



"AGROTOP 2023"

**3. KONFERENCIJA O AGROTURIZMU SA MEĐUNARODNIM
UČEŠĆEM**

**3rd AGROTOURISM CONFERENCE WITH INTERNATIONAL
PARTICIPATION**

**KNJIGA SAŽETAKA
BOOK OF ABSTRACTS**



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Lokalne manifestacije razvojni potencijal agroturizma

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Sažetak: Agroturizam predstavlja specifično iskustvo u seoskom području koje turistima pruža uživanje i upoznavanje sa tradicionalnim kulturnim nasleđem sela, prirodnim lepotama, kao i mogućnosti aktivnog učešća u aktivnostima seoskog gazdinstva. Agroturizam predstavlja realnu šansu za oživljavanje sela putem njihovog razvijanja kao turističke destinacije i kao mesta prijatnog za život, rad, posetu i investiranje. Iako se agroturizam često koristi da opiše sve turističke aktivnosti u ruralnim predelima (npr. seoske slave, litije, susreti sela, muzička takmičenja, muzeji, zanatske izložbe i druge kulturne manifestacije), termin se ipak češće koristi ili za termine koji se odnose na turističke proizvode koji su direktno vezani za seosku sredinu i poljoprivredne proizvode ili za vidove boravka, kao što su: boravak na farmi, bilo u sobi ili u vidu kampovanja, organizovane posete, rekreativne izlete, prodaja poljoprivrednih proizvoda i ručne radinosti kao i obavljanje seoskih poslova. Lokalne manifestacije pružaju odličnu priliku za promociju određenog proizvoda, kraja u kojima se realiziraju, deo baštine regiona i otvaranju dodatnih uslova za uspešnu promociju samih domaćinstava u tom kraju (najčešće kroz kratkotrajni boravak tokom organizacije same manifestacije). Lokalne manifestacije poslednjih godina su sve više prisutne u Srbiji. Brend visokog kvaliteta u oblasti agroturizma treba da postanu i drugi proizvodi (organska hrana, lekovito bilje, autohtone vrste, sir, zanatski proizvodi) koji bi se nudili tokom cele godine, koristeći prednosti raznolikosti, jedinstvenosti i autentičnosti njenih prirodnih i kulturnih resursa. Ove usluge i proizvodi treba da budu ponuđeni lokalnom, nacionalnom, regionalnom i međunarodnom tržištu i turistima koji se ponašaju odgovorno prema prirodi i koji podržavaju zaštitu prirode, očuvanje biološke raznovrsnosti i kulturnog nasleđa.

Ključne reči: lokalne manifestacije, agroturizam, poljoprivreda, promocija.

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Local events – the potential for development of agrotourism

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Abstract: Agrotourism represents a specific experience in a rural area that offers tourists enjoyment and acquaintance with the traditional cultural heritage of the village, natural beauty, as well as the possibility of active participation in the activities of the rural economy. Agrotourism represents a real chance for the revival of villages through their development as a tourist destination and as a pleasant place to live, work, visit and invest. Although agritourism is often used to describe all tourist activities in rural areas (e.g. village festivals, processions, village meetings, music competitions, museums, craft exhibitions and other cultural manifestations), the term is still more often used for terms related to tourism manifestations products that are directly related to the rural environment and agricultural products or to types of stay, such as: staying on the farm, either in a room or in the form of camping, organized visits, recreational trips, selling agricultural products and handicrafts, as well as doing farm work. Local manifestations provide an excellent opportunity for the promotion of a certain product, the region where they are realized, part of the heritage of the region and open additional conditions for the successful promotion of households in that region (most often through a short-term stay during the organization of the same manifestation). Local events have been increasingly present in the Srbiji in recent years. Other products (organic food, medicinal plants, indigenous species, cheese, artisanal products) that would be offered throughout the year, taking advantage of the diversity, uniqueness and authenticity of its natural and cultural resources, should become a high-quality brand in the field of agritourism. These services and products should be offered to local, national, regional and international markets and tourists who behave responsibly towards nature and who support nature protection, preservation of biological diversity and cultural heritage.

Keywords: local manifestations, agrotourism, agriculture, promotion.
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Savremeni trendovi informacionih sistema u agraru

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Sažetak: U poljoprivredi, kao i u drugim granama privrede, nezamislivo je poslovanje bez informacionih sistema i novih informacionih tehnologija. Informacioni sistem se može implementirati i bez korišćenja računara, međutim, moderne tehnologije (baze podataka, tabelarne kalkulacije, računarske mreže i web) su praktično savršene za kreiranje efikasnih i upotrebljivih informacionih sistema, pa se tako informacioni sistemi generalno uvek vezuju za računare. Digitalna revolucija je u toku i poljoprivreda nije zaobiđena. Naprotiv, nove tehnologije su i te kako našle primenu u poljoprivredi. Osnova korišćenja informacionih tehnologija u poljoprivredi bazira se na: upravljačkom timu koji upravlja informacionim sistemima, upotrebi preciznih i tačnih tehnologija poput GPS, robotizovanih izmuzišta, bespilotnih letilica, dronova, meteoroloških stanica, digitalnih mapa, daljinskih sistema za navodnjavanje i dr., kao i korišćenje robota i veštačke inteligencije na svim nivoima poljoprivredne proizvodnje. Upotrebom ovakvih i sličnih savremenih tehnologija nameće se potreba za edukacijom korisnika ovakvih sistema, odnosno poljoprivrednih proizvođača kako bi na jednostavan i brz način dolazili do potrebnih informacija, ali, takođe i plasirali svoje. Jedan od takvih sistema, novijeg datuma, je e-Agrar koji je uveden sa ciljem modernizacije i ubrzanja procesa transfera podataka kod poljoprivrednih proizvođača.

Ključne reči: poljoprivreda, savremene tehnologije, digitalizacija, e-agrar
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Contemporary trends in information systems in agriculture

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Abstract: In agriculture, as in other branches of the economy, business without information systems and new information technologies is unthinkable. An information system can be implemented without a computer, however, modern technologies (databases, spreadsheets, computer networks, and the web) are practically perfect for creating efficient and usable information systems, so information systems are generally always connected to computers. The digital revolution is underway and agriculture has not been bypassed. On the contrary, new technologies have also found applications in agriculture. The basic of use of information technologies in agriculture is based on: the management team that manages information systems, the use of precise and accurate technologies such as GPS, robotic milking parlors, unmanned aerial vehicles, drones, weather stations, digital maps, remote irrigation systems, etc., as and the use of robots and artificial intelligence at all levels of agricultural production. With the help of such and similar modern technologies, there is a need to educate the users of such systems, that is, agricultural producers to get the necessary information simply and quickly, but also to market their own. One such recent system is e-Agrar, which was introduced to modernize and speed up the data transfer process for agricultural producers.

Keywords: agriculture, modern technologies, digitization, e-agriculture

002 1TU 2023



Banjski turizam kao prostorno određen proizvod razvoja ruralne destinacije

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Apstrakt: Život u gradovima postao je život pun stresa i napetosti, tako da su u poslednje vreme, sve aktuelnije ponude za provođenje slobodnog vremena u ruralnim prostorima. Posebno su atraktivne destinacije koje na ruralnim prostorima nude i ponudu banja, koje nisu više samo mesta rehabilitacije, već uživanja, aktivnog provođenja vremena i velnesa. Ruralne destinacije na kojima postoje uslovi za razvoj banjskog turizma, opredeljuju se za razvoj u tom smeru, razvijajući pored banjskog turizma, seoski, ekološki, gastronomski i druge oblike održivog turizma. Rad je zasnovan na istraživanju mišljenja posetilaca banje Vrdnik. U istraživanju su učestvovali ispitanici iz pet zemalja, njih 322. Došlo se do zaključka da ispitanici veoma dobro razlikuju velnes i spa kao deo zdravstvenog turizma od medicinskih mesta u koja odlaze bolesni, a da zajedno velnes i spa turizam predstavljaju održivi proizvod ruralnih destinacija. Drugim rečima, da je ispitanicima prevencija mnogo važnija od rehabilitacije.

Ključne reči: velnes i banja, turizam, prevencija, razvoj ruralnih destinacija, Vrdnik
003 1TU 2023



Spa tourism as a spatially determined product of rural destination development

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Abstract: Life in cities has become a life full of stress and tension, so lately, offers for spending free time in rural areas are becoming more and more current. Destinations that offer spas in rural areas are particularly attractive, which are no longer just places of rehabilitation, but of enjoyment, active spending of time and wellness. Rural destinations where the conditions for the development of spa tourism exist, opt for development in that direction, developing in addition to spa tourism, rural, ecological, gastronomic and other forms of sustainable tourism. The paper is based on research of the Vrdnik health resort visitors opinion. Respondents from five countries, 322 of them, participated in the research. The conclusion was reached that the respondents very well distinguish wellness and spa as a part of health tourism from medical places where sick people go, and that together wellness and spa tourism represent a sustainable product of rural destination. In other words, prevention is much more important than rehabilitation.

Keywords: wellness and spa, tourism, prevention, rural destination development, Vrdnik

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Ocena stanja i problema poljoprivrede i sela Topličkog okruga

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Sažetak: Poljoprivreda ima važnu ulogu u ekonomiji Topličkog regiona, jer se poljoprivredom bavi preko 30% stanovništva. Postojanje prirodnih resursa i tradicija bavljenja poljoprivrednom proizvodnjom ključni su faktori koji doprinose značaju poljoprivrede. Pored Prokuplja (43.793 ha), Opština Kuršumlija (37.769 ha), zahvata najveći deo Topličkog okruga, zatim slede Opština Blace (18.304 ha) i Žitorađa (18.044 ha). Obradivo zemljište je uglavnom u posedu poljoprivrednih gazdinstava, dok su pašnjaci u državnoj svojini. Toplički upravni Okrug ima pogodnost da uz objedinjavanje prirodnog potencijala, ekološki očuvane sredine, kulturno-istorijskog nasleđa i ostalih atraktivnosti predela mogu izvući maksimalne povoljnosti za razvoj sredine i poljoprivrede u njoj. Posebno je izražena mogućnost razvoja seoskog turizma, koji zahvaljujući prirodnim resursima, ekološkim vrednostima i ambijetalnim karakteristikama ruralne sredine stvara zanimljiv i perspektivan turistički proizvod. Uporedo sa tim neophodno je obnoviti seosku infrastrukturu i dati veću podršku unapređenju sela u cilju očuvanja tradicionalnih vrednosti života na selu.

Ključne reči: poljoprivreda, ruralna sredina, turistički proizvod
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Evaluation of the state and the problems of agriculture and villages in the Toplica district

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Abstract: Agriculture plays an important role in the economy of the Toplica district, as more than 30% of the population is engaged in agriculture. The existence of natural resources and the tradition of engaging in agricultural production are key factors that contribute to the character of agriculture. Next to Prokuplje (43,793 ha), the municipality of Kursumlija (37,769 ha) covers the largest part of the Toplica district, followed by the municipalities of Blace (18,304 ha) and Zitorađa (18,044 ha). Arable land is mostly owned by agricultural holdings, while pastures are state property. The Toplica administrative district has the advantage that by combining the natural potential, ecologically preserved environment, cultural and historical heritage and other attractiveness of the area, they can extract maximum benefits for the development of the environment and agriculture in it. The possibility of the development of rural tourism, which thanks to the natural resources, ecological values and environmental characteristics of the rural environment, creates an interesting and promising tourist product, is particularly expressed. Along with this, it is necessary to restore the village infrastructure and give more support to the improvement of the village in order to preserve the traditional values of rural life.

Keywords: agriculture, rural environment, tourism product
004 1TU 2023



Popularizacija i predstavljanje turizma u Topličkom okrugu kroz praktičnu nastavu stranih jezika na Odseku za poslovne studije Topličke akademije strukovnih studija

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Sažetak: Strani jezici igraju veoma bitnu ulogu u srednjim stručnim školama još od njihovog osnivanja. Drugi strani jezik se u srednjim stručnim školama sreće u oblastima turizma i ugostiteljstva, saobraćaja, kulture, umetnosti i javnog informisanja. Strani jezik se u ovim školama javlja i kao izborni predmet i fakultativni deo školskog programa (Vujović, 2028: 149). Đorović (2014) navodi da nastava stranih jezika na univezitetskom nivou ima za cilj sticanje znanja o jeziku koji se izučava. Osposobljavajući se za lakše praćenje stručne i naučne literature na stranom jeziku, studenti proširuju i svoja stručna znanja, a u idealnom slučaju, zahvaljujući saradnji nastavnika stručnih predmeta i nastavnika stranog jezika, postižu interdisciplinarni pristup. Učeći i radeći na tekstovima struke koji su u direktnoj vezi sa gradivom stručnih predmeta na najbolji mogući način stiču paralelno stručna i jezička znanja. Najzad, studenti stiču i znanja o državama u kojima se dati strani jezik govori i o njihovim kulturama, razvijajući na taj način i interkulturnu kompetenciju (ibidem 257). Jezici koji se izučavaju na Odseku za poslovne studije imaju dugu tradiciju i zastupljeni su na svim studijskim programima. Na studijskom programu Turizam, kao i na modulu dualnog obrazovanja se prema programu studentima nude dva strana jezika: engleski i nemački jezik. Studenti imaju mogućnost da u kontinuitetu usavršavaju sve jezičke veštine uz poseban osvrt na neophodne stručne kompetencije i struku za koju se obrazuju. U ovom radu ćemo opisati aktuelnu situaciju i nastavnu praksu stranih jezika na Odseku za poslovne studije Topličke akademije strukovnih studija sa sedištem u Prokuplju. Zatim ćemo predstaviti praktični deo nastave stranih jezika koja je realizovana u nastavnoj 2022/23. godini. Cilj ovog rada je da se prikažu mogućnosti i izazovi nastave stranih jezika na visokoškolskim ustanovama, sa kojima se nastavnici i studenti susreću u radu.

Ključne reči: obrazovni sistem u Srbiji, Toplički okrug, turizam u Srbiji, jezik struke, jezik u turizmu
005 1TU 2023



Popularization and presentation of tourism in the Toplica district through practical teaching of foreign languages at the Department of Business Studies of the Toplica Academy of Applied Studies

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Abstract: Foreign languages have played a very important role in secondary vocational schools since their inception. The second foreign language is found in vocational secondary schools in the fields of tourism and hospitality, transportation, culture, art, and public information. Foreign languages in these schools also appear as elective subjects and optional parts of the school curriculum (Vujović, 2028: 149). Đorović (2014) states that teaching foreign languages at the university level aims to gain knowledge of the language being studied. By training for easier monitoring of professional and scientific literature in a foreign language, students also expand their professional knowledge, and ideally, thanks to the cooperation of subject teachers and foreign language teachers, they achieve an interdisciplinary approach. By learning and working on texts related directly to the material of professional courses in the best possible way, they acquire professional and linguistic knowledge in parallel. Finally, students acquire knowledge of countries where a given foreign language is spoken and their cultures, thus developing intercultural competence (ibidem 257). The languages studied at the Department of Business Studies have a long tradition and are represented in all study programs. In the Tourism study program, as well as in the dual education module, students are offered two foreign languages: English and German. Students have the opportunity to continuously improve all language skills with special emphasis on the necessary professional competencies and the profession for which they are being educated. In this paper, we will describe the current situation and teaching practices of foreign languages at the Department of Business Studies of the Toplica Academy of Applied Studies based in Prokuplje. Furthermore, we will present the practical part of foreign language teaching that was implemented during the 2022/23 academic year. The aim of this paper is to demonstrate the opportunities and challenges of teaching foreign languages at higher education institutions that teachers and students encounter in their work.

Keywords: education system in Serbia, Toplica District, tourism in Serbia, language of profession, language in tourism.

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Agencijsko poslovanje u lovnom turizmu

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Sažetak: Specifičnost lovnoturističke delatnosti je u činjenici da je za uspešnost iste neophodno postojanje određenog raspoloživog fonda jedne ili više vrsta divljači u adekvatnom prirodnom ambijentu prilagođenom (opremljenom odgovarajućim objektima, sredstvima, uređajima i sl.) za bezbedan, odnosno uspešan lov. Inače, lov organizovan u cilju ostvarivanja turističkog prometa naziva se turističkim lovom. Lovnoturističko tržište je, kao i tržište uopšte, pod stalnim uticajem tražnje i ponude, troškova i dobiti, kao i unutrašnje (u datoj državi) i međunarodne pravne regulative. Jedna od glavnih karika u organizaciji lovnoturističkih područja i realizaciji lovnoturističkih poslova je lovnoturistička agencija. Lovno-turistička agencija je vrsta turističke agencije, koja predstavlja privredni subjekat čija komercijalna delatnost obuhvata posredničke, organizatorske i snabdevačke poslove u domenu lovnoturističkih usluga. Osnovna specifičnost u poslovanju lovno-turističkih agencija je posredovanje, a često i direktna participacija u pružanju, za lovnoturističku klijentelu, primarnih, lovnoturističkih usluga. Specifičnosti u pružanju usluga lovno turizma u odnosu na uobičajene (klasične) turističke usluge su brojne, a iste se posebno manifestuju pri: rezervaciji lova, asistenciji na mestu prijema lovaca-turista, u fazi odvijanja lovne aktivnosti, naplate usluga, kao i u odnosu na nadležnosti i zadatke stručnih vodiča i pratilaca u lovu. Usvajanjem novog Zakona o divljači i lovu stekle su se relevantne normativno-pravne pretpostavke za uspostavljanje realnih tržišnih pozicija lovno-turističkih agencija i njihovo još kvalitetnije angažovanje u pružanju usluga u lovnom turizmu.

