Izola municipality

# Preizkušanje alternativnih načinov varstva kapusnic pred škodljivci

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**Izvleček**
V slovenskih agroekoloških razmerah pri gojenju kapusnic največ težav in škode povzročajo škodljivci. Zaradi številnosti in raznolikosti vrst je varstvo kapusnic pred škodljivci zahtevna naloga, ki jo majhen izbor insekticidov še otežuje. Slednje predstavlja izziv za iskanje nekemičnih oz. alternativnih načinov zatiranja. S predstavljenim poljskim poskusom smo zato želeli preveriti, ali lahko z uporabo selena oz. z uporabo agrohomeopatskega pripravka zmanjšamo škodo, ki jo na brokoliju (*Brassica oleracea var. italica*) povzročajo škodljivci. Selen smo sadikam brokolija dodali 3 dni pred presajanjem v obliki selenata (Se(VI)), agrohomeopatski pripravek X19 (*Cora agrohomeopatie*) pa smo uporabili skladno z navodili. Se(VI) je pozitivno vplival na začetni razvoj rastlin, ob pobiranju pa so bile rastline le nekoliko, a ne statistično značilno, težje kot pri kontroli in X19, značilnih razlik pa ni bilo niti pri masi rože. Boljša začetna rast bi lahko bila posledica manjšega pritiska škodljivcev v primerjavi s kontrolo in X19. Rezultati namreč nakazujejo na nekoliko manjši obseg poškodb zaradi bolhačev kot tudi na manjše število bub kapusove muhe na koreninskem sistemu ob spravilu pri rastlinah, ki jim je bil dodan Se(VI), čeprav razlike niso statistično značilne. Aplikacija agrohomeopatskega pripravka X19 ni vplivala ne na rast rastlin, ne na obseg poškodb zaradi bolhačev oz. na prisotnost bub kapusove muhe.

**Ključne besede:** brokoli, *Delia radicum*, *Phylotretta spp.*, selen, agrohomeopatija

# Testing of alternative plant protection agents against brassica pests

**Abstract**
In Slovenian agroecological conditions the main problems and damages in vegetable brassica production are caused by insect pests. The number and diversity of species sets the management of harmful insects in cole crops as a demanding task which is being aggravated by limited assortment of fitofarmaceutical products. The later presents a challenge to search for alternative techniques for insect pest management. The aim of the presented field trial was therefore to examine whether the damage caused by insect pests on broccoli (*Brassica oleracea var. italica*) could be reduced by the use of selenium and agrohomeopathic product respectively. Selenium in the form of selenaite (Se(VI)) was applied to broccoli transplants 3 days before transplanting. Agrohomeopathic product X19 (Cora agromomeopathie) was applied according to the instructions. Plants treated with Se(VI) exhibited better initial growth while at the harvest they were still slightly, but not statistically significant, heavier than the control and X19 plants, and there was no difference in the weight of curds. The better initial growth could be the result of lower pest pressure in comparison with control and X19 since Se(VI) treated plants were slightly, but

not statistically significant, less damaged by *Phylotretta* spp. and had less pupae of Delia radicum at harvest. The application of agrohomeophatic product X19 did not exhibit any influence nether on the growth of plants nether on the damage caused by flea beetles and presence of cabbage root fly pupae respectively.

**Key words:** broccoli, *Delia radicum*, *Phylotretta* spp., selenium, agrohomeopaty

# *Prirast jagnjet oplemenjene jezersko-solčavske pasme v ekološki reji*

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**Izvleček**
V prispevku smo predstavili težo jagnjet in dnevni prirast pri oplemenjeni jezersko-solčavski pasmi (JSR) na poskusni kmetiji, ki je usmerjena v ekološko prirejo mesa. Čredo sestavlja 129 ovc pasme JSR in 2 ovna. Eden od ovnov je pasme JSR in drugi pasme texel. Letno se skoti približno 250 jagnjet. V opazovani čredi kotitve potekajo trikrat na dve leti, enojčkov je bilo 48 %, dvojčkov 45 % in trojčkov le 7 %. Povprečno število mladičev na leglo za leto 2012 je bilo 1,58. V raziskavo smo vključili 12 ovc z različnim številom mladičev v leglu (enojčki, dvojčki, trojčki). Kot smo omenili, trop na kmetiji sestavlja tudi oven pasme texel, zato smo v poskus vključili še jagnjeta te pasme. Namen poskusa je bil ugotoviti prirast jagnjet glede na število teh v gnezdu. Dvojčki pasme texel so z 271 g/dan priraščali najbolje, za 9 g/dan so slabše priraščali enojčki JSR pasme. Sledijo jim dvojčki pasme JSR, katerih dnevni prirast je znašal od 218 do 252 g/dan. Najmanjši prirast smo zabeležili pri trojčkih (200 g/dan), kar smo tudi pričakovali. Na kmetiji ugotavljamo, da jagnjeta ovc, ki jagnjijo prvič, priraščajo slabše in počasneje. Stanje se ponovi nekje po 13. jagnjitvi, ko ovce nimajo vedno dovolj mleka. V povprečju so jagnjeta JSR pasme na ekološki kmetiji brez dokrmljevanja priraščala 222 g/dan (60 ± 15 dni), kar je za 2 g več kot je slovensko povprečje v letu 2013.

**Ključne besede:** opl. jezersko-solčavska pasma, texel, plodnost, prirast, ekološka reja

# *Average Daily Growth of Improved Jezersko-Solčava Lambs in Organic Farming*

**Abstract**
This paper presents the weight of Improved Jezersko-Solčava (JSR) lambs and their daily growth at the experimental organic meat production farm. The flock consists of 129 ewes, all JSR breed and of 2 rams. One of the rams is a JSR and the other is a Texel breed. The ewes produce approx. 250 lambs per year. There are 3 lambings within a 2 year period in the observed flock, producing 48 % of singles, 45 % of twins and only 7 % of triplets. The average number of lambs per litter was 1.58 in 2012. Our research involved 12 ewes with various numbers of lambs in their litters (singles, twins, triplets). As one of the

rams is a Texel, our research considered Texel lambs as well. The aim of the research was to determine the animal growth rate according to the number of lambs in a litter. The growth rate of Texel twins was the highest at 271 g/day, while Jezersko-Solčava singles grew at the rate of 262 g/day and Jezersko-Solčava twins' growth rate was between 218 and 252 g/day. Triplets grew, as expected, at the slowest rate (200 g/day). We established that the lambs of ewes lambing for the first time grow more slowly and feebly, which is also the case after their 13th lambing when ewes often lack milk. On average the ecological lambs of JSR breed with no extra feeding grew 222 g/day (60 ± 15 days) which is 2 grams more than Slovenian average growth in year 2013.

**Key words:** improved Jezersko-Solčava breed, texel breed, growth, organic farming

# *Kmetijsko znanje dijakov v biotehniškem izobraževanju*

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**Izvleček**
V raziskavi, ki je potekala v Biotehniškem centru Naklo, smo preverjali učinek pouka na šolskem vrtu na kmetijsko znanje dijakov. Kmetijsko znanje smo ugotavljali s testom znanja pri 237 dijakih kmetijske in hortikulturne usmeritve.
Vprašanja so zajemala 5 vsebinskih sklopov. Dijaki so se najbolje izkazali pri vsebinskem sklopu varstvo rastlin, oskrba posevka in skladiščenje pridelka (M = 61,7, SD = 20,8). Nekoliko slabše rezultate so dosegli pri naslednjih treh vsebinskih sklopih: gnojenje, načrtovanje in analiza tal (M = 56,1–48,0; SD = 18,2–25,6). Zelo slabo znanje pa so pokazali pri sklopu prepoznavanje rastlin in živali (M = 20,2, SD = 28,9). Znanje dijakov se je statistično pomembno razlikovalo glede na stopnjo izobraževanja ($p < 0,01$) in letnik izobraževanja ($p < 0,01$). Dijaki so dobro poznali definicije in dejstva, slabše dosežke pa so pokazali pri nalogah, ki so zahtevale uporabo znanja.

**Ključne besede:** kmetijsko znanje, šolski vrt, srednja šola

# *Agricultural Knowledge of Students in Biotechnical Education*

**Abstract**
In this research, conducted at the Biotechnical Centre Naklo, we examined the effect of education in the school garden on students' agricultural knowledge. Students' knowledge was assessed by administering a test to 237 students of agricultural and horticultural programmes.

The questions covered five topics. The students achieved the best results in the topic of plant protection, care and crop storage (M = 61.7, SD = 20.8). They performed slightly worse in the following three topics: fertilization, design and soil analysis (M = 56.1 to 48.0, SD = 18.2 to 25.6). Inadequate knowledge was demonstrated in the topic of identifying plants and animals (M = 20.2, SD = 28.9). The knowledge of students varied significantly according to the level of education ($p < 0.01$) and the year group ($p < 0.01$). The students knew facts and definitions, whereas they demonstrated less knowledge in knowledge application tasks.

**Key words:** agricultural knowledge, school garden, secondary school

# *Pomen samoimkompatibilnosti in citoplazemske moške sterilnost pri pridobivanju hibridnih sort zelja (Brassica oleracea var. capitata L.)*

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**Izvleček**
Postopki žlahtnjenja zelja (*Brassica oleracea* var. *capitata*) so dolgotrajni, ker se med drugim srečujemo tudi s problemom samoinkompatibilnosti in težavami pri pridobivanju semena hibridov. V ta namen je potrebno v izbrane linije vnesti citoplazemsko moško sterilnost (CMS), uporabiti samoinkompatibilnost ali gametocide. V preteklih letih smo izvedli 2 kompletna ciklusa žlahtnjenja, kar pomeni, da smo pridobili čiste linije različnih starševskih rastlin. Izhajali smo iz križancev med hibridnim kultivarjem Hawke F1 in udomačeno populacijsko sorto Varaždinsko. Iz prvega ciklusa žlahtnjenja je bilo odbranih 19 linij, ki so bile medsebojno križane; skupno smo pridobili seme 105 križancev. Linijam iz prvega ciklusa smo določili tolerantnost na črno žilavko kapusnic in linije, ki so kazale visoko stopnjo tolerantnosti vključili v nova križanja s populacijsko sorto Varaždinsko in tolerantnim hibridnim kultivarjem Matsumo F1. Sledilo je pridobivanje dihaploidnih linij in določevanje samoinkompatibilnostnega razreda. Iz drugega ciklusa žlahtnjenja je bilo odbranih 30 linij, ki so ustrezale po morfoloških lastnostih in so bile medsebojno križane v rastni sezoni 2012. V letu 2013 je bil izveden poljski poskus s polovičnimi dialelnimi križanci v obsegu (8x8), prav tako pa v manjšem obsegu s preostalimi 430 križanci. V letošnjem letu bo izveden poskus z odbranimi križanci, ki jih bomo primerjali s komercialno zanimivimi hibridi. V predstavitvi na simpoziju bodo podani tudi rezultati poljskega poskusa s križanci iz letošnjega leta, predvsem pa problematika samoinkompatibilnosti ter citoplazemske moške sterilnosti.

**Ključne besede:** žlahtnjenje, zelje, hibrid, samoinkompatibilnost, CMS

# *The importance of self-incompatibility and cytoplasmic male sterility in hybrid seed production (Brassica oleracea var. capitata)*

**Abstract**
Cabbage breeding is time consuming because of difficulties with self-incompatibility and problems with seed production. Therefore it is necessary to incorporate citoplasmic male sterility (CMS) into inbreed lines or use the phenomenon of self-incompatibility. The treatment with gametocides can be also effective. During recent years, two complete breeding cycles were performed. We have obtained the inbreed lines from different donor plants. Hybrid cultivar Hawke served as donor of high androgenetic responsiveness while heirloom variety Varaždinsko was used for its growth characteristics. From the first breeding cycle 19 lines were selected and crossed with each other yielding 105 hybrids. In the following years, the lines from the first cycle were selected according to black rot tolerance. Inbreed lines with high degree of tolerance to this bacterial disease were included in crosses with variety Varaždinsko and hybrid cultivar Matsumo F1. New donor plants were used for induction of doubled haploids and self-incompatability class was determined. From the second breeding cycle 30 lines with appropriate morphological characteristics were selected and crossed in the growing season 2012. In 2013 a field trial with half dialell crosses in the range (8x8) and another 430 experimental hybrids were examined. We obtained information about potentially interesting hybrid varieties for the Slovenian market. During this growing season a field trial with the best experimental hybrids and commercially interesting hybrids was planted. Results of the field trial from 2014 will be presented on the Symposium. Problem of self-incompatibility and citoplasmic male sterility will be also discussed.

**Key words:** breeding, hybrid, white cabbage, self-incompatibility, CMS

# *Prve izkušnje z uporabo proizvodov CORA Agrohomeopathie v hmeljiščih*

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**Izvleček**
V letu 2013 je bil izveden prvi proizvodni poskus z uporabo preparatov CORA Agrohomeopathie v nasadu hmelja sorte

»Aurora« v Savinjski dolini. V poskusu so bili uporabljeni štirje različni agrohomeopatski pripravki v treh odmerkih. Kot kontrola so služile rastline v istem nasadu, ki so bile tretirane s sistemičnimi insekticidi in rastline, ki jih niso tretirali. Tretiranje je bilo opravljeno z običajno opremo za škropljenje. Preizkušena sta bila dva protokola tretiranja. Med poskusom so spremljali fenološki razvoj rastlin, pojav peronospore, dinamiko pojavljanja listnih uši in hmeljevega bolhača. Ocenjen je bil tudi potencialni pridelek in analizirana vsebnost alfa-kislin v pridelanih hmeljevih storžkih. Na podlagi preliminarnega poskusa lahko ugotovimo, da so v prvem letu uporabe pripravkov Cora Agrohomeopathie rastline bile vso rastno dobo v dobri kondiciji, pridelek hmelja je bil enak povprečju letnika, kakovost je bila boljša od povprečja, na storžkih ni bilo ugotoviti poškodb nastalih zaradi škodljivih organizmov. Dobljeni rezultati so podlaga za odločitev, da se s poskusi uporabe agrohomeopatskih pripravkov nadaljuje.

**Ključne besede:** agrohomeopatija, hmelj, pridelava, zaščita rastlin, preliminarni poskus

# *First experiences with CORA Agrohomeopathie preparations in hop fields*

**Abstract**

In 2013 preliminary experiment using preparations CORA Agrohomeopathie in hopfield of varietiy »Aurora« in Savinjska Valley was conducted. Four different agrohomeopathy preparations in three doses were tested in the experiment. Hop plants on the same hopfield, treated with systemic insecticides and not treated plants were used as the control. Treatment was carried out with the usual spraying equipment. Two treatment protocols were tested. Phenological development of the plant, the emergence of downy mildew, the dynamics of occurrence of hop aphids and hop flea beetle were monitroed. Potential yield was assessed and the content of alpha-acids in hop cones analyzed.

Based on the preliminary experiment we can conclude that in the first year of use of preparations Cora Agrohomeopathie plants were in good shape through all growing season, the yield was on the average of the year, the quality was better than average and the damage caused by pests in the cones was not apparent. Results helped in decision to continue with experiment also in next seasons.

**Key words:** agrohomeopathy, hops cultivation, plant protection, preliminary experiment

# Ali temperatura tal, ki je posledica uporabe različnih zastirk, vpliva na razvoj krompirjevih gomoljev?

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**Izvleček**
Ugotavljali smo, kako različne organske in anorganske protiplevelne zastirke vplivajo na temperaturo tal in kako le-ta vpliva na pridelek zgodnjega krompirja. V raziskavi smo uporabili eksperimentalno, deskriptivno in komparativno metodo. Pod zastirko je temperatura tal navadno nekoliko višja kot temperatura tal brez zastirke. Gojili smo zgodnji krompir (*Solanum tuberosum*) sorto ´Gourmandine´. Začetna temperatura tal ob sajenju je bila povsod enaka. Tla smo prekrili s črno polipropilensko folijo, črno etilensko folijo in s slamo, na enem delu pa tal nismo prekrili. Del posevka smo prekrili še z belo polipropilensko folijo debeline 20 g/m$^2$ za zaščito pred mrazom. Temperatura tal je različno naraščala glede na način zastiranja in način varovanja pred mrazom. Za hiter začetni razvoj je priporočljiva črna zastirka, ki ogreje tla in povzroči hiter vznik, osipavanje in pletje ni potrebno. Organska zastirka preprečuje segrevanje tal, kar upočasni razvoj. Dodatna zaščita pred mrazom segreje tudi tla. Klasično gojenje krompirja na grebenih zahteva osipavanje in odstranjevanje plevela. Segreta tla v začetku razvoja rastlin in višja temperatura tal med nadaljevanjem razvoja ugodno vplivata na razvoj in pridelek zgodnjega krompirja.

**Ključne besede:** krompir, zastirka, temperatura tal, pridelek

# Does the soil temperature, which is a result of using different sorts of covers, affect the growth of potato tubers?

**Abstract**
Experimental, descriptive and comparative methods were used in our research to find out how various kinds of organic and inorganic covers affect the temperature of soil and consequently an early potato harvest. The soil temperature is usually a bit higher if the soil is covered. We grew early potatoes (*Solanum tuberosum*) cultivar ´Gourmandine´. The initial soil temperature did not differ at the beginning of planting. The soil was covered with polypropylene foil, black ethylene foil and hay; one section was left uncovered. One part of the bed was covered with white polypropylene foil 20 g/m$^2$ to protect the crop from cold. There was a significant temperature difference among differently covered parts. Black foil, which warms the soil and quickens the sprout, should be used if you want fast growth at the beginning. Weeding and hilling up the soil are no longer necessary. Organic cover prevents heating the soil, which means that the growing process is slowed down. Additional protection against cold also contributes to higher soil temperature. On the other hand, conventional potato growing involves more work like weeding and hilling up the soil along the sides of the plants. Therefore higher soil temperature has a positive effect on growing and harvesting early potatoes.

**Key words:** potato, cover, soil temperature, harvest

# *Odziv rička (Camelina sativa (L.) Crantz) na pridelavo na nižinskih poljedelskih območjih*

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**Izvleček**

Sortni poskus z ričkom smo postavili v letih 2012 in 2013 na štirih lokacijah (v Prekmurju na lahkih in težkih tleh ter v Savinjski dolini na težkih in srednje težkih tleh). Vključene sorte: danski sorti Vega in Hoga, nemški Ligena in Calena in ekološko pridelana Calena: Bio Calena ter Slovenska avtohtona sorta. Problem pridelave rička na nižinskih poljedelskih površinah v Savinjski dolini in v Prekmurju, če posevkov nismo ročno pleli in smo upoštevali trenutno zakonodajo glede registracije fitofarmacevtskih sredstev, se je pokazal v: i) nerazpoložljivosti uporabe sredstev za zaščito pred boleznimi in škodljivci ter za zatiranje plevelov, posledično slabe konkurenčnosti plevelom ter prisotnosti bolezni in škodljivcev, ki so ponekod presegli prag škodljivosti, ii) neprilagojenosti rastline na pridelavo v razmerah, ko je poleti več dni zaporedoma vroče (nad 30 °C) in je obenem suh zrak – luski so se v nekaj dneh začeli odpirati in izpadalo je seme, iii) veliki občutljivosti na nizke temperature in/ali mokra, hladna tla spomladi; v takšnem letu (2013) ni prišlo niti do ustreznega vznika oziroma do žetve, iv) pridelek lahko ocenimo na vseh lokacijah razen na lokaciji Savinjska dolina – težka tla v enem od preučevanih let (2012) kot slab, komaj okoli 0,5 t/ha, oziroma ničen v letu 2013. Poljščina je bolj primerna za manjše površine, ki omogočajo hitre intervencije in nekaj ročnega dela, da je pridelek zagotovljen, sploh če seme stisnemo in prodajamo olje, ki dosega zelo dobro ceno.

**Ključne besede:** *Camelina sativa* (L.) Crantz, navadni riček, sorte, pridelek, pridelava, vremenske razmere

# *Response of Camelina (Camelina sativa (L.) Crantz) to the lowland agricultural areas*

**Abstract**

Variety trial was conducted in 2012 and 213 at four locations (Prekmurje and Savinja valley on different soil). Included varieties were: Danish Vega and Hoga, German Calena, Bio Calena and Ligena and Slovenian autochthonous variety. In the experiments weeds were not mechanicaly removed and the current legislation regarding plant protection products was

considered. The problems of Camelina production in lowland agricultural areas in Savinjska Valley and in Prekmurje were: i) the unavailability of plant protection means against diseases and pests and weeds; ii) Camelina is not adapted to the high temperatures, especially when temperatures were above 30 °C more days in a row and the air was dry. Husks were starting to open and seeds were falling out; iii) high sensitivity to low temperature and/or wet, cold soil in spring. In the year of 2013, when the spring was cold and wet, there was no adequate emergence and no harvest; iv) the yield was low, only about 0.5 t/ha, with exception of Camelina on heavy soil in Savinjska Valley in the year 2012. The crop is more suitable for smaller areas, which allow rapid intervention and some manual work, so the yield is guaranteed, especially if the seed is compressed and we sell oil, which achieves a very good price.

**Key words:** *Camelina sativa* (L.) Crantz, false flax, varieties, yield, cultivation, weather conditions

# *Uporaba pristopa socialnega podjetništva za ustvarjanje inovativnih eko-socialnih intervencij v kmetijstvu v Sloveniji: študijski primer, pilotna raziskava*

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**Izvleček**
Slovenija se sooča z vrsto problemov: družbeni, demografski, okoljski, ekonomski, agronomski ... S sintezo praks, ki so nekoč že obstajale na našem ozemlju (medgeneracijsko sodelovanje, zadružništvo) in njihovo implementacijo času in prostoru primerno, rešujemo današnje probleme in omogočamo nove možnosti razvoja podeželja ter razvijamo nov gospodarski segment – socialno podjetništvo, ki dobiva danes vedno večji pomen.

V tem prispevku bomo predstavili lastno raziskavo z metodo akcijskega raziskovanja, učenja z delom, ki nam bo služila za ustanovitev socialnega podjetja na osnovah naše raziskave.

Raziskava je temelj za razvoj novih možnosti zaposlitev in razvoja podeželja, na prenosu znanja starejših generacij in implementaciji tega znanja v današnji čas. S pomočjo metode akcijske raziskave testiramo idejo za implementacijo in ustanovitev socialnega podjetja, ki bo opolnomočilo ljudi za sprejemanje lastnih odločitev in omogočila nove razvojne možnosti podeželskega območja.

