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- Courses catalogue -

TEMPUS Project:
**Building Capacity of Serbian Agricultural Education
to Link with Society (CaSA)**
544072-TEMPUS-1-2013-1-RS-TEMPUS-SMHES
(2013 – 4604 / 001 - 001)

Coordinator:
University of Belgrade, Faculty of Agriculture

WP4 (DEV) - Modernization of teaching contents
**4.3. Development of classical (f2f) vocational courses
for AMS teachers and agronomists in extension service**
4.4. Development of web based vocational courses

WP7 (DEV) - Pilot implementation of vocational courses
7.1. Implementation of classical pilot vocational courses
7.2. Implementation of pilot web based vocational courses

Belgrade, 2015

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Belgrade, 2015

Goran Topisirović (Editor)

**Vesna Poleksić, Ana Pešikan, Slobodanka Antić, Pasquale Pazienza, Franc Bavec,
Cosmin Salasan, Snežana Tanasković, Ljubinko Jovanović**

**This brochure is a result of the TEMPUS project
“Building Capacity of Serbian Agricultural Education to Link with Society”
(CaSA)**

544072-TEMPUS-1-2013-1-RS-TEMPUS-SMHES (2013-4604/001-001).

Goran Topisirović edited and prepared all courses for review and publishing

**Ana Pešikan and Slobodanka Antić carried out a methodological pedagogical
review of courses. They also trained UT for ATL.**

**Pasquale Pazienza, Franc Bavec, and Cosmin Salasan coordinated peer review
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Snežana Tanasković and Ljubinko Jovanović are WP4 and WP7 leaders

Vesna Poleksić is CaSA project coordinator.

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TEMPUS project CaSA

COURSES CATALOGUE

In the frame of WPs 4 and WPs 7 the SC and the working group in charge of realizing WP7 have decided to publish this Courses catalogue. Courses aimed for Agricultural Middle School (AMS) teachers and advisers/experts from Agricultural advisory services, were created during realization of WP 4 by University teachers (UT) from five Serbian Agricultural faculties/Universities. Prior to courses creation University teachers have accomplished trainings in Active Teaching/Learning, in e-learning and in Academic skills. Trainings were delivered by two training organization, participants in CaSA.

In total 63 courses have been created. The structure of the courses prepared and presented in this catalogue is presented in the following Table:

Courses type	UB	UNS	UNIKG	SUNP	EDUCONS	TOTAL
By area						
Plant production & protection	4	8	4	0	1	17
Animal production & Veterinary medicine	6	7	1	1	0	15
Food technology	5	0	2	3	0	10
Agricultural Engineering	0	1	1	2	0	4
Soil sciences	1	0	0	1	4	6
Agro economy	1	1	1	0	4	7
Other	1	0	2	1	0	4
By the target group						
AMS (teachers)	12	5	2	8	5	32
PSSS (advisors)	6	2	5	0	0	13
AMS & PSSS	0	10	4	0	4	18
By type						
Classical	12	3	1	0	9	25
Online	3	1	4	0	0	8
Blended	3	13	6	8	0	30
By course duration						
1 day (8 hours)	10	2	2	6	6	26
2 days (16 hours)	8	15	9	2	3	37
By University	18	17	11	8	9	63

Courses are actually prepared for implementation and accreditation: AMS courses are submitted to the Ministry of Education, Science and Technological Development, and a first group of courses for advisors is under preparation to be submitted to the Advisory council for Agriculture.

This courses catalogue will be used during courses implementation and preparation for accreditation. Courses will be realized during CaSA project lifetime, and evaluated by users, middle school teachers and advisors.

Finally, last but not least, all courses will be available on the National Repository for Agricultural Education, NaRA, and the main output of the CaSA project, a unique portal for Serbian agricultural education and main resource for agricultural LLL and in-service training.

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University of Belgrade
Faculty of Agriculture



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University of Belgrade



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Freshwater crayfish aquaculture

Teacher	Božidar Rašković
University	University of Belgrade, Faculty of Agriculture
Course	Freshwater crayfish aquaculture
Target	Agricultural Middle Schools
Type	online
Duration	1 day – 8 hours



Description

The aim of this course is to popularize aquaculture of freshwater crayfish (FC) in Serbia. This area of aquaculture is highly developed in the world and in some countries it is one of the most important branches of animal husbandry. Meanwhile, in Serbia, people are completely unaware about possibility of rearing FC, even though as a country we have all the necessary conditions for it. I support the stand that introducing of this course to students in secondary vocational schools engaged in agriculture (SVSA) can bring benefit to students, to the society and to the country as a whole.

According to data of the Statistical Office of the Republic of Serbia and the Ministry of Agriculture and Environmental protection, the share of agriculture and aquaculture in the country's GDP is at the level of 14%, but with a huge potential to further increase this percentage in the next 10 years. Rearing of FC is relatively simple and very similar to rearing of fish, since the same objects and similar practices can be used for both fish farming and the rearing of FC. Although understated in Serbia, rearing of freshwater crustaceans represents a potential for profit, given that large markets exist in Western and Northern Europe (primarily France and Sweden), with a long tradition of consuming these animals. Aquaculture of FC could be easily conjoined with some of the following courses in SVSA: Animal Science, Livestock nutrition and Fish rearing (Aquaculture). This would enable acquiring basic knowledge about methods of FC rearing, and that would take no more than one to two teaching units. Some SVSA in their curriculum already have practical classes at fish farms, and they could easily organize students' pilot projects in small facilities where different species of FC could be reared.

Secondary aim of this course would be to try to change the traditional view of teachers when it comes to animal science (favoring of terrestrial animals) and presenting FC aquaculture as alternative to traditional livestock production. In addition to these facts, a number of species suitable for rearing in Serbia (as high as five) should not be ignored.

Contents

The course will be divided into eight lessons and it is planned that one unit can be covered in one hour of teaching:



1. Biology of FC
2. The basic characteristics of commercially important species of FC
3. Water quality
4. Nutrition of FC
5. Diseases of FC
6. The technology of cultivation of FC
7. Artificial spawning
8. Facilities for FC rearing

Some facts about FC not present in the list of topics will be mentioned in these units: importance of FC aquaculture in Europe, rearing practices and markets in selected countries, behavior of FC, history of cultivation, as well as the introduction of alien species in Serbian rivers, streams and lakes.

Objectives

1. Teachers at SVSA generally have only basic knowledge of biology of aquatic animals. That is why the greater part of the course will be committed to ensuring that participants gain knowledge on the morphology and physiology of FC in order to better understand these animals. A special aspect will be devoted to FC nutrition and diseases, since these two areas are crucial for the successful rearing, achieving desired growth and reducing mortality of FC.
2. Second objective of the course is that teachers at SVSA gain new knowledge about the water quality and optimal parameters for the cultivation of FC, as well as to understand the similarities between rearing FC and rearing fish.
3. Teachers should promote the development of aquaculture in Serbia during common work with students.

Activities

1. Due to the fact that the course will be organized online (e-learning platform *Moodle*), a minimum of eight teaching units will be available to participants.
2. A forum for exchanging questions and experiences of all enrolled teachers will be available. Large amount of multimedia content (movies and pictures) will be placed on the online platform. This will help participants in understanding of FC life in the natural environment, catching and rearing of FC.

Materials

No material is planned for this course.



Hybridization of fruit trees and grapevine

Teacher	Dragan Nikolić	 
University	University of Belgrade, Faculty of Agriculture	
Course	Hybridization of fruit trees and grapevine	
Target	Agricultural Middle Schools	
Type	classic	
Duration	1 day - 8 hours	

Description

Hybridization i.e. crossing is the most important and most effective way to create new varieties of fruit trees and grapevine. This course is designed for teachers of secondary vocational schools in the field of fruit science and viticulture so that they can modernize knowledge in this field. During the course, participants will renew the knowledge acquired at faculty and meet with the new procedures and skills for the creation of a new variety. New knowledge will be gained in the field of inbreeding and heterosis breeding, crossing techniques and working with hybrid seeds and seedlings.

Teachers will get during the theoretical and practical schooling comprehensive overview of current knowledge in this field. Attending this course and new skills within the crossing techniques will facilitate teachers work with their learners.

Contents

The first and second topic will involve common discussions and the renewal of previously acquired knowledge about the significance and objectives of hybridization, the choice of parents for hybridization, hybridization division and the most important ways of crossing.

The third topic will involve the modernization of the knowledge and introduction with new elements of inbreeding and heterosis breeding and practical procedures in the technique of hybridization.

The fourth topic will involve new knowledge about working with hybrid seeds and seedlings.

Objectives

The overall objective of the course is attendants renewal of the previously acquired knowledge and learn to track innovation in the field of fruit trees and grapevine breeding, which contributes to improving teaching.

Specific goals of the course are:

1. To increase the professional competence of teachers in line with new trends in the field of hybridization and their training for practical application of innovations in this field in accordance with the needs of the peculiarities of educational profiles.
2. Acquisition of practical knowledge about important ways for create new



varieties of fruit trees and grapevine, primarily through mastering the technique of hybridization and work with hybrid seeds and seedlings. Acquired knowledge teachers should also allow standalone teaching and scientific work in a given field and announce the results at seminars and scientific meetings.

Activities

The teacher will inform the course attendants with the plan and schedule of work in the course.

Participants will complete a questionnaire that will be checking existing knowledge of hybridization of fruit trees and grapevine.

Renewal the acquired knowledge within the first and second topic will be carried out through a Power Point presentation.

The teacher will divide course attendants into groups (5 members) and give them tasks to practical examples and through discussion that they exercise of crossing ways. Course participants will present the results of their group in front of the teacher and all the other groups.

The third and fourth topic will be exposed primarily through a Power Point presentation of teacher and presentation of acquired knowledge and experience in this area interested participants of the course before the other participants of the course, and then practical work in the field and laboratory.

On the field will be demonstrate new procedures of emasculation, isolation of flowers, collecting of pollen and pollination. The teacher will divide course participants into groups (3 members) and each group will practice procedures for crossing, applying new skills which have been demonstrated by the teacher.

The course attendants will practice in the laboratory of new separation techniques and sowing of hybrid seeds.

At the end of the course, participants will solve per 30 questions via the test from the entire area of the course and answer on questions related to the evaluation of the course and teacher.

Materials

For the realization of the proposed course need the space (classroom with thirty seats), computer and projector. In this space through a Power Point presentation will be performed theoretical part of the teaching and evaluation of the course participants through tests. For practical implementation of the hybridization methods have required orchard or vineyard, laboratory, as well as necessary consumable materials.



Modern biotechnological reproductive technologies aimed to increase genetic capacity of domestic animals

Teacher	Dragan Stanojević
University	University of Belgrade, Faculty of Agriculture
Course	Modern biotechnological reproductive technologies aimed to increase genetic capacity of domestic animals
Target	Agricultural Middle Schools
Type	blended
Duration	2 days - 16 hours



Description

The course would last two days. A first part of the course will be held with computers and platform for electronic learning. In the first part of the course a material which will consist of textual part, photographs, video material and illustrations of all the phases of mentioned biotechnological procedure will be presented to the teachers via lectures on *Moodle*. There will be three lessons: estrous cycle in breeding females and possibility to control it, superovulation and embryo-transfer and cloning of domestic animals. The lessons will be presented in this chronological order. At the end of each lesson the participants will be asked some questions to which they have to give a correct answer in order to pass to a next lesson. In this way the participant will revise his/her pre-knowledge on reproduction and with the help of this knowledge and his/her critical opinion he/she will try to solve it on their own and to understand the importance and technique of mentioned methods. During the course the forum will be held where the participants will be able to communicate and exchange the impressions and ideas and try to solve misunderstandings. In addition, a creator of the course will also be involved in a discussion as a forum moderator.

Second part of the course is conceived as a workshop. In the first part of the workshop the participants would be free to express their misunderstandings and unclear items which they could not solve during the first part of the course. They would try to solve these problems mutually explaining them to each other in active participation and assistance from the creator of the course. Each of the mentioned biotechnological methods would be presented to them in the form of video material but with the comments and explanations by the lecturers. After that the participants of the course would be randomly divided into groups and be given one task each where with the application of previously acquired knowledge they would try to solve an actual practical problem and at the end would present their possible solution and explain it. After presenting the solution to a problem a discussion would be organized (round table) where everyone would be able to express his/her opinion and views and make comments on a potential use of mentioned methods in our livestock breeding.



Contents	<ol style="list-style-type: none">1. Estrous cycle of breeding females and estrous cycle control.2. Superovulation and embryo-transfer.3. Cloning of domestic animals.
Objectives	<ol style="list-style-type: none">1. To revise their previously acquired knowledge in reproduction;2. To learn about a new biotechnological procedures in reproduction of domestic animals;3. To practice expressing argumentative standpoint regarding mentioned biotechnological measures;4. To consider the problem of use of these new technologies in our context: to realize a potential possibilities for the application of new knowledge and technologies.5. To get acquainted with the problems and potential consequences of using these procedures also regarding ethical principles, especially when we speak about cloning of domestic animals.
Activities	Presented in the description of the course.
Materials	Computer with internet connection, computer and projector, paper and pencils for participants + lessons for studying + questions/knowledge test +video snapshot of each of the mentioned biotechnological methods + task to apply knowledge in practice



Mycotoxins in fruits and vegetables

Teacher	Ivana Vico
University	University of Belgrade, Faculty of Agriculture
Course	Mycotoxins in fruits and vegetables
Target	Agricultural Extension Service
Type	classic
Duration	1 day - 8 hours



Description

Mycotoxins are toxic secondary metabolites of some fungal species which are harmful to humans and animals even in very low concentrations. They comprise a large group of chemical compounds capable of causing acute illnesses with severe symptoms or chronic toxicoses with cumulative effects including cancers or immune deficiency, all known as mycotoxicoses. Mycotoxins are one of the main causes of food contamination. Toxin producing plant pathogenic fungi, secrete mycotoxins in fruit and vegetable tissues and commodities during growth, making contaminated food a serious threat to the health of humans and animals. The course „Mycotoxins in fruits and vegetables“ is intended for the advisory service having in mind that knowledge about toxigenic fungi and main toxins they produce will enable the production of safe food for human and animal consumption. Through this course advisory service members, who had little or no chance to learn about these fungi during undergraduate studies, will gain knowledge on main characteristics, detection and the control of toxigenic fungi. Also, during the course they will have the possibility to study the most important mycotoxins in fruits and vegetables, ways of their detection, prevention of mycotoxin contamination and decontamination of contaminated fruits, vegetables and commodities.

Contents

During the course focus will be on two main topics: mycotoxins and toxigenic fungi causal agents of vegetable and fruit decay and detection and control of toxigenic fungi for the purpose of overcoming fruit, vegetable and commodity contamination. These two topics will be divided in the following teaching units:

1. The most important mycotoxins (MT) in fruits, vegetables and their commodities:
 - Definition, economic importance, toxicity;
 - Important toxin producing plant pathogenic fungi, time and mode of infection;
 - Influence of ecological factors on fungal development and MT synthesis;
 - Presence of MT in fruits, vegetables and commodities;
 - Law regulations - legislative limits.
2. Detection and control measures for prevention of the presence mycotoxins:
 - Identification of pathogenic fungi, toxin producers;



- Identification of MT, determination of mycotoxin levels;
- Prevention of contamination and decontamination of contaminated food.