Ključne reči: lov, turizam, agencija, poslovanje.

006 1TU 2023



Agency business in hunting tourism

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Abstract: The specificity of the activity of hunting tourism is that for its success it is necessary to have a fund available for one or more species of game in an adequate natural environment adapted (equipped with appropriate facilities, means, devices, etc.) for safe and successful hunting. Otherwise, hunting organized for the purpose of achieving tourist traffic is called tourist hunting. The hunting tourism market, like the market in general, is constantly influenced by demand and supply, costs and profits, as well as internal (in a given country) and international legal regulations. One of the main links in the organization of hunting and tourism areas and the implementation of hunting tourism is the hunting and tourism agency. A hunting-tourist agency is a type of tourist agency, which represents a business entity whose commercial activity includes intermediary, organizational and supply activities in the field of hunting-tourist services. The primary specificity in the business of hunting-tourist agencies is mediation, and often direct participation in the provision of primary, hunting-tourist services for the hunting-tourist clientele. There are many peculiarities in the provision of hunting tourism services in relation to the usual (classic) tourist services, and they are especially manifested in: hunting reservations, assistance at the reception point for hunter-tourists, in the phase of hunting activities, charging for the service, as well as in relation to jurisdiction and tasks of professional guides and companions in hunting. With the adoption of the new Law on game and hunting, the relevant normative-legal prerequisites for the establishment of realistic market positions of hunting-tourist agencies and their even better engagement in the provision of services in hunting tourism have been acquired.

Keywords: hunting, tourism, agency, business.

006 1TU 2023



Najčešći razlozi prevremenog izlučenja krava iz proizvodnje

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Sažetak: Govedarstvo naše zemlje je heterogeno po svom sastavu i genetskoj vrednosti, s obzirom da u rasnom pogledu ima primitivnih domaćih rasa tipa Buše, oplemenjenog domaćeg govečeta u tipu Simentalca, plemenitih i visokoproduktivnih rasa za proizvodnju mleka tipa Holštajn-Frizijskog govečeta, sve više specijalizovanih genotipova za proizvodnju mesa (Šarole, Limuzin i drugi) i različitih tipova meleza za proizvodnju: mleka, mleka i mesa i samo mesa. Odgajivačkim ciljem su definisana poželjna grla, a to su profitabilna i visokoproduktivna grla sa visokom dnevnom konzumacijom, dobrim zdravljem i plodnošću. Cilj je postizanje maksimalnih genetskih vrednosti za ekonomski važne osobine u skladu sa ekonomskim efektima genetskog poboljšanja, koju je postigla u razvijenim zemljama sveta. Donošenje odluke o izlučenju mlečnih grla iz proizvodnje predstavlja vrlo kompleksan proces. Za donošenje ovakve odluke neophodno je obuhvatiti i analizirati veliki broj faktora koji utiču na ekonomičnost proizvodnje. Na proces donošenja odluke o izlučenju utiču i biološki i organizacioni faktori. Dominantni razlog izlučenja u prvoj laktaciji bila je neprodnost i poremećaji u reprodukciji, što je u skladu sa dosadašnjim ispitivanjima i dobijenim rezultatima. Slabe reproduktivne performanse grla, takođe, utiču na povećanje trajanja servis perioda što dovodi do povećanja rizika od izlučenja. Opšti zaključak koji se može izvesti na osnovu rezultata većeg broja istraživanja jeste da je rizik od izlučenja značajno manji u stadima koja se šire, nego u stadima koja imaju konstantan broj grla. Najviši rizik od izlučenja imaju grla koja se nalaze u stadima u kojima se broj grla smanjuje. Mnoge promene osobina predaka goveda rezultat su prirodne selekcije.

Ključne reči: govedarstvo, selekcija, preveremeno izlučenje, ekonomičnost
001 2AP 2023



The most common reasons for premature withdrawal of cows from production

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Abstract: Our country's cattle breeding is heterogeneous in terms of its composition and genetic value, considering that in terms of race, there are primitive domestic breeds of the Bush type, refined domestic cattle of the Simmental type, noble and highly productive breeds for milk production of the Holstein-Friesian type of cattle, increasingly specialized genotypes for meat production (Charolais, Limousin, and others) and different types of hybrids for production: milk, milk and meat and only meat. The breeding goal defines desirable cows, which are profitable and highly productive cows with high daily consumption, good health, and fertility. The goal is to achieve maximum genetic values for economically important traits by the economic effects of genetic improvement, which has been achieved in the developed countries of the world. Deciding to remove milk cows from production is a very complex process. To make such a decision, it is necessary to include and analyze a large number of factors that affect the economy of production. The process of deciding excretion is influenced by both biological and organizational factors. The dominant reason for excretion in the first lactation was infertility and disorders in reproduction, which is to the previous tests and the obtained results. Poor reproductive performance of the throat also affects the increase in the duration of the service period, which leads to an increase in the risk of shedding. The general conclusion that can be drawn based on the results of a large number of studies is that the risk of shedding is significantly lower in expanding herds than in herds with a constant number of heads. Heads in herds where the number of heads is decreasing have the highest risk of excretion. Many changes in the traits of cattle ancestors are the result of natural selection.

Keywords: cattle breeding, selection, premature excretion, economy
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Uloga poljoprivrednih savetodavaca i stručnih službi u ruralnom razvoju

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Sažetak: Cilj rada je da se na osnovu primera u PSSS Jagodina doo utvrdi uloga i uticaj poljoprivrednih savetodavaca na ostvarenje određenih mera ruralnog razvoja. Na tok ruralnog razvoja u velikoj meri utiču različiti politički pritisci. Uticaj političke dimenzije kao faktora naročito je izražen u domenu proširenja EU i zaštite evropske poljoprivrede od svetske konkurencije. Razvoj i primena IT su globalna pojava i nisu karakteristična isključivo u urbanim sredima. Naročito u razvijenom delu sveta IT imaju primenu u ruralnim područjima i visok stepen delovanja na unapređenje uslova života i rada na selu. U smislu odgovora na cilj ovog rada istraživanje je vršeno u prostorijama PSSS Jagodine u Jagodini i na terenu, na dva poljoprivredna gazdinstva, tokom decembra meseca 2020. godine. Prvenstveno je vršeno posmatranje načina rada zaposlenih u PSSS Jagodini i prikupljanju potrebne interne dokumentacije za potrebe istraživanja. Obavljen je intervju sa većim brojem zaposlenih savetodavaca iz različitih oblasti poljoprivredne proizvodnje, na osnovu čega su doneti odgovarajući zaključci u smislu sprovođenja agrarne politike, transfera znanja, načinu komunikacije sa poljoprivrednim proizvođačima, načinu popunjavanja aplikacionih listova, promovisanju ženskog preduzetništva i rodne ravnopravnosti kao i diverzifikaciji ruralnih područja. U radu je korišćena metodologija: metod studije slučaja, metod posmatranja kao planskog i sistematično izvedenog prikupljanja činjenica i metod intervjua. Interna dokumentacija PSSS Jagodina doo, baza podataka savetodavnih aktivnosti IPN-a, zakonske regulative Republike Srbije poslužili su kao izvor podataka.

Ključne reči: poljoprivreda, savetodavstvo, ruralni razvoj, transfer znanja.
002 2AP 2023



The role of agricultural advisors and expert services in rural development

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Abstract: The paper aims to determine the role and influence of agricultural advisers on the implementation of certain measures of rural development, based on the example of PSSS Jagodina doo. The course of rural development is largely influenced by various political pressures. The influence of political dimensions as a factor is particularly pronounced in the domain of EU enlargement and the protection of European agriculture from global competition. The development and application of IT are a global phenomenon and are not characteristic exclusively in urban areas. Especially in the developed part of the world, IT is used in rural areas and has a high degree of effectiveness in improving living and working conditions in the countryside. In terms of the answer to this paper, the research was carried out on the premises of PSSS Jagodina in Jagodina and the field, on two agricultural farms, in December 2020. Primarily, observation of the way of work of employees in PSSS Jagodina and collection of necessary internal documentation for research purposes was carried out. An interview was conducted with a large number of employed advisers from various fields of agricultural production, based on which appropriate conclusions were drawn in terms of the implementation of agricultural policy, knowledge transfer, methods of communication with agricultural producers, methods of filling out application forms, promotion of female entrepreneurship and gender equality, as well as diversification. . rural areas. The methodology used in the work: case study method, observation method as planned and systematically performed collection of facts, and interview method. The internal documentation of PSSS Jagodina d.o.o., the database of advisory activities of the IPN, and the legal regulations of the Republic of Serbia served as a source of data.

Keywords: agriculture, counseling, rural development, knowledge transfer.
002 2AP 2023



Značaj sprovođenja aeracije u slatkovodnim ribnjacima

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Sažetak: Privredni značaj ribarstva je veliki. Ribarstvo predstavlja mali segment srpske privrede, ali nije bez perspektive. U Srbiji se gajenje riba obavlja u ribnjacima i izlovom riba iz otvorenih voda. Objekti akvakulture – ribnjaci, najvećim delom su locirani na prostoru pokrajine Vojvodine (šaranski ribnjaci) i u brdsko planinskim krajevima Srbije (pastrmski ribnjaci). Proizvodnja ribe se obavlja u poluintenzivnim i intenzivnim sistemima. Poluintenzivni sistemi su zastupljeni na šaranskim ribnjacima, dok je intenzivna proizvodnja na pastrmskim ribnjacima, kaveznim sistemima, šaranskim ribnjacima malih površina i RAS sistemima. Kiseonik se normalno nalazi u vodi ribnjaka u koncentracijama koje su određene vazдушnim pritiskom, salinitetom, temperaturom. Glavni izvori kiseonika u vodi su fotosinteza vodenih biljaka kao i difuzija iz atmosferskog vazduha. Sadržaj kiseonika u vodi varira u zavisnosti od doba dana tj. količine svetla koje pada na vodenu površinu. Neophodno je svakodnevno praćenje sadržaja kiseonika. Unošenjem kiseonika u vodu pospešuje se aerobna razgradnja organskih otpadaka čime se stvara prirodna hrana u lancu ishrane, a sprečava anaerobno truljenje i razvoj štetnih bakterija u vodi itd. Primenom aeratora moguće je poboljšati kvalitet vode, poboljšati životne uslove ribe, povećati gustinu uzgoja. Pravilan izbor aeratora podrazumeva poznavanje potreba gajene ribe, fizičko-hemijskih uslova u ribnjačkoj vodi sa jedne strane, i karakteristika rada različitih vrsta aeratora sa druge strane. Mesto postavljanja aeratora u ribnjaku treba tako izabrati, da se aeracija vode vrši u delovima ribnjaka gde se riba obično skuplja kada nastupi nedostatak RK. Aeratore koji sem obogaćivanja vode kiseonikom stvaraju i vodenu struju, treba postaviti na sredini najduže stranice ribnjaka, nekoliko metara od obale. Od 3 do 4 sata potrebno je da aerator od 1,5 kW promeni vodu površine 1ha.

Ključne reči: ribarstvo, ribnjak, kiseonik, aerator
003 2AP 2023



Importance of aeration in freshwater fish farming

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Abstract: The economic importance of fishing is great. Fishing represents a small segment of the Serbian economy, but it is not without perspective. In Serbia, fish farming is done in ponds and by catching fish from open waters. Aquaculture facilities-ponds, are mostly located in the province of Vojvodina (carp ponds) and the mountainous regions of Serbia (trout ponds). Fish production is carried out in semi-intensive and intensive systems. Semi-intensive systems are represented on carp ponds, while intensive production is on trout ponds, cage systems, carp ponds of small areas, and RAS systems. Oxygen is normally found in pond water in concentrations determined by air pressure, salinity, and temperature. The main sources of oxygen in water are the photosynthesis of aquatic plants as well as diffusion from atmospheric air. The oxygen content in the water varies depending on the time of day, ie. the amount of light falling on the water surface. Daily monitoring of oxygen content is necessary. By introducing oxygen into the water, the aerobic decomposition of organic waste is promoted, which creates natural food in the food chain, and prevents anaerobic decay and the development of harmful bacteria in the water, etc. By using aerators, it is possible to improve water quality, improve the living conditions of fish, and increase the density of breeding. The correct choice of aerator implies knowledge of the needs of the farmed fish, the physicochemical conditions in the pond water on the one hand, and the characteristics of the work of different types of aerators on the other hand. when there is a lack of RK. Aerators, which, in addition to enriching the water with oxygen, also create a water current, should be placed in the middle of the longest side of the pond, a few meters from the shore. It takes 3 to 4 hours for a 1.5kW aerator to change the water of 1ha.

Keywords: fishery, pond, oxygen, aerator
003 2AP 2023



Značaj upotrebe robotike u živinarstvu

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Sažetak: Tehnološki razvoj u projektovanju i proizvodnji poljoprivredne mehanizacije imao je za cilj da ona bude racionalna, jeftina, energetski štedljiva i ekološki prihvatljiva. I pored toga ona nije bila dostupna kao investicija za najveći broj naših poljoprivrednih proizvođača. Vremenom, mehanizacija u poljoprivredi i njeno nestručno ili nepravilno primenjivanje počelo je da uslovljava i da se odražava na proizvod, u smislu lošeg kvaliteta, a pre svega u prirastu, nosivosti i kvalitetu. Kao odgovor na takve pojave, a kao jedno od mogućih rešenja jeste primena robota i digitalizacija opreme. Roboti igraju sve veće i važnije uloge na živinarskim farmama. Poboljšanjem efikasnosti proizvodnje povećava se sigurnost hrane, unapređuju zdravlje i dobrobit životinja, doprinosi boljim uslovima rada i dobrobiti na farmama. Osnovne funkcije ovih robota, u zavisnosti od modela, su ili za čišćenje i dezinfekciju živinarskih objekata ili za prevrtanje i aeraciju prostirke. Ali ovi roboti su takođe modularni omogućavajući korisnicima da ih pretvore u nekoliko različitih verzija sa mogućnošću obavljanja različitih zadataka. Osim svojih osnovnih funkcija, roboti su opremljeni da sakupljaju, analiziraju i čuvaju podatke-senzorima, kamerama i drugim sistemima-pomoću kojih mogu poboljšati vođenje evidencije i sledljivost na farmama. Kontinuirano mere ambijentalne faktore, kao što su temperatura, vlažnost vazduha, ugljen dioksid i amonijak, blagovremeno upozoravaju farmera o potencijalnim problemima. Najveći značaj upotrebe robota u živinarstvu ogleda se u kontroli zdravstvenog stanja živine, pre svega gde stalno izbijaju nove epidemije ptičjeg gripa, učestalih zoonoznih bolesti, razvoj organizama otpornih na lekove i dr. pri čemu se robotima brzo i delotvorno deluje tokom izbijanja bolesti. Smanjivanjem ljudskog kontakta sa pticama, uklanjanjem ljudske greške i efikasnijim obavljanjem zadataka, roboti, postaju neprocenjivi instrument u ovoj stalnoj borbi.

Ključne reči: roboti, živinarstvo, farma, dobrobit
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The importance of using robotics in poultry farming

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Abstract: Technological development in the design and production of agricultural machinery aimed to make it rational, cheap, energy-saving, and environmentally friendly. Despite this, it was not available as an investment for the majority of our agricultural producers. Over time, mechanization in agriculture and its unprofessional or improper application began to condition and reflect on the product, in terms of poor quality, and above all in growth, carrying capacity, and quality. As a response to such phenomena, as one of the possible solutions is the application of robots and the digitization of equipment. Robots are playing a bigger and more important role in poultry farms. By improving production efficiency, they increase food safety, improve the health and well-being of animals, and contribute to better working conditions and well-being on farms. The basic functions of these robots, depending on the model, are either for cleaning and disinfection of poultry facilities or for turning over and aerating the mat. But these robots are also modular allowing users to transform them into several different versions with the ability to perform different tasks. In addition to their basic functions, robots are equipped to collect, analyze, and store data-sensors, cameras, and other systems-with which they can improve record-keeping and traceability on farms. They continuously measure ambient factors, such as temperature, air humidity, carbon dioxide, and ammonia, warning the farmer about potential problems in a timely manner. The greatest importance of the use of robots in poultry farming is reflected in the control of the health status of poultry, especially where new epidemics of bird flu, frequent zoonotic diseases, the development of drug-resistant organisms, etc. are constantly breaking out. whereby robots act quickly and effectively during disease outbreaks. Robots are becoming an invaluable instrument in this ongoing battle by reducing human contact with birds, eliminating human error, and performing tasks more efficiently.