**Ključne besede:** ekološko kmetijstvo, akcijska raziskava, socialno podjetje, medgeneracijsko sodelovanje, brezposelnost, trajnostni razvoj podeželja

# *Using the social entrepreneurship approach to generate innovative eco-social interventions in agriculture in Slovenia: a case study*

**Abstract**

Slovenia is today facing a series of problems: social, demographic, environmental, economic, agronomic ... With the synthesis of practices that once existed in our territory (intergenerational cooperation, cooperatives) and their implementation time and environment appropriate we will solve today's problems and enable new possibilities for the development of rural areas and developing new economic segment - social entrepreneurship, which is today growing in importance.

In this paper, we present our own research using the method of participatory action research, learning by doing, which will serve us for the establishment of social enterprise start-up based on our research.

The study will be the foundation for the development of new employment opportunities in rural areas.

Research is based on the knowledge transfer from the older generations and implementation of this knowledge in today's situation. With the method of paricipatory action research we are testing our project idea for implementation and establishment of social enterprise which will empower people for their own decisions and enable new development opportunities of the rural area.

**Key words:** organic agriculture, action research, social enterprise, intergenerational participation, unemployment, sustainable rural development

# *KONOPLJA – več kot samo industrijska rastlina*

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**Izvleček**

Industrijska/navadna konoplja – *Canabis sativa* L. var. *sativa* je rastlina, ki z leti (ponovno) pridobiva na pomenu. Končno se jo prepoznava kot cenjeno rastlino s številnimi zdravilnimi učinki (za zemljo, ljudi in živali) in vsestransko uporabnostjo. V Sloveniji se je začela pospešeno sejati in uporabljati v predelavi v letu 2011, kar danes rezultira v številki 220 za pridelovalce (l. 2013), v l. 2014 pa se bo število predvidoma še zvišalo na 400 pridelovalcev. Dodatna motivacija za kmete je bil Pravilnik o pogojih za pridobitev dovoljenja za gojenje konoplje in maka (Ur. l. 40/2011), ki spodbuja s strani države tiste, ki jih zanima »oranje ledine« v rokovanju s tako posebno rastlino, kot je konoplja. V naši študiji smo s pomočjo dveh anket preverili, kako ljudje - potrošniki v splošnem poznamo konopljo ter na drugi strani povprašali pridelovalce o tem, kaj menijo o osveščenosti potrošnikov ter o trajanju ukvarjanja z industrijsko konopljo.

Z našo študijo želimo opozoriti na izredno pomembne lastnosti konoplje za naše gospodarstvo, kmetijstvo in zdravje ter predstaviti, predvsem pa prikazati trenutno stanje glede znanja in zavedanja o industrijski konoplji tako pri pridelovalcih kot potrošnikih.

**Ključne besede:** industrijska konoplja, kmetijstvo, zdravilni učinki, uporaba, trajnost

## *HEMP – more than just an industrial crop*

**Abstract**
Industrial hemp *Canabis sativa* L. var. sativa is a crop which is gaining on its importance from year to year more. Hemp is becoming generally accepted culture which has several positive effects on land, animals and people and can be used in various ways – for instance as building material. In Slovenia we observed higher production in 2011 – the new legislation about cultivation of hemp and poppy (Ur.L. 40/2011), where in 2013 there were already 220 producers and 400 are expected in 2014. In our study we used two different polls for producers and consumers about various topics in connection with industrial hemp.

The study aims at providing new insights on the status of this culture in Slovenia and present several beneficial impacts of hemp on agriculture, health and industry.

**Key words:** industrial hemp, agriculture, healing effects, usage, sustainability

## *Correlation of phenolic components in red and purple tomatoes*

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**Abstract**
Different parts of plants (roots, leaves, flowers, fruit, stem, bark) have been successfully used to treat numerous diseases. Tomato is known for its medicinal properties. The components that affect its activity are different phenolic compounds. Because of contraindications artificial preservatives priority is to use natural preservatives.
In this paper, we compared the content of phenolic compounds between the Russian Black Prince variety, type were tested, which is with high content of anthocyanins with hybrid Sidra F1 selections Institute of Vegetable S.Palanka. In the phase of technological maturity, the selection of sample produce for the purpose of chemical analysis has been performed. The object of the paper has been to define and establish the correlation between the total phenolic compounds and their antioxidant activity in the ethanol extracts of tomato . Antioxidant activity, defined as the ability of neutralising DPPH radicals.Total phenols were evaluated by the Folin-Ciocalteu, has been determined by means of spectrophotometric method. Results show that the total phenolic content was higher in the Black Prince (E1) (0.0877 ± 0.0001 g GAE/100g sample) than in Sidra (E2) (0.0711 ± 0.0001 g GAE/100g sample). High values of antioxidant activity were identified (92.67% for E1 and 90.72% for E2).

**Key words:** tomato, antioxidant, extract

# *Ohranitev visokogorskih kmetij na območju Poljanske doline*

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**Izvleček**
V prispevku, ki je povzetek diplomske naloge, predstavljamo življenje in možnosti za ohranitev visokogorskih kmetij v Poljanski dolini. Poljanska dolina leži v porečju Poljanske Sore, poteka od Škofje Loke do Žirovske kotline, dolga je 42 km in sodi med podeželske oziroma kmečke pokrajine. Predstavljenih je deset visokogorskih kmetij, kjer smo s pomočjo intervjujev in Swot analize pridobljenih podatkov proučili možnosti za ohranitev ali propad kmetij, razvoj dopolnilnih dejavnosti, primerjavo med posameznimi kmetijami, ki se že ukvarjajo s turizmom, prednosti in priložnosti in tudi slabosti po posameznih kmetijah. Rezultati kažejo, da imajo proučevane kmetije realno možnost obstoja, ob upoštevanju večjega vključevanja v dopolnilno turistično dejavnost (ekološka turistična dejavnost, predelava mlečnih izdelkov, športni turizem), večjo pozornost je potrebno nameniti oglaševanju in promociji; težave pa se pojavljajo pri pridobitvi finančnih sredstev. Celotno območje prestavlja še veliko neizkoriščenih možnosti za razvoj in s tem tudi nova delovna mesta, kar je v času okrevanja gospodarstva še kako pomembno.

**Ključne besede:** Poljanska dolina, visokogorske kmetije, ohranitev, turizem

# *Maintaining the highland farms in the area Poljanska Valley*

**Abstract**
The article is a summary of the diplom thesis presents the life and opportunities for the conservation of mountain farms in the valley Poljanski. Poljanska Valley lies in the basin Poljanska Sora, runs from Bishops Loke to Žiri Basin, 42 km long and is one of the rural and rustic landscape. Presented ten highland farms, where we are through interviews and SWOT analysis of data obtained will explore possibilities to preserve or collapse farms, the development of complementary activities, comparisons between individual farms that are already engaged in tourism, strengths and opportunities as well as weaknesses in individual farms. The results show that the studied farm real possibility of the existence, taking into account the greater involvement of the complementary tourist activities (eco-tourism activities, processing of dairy products, tourism), greater attention should be paid to the advertising and promotion; but difficulties arise in obtaining funding. The whole area represents numerous opportunities for development and thus new jobs which in times of economic recovery more important.

**Key words:** Poljanska valley, mountain farms, conservation, tourism

# *Suša se predstavi*

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**Izvleček**
Sušni dogodki, ki jih v grobem opišemo kot pomanjkanje padavin v nekem obdobju, so zabeleženi v zgodovinskih zapisih in jasno kažejo, da so se z njo spopadali že naši predniki. Klimatološke analize potrjujejo, da se pogostnost in intenziteta suš v Sloveniji povečujeta, posledično pa tudi tveganje in ranljivost kmetijske pridelave. Padavinski primanjkljaj vodi do ekonomskih škod, motene oskrbe z vodo in negotovosti pridelave hrane. Upravljanje s sušo in njenimi posledicami pa je odvisno od sposobnosti okolja in družbe. Ob sušnih dogodkih je za optimalno kakovost in količino pridelka ključnega pomena kontinuirana oskrba rastlin z vodo. Učinkovito rabo vode pri rastlinah lahko dosežemo s spremljanjem razvoja vremena in dejanskih razmer na kmetijskih zemljiščih. Sledenje kmetijske suše se izvaja na več nivojih: zgodnje opozarjanje, prvi signali suše in razglas suše. Pomembno je zgodnje opozarjanje na sušo, ker omogoča, da s pravilnimi tehnološkimi pristopi in kmetijskimi tehnikami omilimo ali celo izničimo učinke kmetijske suše. Sušnim obdobjem sledimo z meritvami osnovnih meteoroloških (predvsem padavine) in kompleksnejših agrometeoroloških spremenljivk (vodna bilanca), uporabo sušnih indeksov in vodnobilančnih modelov, kot je model IRRFIB, razvit na Agenciji RS za okolje. Model zajema interakcije vode v sistemu rastlina-tla-podnebje. Je pomembno orodje za spremljanje dinamike vodne bilance kmetijske rastline, ki z vključevanjem vremenske napovedi omogoča tudi napoved razvoja suše v prihodnje.

**Ključne besede:** pomanjkanje vode, kmetijska suša, sledenje suši, vodna bilanca

# *Measuring Drought*

**Abstract**
Drought events are described as lack of precipitation in definite time period. They are noted already in historical reports which clearly show that also our ancestors coped with drought. Climatological analyses for Slovenia confirm that drought frequency and intensity are increasing, consequently also risk and vulnerability of agriculture production. Rainfall deficit leads to economic costs, disturbed water supply and food insecurity. Drought management and its impacts depend highly on the level of capacities of the environment and population. For optimal quality and quantity of crop production continuous crop water supply is crucial. Efficient crop water use could be achieved with meteorological monitoring of weather development and actual conditions on agricultural fields. Agricultural drought monitoring is performed at multi levels: early warnings, first signals of drought and drought alert. Early warning has very important role which enables to alleviate or even eliminate agricultural drought impacts with properly implemented measures. Periods with lack of precipitation can be monitored with of basic meteorological measurements (mainly precipitation) and complex agrometeorological variables (water balance) or with use of drought indices and water balance models, as model IRRFIB, developed at Slovenian Environment Agency. Model integrates water interactions in the crop-soil-climate system. It is important tool to monitor crop water dynamics, which together with weather forecast enables to estimate development of drought.

**Key words:** water shortages, agricultural drought, drought monitoring, water balance

# *Ključni dejavniki inoviranja v LEADER območjih na Južnem Tirolskem*

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**Izvleček**
LEADER, ki je del Evropskega kmetijskega sklada za razvoj podeželja (EKSRP), je na Južnem Tirolskem ključni dejavnik za spodbujanje razvoja na perifernih območjih. Program temelji na pristopu "od spodaj navzgor", izvajajo pa ga lokalne akcijske skupine (LAS), ki predstavljajo obliko javno-zasebnega partnerstva.
Inovativnost je sestavni del programa LEADER, vendar je v smernicah opredeljena zelo ohlapno z namenom, da si lokalni akterji interpretacijo oblikujejo sami. Glavno raziskovalno vprašanje pričujočega prispevka je, ali je inovativnost v zadnjem obdobju programa LEADER na Južnem Tirolskem prvotni cilj lokalnih akcijskih skupin ali le način prilagajanja predpisom EU financiranja. S kvalitativno raziskavo v obliki polstrukturiranih intervjujev, ki smo jih opravili z menedžerji LAS, nosilci projektov in strokovnjaki, smo opredelili obseg inovativnosti v okviru programa LEADER na Južnem Tirolskem, predstavili uspešne in inovativne prakse, identificirali ključne dejavnike za inovativnost ter zbrali predloge in priporočila za prihodnja obdobja programa LEADER. Čeprav menedžerji LAS priznavajo, da inovativnost ni prioritetni cilj lokalne strategije, poudarjajo, da si prizadevajo vključevati inovativne pristope. Sredstva so tako včasih namenjena projektom, ki bi jih lahko financirali tudi iz drugih virov. Kljub temu pa LEADER omogoča, da regije realizirajo iniciative, ki jih drugače ne bi mogle.

**Ključne besede:** LEADER, LAS, inovacija, razvoj podeželja, Južna Tirolska, dobre prakse

# *Key drivers for innovation in LEADER areas of South Tyrol*

**Abstract**
The LEADER programme, interventional component of the European Agriculture Fund for Rural Development (EAFRD), is a key element to foster peripheral areas in South Tyrol. The programme is based on a bottom-up approach and is carried out by the local action groups (LAGs), which represent a form of public-private partnerships.
Innovation is an integral element of LEADER, but it is defined very rough in respective guidelines, which leaves the interpretation open to the local actors. In this paper we address the question whether within LEADER in the period 2007–2013 innovation is an objective pursued by LAGs in South Tyrol or just a way of conformity to the EU funding regulations. Based on qualitative research primarily by means of semi-structured interviews with LAG managers, project holders and experts in 2014, we characterize a scope of innovation relevant for LEADER in South Tyrol, introduce successful and innovative practices from the area, identify drivers for innovation and make proposals and recommendations for future LEADER periods. Although LAG managers admit that innovation is not their preferred objective, they underline that the LAG strategies are at least intended to strive innovative approaches. Admittedly funds were sometimes disbursed for necessary projects that could be funded from other sources; nonetheless, LEADER offered a setting for introducing new initiatives that otherwise would not have been brought to life.

**Key words:** LEADER, LAG, innovation, rural development, South Tyrol, good practice

# *Lokalna omrežja in trajnostni razvoj podeželja*

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**Izvleček**
V članku predstavljamo koncept možnosti razvoja kmetijstva v kontekstu trajnostnega razvoja in rasti z lokalnimi viri in udeleženci skozi kooperativno strategijo. Trajnostni razvoj razlagamo kot: »Delati stvari na pravi način« in si prizadevati za čisto industrijo tako, da bomo omogočili koriščenje virov in kvalitetno bivanje v zdravem in lepem okolju tudi naslednjim generacijam.

V članku avtor predstavlja koncept trajnostnega razvoja z oblikovanjem omrežij. Možna strategija razvoja, ki jo predlaga na podlagi primerjave izkušenj dobrih praks v svetu, je strategija mrežnega povezovanja. Velik poudarek je na podjetniški iniciativi, iskanju in izkoriščanju poslovnih priložnosti. Kmetije s svojo specifiko se soočajo z omejenostjo virov, ki jih lahko rešujejo s povezovanjem in sodelovanjem v omrežjih, kjer koristijo različne sinergijske učinke od možnosti specializacije, zniževanja stroškov in učinkovitejšega nastopa na trgu.

**Ključne besede:** trajnostni razvoj, podeželje, podjetništvo, omrežja, znanje

# *Local colaboration networks and sustainable development on rural area*

**Abstract**

In this paper we present the concept of the development of agriculture in the context of sustainable development and growth with local resources and participants through cooperative strategy. Sustainability is interpreted as: »Doing things in the right way« and pursue clean industry, and allow resource extraction and quality stay in a healthy and nice environment for future generations.

In this article the author present concept of sustainable development by creating a cross linking between the different complementary entities. Possible development strategy that we propose on the basis of comparison of experiences of good practice in diiferent rgions, is the networking strategy. The main focus is on entrepreneurial initiative, finding and exploiting business opportunities. Farms with their specifics are faced with limitations resources which can be solved by integration and participation in common networks, which benefit with variety of synergetic effects: specialization, cost savings, effective and efficient marketing communicatiation and salles.

**Key words:** sustainable development, rural area, entrepreneurship, clusters, knowledge

# *Izobraževanje zaposlenih v Višji strokovni šoli Biotehniškega centra Naklo*

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**Izvleček**

Spremembe se pojavljajo ves čas in terjajo prilagajanje zaposlenih novim razmeram, to pa pogosto vključuje tudi pridobivanje novih znanj in spretnosti. Le zaposleni, ki bo imel potrebna znanja in spretnosti, bo lahko pri svojem delu uspešen, in le organizacija z dobro in ustrezno izobraženim in usposobljenim kadrom bo lahko dosegala zastavljene cilje in ostala konkurenčna. Za zaposlene v Višji strokovni šoli Biotehniškega centra Naklo (v nadaljevanju BC Naklo) je izobraževanje ključnega pomena. K procesu stalnega usposabljanja in vseživljenjskega izobraževanja jih usmerjajo hitro spreminjajoče se razmere in potrebe po novem znanju in spretnostih. Vseživljenjsko učenje je pomembna vrednota v današnjem času naglih sprememb, ki jih doživljajo tudi šole.

Zavedajo se pomena nadaljnjega izobraževanja in izpopolnjevanja strokovnega in drugega znanja, da bi v čim večji meri vse pridobljeno znanje prenašali tako na kolege kot na študente.

Veščine in znanja, ki jih morajo zaposleni obvladati na delovnem mestu, le redko sovpadajo s tistimi, ki so jih pridobili s formalno izobrazbo. Dodatna usposabljanja morajo postati vsakodnevna praksa, da lahko organizacija zagotovi rast in razvoj.

Vsa usposabljanja in izobraževanja morajo biti v organizaciji skrbno načrtovana ter pripravljena na osnovi predhodno ugotovljenih potreb po znanjih, seveda pa ne gre zanemariti poteka in vrste izobraževanj tudi s finančnega vidika.

**Ključne besede:** izobraževanje, strokovno znanje, usposabljanje, potrebe po znanjih

# *Education of Employees in Higher Vocational College of Biotechnical Centre Naklo*

**Abstract**

Changes occur all the time and require adaptation of employees to the new situation, and this often includes the acquisition of new knowledge and skills. Only employees who will have the necessary knowledge and skills to be successful in their work, and the only organization with a good and properly trained and qualified staff will be able to achieve the set goals and remain competitive. For employees in Higher Vocational College of Biotechnical Centre (hereinafter referred to as BC Naklo) education is crucial. The process of continuous training and lifelong learning is guided by a rapidly changing environment and the need for new knowledge and skills. Lifelong learning is an important asset in today's time of rapid change experienced by the school.

They are aware of the importance of continuing education, training and gaining professional and other skills in order to transfer the acquired knowledge to colleagues and students as much as possible.

Skills and knowledge demanded from employees rarely coincide with those acquired through formal education. Additional training should become a daily practice, so that the employer can ensure growth and development.

All training and education must be carefully planned and prepared on the basis of previously identified skills that are needed, and one should not overlook the financial perspective of the organizing and types of training.

**Key words:** education, skills, training, needs

# *Zaposlovanje diplomantov Biotehniškega centra Naklo*

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**Izvleček**
Dandanes je pereč problem visoka brezposelnost mladih, s tem pa tudi nizka zaposlenost mladih v Sloveniji. To je aktualna problematika ne samo v Sloveniji, ampak tudi v Evropi. Prehod iz študija v zaposlitev je za mlade vse bolj otežen, saj nimajo ustreznih delovnih izkušenj iz začasnih del, ki so jih opravljali med študijem. Pojavlja se tudi situacija, da mladi, ki dejansko dobijo zaposlitev, opravljajo dela, ki so na nižji zahtevnostni stopnji glede na njihovo končno stopnjo izobrazbe.

V članku smo na začetku predstavili trenutno situacijo zaposlovanja in brezposelnosti v Sloveniji in Evropski uniji, v raziskovalnem delu članka pa smo predstavili in raziskali stanje zaposljivosti diplomantov Biotehniškega centra Naklo ter zaposljivost profilov, pridobljenih s študijskimi programi, ki jih ponuja Višja strokovna šola Biotehniškega centra Naklo. Ugotovili smo, da je zaposljivost diplomantov Biotehniškega centra Naklo dokaj visoka, vendar se ne zaposlujejo v smeri svoje končne izobrazbe, saj je razpisanih prostih delovnih mest manj kot diplomantov teh profilov.

**Ključne besede:** diplomanti, brezposelnost, iskanje zaposlitve, delo

# *Employment of Graduates of Biotechnical Centre Naklo*

**Abstract**
Nowadays, we are facing a pressing problem of high youth unemployment, and thus the low employment of young people in Slovenia. This is a topical issue not only in Slovenia, but also in Europe. The transition from study to employment for young people is increasingly difficult because of the lack of relevant working experience in temporary works having been performed during the study. There is also a situation that young people who actually get a job, perform works on the lower difficulty levels which are not in accordance with their final degree.

At the beginning of this article we present the current situation of employment and unemployment in Slovenia and the European Union, in the research part of the article, we present and investigate the state of employability of Biotechnical Centre Naklo graduates and employability profiles obtained from the study programmes offered by the Higher Vocational College of Biotechnical Centre Naklo. We realised that the employability of Biotechnical Centre Naklo graduates is quite high, but not all of them are employed in accordance with their final qualification, because there are less vacancies than graduates of these profiles.

**Key words:** graduates, unemployment, job search, job

# Potrebnost posebne zakonodajne ureditve s področja čebelarstva

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**Izvleček**
Na območju današnje države Slovenije je bil prvi Zakon o čebelarstvu izdan leta 1775. Ohranjanje naše avtohtone kranjske čebele in pomen čebelarstva je opredelil Načrt čebelarskega zakona leta 1920. Področje čebelarstva ureja Zakon o živinoreji, ki je bil sprejet leta 2002 ter vrsta nacionalnih predpisov. S pristopom Slovenije v Evropsko unijo je bil sprejet evropski pravni red, upoštevana pa so bile slovenske specifičnosti s področja čebelarstva in zaščite kranjske čebele. Za ohranjanje slovenske avtohtone čebelje rase *Apis mellifera carnica* bi bilo potrebno izdelati in sprejeti poseben Zakon o kranjski čebeli in čebelarstvu, kot ga imajo na primer na avstrijskem Koroškem, v Nemčiji in v Makedoniji. Namreč Slovenija ima dobro razvito čebelarstvo, ki je krepko nad evropskim povprečjem. Slovenija v okviru EU pomeni 0,40 % delež prebivalstva, 0,46 % delež ozemlja in gospodari z 1,10 % deležem čebeljih družin. Po populacijski gosti je Slovenija na četrtem mestu v EU z gostoto 8,24 čebeljih družin/km$^2$, kar je 137,22 % več od povprečja EU, ki je 3,47 čebeljih družin/km$^2$.

**Ključne besede:** čebelarstvo, zakonodaja, Slovenija, populacijska gostota, statistična analiza

# Requirement of special legislative regulation in the field of beekeeping

**Abstract**
In the area of the present-day country of Slovenia, the first Beekeeping Act was released in 1775. Keeping our local breed of Carniolan bees and the beekeeping significance was defined by the Beekeeping Act Plan from 1920. The field of beekeeping has been regulated by the Livestock Act adopted in 2002 and a number of national regulations. With the accession of Slovenia to the European Union the European acquis communautaire was adopted, and the Slovene specificity in the field of beekeeping and protection of the Carniolan bee was taken into account. In order to maintain the Slovene local breed of bees *Apis mellifera carnica* it would be necessary to elaborate and adopt a special Carniolan Bee and Beekeeping Act, as for example the acts in the Austrian Carinthia, in Germany and in Macedonia. Namely, Slovenia has a well developed beekeeping, which is well above the European average. Within the EU Slovenia represents 0.40% share of the population, 0.46% share of the territory and manage with 1.10% share of bee colonies. According to the bees population density Slovenia is in fourth place in the EU with a density of 18.24 bee colonies/km$^2$, which is 137.22% more than the EU average, which is 3.47 bee colonies/km$^2$.