Objectives

1. Development of the ability to connect knowledge from different areas of plant pathology, pomology and vegetable crop production.
2. Implementation of the knowledge on postharvest plant diseases and causal agents of this diseases with emphasis on toxigenic fungi.
3. Understanding nature's laws in order to prevent and control decay caused by toxigenic fungi.
4. The ability to implement gained knowledge in new situations with the purpose of preventing mycotoxin contamination and producing safe food.

Activities

1. At the beginning of the course a short introductory lecture will be given to attendants in order to inform them on the content and objectives of the course.
2. Attendants are given a test to evaluate their current knowledge in postharvest pathology and toxigenic fungi.
3. Teacher gives a lecture through presentations in power point and discussion on the topics with students.
4. Students are divided in two groups and each is given decayed samples of fruit or vegetable. Each group gives identification assumptions on the disease and disease causing agent and based on that on the possibility of the fruit being contaminated with mycotoxins.
5. After a short introduction the topics in the second part of the course teacher gives a lecture with the aid of presentations in power point and through discussion with attendants.
6. Previously determined groups now get new material (pure cultures of toxigenic fungi) and they characterize macroscopic and microscopic features in order to tentatively identify the fungi.
7. Teacher leads discussion with the aim of unlabeled photographs of diseased plants, fungal cultures, etc. in power point with the purpose of repeating newly gained knowledge. The attendants are each asked to comment a photograph so that everyone gets a chance to test gained knowledge on a new example.
8. Another, parallel form of test is given to attendants in order to evaluate advancement as a result of the course.

Materials

Printed handouts and test, decayed and healthy fruit, fungal cultures, microscope, microscopic slides, water, needle for slide mount preparation.



Microorganisms in sustainable agriculture

Teacher	Jelena Jovičić Petrović
University	University of Belgrade, Faculty of Agriculture
Course	Microorganisms in sustainable agriculture
Target	Agricultural Middle Schools
Type	classic
Duration	1 day - 8 hours



Description

For decades, the development of intensive agriculture has led to a significant use of pesticides and fertilizers, thus leading to the growing problems related to the protection of natural resources and the impact on human health. Such a trend in agriculture caused the considerably larger focus on conventional production in the education of future staff in the field of agriculture.

However, the soil is the basis of the safe food production. The living soil component - microorganisms is the part which is usually ignored, although the microbial populations in soil are the basis of the fundamental processes that lead to the stability and productivity of agroecosystems.

Regarding the foregoing, the course goal is that teachers understand the importance of the role of microbiological processes in the agricultural soil as a sustainable ecosystem, and to get closer to the possibilities of advanced microbiological inoculums to achieve better quality of soil and crops.

The aim is to motivate teachers to continuously and independently acquire new knowledge in this field, as well as to influence on the development of students' awareness of the importance of the conservation of natural resources which is always relied on biological processes. Due to the acquired knowledge and adopted principles, teachers will be strengthened and motivated for the application of innovative knowledge in the theoretical as well as in practical classes – in the management of experimental fields owned by majority of agricultural schools.

Contents

1. Microbiological processes in agricultural soil;
2. Plant Growth Promoting Microorganisms;
3. Microorganisms and soil health;
4. Microbial inoculants in sustainable agriculture;
5. The effect of agricultural practices on microbiological processes in soil.

Objectives

1. Increasing the professional competence of teachers according to the progress in modern biotechnology in the area of sustainable agriculture;
2. Enabling participants to understand the significance of soil as an ecosystem;
3. Getting insight in advantages and upgrade of the knowledge about the



- possibilities of microbial inoculants application;
4. Acquiring knowledge and developing awareness about the importance of agricultural effects on microbial activity and sustainability in agriculture;
5. Improvement of the teamwork skills.

Activities

1. A brief interaction in which participants have to connect certain microorganisms with respective soil processes, first individually and then with teacher's help. The purpose of the interaction is getting insight in to the previous knowledge of the participants. 20 min
2. Participants listen to an introductory lecture about microbial diversity in soil, microbiological processes and their importance to sustainable agriculture, with emphasis on the trend in agriculture and education regarding the intensive/sustainable agriculture. 40 min
3. Participants individually combine the names and definitions of microbial processes in the cycling of carbon and nitrogen, followed by a brief discussion with the teacher. 20 min
4. The teacher briefly presents the main groups of microorganisms that are important to sustainable agriculture and which will be the topic of the task that follows (microorganisms in humification, azotofixation, plant growth promoting microorganisms, bioremediation agents, and mycorrhizal fungi). 15 min
5. Participants are divided into five groups. The teacher gives them prepared material for group work. 5 min
6. Groups have to prepare presentation for others about one of the previously listed groups of microorganism (with the emphasis on their primary role, application possibilities and advantages of their use in sustainable agriculture). Participants have two classes for this task, also provided some literature, possibility to search the internet and teacher's help if needed. 90 min
7. One representative of each group presents the results of his group (method of choice - poster, presentation, other, etc..). Other participants listen actively with taking notes, which will be useful in the next task (teacher emphasis that before presentations). Teacher comments presentations with additional explanation where necessary, other participants ask questions. 120 min
8. Participants listen actively with taking notes (purpose of the notes, same as in the previous task) about the application of microbial inoculants in agriculture (biocontrol agents, bio-fertilizers, mycorrhizal fungi) and positive and negative effect of agricultural practices on microbiological processes in soil. 70 min
9. At the end of the course, participants in groups with the help of their notes have to make a summary that includes the groups of microorganisms with the list of advantages and disadvantages of the application of certain microorganisms as inoculants, as well as the influence of agricultural practices on the effect of inoculants application. 60 min

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Materials

Papers with the names of microorganisms and processes for the first brief interaction, computers with internet access, paper, markers, video beam, printed text related to significant groups of microorganisms in soil, scheme showing microbial processes in the nitrogen and carbon cycle.

Physiology of digestion and reabsorption in mono- and polygastric animals

Teacher	Vesna Davidović
University	University of Belgrade, Faculty of Agriculture
Course	Physiology of digestion and reabsorption in mono- and polygastric animals
Target	Agricultural Middle Schools
Type	classic
Duration	1 day - 8 hours



Description

Digestive tract in some species of domestic animals differs by its structure and function. In monogastric animals an enzymatic digestion influenced by ferments produced by digestive tract cells is carried out. In polygastric animals (ruminants) food is digested mainly under the influence of microflora and microfauna enzymes, which are constantly present in digestive tract. Besides the differences in the structure and mode of food decomposition, for all animals is common that ingested nutrients (proteins, fats and carbohydrates) breaks down into its simplest components, and then followed by their smoothly resorption through the intestinal epithelium into the blood or lymph. Water, minerals and vitamins are not subject to the process of change in the digestive tract, but they have been reabsorbed and used in unchanged form. After resorption, all of this substances the organism uses to synthesize its own ingredients and as a source of energy.

The purpose of the course is to provide teachers gaining of the new and innovation of the previous knowledge from basic studies by introduction of new concepts in the area of overall activity and functional organization of the digestive tract of domestic animals, neuroendocrine cells in the mucosa of the gastrointestinal tract (DNES-a), synthesis and reabsorption of nutrients, functions of macro and microelements and balance of vitamins in the diet of farm animals.

Furthermore, the course should enable the teachers to master specific practical skills in the field of knowledge and evaluation the effects of digestive tract enzymes on nutrients digestion, as well the application and addition of adequate levels of minerals and vitamins in food for animals.

Contents

Theme of the course is the physiology of digestion and reabsorption in mono- and polygastric animals

Objectives

1. To enable teachers attainment the new and innovation of previous knowledge from basic studies by introduction to new concepts in the field of activities and the overall functioning of the organization and neurohormonal regulation of the digestive tract of domestic animals, the roles and functions of the diffuse



neuroendocrine system (gastrin, secretin, cholecystokinin, VIP, GIP, somatostatin, glucagon, motilin, neurotensin, substance P), synthesis and resorption of nutrients, use of mineral substances (macro- and trace elements) and vitamins in the diet in order to maintain health and improve the productive and reproductive characteristics.

2. To allow teachers to master the specific practical skills in the field of knowing and evaluation the enzymes of the digestive tract effects on nutrients digestion, as well the application and addition of adequate levels of minerals and vitamins in food for animals.

Activities

1. Course participants receive introductory instruction from the teacher and get to know about the theme and objectives of the course.
2. They complete the questionnaire to check their previous knowledge of nutrients' digestion and resorption processes.
3. Participants listen the introductory lecture of the teacher complemented by the power point presentation on the structural and functional characteristics of the digestive system in mono- and polygastric animals. In this way, they restore previous knowledge acquired at the basic studies.
4. Participants listen the lecture of the teacher complemented by the power point presentation on the new concepts in the area of overall activity and functional organization of domestic animals' digestive tract, neuroendocrine cells in the mucosa of the gastrointestinal tract (DNES), synthesis and resorption of nutrients, the function of the macro- and microelements and the balance of vitamins in animal nutrition. They relate and apply the new information to existing experience and knowledge of the physiology of the digestive system.
5. After the teacher expose some segments of the lectures, participants can request information and explanations for what is unclear and they can share their experience and knowledge of that theme.
6. After completion of the theoretical part, the teacher divides participants into the groups and each group gets the task to prove the effect of the digestive tract enzymes (pepsin, lab enzyme, trypsin, amylase, saccharose) on digestion of nutrients (amylum and protein) in the laboratory conditions.
7. Participants from the previously formed groups have an additional task to assess the type of deficit based on the image of an animal with certain vitamin or mineral deficiency, and to determine appropriate levels of these substances which should be added to the food.
8. Participants define the problem, plan a solution, record the results and tell them to the colleagues, they conduct an argumentative dialogue, and they make decision.
9. At the end of the course, participants fill in a test to check the progress of the course.

Building Capacity
of Serbian Agricultural
Education
to Link with Society



Co-funded by the
Tempus Programme
of the European Union

Izgradnja kapaciteta
srpskog obrazovanja
u oblasti poljoprivrede
radi povezivanja sa društvom

Coordinator:
University of Belgrade
Faculty of Agriculture

Koordinator:
Univerzitet u Beogradu
Poljoprivredni fakultet

Materials

Laboratory equipment (tubes, racks of test tubes, burners), water bath, Feling I and Feling II solutions, 1% and 5% amyllum solution, Lugol solution, lab enzyme, milk, extract of gastric and intestinal mucosa, pancreatic extract, 0.3% HCl, 1% Na₂CO₃, 5% NaOH, 0.25% CuSO₄, coagulated egg white, 1% saccharose, paper, pens.

Pictures of the animals with deficiency of certain vitamins or minerals.



Innovation in production of fermented dairy products and cheeses

Teacher	Jelena Miočinović
University	University of Belgrade, Faculty of Agriculture
Course	Innovation in production of fermented dairy products and cheeses
Target	Agricultural Middle Schools
Type	classic
Duration	2 days - 16 hours



Description

The purpose of this course is to gain new knowledge about innovations and trends in the production of fermented milk products and cheeses, as well as tools for achieving adequate safety and high quality of these products. The course will provide students with knowledge and understanding of the manufacturing process of new types of fermented dairy products (use of different ingredients, such as fiber, milk protein powders, probiotic bacteria etc., the use of modern operations such as high pressure, ultrasound, etc.) and different cheeses.

Also, the course will provide an understanding of the existing domestic and international regulatory rules regarding the safety of food products, particularly dairy products. Participants will be able to produce some of their own products (fermented milk products and / or cheese). Special emphasis during the course will be on the latest methods of testing the quality of fermented dairy products and cheeses (testing textural properties of the product and sensory quality of the product).

Contents

1. Production of fermented dairy products and cheeses in world and Serbia
2. Basic of milk chemical composition and properties, production of fermented dairy products and cheeses
3. Innovations in the production of fermented dairy products and cheeses (new types of products, different ingredients, application of modern operations such as ultrasound, high pressure etc.).
4. Examination of fermented milk products and cheeses modern analytical methods
5. Regulatory aspects of production and processing of milk

Objectives

1. Renewal of existing knowledge on the composition and properties of milk, fermented dairy products and cheeses
2. Acquisition of knowledge about innovation in the production of fermented dairy products and cheeses
3. Development of awareness and understanding of important aspects of safety



- and quality of fermented dairy products and cheeses
4. Acquiring knowledge about modern techniques of testing the quality of milk products (texture profile analysis, sensory evaluation)
 5. Acquiring knowledge and manufacturing capabilities of the selected dairy products (a new kind of fermented products or cheese)

Activities

I day

- Part of the course will be through lectures that present the teacher with the renewal of existing and new knowledge (based on the course content)
- Divided into groups, participants will produce fermented dairy products and one type of cheese
- Joint discussion and conclusions about important aspects of safety and quality of fermented milk products and cheese

II day

- In groups, participants will draw up a list of potential risks and defects that may occur in the production of fermented dairy products and cheeses
- Investigation of textural properties and sensory evaluation of products produced previous day
- Joint review and discuss the results of quality of milk products

Materials

Milk, starter culture, salt; video-beam, laptop; papers



Improvement of fish production

Teacher	Marko Stanković
University	University of Belgrade, Faculty of Agriculture
Course	Improvement of fish production
Target	Agricultural Extension Service
Type	classic
Duration	1 day - 8 hours



Description

Currently aquaculture represents the fastest growing food sector, which is constantly developing, expanding and intensifying in almost all areas of the world. In order reach the world levels, it is necessary to work continuously on improving fish production in Serbia. The possibilities for development of aquaculture in Serbia are primarily in increasing the production per unit area (volume), surface area of fishponds and the diversity of cultivated fish species. Increase of production in fish ponds can be realized through intensifying production using good quality supplemental feed, modern selection programs for obtaining better quality of fish fry, reconstruction of existing ponds, improving production technology by using aerators and feeders in ponds, as well as better prevention and health protection of cultivated fish.

The idea of the course is to provide agricultural advisers with the knowledge on fish breeding programs, better quality fish feeds and additional improvements in fish production technology. By introducing these issues to agricultural advisors and through their personal communication with fish producers, the knowledge will be easier to adopt and implemented by fish producers, providing better production results and better quality of the final product.

Contents

1. Fish habitats
2. Characteristics of commercially produced fish in Serbia
3. Fish production systems
4. Technology of fish production
5. Modern concepts of fish nutrition
6. Possibilities for obtaining new production capacities

Objectives

1. To review previously acquired knowledge of basic characteristics of the most abundant commercial fish species
2. To learn new concepts in fish production technology and understand their strengths and ways of application
3. To exercise the ability of argumentative representation of certain procedures and methods



4. To discuss the problems of applying new technologies in fish production and opportunities for increasing of existing capacities for fish production

Activities

1. Participants will be briefly informed on the course program
2. Participants will fill in a short questionnaire on previously acquired knowledge on systems and technology of fish production.
3. Participants will be listening to oral presentations on thematic units from the above mentioned course content with especial stress on challenging issues
4. The University teacher (UT) divides the participants in groups that will work on different fish production issues. Later, they will discuss problems of fish production and try to suggest improvements in these areas.
5. At the end of the course, participants take a test in order to provide the UT with the information on the level of knowledge gained from the course.