Keywords: robots, poultry, farm, welfare
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Klinička patologija metabolizma krava simentalске rase na području Blaca, Aleksinca i Niša

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Sažetak: U uslovima negativnog bilansa energije organizam troši sopstvene rezerve energije, najpre rezerve glikogena, zatim masti a onda i proteina. Kao posledica toga dolazi do mršavljenja, manjeg ili većeg stepena zamašćenja jetre, smanjenja proizvodnih i reproduktivnih sposobnosti životinja, a u nekim slučajevima i do uginuća. U ovom radu prvo su razmatrani podaci o energetskim procesima u ranoj laktaciji, sa posebnim osvrtom na negativan bilans energije na početku laktacije. Razmatrani su takođe i najvažniji zdravstveni poremećaji krava u laktaciji. Dovoljan podatak o stanju balansa energije u određenim periodima laktacije može da pruži određivanje vrednosti samo tri parametra i to u mleku, a ne u krvi, a to je koncentracija masti u mleku, proteina i uree. Za ove podatke nije potrebna posebna oprema a do uzoraka mleka se lako dolazi za razliku od uzoraka krvi. Prva faza laktacije, koja traje do tri meseca posle porođaja, najkritičnija je faza u proizvodnom ciklusu. Naime, uspostavljanjem laktacije organizam visoko-mlečnih krava je opterećen do krajnjih fizioloških granica (40 do 60 posto ukupne proizvodnje mleka proizvede se u prvih 120 dana laktacije). Za ovu fazu laktacije je isto tako karakteristično da krave fiziološki pojedu manju količinu hrane, tako da do druge nedelje posle teljenja mogu dnevno da unose svega 10 do 11 kg suve materije obroka. Potom se unosenje hrane postepeno povećava i dostiže optimalne mogućnosti između drugog i trećeg meseca laktacije (18 do 21 kg suve materije obroka na dan). To praktično znači da u prvim nedeljama laktacije postoji negativan energetski bilans, jer su ukupne energetske potrebe daleko veće, nego što mogu da se obezbede iz alimentarnih izvora. Procenjeno je da trećina energije koja se gubi izlučivanjem mleka u prvom mesecu laktacije potiče iz telesnih rezervi organizma.

Ključne reči: bilans energije, mleko, laktacija
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Clinical pathology of the metabolism of Simmental cows in the area of Blace, Aleksinac and Niš

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Abstract: In the conditions of negative energy balance, the body consumes its own energy reserves, first glycogen reserves, then fats and finally proteins. As a result, there is a weight loss, a greater or lesser degree of fatty liver, a decrease in the productive and reproductive abilities of animals and in some cases even their passing away. In this paper, the data on energy processes in early lactation were discussed firstly, with special reference to the negative energy balance at the beginning of lactation. The most important health issues of lactating cows were also discussed. Sufficient information on the state of energy balance in certain periods of lactation can provide the determination of the value of only three parameters in milk and not in blood, precisely the concentration of fat in milk, protein and urea. Special equipment is not required for this data, and milk samples are easy to obtain, unlike blood samples. The first stage of lactation, which lasts up to three months after deliverance, is the most critical stage in the production cycle. Thus, with the establishment of lactation, the organism of high-dairy cows is burdened to the extreme physiological limits (40 to 60 percent of the total milk production is produced in the first 120 days of lactation). It is also characteristic for this stage of lactation that cows physiologically eat a smaller amount of food, so that until the second week after calving, they can consume only 10 to 11 kg of dry meal per day. Then the feed intake gradually increases and reaches optimal possibilities between the second and third month of lactation (18 to 21 kg of dry meal per day). Practically this means that in the first weeks of lactation there is a negative energy balance, because the total energy needs are far greater than they can be provided from alimentary sources. It has been estimated that a third of the energy that is lost through the secretion of milk in the first month of lactation comes from the body reserves.

Keywords: energy balance, milk, lactation
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Značaj ocene telesne kondicije visoko-mlečnih krava u fazi zasušenja i fazi rane laktacije

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Sažetak: Ocena telesne kondicije životinja je veoma pouzdan pokazatelj energetskog statusa, pogotovu u peripartalnom periodu, kada nastaju najizraženije promene u metabolizmu. U periodu zasušenja, krave mogu da budu u tovnjoj kondiciji, a na početku laktacije, kada se stepen korišćenja telesnih rezervi povećava uporedo sa povećanjem proizvodnje mleka, mogu da mršave do potpunog iscrpljenja. Smatra se da je potrebno da se najmanje dva puta godišnje vrši optimizacija obroka i kontrola stanja uhranjenosti krava, kako bi se izbegle velike promene u metabolizmu. Stepenu uhranjenosti visoko-mlečnih krava u visokom graviditetu utiče na intenzitet lipomobilizacije i racionalno korišćenje masti za zadovoljenje energetskih potreba. Praćenje telesne kondicije životinja može da bude pouzdan pokazatelj energetskog statusa, pogotovo u peripartalnom periodu. Poznata je činjenica, da se stepen korišćenja telesnih rezervi kod negativnog bilansa energije povećava sa povećanjem proizvodnje mleka. Postupkom poznatim kao ocenjivanje telesne kondicije (OTK) određuju se telesne rezerve, odnosno relativna količina subkutanog masnog tkiva. Preporučuje se kontrola OTK najmanje jednom mesečno u toku laktacije i svakih 15 dana tokom zasušenja. Svaka životinja treba da bude ocenjena u svim fazama proizvodnje i reprodukcije: u zasušenju, na teljenju, na 30 dana posle teljenja, prilikom pripusta/osemenjavanja (od 60. do 70. dana), u trenutku potvrde steonosti (od 120 do 150. dana) i u trećoj fazi laktacije (po sistemu Elanco Animal Health Buletin AI 8478). Prema ovom sistemu ocena telesne kondicije životinja izražava se numerički od 1 do 5 poena. Treba imati u vidu da svaka promena u telesnoj kondiciji za jedan poen podrazumeva promenu telesne mase najmanje za 55 kg pa sve do 75 kg telesne mase. Na osnovu dobijenih podataka izračunate su prosečne vrednosti kao i odstupanja u odnosu na standardne vrednosti za pojedine kategorije (zasušenje, puerperijum, rana i kasna faza laktacije).

Ključne reči: telesna kondicija, peripartalni period, telesne rezerve
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Significance of the body condition assessment of high-yielding dairy cows in the drying-up and early lactation phase

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Abstract: The assessment of the body condition of animals is a very reliable indicator of energy status, especially in the peripartum period, when the most significant changes in metabolism appear. During the drying period, cows can be in fattening condition, and at the beginning of lactation, when the degree of use of body reserves increases along with the increase in milk production, they can lose weight until complete exhaustion. It is thought that it is necessary to optimize the feed intake and control the state of nutrition of cows at least twice a year, in order to avoid major changes in metabolism. The degree of nutrition of high-dairy cows in high pregnancy affects the intensity of lipomobilization and the rational use of fat to meet energy needs. Monitoring the body condition of animals can be a reliable indicator of energy status, especially in the peripartum period. It is widely known that the degree of utilization of body reserves in case of a negative energy balance increases with the increase in milk production. Body reserves, i.e. the relative amount of subcutaneous adipose tissue, are determined by a procedure known as body condition assessment (BCA). It is recommended to check BCA at least once a month during lactation and every 15 days during drying. Each animal should be evaluated at all stages of production and reproduction: at drying-off, at calving, 30 days after calving, at mating/insemination (from the 60th to the 70th day), at the moment of confirmation of pregnancy (from the 120th to the 150th day) and in the third stage of lactation (according to the Elanco Animal Health Bulletin AI 8478 system). According to this system, the evaluation of the body condition of animals is expressed numerically from 1 to 5 points. It should be considered that any change in body condition by one point equals a change in body weight of at least 55 kg and up to 75 kg of body weight. Based on the obtained data, average values as well as deviations from standard values for individual categories (drying, puerperium, early and late stages of lactation) were calculated.

Keywords: body condition, peripartum period, body reserves
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Optimizacija mikroklimatskih uslova u govedarstvu

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Sažetak: Goveda predstavljaju vrstu stoke koja lakše podnosi niske nego visoke temperature. Širi interval komfora, zavisno od kategorije, iznosi od 0 - 26°C, optimalni - najpovoljniji - od 12 - 16°C. Konkretno, za muzne krave najpovoljnija temperatura vazduha u objektu je u intervalu od 4 - 15°C. Sa padom temperature ispod 4°C dolazi do smanjenja mlečnosti, jer se deo energije iz hrane troši prvenstveno na zagrevanje organizma. Sa povećanjem temperature iznad 20°C krave najpre reaguju smanjenjem apetita, to za posledicu ima pad mlečnosti. Za svaki stepen povećanja temperature vazduha iznad 24°C smanjuje se konzumiranje suve materije hrane za oko 2,8%. Osetnije smanjenje mlečnosti dolazi sa povećanjem temperature vazduha iznad 27°C. Interval poželjne vlažnosti vazduha u stajama za goveda je 60-80 %. Smanjenjem relativne vlažnosti vazduha u staji ima za posledicu otežano disanje stoke i pad apetita. Posledica toga je i manja proizvodnja. Obrnuta situacija-povećanje relativne vlažnosti vazduha-pogoduje pojavi bolesti. Ako se uzme u obzir podatak da krava telesne mase od 500 kg izluči za jedan sat oko 300 g vodene pare, onda je jasno da i provetravanje staje treba itekako ozbiljno shvatiti kako bi se relativna vlažnost vazduha zadržala na zadovoljavajućem nivou i izbegla već navedena situacija da grla dodju u stanje toplotnog stresa.

Ključne reči: mikroklimat, staja, govedarstvo, mleko, meso
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Optimization of microclimatic conditions in cattle breeding

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Abstract: Cattle are a type of livestock that tolerates low temperatures more easily than high temperatures. The wider comfort interval, depending on the category, is from 0 - 26°C, optimal - the most favorable - from 12 - 16°C. Namely, for dairy cows, the most favorable air temperature in the building is in the interval of 4 - 15°C. When the temperature drops below 4°C, milk yield decreases because part of the energy from food is spent primarily on heating the body. With an increase in temperature above 20°C, cows first react by decreasing their appetite, which results in a decrease in milk yield. For each degree of increase in air temperature above 24°C, consumption of dry food decreases by about 2.8%. A more noticeable decrease in milk yield comes with an increase in air temperature above 27°C. The interval of desirable air humidity in livestock barns is 60-80%. A decrease in the relative humidity of the air in the barn leads to difficulty breathing of the cattle and a decrease in appetite. The result is less production. The opposite situation - an increase in the relative humidity of the air - favors the appearance of the disease. If it is taken into account that a cow with a body weight of 500 kg emits about 300 g of water vapor in an hour, then it is clear that the ventilation of the barn should be taken seriously to maintain the relative humidity of the air. at a satisfactory level and avoid the throat situation mentioned above. they come into a state of heat stress.

Keywords: microclimate, barn, animal husbandry, milk, meat
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eGvozno – Sistem za praćenje životinja u ekstremno ruralnim područjima

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Sažetak: Uzgoj goveda u sistemu krava tele postaje sve popularniji u brdskoplaninskim područjima Bosne i Hercegovine. Dok sa jedne strane, postoji jako puno prednosti ovog načina uzgoja goveda, sa druge strane postoji i niz ograničavajućih faktora koji se ogledaju u nedostatku radne snage, lošoj IKT infrastrukturi i slično. U cilju identifikacije pozicije grla u područjima koja nisu dobro pokrivena GSM mrežom, korišćenje LoRAWAN tehnologije može biti jedno od optimalnih rješenja. U ovom radu opisana je arhitektura implementiranog rješenja na farmi GVOZNO koja je locirana na 1.200 metara nadmorske visine. Na farmi se nalazi više od 150 grla aberdin angus pasmine. Grla borave na pašnjacima više od osam mjeseci godišnje, dok su u zimskom period u štali. Pašnjaci se miješaju sa manjim distriktima prekrivenim šumom, kao i brežuljcima, što otežava lociranje životinja. Sistem se sastoji od hardverske komponente nabavljene na tržištu, te od softvera kreiranog za konkretnu namjenu. Nakon skoro dvije godine korišćenja sistema u ekstremno ruralnim područjima može se zaključiti da ovaj IoT sistem predstavlja pouzdano, jeftino i jednostavno rješenje za potrebe lociranja goveda.

Ključne reči: GPS, LoRaWAN, jeftina rješenja, životinje, pašnjaci
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eGvozno - Cattle-tracking system in extremely rural areas

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Abstract: The cow-calf system is becoming popular in the hilly-mountainous areas of Bosnia and Herzegovina. While, on the one hand, there are a large number of advantages for this kind of production, on the other hand, there are also a large number of limitations, such as: lack of labor force, poor ICT infrastructure, etc. In order to identify the position of cattle in areas that are not well covered by the GSM network, the use of LoRaWAN technologies can be one of the optimal solutions. The paper describes the architecture of the implemented solution on the farm "GVOZNO" located at 1,200 meters above sea level. There are over 150 head of Aberdeen Angus cattle on the farm. Cattle spend more than eight months a year on pastures. The pastures are mixed with smaller forest districts and small hills, which makes it difficult to identify position of the animals. The system consists of hardware components purchased on the market and software created for a specific need. After almost two years of use in extremely rural areas, the conclusion is that this IoT system represents a reliable, low-cost and simple solution for the purpose of locating the position of cattle.

Keywords: GPS, LoRaWAN, low-cost solution, animals, pastures
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Stanje i potencijal autohtonih rasa svinja u Srbiji i njihov značaj za održivu poljoprivredu

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Sažetak: Autohtone rase su nastale na određenom geografskom području i prilagođene su uslovima života tog područja. Zbog sve skuplje farmerske proizvodnje svinja, poljoprivredni stručnjaci očekuju dalji blagi porast broja grla autohtonih rasa svinja, pre svih moravke. Uprkos manjoj produkciji i prirastu, jednostavnija proizvodnja, veća cena i sve sigurnija prodaja, preporučuju ovu autohtonu rasu budućim uzgajivačima. Država podstiče uzgajanje autohtonih rasa značajno većim subvencijama. Nekada zaboravljena autohtone rase, poput moravke, resavke, mangulice i drugih postaje sve profitabilnija na tržištu koje sve više traži autohtone domaće životinje uzgajane u prirodnim uslovima. Moravka, resavka i mangulica predstavljaju značajan genetski resurs naše zemlje, te zbog toga ne smemo dozvoliti da one iščeznu kao što se dogodilo sa mnogim drugim rasama domaćih životinja dok nismo obraćali dovoljno pažnje. Učimo, informišimo se i naposljetku delujmo zajedno kako bismo učinili sve što možemo da sačuvamo sve autohtone rase domaćih životinja. Važnost očuvanja autohtonih rasa je izuzetno značajna čak i kada nema ekonomske računice, jer autohtone rase predstavljaju jedinstveni izvor gena koje možemo u budućnosti iskoristiti, posebno iz razloga jer biotehnologija kao nauka stalno napreduje. Glavne aktivnosti koje se odnose na upravljanje i konzervaciju genetičkim resursima u narednom periodu treba da se odnose na: uključivanje novih tehnologija konzervacije (pre svega koje se odnose na ex-situ); izradu javno dostupne baze odgajivača autohtonih rasa, razvoj naučnih istraživanja; rad na izgradnji ljudskih i infrastrukturnih kapaciteta, rad na popularizaciji (izložbe stoke, sajmovi, izdavanje brošura, saradnja sa medijima), uključivanje autohtonih rasa u sisteme organske proizvodnje, razvoj tržišta za animalne proizvode sa zaštićenim geografskim poreklom dobijenih od autohtonih rasa, razvoj agro-turizma u zaštićenim oblastima, parkovima prirode, kao i nastavak saradnje na globalnom i regionalnom nivou.

Ključne reči: autohtone rase, održiva poljoprivreda, genetika, resursi
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The state and potential of autochthonous pig breeds in Serbia and their importance for sustainable agriculture

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Abstract: Autochthonous races originated in a certain geographical area and were adapted to the living conditions of that area. Due to the increasingly expensive farm production of pigs, agricultural experts expect a further slight increase in the number of heads of autochthonous pig breeds, primarily Moravian. Despite the lower production and increase, simpler production, higher price and more reliable sales, this autochthonous breed is recommended to future breeders. The state encourages the cultivation of autochthonous species with significantly higher subsidies. Once forgotten autochthonous breeds, such as the Moravian, Resavka, Mangulica and others, are becoming more and more profitable in the market, which is increasingly looking for autochthonous domestic animals raised in natural conditions. Moravka, resavka and mangulica represent an important genetic resource of our country. Therefore, we must not allow them to disappear, as has happened to many other breeds of domestic animals, until we pay enough attention. Let's learn, get informed and finally together to do everything to preserve all autochthonous breeds of domestic animals. The importance of preserving autochthonous races is extremely important even when there is no economic calculation because autochthonous races represent a unique source of genes that we can use in the future, especially since biotechnology as a science is constantly advancing. The main activities related to the management and preservation of genetic resources in the following period should refer to: the inclusion of new conservation technologies (primarily related to ex-situ); creation of a publicly available database on breeders of autochthonous breeds, development of scientific research work; work on building human and infrastructural capacities, work on popularization (livestock exhibitions, fairs, publication of brochures, cooperation with the media), inclusion of autochthonous breeds in organic production systems, market development for animal products with protected geographical origin obtained from autochthonous breeds, development of agrotourism in protected areas, nature parks, as well as the continuation of cooperation at the global and regional level.