**Key words:** beekeeping, legislation, Slovenia, population density, statistical analysis

# *Posebno varstvo kranjske čebele (Apis mellifera carnica) kot avtohtone pasme*

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**Izvleček**
Ozemlje Slovenije je izvirno območje kranjske čebele (*Apis mellifera carnica*), zato ni dovoljeno vnašati drugih pasem. Na podlagi morfoloških in gospodarskih lastnosti kranjice ter odpornosti na bolezni poteka selekcijsko delo v čebelarstvu. Kranjska čebela je ena izmed štirih evropskih pasem, ki je razširjena v večjem delu Avstrije, Madžarske, Slovaške, Srbije, v delu Makedonije, v Bosni in Hercegovini ter na Hrvaškem. V Sloveniji je populacija kranjske čebele razdeljena v alpsko, dinarsko–kraško, panonsko, južnoprimorsko in severnoprimorsko skupino. Ohranitev raznolikosti populacije je eden od pomembnih ciljev odobrenega Rejskega programa za kranjsko čebelo. Avtohtona pasma kranjska čebela je vodena v Registru pasem z zootehniško oceno. Javna služba, ki opravlja naloge genske banke bo do leta 2015 opravila molekularno gensko analizo za ugotavljanje genske čistosti kranjske čebele. V Izvorni rodovniški knjigi je od leta 2001 vpisano 191.911 gospodarskih matic in 264 rodovniških matic. V letu 2013 je bilo vpisanih 29.892 matic, od tega 57,6 % za prodajo v Sloveniji, 33,9 % za prodajo znotraj EU in 8,5 % za prodajo izven EU. V analizi ugotavljamo, da se je v obdobju 2000–2010 število čebelarstev povečalo za 12,6 %. Tretjino čebelarstev je imelo od 3 do 9 čebeljih družin, več kot četrtina od 10 do 19 čebeljih družin in dobrih 22 % od 20 do 49 čebeljih družin. Trend rasti imajo čebelarstva z večjim številom čebeljih panjev, zmanjšujejo pa se čebelarstva z minimalnim številom panjev.
Potrebno bo ponovno vzpostaviti že zaščiteno blagovno–storitveno znamko *Authentic carniolan* kot lastno shemo kakovosti vzrejnih čebel.

**Ključne besede:** kranjska čebela, avtohtona pasma, biodiverziteta, Slovenija, statistična analiza

# *Special protection of the Carniolan bee (Apis mellifera carnica) as a local breed*

**Abstract**
The territory of Slovenia is the original area of the Carniolan bee (*Apis mellifera carnica*), therefore, it is not permitted to introduce other breeds. On the basis of morphological and commercial properties of the Carniolan bee and resistance to diseases there is selection work carried out in beekeeping. The Carniolan bee is one of the four European breeds, which is widespread in the major part of Austria, Hungary, Slovakia, Serbia, in a part of Macedonia, in Bosnia and Herzegovina and Croatia. In Slovenia, the Carniolan bee population is divided into the Alpine, Dinaric-Karst, Pannonian, South Primorska and North Primorska groups. Maintaining the diversity of the bee population is one of the important objectives of the approved Breeding programme for the Carniolan bee. The local breed Carniolan bee is recorded in the Register of breeds with zootechnical assessment. The Public Service, which performs the gene bank tasks, will carry out a molecular genetic analysis for ascertaining the genetic purity of the Carniolan bee by 2015. In the Original bee herd book from 2001, there is recorded 191,911 commercial queen bees and 264 herd queen bees. In 2013, there were 29,892 registered queen bees, of which 57.6%

for sale in Slovenia, 33.9% for sale within the EU and 8.5% of sale outside the EU. In the analysis, we ascertain that in the period 2000-2010 the number of beekeepers increased by 12.6%. One third of beekeepers had from 3 to 9 bee colonies, more than a quarter from 10 to 19 bee colonies and more than 22% from 20 to 49 bee colonies. The growth trend is with beekeepers having a large number of bee hives, the number of beekeepers with the minimum number of hives is decreasing.
It will be necessary to restore already registered Authentic Carniolan trademark as its own quality scheme of bred bees.

**Key words:** Carniolan bee, local breed, biodiversity, Slovenia, statistical analysis

# *Pridelava krompirja z uporabo fitofarmacevtskih sredstev v neugodnih vremenskih razmerah*

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**Izvleček**
Krompir je bil na Slovensko razširjen v času Habsburške monarhije, ko je cesarica Marija Terezija z odlokom o obveznem pridelovanju krompirja rešila pokrajino lakote in hkrati poskrbela za jed – pražen krompir. Šenčur je znan po pridelavi krompirja, kar simbolizira tudi spomenik cesarici Mariji Tereziji s krompirjem postavljen sredi Šenčurja. V Sloveniji je bilo leta 2013 pridelano 62.155 ton krompirja na 3.307 ha obdelovalnih površin; hektarski donos je bil 18,79 ton oziroma 6,85 odstotnih točk manj glede na povprečje pridelka 1991–2013. Največji donos krompirja je bil 26,42 ton/ha leta 2011, najmanjši pa 12,10 ton/ha leta 1992. Obdelovalne površine za krompir so se v obdobju 1991–2013 zmanjšale za 74,7 %, količine pridelanega krompirja pa so se zmanjšale za 65,7 %. Krompir raste do pet mesecev in ga je v tem času potrebno z varstvom in zatiranjem pred pleveli, pred plesnijo, pred črno listno pegavostjo, pred koloradskemu hrošču in pred listnimi ušmi zaščititi. V ta namen se uporablja fitofermacevtska sredstva. Spremljali smo meteorološke podatke in sledili postopku tretiranja s fitofarmacevtskimi sredstvi pri zatiranju bolezni in škodljivcev pri rasti krompirja v letu 2013, ko je bilo nenormalno mokro. Na rast in pridelek krompirja vplivajo tla, temperatura, dolžina dneva, relativna vlaga in padavine. Za rast in pridelek krompirja je pomembno pravočasno učinkovito ukrepanje s fitofarmacevtskimi sredstvi za varstvo rastlin pred pleveli in škodljivci.

**Ključne besede:** krompir, fitofarmacevtska sredstva, Slovenija, hektarski donos, statistična analiza

# *Growing potatoes with the use of phyto-pharmaceutical products in adverse weather conditions*

**Abstract**
Potatoes were expanded on the Slovene territory during the Habsburg Monarchy, when the Empress Maria Theresa by a decree on compulsory cultivation of potatoes solved the country of hunger and at the same time took care of dish - fried potatoes. Šenčur is famous for the cultivation of potatoes, which is also symbolized by a monument to Empress Maria Theresa with potatoes placed in the centre of Šenčur. In Slovenia, in 2013 there were grown 62,155 tonnes of potatoes on 3,307 hectares of arable land; the crop yield per hectare was 18.79 tons, or 6.85 percentage points less than the average yield from 1991 to 2013. The largest potato yield was 26.42 tonnes / ha in 2011, the lowest 12.10 tons / ha in 1992. The arable land for potatoes in the period from 1991 to 2013 decreased by 74.7%, and the amount of harvested potatoes decreased by 65.7%. Potatoes grow up to five months and during this time the protection and control are necessary against weeds, mould, black leaf spottedness, Colorado beetle and against aphides. For this purpose phyto-pharmaceutical products are used. We monitored meteorological data and followed the treatment procedure with the phyto-pharmaceutical products in the control of diseases and pests in growing potatoes in 2013, when it was abnormally wet. The growth and yield of potatoes are influenced by soil, temperature, day length, relative humidity and rainfall. Timely, effective action with phyto-pharmaceutical products to protect crops against weeds and pests are important for growth and yield of potatoes.

**Key words:** potatoes, phyto-pharmaceutical products, Slovenia, yield per hectare, statistical analysis

# *Vpliv Lune na rast redkvic (Raphanus Sativus L.)*

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**Izvleček**
Proučevali smo vpliv Luninega setvenega koledarja po Marii Thun na kalitev in rast redkvice (*Raphanus Sativus* L.). Za vsak Lunin položaj smo posejali po 100 semen vsakega pridelovalca (Semenarna Ljubljana, Arcoiris Italija), skupno 800 semen. Celoten poskus je potekal od 30. aprila do 24. junija 2014, ko smo ob tehnološki zrelosti redkvic opravili puljenje in meritve. Merili smo naslednje parametre: maso in višino celotne rastline, premer korena (ploda) redkvice, dolžino nadzemnih in podzemnih delov rastline, maso nadzemnega in podzemnega dela rastline, celotno maso redkvice in beležili uporabnost redkvice. Ugotovili smo, da je bila skupna kaljivost po vseh obravnavanjih večja pri semenarski hiši Semenarna Ljubljana, vendar te razlike niso bile statistično značilne. Najbolje so kalile redkvice na dan za korenino, sledijo mu dan za list, cvet in plod. Rezultate smo obdelali in analizirali s statistično analizo variance. Doseženi so bili statistično značilni rezultati. Glede na dobljene rezultate sklepamo, da ima termin setve po luninem setvenem koledarju vpliv na kaljenje in rast redkvic.

**Ključne besede:** biološko dinamično kmetovanje, Lunin setveni koledar, Maria Thun, redkvica - *Raphanus Sativus* L. , multivariantna statistična analiza

# *Lunar influence on the growth of radishes (Raphanus Sativus L.)*

**Abstract**
The effect of lunar sowing calendar according Maria Thun on the germination and growth of radishes (*Raphanus Sativus* L.) was studied. For each lunar position 100 seeds of each producer (Semenarna Ljubljana, Arcoiris Italy) were sown, a total of 800 seeds. The entire experiment took place from 30 April to 24 June 2014, when radishes were at their technological maturity and they were pulled out because of the performed measurements. We measured the following parameters: the mass and height of the whole plant, root diameter, the length of the above ground and underground parts of the plants, the weight of the above ground and underground plant mass, the mass of the whole plant and usefulness of radishes. We found out that the total germination in all treatments was higher in Semenarna Ljubljana, but not statistically significant. Top radishes are ones that were sown on the day for the root, followed by the day of the leaf, flower and fruit. The results were processed and analyzed with statistical analysis of variance. Statistically significant results have been achieved. According to the results obtained it was predicted that the sowing dates according to the lunar sowing calendar do have an effect on the germination and growth of radishes.

**Key words:** biodynamic agriculture, Lunar sowing calendar, Maria Thun, radish- *Raphanus Sativus* L., multivariant statistic analyses

# *Nitrogen fertilization influences productivity and nutrient content in plant biomass of potatoes*

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**Abstract**
The effect of nitrogen fertilization (0, 200, 400, 600, 800 and 1000 mg/kg soil) on the content of nitrogen (N), phosphorus (P) and potassium (K) in potato plant parts and the uptake of the elements from the soil under pot experimental conditions was studied. Equal P and K fertilizing rates (150 mg/kg soil) were applied to all variants. The increase of N rate increased the nitrogen level from 1.17 % (N0) to 2.06 % ($N_{1000}$) in roots, from 0.43 % to 2.31% ($N_{1000}$) in tubers and from 2.08 (N0) to 3.29 % ($N_{1000}$) in above ground biomass. Approximately 74 % of absorbed nitrogen from the soil was alocated in the above ground biomass. The rest of the nitrogen was distributed between roots (14 %) and tubers (12 %). Slight differences in plant P and K uptake at all treatments were observed. The highest yield of potato tubers per plant (288 g) was achieved after treatment with the lowest nitrogen rate ($N_{200}$). The enhancement of N rate decreased potato yields. Due to rather high nitrogen rate at the last variant ($N_{1000}$), the formation of tubers was completely suppressed.

**Key words:** *Solanum tuberosum* L., nitrogen fertilization, uptake of N, P, K, yield

# Razvoj kmetijstva v Dravski dolini po civilizacijskih razvojnih stopnjah

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**Izvleček**
Kmetijstvo v dolini reke Drave je usmerjeno v intenzivno poljedelstvo, na hribovitem Pohorju in Kozjaku pa v ekstenzivno živinorejo. Čeprav je Dravska dolina opredeljena kot območje z omejenimi dejavniki za kmetijstvo, ima kmetijstvo pomembno vlogo pri gospodarskem razvoju Dravske doline in oblikovanju tamkajšnje kulturne pokrajine. Značilnosti kmetijstva in spremembe v njegovem razvoju po posameznih civilizacijskih razvojnih stopnjah smo v prispevku prikazali s pomočjo modelov rabe tal in kmetijstva v agrarni, industrijski in postindustrijski dobi, ki so grafični prikaz spreminjanja kulturne pokrajine v posameznih razvojnih stopnjah. Modele smo izdelali na podlagi obstoječih virov, skope literature in terenskega dela. Podali smo tudi tri možne scenarije razvoja kmetijstva Dravske doline v prihodnje. Kot alternativno rešitev za njegov uspešen razvoj med leti 2020 in 2050 smo predvideli upoštevanje trajnostnega razvoja, povezovanje kmetijskih in nekmetijskih dejavnosti ter glokalizacije.

**Ključne besede:** Dravska dolina, kmetijstvo, civilizacijske razvojne stopnje, agro-živilska veriga, gospodarski razvojni krogi

# The Drava Valley Agricultural Development according to the Stages of Societal Development

**Abstract**
The agriculture of the Drava Valley is primarily focused on intensive farming, as well as on extensive livestock farming on the hilly slopes of the Pohorje Hills and the Kozjak Hills. Although the Drava Valley is identified as a less-favoured agricultural area, agriculture has got an important role in the economic development of the Drava Valley, as well as in shaping its cultural landscape. The agricultural features and its developmental changes according to the stages of societal development were presented by land use- and agricultural models in the agrarian, the industrial, and the post-industrial era respectively. The models are a graphical representation of cultural-landscape changes in individual eras. The models were formed on the basis of existing sources, scarce literature, and field work. Three possible future scenarios for the agricultural development of the Drava Valley were also provided. As an alternative solution for the successful agricultural development between 2020 and 2050, sustainable development, the integration of agricultural and non-agricultural activities, and glocalization were envisaged.

**Key words:** the Drava Valley, agriculture, stages of societal development, agro-food chain, economic cycles

# *Aquaponic in classrooms as a tool to promote system thinking*

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**Abstract**
„System thinking with Aquaponic" is an educational concept that aims to train students in system thinking by using a connected fish and plant culture system. System thinking is seen as a central skill in education for sustainability. Between October 2007 and January 2008, a teaching sequence took place with three classes of 7th grade students in the Zuerich agglomeration, Switzerland. Several themes were introduced in the lessons by means of a classroom model: what is a system, relationship between system components, feedback loops and self-regulation and finally planning and construction of an Aquaponic classroom system. The students then also operated and monitored the system. The effect of the teaching sequence on system thinking competences was assessed at the beginning and at the end of the sequence. The ability of students to think in a systemic way instead of linear succession improved significantly in the posttest compared to the pretest. In addition, gender specific differences in relation to learning systemic thinking were compared. Female students showed slightly better results than male students; the reasons for this could not be pinpointed.

**Key words:** aquaponic, system thinking, ecotechnology, paedagogical work

# *The multifunctional aquaponic system at ZHAW used as research and training lab*

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**Abstract**
Aquaponics plays a part in promoting sustainable development on different levels in society, and its use is becoming ever more widespread. However, there are not enough trained specialists yet to build and operate such systems. The aim of this paper is to highlight the role of institutions of higher education – like ZHAW – can play to mitigate this deficit. ZHAW has the ability to execute applied research, teaching on BSc and MSc level, and is aiming to increase societal added value concerning education and health. Each of these levels has different demands on the aquaponic system concerning a multitude of factors, such as access, size, construction, climate control, diversity of production methods, recycling and closed loop systems, provision of energy from renewable sources and rainwater harvesting, treatment and use. To evaluate how these objectives are reached, the requirements on the system originating from each level are defined. These are used to evaluate the aquaponic system that was built and operated at ZHAW. Other aquaponic systems in use are compared to the ZHAW system, using the same evaluation criteria. The results show that the ZHAW Aquaponics Lab can reach all target levels, if the aquaponic farm of its spin-off company UrbanFarmers is viewed as an extension of it.

**Key words:** aquaponics, urban farming, education

# *Vodenje učnega okolja, ki odpira razvoj novih dejavnosti na podeželju*

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**Izvleček**
Smo v času, ki pred vse generacije  postavlja vprašanja in izzive. Kako priti do novih idej, kako razviti novo dejavnost, kje začeti, kje pridobiti znanja, veščine in spretnosti? Vsekakor so odgovornosti in naloge v nas odraslih, mentorjih, učiteljih, da zelo aktivno pristopamo k oblikovanju takih učnih okolji, ki bodo pri mladih spodbujala inovativnost, željo po raziskovanju, željo po doživetem timskem delu, navduševanju za iskanje, spodbujanje k oblikovanju lastnih stališč, mnenj . . .
V prispevku bom spregovorila o procesu vodenja in načrtovanja t. i. odprtega kurikula, ki ga imajo mladi v današnji šoli na voljo. Programske vsebine vsako leto na novo oblikujemo in načrtujemo na osnovi želja in načrtov dijakov, usmeritev šole in pričakovanja socialnih partnerjev.
V osrednjem delu bom predstavila nekaj glavnih izsledkov širše analize, ki jo opravimo vsako leto. Kakšni interesi in želje se kažejo pri mladih.
Razvojno in organizacijsko gre pri oblikovanju vsebin v odprtem kurikulu, za novost. To je tudi posebna naloga in spodbuda za šole, za posameznega mladega pa priložnost za premik v načrtovanju lastne prihodnosti.
V procesu vodenja je pričakovana odgovornost spremljanja, analiziranja, načrtovanja in razvoja posamezne stroke.
S prenosom odgovornosti na mlade, dosegamo večjo angažiranost in samoaktivnost, s tem pa dolgoročno večji potencial za samozaposlitev in razvoj novih dejavnosti na podeželju.

**Ključne besede:** mladi na podeželju, nove ideje, oblikovanje skupin, priprava projekta, nove pobude, samozaposlitev

# *Managing the learning environment that allows the development of new rural activities*

**Abstract**
We live in a time, in which all generations are confronted with new questions and challenges. How to get new ideas? How to design new activities? Where to begin? Where to get the necessary skills? Above all, these are the responsibilities and tasks of adults, mentors and teachers who should take an active approach to form such learning environments that encourage young people's innovation, desire to research, wish for experienced team-work, excitement for finding information and formation of their own opinions and standing points etc.
In this article I will discuss the process of managing and designing the so-called open curriculum, which is offered to today's young people. Every year we make a new plan and design the curriculum contents based on young people's wishes and plans, school's orientation and the expectations of our social partners.
In the central part, I will present the main results of the annual research that shows the interests and wishes of young people. The open curriculum is new in the sense of development and organization. It is also a special task and an initiative for schools. In addition, it gives the individuals an opportunity to move forward and plan their future.
In the process of performing the open curriculum we have to take responsibility and observe, analyze, plan and develop different fields of expertise.
If we shift responsibility to young people, we achieve greater involvement and self-activity on their part; and therefore bigger potential for self-employment and development of new rural activities.

**Key words:** young people in rural areas, new ideas, forming groups, preparing a project, new initiatives, sely-employment

# *Preizkušanje metod za trajnostno odstranjevanje alpske kislice (Rumex alpinus L.) na planini Korošica*

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**Izvleček**
V članku predstavljamo testiranje metod za trajnostno odstranjevanje alpske kislice (*Rumex alpinus*) na pašnikih planine Korošica. Na planini Korošica se je domnevno zaradi pašne preobremenjenosti v zadnjih cca. 20 letih razrasla alpska kislica, ki izpodriva polnaravni traviščni habitati tip suha volkovja in podobna kisla travišča pod gozdno mejo z arniko (*Arnica montana*). V prispevku so predstavljeni rezultati različnih načinov odstranjevanja R. *alpinus* na planini Korošica v rastnih sezonah 2012 in 2013. R. alpinus se šteje za škodljiv plevel na travnikih in se lahko razširi na velikih območjih gorskih in planinskih pašnikov. Ti pašniki so pogosto del območja Natura 2000 ali drugih območij v okviru varstva narave, kjer uporaba

herbicidov ni zaželena. Zato smo v naključnem bloku v 4 ponovitvah preizkusili različne sonaravne načine odstranjevanja, kot so nadzorovana paša goveda, paša prašičev košnja, termična obdelava, prekrivanje s črno folijo in ročno izkopavanje, pri čemer smo za govedo ter prašiče uporabili le eno ponovitev. Največja izguba biomase alpske kislice je bila pri ročnem izkopavanju in zastiranju s črno folijo. Pri drugih metodah se je število poganjkov nekoliko zmanjšalo, vendar se je povečala pokrovnost rastlin alpske kislice. Odstranjevanje alpske kislice s pomočjo plamena se ni izkazala za primerno metodo. Za ugotavljanje uspešnosti metod bo potrebno testiranje še vsaj nekaj rastnih sezon oziroma prenos metod na večje površine.

**Ključne besede:** alpska kislica, *Rumex alpinus*, planina Korošica, poizkus odstranjevanja, Natura 2000

## *Testing of different integrated management methods of Rumex alpinus removal on montane pasture Korošica*

**Abstract**

Results of different methods of *Rumex alpinus* management in montane pasture Korošica are presented. The appearance of *Rumex alpinus* on large surfaceson the mountain pasture Korošica is presumably due to grazing congestion in the last approx. 20 years , which replaced habitat type dry grasslands with Nardus stricta and similar acidic grasslands below the tree line with Arnica montana. This paper presents the results of different methods of removal of R. alpinus on the mountain Korošica in the growing seasons of 2012 and 2013. *Rumex alpinus* is considered as noxious weed on grasslands and can spread on large areas on montane and alpine pastures. These pastures are often part of Natura 2000 areas or other areas under nature protection so use of herbicides is not preferred. Therefore we tested different integrated methods: controlled cattle grazing, pigs rooting, mowing, heat treatment, covering with black foil and manual digging in 4x4 plots and four replicates. After the treatment the plots were sown by commercial grassland mixtures. Highest loss of *Rumex* biomass after the first year was found by manual digging and foil treatment. Pig digging also proved to be successful, while other methods just reduced shoot number, and plant cover and biomass of vegetation remained high. Further monitoring will be needed, at least for some seasons, but also transfer of these methods on large-scale treatment surfaces has to be tested.