Materials

Material needed is PowerPoint presentations, computer and projector, tests, pencils, questionnaires, notebooks, blackboard, marker pen and sponge.



Food Microbiology

Teacher	Milena Savić	
University	University of Belgrade, Faculty of Agriculture	
Course	Food Microbiology	
Target	Agricultural Middle Schools	
Type	blended	
Duration	2 days - 16 hours	

Description	Microorganisms play an important role in the food production. Also, the main competitor in the food production, consumption, distribution and storage and also foodborne disease agents are microbes. The course should enable high school teachers to improve specific skills of organizing classes and encourage them to introduce an online and interactive teaching methods. The course should also help teachers to renew and to supplement their knowledge in the field of food microbiology.
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Contents	<ol style="list-style-type: none">1. Sources and importance of microorganisms in food2. Defining the dominant groups of microorganisms in food3. Characteristics of the dominant groups of microorganisms in food4. Factors affecting the growth of microorganisms in food5. The products of metabolism of microorganisms in food
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Objectives	<ol style="list-style-type: none">1. Systematization of the acquired knowledge of participants in the field of food microbiology, which can serve as a model in their work with students.2. Supplementing knowledge and skills of participants about how to create tests online, vocabulary with tasks in the field of food microbiology with examples, training the use of Moodle. Developing the ability of participants to find the necessary information.3. Development of the ability of participants to consolidate acquired knowledge in various fields of food microbiology through test making and solving problems.4. Contribution to the development of the ability of participants to apply the acquired knowledge in the field of food microbiology in the new situations, creating scenarios5. Presentation of the news, statistics and trends in the field of food microbiology which can help to the participants in their own teaching.
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Activities	Activities during the first day - The course participants organized in groups create online dictionaries of the most important words in the field of food microbiology. Mutual, groups
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compare lists of terms, supplement and comment dictionaries, argue the importance of the selected terms. The activity ends with making the final list of common terms that will enter into a common online dictionary.

- Participants in teams (from each group one participant) associate terms from different themes for different microorganisms (microorganism with growth factors and products of metabolism). Participants are thinking about how to present concepts (conceptual maps, illustrations, drawings, diagrams etc.). Participants present the results and teams discuss and argue the results.
- The course participants further practice the application of knowledge through a combination of different factors and predicting the most risky or the most favorable factors for the presence of certain groups of microorganisms in food. One team gives the other team tasks in the form of scenarios. Every team presents the conclusions, discuss and evaluate the work of other teams.
- Lecturer at the end of the day gives the Power Point presentation on the latest trends in the field of food microbiology and global epidemic data with statistics. The participants share their observations during the presentation.

Activities during the second day

- The course participants organized in groups create tests of knowledge online (they choose the form of the test and the lecturer helps them). They create test with the tasks of the practical application of knowledge, which should anticipate the risks or to identify the causes of food spoilage / potential benefits of microorganisms in the food using dictionaries. One group solves the test of the other, and then discuss the results and test form.
- Lecturer gives to the teams different scenarios - actual cases of food poisoning in the last 5 years. Participants should solve scenarios using dictionaries, predicting possible poisoning prevention according to the microorganism growth factors. Every team present the conclusions, discuss and evaluate the work of other teams.

Materials

The printed material, computers with internet access for all course participants, blackboard, video-beam, large-format papers, markers, notebooks and pens for all participants.



Sanitation of food facilities

Teacher	Milica Petrušić
University	University of Belgrade, Faculty of Agriculture
Course	Sanitation of food facilities
Target	Agricultural Middle Schools
Type	blended
Duration	2 days - 16 hours



Description

Course sanitation of food facilities should contribute to raising awareness of food safety, and thereby also importance of the principles of planning, development, implementation, maintenance, installation or improvement of hygiene practice, in order to ensure appropriate environmental conditions for food production. The course develops awareness of numerous possibilities food contamination from the moment of production to the moment of consumption, as well as various means that will enable obtaining safe food. Also, the course will cover the importance of sanitation facilities in the protection of human health and its association with the surrounding environment factors that affect the health.

During the studies, insufficient time and space is dedicated to the question of food safety, the possibility of contamination, and therefore the sanitation food facilities. Considering how much this topic is important for daily life, especially for someone who will have agriculture as profession, it is essential to expand the current knowledge and learn some new information in this field.

Contents

Course participants will be acquainted with sanitation and its importance in food facilities. Also, various factors will be processed such as air and water microbiology, hygiene of employees in facilities and biofilms, which may lead to certain problems in food facilities. Likewise, the course will include introduction to detergents and means for sanitation, as well as the basic principles of sanitation facility that can contribute to solving some of the fundamental problems in food facilities.

Objectives

1. Consideration of the role and significance of sanitation in food facilities
2. Raising awareness on the importance of water and air microbiology and hygiene of employees, getting familiar with the biofilms and problems which they cause in food facilities, recognizing the importance of different means of washing and sanitation
3. Developing awareness of the importance of the basic principles of sanitation and their role in food facilities.



Activities

1. Before the start of the course, course participants should fill out a brief questionnaire which would be positioned on *Moodle* system. The questionnaire would include some basic questions about sanitation of food facility and it should provide insight into how the participants are familiar with some basic concepts of sanitation.
2. The first day will include a keynote lecture as a reminder of the basic concepts in the sanitation of food facility, followed by a lecture about the significance of microbiology of air and water, hygiene of employees and the problems they may cause, as well as an increasing problem in food facilities, biofilms.
3. After lectures, the rest of the day is scheduled for activities on Moodle system, in the form of vocabulary of new terms, as well as setting up topic for discussion on the forum where the course participants could give some examples of problems that are encountered in food facilities and the ways of solving of given problem.
4. The second day is dedicated to lectures on the washing agents, means of sanitation and basic principles of sanitation facility.
5. After the completion of the lectures, the rest of the day is intended for work in groups (4-5 people), where each group would be set up with a problem that had encountered some of the food facilities. Problems would be different and they would include some of the basic concepts that cause a variety of problems in food facilities such as various contaminants from water or air, biofilms that cause increasing problems, etc. Within the group, participants should consider all the ways of solving a given problem and eventually provide a unique solution. The solution of the problem should involve some of the basic principles of sanitation, washing agents and sanitation facilities or a combination of these components. After a certain time given them to solve the problem, each group would have a few minutes to explain the problem and to present their solution of the problem which they got. After the presentation of each group, course participants would mutually discuss about the solution of given problems and along with the teacher correct the eventual mistakes and indicate maybe a better solution for some problems. Through this method of teaching, course participants should be able to apply newly acquired knowledge and with group work applying them in some of the situations that can be found in food facilities.
6. At the end of the course, participants would have the opportunity to evaluate the course.

Materials

Appropriate room, preferably with computers and internet access, several Petri dishes with nutrient agar.



Pig production in the conditions of unstable market

Teacher	Mladen Popovac
University	University of Belgrade, Faculty of Agriculture
Course	Pig production in the conditions of unstable market
Target	Agricultural Extension Service
Type	classic
Duration	2 days - 16 hours



Description

The course is intended for advisors (PSSS) for the purpose of applying an adequate technology and improving the conditions of pig breeding which are characteristic for larger part of domestic pig production in order to achieve better economic results in this branch of livestock breeding in the conditions of unstable market. A cyclical process of pig meat production, regarding offer and demand, is characteristic not only for domestic market but for global market as well, this process being repeated in proper time intervals of 4 years in developed countries while the price per product unit (kilo of live weight of fattener) in these countries is far less variable than in undeveloped and developing countries. By applying proper conditions and standards in selection, reproduction, raising, nutrition, housing and agro-management of overall technological process of pig breeding production negative effects of unstable market could be alleviated and prevented up to a point in order that an appropriate financial gain could be realized. During the course the most common problems in domestic pig industry will be discussed and concrete proposals for their efficient solving presented in order that this segment of livestock production should be competitive with other segments of agro-business.

Contents

The course is conceived so as to deal with the problem of the most important segments of pig production in the conditions of domestic production with a concrete proposals to the solutions of current problems. Topics included in the realization of the course are following:

1. Introduction and the importance of pig production;
2. Pig selection;
3. Pig raising;
4. Pig reproduction;
5. Pig housing systems;
6. Nutrition of pigs;
7. Economic profitability and competitiveness of pig production.

Objectives

1. A major goal of the course is for PSS advisors to acquire wider knowledge than



that acquired in undergraduate studies on pig production. Through introductory lecture which is conceived as an interaction between lecturer and participants of the course the lecturer will gain insight into a level of knowledge of participants and in that way adapt the course to their level of knowledge and address the problems which they meet in practice and which will be mentioned in a discussion between lecturer and participants.

2. Through course lessons the problems in pig production and the possibilities of their overcoming in practice will be presented, so that advisors should help pig breeders by their suggestions to make pig production more competitive and to realize economic gain in this branch of livestock breeding in the conditions of unstable market which is characteristic for this branch of livestock production.
3. In addition, advisor capability to independently work on terrain and solve specific problems will be encouraged. By working in groups and solving concrete problems participants of the course will alone or with the help of lecturers suggest solutions which will be further analyzed by all the participants of the course and adapted so that they solve the problem in the best way.

Activities

1. Course participants will listen to oral presentations of topics listed in the contents and will have an opportunity to ask questions and participate actively in presentation.
2. After presentation of each topic the participants divided into groups will have concrete problems to solve and suggest the way in which they could be solved what will be further analyzed and worked out in a panel discussion.
3. At the end of every topic as well as at the end of a whole course panel discussions will be organized in which the participants will talk about their experiences and problems associated with pig production and a lecturer will together with other participants try to suggest concrete proposals to the solutions of these problems.

Materials

PowerPoint presentation, computer with video projector, questionnaires, pencils, notebooks, board, felt tip markers, sponge.



Postharvest pathogens of fruits and vegetables

Teacher	Nataša Duduk
University	University of Belgrade, Faculty of Agriculture
Course	Postharvest pathogens of fruits and vegetables
Target	Agricultural Extension Service
Type	classic
Duration	1 day - 8 hours



Description	Plant diseases are the cause of economic losses in crop production, which is why great care in modern agriculture is directed towards the protection of plants during cultivation. However, plant pathogens lead to postharvest fruit rot and can cause significant losses. This issue has not received sufficient attention in the basic studies of Phytomedicine, therefore the aim of this course is updating knowledge about the most important postharvest pathogens of fruits and vegetables and the introduction of comprehensive control measures that will contribute to the achievement of high yields and reducing damage caused by postharvest decay. Through this course advisory service members will be trained to transfer their knowledge to farmers regarding the importance of postharvest plant pathogens and a variety of control measures which will help reduce postharvest economic losses.
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Contents	<ol style="list-style-type: none">1. The first topic will cover the economic losses, the conditions necessary for development of postharvest diseases (during storage and warehousing), sources of inoculum, infection and colonization of pathogens, as well as diagnostic methods.2. The second topic will include the most important postharvest pathogens of various fruit and vegetable crops, as well as their control management.
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Objectives	<ol style="list-style-type: none">1. Improving knowledge of economic importance, epidemiology, diagnostic methods and control of causal postharvest pathogens of fruits and vegetables, as well as the skills of giving accurately diagnosis of diseases and appropriate control measures.2. Developing the ability to connect knowledge from different fields of plant pathology, pomology and vegetable crop production.3. Contribution to the development of the capacity to apply the acquired knowledge to new situations, making the program of control measures to reduce the economic loss due to the presence of pathogenic fungi.
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Activities	1. The course will be conducted as interactive teaching. It will consist of an
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introductory part which will provide the participants with the information regarding themes and objectives of the course.

2. Participants will complete a brief test that will check their knowledge about the causal agents of postharvest decay of fruits and vegetables.
3. After that, the teacher will, in accordance with students' prior knowledge, give lecture and inform students about content on the first topic through power point presentation and discussion.
4. Then the teacher divide participants into groups and each group will be assigned to give a preliminary diagnosis of the disease on a specific example.
5. Presentation of groups work and its public justification in front of the whole group.
6. The second topic will be exhibited depending on the previous knowledge of students in the form of a power point presentation and discussion about individual experiences.
7. Previously formed groups of students will be assigned to make a program of control measures for certain types of fruit or pathogenic fungi and to present publicly in front of the whole group.
8. At the end of the course, participants will do a test for advancement evaluation.

Materials

The printed material, decayed fruits and vegetables that will be used to diagnoses, microscopic slides, water, needle for slide mount preparation, microscope.



Microbiological Food Safety

Teacher	Nemanja Mirković
University	University of Belgrade, Faculty of Agriculture
Course	Microbiological Food Safety
Target	Agricultural Middle Schools
Type	classic
Duration	2 days - 16 hours



Description	The purpose of organizing a two-day seminar with lectures is to familiarize teachers with the sources of pathogenic microorganisms in food, characteristics of pathogenic microorganisms in food and the types of food that are carriers of pathogenic microorganisms. Recognizing the importance of the successful detection and identification of pathogenic microorganisms in food, using standard molecular and microbiological methods. Introducing teachers with corrective procedures for the control of pathogens in food. Implementation of this program is achieved improving the professional competence of teachers of secondary schools in the field of application of microbiological food safety.
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Contents	<ol style="list-style-type: none">1. Expanding the knowledge to the latest data about the sources of pathogenic microorganisms in food, both in the production process and at the end of the production process.2. Disadvantages and advantages of the classical microbiological methods in relation to the modern molecular methods for the detection of pathogenic micro-organisms in foods.3. Corrective procedures in the food industry for the control of pathogenic microorganisms in the food.
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Objectives	<ol style="list-style-type: none">1. Expansion of knowledge of teachers about the source of pathogenic microorganisms in food2. Introduction to the problems in the food industry, causes of contamination of food with pathogenic microorganisms3. Getting started with modern molecular methods for detection of pathogenic microorganisms in food4. Consideration of the advantages and disadvantages of conventional microbiological methods in comparison with modern molecular methods for detection of pathogenic microorganisms in food5. Strengthening the ability of teachers in the implementation of corrective procedures for the control of pathogens in food
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Activities

First day:

Pathogens in food, a review by groups of microorganisms, where can be found. Problems caused by pathogenic micro-organisms in the food industries, the most recent data. New pathogens, opportunistic pathogens in foodstuffs. Introduction to modern methods for the detection of microorganisms in food products. Teachers will work in groups on a comparison of conventional microbiological methods and modern molecular methods for the detection of pathogenic microorganisms in food products (skills, working time, price and sensitivity of the method).

Second day:

Introduce participants of the course with the problems that are facing the food industry to ensure microbiologically safe product (standards, regulations). Corrective procedures for the control of pathogens in the food industry. Course participants will work in groups in the specific case of the introduction of corrective actions for the control and elimination of pathogenic microorganisms in the food industry.

Materials

Computer with video beam, blackboard, chalk.



Behavioral disorders and health in cattle

Teacher	Renata Relić
University	University of Belgrade, Faculty of Agriculture
Course	Behavioral disorders and health in cattle
Target	Agricultural Advisory Service
Type	online
Duration	1 day - 8 hours



Description

The term "animal welfare" among professional and consumers around the world has been often mentioned. According to the concept of welfare, quality of animal products is (reasonably) associated with the quality of animals' life and environment. This gradually change consumer awareness in Serbia, so they rather choose products for which they know or assume they are obtained from animals kept in good conditions and in accordance with the principles of welfare protection. However, the high production is often placed in front of farm animals' needs and thus opposes the welfare concept. Consequently a number of associated conditions in farm animals appears, mutually called "technopathies", involving psychopathies (illness, injury), reproductopathies (disorders in reproduction) and ethopathies (disorders in animal behavior).