Keywords: indigenous breeds, sustainable agriculture, genetics, resources
009 2AP 2023



Fiziologija i patološka fiziologija metabolizma proteina kod mlečnih krava Holštajn-Frizijske rase

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Sažetak: Najveći deo proteina hrane podleže metaboličkoj aktivnosti mikroorganizama u buragu i biva pretvoren u proteine ćelija mikroorganizama. Proteini ćelija mikroorganizama buraga zatim se lako svaruju u želucu i tankom crevu i imaju visoku biološku vrednost. Relativno mali deo proteina hrane koji izbegne metaboličku aktivnost mikroorganizama buraga hidrolizuje se i resorbuje u daljim delovima digestivnog trakta. Hidrolizom proteina pod dejstvom proteolitčkih enzima bakterija i protozoa buraga, nastaju peptidi i aminokiseline, koji se dalje razgrađuju do amonijaka koji se dalje ugrađuje u proteine mikroorganizama. Smanjen sadržaj energije u obroku smanjuje broj i aktivnost bakterija buraga. To znači da amonijak koji nastaje u buragu razgradnjom proteina, ne može u potpunosti da se iskoristi od bakterija za sintezu bakterijskih proteina, koji će kasnije u tankom crevu biti dalje iskorišćene. S obzirom na to da se aminokiseline krvi koriste za sintezu proteina mleka, smanjenje njihove koncentracije dovodi do smanjene sinteze proteina u mlečnoj žlezdi i posledično manje koncentracije proteina u mleku. Treba napomenuti da je energija koja se dobija razlaganjem glukoze značajan faktor, koji doprinosi sintezi proteina mleka. Razgradnja proteina se vrši putem proteolitčkih aktivnosti mikroorganizama (bakterija i protozoa) i podrazumeva dve faze: najpre se dešavaju hidrolitičke reakcije u kojima se proteini razlažu do polipeptida, a potom se polipeptidi razlažu do slobodnih masnih kiselina. U daljem toku procesa od aminokiselina se dobijaju niže masne kiseline, amonijak i ugljendioksid. Na ovaj način preživari dolaze do esencijalnih aminokiselina, koje se ne unose hranom. Sposobnost mikroorganizama da koriste neproteinski azot za sintezu sopstvenih proteina naziva se ciklus regeneracije proteina. Cilj ovog rada je da se na osnovu koncentracije ureje i sadržaja proteina i njihovog međusobnog odnosa odredi da li je metabolizam proteina u fiziološkim granicama ili je u pitanju patološka fiziologija metabolizma proteina kod ispitivanih krava Holštajn-frizijske rase.

Ključne reči: mikroorganizmi, protein, amonijak
010 2AT 2023



Physiology and pathological physiology of protein metabolism in Holstein-Friesian dairy cows

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Abstract: Most of the food protein undergoes the metabolic activity of microorganisms in the rumen and is converted into proteins of the cells of the microorganisms. The proteins of rumen microorganism cells are then easily digested in the stomach and small intestine and have a high biological value. A relatively small part of food protein that escapes the metabolic activity of rumen microorganisms is hydrolyzed and resorbed in further parts of the digestive tract. Hydrolysis of proteins under the action of proteolytic enzymes of bacteria and protozoa of the rumen produces peptides and amino acids, which are further dissolved into ammonia, which is further incorporated into the proteins of microorganisms. Reduced energy content in the meal reduces the number and activity of rumen bacteria. This means that the ammonia produced in the rumen by the dissolving of proteins cannot be fully used by the bacteria for the synthesis of bacterial proteins, which will be further used later in the small intestine. Given that blood amino acids are used for milk protein synthesis, a decrease in their concentration leads to reduced protein synthesis in the mammary gland and consequently a lower protein concentration in milk. It should be noted that the energy obtained from the breakdown of glucose is a significant factor that contributes to the synthesis of milk proteins. Dissolving of proteins is carried out through the proteolytic activities of microorganisms (bacteria and protozoa) and involves two phases: first, hydrolytic reactions occur in which proteins are disintegrated into polypeptides, and then polypeptides into free fatty acids. In the further course of the process, lower fatty acids, ammonia and carbon dioxide are obtained from amino acids. In this way, ruminants get access to essential amino acids, which are not taken in with food. The ability of microorganisms to use non-protein nitrogen to synthesize their own proteins is called the protein regeneration cycle. The aim of this paper is to determine, based on urea concentration and protein content and their mutual relationship, whether protein metabolism is within physiological limits or whether it is a question of pathological physiology of protein metabolism in the tested cows of the Holstein-Friesian breed.

Keywords: microorganisms, protein, ammonia
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Uticaj sastava piletne mase na laboratorijsku klijavost semena šećerne repe

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Sažetak: Piliranje semena je tehnološki postupak u procesu dorade semena šećerne repe u toku kojeg se na seme manje krupnoće nanosi omotač, piletna masa. Postupak i tehnologija pravljenja piletne mase, kao i nanošenje mase na seme, imaju za cilj da obezbede postojanost pilete, odnosno njenu čvrstoću i lako rastvaranje pod uticajem vlage iz zemljišta. Ispitivan je različiti sastavi piletne mase (težinski odnos piljevine i perlita) kroz 4 tretmana i to piletna masa sa težinskim odnosom piljevine i perlita 60%:40%, 50%:50%, 40%:60% i kontrolna varijanta (nepilirano seme). Rezultetati ispitivanja pokazuju da je laboratorijska klijavost svih varijanti piliranog semena nezavisno od udela perlita u piletnoj masi signifikantno veća od nepiliranog semena. Pilirano seme sa većim udelom perlita u piletnoj masi (50-60%) pokazalo je statistički značajne i visoko značajne razlike kako u pogledu energije klijanja, tako i ukupne klijavosti.

Ključne reči: pilirano seme, piletna masa, energija klijanja, klijavost semena
001 3BP 2023



The influence of the composition of coating material on laboratory germination of sugar beet seed

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Abstract: Seed coating is a technological process in sugar beet seed production, in which coating material, is put on the smaller fractions seed. The aim of production and technology of coating mass, is to make firm and stable but with ability to easily dissolve when in moist soil. Different compositions of coated mass (weight ratio of sawdust and perlite) were tested through 4 treatments, namely coated mass with a weight ratio of sawdust and perlite 60%:40%, 50%:50%, 40%:60% and the control variant (unmilled seed). The results of the test show that the laboratory germination of all varieties of shelled seeds is significantly higher than that of unshelled seeds, regardless of the proportion of perlite in the seed mass. Coated seeds with a higher percentage of perlite in the coated mass (50-60%) showed statistically significant and highly significant differences both in terms of germination energy and overall germination.

Key words: coated seed, coated mass, germination energy, seed germination
001 3BP 2023



Prednosti u zasnivanju sejanih travnjaka primenom metode transplantacije busena

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Sažetak: U radu je prikazan postupak zasnivanja sejanih travnjaka transplantacijom busenova. Ogljed je postavljen na teritoriji Paraćina u 2021. godini. Za setvu su korišćene tri travne vrste sa dobrim adaptabilnim svojstvima. Pri postavljanju ogljeda primenjene su sve predviđene mere nege nakon setve travne smeše. Ovako formirani travni pokrivač se reže na pravougaone oblike i premešta kao travni busen na stalno mesto. Travni buseni iz ovog ogljeda su namenjeni za igrališta i sportske terene kao za dvorišta i okućnice i pokazali su znatne prednosti u odnosu na zasnivanje travnjaka klasičnom setvom semena na stalno mesto.

Ključne reči: Travnjak, transplantacija busena, travna vrsta, adaptabilna svojstva.
002 3BP 2023



The advantages of establishing lawns using the sod transplant method

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Abstract: The paper shows the procedure for establishing sown lawns by transplanting sods. The experiment was set up on the territory of Paraćin in 2021. Three grass species with good adaptability properties were used for sowing. When setting up the test, all the intended care measures were applied after sowing the grass mixture. The grass sods from this sample are intended for playgrounds and sports fields as well as for yards and gardens and have shown significant advantages compared to the establishment of lawns by classical sowing of seeds in a permanent place.

Keywords: Lawn, sod translocation, grass species, adaptive properties.
002 3BP 2023



Uticaj vremena setve na prinos kukuruza u uslovima deficita vlage tokom vegetacije

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Sažetak: U radu su prikazani rezultati prinosa više hibrida FAO grupe zrenja 400, 500 i 600. Ogled je postavljen na lokalitetu Aleksinac i praćene su dve proizvodne godine 2021 i 2022. Ogled je izveden u uslovima suvog ratarenja a obe proizvodne godine su bile sa izuzetno malom količinom padavina tokom vegetacije. Na osnovu dobijenih rezultata utvrđeno je da postoji značajna razlika u pogledu prinosa hibrida sejanih u različitim rokovima. Pored ovoga utvrđeno je da postoji i razlika u prinosima hibrida kukuruza zavisno od FAO grupe zrenja.

Ključne reči: prinos, kukuruz, hibrid, vegetacija, vreme setve.

003 3BP 2023



The influence of sowing time on corn yield in the conditions of moisture deficit during the growing season

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Abstract: The paper presents the yield results of several hybrids of the FAO ripening group 400, 500 and 600. The trial was set up at the Aleksinac location and two production years 2021 and 2022 were monitored. The trial was conducted under dry farming conditions and both production years were exceptionally a small amount of precipitation during the growing season. Based on the obtained results, it was determined that there is a significant difference in the yield of hybrids sown in different terms. In addition, it was determined that there is a difference in the yield of corn hybrids depending on the FAO ripening group.

Keywords: yield, corn, hybrid, vegetation, sowing time.
003 3BP 2023



Ispitivanje uticaja mineralnih i organskih folijarnih đubriva na prinos i kvalitet paprike sorte mišina

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Sažetak: Folijarna primena đubriva ima značajnu ulogu u postizanju većeg prinosa i kvaliteta svih gajenih biljnih vrsta, a posebno u proizvodnji povrća. Ova uloga proizilazi iz osobine folijarnih đubriva da pored obezbedjenja biljaka hranljivim materijama i prirodnim fitohormonima utiču i na povećanje tolerantnosti povrtarskih i drugih gajenih biljaka na ekonomski značajne bolesti. U ovom radu korišćena je sorta paprike Mišina F₁ u tipu kapije namenjena za proizvodnju na otvorenom. Ogled je postavljen po slučajnom blok sistemu u četiri ponavljanja. Merenja su izvedena na po 160 biljaka po svakom preparatu. Rasad paprike je proizveden po sistemu „golih žila“. Paprika je gajena u jednorede trake u sistemu zalivanja „kap po kap“. Ispitivane su dve grupe folijarnih đubriva i to mineralna i organska. Od mineralnih Fitofert kristal peper 11:7:33+4MgO+ME i Wuxsal Super, a od organskih Eko Booster 2 i Wuxal Ascofol. Obavljena su četiri tretmana u dozama koje su preporučene od strane proizvođača ovih đubriva. Berba fiziološki zrelih plodova obavljena je u pet termina počev od 26. avgusta do 20. septembra. Najveća količina fiziološki zrelih plodova ubrana je u četvrtoj berbi. Od mineralnih đubriva bolji efekat na prinos ispoljio je preparat Fitofert kristal peper 11:7:33+4MgO+ME, a od organskih Wuxal Ascofol. Od svih ispitivanih folijarnih đubriva najbolji efekat na prinos paprike ispoljio je preparat Fitofert kristal peper 11:7:33+4MgO+ME.

Ključne reči: folijarna đubriva, organska i mineralna, paprika
004 3BP 2023



Investigation of the influence of mineral and organic foliar fertilizers on the yield and quality of the Mišina pepper variety

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Abstract: Foliar application of fertilizers plays a significant role in achieving higher yield and quality of all cultivated plant species, especially in vegetable production. This role stems from the property of foliar fertilizers that, in addition to providing plants with nutrients and natural phytohormones, they also increase the tolerance of vegetable and other cultivated plants to economically significant diseases. In this work, the Mišina F1 pepper variety in the gate type intended for outdoor production was used. The experiment was set up in a randomized block system with four replications. Measurements were performed on 160 plants for each preparation. Pepper seedlings were produced using the "bare veins" system. Peppers were grown in single-row strips in a drip irrigation system. Two groups of foliar fertilizers, mineral and organic, were tested. From mineral Fitofert crystal pepper 11:7:33+4MgO+ME and Wuxsal Super, and from organic Eko Booster 2 and Wuxal Ascofol. Four treatments were carried out in doses recommended by the producers of these fertilizers. Physiologically ripe fruits were harvested in five periods starting from August 26 to September 20. The largest amount of physiologically ripe fruits was harvested in the fourth harvest. Of the mineral fertilizers, the preparation Fitofert crystal pepper 11:7:33+4MgO+ME showed a better effect on the yield, and of the organic Wuxal Ascofol. Of all tested foliar fertilizers, the preparation Fitofert crystal pepper 11:7:33+4MgO+ME showed the best effect on pepper yield.

Keywords: Foliar fertilizers, organic and mineral, pepper
004 3BP 2023



Dijagnostika zemljišta Topličkog okruga kao edafskog faktora biljne proizvodnje

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Sažetak: U radu su prikazani rezultati ispitivanja hemijskih i fizičkih osobina zemljišta, vršena u akreditovanoj laboratoriji Odseka za poljoprivredno-pehrambene studije u Prokuplju, 2020. godini na 30 prosečnih uzoraka zemljišta i 2021. godini na 30 prosečnih uzoraka zemljišta. Od hemijskih osobina analizirani su: pH vrednosti u H₂O i u 1M KCl-u, humus metodom Kotzmanna, ukupni azot računski iz humusa, lakopristupačni kalijum i fosfor AL metodom po Egner-Riehm-u, a sadržaj CaCO₃ je određen Šajblerovim kalcimetrom. Analizirane su fizičke osobine: sadržaj vode u obliku masene frakcije u zemljištu-gravimetrijska metoda, (SRPS ISO 11465:2002) i mehanički sastav zemljišta pipet metodom uz pripremu uzoraka sa natrijum-pirofosfatom i klasifikacijom teksturnih klasa po ISSS, Baize (1993). Rezultati plodnosti zemljišta na različitim lokacijama u Topličkom okrugu, pokazuju da su ispitivana zemljišta jako kisele do slabo kisele reakcije u H₂O i kisele do neutralne reakcije u 1M KCl-u, slabog do srednjeg sadržaja humusa i ukupnog azota i slabo karbonata na svim analiziranim zasadima. Zemljišta su optimalne obezbeđenosti lakopristupačnim kalijumom i niske obezbeđenosti lakopristupačnim fosforom. Sadržaj vode u obliku masene frakcije u zemljištu služi za prevođenje rezultata vazdušno suvih uzoraka u rezultat izražen na masu suvog zemljišta. U analiziranim zemljištima, po teksturnim klasama dominiraju glinaste ilovače, ilovače i lake glinuše.

Ključne reči: Hemijske i fizičke osobine zemljišta, teksturne klase, Toplički okrug. 005 3BP 2023



The diagnostics of the Toplica district soil as an edaphic factor of plant production

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Abstract: The paper presents the results of testing the chemical and physical properties of soil, performed in the accredited laboratory of the Department of Agriculture and Food Technology in Prokuplje, in 2020. on 30 average soil samples and in 2021. on 30 average soil samples. Chemical properties that were analyzed are: pH values in H₂O and in 1M KCl, humus by Kotzmann method, total nitrogen calculated from humus, readily available potassium and phosphorus AL by Egner-Riehm method, and CaCO₃ content was determined by Schäubler calcimeter. Physical properties were analyzed: water content in the form of mass fraction in soil-gravimetric method (SRPS ISO 11465:2002) and mechanical composition of soil by pipette method with the preparation of samples with sodium pyrophosphate and classification of texture classes according to ISSS, Baize (1993). The results of soil fertility at different locations in Toplica district show that the examined soils are very acidic to weakly acidic reaction in H₂O and acidic to neutral reaction in 1M KCl, low to medium content of humus and total nitrogen and weakly carbonate in all analyzed plantations. The soils are optimally supplied with easily accessible potassium and low provided with easily accessible phosphorus. The water content in the form of mass fraction in the soil is used to translate the results of air-dry samples into the result expressed on the mass of dry soil. In the analyzed soils, clay loams, loams and light loams dominate by texture classes.