**Key words:** *Rumex alpinus*, montane pasture Korošica, Natura 2000, methods of removal

2. sekcija:

# *Naravovarstvo*

2nd session:

# *Environmentalism*

# *Merjenje trajnostnega razvoja lokalne skupnosti Naklo z metodo ekoloških sledi*

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**Izvleček**
Globalno trajno sprejemljiv obseg porabe naravnih virov in spoštovanje globalnih okoljskih omejitev je mogoče doseči zgolj s prilagoditvijo lokalnim omejitvam okolja. To pomeni, da se morajo značilnosti trajnostnega, sonaravnega razvoja uveljaviti v lokalnih skupnostih. Rezultati izračunov ekoloških sledi na ravni celotne lokalne skupnosti Naklo so uporabni za izdelavo strategije trajnostnega razvoja obravnavane in tudi drugih primerljivih občin. Tako zasnovano raziskovanje služi za iskanje poti trajnejšega zmanjševanja razkoraka med različnimi geografskimi zmogljivostmi okolja na eni strani in razvojnimi potrebami prebivalcev občine na drugi strani.

V raziskavi smo prikazali merjenje in vrednotenje ekoloških sledi kot sinteznega kazalnika razvoja v občini Naklo. Ugotovili smo ekološki primanjkljaj v opazovanem sistemu Občine Naklo (ekološke sledi 6,09 gha/preb., ekološki primanjkljaj 4,36 gha/preb.), na podlagi ugotovitev pridobljenih v raziskavi je možno predlagati specifične ukrepe za zmanjšanje pritiskov na okolje.

**Ključne besede:** trajnostni razvoj, ekološke sledi, lokalna skupnost, občina Naklo

# *Ecological follov-up of the development off local communities Naklo by the method of ecological footprint*

**Abstract**
Globally sustainable acceptable volume of the natural resources use and respect of global environmental limitations can only be achieved through adaptation to local limitations of the environment. This means that the characteristics of sustainable development must be respected in local communities. The results of the ecological footprint at the level of the entire municipality Naklo can be used to design a sustainable development strategy for this and other comparable municipalities. Research on such basis leads to finding a path towards more long-term decrease of the gap between different geographical capabilities of the environment on one side and developmental needs of inhabitants of the municipality on the other side.

This thesis presents the results and the evaluation ecological footprint with synthetically development indicators of the municipality Naklo. In the observed system muncipality Naklo a huge ecological deficit has been discovered (ecological footprint 6,09 gha/per capita, ecological deficit 4,36 gha/per capita), based on these research conclusions, can propose specific actions to reduce pressures on the environment.

**Key words:** sustainable development, ecological footprint, local community, municipality Naklo

# *Uporaba različnih vrst gnojil na športnih in rekreacijskih zelenih površinah v luči varovanja okolja*

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**Izvleček**
Rast in razvoj travne ruše je nedvomno odvisna od nujno potrebnih hranil. Zaradi pomanjkanja hranil (kot so dušik, fosfor, kalij, kalcij, magnezij, deloma železo) v tleh moramo le-ta v procesu oskrbe zelenih travnih površin dodajati z gnojenjem. Gnojenje travne ruše namreč vpliva tudi na kakovost igre, ki se na njej odvija. Nedvomno pa je gnojenje povezano tudi z vplivom na okolje, zlasti nepravilno in nepravočasno gnojenje, saj se hranila, ki jih rastline ne porabijo, zaradi padavin in namakanja izperejo v podtalnico. Glede na širok izbor gnojil lahko izbiramo tista, ki najmanj vplivajo na okolje in hkrati omogočajo kakovostno rabo travne površine za šport ali rekreacijo. Na poskusnem polju Medpodjetniškega izobraževalnega centra Grm Novo mesto smo v bločnem poizkusu primerjali kontrolirano delujoča, počasi delujoča, organska in klasična gnojila in njihov vpliv na izpiranje hranil (dušika) v podtalnici. S pomočjo analize nitratov v tleh (mg/100 g suhih tal) s pomočjo spektrofotometra in statističnega programa StatGraphics plus lahko sklepamo, da najmanjšo vrednost nitratov v vzorcu tal dosegamo pri uporabi organskih gnojil na vseh treh globinah vzorčenja, največjo pa pri obravnavanju s klasičnimi NPK gnojili, zaradi česar ta tip gnojil predstavlja največji potencial za onesnaževanje podtalnice.

**Ključne besede:** zelene športne površine, gnojenje, izpiranje hranil, gnojila

# *The use of different types of fertilizers on the green sports grounds in the light of environmental protection*

**Abstract**
Growth and development of turf is undoubtedly depends on essential nutrients. Due to the lack of nutrients (such us nitrogen, phosphorus, potassium, calcium, magnesium, partly iron) in the soil, we need to add it by fertilization in the process of turf supplying.
Fertilization of turf has an impact on the quality of the game, which takes place on it. Undoubtedly. fertilization is also associated with environmental impact, particularly improper and untimely fertilization. Nutrients that plants do not uptake, due to rainfall and irrigation leaching in the groundwater. Given the wide range of fertilizers can choose those that have the minimum impact on the environment and at the same time allow the use of high-quality grass surfaces for sport or recreation. In the experimental field of Entrepreneurial Education Center Grm Novo mesto, we compared the controlled acting, slow –acting, organic and conventional fertilizers and their impact on the leaching of nutrients (nitrogen) in groundwater with the block trial. The analysis of nitrate in the soil (mg/100 g dry soil) with the help of spectrophotometer and statistical program StatGraphics plus we can conclude that the minimum value of nitrates in the soil sample is achieved with the use of organic fertilizers on all three sampling depths, the highest being in dealing with conventional NPK fertilizers, which makes this type of fertilizer represents the greatest potential for pollution of groundwater.

**Key words:** green sports surfaces, fertilization, leaching of nutrients, fertilizers

# Nosilne zmogljivosti zavarovanih območij v Sloveniji

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**Izvleček**
Prispevek govori o okoljski, socialni in ekonomski nosilni zmogljivosti zavarovanih območij v Sloveniji. Nosilne zmogljivosti določenega območja pomenijo maksimalno število vrst - ljudi (rastlin, živali) na določenem območju, ki se lahko nemoteno razvijajo (uspevajo) in oskrbujejo z razpoložljivimi naravnimi viri, ne da bi prišlo do obremenjevanja okolja, do te mere, da se zmanjša nosilna sposobnost okolja v prihodnosti (Hardin, 1977). Svetovna komisija za zavarovana območja (WCPA) pri Mednarodnem združenju za varovanje narave (IUCN) je zavarovana območja opredelila kot območja na kopnem in/ali morju, ki jih varujemo zaradi biotske raznovrstnosti in drugih naravnih ter kulturnih vrednot. Prispevek osvetljuje, kakšne so regeneracijske in nevtralizacijske sposobnosti zavarovanih območij v Sloveniji glede dejavnosti, ki se v njih izvajajo in glede na podatke zavarovanih območij, ki o tem obstajajo.

**Ključne besede:** okoljska, socialna, ekonomska nosilna zmogljivost, zavarovana območja

# Carrying capacity of protected areas in Slovenia

**Abstract**
The article discusses the environmental, social and economic carrying capacity of protected areas in Slovenia. The carrying capacity of a given area means the maximum number of species - humans (plants, animals) in an area that can be smoothly evolve (grow) and the supply of available natural resources, not to cause pollution of the environment, to the extent that it reduces the carrier the ability of the environment in the future (Hardin, 1977). World Commission on Protected Areas (WCPA) of the International Association for Nature Conservation (IUCN), the protected areas identified as an area of land and / or sea, protected by the due biodiversity and other natural and cultural values. Article highlights what regeneration and neutralization capacity of protected areas in Slovenia in relation to activities carried out therein and according to the information protected areas on there.

**Key words:** environmental, social, economic carrying capacity, protected areas

# *Prihodnje varstvene in razvojne smernice osnutka Načrta upravljanja Triglavskega narodnega parka*

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**Izvleček**
Načrta upravljanja Triglavskega narodnega parka (TNP) je najpomembnejši programski akt, s katerim se določijo načini varstva, rabe, gospodarjenja in upravljanja ter razvojne usmeritve. Poleg Zakona o Triglavskem narodnem parku (ZTN-1) predstavlja ključni dokument zavarovanega območja, ki zagotavlja trajno, učinkovito in usklajeno upravljanje. V prispevku smo pregledali izhodišča za načrt upravljanja, dolgoročne, operativne cilje in ukrepe, ki jih bo TNP upošteval v obdobju 2014–2023. Prispevek govori o prihodnjih varstvenih in razvojnih usmeritvah, varovalnem režimu in o ukrepih glede izvajanja različnih dejavnosti v zavarovanem območju, ki so napisane v osnutku Načrta upravljanja TNP za obdobje 2014–2023.

**Ključne besede:** Triglavski narodni park, načrt upravljanja, varstvene in razvojne smernice

# *Future protection and development guidelines of the draft management plan of the Triglav national park*

**Abstract**
Management Plan of the Triglav National Park (TNP) is the most important program document by which to determine the modalities of protection, use, management and governance, and development policies. In addition, the Act on the Triglav National Park (ZTNP-1) is a key document in the protected area, which ensures continuous, efficient and coordianted management. In this paper we examine the starting point for a management plan, long-term operational objectives and actions that will bet aken into account TNP during the period 2014-2023. The article discusses the future conservation and development policies, buffer regime and the measures concerning the implementation of various activities in the protected area, which are written in the draft Management Plan for the period 2014-2023 TNP.

**Key words:** Triglavski narodni park, Management Plan of the TNP, protection, development guidelines

# K trajnostni univerzi - Primer Fakultete za organizacijske vede

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**Izvleček**
Čeprav je bilo do sedaj glavna pozornost izobraževanja na področju trajnostnega razvoja usmerjena na osnovne in srednje oziroma poklicne šole, se je v zadnjem desetletju povečalo tudi število visokošolskih ustanov, ki v svoj program vključujejo načela trajnostnega razvoja in odgovornega odnosa do okolja. Vsekakor je na tem področju še veliko možnosti za izboljšave, ki izhajajo iz razkoraka med načeli trajnostnega razvoja in njihovo dejansko vključitvijo v študijske programe in ostale segmente delovanja institucije. Fakulteta za organizacijske vede Univerze v Mariboru je z umestitvijo okoljskih in trajnostnih vsebin v študijski proces ena izmed prvih visokošolskih organizacij v Sloveniji, ki skuša sistematično spodbujati študente k trajnostnemu in družbeno odgovornemu vedenju. V ta namen fakulteta izvaja vrsto dejavnosti, katerih namen je omogočiti aktivno vključevanje študentov v aktivnosti, ki sovpadajo z okoljskim in družbenim vidikom trajnostnega razvoja. V pričujočem prispevku so prikazane nekatere aktivnosti fakultete s področja trajnostnega razvoja, vključujoč tudi vključevanje v različne mednarodne projekte s področja trajnostnega razvoja in varstva okolja. Nadalje so v prispevku obravnavane tudi razne aktivnosti, ki prikazujejo vpetost fakultete v lokalno skupnost. V sklepnem delu prispevka so podana tudi priporočila in smernice za druge visokošolske ustanove.

**Ključne besede:** trajnostni razvoj, okoljsko izobraževanje, univerza, Eko-šole

# Towards a Sustainable University: The Case Study of the Faculty of Organizational Sciences

**Abstract**
Even though the focus which concerns the sustainable actions has been so far predominantly integrated within primary and secondary schools, the number of higher education institutions which incorporated sustainable principles in their curriculum and/or operation during the last decade, has increased. Nevertheless, there are still many challenges that arise from the gap between sustainable thinking which is embedded in several operations of the educational institution and its curriculum. With its environmental and sustainable oriented courses in the curriculum, the Faculty of Organizational Sciences (FOV) at University of Maribor has been one of the first higher educational institutions in Slovenia which aims to promote sustainable thinking among students. Based on the theoretical foundations, the FOV expanded the sustainability-oriented activities in terms of active engagement in several international projects dealing with environmental and sustainable topics. Further on, FOV also promotes sustainability by encouraging their students to actively participate in the sustainable and environmentally friendly actions and projects. Therefore, the paper presents and discusses some key activities of the faculty in the field of sustainability. In addition, several activities for students as well as for local residents are discussed in this paper. The paper concludes with recommendations for further actions and directions for other higher educational institutions are given.

**Key words:** sustainable development, environmental education, university, Eco-Schools

# *Upravljanje mokrišč na primerih Zelencev in Planika*

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**Izvleček**
Pri varstvu narave se pogosto znajdemo v dilemi, koliko in če sploh posegati na različna varovana območja. Namen članka je predstaviti to dilemo ter na primerih Zelencev in Planika prikazati možne načine upravljanja in poseganja na varovana območja mokrišč zaradi njihovega varstva. V projektu WETMAN smo ti dve območji dodatno raziskali, na osnovi raziskav pripravili načrt za njuno upravljanje in se odločili za določene posege na terenu. Tako smo na Zelencih pripravili načrt upravljanja, postavili prodni zadrževalnik, odstranjevali zarast in uredili del infrastrukture za obiskovalce. Na Planiku smo odstranjevali zarast in postavili pregrade na starih hidromelioracijskih jarkih. Na obeh območjih smo ozaveščali različne deležnike in pri tem uporabljali različne komunikacijske pristope. Za posege smo se odločili, ker smo ugotovili, da dejavnosti ljudi spreminjajo naravne procese do te mere, da ti lahko ogrožajo visoko biotsko raznovrstnost preučevanih območij, ki jo želimo ohranjati. Dolgoročni učinki naših akcij se bodo pokazali šele v prihodnje, zato bomo stanje narave spremljali še naprej.

**Ključne besede:** upravljanje mokrišč, Zelenci, Planik, Wetman, načrt upravljanja

# *Wetlands Management – Case Study Pilot Areas Zelenci and Planik*

**Abstract**
In nature conservation practise, the dilemma of how intensively (if at all) to interfere in different areas of conservation with field actions is frequently encountered. The purpose of this article is to present this dilemma in two case study areas, Zelenci and Planik, by describing different management practices and already implemented nature conservation interventions. During the WETMAN project, these two areas were first thoroughly researched, then management plans prepared based upon the obtained results, and finally field actions carried out. The activities at Zelenci included preparation of the management plan, the gravel barrier construction, overgrowth removal and partial restoration of the visitor infrastructure. At Planik, the activities included overgrowth removal and construction of dykes on drainage canals. Various information exchange tools for communication with different stakeholders at both sites were used. The decision for field interventions was accepted as it had been recognised that human activities influence natural processes to the degree, where high biodiversity, agreed to be protected, is endangered. Long-lasting effects of implemented field actions will be seen yet in future, therefore regular monitoring of the sites is envisioned.

**Key words:** wetlands management, Zelenci, Planik, Wetman, management plan

# Biotično zatiranje hlevske muhe

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**Izvleček**
Kmetijstvo je kot osnovna panoga človekovih dejavnosti v celoti vezana na živi svet in odnose v njem. Biotska raznovrstnost je ključnega pomena za vse povezave med organizmi samimi in njihovim okoljem. In vendar se je potrebno tudi znotraj kmetijske pridelave odločiti za koristne, želene, neželene in celo škodljive organizme.
Hlevsko muho prav gotovo uvrščamo med neželene, pravzaprav škodljive organizme, saj je povzročitelj bolezni, nemira med živalmi in zmanjšane proizvodnje. Načinov za njeno zatiranje, predvsem kemičnih, je veliko, vendar jim lahko pripišemo precej negativnih lastnosti. Dokaj hitro se pojavi odpornost na posamezen pesticid, njihovo delovanje je kratko in je potreben pogost nanos, sredstva so škodljiva tudi koristnim organizmom in živalim v hlevu.
Pojav biotičnega zatiranja hlevske muhe z biološko (gnojnično) muho in mini oso predstavlja rešitev za okolje in koristne insekte.
Vendar, ali lahko ob tem pozabimo na kmečko lastovko, ki gnezdi v hlevih? Kaj pa potencialna nevarnost, ki jo predstavlja tujerodni organizem za ekosistem? Spomnimo se na harlekinsko polonico in medečega škržata. Za oba je veljalo, da se v naših podnebnih razmerah ne moreta uspešno razmnoževati.
Nikakor ne gre, da bi biološko zatiranje hlevske muhe označili za neprimerno. Velja pa ohranjati pozornost na morebitno invazivnost biološke muhe ter prepustiti nekaj dela tudi lastovkam.

**Ključne besede:** hlevska muha, biotično zatiranje, biološka (gnojnična) muha, mini osa, plenilec invaziven organizem, lastovka

# Biological control of barn flies

**Abstract**
Agriculture as a basic industry is fully related to all living things and the relations between them. The relations between the organisms and their environment, however, are highly dependent on biodiversity. Yet, there is a need in agricultural production to decide for the useful and desired organisms as well as for the undesired or even harmful beings. The barn fly is definitely ranked among the unwanted or harmful organisms since it causes diseases, distress among animals and a decline in (milk) production.
There are different types of barn fly control. Chemical means are easily available, however, they have many disadvantages. Just to mention a few: quickly developed pesticide resistance, their short-term effectiveness, which results in frequent applications, and their harmful effect on the useful organisms as well as on the animals in the barn. Biological means, on the other hand, seem to be a solution for the environment and for the non-target insects. The examples of biological eliminators are the parasitic wasp *Spalangia cameroni and the dump fly Ophyra aenescens*. However, we should not forget the barn swallow, which nests in stables. Additionally, we should bear in mind a potential risk of non-native species to the local ecosystem. The harlequin ladybird and frosted moth-bug, for example, were both considered unlikely to reproduce in our climate conditions. On balance, biological barn fly control is not an inappropriate method but being alert to the possible invasivity of the dump fly and not neglecting the work done by barn swallows is essential.

**Key words:** barn fly, biological control, dump fly, *Spalangia cameroni*, predator, invasive species, barn swallow

# Vrtičkarstvo v Mengšu

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**Izvleček**
V občini Mengeš je leta 2012 Kmetijski inštitut Slovenije izvedel raziskavo »Kakovost tal na vrtičkih v Mengšu«. Namen raziskave je bil tudi ugotoviti, kakšna je kakovost tal na vrtičkih v Mengšu ter na kakšen način lastniki vrtičkov v Mengšu pridelujejo zelenjavo. V ta namen smo oktobra 2012 na 30 vrtičkih izvedli vzorčenje zgornjega sloja tal (do 20 cm). Vzorce tal smo analizirati na pH, rastlinam dostopni fosfor in kalij, organska snov, Pb, Cd, Zn. Hkrati z vzorčenjem tal smo izvedli tudi anketo o vrtičkarstvu v Mengšu. Tla na vrtičkih so zelo dobro založena z organsko snovjo, saj je povprečna vsebnost organske snovi v tleh znašala 5,9 %. V 94 % vzorcev tal smo ugotovili ekstremno oskrbljenost tal s fosforjem (več kot 40 mg $P_2O_5$/100 g). Povprečna založenost tal s kalijem je bila 31 mg $K_2O$/100 g tal, kar je malenkost več od optimalne oskrbljenosti (20–30 mg $K_2O$/100 g tal). Preseženo mejno vrednost Pb smo ugotovili v 8 vzorcih tal, Zn v 6 vzorcih tal in Pb v 3 vzorcih tal. Primerjava rezultatov kemijskih analiz tal z odgovori iz ankete je pokazala, da imajo vrtičkarji v Mengšu večinoma napačno predstavo o tem, kakšna je kakovost tal na njihovih vrtičkih. Napačna predstava je posledica dejstva, da do sedaj 97 % anketiranih vrtičkarjev še nikoli ni oddalo vzorec tal v kemijsko analizo, 80 % vrtičkarjev za gnojenje nima izdelanega gnojilnega načrta, 90 % vrtičkarjev pa nima ustrezne kmetijske izobrazbe.

**Ključne besede:** Mengeš, vrtički, tla, rodovitnost tal, težke kovine, anketa

# Allotment Gardens in the City of Mengeš

**Abstract**
In 2012 a survey »Soil quality on the allotments in Mengeš area« was carried out in the Agricultural Institute of Slovenia. The aim of the survey was to determine the quality of soil in Mengeš allotments and find out how the owners of allotments grow their vegetables. Regarding this sampling of the upper soil layer (20 cm) was conducted in October 2012 on 30 garden plots. The soil samples were analysed on pH value, plant available phosphorus and potassium, organic matter, Pb, Cd and Zn. At the same time as sampling the soil a poll interview of gardening in Mengeš was carried out. Soils in the allotments are well supplied with organic matter, as the average content of organic matter in the soil was 5.9%. In 94 % of soil samples, we found extremely oversupplied content of phosphorus (more than 40 mg $P_2O_5$/100g). The average content of potassium was 31 mg $K_2O$/100g, which is slightly higher than the optimal values (20–30 mg $K_2O$/100g soil). The exceeded limit values of

Pb were detected in 8 samples, Zn in 6 samples and Pb in 3 soil samples. Comparison between chemical analyses results and answers from poll interview showed that most gardeners in Mengeš had a wrong perception about the quality of the soil in their allotments. Misconceptions is due to the fact that 97 % of the gardeners had never placed a sample of soil in chemical analysis, 80 % of gardeners do not have a fertilization plan and 90 % of gardeners have no relevant agricultural education.

**Key words:** Mengeš, allotments, soil, soil fertility, heavy metals, poll interview

# *Nova paradigma bilance vodnega odtisa*

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**Izvleček**
Vodni odtis opredeljuje del širokega koncepta odtisov, ki jih srečujemo v znanosti. Problematika vodnega odtisa vključuje neposredno porabljeno vodo in virtualno vodo.
Paradigma bilance vodnega odtisa nam predstavlja delež kvantitativnega okvira odnosa med človekom in naravnim okoljem.

Za nazorno simulacijo pretakanja snovi in energije v sistemih je priporočljivo uporabiti uveljavljeno orodje. Sankeyevi bilančni diagrami so primerni tudi za ponazarjanje masnih bilanc vodnega odtisa. K celovitemu razumevanju vodnega odtisa lahko mnogo prispeva tudi teorija množic, ki je primerna za obravnavo polja množic.

Razvili smo bilančni diagram parcialnih vodnih odtisov in oblikovali ustrezno polje množic. Paradigma bilance vodnega odtisa je vezana na standardno razumevanje vodnega odtisa in prikazuje njegove deleže, ki jih ovrednotimo in prikazujemo v medsebojnem razmerju posameznih sistemov.

Za spodbujanje okoljske trajnosti in za doprinos k trajnostnemu razvoju, je potrebno osveščanje ljudi o vodnem odtisu, ki ga za seboj puščajo posamezne države. Nekatera gospodarstva in gospodarske veje porabljajo ogromne količine virtualne vode, ki neposredno ogrožajo trajnostni razvoj lokalnega geografskega področja.