Behavior of an animal may indicate that it is injured or sick, but it often changes before the appearance of obvious health and other problems. Farmers should be aware of the animals' life needs and should know to recognize and understand the changes in their behavior, which is in practice commonly associated with appropriate knowledge, experience and motivation. The role of advisors is significant in farmers' education about animal behavior, but it is usually focused on other types of issues that arise in practice.

The purpose of this course is providing new information to advisors and linking their existing knowledge considering the most common ethopathies of cattle in different rearing systems, their cause and the effects, as well as their relation to other technopathies and common health problems of cattle. Furthermore, the advisers within the course can gain knowledge about the practically applicable methods of evaluation of certain forms of cattle behavior. The acquired knowledge can improve fieldwork of the advisors enabling them to arguably explain the concept of animal welfare to farmers, as well to point to failures in the cattle rearing and to help in solving their behavioral i.e. welfare problems.

Contents

1. The concept of animal welfare and its assessment, definition of technopathies and conditions that they include;
2. Life needs and natural behavior of cattle;
3. Characteristics of rearing systems and their compliance with cattle needs;



4. Most common ethopathies in different categories of cattle - characteristics, causes, correlation to health and production, assessment, prevention of the occurrence.

Objectives

1. Updating the knowledge about welfare and behavior in cattle
2. Development of the ability to recognize the most common ethopathies in cattle, causes of their occurrence and correlation to the cattle health and production
3. Contribution to solving specific cattle welfare problems in practice

Activities

1. Participants attend the course topics in the order they are listed in the content of the course. Within the each topic there are lessons containing the material necessary for participants to gain new, as well to renewal and link existing knowledge. Lessons also contain questions for exercise and for better understanding the material.
2. After mastering all lessons the participants work test of practical application of knowledge, in which they should anticipate the occurrence of the ethopathy or to recognize it in a particular rearing system according to given photograph and/or description
3. Participant can use forum for discussion about test results and for questions.

Materials

Computer and internet connection; prepared lessons and test of practical application of knowledge on *Moodle* platform



Capital Investment Evaluation

Teacher	Sanjin Ivanović
University	University of Belgrade, Faculty of Agriculture
Course	Capital Investment Evaluation
Target	Agricultural Middle Schools
Type	classic
Duration	1 day - 8 hours



Description	<p>Target group of the course are professors of agricultural middle schools. They will become familiar with basic elements of economic profitability and financial feasibility of capital investments in agriculture.</p> <p>Capital investments involve purchase of fixed assets in agriculture such as buildings, equipment, breeding livestock, land and permanent crops. Investments are undertaken because of two reasons:</p> <ul style="list-style-type: none">- to replace existing fixed assets with the same new assets or- to purchase more modern fixed assets instead of existing ones. <p>Without investments in modernization of fixed assets technical and technological development in agriculture is impossible. Respectively, capital investments are precondition to maintain competitiveness of agricultural producers. However, before investments in agriculture are undertaken it is necessary to check their acceptability. Only those investments which are acceptable should actually be undertaken in practice.</p> <p>Within this course participants will learn to calculate the net present value of the investment as well as to check whether the investment will generate sufficient cash to make the principal and interest payments on borrowed funds used to purchase the asset.</p>
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Contents	<ol style="list-style-type: none">1. Capital budgeting (concept and methodology for determination of economic profitability and financial feasibility of investments in agricultural enterprises and family farms).2. Practical application of capital budgeting in agricultural production.
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Objectives	<ol style="list-style-type: none">1. Acquiring basic knowledge in evaluation of capital investments in agricultural production and selection of investments that will improve the financial performance of the business.2. Practical performance of assessment of economic effectiveness and financial feasibility of investments.
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Activities	<ol style="list-style-type: none">1. First class – Participants attend introductory lecture. The topics of the lecture are difference between fixed and working assets as well as characteristics of investments in agriculture. Participants calculate amount of investments in purchase of fixed assets and influence of various factors on this amount.2. Second and third class – Using an example, participants determine cash revenues, cash expenses and net cash flow of investment.3. Fourth – Participants attend lecture on time value of money, appropriate discount rate and use of mathematical tables which are necessary to determine net present value of investment and its financial feasibility.4. Fifth and sixth – Participants independently (using examples) determine net present value of the investments in agriculture.5. Seventh and eighth class – Participants independently (using examples) determine financial feasibility of the investments in agriculture.
Materials	<p>Appropriate examples of evaluation of investments in agricultural production will be used during the training (there will be evaluated investments in agricultural land, investments in livestock production, investments in orchards and vineyards).</p> <p>For successful participation in the course attendants will receive and use mathematical tables (present value of \$1) – formula: $\\$1/(1+i)^n$.</p>



The concept of terroir and the impact on the quality of grapes and wine

Teacher	Zorica Ranković-Vasić
University	University of Belgrade, Faculty of Agriculture
Course	The concept of <i>terroir</i> and the impact on the quality of grapes and wine
Target	Agricultural Extension Service
Type	classic
Duration	1 day - 8 hours



Description

It is well known that not only the different varieties of vines can give wines that vary in flavor but the same variety can give different wines depending on the locality where it is grown. The differences between the vine growing regions are in the soil and microclimate conditions which result in the production of grapes with different characteristics. Those differences are reflected in the wines which take on the character of the area in which the variety of grapes vine was grown and produced. The existence of qualitative differences between different *terroir*, but also the existence of a mechanical link between a *terroir* and produced grape and wine is the basis of this course.

Counselors „PSSS“, as users of the course will be introduced to the basic elements of *terroir* and the impact on the quality of grape and wine. The purpose of this course is to acquire knowledge of the existence of qualitative differences between the various *terroir* and the existence of a mechanical link between a *terroir* and produced grape and wines. Advisers will this knowledge transfer to winegrowers, to assist them in obtaining quality grape intended for the production of optimal wines quality.

Contents

1. Introduction to the work plan on course
2. Introduction to the concept of *terroir* in viticulture
 - 2.1. Interpretation of the term *terroir*
 - 2.2. Examples of different *terroir* environments in the world and Serbia
3. Impact of the ecological potential of the localities to the cultivation of grapevine and quality wine grapes
 - 3.1. The influence of climatic and meteorological factors
 - 3.2. The effect of soil factors
4. *Terroir* "zoning" in viticulture
 - 4.1. Using GPS and GIS technology
5. Effects of the *terroir* and the impact on the cultivar phenology
 - 5.1. Identification BBCH scale
6. The choice of the localities for vineyards
 - 6.1. Macro relief as a factor of grape growing



- 6.2. Improving fertility, physical and chemical properties of soil
7. Cultivar as a factor *terroir*
 - 7.1. Selection of a high quality planting materials
8. Modern systems of cultivation and management
 - 8.1. Establishing the optimal relationship between the yield and quality of grapes
 - 8.2. Improving the microclimate conditions gauntlet
9. „Phenolic maturity“ of grapes
 - 9.1. Mechanical and chemical composition of grapes for obtaining quality wines
 - 9.2. The dynamics of phenolic composition of grapes during the maturation
10. Management of *terroir*
 - 10.1. Qualitative differences between different *terroir*
 - 10.2. Different styles of wines from different *terroir*

Objectives

The overall objective of the course is further training of advisors from „PSSS“ the field of contemporary production of grapes intended for obtaining wines of optimal quality.

As specific goals of the course are expected to:

1. Participants will gain knowledge about: the basic elements of *terroir* and their impact on the quality of grapes and wine.
2. Participants will learn to effectively use the spectrophotometer (a device for determining phenolic composition of the grapes).

Activities

1. Topic (9.00-9.15am) - The teacher of the course introduces participants to the whole plan and schedule of work in the course.
2. Topic (9.15-10.00am) - A teacher with the help of a *PowerPoint* presentation of the course introduces participants to the interpretations and basic elements of a *terroir*. Shows them different examples of *terroir* environments in the world and Serbia.
3. Topic (10.00-10.45am) - A teacher with the help of a *PowerPoint* presentation introduces participants to the basic elements of the ecological potential of a localities (climatic and soil factors). Discussion of the various *terroir* zones in Serbia. Each participant talking about climatic and soil characteristics of the wine-growing region they come from.
Pause (10.45-11.00am)
4. Topic (11.00-11.45am) - A teacher with help of a *PowerPoint* presentation introduces participants to the importance of the use of GPS and GIS technology. Participants express their opinions.
5. Topic (11.45-12.30am) - With the help of a *PowerPoint* presentation the teacher introduces to the importance of applying BBCH scale of phenological phases of development of the grapevine. The course participants present their observations



on the producer vineyards.

6. Topic (12.30-13.15pm) - With the help of a *PowerPoint* presentation the teacher introduces participants to the basic principles of choice locations for vineyards. The teacher divides participants into groups (3-5 members depending on the total number of listeners of the course). Each participant in the group have results of chemical analyzes of the soil in the region from which it comes. The teacher gives instructions for work. Members of each group work different tasks to improve the fertility of chemical and physical properties of the soil in certain localities and presenting their results.

Lunch (13.15-14.15pm)

7. Topic (14.15-15.00pm) - The teacher of the course introduces participants to the importance of the choice cultivar in *terroir*. Already established groups receive material to work (vine grafts, scissors, questionnaires ...) in order to determine the quality of planting material. The teacher gives instructions. The course participants share their knowledge and experience on the planting materials from their vineyards and compares them with the material obtained in class. Joint discussions.

8. Topic (15.00-15.45pm) - The course participants share their knowledge of grape growing systems and agrotechnical and viticultural measures which producers apply in their vineyards. With the help of a *PowerPoint* presentation the teacher of the course introduces participants to new methods and measures in this field. Together discussions.

Pause (15.45-16.00pm)

9. Topic (16.00-16.45pm) - With Using *PowerPoint* presentations the teacher of the course introduces participants to the importance of determining the quality of the grapes. The participants discuss with the teacher on how they do that on the ground. All together they go to the lab. Each group receives material from teachers to work in order to determine the quality of the obtained samples of grapes. Given that participants in their work are already using appliances for determining the ripeness of the grapes, the teacher shows the basic principles of work, just a spectrophotometer, because did not use this appliance. Each group works on the device using their samples of grapes. The teacher monitors the work of the group and directs them in their work. The groups present the results.

10. Topic (16.45-17.15pm) - The teacher introduce about qualitative categories of a wine in *terroir* environment.

(17.15-18.15pm) - Tasting of wines from different *terroir*. Together discussion and conclusions.

Evaluation (18,15-18,30pm) - The course participants answer on the questions from the survey and express their opinions and impressions about the overall course.

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Coordinator:
University of Belgrade
Faculty of Agriculture

Koordinator:
Univerzitet u Beogradu
Poljoprivredni fakultet

Materials

Computers, *PowerPoint* presentations, whiteboard, markers, sponge, paper, pens, a lists with the results of chemical analyzes of different types of soil, planting materials, scissors, questionnaires, grape, spectrophotometer, materials and equipment for wine tasting.



Water quality and bioindicators

Teacher	Zorka Dulić
University	University of Belgrade, Faculty of Agriculture
Course	Water quality and bioindicators
Target	Agricultural Middle Schools
Type	online
Duration	2 days - 16 hours



Description

Degradation of water ecosystems is currently one of the most significant types of environmental pollution. Agriculture is considered to be one of the main causes of surface and groundwater pollution. The issue of water pollution, causes and consequences of their neglect in Serbia, as well as possibilities for their rehabilitation has not received sufficient attention in schools and on studies at the Faculty of Agriculture. However, this is also a global problem that should not only be dealt with in schools. Raising awareness on the importance, but also the vulnerability of aquatic ecosystems as well as the sources of pollution, should be carried out at all levels of the society, in schools and through education of citizens and wider audience. Informing inhabitants of Serbian cities and rural areas with the current situation and possibilities for their involvement in monitoring and conservation of water resources could be one of the most effective ways in solving this environmental issue. The experience of European countries and the USA have witnessed success in this approach to environmental protection, and showed that the involvement of each individual in monitoring programs is of immense importance for the success of the program and preservation of water resources. This course will enable teachers to get insight into possible approaches to monitoring and protection of water resources in Serbia, regardless of their previous knowledge of these issues. In addition, transfer of knowledge from teachers to students is the most important step in raising the awareness of the problem, both at local and global levels. This way teachers and students have the opportunity to become an integral part of the campaign dealing with this important environmental issue.

Contents

1. The concept of water quality, water quality parameters, values for different levels of degradation of aquatic ecosystems and sampling methods.
2. Communities of aquatic organisms, their structure and ecology, and role as bio-indicators of water quality. Methods for sampling organisms.
3. Types of monitoring programs of aquatic ecosystems

Objectives

1. Acquisition and improvement of knowledge on water quality, communities of



aquatic organisms and their bio-indication properties, sampling methods, and sources of pollution.

2. Capability of creating a manual for voluntary assessment of the status of aquatic ecosystems, as well as integrated use of water quality parameters and environmental conditions necessary for optimal development of aquatic organisms.
3. Capability of applying acquired knowledge to other areas of environmental protection (terrestrial, air).

Activities

1. At the beginning of the course, participants take a short *Moodle* test to help the University teacher (UT) determine the level of their knowledge on water quality, indicator biocenosis and monitoring learned in previous education.
2. Based on test results, the UT divides participants into two groups: group without prior knowledge and group with some previous knowledge.
3. Each group of participants, depending on prior knowledge, gets *Moodle* access to certain materials - presentations (*ppt*) for reading and *Moodle* lessons for practicing and additional literature in the form of *pdf* texts, links and clips, as well as links to interactive keys for determination of aquatic animals.
4. After getting familiar with the literature, the UT divides participants again, but in smaller groups (two or three participants). Each group is given the task to make a basic manual that can be used to determine the state of a small local watercourse.
5. The manual should include: size of the investigated area, coordinates, type of habitat, potential contaminants (e.g. proximity to fields, farms or factories), equipment needed for a basic analysis of the ecological state of water, which equipment is owned by the school in which the teacher works that could be used for this research, The text of the manual should be submitted online, through the *Moodle* activity "submission of finalized manuals".
6. The following day, participant groups organize a trip to a small local watercourse: stream, river, lake, pond or canal and perform an inspection of the water quality using instructions from their manual.
7. Following completion of the task, the group analyzes their results and writes a report similar to an official report of agencies for environmental protection.
8. Time after that will be used for a mediated discussion on the results obtained and for drawing conclusions about the water quality, impact of pollution on the aquatic organisms, as well as the advantages and disadvantages of voluntary assessment of aquatic ecosystems using Skype conference call.

Materials

Given that this is an online course, material needed is a computer, *Skype* profile, computer camera and *Internet* connection.