Keywords: Chemical and physical properties of soil, texture classes, Toplica district.
005 3BP 2023



Primena biopesticida u organskoj poljoprivredi

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Sažetak: Zaštita bilja u organskoj poljoprivredi zasniva se na principima organske zaštite bilja koja podrazumeva korišćenje svih raspoloživih preventivnih i dozvoljenih bioloških mera. U ovom radu su, pored preventivnih mera, posebno obrađene biološke mere zaštite biljaka od štetočina i patogenih mikroorganizama. Prikazane su osnovne karakteristike biofungicida i bioinsekticida koji su registovani i imaju dozvolu za primenu u organskoj poljoprivredi na teritoriji RS. Obrađeni su od biofungicida: Ekstrasol, Aurum B, Polyversum, Vintec, Fuzarix, Erwix, Cerix, Timorex Gold. Bioinsekticidi: Foray 48 B, Lepinox plus, Carpovirusine EVO 2, Madex Twin. Detaljno su opisane aktivne materije, način delovanja, spektar delovanja, preporučene doze, karence i radne karence.

Ključne reči: Organska poljoprivreda, zaštita bilja, biološke mere, biofungicidi, bioinsekticidi.

006 3BP 2023



Application of biopesticides in organic agriculture

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Abstract: Plant protection in organic agriculture is based on the principles of organic plant protection. It implies the use of all available preventive and permitted biological measures. In addition to preventive measures, this paper provides clear and detailed insight into biological measures relating to the protection of plants against pests and pathogenic microorganisms. Furthermore, the paper presents basic characteristics of biofungicides and bioinsecticides registered and licensed for use in organic agriculture on the territory of the RS. The following biofungicides are discussed: Ekstrasol, Aurum B, Polyversum, Vintec, Fuzarix, Erwix, Cerix, Timorex Gold. Bioinsecticides: Foray 48 B, Lepinox plus, Carpovirusine EVO 2, Madex Twin. The active substances, mode of action, spectrum of action, recommended doses, waiting periods and working periods are described in detail.

Keywords: Organic agriculture, plant protection, biological measures, biofungicides, bioinsecticides.
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Analiza procesa proizvodnje smilja (*Helichrysum italicum* (Roth) G.Don.), kompanije Ekoplantaža u Tamnjanici

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Sažetak: U ovom radu je opisana analiza procesa proizvodnje smilja kompanije Ekoplantaža u Tamnjanici. Prezentovane su sve hemijske, morfološke i fiziološke karakteristike i ekološki faktori. Analizirani su zemljišni uslovi i vrste agrotehničkih mera, kao i njihova usaglašenost sa principima organske proizvodnje. Za proizvodnju su obezbeđene sertifikovane sadnice od renomiranog stranog dobavljača. Posebna pažnja posvećena je merama suzbijanja bolesti. Cilj rada je osavremenjavanje proizvodnje, kako bi se postigli što bolji prinosi, prerada i destiliranja smilja za dobijanje ulja. Rezultati su pokazali da je izbor lokacije za proizvodnju u sistemu organske proizvodnje dobar, agroekološki faktori su povoljni za gajenje, primenjene mere nege su u skladu sa principima organske proizvodnje, suzbijanje korova u zasadu se obavlja mehanički, đubrenje se obavlja organskim peletiranim đubrivima. Ovaj rad sadrži originalne fotografije, te specifičan pristup prilikom rada, sve sa ciljem da se olakša razumevanje materije i doprinese vizuelnoj edukaciji njenih korisnika. Rezultati dobijeni u ovom radu koristiće unapređenju tehnologije proizvodnje smilja.

Ključne reči: smilje, analiza, organska proizvodnja, nega, đubrenje, zaštita, berba.
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Analysis of the production process of *Helichrysum (Helichrysum italicum (Roth) G. Don.)* in the Ecoplantage company in Tamnjanica

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Abstract: This paper describes the analysis of the immortelle production process of the Ekoplantaža company in Tanjanica. All chemical, morphological and physiological characteristics and ecological factors are presented. Soil conditions and types of agrotechnical measures were analyzed, as well as their compliance with the principles of organic production. Certified seedlings from a reputable foreign supplier are provided for the product. Special attention is paid to disease control measures. The aim of the work is to modernize the production, in order to achieve the best possible yields, processing and distillation of immortelle to obtain oil. The results showed that the choice of location for production in the organic production system is good, agroecological factors are favorable for cultivation, applied care measures are in accordance with the principles of organic production, weed control in the plantation is done mechanically, fertilization is done with organic pelleted fertilizers. This work contains original photographs, and a specific approach when working, all with the aim of facilitating the understanding of the material and contributing to the visual education of its users. The results obtained in this work will benefit the improvement of immortelle production technology.

Keywords: *Helichrysum*, analysis, organic production, care, fertilization, protection, harvest.

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Tekstualni konektori za nabranje u naučnoistraživačkim radovima iz oblasti poljoprivrede na engleskom jeziku

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Sažetak: Predmet ovog rada je upotreba tekstualnih konektora za nabranje u naučnoistraživačkim radovima iz oblasti poljoprivrede na engleskom i srpskom jeziku. Naime, smatra se da kulturni prostor sa kog autor potiče ima uticaja na način njegovog pisanog izražavanja na stranom jeziku, čak i onda kada se radi o naučnoistraživačkim publikacijama koje se odlikuju svojim specifičnim stilom. Ovom prilikom učinjen je pokušaj da se na korpusu naučnoistraživačkih radova iz oblasti poljoprivrede na engleskom i srpskom jeziku utvrdi da li taj uticaj postoji i koliki je njegov intenzitet. Analizirani su radovi koje su pisali srpski autori na srpskom jeziku, zatim radovi angloameričkih autora na engleskom jeziku i radovi srpskih autora na engleskom jeziku. Kao glavni parametar za utvrđivanje stilskih razlika u načinu pisanja data je analiza tekstualnih konektora za nabranje. Dobijeni rezultati ukazuju na to da srpski autori još uvek pišu naučnoistraživačke radove na engleskom pod uticajem svog maternjeg jezika, ali taj uticaj nije veliki i mogao bi se dodatno smanjiti ukoliko bi se akademskom pisanju posvetilo više pažnje u našem obrazovnom sistemu.

Ključne reči: tekstualni konektori, engleski, srpski, naučnoistraživački radovi, poljoprivreda.
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Enumerative textual connectors in English and Serbian scientific research articles in the field of agriculture

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Abstract: The subject of this paper is the use of text connectors for enumeration in scientific research papers in the field of agriculture in English and Serbian. Namely, it is considered that the cultural space from which the author originates has an influence on the way of his written expression in a foreign language, even when it comes to scientific research publications that are distinguished by their specific style. On this occasion, an attempt was made to determine whether this influence exists and what its intensity is based on the corpus of scientific research papers in the field of agriculture in English and Serbian. The works written by Serbian authors in the Serbian language, then the works of Anglo-American authors in the English language and the works of Serbian authors in the English language were analyzed. As the main parameter for determining stylistic differences in the way of writing, the analysis of text connectors for enumeration is given. The obtained results indicate that Serbian authors still write scientific research papers in English under the influence of their mother tongue, but this influence is not great and could be further reduced if more attention was paid to academic writing in our educational system.

Keywords: text connectors, English, Serbian, scientific research works, agriculture.
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Efikasnost fungicida u suzbijanju bolesti kupine sa posebnim osvrtom na žutu rđu

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Sažetak: Kupina je kao voćna vrsta, a naročito u našoj zemlji, veoma mlada kultura. Plodovi kupine su pogodni i veoma traženi za raznovrsnu domaću i industrijsku preradu, duboko zamrzavanje i za potrošnju u svežem stanju. Pošto u našoj zemlji nema dovoljno preparata za suzbijanje rđe kupine u ovom radu ispitano je dejstvo i efikasnost preparata na bazi bakra (bakar hidroksid), kaptana i aktivnih materija iz grupe triazola (tebukonazol, difenokonazol) koje se preporučuju u novije vreme za suzbijanje rđe kupine. Ispitivanje efikasnosti fungicida izvedeno je tokom 2022. godine na komercijalnom zasadu kupine sorta Tornfree u selu Cvetojevac. Efikasnost ispitivanih fungicida izračunata je po formuli Abbott-a. Na osnovu rezultata ispitivanja efikasnosti fungicida kao i analize agrometeoroloških podataka može se zaključiti da je 2022. godina bila povoljna za pojavu i širenje žute rđe kupine. Najveći problem u suzbijanju žute rđe na kupini predstavljaju proizvođači koji ili ne tretiraju svoje zasade ili to rade nasumično, sredstvima za koja tvrde da su efikasna u suzbijanju ove bolesti. Najveća efikasnost u suzbijanju rđe kupine postigla bi se podizanjem svesti o značaju kvalitetne i pravovremene zaštite kupine.

Ključne reči: kupina, efikasnost, fungicidi, žuta rđa
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Efficiency of fungicides in suppression of blackberry plant diseases with special reference to yellow rust

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Abstract: Blackberry is, as a fruit species, especially in our country, a very young culture. Blackberry fruits are suitable and highly sought after for various domestic and industrial processing, deep freezing and fresh consumption. Since there are no enough active substances for blackberry rust control in our country, this paper examined the effect and effectiveness of preparations based on copper (Copper hydroxide), captan and active substances from the triazole group (tebukonazole, difenconazole) that are recommended in recent times for rust control blackberries. The test of the effectiveness of the fungicide was carried out in 2022. on a commercial blackberry plantation of the Tornfree variety in the village of Cvetojevac. The effectiveness of tested fungicides was calculated according to Abbott's formula. Based on the results of testing the effectiveness of fungicides as well as the analysis of agrometeorological data, it can be concluded that 2022. was favorable for the appearance and spread of blackberry yellow rust. The biggest problem in suppressing yellow rust on blackberries is represented by producers who either do not treat their plantations or do so randomly, with means that they claim are effective in suppressing this disease. The greatest effectiveness in suppressing blackberry rust would be achieved by raising awareness of the importance of quality and timely protection of blackberries.

Keywords: blackberry, efficiency, fungicides, yellow rust
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Monitoring nad bakterijom *Acidovorax citrulli* na lubenici

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Sažetak: Biljne vrste familije *Cucurbitacea* (krastavac, lubenica, dinja, tikvica) predstavljaju jedne od osnovnih povrtarskih useva, jer pored upotrebe u svežem stanju, imaju i značajnu primenu u prehrambenoj i farmaceutskoj industriji. *Acidovorax citrulli* prouzrokuje bakterioznu mrljavost plodova lubenice, može da izazove značajne ekonomske gubitke u proizvodnji lubenica, koji mogu biti i do 90%. Prvi put je detektovana 1989. godine na Floridi, Južnoj Karolini i Indijani u Sjedinjenim Američkim Državama. Slični simptomi su opisani još 1960. godine ali nije moglo sa sigurnošću da se tvrdi da je reč o ovoj bakteriji. Bakteriozna mrljavost plodova lubenice (*Acidovorax citrulli*) u našoj zemlji se nalazi na listi A1 karantinskih štetnih organizama. U Srbiji prvi put se registruje u proizvodnji lubenice u regionu Srema i Bačke u 2014. godini a zatim i u 2016. godini. Kako bi se ta pojava zaustavila jer može da ima veoma opasne posledice po proizvodnju lubenice u Sremu, potrebno je da se alarmiraju sve službe biljnog karantina. Pre svega granična fitosanitarna inspekcija koja vrši kontrolu uvoza semena, potom i fitosanitarna inspekcija na terenu koja prati i vrši nadzor u proizvodnji lubenice u kritičnom području.

Ključne reči: lubenice, bakteriozna mrljavost, karantinska štetočina, program zaštite, praćenje
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Monitoring of *Acidovorax citrulli* bacteria on watermelon plants

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Abstract: Plant species of the *Cucurbitaceae* family (cucumber, watermelon, cantaloupe, and squash) represent one of the basic vegetable crops because, in addition to being used fresh, they also have significant applications in the food and pharmaceutical industries. *Acidovorax citrulli*, the cause of bacterial spotting in watermelon fruits, can cause significant economic losses in watermelon production, which can be up to 90%. It was first detected in 1989 in Florida, South Carolina, and Indiana in the United States of America. Similar symptoms were described as early as 1960, but it could not be said with certainty that it was this bacteria. Bacterial spotting of watermelon fruits (*Acidovorax citrulli*) in our country is on the list of A1 quarantine harmful organisms. In Serbia, it was registered for the first time in the production of watermelon in the regions of Srem and Bačka in 2014 and then in 2016. In order to stop this phenomenon because it can have very dangerous consequences for watermelon production in Srem, it is necessary to alert all plant quarantine services. First of all, the border phytosanitary inspection that controls the import of seeds, then the field phytosanitary inspection that monitors and supervises the production of watermelon in the critical area.

Keywords: watermelons, bacterial spotting, quarantine pests, protection programs, monitoring

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Suzbijanje *Capnodis Tenebrionis L.* upotrebom folije u zasadima višnje

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Sažetak: Godinama unazad u zasadima višanja širom Srbije javlja se problem sušenja stabala usled pojave i prenamnožavanja žilogriza. Povoljni uslovi za razvoj ove štetočine u pogledu dugih sušnih perioda doveli su do njegovog prenamnožavanja. *Capnodis tenebrionis L.* može biti ključna štetočina u nekim oblastima i uslovima uzgoja, posebno u organskim voćnjacima i/ili u sušnim i semiaridnim sredinama, gde su biljke podložne destruktivnom delovanju larvi na korenje i moraju se primeniti strategije kontrole. Odrasle jedinke se hrane korom izdanaka, pupoljaka i lisnih peteljki i obično više vole oslabljen i bolesna stabla nego bujna. Ove odrasle jedinke mogu ozbiljno da oštete mlada stabla u rasadnicima, voćnjacima i plastenicima, ali retko pogađaju uspostavljene, dobro kultivisane i navodnjavane voćnjake. Ženke polažu jaja u pukotine suvog zemljišta ili ispod kamenja, blizu drveća i ređe na kori. Novorođene larve puze unutar tla, prodiru u korenje i hrane se kortikalnim i subkortikalnim tkivom korena. Cilj ovog rada ogleda se u određivanju mogućnosti primene novih mehaničkih mera u suzbijanju ove štetočine. Sprovedeno istraživanje obihvatilo je postavljanje folije prilikom zasnivanja zasada višanja na površini od dva hektara. Ukupnu površinu čine tri pojedinačne parcele. Zasadi su zasnovani 2020. godine. Folija širine jednog metra postavljena je na celoj dužini reda. Dodatno oko samog stabla postavljena je još jedna folija dimenzija 1mx1m. U svrhu ovog istraživanja odabrana je folija debljine 70 µm. Nakon postavljanja folija je prekrivena slojem zemlje prosečne debljine 5-8 cm. Na ovakav način sprečeno je propadanje folije usled dejstva vremenskih uslova. Kako bi se obezbedilo adekvatno praćenje i kontrola primenjene metode mehaničke zaštite u svakom od zasada ostavljena su po dva reda na kojima nije postavljena folija. Vizuelnom kontrolom od dana zasnivanja zasada do danas utvrđeno je znatno manje sušenje stabala u redovima pod folijom za razliku od redova koji nisu pod folijom. Kod osušenih stabala redova koji nisu pod folijom uočeno je prisustvo larve *Capnodis tenebrionis L.* u korenovom vratu, što nije bio slučaj kod stabala u redovima pod folijom.

Ključne reči: *Capnodis tenebrionis L.*, folija, mehanička zaštita
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Using foil for suppression of *Capnodis Tenebrionis* in cherry plantations

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Abstract: Years ago, in cherry orchards throughout Serbia, there was a problem of tree drying due to the appearance and proliferation of woodworm. Favorable conditions for the development of this pest in terms of long dry periods led to its proliferation. *Capnodis tenebrionis* L. can be a key pest in some areas and cultivation conditions, particularly in organic orchards and/or in arid and semiarid environments, where plants are susceptible to the destructive action of larvae on roots and control strategies have to be applied. Adult beetles feed on the bark of shoots, buds, and leaf petioles, and usually prefer weakened and diseased trees rather than vigorous ones. These adults can seriously damage young trees in nurseries, orchards and greenhouses, but rarely affect established, well-cultivated and irrigated fruit-bearing orchards. Females lay eggs in the cracks of dry soil or under stones, close to trees and rarely on the bark. Neonate larvae crawl within the soil, penetrate the roots and feed on the root cortical and subcortical tissues. The aim of this work is to determine the possibility of applying new mechanical measures to control this pest. The research carried out covered the installation of foil during the establishment of cherry plantations on an area of two hectares. The total area consists of three individual plots. The plantings were established in 2020. One meter wide foil was placed along the entire length of the row. In addition, another 1mx1m foil was placed around the tree itself. For the purpose of this research, a foil with a thickness of 70 µm was chosen. After installation, the foil is covered with a layer of soil with an average thickness of 5-8 cm. In this way, the deterioration of the foil due to weather conditions is prevented. In order to ensure adequate monitoring and control of the applied method of mechanical protection, in each of the plantings, two rows were left on which no foil was placed. A visual inspection from the day the plantings were established to the present day revealed significantly less drying of the trees in the rows under foil, in contrast to the rows that are not under foil. The presence of *Capnodis tenebrionis* L. larvae in the root neck was observed in the dried trees of rows that were not covered with foil, which was not the case with trees in rows under foil.