**Ključne besede:** voda, vodni odtis, virtualna voda, bilanca vode, trajnostni razvoj

# *New paradigm of Water Footprint Balance*

**Abstract**

Water footprint balance is a part of broad spectra of footprints which are described in literature. Water footprint balance includes direct water consumption and virtual water. Water footprint balance paradigm presents a part of quantitative frame of human and nature relation.

Established tools should be used for illustrative simulation of material and energy flow in systems. Sankey balance diagrams are also appropriate for presentation of water footprint mass balance. For the complete water footprint understanding set theory, which is suitable for set field investigation, can be used.

Partial water footprint balance diagram was developed and appropriate investigation field was formed. Water balance paradigm is connected to standard understanding of water footprint. It presents its parts which are evaluated and presented in relation between individual systems.

For environmental sustainability encouragement and contribution to sustainable development people need to be aware about water footprint made by individual countries. Some industries are large consumers of virtual water which directly endangers sustainable development of local geographical area.

**Key words:** water, water footprint, virtual water, water balance, sustainability

# *Pesticidi kot hormonski motilci in njihov vpliv na okolje*

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**Izvleček**

Skrb ljudi v povezavi s pesticidi in njihovimi škodljivimi posledicami za zdravje se je pričela v poznih 50. in zgodnjih 60. letih prejšnjega tisočletja, ko je Rachel Carson izdala znamenito knjigo "Silent spring" (1962). Takrat se prvič omenijo negativni učinki pesticida DDT, revolucionarnega izdelka, ki pa se kasneje izkazal za enega najbolj nevarnih okoljskih onesnaževalcev-hormonskih motilcev. V skupino hormonskih motilcev prištevamo sicer tudi druge snovi, vendar so pesticidi številčno najpogostejši, hkrati pa redkeje obravnavani v literaturi s stališča pravilne uporabe v kmetijstvu. V prispevku bomo predstavili pogosteje uporabljene pesticide v slovenskem prostoru, pojasnili njihove učinke predvsem s stališča vpliva na človekovo zdravje (hormonski motilci), prikazali načine vstopa teh snovi v okolje in tudi, kakšne so praktične možnosti preprečevanja in primernega ravnanja z obravnavanimi snovmi v okolju. Pesticidi v visokih koncentracijah povzročajo akutne zastrupitve, daljšo izpostavitev nižjim koncentracijam pa povezujejo z vrsto kroničnih bolezni, med katerimi so na prvem mestu alergije, bolezni in težave z reproduktivnim sistemom, nevrološke motnje in rak. Zaradi naraščanja uporabe pesticidov smo preko okolja (prst, zrak in površnike vode), hrane in pitne vode čedalje bolj izpostavljeni pesticidom tudi ljudje in živali. V prispevku bomo torej opisali izpostavljeno tematiko in hkrati predstavili alternative uporabi pesticidov.

**Ključne besede:** pesticidi, hormonski motilci, zdravje, trajnostno okolje

# *Pesticides as endocrine disruptors and their environmental effects*

**Abstract**
The paradigm of endocrine disruptors dates back to the late 1950, when Rachel Carson published her famous book "Silent spring" in 1962. She was the first to publically reveal detrimental effects of pesticide DDT, which later become one of the most recognizable environmental pollutants. In the large group of endocrine disruptors there are also other chemical groups, but pesticides are the most abundant and on the other hand, there are so little data about how to properly use them in agriculture. We will try to present a few pesticides, more often used in Slovenia, show their effects on health and environment and try to suggest alternatives towards the mass usage of pesticides.

**Key words:** pesticides, endocrine disruptors, health, sustainable environment

# *Integriran koncept vzgoje in izobraževanja za trajnostni razvoj (VITR) v povezavi s pozitivno psihologijo*

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**Izvleček**
V članku obravnavamo povezave med vzgojo in izobraževanjem za trajnostni razvoj (VITR) in psihologijo, s posebnim poudarkom na integraciji vsebin pozitivne psihologije ter možnostjo aktivnega vključevanja le-teh preko kroskurikularnega povezovanja v srednjem in višjem strokovnem izobraževanju. Pozitivna psihologija in vsebine trajnostnega razvoja običajno niso primerno povezane in integrirane v letnih učnih pripravah in izvedbenih kurikulih, kar omejuje emotivne rezultate VITR, spremembo stališč in vrednot ter proaktivno okoljsko delovanje. Na osnovi opravljene analize utemeljujemo, da je potrebno posvetiti večjo pozornost posodabljanju učnih načrtov in kroskurikularnemu povezovanju psihologije in trajnostnega razvoja, pri razvijanju okoljskih, komunikacijskih in družbenih kompetenc.

**Ključne besede:** trajnostni razvoj, izobraževanje, psihologija

# *Integral concept of education for sustainable development (ESD) connected with positive psychology*

**Abstract**
The article is focused on education for sustainable development (EDS) and psychology, with particular emphases on content of positive psychology and possibilities of integration through cross curricular connection during secondary in higher vocational education. Positive psychology and EDS have not been well integrated in annual educational settings and realization curricula since affective results, change of attitude, values and proactive environmental behaviour are limited. Based on analyses, we established that more attention should be given to updating curricula and cross curricular approaches between positive psychology and EDS content, in particular to develop environmental, communication and social skills.

**Key words:** sustainable development, education, psychology

# *Metode ugotavljanja obremenitev z različnimi polutanti v Sloveniji, njihove značilnosti in slabosti - ekološki monitoring*

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**Izvleček**
Okoljevarstvo in skrb za naravo in človeka postajata v sodobnem času pomemben dejavnik razvoja družbe tako v svetu kot pri nas. Pomen zdrave in kvalitetne pitne vode, zemljišč za pridelavo hrane ter zraka neobremenjenega z različnimi izpusti, so predpogoj za rast in prihodnost okolja celotne populacije. Zaradi preteklih neustreznih posegov v okolje in prostor, prekomernega izkoriščanja naravnih virov, na drugi strani pa neprimernega odnosa in skrbi do narave, so na vseh treh segmentih: v naravi, okolju in na ljudeh nastale posledice, ki bistveno vplivajo na kvaliteto življenja prebivalcev, ki v takšnih okoljih živijo in ustvarjajo. Reševanje nastalih negativnih razmer iz preteklosti mora zato postati prioriteta vsake, v prihodnost orientirane družbe. Obstajajo postopki in aktivnosti, ki lahko v veliki meri odpravijo neustrezna ravnanja ali jih vsaj omejijo. Nujno moramo spremeniti razmišljanje in odnos do okolja in narave in sprejeti dejstvo, da so naravni viri omejeni in jih je potrebno ohranjati.

**Ključne besede:** ekološka zavest, okolje, sanacija, obremenjevanje, posledice

# *Methods for identifying different types of pollutants in Slovenia their possibilities and weakness - ecological monitoring*

**Abstract**
Care for environment, nature and humanity, become nowadays an important factor in the development of society in the whole world and also in our country. The importance of healthy and quality drinking water, land for food production and unpolluted air are prerequisites for the growth and development of the environment ad society as a whole in the future. Due to the past, insufficient monitoring of environment and unsuitable spatial planning overexploitation of natural resources, and on the other hand, inappropriate atitude to nature are in all three segments: nature, environment and humanity result consequences that significantly affect the quality of life of residents who in such environments live and work. Deal with any adverse situation in the past, has therefore become a priority for modern, future-oriented society. There exist certain procedures and activities which can eliminate or eventually limit innapropriate behaviour to the nature. It is necessary to change the way of thinking and the relation to the environment and to the nature as well as except the fact that natural resources are limited and therefore must be preserved.

**Key words:** environmental awareness, environment, environmental remediation, pollution, consequences

# *Klasična, starejša stanovanjska hiša na poti do samooskrbnega objekta*

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**Izvleček**
Priča smo podražitvam konvencionalnih energentov, goriv, ki poganjajo naša vozila in ogrevajo naša stanovanja. Vse skupaj pa pesti na eni strani vedno večja potreba po fosilnih gorivih, na drugi strani pa vedno večje pomanjkanje teh. Poleg tega, pa tako s pridobivanjem kot s kurjenjem fosilnih goriv, močno onesnažujemo in uničujemo lasten svet. Vse skupaj pa predstavlja velik problem za človeštvo in celo naravo.

V delu bom predstavil možnosti iz področja samooskrbe hišnega objekta, z električno energijo in izkoriščanje obnovljivih virov energije kot vir toplote za ogrevanje stanovanja. Strmeli bomo k temu, da klasično hišo, popeljemo na pot do samooskrbe, ter tako vzpostavimo objekt, ki bo v največji meri samozadosten. Več pozornosti bo dano sončni energiji, ki je na naših koncih zelo poznana in uporabljena, ter energiji biomase, ki je tudi v obilju, vendar slabo izkoriščena.

Namen naloge je, da raziščem področje samooskrbe za hišni sistem, in preučim različne tehnologije OVE, ki najbolj omogočajo da objekt na koncu postane popolnoma ali v večji meri samozadosten. Vsa potrebna tehnologija bo prilagojena, glede

na lastne konkretne hišne potrebe (po elektriki in toploti). Vse skupaj bo podprto s finančno sliko, saj nas zanima v kolikšni meri, se investicija v določeno tehnologijo izplača.

Ugotovitve so nas pripeljale do zaključka, da trg omogoča montažo tehnologij, ki objekt oskrbujejo z lastno proizvedeno energijo, ter so potrebe po nakupu električne energije minimalne. Vendar nas pri tem lahko omejujejo, geografska lokacija, finančna zmogljivost posameznika ter trenutno gospodarsko stanje.

**Ključne besede:** samooskrbni objekt, tehnologije obnovljivih virov energije, električna energija, toplotna energija

## *Classic, older residential house on the way to subsistence facility*

**Abstract**

We are witnessing the increase in prices of coventional fuels, those that power our vehicles and heat up our residences. Everyone is bothered either by increasingly higher demand for fossile fuels or by the increasing lack of these. Besides this we cause high pollution and destruction to our world by producing and using the fossile fuels. All of this presents a big problem for humanity and the nature as a whole.

In my work I present possibilities in the field of self-sufficiency in residential housing regarding electric energy and the use of renewable sources of energy as well as sources for heating the residences. Our objective is to take a classic house on a journey to self-efficiency and thus establish a facility with maximised self-sustenance. Most focus will be put on solar energy, which is widely known and used in our territory, and on biomass energy, which is also abundant, but poorly utilised.

The purpose of my work is to explore the field of self-sufficiency for housing systems and to study various RSE technologies, which would best enable for facilities to become totally or largely self-sufficient. All the required technology will be adjusted to individual housing

requirements (of electricity and heating). All of this will be supported by financial aspect as we are interested in what extent the investment in specific technology is beneficial.

The findings led us to the conclusion, that the market allows for installation of technologies that supply the facility with self-generated energy, and the need for purchasing electricity reduces to a minimum. However, we could be limited due to geographical location, financial capacity of the individual, and the current economic situation.

**Key words:** self-sufficient facility, technologies for renewable energy sources, electricity, heat energy

# Ekoremediacijski postopki kot metode reševanja nastalih ekoloških problemov

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**Izvleček**
Ekoremediacije ali krajše ERM, so postopki, ki na naraven (s pomočjo uporabe rastlin in dreves, ter okolju, naravi in ljudem prijazen) način lahko obnovijo degradirana območja. Revitalizirajo okolja obremenjena z različnimi polutanti, ki se nahajajo v njem kot posledica neustreznih tehnoloških procesov v industriji, zaradi naravnih nesreč in pomanjkanja okoljske zavesti. Zajemajo različno paleto dejavnosti, ki povzemajo samočistilne sposobnosti narave, ki v okolju potekajo že tisočletja. Danes so uporabljene na sodoben, času in prostoru primeren način. Primerni so povsod tam, kjer obstajajo občutljivi habitati za živalski in rastlinski svet, oziroma v okoljih, kjer želimo ponovno vzpostaviti naravne procese. Sami postopki so časovno omejeni, saj ne dajejo trenutnih rezultatov, vendar so okolju prijazni in ne povzročajo dodatnih posegov vanj. Rastlinske čistilne naprave za prečiščevanje komunalnih odpadnih voda ter postopki, kot so rizofiltracija, fitostabilizacija, fitoekstrakcija za zmanjševanje in odpravljanje obremenitev v zemljinah, omejevanju prašenja, erozij itd., so samo nekatere izmed njih, ki jih tudi v Sloveniji v zadnjem času s pridom uporabljamo.

**Ključne besede:** ekoremediacija, naravni procesi, polutanti, rastlinske čistilne naprave, komunalne odpadne vode, težke kovine

# Ecoremediation procedures as a method of resolving the ecological problems

**Abstract**
Ecoremediation or abbreviated ERM are procedures wich are on natural way (it means on the way which is friendly to the nature, with plants and trees, environment and humans) restore degraded areas. There are included various kinds of degradation which can derive due to dispersion of pollutants because of inadequate technological processes in industry, natural disastres etc. Ecoremediations include diferent range of activities which reflect the self purification ability of nature, which have been ongoing for millennia. These self-purification abilities of the nature are used in a way appropriate to the modern time and contemporary environment. They are suitable everywhere, where there are sensitive habitats for wildlife, or in environments where we want to restore natural processes. The procedures are limited by time. As their results can not be reached immediately but they need certain time. However, they are environmentally friendly and do not cause additional environmental interventions. Some of the most outstanding examples of ecoremediations are wetlands for purification of waste water as well as procedures like risofiltration, phytostabilization, phytoextraction, reduction or elimination of soil pollution, limitation of dusting and erosion etc.

**Key words:** ecoremediation, natural proceses, polutants, plant cleaning devices, municipal wastewater, heavy metals

# Oskrba s pitno vodo

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**Izvleček**
Prispevek obravnava porabo pitne vode, ki je naše naravno bogastvo, saj je v svetovnem merilu še vedno vsak peti prebivalec brez dostopa do pitne vode. Pri pitni vodi je zelo pomembna zakonodaja, ki z množico zakonskih določil omogoča »boljšo vodo«, tako na evropski ravni, kot na državni in lokalni ravni.

Namen raziskave je bil preverjanje trditve Agencije Republike Slovenije za okolje, da se je poraba pitne vode na prebivalca v zadnjih 100 letih povečala za šestkrat, in Statističnega urada Republike Slovenije, da se poraba vode od leta 2008 ni bistveno spremenila. Trditev smo preverjali na podlagi konkretnih podatkov komunalnega podjetja o prodani pitni vodi na območju Jesenic in Žirovnice. Izdelali smo analizo prodane pitne vode na izbranem območju ter izvedli primerjavo z zbranimi podatki, ki veljajo za Slovenijo. Rezultati so pokazali, da omenjeni trditvi ne veljata za območje lokalnih skupnosti Jesenice in Žirovnica. Z izdelavo regresije smo analizirali vplive na količino prodane vode in na prihodke podjetja v občinah Jesenice in Žirovnica. Ugotovili smo, da na količino prodane vode in na prihodke podjetja vpliva temperatura zraka.

**Ključne besede:** pitna voda, prodaja vode, oskrba, uporabnik, poraba vode v gospodinjstvu, poraba vode v gospodarstvu

# Drinking water supply

**Abstract**
This contribution is about the use of drinking water, which is our natural wealth, even though on a world scale every fifth inhabitant has no access to drinking water. With drinking water comes a very important legislation with a set of provisions, which enables ″better water″ on a European level as well as on state and local level.

The purpose of the study was to verify the statements of the Agency of the Republic of Slovenia for the environment, that the usage of drinking water per capita in the last 100 years has increased six times and the statement of the Statistical Office of the Republic of Slovenia, saying that the consumption of water has not fundamentally changed since 2008. We verified the statements based on solid information provided by the communal company about sold drinking water in the area of Jesenice and Žirovnica. We made analysis of the sold drinking water in the chosen area and compared it with the gathered information valid for Slovenia. The results indicated the statements are not valid for the area of Jesenice and Žirovnica. With the making of regression, we analysed the effects on the quantity of sold drinking water and revenue companies in this general area. What we gathered is that the air temperature has an effect on the amount of sold water and revenues of companies.

**Key words:** drinking water, sale of water, catering, consumer, use of water in households, use of water in economy

# Proizvodnja in raba obnovljivih virov energije v EU in Sloveniji

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**Izvleček**
V večini držav članic EU je z izvajanjem nacionalnih politik iz nacionalnih akcijskih načrtov prišlo do občutne rasti uporabe OVE (*obnovljivi viri energije*) . Po začetni spodbudni rasti pa so dodatne analize razkrile manj optimistične napovedi, kot je kazalo na začetku. Zaostajanje za cilji je vidno predvsem v sektorjih električne energije, ogrevanja in hlajenja ter prometa. Kar 15 držav članic ni doseglo svojih ciljev za leto 2010 glede deleža energije iz obnovljivih virov v mešanici virov električne energije, v prometnem sektorju pa svojega 5,75-odstotnega okvirnega cilja za 2010 ni doseglo 22 držav članic. Med temi državami je tudi Slovenija. Najslabši rezultati pri izpolnjevanju nacionalnih načrtov so pri izrabi vetrne energije. Med obnovljivimi viri energije sta bila v EU leta 2012 najpomembnejša biomasa in odpadki, kar predstavlja nekaj manj kot dve tretjini (65,5 %) primarne proizvodnje obnovljivih virov energije. Hidroelektrarne dosegajo drugi največji delež s 16,2 %. Posebno hitro rast sta kljub nizki stopnji proizvodnje dosegli vetrna in sončna energija, kar predstavlja 10,0 % in 5,1 % delež. Očitno je, da bodo morale nekatere članice dodatno ukrepati in hitro prilagoditi akcijske načrte za doseganje postavljenih ciljev.

**Ključne besede:** obnovljivi viri energije, hidroenergija, fotovoltaika, vetrna energija

# Production and Use of Renewable Energy Sources in EU and Slovenia

**Abstract**
Most EU member states have achieved a significant growth in the use of RES (*renewable energy sources*) with the implementation of the national policy of national action plans. After the initial encouraging growth further analysis revealed a less optimistic forecast than at the beginning. Lagging behind the goals is visible mainly in the electricity, heating, cooling and transport sectors. 15 member states, including Slovenia, failed in theirs 2010's goals to reach the share of energy from renewable sources in the electricity production. In the transport sector, 5,75 percent of its indicative target for 2010 is not achieved in 22 member states, including Slovenia. A failure in national plans is most evident in the wind energy sector. In 2012, the most important renewable energy sources in the EU were biomass and waste, which accounts for slightly less than two-thirds (65,5%) of primary production of renewable energy. Hydroelectric power stations achieved the second largest share with 16,2%. Particularly rapid growth, despite the low level of production, achieved wind and solar energywith the share of 10,0% and 5,1% . It is obvious that some member state will have to act fast and adjust action plans to achieve the setted goals.

**Key words:** renewable energy sources, hydropower, photovoltaics, wind energy

# *Predinvesticijski izračun proizvodnje električne energije v mali hidroelektrarni*

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**Izvleček**
Pred odločitvijo o investiciji v izgradnjo male hidroelektrarne je zelo pomemben čim bolj točen izračun proizvodnje električne energije v bodočem objektu. Proizvodnja električne energije je vhodni parameter v študiji ekonomske upravičenosti investicije. Na višino letne proizvodnje vpliva mnogo dejavnikov, na nekatere lahko vplivamo z različnimi tehničnimi rešitvami (izbira turbine, generatorja, cevovoda…), nekateri dejavniki pa so naravna danost lokacije (bruto padec in naravni pretok vodotoka na profilu odjema vode). Izveden je izračun proizvodnje EE na osnovi znanih podatkov o pretoku in padcu male hidroelektrarne z upoštevanjem resničnih, nelinearnih diagramov izkoristka turbine in generatorja ter različnih hidravličnih izgub, ki nastopajo v derivaciji.

**Ključne besede:** izračun proizvodnje električne energije MHE

# *Pre-investment energy yield calculation of Small Hydro Power Plant*

**Abstract**
Pre-investment energy yield calculation of small hydro power plant (SHPP) is one of crucial input parameters to investment feasibility study of SHPP and is therefore very important to be as precise as possible. There are multiple influences to SHPP energy yield, some of them can be controlled through correct SHPP design approaches (selection of turbine, generator equipment, derivation, water cleaning solutions,…) others are submitted to natural site parameters (river water flow, site gross head, derivation length, ...) This study performs a yearly energy production calculation based on known water flow and gross head and considering realistic non-linear turbine and generator efficiency curves as well as realistic hydraulic pressure losses in complete water derivation system and outlet canal.

**Key words:** energy yield calculation of small hydro power plant

# Metoda za izračun učinka zamenjave solarnega razsmernika

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V življenjski dobi sončne elektrarne se njihovi lastniki srečajo z dilemo ustrezne izbire novega omrežnega razsmernika, saj njegov izkoristek vpliva na energijski in posledično tudi finančni izplen. Učinek zamenjave razsmernika običajno ugotavljamo s pomočjo specializiranih programskih produktov, ki pa povprečnemu lastniku sončne elektrarne predstavljajo prevelik finančni zalogaj. Izračun lahko izvedemo z upoštevanjem »Evro« izkoristka, vendar pri tem predpostavimo konstanten izkoristek v celotnem obratovalnem območju razsmernika. Raziskovalno delo poizkuša z uporabo enostavnih matematičnih operacij razviti natančnejši postopek za izračun vpliva zamenjave razsmernika na energijski izplen, pri čemer upoštevamo nelinearno odvisnost med izkoristkom in obremenitvijo razsmernika. Metoda temelji na uporabi »trendne črte« programskega produkta Excel. Kljub enostavnosti postopka trdimo, da je izračun natančen saj upošteva izkoristek razsmernika pri poljubni obremenitvi. Teoretična podlaga je bila preizkušena na primeru 15-minutnega obremenilnega diagrama dejanske sončne elektrarne, kjer smo primerjali tri tipe razsmernikov in ugotavljali njihov vpliv na proizvodnjo električne energije. Pri uporabi polinomske funkcije je izračunana proizvodnja večja kot v primeru poenostavljenega izračuna z uporabo Evro izkoristka. Dva od analiziranih razsmernikov sta imela enak Evro izkoristek, kar teoretično predstavlja enako proizvodnjo. Z upoštevanjem polinomske funkcije pa ugotovimo, da se proizvodnji razlikujeta za eno odstotno točko.

**Ključne besede:** izkoristek razsmernika, polinomska funkcija

# Yield evaluation for exchanged solar inverter

**Abstract**
Solar plant operators face a dilemma how to optimally choose grid inverters, because its efficiency has great effect on yield. Special software solutions are used for this type of analysis, but professional software usually turns out to be too expensive for average plant operator. When comparing two inverters, Euro efficiency is used, which is given for average load and is considered constant throughout operating range.
This paper shows efficient way of calculating efficiency of different inverters used in a solar power plant. Despite its simplicity, this method is precise because inverter efficiency is calculated for every single operating point. Developed method was tested using 15-minutes load profile of actual solar power plant. The goal was to determine effect of different inverters on solar plant yield. Its increase is larger when polynomial function is used. Two inverters that were used in yield evaluation have equal Euro efficiency, which in theory represents equal yield increase. When polynomial function was applied, actual yield differs by one percentage point.