Autochthonous lactic acid bacteria -vector of traditional cheeses standardization and innovative technology of functional food development

Teacher	Zorica Radulović
University	University of Belgrade, Faculty of Agriculture
Course	Autochthonous lactic acid bacteria -vector of traditional cheeses standardization and innovative technology of functional food development
Target	Agricultural Middle Schools
Type	classic
Duration	2 days - 16 hours



Description

The course should contribute to strengthening the awareness of teachers about the importance of traditional products and their standardization and protection, and the possibility of developing new innovative technologies safe functional foods, all based on preserving the biodiversity of indigenous lactic acid bacteria. The course should include the role and importance of indigenous lactic acid bacteria (LAB), isolated from traditional cheeses, as well as a rich biodiversity with great potential multiple applications. On one hand, the course should contribute to the expansion of knowledge about the role of these bacteria in traditional cheeses, which are characterized by rich smell and taste and their importance in the standardization of the production of traditional cheeses as safe food of uniform quality and also in preserving the quality and better marketing of traditional cheeses. On the other hand, the course will contribute to expanding knowledge on the development of innovative technologies in the production of functional foods, which are based on the use of commercial probiotics or indigenous lactic acid bacteria which are confirmed to have potential probiotic properties.

Contents

1. Introduction to the general characteristics of LAB, their metabolism and important properties that should have to be applied as a starter culture in cheese production
2. The issue of selection of LAB and their application in a standardized production of traditional cheeses in brine will be covered by the methodology of selection of indigenous potential probiotic LAB strains in vitro.
3. The impact of gastrointestinal (GI) microflora on human health, with special emphasis on the importance of probiotics in maintaining and improving the health of people.
4. Pointing out the potential application of indigenous probiotics in functional foods (probiotic cheeses, yoghurt enriched omega-3 fatty acids, probiotic



chocolate, sausages).

Objectives

1. Expanding knowledge about general characteristics and metabolism of LAB o Consideration of the role and importance of starter cultures in the production and cheese
2. Expanding knowledge of knowledge about the characteristics of indigenous LAB and their role in standardization of traditional cheeses
3. Raising awareness about the importance of standardized production of traditional cheeses as safe food, in order to protect the origin label and improve sales of traditional cheese
4. Acquiring knowledge about the role of lactic acid bacteria (probiotics) in the GI tract and significance for human health
5. Acquiring knowledge about the criteria for selection of potential probiotics in vitro
6. Developing awareness of the importance of new technologies to produce functional foods enriched with probiotic bacteria

Activities

The first part of the first day of the course will include communication with participants about their previous knowledge, and then the characteristics and metabolism of lactic acid bacteria, as well as the characteristics important for the starter culture and their role in the production and maturation of cheeses will be presented. The second part of the first day will be devoted to a more detailed explanation of the importance of indigenous LAB in the traditional cheeses, methodology and selection criteria for their use as starter cultures in order to standardize the production of traditional cheeses. The third part of the first day will cover the course participants work in pairs, where will be necessary to draw up a starter culture of the offered species and characteristics of LAB. Discussion about solutions, which each pair offered. The first part of the second day will be devoted to communication with participants about their current knowledge on the composition of the GI microflora as ecosystem important for human health. In addition, participants will have the opportunity to expand their knowledge on the role of probiotics in the digestive organs and their impact on human health, and then on the selection criteria of autochthonous potential probiotics for use in functional food production. The second part of the second day will cover the involvement of all participants in the scenario, which implies solving the original problem in working in groups.

Materials

Video beam, laptop, white board or large paper pad, marker. For the interactive class - an additional three laptops

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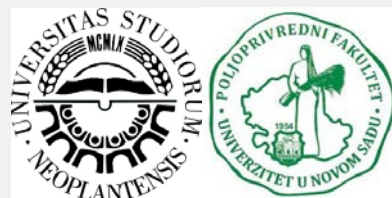
Faculty of Agriculture





Applied veterinary epidemiology

Teacher	Aleksandar Potkonjak
University	University of Novi Sad, Faculty of Agriculture
Course	Applied veterinary epidemiology
Target	Agricultural Middle Schools
Type	blended
Duration	2 days - 16 hours



Description

In the last decade Veterinary epidemiology suffered significant revisions. The mere appearance of new diseases with changing of risk factors for the emergence of diseases and lifestyles of people, as well as technology development; greatly changed the definition, objectives and methods of the discipline. In our country, a few years ago, this subject did not exist as an independent in university curricula. As international institutions (WHO, FAO, OIE, CDC and ECDC) require the application of epidemiological knowledge and skills, additional education of teachers in secondary schools and republic veterinary inspectors is necessary. In the curriculum of vocational subjects for the educational profile of a veterinary technician, in secondary schools, subject Epizootiology is included (an archaic term for Veterinary Epidemiology), with a very limited and obsolete methodical units taught by teachers. Republic veterinary inspectors, primarily work on eradication of infectious diseases of animals and control of hygienic quality of food. Technical basis for this work presents veterinary epidemiology. Upon completion of the course students should be able to apply the basic principles of veterinary epidemiology and improve their professional activities.

Contents

1. Importance of international organizations
2. Notification of infectious diseases
3. Theory of cause and effect
4. Types of epidemiological studies
5. Incidence, prevalence, morbidity, mortality, lethality
6. Defining of type and size of samples
7. Epidemiological survey
8. Epidemiological investigation
9. *E-learning*: solving of epidemiological problems

Objectives

1. Acquisition of new knowledge on applied veterinary epidemiology and skills of applying of epidemiological methods
2. Modernization of teaching in the Epizootiology in secondary schools
3. Application of epidemiological methods in everyday professional work of



republic veterinary inspectors

Activities

On the first day, participants attend the lectures (importance of international organizations, notification of infectious diseases; theory of cause and effect; types of epidemiological studies and incidence, prevalence, morbidity, mortality, lethality), individually solve a task (defining of type and size of samples) and work in group on topics (epidemiological survey and epidemiological investigation).
On the second day participants, using E-learning Moodle, individually solve epidemiological problems and then the summative test.

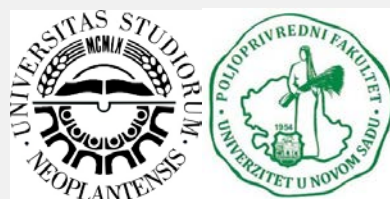
Materials

1st day - room for attending of lectures and organization of small groups of participants for workshop. Prepared and multiplied papers, manuals, instructions and questionnaires for workshop. ICT.
2nd day - ICT.



Invasive weed species

Teacher	Bojan Konstantinović
University	University of Novi Sad, Faculty of Agriculture
Course	Invasive weed species
Target	Agricultural Middle Schools & Agricultural Extension Service
Type	blended
Duration	2 days - 16 hours



Description

Invasive weed species are all species that are intentionally or accidentally transferred from their natural habitats into new ecosystems, where in the process of competition they suppress autochthonous (domesticated) species invading available areas. Human activities are primary ways of invasive species introduction.

Invasive species repress native ones, invading new habitats. These species first occupy urban and ruderal habitats, and later spread in the countryside. As strong competitors, invasive species may endanger survival of autochthonous species. By introduction of new species, new organisms, pathogenic to native ones, can be also introduced. In this case epidemic diseases and significant reductions of biological biodiversity occur in infested area. Newly introduced species often represent vectors, pathogens and allergens dangerous to human health, other plants and animals. Invasive weed species in these areas grow fast and spreading aggressively endangering other plants, disturbing existing water and land ecosystems by changing their existing structure and function. Invasive plants are difficult to control, they easily become dominant in certain area, thus making their control very expensive and complicated.

European regulations stipulate the obligation of the monitoring and control of these species starting from 2016. Due to previously mentioned facts, the additional training of teachers in secondary schools and consultants is necessary in order to accomplish timely transfer of knowledge to students and farmers who often have the first opportunity to meet with newly introduced species. In this manner, introduction and further spread of harmful, toxic or allergenic weed species that is intensified due to climate changes could be prevented.

Contents

The course comprises of several teaching units:

1. Spread of invasive weed species and their significance
2. Invasive weed species in the Republic of Serbia
3. Impact of invasive species on agricultural production
4. Economic significance and impact of invasive species to the environment and human health

5. Identification of invasive species
6. Legislation in the Republic of Serbia and EU
7. Possibilities of control

Objectives

1. Improvement of existing and gaining new knowledge on significance, distribution and impact of invasive weed species to agricultural production, environment and human health. Introduction to the current and forthcoming legislative regulation in the EU and Serbia.
2. Modernization of teaching in secondary schools.
3. Application of acquired / enhanced knowledge in everyday professional work PSSS .

Activities

A two days lasting course. The first day – evaluation of previous knowledge of the participants. Classes in the general part of the course, with the use of AUN methods. Working in groups on identification of invasive species. The second day – work in groups on the possibilities of control and prevention of invasive species spared. Individual tasks solving in *Moodle*.

Materials

The first day – room for lectures and organization of small groups of workshop participants. Prepared and copied papers, manuals, instructions, plant identifications and questionnaires for the workshop.
The second day – classroom equipped with computers with *Moodle* platform for each student.



Veterinary anesthesiology and analgesia

Teacher	Bojan Toholj
University	University of Novi Sad, Faculty of Agriculture
Course	Veterinary anesthesiology and analgesia
Target	Agricultural Middle Schools
Type	blended
Duration	2 days - 16 hours



Description

Veterinary anesthesiology and analgesia in past decade suffer great changes and improvements. Majority of vets despite they are using a general anesthesia in everyday manners, they still don't know a newer techniques. Sometimes a veterinarians say that a analgesia in postoperative recovery can be even dangerous because the animal can start to use their legs and to damage a sutures etc. Of course that this is unacceptable. Pain and any discomfort are unacceptable from the point of view of animal welfare. It's very important to revise and renew a knowledge of anesthesia and analgesia.

Contents

Course attendants are listening a lectures and on the ends of lectures they are involved in resolving a specific problems

First day

1. Introduction

- History of anesthesia
- Types of anesthesia
- Premedication, induction, intubation, maintenance, monitoring

2. General anesthesia protocol

- General injection anesthesia
- General inhalation anesthesia

3. Complication of anesthesia

4. Local anesthesia

After this set of lectures attendants are solving in groups a specific problems on didactic materials prepare for this purpose.

Second day

5. Analgesia

6. Intensive care

7. Cardiopulmonal reanimation

8. Eutanasia

After this set of lectures attendants are solving in groups a specific problems on didactic materials prepare for this purpose



9. Workshop: Attendants are solving problems and making anesthetic protocol by own. The lecturer make assessment of anesthetic protocols, and gave a little awards to the best attendant. (for example a surgical blade)
10. *E-learning*: a problem solving

Objectives

Renewal of knowledge of the attendants, veterinarians in usage of general anesthesia and analgesia of domestic animals. After completion of course attendants should be able to use a modern general anesthesia and analgesia in everyday work with domestic animals, to recognize and treat acute and chronic pain.

Activities

First day

The attendants are listening a lectures about anesthesia and analgesia. Up to the end of the day they are solving a specific problems in small groups.

Second day

After lectures and problems solving in groups, a attendants are involved in workshop where they are use previously accepted knowledge.

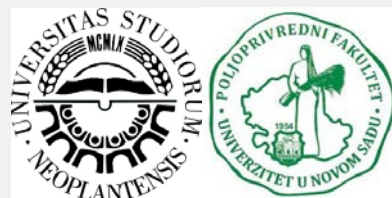
Materials

Lecture room with audiovisual equipment, working materials (paper, sheets, etc.)



The plants - bioindicators of habitat conditions

Teacher	Branka Ljevnaić-Mašić
University	University of Novi Sad, Faculty of Agriculture
Course	The plants - bioindicators of habitat conditions
Target	Agricultural Middle Schools
Type	blended
Duration	2 days - 16 hours



Description

The purpose of the course is enabling the various participants in the assessment of the environmental conditions that exist in a given habitat, based on the ecological analysis of the flora and analysis of plant life forms in a given habitat. At the end of completion of the course, participants should master theoretical and practical knowledge of bioindicators - phytoindication ie. the importance and application of plants in the assessment of site conditions, and to be able to apply the acquired knowledge in practice.

Contents

Theoretical part:

The term of bioindication - phytoindication. Phytoindicators and their importance. Ecological factors. Adaptations of plants to site conditions and adaptive mechanisms. Life forms of plants. Indicator values (ecological indices) of plants and their application. An overview of major plant species as bioindicators of specific habitats and soil (clean and polluted aquatic ecosystems, dry, thermophilic, cold, oligotrophic, eutrophic, saline habitats, acidic and alkaline soils, land loaded with heavy metals, heliophytes and sciophytes, calciphilic and calciphobous plants, serpentinophytes, etc.) - taxonomic, morphological, biological and ecological characteristics.

Practical part:

Application of plants as bioindicators. The spectrum of life forms of plants. The ecological analysis of the flora. Determination and recognition of plants as bioindicators of specific habitat/land (basis on the morphological, biological and ecological characteristics, site conditions).

Objectives

Understanding the terms of bioindication – phytoindication. Introducing with the bioindikation potential of plants, their significance and application in assessing of habitat conditions. Practical application of indicator values (environmental indices) of plants in bioindication. Acquiring of skills in the determination and recognition of plant species as bioindicators of specific habitats and soil (clean and polluted aquatic ecosystems, dry, thermophilic, cold, oligotrophic, eutrophic, saline habitats, acidic and alkaline soils, land loaded with heavy metals,



heliophytes and sciophytes, calciphilic and calciphobous plants, serpentophytes etc.). Acquiring of skills in recognizing the basic characteristics of the specific habitat/land based on phytoindicators.

Through the individual work and work in groups, course participants will have the opportunity to practically apply the acquired knowledge of phytoindication and to develop the skills of teamwork, to discuss and make decisions, and encouraging professional exchange of teachers.

Activities

During the theoretical part of the course, it is envisaged that participants listen to lectures about bioindication and about plants as bioindicators of habitat conditions, actively participate in the discussion with questions, connect previous knowledge and adopt new concepts/terms, to work individually and in groups on specific tasks. During individual and group work, course participants will have the opportunity to solve the given problems about plants as bioindicators of habitat conditions (calculation of ecological analysis, analysis of plant life forms etc.)

The part of the course will be online, using the Internet and Moodle. At the online course, participants will be given the necessary literature, and will have the possibility of evaluating the acquired knowledge by solving online test about phytoindication and discuss online about that.

Materials

PC/laptop, *PowerPoint* presentations, Internet, literature, printed pictures of plants, tables, calculator, notebook



Improvement of organic livestock (dairy and beef) production

Teacher	Denis Kučević
University	University of Novi Sad, Faculty of Agriculture
Course	Improvement of organic livestock (dairy and beef) production
Target	Agricultural Middle Schools and Agricultural Extension Service
Type	blended
Duration	2 days - 16 hours



Description

Organic animal production, primarily the production of bovine milk and meat according to the principles of organic production in Serbia is almost non-existent. Unfortunately, its share of total conventional livestock production is far below 1%. On the market, mainly organic origin appeared products of plant production. Therefore it is justified and necessary to consultants and teachers, who are in direct contact with farmers and future professionals, closer to the actual situation of this production, its principles, trends, opportunities and necessity for improvement and development of this type of production. In addition, the purpose of the course would be to an already constructed network of advisory and academic impact on a new concept of thinking among farmers, to this production "woke up" and therefore, at least partly in future cover the obvious deficit of organic products of animal origin on the market.