Keywords: *Capnodis tenebrionis* L., foil, mechanical protection

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Redukcija broja hemijskih tretmana u kontroli *Rhagoletis cerasi* kao način zaštite životne sredine

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Sažetak: U sveobuhvatnoj proizvodnji voća kontrola brojnosti štetočina, pojave patogenih bolesti kao i njihovo suzbijanje zauzimaju značajno mesto. Adekvatno poznavanje i praćenje pojave štetočina i patogena omogućava pravovremeno reagovanje i sprovođenje mera hemijske zaštite. Međutim, prisustvo sve većeg broja štetočina i patogena zahteva stalno praćenje njihove brojnosti i klimatskih uslova za njihov razvoj, radi preuzimanja određenih mera zaštite. U skorije vreme, sa ciljem proizvodnje zdrave hrane i zaštite životne sredine, razvijene su različite metode zaštite. Sprovedeno istraživanje obuhvatalo je praćenje pojave i leta *Rhagoletis cerasi*. Na osnovu dobijenih podataka, suzbijanje ovog insekata sprovedeno je primenom novih tehnologija, koje omogućavaju smanjenje upotrebe pesticida.

Ključne reči: *Rhagoletis cerasi*, praćenje leta, žute klopke
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Reducing the number of chemical treatments in the control of *Rhagoletis cerasi* as a way of protecting the environment

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Abstract: In the overall fruit production, pest control occupies a special place. Knowing the biological properties of pests and their presence, chemical control measures have been most commonly applied, which exhibit high efficacy if applied within optimal timelines. However, the development of a large number of pests and pathogens requires constant monitoring of their abundance and climatic conditions for their development, in order to take over certain protection measures. More recently, with the aim of producing healthy foods and protecting the environment, different methods have been developed. The conducted research included monitoring of the occurrence and flight of the *Rhagoletis cerasi*. Based on the obtained data, the control of this insect was carried out using new technologies, which enable the reduction of pesticide use.

Keywords: *Rhagoletis cerasi*, flight monitoring, yellow traps
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Ekonomski značajne mikoze na starim sortama jabuke u Topličkom i Nišavskom okrugu

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Sažetak: Fitopatogene gljive su svake godine prisutne u zasadima jabuke gde, u zavisnosti od vremenskih uslova i osetljivosti sorte, mogu pričiniti značajne štete koje se ogledaju u smanjenju prinosa, pogoršanju kvaliteta plodova i smanjenoj vitalnosti stabla. Sorte jabuke koje se koriste u organskoj poljoprivredi treba da budu što je više moguće otpornije na prouzrokovalače peplnice (*Podosphaera leucotricha*), čađave pegavosti lista i krastavosti plodova (*Venturia inaequalis*) i sušenje cvetova, grančica i trulež plodova jabučastih voćaka (*Monilinia fructigena*). Ispitivanja su vršena na dva lokaliteta tokom vegetacije 2022. godine. Pregledani su listovi i plodovi na starim sortama jabuka Šarunki i Kožari na području topličkog i nišavskog okruga kako bi utvrdili koje od spomenutih fitopatogenih gljiva ostvaruju infekciju na ovim sortama i u kom inteztetu. Na osnovu prikupljenih podataka utvrđeno je da plodovi Kožare na kojima je zabeležen jači napad jabukinog smotavca (*Cydia pomonella*) koji izaziva cvrljivost, su ispoljili veću osetljivost na patogena *Monilinia fructigena*. Sorte Šarunka i Kožara ispoljile su visoku otpornost na ekonomski značajne mikoze. Ove sorte imaju skromne zahteve prema agrotehničkim i pomotehničkim merama. Redovne su rodnosti, plodovi su im visokog kvaliteta, pogodne su za transport i čuvanje. Upotreba zaštitnih sredstava svedena je na minimum, pa kao takve idealne su za gajenje u organskoj proizvodnji.

Ključne reči: mikoze, stare sorte, Šarunka, Kožara
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Economically significant mycoses on old apple varieties in Toplica and Nišava districts

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Abstract: Phytopathogenic fungi are present in apple orchards every year, where, depending on the weather conditions and the sensitivity of the variety, they can cause significant damage, which is reflected in the reduction of yield, deterioration of fruit quality and reduced vitality of the tree. Apple varieties used in organic farming should be as resistant as possible to powdery mildew (*Podosphaera leucotricha*), sooty leaf spot and fruit scab (*Venturia inaequalis*) and drying of flowers, twigs and fruit rot of apple fruit trees (*Moniligen*). Tests were conducted at two locations during the 2022 growing season. The leaves and fruits of the old apple varieties Šarunki and Kožari in the area of Toplice and Nišava districts were examined in order to determine which of the mentioned phytopathogenic fungi infect these varieties and in what intensity. Based on the collected data, it was determined that Kožara fruit, which had a stronger attack by the apple curler (*Cidia pomonella*), which causes ringworm, showed greater sensitivity to the pathogen *Monilinia fructigena*. Varieties Šarunka and Kožara showed high resistance to economically significant mycoses. These varieties have modest requirements for agrotechnical and auxiliary measures. They have regular fertility, their fruits are of high quality, they are suitable for transport and storage. The use of protective agents is reduced to a minimum, so as such they are ideal for cultivation in organic production.

Key words: mycoses, old cultivars, Šarunka, Kožara
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Ispitivanje uticaja različitih sredstava na brojnost krompirove zlatice

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Sažetak: Krompirova zlatica (*Leptinotarsa decemlineata* Say) je insekt iz porodice zlatice (*Chrysomelidae*), poreklom sa zapada Severne Amerike. Njena primarna biljka domaćin je krompir (*Solanum tuberosum* L.), a sekundarne paradajz (*Solanum lycopersicum* L.), plavi patlidžan (*Lycopersicon melongena* L.) i duvan (*Nicotiana tabacum* L.). Glavni problemi u kontroli i suzbijanju krompirove zlatice vezani su za brojne tretmane, izraziti razvoj rezistencija i mali broj prirodnih neprijatelja. Cilj istraživanja bio je utvrđivanje uticaja različitih supstanci na suzbijanje krompirove zlatice. Za potrebe ovog rada posađeno je pet eksperimentalnih polja sa po 25 biljaka *Solanum tuberosum* L. Razmak između ovih površina je bio 200 cm. Nultog dana prebrojana su imaga na svim parcelama. Na polju 1, postavljenom kao kontrola, uočeno je 187 imaga *Leptinotarsa decemlineata* Say. Na biljkama polja 2 bilo je prisutno 169 imaga, biljke su tretirane insekticidom a.m. spinosad (0,5-1 ml/100 m²). Na biljkama polja 3, izbrojano je 172 imaga. Polje je tretirano rastvorom polena cveta zove (*Sambucus nigra* L.). Polje 4 tretirano je pre pojave imaga, rastvorom polena *Sambucus nigra* L., tako da je prisustvo ove štetočine izostalo. Na biljkama polja 5 zabeleženo je prisustvo 176 imaga *Leptinotarsa decemlineata* Say. Na ovom oglednom prostoru obavljeno je malčiranje osušenom drogom koprive (*Urtica dioica* L.) u cilju sprečavanja migracije odraslih jedinki u zemlju i do ostalih oglednih polja. Broj jedinki praćen je u četiri navrata u razmaku od po tri dana. Rezultati su pokazali da se najmanji broj imaga razvio na polju 4, prva imaga pojavila su se tek 12-og dana i to svega 10 jedinki na polju. Malčiranje koprivom dalo je slab, ali konstantan pad broja jedinki do 35,23% devetog dana. Na polju 2 zapažen je najintenzivniji pad, do šestog dana na čak 5,92%, nakon čega sledi lagani porast do 14,79% prisutnosti imaga. Na osnovu svega iznetog zaključili smo da prirodna sredstva mogu poslužiti za tretiranje krompirove zlatice i da dalja istraživanja treba usmeriti u tom pravcu.

Ključne reči: *Leptinotarsa decemlineata* Say, *Solanum tuberosum* L., štetočina, suzbijanje.

006 5ZB 2023



Examining the effect of different agents on the population of potato beetles

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Abstract: The potato beetle (*Leptinotarsa decemlineata* Say) is an insect from the family of beetles (*Chrysomelidae*), native to North American West. Its primary host plant is potato (*Solanum tuberosum* L.), whereas secondary host plants are tomato (*Solanum lycopersicum* L.), eggplant (*Lycopersicon melongena* L.) and tobacco (*Nicotiana tabacum* L.). The main problems in the control and suppression of the population of potato beetles are related to numerous treatments, increased resistance to treatments and few natural predators. The aim of the research was to determine the influence of various substances on the control of potato beetles population. For the purposes of this work, five experimental fields were planted each with 25 *Solanum tuberosum* L plants. The distance between these areas was 200 cm. On the day zero, all the insects in the imago stage were counted in all plots. In field 1, set as a control field, 187 *Leptinotarsa decemlineata* Say imagos were observed. 169 imagos were present on the plants of field 2, and the plants were treated with insecticide a.m. spinosad (0.5-1 ml/100 m²). 172 imagoes were observed on the field 3 plants. The field was treated with elderberry pollen solution (*Sambucus nigra* L.) . Field 4 was treated with *Sambucus nigra* L. pollen solution before the emergence of imago, so there was no presence of this pest. The presence of 176 *Leptinotarsa decemlineata* Say imagos was recorded on the field 5 plants. in this experimental area, mulching with dried nettle drug (*Urtica dioica* L.) was applied in order to prevent the migration of adult insects into the ground and to the other experimental fields. The number of individuals was monitored on four occasions with an interval of three days. The results showed that the smallest number of imagos developed in field 4, the first imagos having appeared only on the 12th day and only 10 insects per field. Mulching with nettle produced a slight but constant decrease in the number of insects up to 35.23% on the ninth day. In field 2, the most intense drop in the number of insects was observed, up to as much as 5.92% on the sixth day, followed by a slight increase of the presence of imago up to 14.79%. Based on all the evidence presented, one can conclude that natural agents can be used to treat potato plants against the potato beetle and that further research should be aimed in that direction.

Keywords: *Leptinotarsa decemlineata* Say, *Solanum tuberosum* L., pest, control.
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Uloga strategijskog menadžmenta u motivisanju zaposlenih u prehrambenoj industriji

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Sažetak: U radu se ispituje uloga strategijskog menadžmenta u motivisanju zaposlenih u prehrambenoj industriji u Republici Srbiji. Istraživanje je sprovedeno na uzorku od 137 zaposlenih u konditorskim preduzećima. Uticaj strategijskog menadžmenta u motivisanju zaposlenih ispitan je kroz tri dimenzije strategijskog menadžmenta: leaderski stil, preduzetnička orijentacija i promovisanje održivog ponašanja. Rezultati istraživanja ukazuju da su značajni faktori leaderski stil i preduzetnička orijentacija, koja se ogleda u podršci i samostalnosti zaposlenih u radu.

Ključne reči: Strategijski menadžment, prehrambena industrija, leaderski stil, motivacija zaposlenih, preduzetnička orijentacija, održivo ponašanje
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The role of strategic management in motivating employees in the food industry

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Abstract: The paper examines the role of strategic management in motivating employees in the food industry in the Republic of Serbia. The research was conducted on a sample of 137 employees in confectionery companies. The impact of strategic management on employee motivation was examined through three dimensions of strategic management: leadership style, entrepreneurial orientation, and promotion of sustainable behaviour. The research results indicate that significant factors are leadership style and entrepreneurial orientation, which are reflected in the support and autonomy of employees in their work.

Keywords: Strategic management, food industry, leadership style, employee motivation, entrepreneurial orientation, sustainable behavior
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Upoređivanje sadržaja vitamina C u sortama jabuka Zukva i Ajdared

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Sažetak: Cilj ovog rada jeste proučavanje i poređenje sadržaja vitamina C u plodovima jabuke sorte Zukva i Ajdared. Određivanje sadržaja askorbinske kiseline (AsA) i redukovanog oblika askorbinske kiseline (DAsA) vršeno je metodom tečne hromatografije visokih performansi (HPLC). Rezultati su izraženi u *mg/100 g* kao ukupna količina TAsA=AsA+DAsA. Prema dobijenim rezultatima, sok ploda jabuke sorte Zukva sadrži 12,9 $\mu\text{g/ml}$ ukupne askorbinske kiseline, što je za oko 60% više u odnosu na jabuku sorte Ajdared gde je u sok ukupna askorbinska kiselina prisutna sa 8,1 $\mu\text{g/ml}$. Zbog pravilne ishrane, što je u danas od izuzetne važnosti, autori su mišljenja da autohtonu sortu Zukva treba što pre vratiti na njeno zasluženno mesto.

Ključne reči: jabuka, *Malus domestica*, vitamin C, HPLC, hrana
002 5PT 2023



Comparison of vitamin C content in Zukva and Idared apple varieties

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Abstract: The aim of this work is to study and compare the content of vitamin C in apple fruits of Zukva and Idared varieties. The determination of the content of ascorbic acid (AsA) and the reduced form of ascorbic acid (DAsA) was performed using the method of high-performance liquid chromatography (HPLC). The results are expressed in *mg/100 g* as the total amount of TAsA=AsA+DAsA. According to the obtained results, the fruit juice of the Zukva apple variety contains 12.9 $\mu\text{g/ml}$ of total ascorbic acid, which is about 60% more compared to the Idared apple variety, where the total ascorbic acid is present in the juice with 8.1 $\mu\text{g/ml}$. Due to proper nutrition, which is extremely important nowadays, the authors are of the opinion that the autochthonous Zukva variety should be returned to its rightful place as soon as possible.

Keywords: apple, *Malus domestica*, vitamin C, HPLC, food
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Određivanje proteina i fizičko-hemijskih parametara u žitaricama za proizvodnju stočne hrane

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Sažetak: Žitarice su najvažniji usevi na svetu. U poređenju sa semenom mahunarki, zrna žitarica sadrže relativno malu količinu proteina, sa prosečno 10–12% suve mase. Ipak, one obezbeđuju tri puta veću količinu proteina za ishranu ljudi i domaćih životinja, u poređenju sa semenom mahunarki. U ovom radu ispitivani su sadržaj sirovih proteina i fizičko-hemijski parametri sorte pšenice NS 40S i hibrida kukuruza ZP 606. Ispitivana pšenica i kukuruz gajeni su tokom dve uzastopne rodne godine. Prva godina bila je sa većom ukupnom količinom padavina i pravilnim rasporedom padavina u toku letnjih meseci, a druga sa manjom ukupnom količinom padavina i sa smanjenom količinom padavina u toku letnjih meseci. Cilj rada bio je određivanje navedenih parametara u zrnu pšenice i kukuruza, proizvedenim u agroekološkom uslovima Topličkog okruga. Sirovi proteini određeni su metodom po Kjeldal-u, pH vrednost je odečena potencimetrijski, a aktivnost vode merena je meračem aktivnosti vode. Sadržaji sirovih proteina u pšenici tokom dve rodne godine iznosili su 10,99% i 11,93%, a u kukuruza 8,49% i 9,11%. pH vrednosti pšenice tokom dve uzastopne godine iznosile su 5,45 i 5,52, a kukuruza 5,72 i 5,82. Aktivnosti vode kod pšenice iznosila su 0,60 i 0,42. Aktivnosti vode kod kukuruza iznosile su 0,67 i 0,56. Prosečni sadržaji proteina i pH vrednosti pšenice i kukuruza koji su gajeni u godini sa većom ukupnom količinom padavina bili su manji, nego u godini sa manjom ukupnom količinom padavina. U godini sa većom ukupnom količinom padavina utvrđene su veće vrednosti aktivnosti vode u pšenici i kukuruza, nego u godini sa manjom ukupnom količinom padavina. Prikazani rezultati istraživanja predstavljaju doprinos boljem vrednovanju ovih sirovina pri njihovoj upotrebi u ishrani domaćih životinja.

Ključne reči: pšenica, kukuruz, stočna hrana, proteini, pH vrednost, aktivnost vode
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Determination of protein content and physico-chemical parameters in cereals used for animal feed production

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Abstract: Cereals are the most important crops in the world. Cereal grains contain relatively little protein compared to legume seeds, with an average of about 10–12% dry wt. Nevertheless, they provide three times higher amount of protein for the humans and livestock nutrition, compared to legume seeds. In this study, crude protein content and physico-chemical parameters of NS 40S wheat genotype and ZP 606 corn hybrid were investigated. The examined wheat and corn were grown during two consecutive crop years. The first year was with a higher total amount of precipitation and a regular distribution of precipitation during the summer months, and the second year with a lower total amount of precipitation and with a reduced amount of precipitation during the summer months. The objective of this study was to determine the mentioned parameters in wheat and corn grains, produced in the agro-ecological conditions of the Toplički district. Crude proteins were determined by the Kjeldahl method, the pH value was determined potentiometrically, and the water activity was measured by water activity meter. The contents of crude proteins in wheat during the two crop years were 10.99% and 11.93%, and in corn 8.49% and 9.11%. The pH values of wheat during two consecutive years were 5.45 and 5.52, and that of corn were 5.72 and 5.82. Water activities in wheat were 0.60 and 0.42. Water activities in corn were 0.67 and 0.56. The average protein contents and pH values of wheat and corn grown in a year with a higher total amount of precipitation were lower than in a year with a lower total amount of precipitation. In a year with a higher total amount of precipitation, higher values of water activity in wheat and corn were determined than in a year with a lower total amount of precipitation. The presented research results represent a contribution to a better evaluation of these raw materials when they are used in the livestock nutrition.