**Key words:** inverter efficiency, polynomial function

# *Sanacija in učinki sanacije mehkega jezu HE Sava*

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**Izvleček**
Hidroelektrarna Sava, hidroelektrarna Vinka Majdiča je bila zgrajena leta 1924. Od leta 1949 je v upravljanju Gorenjskih elektrarn. Elektrarna je pretočno kanalskega tipa in izkorišča vodni potencial reke Save v Kranju. Njena letna proizvodnja je 10,5 GWh. Pri obratovanju elektrarne pomembno vlogo predstavlja mehki jez dolžine 250 m, zgrajen leta 1976. Življenjska doba mehkega jezu je odvisna od kvalitete materiala in montaže ter hidroloških razmer v normalnih in izrednih pogojih.
S statistično analizo smo analizirali hidrološke podatke glede na časovno vrsto (mesečno, letno), proizvodnjo električne energije in ugotavljali vpliv mehkega jezu na obratovanje HE Sava pred in po sanaciji.
Pristop k tehnični rešitvi sanacije mehkega jezu je upošteval izkustvene rešitve, inovacijske predloge ter varnostne in ekološke zahteve. Izvedba mehkega gumenega jezu HE Sava je primer dobre prakse, ki upošteva ekonomske, energetske, ekološke in tehnološke parametre, na strokovni ravni, z ekonometrijskim modelom pa znanstveni pristop ocenjevanja učinkov proizvodnje.

**Ključne besede:** hidroelektrarna, električna energija, mehki jez, ekologija, ekonomika proizvodnje

# *Rehabilitation and rehabilitation effects of the Sava HPP soft dam*

**Abstract**
A Sava hydro power plant, namely the Vinko Majdič hydro power plant was built in 1924. Since 1949, it has been managed by Gorenjske elektrarne. The plant is of a flow channel type and utilizes the water potential of the Sava River in Kranj. Its annual production is 10.5 GWh. In the operation of the plant the 250 m long soft dam, built in 1976, plays an important role. The soft dam lifetime depends on the quality of materials and construction, and hydrological conditions in normal and emergency conditions.

By the statistical analysis, we analysed hydrological data according to the time scope (monthly, annually), electric power production and kept ascertaining the soft dam impact on the operation of the Sava HPP before and after rehabilitation.

An approach to the soft dam rehabilitation technical solution allowed for the experiential solutions, innovative proposals, and safety and environmental requirements. The implementation of the Sava HPP soft rubber dam is an example of good practice that allows for economic, energy, environmental and technological parameters on the professional level, and by the econometric model it considers a scientific approach to the assessment of the production effects.

**Key words:** hydro power plant, electric power, soft dam, ecology, economics of production

# Učinkovita uporaba kmetijske mehanizacije

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**Izvleček**
V Sloveniji je bilo leta 2013 127.988 traktorjev, kar je 18,3 % več kot leta 2000. Kmetijsko gospodarstvo je imelo povprečno dva traktorja. Slovenija je imela 62,2 traktorjev na tisoč prebivalcev in 6,31 traktorja na hektar. V Sloveniji je med registriranimi cestnimi vozili 6,3 % traktorjev in 0,4 % traktorskih prikolic. Glede na starost je 79,4 % traktorjev starejših od 12 let in 59,4 % traktorskih priklopnikov starejših od 12 let. Stroški za gorivo in vzdrževanje na kmetiji spadajo med variabilne stroške in so odvisni od letne rabe strojev. Zmanjševanje porabe goriva v kmetijstvu lahko voliva na ekonomiko pridelave hrane in posledično zmanjševanje emisij toplogrednih plinov. Pomembno je sistematično spremljanje porabe goriva na traktorjih pri opravljanju kmetijskih operacij s postopki. Na zmanjševanje porabe goriva v kmetijstvu vplivajo sami uporabniki z ukrepi pri opravljanju delovnih operacij. Lokalno pridelana hrana ima pozitiven vpliv na logistiko, saj se zmanjšujejo transportne poti in posledično ogljični odtis. Alternativo dizelskemu gorivu predstavlja biodizel in rastlinsko olje. Veliko število traktorjev je posledica premajhnega sistematičnega nadzora pri subvencioniranih nakupih kmetijske mehanizacije.

**Ključne besede:** logistika, traktor, poraba goriva, ogljični odtis, statistična analiza

# Efficient use of agricultural machinery

**Abstract**
In 2013 there were 127,988 tractors in Slovenia, which is 18.3% more than in 2000. A farm had two tractors in average. Slovenia had 62.2 tractors per thousand inhabitants and 6.31 tractors per hectare. In Slovenia, there are 6.3% of tractors and 0.4% of tractor trailers among registered road vehicles. As to their age, 79.4% of tractors are older than 12 years and 59.4% of tractor trailers older than 12 years. Fuel and maintenance costs on a farm belong to variable costs and depend on the annual use of machinery. Reducing fuel consumption in agriculture can influence on the economics of food production and consequently reduce greenhouse gas emissions. It is important to systematically monitor the fuel consumption on tractors in the performance of agricultural operations with procedures. The users themselves impact on reducing the fuel consumption in agriculture by measures in the performance of work operations. Locally grown food has a positive impact on logistics as it reduces transport routes and consequently the carbon footprint. An alternative to diesel is represented by biodiesel and vegetable oil. A large number of tractors is a consequence of too small systematic control in the subsidized purchase of agricultural machinery.

**Key words:** logistics, tractor, fuel consumption, carbon footprint, statistical analysis

# *Medpredmetno povezovanje za spodbujanje okoljske ozaveščenosti*

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**Izvleček**
K okoljskem ozaveščanju lahko veliko doprinese tudi okoljska umetnost, ki za ustvarjanje uporablja odpadne snovi. V tujini je tovrstno ustvarjanje znano pod nazivom "Environmental Art", okoljska umetnost. Umetniška dela in instalacije združujejo informacije, promovirajo nove poglede na iste objekte, se dotaknejo človekovih čustev in v nekaterih primerih celo poveličujejo smeti. V prispevku predstavljamo rezultate pilotske raziskave, ki je bila izvedena v četrtem razredu osnovne šole, v šolskem letu 2012/13, v kateri je bil izveden inovativni didaktični pristop poučevanja naravoslovja z umetnostjo. Okoljske vsebine so bile podane interdisciplinarno z medpredmetnim povezovanjem s poudarkom na naravoslovju in likovni umetnosti. Z namenom ugotoviti vpliv inovativnega didaktičnega pristopa poučevanja naravoslovja z umetnostjo je bila izvedena anketa pred izvedbo pristopka in po njem. Pridobljeni podatki so bili analizirani za potrebe ugotavljanja sprememb v okoljski ozaveščenosti učencev. S $\chi 2$ preizkusom, pred in po uvedeni intervenciji, z anketo pridobljenih odgovorov je bilo ugotovljeno, da je večina učencev pozitivno spremenila svoj odnos do okolja.

**Ključne besede:** okoljsko ozaveščanje, trajnostni razvoj, likovna umetnost, okoljska umetnost, inovativni didaktični pristop, poučevanje naravoslovja z umetnostjo (IDPPNU)

# *Enhancing environmental awareness with cross curricular connections*

**Abstract**
Recent research on environmental issues indicates that traditional teaching poorly prepares students for scientific thinking. This distinct lack of scientific thinking is particularly prominent in natural sciences, with a direct bearing on environmental education. Our approach with an emphasis on experimental and experiential work paves the way for easily integrating scientific and environmental issues. Environmental education and awareness are explored in a scientific context through visual arts exploration, empowering students to develop their ability to understand and critically respond to the environmental challenges of the modern world.
Our research analyzes 4th grade pupils' attitudes towards environmental issues and art. Initially, we develop their ability to approach and raise their emerging environmental awareness through art. This is our starting point for implementing our innovative didactic approach to teaching environmental issues, based on cross-curricular integration with emphasis on science and art. Art exploration is holistic, galvanizing dynamism and emotions that easily lend to changing attitudes towards environmental issues. The natural link between environmental issues and art is suitably reflected in our use of waste materials in artworks.

**Key words:** environmental awareness, sustainable development, art, environmental art, inovative didactic approach of teaching ( IDAT )

# *Information-analytical system of environmental monitoring technologically disturbed landscapes*

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**Abstract**
The Russian Federation is one of the world leaders in the coal extraction. Most of the coal reserves are mined by the cheapest open way. There are a lot of open pits which are very harmful to the environment. The effective tool for reconstruction projects is a specialized system that allows handling required data. Developed information- analytical system for monitoring the impact of the coal industry on the environment includes a database, geoinformation system and software module of calculating the integral characteristics of the environment. Represented structure of a database contains twenty two related tables that take into account the work carried out on disturbed sites and monitoring data. Geoinformation system with a web interface includes graphical and thematic databases with environmental focus. The software module is designed to calculate the current integral characteristics of the environment of studied technogenic landscapes and predict the timing of pollution neutralization and restore the biological productivity of technogenic landscapes. The relationship between database and GIS provides additional opportunities for visual analysis and study of spatial relationships among coal mines, their remediation technologies and the characteristics of their ecological conditions.

**Key words:** Anthropogenic landscapes;neutralization of contamination; monitoring technologically disturbed landscapes; information system; the environment; GIS technology; forecasting periods neutralize contaminants; recovery of biological productivity

# *Preliminary results of a floating wetland system in carp breeding*

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**Abstract**
Aquaculture allows fish cultivation under controlled conditions and it is often considered as a sustainable solution that determines economic development while safeguarding environmental resources. Furthermore, over the past few decades wetland systems have been used for water treatment as they can break down pollutants through the interaction between plants, soil and microorganisms. For this reason, a trial was conducted at the University of Padova (Italy), combining these two systems. It took place in the North of Italy from 21/07/2011 to 18/11/2011. Two tanks were set up for aquaculture, both connected to a mechanical/biological filtration system, but only one with the inclusion of Tech-IA, a floating mat that allows herbaceous plants to float on the water surface, carrying out their purifying function without the aid of a substrate. About 30 kg of carp (*Cyprinus carpio*) were released in each tank. Several parameters were measured during the trial to assess water quality and each carp was weighed at the end. The results obtained by the tank with Tech-IA showed better water quality data and a faster carp growth rate.

**Key words:** aquaculture, carp, floating mats

# *Herbicidal effect of Ailanthus altissima leaves water extracts on Medicago sativa seeds germination*

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**Abstract**
*Ailanthus altissima* (Mill.) Swingle is a deciduous tree native to Southeast Asia, and one of the worst invasive plant species in Europe and North America. A feature probably contributing to its invasiveness is a production of a secondary metabolites, one of which ailanthone, is shown in several studies to have, amongst other, a herbicidal effect on many plant species. In this study we have tested the herbicidal effect of A. *altissima* leaves water extracts on *Medicago sativa*L. seed germination. M. sativa has been shown in previous studies to be sensitive to A. *altissima* extracts. The main phytotoxic compound in A. altissima was previously shown to be ailanthone, although probably it is not the only one. Water extracts of leaves have been prepared and diluted to multiple concentrations in order to assess the relation between the extract concentration and the intensity of herbicidal activity. The obtained data showed that there was a significant difference between the emergence of treated and untreated seeds, precisely, the emergence of seeds treated with the highest concentration was on average 30% lower than control. These results were expected and consistent with the previous observations of ailanthone being phytotoxic to a wide variety of plants, causing germination inhibition and injuries in older plants. The data available so far show great promise for the possible future applications of ailanthone as a natural product herbicide.

**Key words:** *Ailanthus altissima*, invasive species, herbicide effect, germination, ailanthone

3. sekcija:

# *Hortikultura in floristika*

3rd session:

# *Horticulture and Floristics*

# Vloga rastlin pri sodobnem načinu bivanja

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**Izvleček**
Sodobni življenjski slogi bivanja v Sloveniji sledijo evropskim trendom. Pri tem ima hortikultura pomembno vlogo pri urejanju notranjega in zunanjega prostora. Ureditev notranjega prostora sledi spremembam industrijskega oblikovanja in drugačni razporeditvi časa prebivalcev. V zunanjem prostoru se oblikujejo nove hortikulturne ureditve v skladu s tradicijo, potrebami po lastni, doma pridelani hrani na sonaraven način, prav tako pa glede prostočasnih dejavnosti. Vedno bolj se uveljavlja sonaravna hortikultura, ki prebivalcem sosesk ponuja različne modele trajnostnih zelenih ureditev odprtih površin s poudarkom na ekosistemskih ureditvah, ki so v sozvočju z naravnim okoljem in uporabi za prostočasne dejavnosti in v rekreativne namene. Trendi, kot so ohranjanje naravnih virov, skrb za naravne habitate in prostoživeče živali, blaženje močnih vetrov, omogočanje pronicanja deževnice v tla, zmanjševanje količine odpadkov, uporaba naravnih materialov iz okolice, recikliranje, so postali tudi sestavni del hortikulturnih ureditev. Izbor rastlin vseskozi sledi novim trendom in se predvsem v zunanjem prostoru prilagaja dejavnostim prebivalcev. Članek izpostavlja nekaj posebnosti ureditev z rastlinami glede na prostočasne dejavnosti in slog bivanja.

**Ključne besede:** hortikultura, rastline, notranji prostor, zunanji prostor, trendi, slogi bivanja, prostočasne dejavnosti

# The role of plants in contemporary lifestyle

**Abstract**
Modern lifestyle in Slovenia follows European trends. At this, horticulture has an important role in the regulation of indoor and outdoor space. Arrangement of interior follows the changes of industrial design and different time arrangement. In the outdoor space the new horticultural arrangements are designed in accordance with tradition, the needs of their own, home -made food produced in a sustainable way, but also according to leisure activities. The interest of sustainable horticulture is increasing. It offers different models of sustainable green open spaces with a focus on ecosystem arrangements that are in harmony with the natural environment and used for leisure and recreational purposes for the residents of the neighborhoods. Trends such as the conservation of natural resources, care for the natural habitats and wildlife, mitigation of strong winds, facilitating infiltration of rainwater into the soil, waste reduction, use of natural materials from the environment, recycling, have become an integral part of horticultural arrangements. Selection of plants always follows new trends and especially in the outer space it accommodates to the activities of the inhabitants. This article highlights some special arrangement of plants in relation to leisure and style of living.

**Key words:** horticulture, plants, inner space, outer space, trends, styles of living, leisure activities

# *Perspektive uporabe rastlinskih tkivnih kultur v hortikulturi za izobraževalne, razvojne in komercialne namene*

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**Izvleček**
V aseptičnih laboratorijskih razmerah lahko rastline razmnožujemo s pomočjo semen (generativno) ali z uporabo različnih tehnik tkivnih kultur (vegetativno). Med temeljnimi tehnikami tkivnih kultur sodi tudi mikropropagacija, s pomočjo katere lahko iz različnih delov rastline pridobivamo veliko število klonov matične rastline. Mikropropagacija je zelo uporabna tudi pri pridobivanju brez virusnih sadik, žlahtnjenju novih kultivarjev in shranjevanju genskega materiala. V članku smo izpostavili predvsem povezavo med mikropropagacijo in hortikulturo in uporabnost te metode za izobraževalne, raziskovalno-razvojne in komercialne namene v hortikulturi.

**Ključne besede:** mikropropagacija, hortikultura, in vitro tehnike

# *Perspectives for utilization of horticultural crops tissue culture for educational, R&D and commercial applications*

**Abstract**
Plant reproduction could be performed in aseptically laboratory conditions using seeds (generative path) or plant tissue culture techniques (vegetative path). One of the basic techniques in plant tissue culture is micropropagation which permits us to obtain a wide number of clones of an initial plant. Indeed, micropropagation is very useful to achieve virus-free plants, breeding of new cultivars and conservation of germplasm. Connection between this biotechnological technique and horticulture were explained in the article. Educational, R&D and commercial application of horticultural crops tissue cultures were emphasized.

**Key words:** micropropagation, horticulture, in vitro techniques

# *Vrt kot literarni motiv v delu angleškega romantičnega pesnika Samuela Taylorja Coleridgea*

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**Izvleček**
V članku obravnavam motiv vrta v pesmih angleškega romantičnega pesnika Samuela Taylorja Coleridgea. Pri tem se osredotočam na štiri pesmi iz njegovega pesniško najbolj plodnega obdobja 1795–1798. V metodološkem smislu temelji raz-

iskava na rabi duhovnozgodovinske, formalno logične in imanentno-interpretacijske metode, hkrati s tem pa izhaja tudi iz konteksta literarne idiličnosti in sublimnosti, ki predstavlja interpretativni in metodološki okvir raziskave. Prikazane so tipične značilnosti obeh pojmov, ki ju zlasti na ravni atributov idilične zaprtosti in sublimne odprtosti lahko razumemo kot tipološko dvojico dveh nasprotji. Ob tem se ponuja primerjava z motivoma (idiličnega) zaprtega vrta in (sublimne) odprte narave. Analiza obravnavanih pesmi pa potrdi hipotezo, da lahko vrt kot literarni motiv učinkuje kot stičišče idiličnega in sublimnega literarnega doživetja. Njena potrditev je razvidna iz poglobljene in razširjene romantične sublimne vizije, ki presega paradigmo preprostega idiličnega vrta (Lime-Tree Bower my Prison), ter s prepoznavo sublimne neskončne narave kot duhovne energije, ki je hkrati tudi vir in inspiracija pesniškega kreativnega procesa (Kubla Khan).

**Ključne besede:** vrt kot literarni motiv, književnost, poezija, romantika, angleška romantika, idiličnost, sublimnost

## *Garden as a literary motif in the works of English romantic poet Samuel Taylor Coleridge*

**Abstract**

The article deals with a motif of a garden in the poems of English romantic poet Samuel Taylor Coleridge. The stress is made on the four poems from his poetically most fertile period 1795-1798. The research is based on the usage of different methods, such as 'geistgeschichte', formal logical and interpretative methods. At the same time, the context of the literary idyll and sublime is taken into consideration, as it actually functions as an interpretative and methodological frame of the research. Typical characteristics of both mentioned notions are presented, which leads to a conclusion they can be understood as a binary typological opposition, at least on the level of attributes of the idyllic closeness and the sublime openess. Consequently, the comparison with the motifs of the (idyllic) closed garden and the (sublime) open nature seems to be at hand. The analysis of the interpreted poems, however, confirms the hypothesis that the garden as a literary motif can be seen as the junction of the idyllic and sublime literary experience. Its confirmation is clarified by a deepened, broadened romantic sublime vision which transcends the paradigm of a simple idyllic garden (Lime-tree Bower my Prison), and also by recognition of the sublime infinite nature as spiritual energy, source and inspiration of the poetic creative process (*Kubla Khan*).

**Key words:** garden as a literary motif, literature, poetry, romanticism, English romanticism, the idyll, the sublime

## *Ohranjanje vrednot prednikov za življenjska sopotja in dediščino potomcem*

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**Izvleček**

Rodoslóvje je pomožna zgodovinska veda, ki proučuje in zasleduje družinsko poreklo. Družinsko drevo prikazuje krvno sorodstvo oziroma povezave med posamezniki. Viri rodovnih podatkov so matične knjige, ženitveni zapisnik, vodnik po

župnijskih arhivih, krajevni rodoslovni viri, status animarum, urbarji, knjige po spletu, pokopališča in podobno. Na podeželju so za sporazumevanje ključnega pomena hišna imena. Za rodoslovno delo je v pomoč računalniški program Brother's Keeper, pri raziskavah pa svetovni splet (Google Search) in socialno omrežje Facebook ter osebni kontakti z živečimi sorodniki. Osredotočamo se na zbiranje podatkov o delu, življenju in socialnih razmerah prednikov. Gradiva (dokumente, zapise, pričevanja, transkript intervjuje) nadaljnje obdelamo z metodo kvalitativne raziskave s pomočjo tabele kategorij in drevesa kategorij, analizo in interpretacija rezultatov.

Študij primera raziskave je bila rodbina Papler, katere korenine segajo pred pol stoletja na Nemško. Na Loškem živele pomembne osebnosti v 16. in 17. stoletju, v Lipniški dolini se je rodil Fran Papler, nadučitelj in sadjar, ki je s križanjem vzgojil posebno sorto jabolk Paplerjev bobovec. Izdelava rodinskega drevesa Papler se nadaljuje v preteklost z raziskovanjem in v prihodnost z novimi podatki o potomcih.

Raziskave rodovnika se nadaljujejo v več smereh, da potrdimo ali ovržemo postavljene hipoteze z arhivskimi dokumenti, novimi odkritimi gradivi, s primerjavo DNK dednih zapisov in podobno. Zavedanje lastnih korenin je spoznavanje osebnostnih lastnosti, prepoznavanje sposobnosti in socialnih razmer. Predniki so to nazorno povedali s pregovorom, da »jabolko ne pade daleč od drevesa« in »Kri ni voda«.

**Ključne besede:** rodoslovje, družinsko drevo, vrednote, sociala, kvalitativna raziskava

# *Maintenance of ancestral values for life cohabits and heritage to descendants*

**Abstract**

Genealogy is an auxiliary historical science that studies and pursues the family origin. A family tree shows blood relations or connections among individuals. Sources of genealogical data are civil registers, marital records, guides to parish archives, local genealogical resources, status Animarum, land registers, books online, cemeteries and the like. In rural areas household names are of key importance for communication. The computer programme Brother's Keeper assists in genealogical work, and in researches the World Wide Web (Google Search) and social network Facebook and personal contacts with living relatives. We are focused on collecting data on work, life and social conditions of ancestors. Materials (documents, records, testimonies, transcript of interviews) are further processed by the method of qualitative research by means of the table of categories and categories tree, analysis and interpretation of results.

A Research Case Study was the Papler family, whose roots date back half a century ago in Germany. At Loka there lived VIPs in the 16th and 17th centuries, in Lipnica Valley there was born Fran Papler, headmaster and fruit grower, who by cross growing raised a special sort of apples called Paplerjev bobovec. Creating of the Papler genealogical tree continues in the past by exploring and into the future with new data on descendants.

The genealogical tree research continues in several directions to confirm or disprove hypotheses set forth by archive documents, newly discovered materials, by comparing the DNA of hereditary records and the like. Awareness of own roots is getting to know the personality characteristics, identifying skills and social conditions. Ancestors clearly told that by proverbs that »An apple does not fall far from the tree« and »Blood is not water«.