The course focuses on the subject improving organic livestock (cattle) production and is intended for high school teachers and experts in extension services. The course is designed to perform as an online or blended for a period of 16 working hours.

Contents

The course is planned to be held in the form of block hours (2 x 8). In relation to the course of teaching provided for the teaching (theoretical basis) to the processing of technical terms, linking knowledge, guidance course participants to comments and discussion, guiding participants to independently draw conclusions.

The course includes several teaching units:

- state of organic cattle production in Serbia and the EU (demand, trends)
- Review of the legislation in this field
- The target, principles and methods of organic livestock production
- Technological principles of animal breeding in accordance with organic principles (choice of species and breeds of animals, treatment of animals procured from reinforcement, methods of breeding animals and facilities for animal husbandry, nutrition and animal health protection; Transport of slaughter animals; Earning animal species from natural habitats, in accordance with the law governing organic production)



- The possibility of improvement and strategy development of organic cattle production in the Republic of Serbia

Objectives

- Participants acquire detailed view on the current situation of organic livestock production;
- Participants are able to master methods and principles of organic livestock production;
- Participants develop the ability to independently implement acquired knowledge into practice;
- Participants are able to analyze the differences between conventional and organic principles and production methods;

Activities

The course is scheduled for two days and the first day includes classic teaching methods with the application of active teaching. The second day is envisaged that through the platform of Moodle, course participants will access online from their computers to content of course that will be informative and educational and containing custom animations. In order to test the acquired knowledge, the course participants will take a test. Also, the evaluation of the course by the participants will be done on-line. The course content provides for active involvement participants in a discussion regarding the above examples from production, linked to the existing knowledge, application in practice, problem analysis and proposed measures to improve their production and others.

The role of the lecturer in this course would be the preparation of materials, including participants actively in discussions about the material to be processed, formed groups, directing and modeled work in groups, analyzes and evaluates the knowledge of participants about the teaching units. Participants will actively participate in discussions, recovery concepts and terminology, discussions on current agricultural policy of subsidies for improving organic production, analysis and guidance given examples, group work and giving proposals to improve new methods, change of legislation, the analysis of control and certification organizations etc.

Materials

The classic part of the course requires room with at least 60 seats, equipment for performing video presentations and panel for writing, while the second part of the on-line course is necessary a Moodle platform with networked computer for each participant.



Stress and its importance in contemporary livestock production

Teacher	Dragan Žikić
University	University of Novi Sad, Faculty of Agriculture
Course	Stress and its importance in contemporary livestock production
Target	Agricultural Middle Schools and Agricultural Extension Service
Type	blended
Duration	2 days - 16 hours



Description

Livestock production is becoming more intensive and the importance of stress in farm animals are increasing and becoming more and more of a significant problem. This course will review existing knowledge about stress in domestic animals, point to new research on the impact of stress on performance of farm animals, and bring up the importance and place of animal welfare in modern livestock production to advisors and teachers. I also want to give attention to the link between stress in animals and food safety of animal products. Their improved knowledge in this field will enable advisors and teachers extend this information to farmers and students.

Contents

The course is planned to include several educational entities:

1. General information about stress
2. Physiological fundamentals of stress and mechanisms of action (neuroendocrine and immune system)
3. Stress indicators
4. Stress in the farm animals and productive performance
5. Stress and welfare
6. Importance of stress for the food safety

The course is scheduled for two days and the first day is classic teaching methods with the application of the active learning methods.

On the first day, the discussion should remind participants of definitions of stress and kinds of stressors. Divided into groups, participants will learn the physiological basis of stress through labeling posters as part of the prepared material. In this way participants will be introduced to the most important mechanisms (hypothalamic-pituitary-adrenal axis, hypothalamic-pituitary-thyroid axis and hypothalamic-pituitary-gonadal axis).

The study of the indicators of stress would be done through quantification of the degree of response of animals to the influence of certain types of stressors

On the second day course participants will access to course content on-line in an informative and animative way, but also evaluative tool such a quizzes will be used for checking acquired knowledge. In this way participants will be engaged and given



the opportunity to use a discussion group (forum) as a tool with aim to connect course participants. The course evaluation will be done on-line.

Objectives

The goal of this course is introducing the concept of stress and its impact on the production of farm animals, as well as the importance of stress on food safety. By attending this course, the target group will review and improve their existing knowledge, which will effectively be able to transfer to students and agricultural producers. In this way we will provide a better understanding of the problem of stress as a physiological response and raise awareness on the necessity of implementing animal welfare. Also, to bring up on important of necessary changes in the work with animals in order to ensure better results and obtaining food safety products. Participants will learn about the impact of stress on the production results of farm animals and potential mechanisms of action through real examples from production and group discussion. Participants will connect the individual stressors with potential hazards related to food safety through group work.

Activities

The role of the lecturer in this course will be the preparation of materials, engaging participants actively in discussions about the subjects, group forming, directing and modeling work in groups, analyzing and evaluating the knowledge of students about subjects of this course.

The role of the participants in this course will be the actively participating in discussions, review concepts and terminology, acquiring new knowledge through examples and group work and using acquired knowledge.

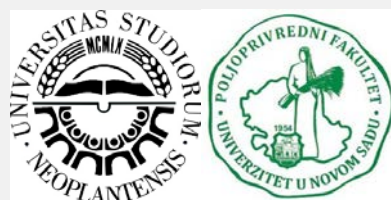
Materials

The formal of the course does not have special requirements, while the on-line part of the course requires *Moodle* platform.



Contemporary grapevine assortment

Teacher	Dragoslav Ivanišević
University	University of Novi Sad, Faculty of Agriculture
Course	Contemporary grapevine assortment
Target	Agricultural Middle Schools and Agricultural Extension Service
Type	blended
Duration	2 days - 16 hours



Description	The selection of grapevine cultivars in the process of establishment of new vineyards is of significant importance. Mistakes made in this way cannot be corrected later, that is, their correction is economically unjustified. A large number of new grape cultivars and clones have been created and introduced lately and they are characterized by improved production characteristics. Introducing the participants with biological and production properties of new grape cultivars and clones as well as with the manner of selecting adequate cultivars and/or clones can significantly improve viticulture. Participants will acquire considerable knowledge of new grapevine cultivars and clones and knowledge on how to select suitable cultivar with respect to given agro-ecological conditions.
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Contents	<ol style="list-style-type: none">1. Classification of grapevine cultivars2. Factors affecting the selection of grapevine cultivars3. Importance of grapevine breeding (clonal selection and hybridization)4. Varieties for white wine production5. Varieties for red wine production6. Table grape varieties7. Grapevine rootstock
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Objectives	<ol style="list-style-type: none">1. Acquiring knowledge on importance of grapevine cultivars2. Broadening knowledge of grown grapevine varieties3. Gaining knowledge on biological and production characteristics of new grapevine cultivars and clones.4. Acquiring knowledge and skills on selection of adequate variety for new vineyard establishment
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Activities	Lectures (<i>PowerPoint</i> presentation) on the topic of: Classification of grapevine cultivars Lectures and co-teaching on the topic of: Factors affecting the selection of grapevine cultivars
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Lectures (*PowerPoint* presentation) on the topic of: Importance of grapevine breeding (clonal selection and hybridization)

Learning in online environment and fieldwork on the topics of: Varieties for white wine production, varieties for red wine production, table grape varieties, grapevine rootstocks.

Participants will be introduced with properties and description of cultivars and clones in groups in the online environment – independent work. Afterwards, the participants will take tests. Upon completion of tests, group fieldwork will be organized and participants will analyze cultivars from the ampelographic collection and they will demonstrate knowledge they have gained in online environment.

Group work: tackling the created problem

Materials

- Printed material
- Computer
- PPP
- Ampelographic collection and/or photos of cultivars



Fruit drying

Teacher	Ivan Pavkov
University	University of Novi Sad, Faculty of Agriculture
Course	Fruit drying
Target	Agricultural Middle Schools and Agricultural Extension Service
Type	blended
Duration	2 days - 16 hours



Description

Serbia is a significant producer of various continental fruit species. Further improvement and better valorization of this production is possible by enhancing processing. One of the less developed aspects of fruit processing in Serbia, with the exception of plums, is drying of apricots, nectarines, pears, quinces and similar fruit species.

During the course, participants will be introduced to the drying technology of the following fruit species: plums, apricots, nectarines, peaches, pears, quinces, and similar fruit species. The development of small and medium-sized enterprises in agriculture can be notably improved in the processing sector by drying of the abovementioned fruit species.

Contents

The course is designed to encompass all important aspects of fruit drying via the following units:

1. Introduction - Fundamentals of the Fruit Drying Process
2. Material Moisture Content and the Mass Balance of Dried Fruit Production
3. Design Solutions for Fruit Dryers and Additional Equipment
4. Plum Drying Technology
5. Apricot, Nectarine, Peach and Pear Drying Technology
6. Basic Laws and Regulations in the Field of Fruit Drying

Practical Work (mathematical tasks - the mass balance of dried fruit production, project assignment - equipping the center with the necessary equipment in the correct order; practical preparation of various fruit species for drying).

Objectives

Participants of the AMS and PSSS course will be introduced to the fundamentals of the fruit drying process, the drying technology of various fruit species, the necessary equipment and current laws and regulations pertaining to fruit drying. They will learn how to calculate the mass balance of dried fruit production (the mass of fresh fruit – the mass of dried fruit), to determine the proper drying technology depending on fruit species, to select the necessary equipment according to the chosen technology, to put the equipment in the correct order in

the facility. They will practically learn how to perform individually all technological operations from fresh fruit to dried fruit.

The attendance of the course will enable the target audience to revise and enhance the existing knowledge, which they will subsequently transfer to students and agricultural producers in an efficient and practical manner.

Activities

On the first day, participants will access the online content covering Units 1 to 6 from their homes or offices by means of the Moodle platform. Subsequently, they will take an online test in order to assess the obtained knowledge. Provided a participant has passed the test, he/she qualifies for the second day of the course.

Practical work is planned for the second day (up to 20 participants) in groups of 4 participants. The first task would be to calculate the production mass balance during drying of one fruit species. The second task entails designing of a floor plan for a drying facility with a production line and necessary equipment. Each group will have different fruit species. Upon the completion of the task, each group will present their results followed by a discussion of all participants.

In practical work, each group will be required to prepare one fruit species for drying based on the acquired knowledge (fruit washing, cutting, pitting and antioxidation) and to select the correct parameters and duration of the drying process.

Activities:

- Group work
- Discussion of group results
- Preparation of various fruit species for drying

Materials

Participants ought to have a computer and access to the online Moodle course from home/work.

The facility for practical work (classrooms, presentation rooms) accommodating at least 20 participants. Blackboard and chalk. Paper of the B0 format, marker pens.

Several different fruit species (seasonal), 2 kg of fresh fruit for each group, cutting tools (smaller kitchen knife or a scalpel), adsorbic acid, powdered sulphur (100 gr), 4 containers of the 10 l capacity. Provided practical work is conducted at the Faculty of Agriculture in Novi Sad, all equipment and material will be provided in the Laboratory of Biosystems Engineering.



Basics in Beekeeping

Teacher	Ivan Pihler
University	University of Novi Sad, Faculty of Agriculture
Course	Basics in Beekeeping
Target	Agricultural Extension Service
Type	classic
Duration	2 days - 16 hours



Description	<p>According to the last census in the Republic of Serbia there are 665,022 hives, and the Province of Vojvodina has 124,174 hives. Number of hives per beekeeper indicates that generally beekeeping is a hobby (60% of beekeepers have up to 20 hives, 30% beekeepers have 20 to 50 hives and just 3% of beekeepers have more than 100 hives). 2004. Serbia received permission to export honey and bee products to EU.</p> <p>By 2008. Serbia has exported 300 tons of honey, while in 2012. Exported a record 2,967 tons of honey. Increase price of bee products and possibility of export them led to a increased interest of people for this type of production. Since 2010. Introduced obligatory labeling of hives, and since 2013. The state began to subsidize beekeeping. Agricultural Advisory Service and Veterinary service have very little experience in the beekeeping, and suddenly beekeepers swamped them with requests for inspection and labeling of hives and questions related about beekeeping technologies.</p> <p>The course should provide knowledge about beekeeping technologies, how to inspect the hives and rules of conducts in the apiary how the work with bees can be safe.</p>
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Contents	<ol style="list-style-type: none">1. Importance of beekeeping2. Beekeeping equipment3. Honey bee biology4. Bees and environment5. Honey bees and pollination of agricultural plants6. Bee products and their quality7. Basic bee disease which significantly reduce the production of beekeeping.8. Practical work.
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Objectives	<ol style="list-style-type: none">1. The acquisition of basic knowledge in beekeeping:<ul style="list-style-type: none">- Honey bee biology- The role of bees in nature- Way of obtaining bee products
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- Quality of bee products
- 2. Learning course participants how they have to behave on at apiary and how they can use beekeeping equipment.
- 3. Learning course participants about basic review of bee colonies
- 4. Provide quality information that course participants can transferred to farmers (future beekeepers)

Activities

The course is divided into two days. The first day is a theoretical introduction, while the second day is a practical work in the apiary.

The first day is designed to work in the classroom with maximum 30 participants.

Activities:

- Initial test
- Teaching
- Working in groups
- Final test

The second day is designed for practical work in the apiary and application of the knowledge from first day. From the 30 initial participants second day can be present only those who answered "NO" on question "Are you allergic on bee venom?" and participants must confirm that answer with signature. Also participants must collect minimum 60% of points on the final test after the first day of the course.

Every participant on practical training must to open hive and inspect it.

Materials

- Equipped space for lecture (classroom or conference room with projector ...) capacity of at least 30 seats.
- Beekeepers suit quantity 10 – 15
- Beekeepers hat quantity 10 – 15
- Beekeepers gloves quantity 10 – 15
- Beekeepers knife quantity 10 – 15
- Beekeepers smoke machine quantity 5 - 8



Beekeeping

Teacher	Ivan Pihler
University	University of Novi Sad, Faculty of Agriculture
Course	Beekeeping
Target	Agricultural Extension Service
Type	classic
Duration	2 days - 16 hours



Description

According to the last census in the Republic of Serbia there are 665,022 hives, and the Province of Vojvodina has 124,174 hives. Number of hives per beekeeper indicates that generally beekeeping is a hobby (60% of beekeepers have up to 20 hives, 30% beekeepers have 20 to 50 hives and just 3% of beekeepers have more than 100 hives). 2004. Serbia received permission to export honey and bee products to EU.

By 2008. Serbia has exported 300 tons of honey, while in 2012. Exported a record 2,967 tons of honey. Increase price of bee products and possibility of export them led to increased interest of people for this type of production. Since 2010. Introduced obligatory labeling of hives, and since 2013. The state began to subsidize beekeeping. Agricultural Advisory Service and Veterinary service have very little experience in the beekeeping, and suddenly beekeepers swamped them with requests for inspection and labeling of hives and questions related about beekeeping technologies.

The course should provide knowledge about beekeeping technologies, how to inspect the hives and rules of conducts in the apiary how the work with bees can be safe.