Keywords: wheat, maize, proteins, animal feed, pH value, water activity
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Faktori koji utiču na kvalitet mesa i značaj poštovanja važećih pravilnika i zakona u Republici Srbiji

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Sažetak: Opšte je poznato da način tretiranja životinja pre klanja, transport, veterinarski pregled, način omamljivanja i klanja kao i sam proces zrenja i obrade mesa jesu faktori koji pored vrste i rase u velikoj meri utiču na kvalitet mesa. Higijena je jedan od najznačajnijih faktora koji direktno utiču na bezbednost upotrebe a i sam rok trajanja mesa i proizvoda od mesa. Kako bi se obezbedili što bolji higijenski uslovi, neophodno je poštovanje određenog protokola i procedura odnosno neophodno je organizovati klanje i preradu mesa u skladu sa važećim standardima, pravilnicima i zakonima koji se odnose na tu delatnost. Inspekcija prostorija i procenjivanje uslova pod kojima se meso prerađuje, pakuje, skladišti, transportuje i distribuira su od osnovne važnosti za uvid o sanitarnim uslovima i utvrđivanje izvora mikrobne kontaminacije. Tehnološki procesi koji se koriste u nekoj klanici ili fabrici moraju biti sračunati tako da se uspešno mogu eliminisati i smanjiti sve vrste kontaminacije mesa i gotovih proizvoda. Potrebno je da se utvrdi da li proizvođač preduzima sve mere kako bi proizveo kvalitetne i zdrave namirnice. Glavni izvori kontaminacije mesa za vreme klanja su bakterije koje se nalaze po koži životinje, papcima i kopitama i koje potiču fekalne flore. Najvažnije među njima su *Enterobacteriaceae*, *Micrococcaceae*, *Lactiobacillaceae*, neke vrste *Bacillus* i *Clostridium*. Psihrotrofi, obično, potiču iz drugih izvora. Takođe, čovek i njegov alat, pribor i predmeti mogu biti izvor kontaminacije. Tako se najčešće prenose mikrokoke, zatim, laktobacili i enterokoke, vrste *Bacillus*, *Pseudomonas* i drugi psihrotrofni mikroorganizmi, salmonele i šigele, *Streptococcus pyogenes* i *Staphylococcus aureus*. U ovom radu izvršena je analiza kriterijuma bezbednosti i protokola klanja krupne stoke prema važećim najnovijem zakonima i pravilnicima u Republici Srbiji u cilju evidentiranja faktora koji značajno utiču na kvalitet mesa. Takođe, dat je primer i prikazani su rezultati mikrobiološkog ispitivanja opreme i površina u klanicama prema važećem standardu.

Ključne reči: kvalitet mesa, mikrobiološka bezbednost, protokol klanja
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Factors affecting the quality of meat and the importance of compliance with relevant laws and regulations in the Republic of Serbia

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Abstract: Generally, it is known that the animal's treated way before slaughter, transport, veterinarian inspection, the method of stunning and slaughtering as well as the ripening and processing of meat are factors that, in addition to species and breed, mostly affect the quality of meat. Hygiene is one of the most important factor that directly affect the safety of use and the shelf life of meat and meat products. To ensure the best hygienic conditions, it is necessary to observe certain protocols and procedures, and it is necessary to organize the slaughtering and processing of meat by valid standards, regulations, and laws related to that activity. The most important is the inspection of premises and assessment of conditions under which meat is processed, packed, stored, transported, and distributed. Technological processes used in a slaughterhouse or factory must be calculated so that they can successfully eliminate and reduce all types of contamination of meat and meat products. The main sources of meat contamination during slaughter are bacteria found on the animal's skin and hooves originating from fecal flora. The most important are *Enterobacteriaceae*, *Micrococcaceae*, *Lactiobacillaceae*, some species of *Bacillus*, and *Clostridium*. Also, man and his tools, accessories, and objects can be a source of contamination. This is how micrococci are most often transmitted, followed by lactobacilli and enterococci, species of *Bacillus*, *Pseudomonas*, and other psychrotrophic microorganisms, salmonella and shigella, *Streptococcus pyogenes* and *Staphylococcus aureus*. In this paper, an analysis of safety criteria and protocols for slaughtering large cattle was performed according to the latest valid laws and regulations in the Republic of Serbia to record the factors that significantly affect the quality of meat. Also, the results of microbiological testing of equipment and surfaces in slaughterhouses according to the current standard are shown as an example.

Keywords: mear quality, microbiological safety, slaughter protocol
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Bakterije mlečne kiseline u tradicionalnim vrstama sireva

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Sažetak: U Srbiji su na nacionalnom nivou zaštićeni Krivovirski kačkavalj, Homoljski ovčiji sir, Homoljski kozji sir, Homoljski kravliji sir, Staroplaninski kačkavalj, Sjenički ovčiji sir, Sjenički kravliji sir i Pirotski kačkavalj od kravljeg mleka. Svaki od nabrojanih sireva poseduje bogatu i atraktivnu istoriju i predstavlja potencijalni brend i polugu za aktivaciju lokalnih ljudskih i materijalnih resursa i unapređenje života u sredinama u kojima se proizvode. Autohtoni sirevi se proizvode uglavnom od svežeg nepasterizovanog mleka, njihova faza zrenja kraće traje i oni imaju izraženiji ukus i specifičnu teksturu. Proizvodni kapaciteti su takvi da se proizvode u malim serijama. Treba napomenuti da potrošači pogotovo inostrani sve više brinu o kvalitetu hrane koju koriste tako da proizvodnja autohtonih vrsta sireva po određenim standardima kvaliteta predstavlja razvojnu šansu za proizvođače ovakvih proizvoda. Formiranje senzornih svojstava fermentisanih proizvoda od mleka a naravno i sireva nastaje kao posledica metaboličke aktivnosti prisutne mikrobiote. Zbog toga, specifične karakteristike sireva proizilaze iz jedinstvene mikrobiote koja se uglavnom sastoji od bakterija mlečne kiseline (BMK). Različite vrste tradicionalnih sireva izrađenih od mleka poseduju jedinstvenu i različitu mikrobiotu u zavisnosti od postupka izrade, kao i ekološke karakteristike mesta u kojima su proizvedeni. Posebno, sirevi proizvedeni od nepasterizovanog mleka tradicionalnim postupkom sadrže veoma raznovrsnu i bogatu mikrobiotu. Taj biodiverzitet može se smatrati glavnim faktorom u formiranju tipičnih karakteristika tradicionalnih sireva. BMK izolovane iz naših autohtonih sireva, karakterišu se dobrim tehnološkim svojstvima i sposobnošću formiranja specifičnog ukusa karakterističnog za odgovarajuće vrste sireva. Zbog toga, radi se na standardizovanju proizvodnje autohtonih sireva uz pomoć domaćih starter kultura. U literaturi se mogu naći podaci o definisanim starter kulturama za proizvodnju sireva sa teritorija Zlatara, Žabljaka, Kopaonika i Golije, dok su u perspektivi sirevi sa Stare planina. Na širem području teritorije opštine Pirot vršena su istraživanja različitih vrsta sireva i izolovan je i identifikovan značajan broj BMK.

Gljučne reči: tradicionalni sirevi, bakterije mlečne kiseline, nepasterizovano mleko 005 5PT 2023



Lactic acid bacteria in traditional types of cheese

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Abstract: In Serbia, Krivovir cheese, sheep cheese, goat cheese and cow cheese from Homolje, cheese from Stara planina, sheep cheese and cow cheese from Sjenica and cow cheese from Pirot are protected at the national level. Each of the listed types of cheese has a rich and attractive history and represents a potential brand and leverage for the activation of local human and material resources and the improvement of life in the environments where they are produced. Indigenous cheeses are produced mainly from fresh unpasteurized milk, their ripening phase is shorter and they have a more pronounced taste and specific texture. The production capacities are such that they are produced in small batches. It should be noted that consumers, especially foreign ones, are increasingly concerned about the quality of the food they use, so the production of indigenous types of cheese according to certain quality standards represents a development opportunity for producers of such products. The formation of sensory properties of fermented milk products and, of course, types of cheese is a consequence of the metabolic activity of the present microbiota. Thus, the specific characteristics of cheeses come from a unique microbiota that mainly consists of lactic acid bacteria (LAB). Different types of traditional cheeses made from milk have unique and different microbiota depending on the production process, as well as the ecological characteristics of the places where they are produced. Specially, cheeses produced from unpasteurized milk using the traditional method contain a very diverse and rich microbiota. This biodiversity can be considered the main factor in the formation of the typical characteristics of traditional cheeses. LAB isolated from our autochthonous cheeses are characterized by good technological properties and the ability to form a specific taste characteristic of the respective types of cheese. Furthermore, a lot of work has been done to standardize the production of autochthonous cheeses with the help of domestic starter cultures. In the written documents, we can find data on defined starter cultures for the production of cheeses from the territories of Zlatar, Žabljak, Kopaonik and Golija, while cheeses from Stara planina are very popular. In the wider area of the territory of the municipality of Pirot, research on different types of cheese was carried out and a significant number of LAB was isolated and identified.

Keywords: traditional types of cheese, lactic acid bacteria, unpasteurized milk
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Fiziološka osnova masti mleka kod visokomlečnih krava Holštajn-Frizijske i Simentalske rase

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Sažetak: Masti mleka potiču prvenstveno od mikrobnog varenja ugljenih hidrata u buragu gde nastaju sirćetna, buterna i propionska kiselina i portalnim krvotokom dospevaju u jetru. Masti mleka potiču prevashodno iz nižih masnih kiselina resorbovanih u buragu, ali delom iz masnih kiselina iz krvi. Poseban značaj u sintezi masti mleka ima sirćetna kiselina koja pretežno nastaje digestijom sirovih vlakana iz obroka, ali delom i buterna kiselina koja se u zidu buraga prevodi u BHBA (beta hidroksi buternu kiselinu), koja se koristi za sintezu mlečne masti. Značajan fiziološki mehanizam nastajanja mlečne masti je mobilizacija masti iz telesnih depoa, što je u uslovima negativnog energetskog bilansa u ranoj fazi laktacije dominantan proces. Proces intenzivne lipomobilizacije masti (triglicerida) iz telesnih depoa može da uvede kravu u patologiju metabolizma, gde je dominantan proces zamašćenje jetre (masna jetra). Prilikom obilne lipomobilizacije, povećava se koncentracija slobodnih masnih kiselina u krvi, što dovodi do povećane sinteze mlečne masti i njene koncentracije u mleku. Procenjeno je da trećina energije koja se gubi izlučivanjem mleka u prvom mesecu laktacije potiče iz telesnih rezervi organizma. Masti u obroku za mlečne krave su procentualno vrlo malo zastupljene (manje od 5 %), ali zbog velike ukupne mase unete hrane, količina unetih masti nije mala. Pomoću lipolitičkih mikroorganizama u buragu, masti stočne hrane se hidrolizuju i oslobađa se glycerol i velika količina nezasićenih masnih kiselina. Pod dejstvom mikroorganizama buraga (bakterije i protozoe) dolazi do redukcije nezasićenih masnih kiselina i nastajanja viših masnih kiselina. Cilj istraživanja u ovom radu bio je da se odredi koncentracija masti u mleku krava i da se na osnovu međusobnog odnosa sadržaja masti i proteina u mleku proceni energetski status krava u ranoj fazi laktacije, kao i da se blagovremeno preduzmu mere korekcije ishrane visoko-mlečnih krava.

Ključne reči: mlečna mast, lipomobilizacija, mikroorganizmi

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Physiological basis of milk fat in high-yielding dairy cows of Holstein-Friesian and Simmental breeds

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Abstract: Milk fats are primarily derived from the microbial digestion of carbohydrates in the rumen, where acetic, butyric and propionic acids are produced and reach the liver through the portal bloodstream. Milk fats originate primarily from lower fatty acids resorbed in the rumen, but partly from fatty acids from the blood. Of particular importance in the synthesis of milk fat is acetic acid, which is mainly produced by the digestion of raw fiber from the meal, but partly also butyric acid, which is converted in the wall of the rumen into BHBA (beta hydroxyl butyric acid), which is used for the synthesis of milk fat. A significant physiological mechanism of milk fat formation is the mobilization of fat from body depots, which is the dominant process in conditions of negative energy balance in the early stage of lactation. The process of intense lipomobilization of fat (triglycerides) from body depots can introduce a cow into metabolic pathology, where the dominant process is greasing the liver (fatty liver). During the abundant lipomobilization, the concentration of free fatty acids in the blood increases, which leads to an increased synthesis of milk fat and its concentration in milk. It has been calculated that a third of the energy that is lost through the secretion of milk in the first month of lactation comes from the body reserves. The percentage of fat in feed intake for dairy cows is very low (less than 5%), but due to the large total mass of feed, the amount of fat is not small. By means of lipolytic microorganisms in the rumen, animal feed fats are hydrolyzed and glycerol and a large amount of unsaturated fatty acids are released. Under the influence of rumen microorganisms (bacteria and protozoa), unsaturated fatty acids are reduced and higher fatty acids are formed. The aim of the research in this paper was to determine the concentration of fat in the cow milk and to assess the energy status of cows in the early stages of lactation based on the mutual ratio of fat and protein content in milk, as well as to take steps to correct the diet of high-dairy cows in a timely manner.

Keywords: milk fat, lipomobilization, microorganisms
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Hemijska svojstva i mikrobiološka kontrola kvaliteta zamrznutog ploda Oblačinske višnje

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Abstract: Višnja (*Prunus cerasus* L.) predstavlja voćnu vrstu koja se isključivo gaji na severnoj zemljinoj hemisferi gde je među kontinentima najveći proizvođač Evropa. Oblačinska višnja (*Prunus cerasus* L. var. *Oblačinska*) je populacija koja je dobila ime po mestu Oblačina koje se nalazi između Niša i Prokuplja u južnoj Srbiji. Postoji mišljenje da su je u Oblačinu doneli doseljenici iz Vojvodine. Plod Oblačinske višnje ima vrlo sočne i intenzivno crveno ili tamno crveno obojene plodove. Odnos kiselina:šećer je 1:6, dajući plodovima osvežavajuće sladak ukus i karakterističnu aromu. U poređenju sa drugim voćem plod višnje ima izuzetno visok sadržaj kalcijuma, magnezijuma, gvožđa, bakra, cinka i fosfora. Konzumira u svežem stanju ali se prerađuje u kompot, slatko, bistri ili kašasti sok, pasterizovanu pulpu ili se podvrgava zamrzavanju. Cilj ovog rada je ispitivanje hemijskih svojstava i mikrobiološka kontrola svežeg i zamrznutog ploda Oblačinske višnje. U okviru analize ispitana je suva materija, pH, sadržaj kiselina (kao limunska), sadržaj ukupnih šećera, sadržaj vitamina C i sadržaj antocijana. Suva materija je određena Abbe-ovim refraktometrom, pH vrednost je merena pH metrom (InoLab WTW, Nemačka). Sadržaj kiselina određen je volumetrijskom metodom, titracijom sa NaOH. Sadržaj ukupnih šećera određen je volumetrijskom metodom po Luff – Schoorl-u. Sadržaj antocijana i sadržaj vitamina C određen je spektrofotometrijskom metodom (spektrofotometrom Jenway). Mikrobiološka kontrola kvaliteta uključila je ispitivanje prisustva bakterija koje su najčešći izazivači kvarenja hrane: *Salmonella* spp. ISO 6579-1:2017, *Listeria monocytogenes* ISO 11290-1:2017, *E. coli* ISO 16649-1:2018 i *Enterobacteriaceae* ISO 21528-2:2017. Rezultati ispitivanja su ukazali da i sveži i zamrznuti plodovi predstavljaju dobar izvor vitamina C i antocijana što ukazuje da je Oblačinska višnja nezamenjiva namirnica u zdravoj ishrani. Rezultati mikrobiološke analize su pokazali odsustvo *Salmonella* spp., *Listeria monocytogenes* i *E. coli*., dok je prisustvo *Enterobacteriaceae* bilo manje od 10 cfu / ml.

Ključne reči: *Prunus cerasus* L., hemijske analize, polifenoli, vitamin C, mikrobiološka kontrola.