**Key words:** genealogy, family tree, values, social welfare, qualitative research

# *Zelene strehe: mesta z manjšim ogljičnim odtisom in izboljšano mikroklimo*

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**Izvleček**
Ozelenjevanje streh in sten je ena najinovativnejših in hitro razvijajičih se področjih hortikulture, krajinske arhitekture in arhitekture. Vsaka streha šteje, še posebno v hitro rastočih mestih, kjer so parkovne površine postale premajhne za celotno populacijo mesta.

Sodobna arhitektura se tako nemalokrat srečuje z zelenim, ne samo na področju zelene pasivne gradnje, temveč tudi na področju ozelenitve ponavadi ravnih streh blokov.

Sodobne strešne ureditve seveda niso plod domišlije današnjih arhitektov, temveč znanja izhajajo predvsem iz skandinavskih dežel, kjer so kmečke hiše dobesedno vstavljene v zemljo, z zemljo prekrite in poraščene s travinjo iz neposredne okolice. Sodobni materijali, tehnologije in védenja prednikov tako danes omogočajo mogočne strešne ureditve, ki z ekstenzivnim vzdrževanjem zmanjšujejo ogljični odtis zgradbe. Ozelenjena streha in fasade so okoljsko sprejemljiveši od konvencionalnih kritin in fasadnih sistemov saj zmanjšujejo porabo energije za hlajenje in ogrevanje zgradb, hkrati pa prečiščujejo padavinske vode.

**Ključne besede:** zelene strehe, nizek ogljični odtis, ekologija, naravovasrtvo, trajnostno

# *Green roofs: cities with smaller carbon print and improved microclimate*

**Abstract**
Greening of roofs and walls is one of the most innovative and fast developing field of horticulture, landscape architecture and architecture. Each roof is considered, particularly in rapidly growing cities where parks have become too small for the entire population of the city.

Modern architecture is therefore often faced with green, not only in the field of green passive construction but also in greening usually flat roof blocks.

Modern roof design is of course not the result of the imagination of today's architects, but the knowledge derived primarily from the Nordic countries where the farmhouses are literally embedded in the ground, covered with soil and vegetated with grasses from the immediate surroundings. Modern Materials, technology and knowledge from ancestors allows massive green roof regime with extensive maintenance and reduced carbon footprint of the building. Green roofs and facades are environmentally more acceptable than conventional roofing and facade systems, as they reduce energy consumption for heating and cooling buildings, but at the same time also purifies rainwater.

**Key words:** green roofs, low carbon print, ecology, nature conservation, sustainable

# Zelene strehe: izbor rastlin in vzdrževanje

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**Izvleček**
Zelene strehe je potrebno načrtovati skupaj z načrtovanjem hiše, ki jo le-ta krasi. Pred načrtovanjem je zato potrebno zastaviti kar nekaj vprašanj, morda najpomembnejši sta, komu ali čemu bo namenjena zelena streha? Se bodo na taki strehi zbirali prebivalci hiše ali bo grajene le zaradi navdušenja nad naravo? Odgovori na vprašanja nato načrtovalce usmerijo tudi v izbor rastlin, ta pa jih vodi v konstruiranje ostrešja, ki bo nosilo vse potrebne plasti in rastline.

Intenzivnost zasaditve oziroma njenega vzdrževanja je znova pogojena od izbora rastlin, ki lahko sega od sukulent do trav in celo nižjih grmovnic in manjših dreves. Poleg intenzivnosti zasaditve in vzdrževanja pa sta pri izboru rastlin najpomembnejši makro in mikro klima, saj dokončno zožita izbor primernih rastlin. Nenazadnje pa je zeleni pokrov odvisen tudi od naklona strehe in želje lastnikov.

**Ključne besede:** zelene strehe, rastline, načrtovanje, ekologija, naravovasrtvo, trajnostno, vzdrževanje

# Green roofs: plant selection and maintenance

**Abstract**
Green roofs should be planned together with the design of the house, which it adorns. Prior planning is therefore necessary to ask a few questions, perhaps the most important are, to whom and what will be the green roof for? Will be residents of the house gathered on such a roof or or only because of the enthusiasm for nature? Answers to the questions and then designers focus in the selection of plants, which in turn, leads to the construction of the roof truss, which will bear all the necessary layers and plants.

The intensity of planting and its maintenance is again conditional on the selection of plants, which can range from grasses and succulents to even lower shrubs and small trees. In addition, the intensity of planting and maintenance are the most important in the selection of plant macro-and micro-climate, because finally narrowed down the selection of suitable plants. Finally, the green cover is also dependent on the roof pitch and the aspirations of the owners.

**Key words:** green roofs, plants, design, ecology, nature conservation, sustainable, maintenance

# *Golfigrišče kot sanacija odlagališča odpadkov: vzdrževanje rekreacijske površine*

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**Izvleček**
Vse več razvrednotenih območij v Sloveniji ostaja nesaniranih in prepuščenih naravnim procesom zaraščanja. Pojavi se vprašanje, kako oziroma na kakšne načine sanirati deponijo komunalnih odpadkov, ki je na eni strani na robu zavarovanega območja in na drugi v neposredni bližini rastočega mesta.

Problem odlagališč je kompleksen, zato njegovo reševanje zadeva mnoge stroke v povezavi s politiko in javnostmi.

Odlagališče odpadkov je moteče zaradi značilne, v prostoru navadno tuje reliefne oblike; zaradi kemizmov, ki nastajajo na mikrolokaciji ter vplivajo na širši prostor; zaradi zgradbe in pojavnosti odlagališč nastajajo številna moteča prostorska nesorazmerja, zato se zastavlja vprašanje, v katerih primerih in kako ta nesorazmerja zmanjšati ali celo odpraviti. Eno od značilnih reliefno izstopajočih nesorazmerij so kopasto oblikovana polja, katerih umeščanje v obstoječi teren je lahko problematično tako pri razgibanem kot tudi ravnem reliefu, kjer prihaja do očitnih nasprotij med kupi smeti odlagališča in okoliškim prostorom. Poleg tega pa na odlagališčih ni prisotne drevnine.

Poleg same izvedbe pa je v času obratovanja potrebno intezivno vzdrževanje zelenic, kar lahko predstavlja še dodaten negativen vpliv na okolje.

**Ključne besede:** golfigrišče, sanacija, vzdrževanje rekreacijskega območja

# *Golf Course as the rehabilitation of landfills: the maintenance of recreational areas*

**Abstract**
Degraded areas in Slovenia remains without rehabilitation and left to natural overgrowth processes. The question arises, how and in what ways rehabilitated landfill of municipal waste, which is on the one hand, on the edge of the protected area and on the other in the vicinity of the growing city.

Problem of landfills is complex and its solution concerns many disciplines, in conjunction with the policy and the public.

Landfill waste is disturbing because of its peculiar, in the space usually foreign landforms; because chemistry generated in micro location and the impact on the wider area; because of the structure and the incidence of landfills generated a number of disturbing spatial disparities, therefore, the question is in which cases and how these disparities reduced or even eliminated. One of the typical relief striking disparities are characteristic objects of fields whose placement in the existing terrain can be problematic for both rugged and flat terrain where there are apparent contradictions between the piles of garbage landfill and the surrounding area. In addition, in landfills is not present nursery business.

In addition to the performance, in the course while in operation is required an intensive maintenance of lawns which may represent an additional negative impact on the environment.

**Key words:** golf course, rehabilitation, maintenance of recreational areas

# *Bio-dinamična pridelava bazilike (Ocimum basilicum)*

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**Izvleček**
V svetu se vse bolj uveljavlja biološko dinamična pridelava hortikulturnih rastlin. Ker smo želeli preveriti vpliv lune na rast in razvoj rastlin, smo izvedli poskus na primeru bazilike (*Ocimum basilicum*). Uporabili smo štiri različne sorte: rdečelistna bazilika *Ocimum basilicum* 'Rosso', grmičasta bazilika *Ocimum x hybrida*, zelenolistna bazilika EKO GENOVE*SE Ocimum basilicum* in citronska bazilika *Ocimum basilicum var. Americanum*. Zanimalo nas je, ali upoštevanje terminov, ki zagotavljajo boljši razvoj korenin, listov, cvetov in plodov, vplivajo na razvoj bazilike, katere glavni pridelek je listna masa. Pri določanju ustreznega datuma setve smo uporabljali setveni priročnik Marie Thun 2012. Poskus je bil izveden v treh ponovitvah, rastline smo imeli posajene v lončke, saj smo tako uporabili že znan substrat in izničili različen vpliv vrtnih tal na razvoj rastlin. Rezultati so pokazali, da so med različnimi setvenimi termini statistično značilne razlike pri rdečelistni, zelenolistna bazilika in citronski baziliki. Pri grmičasti sorti bazilike smo ob analizi podatkov z ANOVA analizo ugotovili, da razlike v količini pridelka niso statistično značilne.

**Ključne besede:** lunin setveni koledar, bazilika, *Ocimum basilicum*, biološko dinamična pridelava

# *Bio-dynamic cultivation of Basil (Ocimum basilicum)*

**Abstract**
Bio-dynamic cultivation of horticultural plants has been more and more used all over the world. In order to verify the lunar influence on the growth and development of plants an experiment for the case of basil has been carried out (*Ocimum basilicum*). Four different varietes have been used: red-leafed basil *Ocimum basilicum* 'Rosso', shrubby basil *Ocimum x hybrida*, green-leafed basil ECO GENOVESE and citric basil *Ocimum basilicum var. Americanum*. We have tried to find out whether the compliance with the terms ensuring better development of roots, leaves, flowers and fruits can affect the development of basil with the leaf mass being the plant's main produce. In determining the appropriate sowing dates we have used the planting guide Marie Thun 2012. The experiment has been carried out three times, the plants had been put into pots with the already known substratum. That's how the potential various garden soil influence on the development of plants has been nullified. The results have shown that various sowing terms have caused statistically significant differences in the cases of red-leafed basil, green-leafed basil and citric basil. In variety shrubby basil the ANOVA data analysis has confirmed no statistically typical differences in the quantity of the produce.

**Key words:** Moon planting calendar, basil, *Ocimum basilicum*, bio-dynamic cultivatio

# Razširjen model za oceno perspektivnih območij Slovenije za pridelavo balkonskih rastlin

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**Izvleček**
V raziskavi, ki smo jo opravili že v letu 2012, smo na podlagi dobljenih rezultatov in s pomočjo računalniškega programa Dexi oblikovali model za oceno ekonomičnosti pridelave okrasnih rastlin na različnih območjih Slovenije. Pri tem modelu smo upoštevali naravne faktorje, ki vplivajo na proizvodnjo okrasnih rastlin: klima, relief in možnosti koriščenja alternativnih virov energije. Zaradi različnih pogojev pridelave okrasnih trajnic in balkonskih rastlin smo oblikovali dva modela. Razširjen model se nanaša na pridelavo balkonskih rastlin v rastlinjakih. Pri razširjenemu odločitvenem modelu smo poleg naravnih dejavnikov upoštevali še socio-ekonomska dejavnika: kupno moč prebivalstva in stopnjo izobraženosti. Ugotovili smo, da je osrednja Slovenija najbolj perspektivno območje za pridelavo balkonskih rastlin, sledi ji obalnokraško območje. Najmanj perspektivno območje v Sloveniji je Jugovzhodna Slovenija in Pomurje, kjer je tudi najmanjša kupna moč prebivalstva.

**Ključne besede:** balkonske rastline, pridelovanje rastlin, modeli, klima, alternativni viri energij, kupna moč, izobrazba, Dexi program

# Expanded model for the evaluation of promising Slovenian areas for the ornamental plants production

**Abstract**
In this research (carried out already in 2012) a model for assessing the economics of production of ornamental plants in different Slovenian regions was formed. It was based on the results obtained by the research and carried out with the help of a computer programme Dexi. In this model the natural factors affecting the production of ornamental plants were taken into account: climate, relief and the possibilities of using alternative energy sources. Owing to the different conditions of production of ornamental perennials and balcony plants we designed two models. The expanded model related to the production of balcony plants in greenhouses. In the case of expanded decision making model socio-economic (and not just natural) factors were taken into account: the purchasing power of the population, and the level of education. It was discovered that the most promising area for growing balcony plants was the Central Slovenia, followed by the Litoral Karst region. On the other hand, the least promising areas were the South-east Slovenia nad Pomurje region; the areas with the lowest purchasing power.

**Key words:** balcony plants, growing plants, models, climate, alternative energy sources, purchasing power, education, Dexi programme

# Mednarodni projekt FlorCert

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**Izvleček**
FlorCert je mednarodni projekt, v okviru katerega se izvaja več različnih aktivnosti z glavnim ciljem – dvig strokovnega srednješolskega nivoja cvetličarjev in poenotenje temeljnih znanj. Primerljivost cvetličarskega znanja z znanjem v različnih državah je neprecenljiva, saj se z mednarodno primerljivim osvojenim znanjem odprejo vrata v svet zaposljivosti. Ko dijak pridobi mednarodno priznan certifikat, dobi potrdilo, da je v svoji izobrazbi dosegel visok mednarodni standard. Tako lahko lažje dobi službo v tujini, saj delodajalci vedo, kakšen nivo znanja lahko od njega pričakujejo. Ravno ta ideja pa se je začela uresničevati z ustanovitvijo FlorCerta.

**Ključne besede:** mednarodni projekt FlorCert, cvetličarstvo, mednarodni standard, temeljna znanja

# International project FlorCert

**Abstract**
FlorCert is an international project in which several activities are carried out. Its main objective is to raise the level of professional skills of the secondary school level florists and to unify fundamental knowledge. Comparability of the floricultural knowledge in different countries is invaluable as obtaining of internationally comparable knowledge opens the door to employability. When students obtain an internationally recognized certificate, they are certified to have achieved high international standards in their education, so they can easily get a job abroad because employers know what level of knowledge can be expected from such employees. With the establishment of Florcert this idea is being brought to life.

**Key words:** international project FlorCert, floristy, international standards, fundamental knowledge

# *Effect of cutting severance date on rooting success and Bio-algeen S-90 application on further growth of cherry laurel Prunus laurocerasus L.*

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**Abstract**
Cherry laurel (*Prunus laurocerasus* L.) mostly used in horticulture for planting as living hedge, was propagated vegetative by cuttings. The aim of this research was to clear the influence of cutting severance date on rooting ratio and effects of biostimulants using in further cultivation of rooted cuttings. Measured parameters were: the number of rooted cuttings, the number of cuttings with callus formation and the number of not successfully survived cherry laurel cuttings. The results indicated significant influence of severance date of successful rooting of cuttings. Rooting rate ranged between 94-98% for cuttings taken in middle till end of October and 40-79% for cuttings taken in November. A significant effect of Bio-algeen S-90 used foliar in concentration of 0.2% was detected on plant height after 14 days cultivation. After six week cultivation, a significant effect in the watering treatment in 1.0% concentration of Bio-algeen S-90 on the plant height was detected. Although, we found no significant difference in leaf number between control, foliar treatment 0.2% and watering with 1.0% Bio-algeen S-90 after 14 days cultivation but, a significant effect of leaf number in watering treatment, six weeks after application period was confirmed.

**Key words:** vegetative propagation, leafy cuttings, greenhouse, biostimulants

4. sekcija:

# *Živilstvo in prehrana*

3rd session:

# *Food Production and Processing*

# *Vnos nitrita v človekov organizem kot posledica vsebnosti nitrata v krompirju (Solanum tuberosum* L.*) in solati (Lactuca sativa* L.*)*

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**Izvleček**
V rastlinah je mineralni dušik vključen v sintezo organskih spojin kot nitrat in je tako del dušikovega krogotoka. Čeprav ima listna zelenjava največje sposobnosti akumulacije nitratov, se pogostokrat omenja krompir kot glavni izvor nitratov za človeka. Redukcija nitrata v ustni votlini pod vplivom nitrat-reducirajoče mikroflore predstavlja 70–80 % celotne človekove izpostavljenosti nitritom. Negativni učinki nitrita na človeka sta methemoglobinemija in povečano tveganje za nastanek gastrointestinalnega raka. V raziskavo smo zajeli 57 vzorcev krompirja in 60 vzorcev solate različne pridelave in različnega izvora in v njih s pomočjo visokozmogljivostne tekočinske kromatografije (HPLC) z reverzno fazo in UV detekcijo določili vsebnost nitrata. Oceno vnosa nitrita smo določili s predpostavko 5 % endogene pretvorbe nitrata do nitrita. Vsebnost nitrata v vzorcih krompirja je znašala od 14 do 448 mg/kg sveže snovi, s povprečno vrednostjo 143 mg/kg, kar je ekvivalentno 1,79 mg nitrita/250 mg zaužitega krompirja. V vzorcih solate je znašala vsebnost nitrata od 316 do 3462 mg/kg sveže snovi, s povprečno vrednostjo 1862 mg/kg, ekvivalentno 9,31 mg nitrita/100 g zaužite solate. Z obrokom krompirja in solate s povprečno vsebnostjo nitratov presežemo maksimalni sprejemljiv vnos za nitrite za 100 %.

**Ključne besede:** Nitrit, nitrat, krompir (*Solanum tuberosum* L.), solata (*Lactuca sativa* L.), HPLC

# *Intake of nitrites into a human body as a consequence of a nitrate content in potato (Solanum tuberosum* L.*) and lettuce (Lactuca sativa* L.*)*

**Abstract**
In plants, mineral nitrogen in the form of nitrate is included in the synthesis of organic compouds and in this way represents a part of nitrogen cycle. Although leafy vegetables have the maximum capacity of nitrate accumulation, potato is often mentioned as the main source of nitrate in humans. Reduction of nitrate in the oral cavity under the influence of nitrate-reducing microflora represents 70-80 % of the total human exposure to nitrite. Overexposure of humans to nitrite can result in methaemoglobinaemia and increased risk of gastrointestinal cancer. The research included 57 samples of potato and 60 samples of lettuce of various production systems and origins. Using high performance liquid chromatography (HPLC) with reversed-phase and UV detection the nitrate content was determined. The nitrite intake was assessed by assuming that 5 % of

the endogenous nitrate is converted to nitrite. Nitrate content in potato samples ranged from 14 to 448 mg/kg fresh weight, with an average of 143 mg/kg, which is equivalent to 1.79 mg of nitrite/250 mg of potatoes consumed. The nitrate content in lettuce samples ranged from 316 to 3462 mg/kg fresh weight, with an average of 1862 mg/kg, which is equivalent to 9.31 mg of nitrite/100 g of lettuce consumed. In a meal of potatoes and lettuce with an average nitrate content the maximum acceptable nitrite intake is exceeded by 100 %.

**Key words:** Nitrite, nitrate, potato (*Solanum tuberosum* L.), lettuce (*Lactuca sativa* L.), HPLC

# *Uporaba encimov pri znižanju vsebnosti akrilamida v jušnih kroglicah*

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**Izvleček**
Akrilamid uvrščamo med procesna onesnaževala v živilih, ki imajo verjetni rakotvorni učinek. V glavnem nastaja kot del Maillardove reakcije med aminokislino asparagin in reducirajočimi sladkorji pri temperaturah nad 120 °C in pri nizki vlažnosti. Med živila, ki lahko predstavljajo pomembni vir vnosa, uvrščamo pekovske izdelke, čips, ocvrt krompirček, industrijsko pripravljene prigrizke, žitne kosmiče, praženo kavo …
Ker odstranitev akrilamida iz končnih izdelkov ni mogoča, se vse usmeritve in priporočila pristojnih institucij v glavnem nanašajo na spremembe procesnih pogojev in tehnoloških receptur ter selektivno izbiro surovin. V prispevku predstavljamo uporabo encimov pri proizvodnji jušnih kroglic, s katero smo znatno znižali vsebnost akrilamida v končnem izdelku v primerjavi s kontrolnim vzorcem. Pilotni poskusi so bili opravljeni pri treh različnih koncentracijah dodanih encimov, pri čemer je bila opravljena tudi organoleptična ocena končnih izdelkov. Dodajanje encimov se je izkazalo kot učinkovit in relativno enostaven način znižanja vsebnosti akrilamida, ki ne bi predstavljal znatnega zvišanja proizvodnih stroškov in bi ga bilo možno uporabiti tudi v proizvodnji nekaterih ostalih živilskih izdelkov, seveda po predhodnih testiranjih.

**Ključne besede:** akrilamid, znižanje vsebnosti akrilamida, encimi, jušne kroglice

# *The use of enzymes in reduction of acrylamide in pearls balls*

**Abstract**
Acrylamide is food processing pollutant with the probable carcinogenic effect. It is mainly formed as a part of a Maillard reaction between the amino acid asparagine and reducing sugars at temperatures above 120 °C and low humidity. Among the foods that may represent an important source of intake bakery product, potato chips, French fries, industrially prepared snacks, cereal flakes, roasted coffee … are included.
Because the removal of acrylamide from the final products is not possible, all the guidelines and recommendations of the relevant institutions are mainly focus on changes in process conditions, technological recipes and selective choice of raw materials. The paper presents the use of enzymes in the production of pearl balls with which we significantly reduced the level of acrylamide in the final product compared to the control sample. Pilot experiments were carried out at three different concentrations of added enzymes, where in an organoleptic evaluation of the final products was also made. It has been shown that adding of enzymes can be an effective and relatively simple way of reducing the level of acrylamide, that would not lead to a significant increase in production costs and could also be used in the production of some other food products, of course, after preliminary experiments.

**Key words:** acrylamide, reducing a level of ayrylamide, enzymes, pearls balls

# *Aditivi v hrani ter odnos potrošnikov do hrane in aditivov*

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**Izvleček**
Čeprav je veliko razlogov za uporabo aditivov v pripravi hrane, je tudi veliko pomislekov zoper njihovo dodajanje. Nejasna je dejanska količina s hrano zaužitih aditivov in kakšno tveganje predstavlja izpostavljenost t. i. »koktajlu aditivov« (seštevku zaužitih aditivov).
V študiji nas je zanimal odnos potrošnikov do hrane in aditivov ter količina dnevnega zaužitja aditivov. Odnos potrošnikov smo ugotavljali z anketiranjem naključnih potrošnikov istega geografskega območja v razmiku petih let. Anketiranje smo ponovili še med srednješolci in potrdili, da na stališča do hrane in do aditivov vpliva starost udeležencev. Naše ugotovitve kažejo, da je pri nakupu živil pri potrošniku najpomembnejša vloga cene, ter da potrošniki ne prebirajo zmeraj oznak in sestavin na živilih. V času od 2008 do 2013 so nastale spremembe v odnosu do hrane in aditivov, saj se je med potrošniki z leti okrepilo znanje o aditivih in zaupanje v varnost hrane.
V drugem delu študije smo ugotavljali količino aditivov, ki jih ljudje dnevno zaužijemo s hrano. V ta namen so udeleženci študije zapisali vse, kar so pojedli v enem dnevu. Na podlagi teh podatkov smo določili število dnevno zaužitih aditivov. Ugotovili smo, da se je v obdobju petih let količina dnevno zaužitih aditivov in arom povečala. V tem obdobju so vidne tudi spremembe v zaužitju posameznih razredov aditivov.