Contents

1. Summary of work in the apiary during the year
2. Organization of honey production on larger apiaries
3. Selection of honey bees
4. Bee pastures
5. Bee disease prevention and therapy
6. Beekeeping as a business opportunity
7. Practical work

Objectives

1. Acquisition of knowledge in the field of beekeeping:
2. Wintering.
3. Swarming bees when and how?
4. Queen production.
5. Prevention and treatment of disease.

6. Learning course participants about review of bee colonies
7. Provide quality information that course participants can transferred to farmers (future beekeepers)

Activities

The course is divided into two days. The first day is a theoretical introduction, while the second day is a practical work in the apiary.

The first day is designed to work in the classroom with maximum 30 participants.

Activities:

- Initial test
- Teaching
- Working in groups
- Final test

The second day is designed for practical work in the apiary and application of the knowledge from first day. From the 30 initial participants second day can be present only those who answered "NO" on question "Are you allergic on bee venom?" and participants must confirm that answer with signature. Also participants must collect minimum 60% of points on the final test after the first day of the course.

Every participant on practical training must to open hive and inspect it.

Materials

- Equipped space for lecture (classroom or conference room with projector ...) capacity of at least 30 seats.
- Beekeepers suit quantity 10 – 15
- Beekeepers hat quantity 10 – 15
- Beekeepers gloves quantity 10 – 15
- Beekeepers knife quantity 10 – 15
- Beekeepers smoke machine quantity 5 - 8



Herbicides-Plants Interaction

Teacher	Maja Meseldžija
University	University of Novi Sad, Faculty of Agriculture
Course	Herbicides-Plants Interaction
Target	Agricultural Middle Schools and Agricultural Extension Service
Type	blended
Duration	2 days - 16 hours



Description

After completing the course, participants (teachers and counselors) order to master the basic theoretical and practical knowledge about the interactions of plants and herbicides or herbicide influence on physiological processes in plants, their mechanism of action, activation, and the fate of herbicides in plants (metabolic processes), phytotoxicity, selectivity, resistance, all in purpose of recognizing phytotoxicity symptoms in weeds and cultivated plants. The contribution of this course is mastering the knowledge and diagnosis damage in a plant, and complements the basic knowledge of teachers and counselors about possible herbicides harmful effects.

Contents

Theoretical part:

Herbicide basic characteristics. Herbicide application. Herbicide mode of action. Harmful effects of the herbicides. Inorganic compounds with herbicidal activity. Organic compounds with herbicidal activity. Herbicides target site of action in plants. The phytotoxicity and selectivity of herbicides. Damage and symptoms of herbicide to the plants according to the mode of action. Herbicide resistant biotypes of weed species. Transgenic crops. The herbicide metabolism. The herbicides fate in the environment.

Practical part:

Bioassay methods. Herbicides selectivity and scale for phytotoxicity determining. Methods of studying the herbicide residues in the soil. Determination of herbicide resistance in weeds. The biological effect of herbicides on the organisms in the water. Herbicides effects on soil microorganisms.

Objectives

To ensure that students attain an understanding of the interaction herbicide-plant (cultivated and weed species), mode of action, the basics of metabolism and degradation of the herbicide. Qualifying for the recognition of phytotoxicity symptoms to weed and cultivated plants and the acquisition of skills in the determination; training in recognizing the effect of herbicides with different modes of action (bleaching effect, chlorosis, necrosis, leaf curling, leaf distortion,



inhibition of growth).

This way can encourage the expert exchange of teachers in agricultural schools and counselors, and it's possible to perform them to know how to diagnose phytotoxic changes in plants. Teachers will later be able to convey to students the importance of the changes that are followed in the examination of herbicide and advisers will be able to propose to the producers to change the way of work or the use of certain herbicides.

Activities

The first day of the course provided the participants listen to lectures (*PowerPoint* presentations). It is planned to realize through the individual work (individually solving simulated problems) and work in small groups (practical work with plant materials). During the practical work of the course, participants will have the opportunity themselves to solve the given problems. With the ability to use literature and the internet, the course participants will have the task to recognize the symptoms and make a diagnosis. They will have an opportunity to present their conclusions and learn to make graphical representations of data.

The second day of the course is planned to be performed online using Moodle and the Internet. The *online* program users will be able to connect their knowledge with the new situations, solve case studies and comparing procedures. The participants of the course will have available materials on phytotoxicity and will be able to handle independently the contents created with the help of dedicated teaching materials. In the online course, participants will be asked to use literature, and will be enabled for its implementation. Applies knowledge will be able to check on the recommended site, with present herbicide symptoms. Knowledge gained on the first day of the course, will have the opportunity to check in the symptom recognition and the test resolution. In the end, a blog discussion on herbicide-plant interactions will be organized. Using *Moodle*, it's enabled the constant availability of materials and constant insight into the issues to be treated, and users will have a high degree of self correction and advancement.

Materials

PowerPoint presentation, literature, PC/laptop, internet, graph paper, calculator, herbicides, plant material, petri dishes, flower pots, filter-paper, tweezers, micropipette.



Plant water relations - theoretical and practical basis

Teacher	Marina Putnik-Delić
University	University of Novi Sad, Faculty of Agriculture
Course	Plant water relations - theoretical and practical basis
Target	Agricultural Middle Schools
Type	online
Duration	2 days - 16 hours



Description

The course is designed to help school teachers to reduce the number of theoretical classes and increase number of practical classes by introduction of additional experimental work in the area of plant physiology. This approach will include active learning and will allow students to be more independent and self-confident. Theoretical and practical bases of this online course will employ modern teaching methods, make classes more interesting, with minimal investments. Students will be trained to make conclusions based on practical training, learn to actively engage in group work and acquire basic knowledge about plant water relations. The final aim is to enable students to perform various tasks related to studies in plant physiology applicable in agricultural production.

Contents

Objectives

Training school teachers to provide students with theoretical and practical knowledge (experimental exercises) adapted to equipment and other conditions existing in secondary schools:

- acquiring factual knowledge of plant physiology, especially water regime
- develop the skills of using the microscope and the basic techniques of working in laboratory (pipetting, measurement, ...)
- adoption of methods related to the topic- experimental procedures
- getting used to work in groups- teamwork
- exercising ability to analyze experimental results and draw conclusions

Activities

School teachers will attend the online course. They will be introduced to the topics which they may later, to the same or to a lesser extent incorporate into their classes. Different aspects of plant water relations will be represented and associated with examples and problems that really occur in agricultural production. They will be given a choice of experiments which they can perform under standard equipped school labs. These protocols are following a theory that is an integral part of the current curriculum of Ministry of Education for Biology classes. Teachers will be thought which theoretical knowledge their students should have as a



prerequisite for performing experiments. During the course teachers will be supplied with tests by which they can access the level of student's theoretical and practical knowledge.

Materials

For the theoretical part of the course: computer

For the practical part of the course (experiments 1-4):

1. plant material, analytical balance, dryer;
2. internal epidermis of onion bulb leaf , razor blade, Petri dishes, pipettes, glass slides, microscope, tweezers;
3. potted plants, duct tape, aluminum foil, balance;
4. leaves of one dicotyledonous and one monocotyledonous plant (for example sugar beet and maize), colorless nail polish, transparent duct tape, glass slides, microscope

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Organic poultry production

Teacher	Mirjana Đukić Stojčić, Lidija Perić
University	University of Novi Sad, Faculty of Agriculture
Course	Organic poultry production
Target	Agricultural Middle Schools and Agricultural Extension Service
Type	blended
Duration	2 days - 16 hours



Description

In recent years the production of organic food is becoming increasingly common in Serbia. Organic poultry production in our country is not developed enough, it is even less developed in comparison to other types of organic livestock production. Compared to conventional production in poultry, compliance with standards and regulations in control of each stage of the production cycle, as defined in organic production, contributes to the production of healthy safe products of animal origin, environmental protection and the improvement of social and economic conditions of a particular region and the country.

The aim of the course would be that participants learn the basics of organic production in the poultry and to get ready for professional work in the field of organic production in poultry.

Contents

Organic poultry production course will be organized in two days. On the first day, the lectures with following topics are foreseen: Types and breeds of chickens in organic production. The chicken's behavior. Basic principles of organic production in poultry. Facilities and equipment in poultry production. Production and quality of table eggs. Meat production. Production standards and legislation.

Lectures will be organized in such way to refresh prior knowledge of participants, help with the adoption of new terminology, and to contribute to the ability for problem solving and decision making. The second day of the course is foreseen for work on computers, course participants will be involved to the course through the Moodle platform, where the necessary material for taking the test is stored. Through the direct discussion, participants will resolve certain issues in organic poultry production, divided into groups. At the end of the second day, in order to check the acquired knowledge, they will take the exam - a test of acquired knowledge. After the test is done, an online survey will be conducted, and the results will be used as an indicator for evaluating the success of the course.

Objectives

The objective of the course would be that participant, who already has a basic knowledge of poultry production, becomes capable for the efficient and

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competent management of organic production in poultry, as well as for working in advisory and professional services related to the organic production of poultry.

Activities

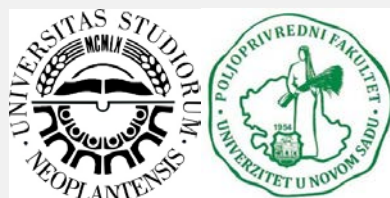
Materials

The lecture hall with 20 seats, PC, video beamer, *Moodle* platform, material for lectures.



Harvest and postharvest of fresh fruits

Teacher	Nenad Magazin
University	University of Novi Sad, Faculty of Agriculture
Course	Harvest and postharvest of fresh fruits
Target	Agricultural Middle Schools and Agricultural Extension Service
Type	classic
Duration	2 days - 16 hours



Description	<p>Food and Agriculture Organization of the United Nations (FAO) estimates show that over 30% of world agricultural production perishes after harvest. If we look at the fruits of the fruit species, which generally have a shorter shelf life, the losses are even greater.</p> <p>Fruit growing in Serbia is one of the branches of agricultural sector with the highest increase and with large share of total agricultural produce exports. However, except for apples, fruit storage technology is not advanced significantly, so the losses after harvest are quite significant, especially for fresh small and stone fruit.</p> <p>The course participants will gain an understanding and practical knowledge of how to "handle" fruit in chain from the harvest to the consumer in order to reduce losses.</p>
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Contents	<ol style="list-style-type: none">1. Methods for harvest time determination2. Handling fruits for the orchard to the cold store3. Storage regime for fruits4. Non parasitical and parasitical disorders of fruits5. Non parasitical disorders prevention
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Objectives	Gaining understanding and practical knowledge of fresh fruits storage.
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Activities	<p><u>Lectures</u> (PPT presentations, discussion, work in groups to solve imaginary situations and problems) on subjects:</p> <ul style="list-style-type: none">- Fruits physiology- Orchard management as a precondition of fruit quality- Harvest time management- Storage regime- Non parasitical and parasitical disorders of fruits- Post harvest treatments <p><u>Practical work</u> (demonstration and individual work):</p>
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- Field work in orchards in different stages of fruits growth
- Recognizing different disorders symptoms
- Knowledge test

Materials

Participants should only bring stationery. All other necessary material would be provided including access to the Experimental orchards for field work.



Drip irrigation system – selection and design

Teacher	Ondrej Ponjičan
University	University of Novi Sad, Faculty of Agriculture
Course	Drip irrigation system – selection and design
Target	Agricultural Middle Schools and Agricultural Extension Service
Type	blended
Duration	2 days - 16 hours



Description	Irrigation is the main agro-technical activity that has to be undertaken in our area so that maximum profit and yields can be achieved. Only 2% of arable land is irrigated in Serbia and they are mostly small plots of 0.5 to 2 ha. The Republic of Serbia has identified this problem and it offers a grant amounting to 30-45%. The purpose of organizing the course on the selection and designing of the drip irrigation system is to introduce a large number of new potential users with the advantages of using the system and possibilities of its application.
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Contents	Topic and training units are as follows: <ol style="list-style-type: none">1. Importance of irrigation in agricultural production,2. Advantages and disadvantages of certain irrigation methods,3. Selection of the most suitable irrigation system with respect to the crops,4. Selection of water source and plant for water supply,5. Selection of irrigation system elements,6. Selection of drip laterals,7. Automatic control of irrigation system,8. Setting up of the irrigation system,9. Independent designing (selection of water supply system and elements of irrigation system) and drawing up the list of equipment as well as setting the price for the irrigation system
-----------------	---

Objectives	Introducing AMS and PSSS with the drip irrigation system. By attending the course, the target groups will broaden their knowledge that they will be able to transfer effectively to their students, that is, agricultural producers. The objective of the course is teaching about how to choose elements and design drip irrigation system independently so that areas under irrigation can be expanded.
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Activities	The course is designed to last for two days. Traditional teaching together with application of AUN method is planned for the first day of the course. The second day is planned in such a way that participants can use <i>Moodle</i>
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platform to access online contents via their computers and take all instruction materials and PPT presentations. The task of the participants is to do a test using the *Moodle* platform. The purpose of the test is for the participants to demonstrate their knowledge about the names and selection of elements of irrigation system. Upon successful completion of the test, every participant solves a specific task (for the given plot, crop ...) relating to designing of water flow and selection of elements for the irrigation system. The specific problem is solved in writing using Excel, by using instruction material and tables of elements of the irrigation system within the Moodle platform. Every participant solves his/her own assignment and explains orally his/her technical solution in front of the group. Oral discussions on possible improvements in technical solution for the irrigation system will be held within the group together with suggesting technical solutions. Providing successful solution to the set assignment (determination of the list of elements forming the specific irrigation system) represents the outcome of the course and proof of having passed the course.

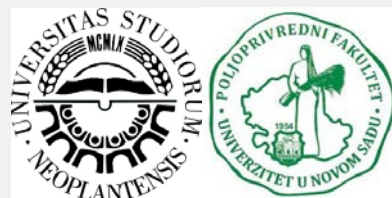
Materials

The room for practical work (classroom, video beam) with seating capacity of minimum 20 seats, board and chalks, paper of B0 format, markers.
Elements of the irrigation system: joints, PE pipes, drip tapes, filters, pressure regulators, etc.
For traditional teaching: PPT presentation, instruction material, standard tasks for designing within the *Moodle* platform.
For the *online* course within the *Moodle* platform with computer for every participant: the participants have to be equipped with a computer and they have to be able to access *Moodle* platform *online*.