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Chemical properties and microbiological quality control of frozen fruit of Oblačinska black cherry

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Abstract: Black cherries (*Prunus cerasus* L.) are a species of fruit grown exclusively in the Northern hemisphere, Europe being the continent with the largest production. Oblačinska black cherry (*Prunus cerasus* L. var. Oblačinska) is a sort that got its name from Oblačina, a village located between the city of Niš and the town of Prokuplje in the Southern Serbia. It is generally believed that this sort was brought to Oblačina by the settlers from Vojvodina. These cherries are very juicy and intensely red or dark red in colour. The ratio of acid and sugar content is 1:6, giving this fruit a refreshingly sweet flavour and a characteristic aroma. In comparison with other fruits, black cherries have an extremely high content of calcium, magnesium, iron, copper, zinc and phosphorus. They can be consumed fresh, but they can also be processed into compote, preserves, clear or mushy fruit juice and pasteurized pulp, or they can be frozen. The aim of this work was to examine the chemical properties and to perform microbiological quality control of fresh and frozen Oblačinska black cherries. The following parameters were examined within this analysis: dry matter content, pH value, acid content (such as citric), total sugar content, vitamin C content and anthocyanin content. Dry matter content was determined using the Abbe refractometer, while pH value was determined using a pH meter (InoLab WTW, Germany). Acid content was determined by the volumetric method, using the NaOH titration. Total sugar content was determined by the Luff-Schoorlvolumetric method. Anthocyanin content and vitamin C content were determined by the spectrophotometric method (Jenway spectrophotometer). The microbiological quality control included testing for food spoilage bacteria *Salmonella* spp. ISO 6579-1:2017, *Listeria monocytogenes* ISO 11290-1:2017, *E. coli* ISO 16649-1:2018 and *Enterobacteriaceae* ISO 21528-2:2017. The test results indicated that both fresh and frozen fruit is a good source of vitamin C and anthocyanins, which indicates that Oblačinska black cherries are indispensable in a healthy diet. The results of microbiological analysis showed the absence of *Salmonella* spp., *Listeria monocytogenes* and *E. coli*. The presence of *Enterobacteriaceae* was less than 10 cfu / ml.

Keywords: *Prunus cerasus* L., chemical analysis, polyphenols, vitamin C, microbiological control.

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Parametri kvaliteta kaše od kupina

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Sažetak: Kupina je nutritivno vredna hrana zbog bogatog i izuzetno povoljnog hemijskog sastava i izvrsnih organoleptičkih svojstava. Na globalnom nivou sve je veća potražnja za bobičastim voćem gde spada i kupina, koje sadrži značajne količine biološki aktivnih jedinjenja, pre svega prirodne polifenole i nutrijente, koje treba ugraditi u funkcionalnu hranu i farmaceutske proizvode. Svež plod i sok kupine odlična su laksativna sredstva, poboljšavaju krvnu sliku, regulišu krvni pritisak i jačaju otpornost organizma, pektini štite organizam od arterioskleroze i infarkta, a celuloza poboljšava varenje hrane. Antocijani ploda kupine su izvanredni i neophodni antioksidanti, koji sprečavaju kancerogena oboljenja. Manje količine jagodastog voća, a samim tim i kupina se prodaju i konzumiraju sveže, zbog lake kvarljivosti (nutritivnog i mikrobiološkog propadanja). Većina se prerađuju u sokove, kaše, džemove, žele, sirupe, voćna vina, čime se donekle smanjuju kvalitet i zdravstvena korist. Kvalitet proizvedene kaše od voća značajno zavisi od faktora kao što su vrsta voća, stepen zrelosti, predtretman, vrsta pakovanja i stepen smrzavanja. Kao materijal za potrebna ispitivanja korišćena je voćna kaša od kupine preduzeća „MIDI ORGANIC“ iz Donjeg Grgura, dobijena savremenim postupkom proizvodnje u aseptičnim uslovima. U cilju praćenja kvaliteta ispitivana je rastvorljiva suva materija (Refraktometrijska metoda), pH vrednost, sadržaj ukupnih kiselina i sadržaj ukupnih antocijana. Vrednosti koje karakterišu ispitivani uzorak su: 8,1 % (m/m), 3,3 pH, 13,7 g/l ukupnih kiselina i 41,3 mg/100g ukupnih antocijana. Rezultati fizičko-hemijske analize kaše od kupine pokazuju da je sadržaj ispitivanih parametara, nakon prerade, ostao bezmalo nepromenjen u odnosu na prosečan sastav sveže kupine, prema literaturi, što je saglasno tvrdnji većine autora.

Ključne reči: kupina, kaša, kvalitet, prerada
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The quality parameters of blackberry pulp

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Abstract: A blackberry is a nutritionally valuable food due to its rich and extremely favorable chemical composition and excellent organoleptic properties. At the global level, there is an increasing demand for berries, including blackberries, which contain significant quantities of biologically active compounds, primarily natural polyphenols and nutrients, which should be incorporated into functional foods and pharmaceutical products. Fresh blackberry fruit and juice are excellent laxatives, they improve blood count, regulate blood pressure and strengthen the body resistance, pectins protect the body from arteriosclerosis and heart attacks, and cellulose improves food digestion. Blackberry anthocyanins are excellent and necessary antioxidants, which prevent cancerous diseases. Smaller quantities of strawberry like fruit, and therefore blackberries, are sold and consumed fresh, due to easy perishability (nutritional and microbiological deterioration). Most of them are processed into juices, porridges, jams, jellies, syrups, fruit wines, with which, to a certain extent, the quality and health benefits are reduced. The quality of the produced fruit pulp significantly depends on factors such as the type of fruit, degree of maturity, pretreatment, type of packaging and degree of freezing. Blackberry fruit pulp from the company "MIDI ORGANIC" from Donji Grgur was used as the material for the necessary tests, obtained by a modern production process in aseptic conditions. In order to monitor the quality, soluble dry matter (Refractometric method), pH value, content of total acids and content of total anthocyanins were examined. The values that characterize the tested sample are: 8,1% (m/m), 3,3 pH, 13,7 g/l of total acids and 41,3 mg/100g of total anthocyanins. The results of the physical-chemical analysis of blackberry pulp have shown that the content of the examined parameters, after processing, remained almost unchanged in relation to the average composition of fresh blackberries, according to the written data, which aligns with the claims of most authors.

Keywords: blackberry, pulp, quality, processing

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Fizčko-hemijske karakteristike i antioksidativna aktivnost vakum osušenog korenastog povrća

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Sažetak: Sveže povrće predstavlja namirnicu bogatog nutritivnog i hemijskog sastava. Njihovo konzumiranje na svakodnevnom nivou u okviru izbalansirane ishrane omogućava potrošačima zadovoljavanje dnevnih potreba za esencijalnim vitaminima, mineralima, dijetetskim vlaknima, proteinima i mastima. Takođe, povrće sadrži širok opseg bioaktivnih jedinjenja, uključujući fenolna jedinjenja, karotenoide i tokoferole, koji pojedinačno ili u kombinaciji mogu imati pozitivne benefite na zdravlje ljudi. S obzirom da sveže povrće sadrži više od 80% vlage, klasifikuje se kao visoko kvarljiva namirnica. Odvijanje nepoželjnih hemijskih i enzimskih promena neminovno dovodi do dodatnog pogoršanja kvaliteta proizvoda. Stoga je nakon berbe povrća neophodno primeniti neku od odgovarajućih tehnika skladištenja i čuvanja u cilju dostizanja produžene održivosti ovih namirnica i njihove dostupnosti tokom cele godine. Jedna od najčešćih metoda koja se primenjuje za konzervisanje svežeg povrća je sušenje. Proces smanjenja vlage prisutne u materijalu koji se suši može podrazumevati odsustvo kiseonika i niže temperature sušenja u odnosu na one koje se primenjuju u okviru konvencionalnih tehnika sušenja. Ovaj vid sušenja naziva se vakuum sušenje. Proizvodi osušeni na ovaj način odlikuju se boljim kvalitetom u pogledu fizičko-hemijskih i bioloških svojstava, u poređenju sa tehnikom sušenja gde proizvod dolazi u kontakt sa kiseonikom i višim temperaturama sušenja. Cilj ovog istraživanja bio je ispitivanje fizičko-hemijskih karakteristika i antioksidativne aktivnosti vakuum osušenog korenastog povrća, među kojima su odabrani mrkva, peršun i pastrnak. Uzorci su osušeni u laboratorijskoj vakuum sušari na temperaturi od 55°C i pritisku 0 mbar. U osušanim uzorcima određena je aktivnost vode (a_w), suva materija, kao i moć rehidracije. U pripremljenim metanolnim ekstraktima bio je izmeren sadržaj ukupnih fenolnih jedinjenja i ukupnih flavonoida, dok je antioksidativni potencijal uzoraka određen primenom tri antioksidativna testa (DPPH, FRAP i ABTS test). Poređenjem uzoraka tri različite vrste osušenog povrća, uočeno je da peršun poseduje najveću sposobnost rehidracije, odnosno naknadnog primanja vode (85%). Međutim, u pogledu bioaktivnih jedinjenja i antioksidativne aktivnosti, rezultati su pokazali da mrkva ubedljivo sadrži najveću koncentraciju ukupnih fenolnih jedinjenja i flavonoida, i da srazmerno tome ima najviši antioksidativni kapacitet.

Ključne reči: korenasto povrće, vakuumsko sušenje, fizičko-hemijska svojstva, bioaktivna jedinjenja

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Physico-chemical characteristics and antioxidant activity of vacuum-dried root vegetables

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Abstract: Fresh vegetable represents a food with a rich nutritional and chemical composition. Its consumption on a daily basis as part of a balanced diet allows consumers to meet their daily needs for essential vitamins, minerals, dietary fiber, proteins and fats. Also, vegetables contain a wide range of bioactive compounds, including phenolic compounds, carotenoids, and tocopherols, which, individually or in combination, may have positive benefits for human health. Since fresh vegetables contain more than 80% moisture, they are classified as highly perishable food. Undesirable chemical and enzymatic changes inevitably lead to additional deterioration of product quality. Therefore, after vegetable harvesting, it is necessary to apply some of the appropriate storage and preservation techniques in order to achieve extended sustainability of these foods and their availability throughout the year. One of the most common methods used to preserve fresh vegetables is drying. The process of reducing the moisture present in the material being dried can mean the absence of oxygen and lower drying temperatures compared to those used in conventional drying techniques. This type of drying is called vacuum drying. Products dried in this way are characterized by better quality in terms of physico-chemical and biological properties, compared to the drying technique where the product comes into contact with oxygen and higher drying temperatures. The aim of this research was to examine the physico-chemical characteristics and antioxidant activity of vacuum dried root vegetables, among which carrots, parsley and parsnips were selected. The samples were dried in a laboratory vacuum dryer at a temperature of 55°C and pressure of 0 mbar. In the dried samples, water activity (a_w), dry matter, and rehydration power were determined. The content of total phenolic compounds and total flavonoids was measured in the prepared methanol extracts, while the antioxidant potential of the samples was determined using three antioxidant tests (DPPH, FRAP and ABTS test). By comparing the samples of three different types of dried vegetables, it was observed that parsley has the greatest ability to rehydrate, i.e. subsequently receives water (85%). However, in terms of bioactive compounds and antioxidant activity, the results showed that carrots convincingly contain the highest concentration of total phenolic compounds and flavonoids, and correspondingly have the highest antioxidant capacity.

Keywords: root vegetables, vacuum drying, physico-chemical properties, bioactive compounds
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Proizvodnja čokolade i analiza čokoladnih proizvoda na evropskom tržištu

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Sažetak: Proizvodnja čokolade i čokoladnih proizvoda na prostoru Evrope razvija se znatno naprednije u poređenju sa ostatkom sveta u smislu kvaliteta i novih, neponovljivih ukusa čokolade. Proizvodnja čokolade je složena i zahteva nekoliko tehnoloških operacija i procesa kako bi se postigao željeni kvalitet proizvoda, te je potrebno poznavati osnovna načela i faktore u proizvodnji kao i svojstva svih sirovina koje se koriste za izradu čokolade i čokoladnih proizvoda. Razvojem tehnologije i uvođenjem novih savremenih mašina u proizvodnju ovako delikatnog proizvoda, znatno se smanjio napor proizvođača u nastojanju da čokoladu učine savršenom. Nakon proizvodnje svakako je potrebno izvršiti detaljnu analizu ispravnosti proizvoda, kao i senzornu analizu na nekolicini ispitanika kako bi se utvrdilo da li će se čokolada svideti krajnjim potrošačima, što je i najbitnije u celokupnom procesu. Analizom čokoladnih proizvoda na prostoru Evrope dolazimo do zaključka da svaki proizvođač ima sopstvenu ideju o spajalju ukusa, međutim svi polaze od tri osnovne vrste čokolade: crne, mlečne i bele. U ovom radu obradićemo samo neke od zemalja Evrope, a to su Belgija, Nemačka, Italija, Hrvatska i Srbija, kako bi uporedili vrste čokoladnih proizvoda sa naših prostora, sa proizvodima nekih od najvećih proizvođača čokolade u svetu.

Ključne reči: čokolada, proizvodnja, Evropa, analiza, tržište.

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Chocolate production and analysis of chocolate products on the European market

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Abstract: The production of chocolate and chocolate products in Europe is developing much more advanced compared to the rest of the world in terms of quality and new, unique flavors of chocolate. The production of chocolate is complex and requires several technological operations and processes in order to achieve the desired quality of the product, and it is necessary to know the basic principles and factors in production as well as the properties of all raw materials used for the production of chocolate and chocolate products. With the development of technology and the introduction of new modern machines in the production of such a delicate product, the effort of producers in trying to make chocolate perfect has been significantly reduced. After production, it is certainly necessary to carry out a detailed analysis of the correctness of the product, as well as a sensory analysis on several respondents in order to determine whether the end consumers will like the chocolate, which is the most important thing in the entire process. Analyzing the chocolate products at Europe, we come to the conclusion that each manufacturer has their own idea of a flavor combination, but they all start from the three basic types of chocolate: dark, milk and white chocolate. In this paper, we will cover only some of the countries of Europe, Belgium, Germany, Italy, Croatia and Serbia, in order to compare the types of chocolate products from our area, with the products of some of the largest chocolate producers in the world.

Keywords: chocolate, production, Europe, analysis, market.
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Primena biopolimera za pakovanje prehrambenih proizvoda

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Sažetak: Biopolimerni materijali su u naučnom fokusu poslednjih godina, kao alternativa komercijalno dostupnim ambalažnim materijalima. Najširi spektar sintetičkih ambalažnih materijala se proizvodi od fosilnih goriva i nisu razgradivi pa predstavljaju veliko opterećenje životne sredine na kraju svog životnog ciklusa. Sa druge strane biopolimerni materijali se dobijaju iz obnovljivih izvora i biorazgradivi su delovanjem mikroorganizama. Veliki je broj izvora iz kojih se ovi materijali mogu dobiti: Polimeri ekstrahovani/izolovani direktno iz biomase; Polimeri proizvedeni klasičnom hemijskom sintezom od bio-monomera; kao i Polimeri dobijeni direktno od prirodnih ili genetski modifikovanih organizama. Najzastupljeniji su predstavnici prve grupe i obično se klasifikuju prema dominantnom gradivnom materijalu. Glavne grupe hemijskih jedinjenja, koje služe kao izvori za biopolimerne filmove i premaze, su polisaharidi, proteini i lipidi. Obzirom da su velikom većinom zdravstveno bezbedni (priznati kao GRAS: Generally Recognized As Safe), odnosno jestivi, jedan od značajnijih pravaca primene biopolimernih materijala je prehrambena industrija. Biopolimerni materijali mogu biti sintetisani i primenjeni kao samostalni filmovi ili pak kao tanke prevlake (premazi) na površini supstrata koji se pakuje. Brojne su prednosti primene biopolimernih materijala. U ovom radu posebno će biti istaknut doprinos primene biopolimernih kako filmova, tako i premaza na različite grupe prehrambenih proizvoda, odnosno uticaj na očuvanje/unapređenje kvaliteta i roka održivosti.

Ključne reči: biopolimeri, ambalaža, pakovanje, hrana, održivost
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Application of biopolymers for packaging of food products

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Abstract: Biopolymer materials have been in the scientific focus in recent years, as an alternative to commercially available packaging materials. The widest range of synthetic packaging materials are produced from fossil fuels and are not degradable, so they represent a large burden on the environment at the end of their life cycle. On the other hand, biopolymer materials are obtained from renewable sources and are biodegradable through the action of microorganisms. There are many sources from which these materials can be obtained: Polymers extracted/isolated directly from biomass; Polymers produced by classical chemical synthesis and bio-monomers as well as Polymers obtained directly from natural or genetically modified organisms. The representatives of the first group are the most represented and are usually classified according to the dominant building material. The main groups of chemical compounds, which serve as sources for biopolymer films and coatings, are polysaccharides, proteins and lipids. Considering that they are mostly safe for health (GRAS: Generally Recognized As Safe), i.e. edible, one of the most important areas of application of biopolymer materials is the food industry. Biopolymer materials can be synthesized and applied as independent films or as thin coatings on the surface of the packaged substrate. There are numerous advantages of using biopolymer materials. In this paper, the contribution of the application of biopolymer films as well as and coatings to various groups of food products will be highlighted, i.e. the impact on the preservation/improvement of quality and shelf life.

Key words: biopolymers, packing, packaging, food, sustainability

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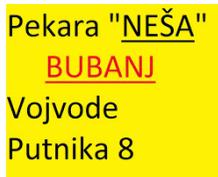
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