Rezultati študije kažejo na pomen spremljanja stališč in dejanskega uživanja aditivov. Rezultatom bi v prihodnje moralo slediti širše zastavljeno izobraževanje o prehrani in spremembe v predpisih.

**Ključne besede:** hrana, aditivi, zdravje, tveganje, odnos, potrošniki, dnevni vnos, koktajl aditivov, predpisi

## *The food additives and consumers attitudes towards food and food additives*

**Abstract**

There are many reasons for using food additives, but there are also arguments to restrain their use. Additives gray zone is the quantity of additives consumed during daily eating and possibility of its effect in so called »additives cocktail« (the sum of eaten food additives). We have studied consumers' attitudes towards food and food additives. We did three surveys in 3 consumer groups: the first survey was done in 2008, next in 2013, both in the same geographic area. The third one was done among youngsters in 2014. We can confirm similar results between the studies - the age of consumers has impact on consumers' opinions. The results of our study show the impact of the price in process of purchasing food, that the consumers still don't pay enough attention to the information on the food labels. In the period from 2008 to 2013 we can confirm some changes in the consumers' attitudes towards food and food additives. They also trust more to the food safety.

In the second part we've tried to determine the amount of additives in the consumers' daily diet. We found volunteers to collaborate in the research. They had to note everything they have eaten during the day. Afterwards we've determined all food additives in their food. We found out that the number of food additives intake has raised during the 5 year period.

The results show that it is important to regularly follow consumer's attitudes towards food and additives and the real intake of food additives. We suggest broader permanent consumers' education programs and changes in legislation

**Key words:** food, food additives, health, risks, attitudes, consumers, daily intake, additives cocktail, legislation

## *Kranjska klobasa kot priložnost slovenskega gostinstva in turizma*

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**Izvleček**

Kranjska klobasa sodi med šest temeljnih sestavin, ki opredeljujejo gastronomijo Slovenije in je eno izmed najbolj prepoznavnih živil slovenske kulinarike doma in v tujini. Namen naloge je bil preučiti, koliko je priljubljena med 296 dijaki in študenti na področju okolice Celja in ali jo opazijo v gostinskih lokalih v domačem kraju. Poleg tega nas je zanimalo, ali bi bila primerna zamenjava za priljubljeno hitro hrano in kako bi preiskovanci sprejeli nekatere ne-tradicionalne jedi s kranj-

sko klobaso. Za preučevanje smo uporabili metodo anketiranja. Ugotovili smo, da bi kranjska klobasa lahko bila občasna zamenjava za priljubljeno hitro hrano, saj bi se vsaj občasno zanjo odločilo 75 % preiskovancev. Okoli 30 % preiskovancev bi vsaj občasno uživalo predlagane ne-tradicionalne jedi s kranjsko klobaso, okoli 45 % pa bi jih bilo pripravljenih poskusiti. Zaključimo lahko, da bi z malo kreativnosti lahko dosegli, da bi bila kranjska klobasa bolj opažena na jedilnikih, četudi le kot dodatek, saj bi tako njeno prisotnost na področju celotne Slovenije močno povečali.

**Ključne besede:** Kranjska klobasa, priložnost, gostinska ponudba, turizem

## *Kranjska klobasa as an opportunity for Slovene hospitality and tourism*

**Abstract**
Kranjska klobasa is one of the six basic components that define the gastronomy of Slovenia and is one of the most recognizable products of Slovene cuisine both at home and abroad. With the method of questionnaire we examined how popular Kranjska klobasa is among the 296 secondary and college students of the Celje area and how often is it noticed in bars and restaurants in their hometown. We also examined whether Kranjska klobasa could be accepted as a proper substitute for the popular fast food as well as how would the students adopt some non-traditional dishes with Kranjska klobasa. We found that 75 % of the surveyed population would at least occasionally replace the popular fast food with Kranjska kobasa. Around 30 % of them would at least occasionally enjoy the proposed non-traditional dishes with the sausage in question and about 45 % would at least be willing to try it. With a little creativity Kranjska klobasa could be more often seen on the menus, even if only as a supplement and thus its presence might considerably increase nationwide.

**Key words:** Kranjska klobasa, Kranjska sausage, opportunity, hospitality offer, tourism

## *Študija reoloških lastnosti testa, pripravljenega z dodatkom mletega odpadnega kruha*

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**Izvleček**
Študija proučuje možnost uporabe higiensko neoporečnega odpadnega kruha kot sekundarne surovine pri ponovni mesitvi. Neprodan, iz trgovskih verig vrnjen in zavržen kruh predstavlja veliko ekonomsko breme pekarski industriji in obenem odkriva sociološko moralne probleme sodobne potrošniške družbe. Odpadni, higiensko neoporečen bel kruh je bil posušen in zmlet v običajno granulacijo moke ter uporabljen v koncentraciji 2,5 do 12,5 % pri ponovni mesitvi. Z farinografsko in alveografsko analizo so bile predhodno proučene reološke karakteristike testa, čas razvoja testa, stabilnost, omehčanje, energija (W) in razmerje med elastičnostjo in raztegljivostjo (p/l). Dodatek reciklata je v negativni korelaciji z reološkimi

lastnostmi testa. Za ocenitev organoleptičnih lastnosti končnega izdelka so bile uporabljene dve vrsti mesitve, običajna direktna mesitev s kulturo *Saccharomyces cerevisiae* in dolg indirekten postopek z dodatkom kulture Lactobacillus sp. Dodatek mlečnokislinske kulture se je izkazal kot boljši način, ki je negativno deloval na razvoj nezaželene nitkavosti, kot posledice aktivacije termostabilnega *Bacillusa subtilis*.

**Ključne besede:** odpadni kruh, farinografska analiza, alveografska analiza, indirektna mesitev

# *Study of the Rheological Characteristics of Dough, Prepared with the Addition of Ground Waste Bread*

**Abstract**

This study examines the possibility of using hygienically clean waste bread as a secondary raw material in dough preparation. Bread which is unsold and returned from supermarkets represents a major economic burden on the baking industry and at the same time reveals sociological and moral problems of modern consumer society. Hygienically clean waste white bread was dried and ground into flour and used in concentrations from 2.5 to 12.5% in dough preparation. Rheological characteristics of dough, dough development time, stability, softening, deformation, energy (W) and the balance between dough elasticity and extensibility (p/l ratio) have been observed by farinograph and alveograph analysis. The waste-bread supplement is in negative correlation with the rheological characteristics of the dough. Two types of dough preparation were used in order to assess the organoleptic characteristics of the final product – the usual direct dough method with the *Saccharomyces cerevisiae* culture and the indirect method with the addition of the Lactobacillus sp. culture. The addition of waste-bread supplement reduces the volume of the products. Dough method using lactic acid culture showed better results, acting negatively on the activation of thermostable *Bacillus subtilis*.

**Key words:** waste bread, farinograph analysis, alveograph analysis, indirect fermentation

# *Poznavanje in zaznavanje živil z geografskim poreklom in geografsko označbo pri potrošnikih v Sloveniji*

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**Izvleček**

Evropska komisija je 25. oktobra 2011 objavila novo uredbo (št. 1169/2011) o zagotavljanju informacij o živilih potrošnikom, ki bo v večjem delu začela veljati 13. 12. 2014. Poleg tega je 14. decembra 2012 (št. 1151/2012) objavila novo uredbo o shemah kakovosti, ki je začela veljati 4. januarja 2013. Potrošniki namenjajo vedno večji poudarek sledljivosti hrane, poreklu in

kakovosti hrane. V povezavi s tem imajo tradicionalni slovenski prehranski in živilski proizvodi možnost trženja v Sloveniji in izven nje ter predstavljajo odlično priložnost trženja ter ustvarjanja dodane vrednosti za lokalne pridelovalce in predelovalce v povezavi z razvojem podeželja in turizmom. V prispevku bomo predstavili 6 v EU zaščitenih slovenskih živil, katere smo v paru s podobnimi konvencionalnimi živili ocenjevali pri potrošnikih. Želeli smo ugotoviti ali potrošniki razlikujejo po okusu med zaščitenimi in drugimi podobnimi konvencionalnimi živili. Senzorično ocenjevanje smo izvedli skupno pri 190 potrošnikih, v treh različnih krajih (Ljubljani, Mariboru in Kopru). Za ugotavljanje ali potrošniki sploh zaznajo razliko med zaščitenim in konvencionalnim izdelkom smo uporabili preskus s primerjavo v paru. Za ugotavljanje všečnosti pa smo uporabili 9-točkovno hedonsko skalo, ki je obsegala devet opisov od izredno ne ugaja do izredno ugaja.

V prispevku bodo predstavljene nekatere ugotovitve o tem, kako slovenski potrošniki v različnih krajih razlikujejo med zaščitenimi in drugimi konvencionalnimi izdelki. Poleg boljšega poznavanja in zaznavanja slovenskih potrošnikov je namen študije spodbuditi potencialne proizvajalce k zaščiti in proizvodnji lokalno tipičnih prehranskih in živilskih proizvodov upoštevajoč senzorične lastnosti živil.

**Ključne besede:** geografsko poreklo, geografska označba, sheme kakovosti, poznavanje in zaznavanje potrošnikov, preskus s primerjavo v paru, 9-točkovna hedonska skala

# *Consumers preference for food products registered with PDO or PGI by consumers in Slovenia*

**Abstract**

The European Commission, published on 25.October 2011 a new regulation about information of foods to consumers (Number 1169/2011). It is also published 14. December 2012 a new European regulation about quality schemes (Number 1151/2012). Consumers devoted more and more emphasis on food traceability, origin and quality of the food. In connection with this, traditional Slovenian food and food products have great possibility of marketing in Slovenia and beyond, and represent an excellent opportunity for marketing and creating added value for local producers and processors in conjunction with rural development and tourism. In the paper we will present 6 Slovenian foods with PDO/PGI in comparison with similar conventional foods. In the study participated 190 consumers from three regions (Ljubljana, Maribor, Koper). They estimated if PDO or PGI food products differ from similar products in the pair (discrimination test), which product is more likable and why (hedonic test based on a 9- point hedonic scale). On the basis of sensory evaluation we will explain some findings about what Slovene consumers understand in different regions. Taking into account the perception of the consumer and EU legislation in the EU and Slovenia will be given some solutions for a better and more efficient visibility of those food products for consumers in the future. In addition to a better knowledge of the perception of consumers of the case studies suggested potential producers to protection and the production of local typical food and food products.

**Key words:** sensory evaluation, hedonic tests, PDO/PGI products quality schemes, consumerpreference, perception of consumers

# *Možnosti uporabe bioplastike kot embalažnega materiala za živila*

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**Izvleček**
Vsak izmed nas se dnevno srečuje z velikim številom različnih plastičnih materialov in proizvodov, narejenih iz njih, saj polimerni materiali zaradi njihove raznolikosti pokrivajo neverjetno širok spekter lastnosti in uporabnosti. Hrana, ki jo kupujemo v trgovini, je pakirana v različne embalažne materiale, prav tako kot tudi proizvodi za osebno higieno; iz plastike so narejeni športna oprema, otroške igrače, pisarniški materiali, kuhinjski pripomočki itn. Plastični materiali so v glavnem umetni polimeri – makromolekule, ki jih označujejo visoke molske mase. Po mnenju strokovnjakov ključno alternativo predstavljajo biorazgradljivi polimeri. Pri razvoju le-teh naj bi bilo v večini pristopov vodilo zgledovanje po naravnih procesih. Biorazgradljivost pomeni, da se neka snov v naravi popolnoma razgradi in pri tem ne pušča negativnih okoljskih posledic. Takšna naj bi bila tudi bioplastika, ki smo jo izdelali v našem laboratoriju. Čeprav je v Sloveniji za enkrat bioplastika za živila prisotna le kot nosilna vrečka v večjih trgovskih centrih, smo skušali poiskati možnosti za uporabo biorazgradljivih materialov pri pakiranju različnih živilskih izdelkov.

**Ključne besede:** plastični materiali, umetni polimeri, embalaža za živila, bioplastika, biorazgradljivost

# *The possibility of using bioplastic as packaging materials for food*

**Abstract**
Since plastics due to its diversity covers incredibly wide range of characteristics and applicability, every person daily meets various plastic materials and products made of plastics. The food that we buy in stores as well as personal-hygiene products are packed in various packaging materials. Sports equipment, children's toys, office supplies, kitchen utensils etc. are all made of plastics. Plastics mainly consist of synthetic polymers, the so-called high molecular weight macromolecules. Experts believe that biodegradable polymers represent their crucial alternative. In the process of their development most of the approaches supposed to be inspired by natural processes. Biodegradability is a term that denotes that a substance is completely degradable in nature and does not have any negative impacts on the environment. Bioplastics that have been produced in our laboratory should also have such characteristics. Although bioplastics for foodstuffs in Slovenia are only used for grocery bags in bigger shopping centres so far, we endeavoured to find a solution for using biodegradable materials for packing various food products.

**Key words:** plastics, synthetic polymers, packaging materials for foodstuff, bioplastics, biodegradability

# *Učinkovitost ponovne uporabe vode in hranil v sistemu akvaponike*

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**Izvleček**
Cilj raziskave je bil oceniti učinkovitost čiščenja pilotnega akvaponičnega sistema za pridelavo krapov in zelenjave v obdobju zagona. Začetni vložek rib je bil 12 kg/m$^3$ (*Cyprinus carpio* L.). Iz bazena z ribami je bila voda speljana skozi usedalnik do biofiltra in nato do zbiralnika za vodo. Iz zbiralnika je nato en del vode tekel na hidroponično gredo, zasajeno s listnatimi rastlinami (*Lactuca sativa, Valerianella locusta, Spinacea oleracea*), drugi del vode pa je tekel preko UV- svetilke nazaj v bazen z ribami. V pilotnem akvaponičnem sistemu smo pet tednov v oktobru in novembru 2013 spremljali fizikalne, kemijske in mikrobiološke parametre ter rast rib in rastlin. Vrednosti raztopljenega kisika in pH so se ujemale z optimalnimi vrednostmi, opredeljenimi v Uradnem listu Slovenije, št. 46/2002, 41/2014. Temperatura vode je bila odvisna od temperature zraka. V obdobju raziskave so bile vrednosti amonijevega dušika ($NH_4$-N), nitritnega dušika ($NO_2$-N) in celotnega fosforja (TP) povečane. Glavni razlog za kopičenje hranil v sistemu je bil najverjetneje slabo razvit biofilm v biofiltru, kar je običajno v prvih nekaj tednih po zagonu sistema. UV-svetilka je uspešno zavirala rast mikroorganizmov v vodi. Dosegli smo visok pridelek rib, kar dokazuje 28,6 % prirastek rib. Rastline na hidroponični gredi so v povprečju dosegle 40 % pokrovnost v času raziskave. Da bi določili učinkovitost pilotnega akvaponičnega sistema za pridelavo zelenjave, bi bilo potrebno daljše obdobje spremljanja sistema in višje temperature.

**Ključne besede:** akvaponika, pridelava zelenjave, krap, krožni sistem, ponovna uporaba vode in hranil

# *Efficiency of water and nutrient reuse in an aquaponic system*

**Abstract**
The objective of this study was to evaluate treatment performance of a pilot aquaponic system for growing carps and vegetable in the startup period. Starting fish load was 12 kg/m$^3$ (*Cyprinus carpio* L.). From a fish tank water flowed through a settler to a biofilter and then to a storage tank. From the storage tank one part of water flowed to the hydroponic bed planted with salads (*Lactuca sativa, Valerianella locusta, Spinacea oleracea*) and the rest of water flowed through the UV lamp back to the fish tank. The pilot aquaponic system was monitored for five weeks in October and November 2013 for physical, chemical and microbiological parameters, fish and plant growth. The values of dissolved oxygen and pH corresponded to the optimum values according to the Official Gazette of Slovenia, No 46/2002, 41/2014. The water temperature correlated with the air temperature. During the experimental period the levels of ammonium nitrogen ($NH_4$-N), nitrite nitrogen ($NO_2$-N) and total phosphorus (TP) were increased. The main reason for accumulation of nutrients in the system was most likely poorly developed biofilm in the biofilter, which is common in the first few weeks after the startup of the system. UV lamp successfully inhibited microorganisms in water. A high fish production was achieved, which was proven with total fish weight gain of 28.6 %. Plants on the hydroponic bed had on average 40 % cover during the experiment. For determination of effectiveness of the pilot aquaponic system for vegetable crops production longer trial period and higher temperatures are required.

**Key words:** Aquaponics, vegetable production, carp, recirculating system, reuse of water and nutrients

# *Ekonomska analiza prodaje medu v Sloveniji*

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**Izvleček**
V Sloveniji je bilo v obdobju 1994–2012 povprečno 154.624 čebeljih družin in leta 2012 167.000 čebeljih družin (panjev). Povprečni donos je bil v 19-letnem obdobju 12,12 kg/panj. Povprečna prodana količina medu je bila 66,653 ton medu in je dosegala povprečno ceno 5,29 EUR/kg. Odkup se je zelo povečal leta 2010 in 2011, potem je prišlo do zmanjšanja, kar je posledica vremenskih razmer.
Korelacijska povezanost kaže obratno smer med ceno medu in količinami proizvedenega medu, kar je posledica ponudbe in povpraševanja. Cena medu je bila v preteklosti v praksi enaka ceni litra žganja, zato smo to preverili v raziskavi. Po statističnih podatkih je bila odkupna cena nižja od 49,3 % (leta 2000) do 31,3 % (leta 2012) glede na ceno žganja. Razlika se znižuje in se je od leta 2000 do leta 2012 zmanjšala za 18,0 odsotnih točk. Z metodo multiplo regresijske analize smo ocenili cenovno funkcijo cene medu. Empirični rezultati kažejo elastičnost ponudbe in povpraševanja. Ugotovili smo, da je cena medu pozitivno povezana s cenami žganja, s cenami posameznih vrst medu in s količinami medu.

**Ključne besede:** med, prodaja medu, Slovenija, statistična analiza, regresijska analiza

# *Economic analysis of honey sales in Slovenia*

**Abstract**
In the period from 1994 to 2012, in Slovenia there were 154,624 bee colonies in average, and in 2012, there were 167,000 bee colonies (hives). The average yield in the 19-year period was 12.12 kg / hive. The average sold quantity of honey was 66.653 tons of honey and reached the average price of 5.29 EUR / kg. Buying-in considerably increased in 2010 and 2011, then followed a decrease as a result of weather conditions.
The correlation connection indicates the opposite direction between the price and quantity of produced honey, which is the result of supply and demand. The price of honey in the past was in practice equal to the price of a litre of spirits, therefore, we checked this in a research. According to statistical data, the purchase price was lower than 49.3% (in 2000) to 31.3% (in 2012) as to the price of spirits. The difference was decreasing and from 2000 to 2012 it decreased by 18.0 percentage points. Using the method of multiple regression analysis, we assessed the pricing function of the honey price. Empirical results show the elasticity of supply and demand. We have ascertained that the price of honey is positively connected with the prices of spirits, with prices of certain types of honey and with honey quantities.

**Key words:** honey, honey sale, Slovenia, statistical analysis, regression analysis

# *Vloga in pomen gibanja Slow Food–a pri razvoju gastronomskega turizma v Sloveniji*

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**Izvleček**
V prispevku predstavljamo vsebine vloge in pomena gibanja Slow food, ki je vplival na razvoj gastronomskega turizma na Slovenskem. Gibanje »slow food«, ki je nastalo konec preteklega tisočletja v Italiji kot odgovor (celo upor) proti nezdravemu ameriškemu načinu prehranjevanja s hitro hrano (fast food). Zato je cilj prispevka ugotoviti, kako Slow food razumemo v Sloveniji, kakšni so njegovi cilji in ali je ta v Sloveniji še v vzponu ali morda v zatonu. Prav tako je cilj prispevka predstaviti razmišljanja poznavalcev gastronomije na tem področju. Namen prispevka pa je vzpostaviti zavedanje pomena gibanja Slow food pri ljudeh.
Tema je bila obdelana s pomočjo strokovne literature, kvalitativne metodologije raziskovanja ter v okviru le – te je bil izveden polstrukturiran intervju v katerem sta sodelovala dva pomembna poznavalca tega področja. Glavno raziskovalno vprašanje, ki se poraja pa je: »Ali gre pri Slow foodu v Sloveniji za hedonizem ali elitizem?« Danes že lahko vidimo zametke novih projektov, ki v manjšem obsegu delujejo po načelih gibanja Slow food. Eden izmed projektov je gostilna Slovenija, ki je sedaj tudi zastal in potrebuje revitalizacijo.

**Ključne besede:** Slow food, gastronomski turizem, gibanje

# *The role and importance of Slow food movement at development of gastronomic tourism in Slovenia*

**Abstract**
The paper presents the content of the role and importance of Slow Food movement, which includes the development of gastronomic tourism in Slovenia. The movement of »slow food«, was created at the end of the last century in Italy as a response (even resistance) to the unhealthy American fast food. The goal of this paper is to find out how Slow Food movement is understood in Slovenia, what its objectives are and whether it is in Slovenia, on the rise or perhaps decline. It is also a goal of this paper to present the thinking of gastronomy experts in this field. Purpose of this paper is to build awareness of the importance of the Slow Food movement at human beings. The topic has been treated with the help of the scientific literature, qualitative research metodology and within only – this was carried out as semi-structured interview in which were included two major experts from this field. The main research question is: »Does the Slow food go for hedonism or elitism in Slovenia?« Today we can see the beginnings of new projects on a smaller scale work by the principles of the Slow Food movement already. One of the projects is very known now, as the »Slovenia Inn,« which has been stopped for now and it needs his own revitalization.

**Key words:** Slow food, gastronomic tourism, movement

# *Effect of Bread Making Process on Aflatoxins Levels Changes*

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**Abstract**
Wheat flour is a commodity with a high risk of Aflatoxins (AFs) contamination. During the bread making there are many processes that can affect the AFs stability. The effect of bread making process using different yeast types on AFs levels was investigated. For this purpose, standards of AFs including B and G were added to flour and then bread loaves were prepared. Three types of commercially available yeast including active dry yeast, instant dry yeast and compressed yeast were used for dough preparation. AFs levels in flour, dough, and bread were analyzed by high performance liquid chromatography (HPLC) with fluorescence detector. The results showed that maximum reduction in aflatoxins levels was observed during first proof while the least decline was seen for the baking stage. The order of AFs reduction in bread making process was AFB1>AFB2>AFG1. Furthermore, the results indicated that the most effective yeast for AFs reduction was instant dry yeast.

**Key words:** aflatoxins, bread, dough, HPLC, yeast

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