Agroecological concepts of sustainable agriculture

Teacher	Srđan Šeremešić
University	University of Novi Sad, Faculty of Agriculture
Course	Agroecological concepts of sustainable agriculture
Target	Agricultural Middle Schools
Type	blended
Duration	1 day - 8 hours



Description	This course aims to introduce participants with contemporary agro-ecological concepts which facilitate the sustainability of agriculture and food safety. On the basis of the presented material students are expected to transfer acquired knowledge and make it accessible to multiple users (i.e. farmers) that are able to effectively implement knowledge. Special attention will be given to analyses of the wider aspects of agroecology that in theoretical and practical terms can affect productivity and enhance agroecosystems services (biodiversity, nutrient cycling, green house gasses emission etc.) at farm level, as well as "bottom up" agroecosystem indicators assessment.
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Contents	<ol style="list-style-type: none">1. The connection between ecology and agronomy2. Basic concepts of sustainability in crop production3. Ecological aspects of plant production (biodiversity, buffer strip, intercropping)4. Sustainable cropping systems and their characteristics5. Description of management technology for crops which application can contribute to the sustainability of agricultural production6. Identification of problems that threaten the sustainability of agriculture at the local, regional and international levels
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Objectives	<ol style="list-style-type: none">1. Ensuring the comprehension of sustainable agriculture principals2. Recognition of the role of certain elements of agro ecosystems in achieving sustainability3. Adoption of criteria for the identification of agroecosystems relevant for sustainable agriculture4. Adoption of criteria for the selection of production systems that are applicable in our agro-ecological conditions5. Introduction to the process of conversion of conventional agriculture into sustainable agriculture
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Activities	<ol style="list-style-type: none">1. <i>Online</i> test to determine the current knowledge2. Interactive presentation of new methods and concepts of agroecology using
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Moodle platform

3. A critical assessment of previously learned knowledge in relation with new (presented) findings
4. Practical teamwork (in groups of 3-4) - on the basis of given parameters participant will make plan of conversion from conventional to sustainable agriculture in *Moodle* platform - case study
5. Evaluation of the conversion plan of each group
6. Checking of understanding the presented material through the test *online*

Materials

Equipment for the presentation, laptop, printed material for work.

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Weather Derivatives and Risk Management in Agriculture

Teacher	Todor Marković
University	University of Novi Sad, Faculty of Agriculture
Course	Weather Derivatives and Risk Management in Agriculture
Target	Agricultural Middle Schools & Agricultural Extension Service
Type	blended
Duration	1 day - 8 hours



Description	The theoretical part of the course allows the participants to improve their existing knowledge in the field of risk management in agriculture through consideration of the basic instruments for risk management, that is, the basic models of insurance in agriculture. Participants will become familiar with the theoretical basis of weather derivatives, as new financial instruments in risk management. The basic parameters that determine the weather derivatives, their financial markets, and the advantages and disadvantages of this type of insurance in relation to traditional one, will be considered. Special emphasis will be placed on numerical aspects of risk management, where quantitative methods for risk assessment (methods of stochastic dominance and analysis of the expected value and variance), will be applied so that teachers / advisors will be able to familiarize themselves with the new method of risk transfer based on the examples of usage weather derivatives in our agriculture.
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Contents	Risk management in agriculture (risk types and instruments for risk management, the concept, types and elements of insurance, problems in the market, assurance programs in agriculture), weather derivatives (the concept and the theoretical basis, types of products, model of a weather contracts, the use of weather derivatives in agriculture).
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Objectives	Familiarizing course participants with the new possibilities of risk management and various forms of insurance in agriculture, with particular emphasis the weather derivatives. Developing an interest in studying new models of insurance in agriculture, as well as considering the possibility of their application in Serbia.
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Activities	Interactive lecture on the characteristics of risk management in agriculture and the insurance models, with particular emphasis on new financial instruments – weather derivatives and the practical part involving numerical examples of risk management (establishing insurance premiums with different models, calculating fair premium and payoff of options etc.). After the lecture, the participants will receive learning material in electronic form ("the program package"). Knowledge
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testing will be conducted in the form of an on-line test. The practical part of the course will involve role-playing exercise, where the course participants will be divided into groups (each group will have a representative of the state, the insurer and the insured) and will present their views on basic issues related to the problems of risk management in Serbia (damage assessment, the amount of premiums, adverse selection and so on.). The aim of this exercise is for the participants to realize that there are different interests in risk management, and to learn about the ways in which farmers, as the insured, can influence the state and the insurers in terms of better solving the basic relations in the field of agriculture insurance. Concluding observations of the results that were obtained during the course.

Materials

Prepared handouts for teachers / advisors (ppt, pdf, excel), laptop with preinstalled software package, video screen, a presenter, smart board, markers in different colors.

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Faculty of Agronomy in Čačak





Production qualitative forage perennial legumes

Teacher	Dalibor Tomić
University	University of Kragujevac, Faculty of Agronomy in Čačak
Course	Production qualitative forage perennial legumes
Target	Agricultural Extension Service
Type	online
Duration	2 days - 16 hours



Description

In aim of intensifying of livestock production, the solution should be sought in the cultivation of high-yielding forage crop of good quality. Together with efforts to reduce energy consumption, environmental pollution and to intensify sustainable agriculture systems, to consider the possibility of increasing the area under forage legumes. As nitrogen fixators, these plants are minimal fertilized with nitrogen fertilizers, whose remains in the soil are easily leaching, causing groundwater pollution. Perennial forage legumes give high yields of quality forage with high protein content. Thanks to this, to a large extent they can replace expensive concentrated animal feeds. The purpose of this course is to Agricultural advisors acquire new knowledge in the field of cultivation of perennial legume plants and the preparation of high-quality roughage feed. This should contribute to an increase in the area under these crops, which will have a direct impact on improving the system of sustainable agricultural production.

Contents

The course will include recent research, connected to the general principles of cultivation and utilization of perennial forage legumes (plants from family *Fabaceae*). The course participants will expand the knowledge of the importance of these plants as forage base in livestock production, about the way and time of application of appropriate agricultural technology and about the way and time of use of crops, in order the best quality of forage be achieved. Within a course, activities will be undertaken through the following course units: Introduction, perennial forage legumes, alfalfa, clovers, birdsfoot trefoil, other perennial legumes, conservation and storing of legume plants.

Objectives

1. Gaining insight into the participants about the importance of growing perennial forage legumes in terms of increasing the yield per unit area, the quality of yield and environmental protection;
2. Acquisition of knowledge of the participants on ways to improve cultivation of these crops;
3. Contribution to the development of competencies to use *online* courses.



Activities

The first activity will be to identify existing knowledge and practice of agricultural extension agents. Then, participants will have the task to learn about with the basic facts of the specific thematic areas. Within each teaching unit will be given a book with the basic knowledge that would otherwise be found in books. Then will provide scientific works with the latest research in the given field in the form of a document. Based on scientific work, participants will work lessons which will provide new knowledge. At the end will be given to photos, videos and other materials on new technologies in the form of a folder. Afterwards, participants will be active in solving the questionnaires, tasks and problems that are made up on the basis of the facts available regarding the thematic units. Positively resolved tasks will lead to the following topics and scenario will be repeated. Activities will take place according to the above teaching units. After some broader thematic areas testing knowledge will be carried out using the online tests.

Materials

1. Computer equipment,
2. The possibility of using the Internet.

Literature



Đukić D., Stevović I., Janjić V. (2009): *Proizvodnja stočne hrane na oranicama i travnjacima*. Agronomski fakultet u Čačku, pp. 591.

Đukić D. (2002): *Biljke za proizvodnju stočne hrane*. Poljoprivredni fakultet u Novom Sadu, pp. 407.

Đukić D., Stevović V. (2012): *Oplemenjivanje krmnih biljaka i proizvodnja stočne hrane na oranicama*, pp. 330.



Application of the spreadsheet calculations in agriculture

Teacher	Dušan Marković	 
University	University of Kragujevac, Faculty of Agronomy in Čačak	
Course	Application of the spreadsheet calculations in agriculture	
Target	Agricultural Extension Service	
Type	blended	
Duration	2 days - 16 hours	

Description	Many areas of agriculture often require certain calculations as support in planning activities. With the development of information technologies, there are software packages that offer the necessary calculations to users in an efficient and easy way. But software programs are usually implemented for a particular purpose and they are commercial, which requires additional funds for their use. It is understood that advisers already have knowledge about their field of work and they need a means to perform calculations faster and automatically according to the specified tasks and custom requirements. The purpose of the course is the mastering and use of spreadsheet calculations in effective solving various agriculture demands.
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Contents	Implement computation in the field of agriculture by spreadsheet calculations with automatically obtaining results (Excel or Writer). Renewals of previous acquired knowledge and getting new skills to use computers in solving various computational problems. Course contained detailed introduction to the program tabular structure and usage function in forming more complex computations. Then, program application in specific case to obtain optimal values of complete feed for domestic animals nutrition and analysis of these results.
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Objectives	<ol style="list-style-type: none">1. Participants would be familiar with using spreadsheets functions and advantages in performing automatic calculations.2. Encouraging participants to recognize benefits of using spreadsheets for more efficiently solving problems which require calculations.3. Training participants to apply their skill in solving specific working tasks such as calculating mixture for feeding domestic animals.
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Activities	Validation of participants acquired knowledge in the previously attended agriculture courses. Check their level of competence to work on a computer with a spreadsheet bases. In the first stage of the activities, participants would be renew their work with program (Excel or Writer), such as entry different data types, formatting cells, introduction to usage of basic functions. Also they should be
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familiar with the guidance for the calculation of feed mixtures and analysis of quality conditions tables for farm animal nutrition. After that, capability of using built-in functions on tabular data would be presented to course participants and function application for solving a particular problem. Participants independently solve small pre-prepared examples in order to understand the benefits of using automatic calculation. Then they are considering practical case (case study) for the calculation of the mixture for feeding domestic animals. After forming calculation it would be apply to different requirements according to the selected animal, or respectively to the expected structure of the mixture. At the end of the course there is a final test where it is necessary to fulfill the condition of 70% of correct answers required for completions of the course, if the student has achieved score 85% to 95% he is very good or excellent for score over 95%.

Materials

Course materials require computers with Internet access, tables of nutrients chemical composition and tables of quality conditions of complete mixture for farm animals' nutrition.



Technology for the production of fruit brandies supplemented with the fungus *Coriolus versicolor*

Teacher	Jelena Pantović, Jelena Mladenović
University	University of Kragujevac, Faculty of Agronomy in Čačak
Course	Technology for the production of fruit brandies supplemented with the fungus <i>Coriolus versicolor</i>
Target	Agricultural Extension Service
Type	blended
Duration	2 days - 16 hours



Description Given the technological innovations in the production of alcoholic beverages around the world and in our country, a need has arisen to provide entrepreneurs and young people wishing and able to start up their own business with knowledge on potentially new products in the field of the technology of alcoholic beverages and their potential industrial-scale production.

Contents The course will provide knowledge on the technology involved in the production of alcoholic beverages, primarily fruit brandies supplemented with the fruiting body of the fungus *Coriolus versicolor*. Also, the trainees will become familiar with the cultivation of this fungus under semi-industrial conditions. The following topics will be covered in the course: Introduction, Fruit Brandy Making Technology, Biochemical Composition of the fungus *Coriolus versicolor*, Potential for Semi-Industrial Production of *Coriolus versicolor*, Maceration of the Fruiting Body of the Fungus in Fruit Brandies, and Marketing of Fruit Brandies Supplemented with *Coriolus versicolor*.

Objectives

1. Gain knowledge on potentially new products in the field of the technology of alcoholic beverages and their enrichment with the medicinal fungus
2. Broaden the trainees' knowledge of fruit brandy making technology and semi-industrial scale cultivation of *Coriolus versicolor*
3. Contribute to developing competence in using online courses.

Activities The course participants will be actively involved in solving problems formulated based on available data. An explanation regarding brandy production technology will be provided to participants. They will also become familiar with the antioxidant and antimicrobial properties of the fungus *C. versicolor* and ways to enrich alcoholic beverages. Before the lecture, the trainees will be interviewed to obtain information on their experience in brandy production and any prior knowledge of the fungus. At the end of the course, there will be an assessment of



the trainees' knowledge gained during the course for verification purposes. At the end of each teaching unit of the course participants will receive a brief tasks such as questions, definitions of new terms, making glossary of terms, and so you should do in order to advance to the next level of the course. At the end of the course there is a final test where it is necessary to fulfill the condition of 70% of correct answers required for completion of the course, if the student has achieved score 85% to 95% he is very good and excellent over 95%.
The course activities will take place under the above topics.

Materials Computer equipment, Internet access, literature, *PowerPoint* presentations



Design and optimization of refrigeration plants in food industry

Teacher	Milan Nikolić	
University	University of Kragujevac, Faculty of Agronomy in Čačak	
Course	Design and optimization of refrigeration plants in food industry	
Target	Agricultural Middle Schools	
Type	online	
Duration	2 days - 16 hours	

Description	Refrigeration plants are present all along the food chain including production, storage, distribution and sale. Refrigeration plants are complex and expensive thermo-energetic systems so it is important for food technologist to understand the basic principles of these devices. Food technologist must also be qualified to design refrigeration system and based on plant capacity to choose equipment that will be effective to meet the required technological and economical parameters.
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Contents	The course will include theoretical and practical experience about principles of operation of refrigeration plants, as well as the latest trends in this field. Students will expand knowledge about material and energy balances in refrigeration systems, equipment used in refrigeration systems, types of insulation materials, automation equipment in refrigeration systems, air conditioning, cooling systems and ways of freezing of certain food products.
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Objectives	<ol style="list-style-type: none">1. Acquiring knowledge about the importance of cooling plants in the food industry, the maintenance and preservation of food and ways of improving the work of cooling plants;2. Contribution to the development of independent competence of design cooling plants;3. Contribution to the development of competence of students to use online courses.
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Activities	Participants will be active during course on solving tasks drawn up on the basis of the facts available. Activities will take place according to the above teaching units.
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Materials	Computer equipment, the possibility of using the Internet
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Developing reading skills in English language for agriculture

Teacher	Milevica Bojović
University	University of Kragujevac, Faculty of Agronomy in Čačak
Course	Developing reading skills in English language for agriculture
Target	Agricultural Middle Schools
Type	blended
Duration	2 days - 16 hours



Description

The purpose of the course is to increase high vocational/agricultural school teachers' competences in English as a foreign language for agriculture within the scope of the competences necessary for the teaching field, course and teaching methodology in high vocational/agricultural schools.

Development of reading skills is one of the basic competences vital for life-long learning. It is important for teachers so that they could teach children/learners this competence in high agricultural schools. Development of reading skills in a foreign language (English language in agriculture) would provide high agricultural school teachers with the essential tools for efficient reading comprehension, understanding, analysis, and evaluation in the process of searching and finding information. This would help the teachers to understand the texts in English language better; thus they will acquire and increase their knowledge in the field of agriculture and biotechnology so that they could transfer it to the end users – learners/students in high vocational (agricultural) schools.

The target group for this course are high vocational/agricultural school teachers in the field of biotechnical and agricultural sciences.

Contents

1. What is reading? Explanation of the process, examples, experiences.
2. Types of reading – skimming, scanning, intensive reading, extensive reading.
3. Reading strategies in English as a foreign language - previewing and predicting, skimming and scanning.
4. Strategies for improving reading comprehension
 - Pre-reading, while-reading, and post-reading activities,
 - Finding main ideas and supporting details in the text,
 - Determining purpose of the text, tone, relationships in the text.
5. Strategies for increasing vocabulary in English language
 - Determining the meaning of the words, phrases, sentences from the context,
 - Using dictionaries (hard copied and online dictionaries),
 - Pronunciation.
6. Strategies for reading in online environment – searching for information,



selecting and evaluating information.

Course objectives

- to assist teachers to develop reading comprehension skills and understand written texts in English as a foreign language for agricultural purposes;
- to assist teachers to develop vocabulary and terminology in English for agricultural purposes;
- to assist teachers to develop skills for finding, selecting and understanding information and texts in online environment.

Course outcomes

Objectives

Teachers will:

- learn that different written materials are to be read in different ways;
- learn to find the main ideas and supporting details in a text;
- learn to interpret information found in the text;
- learn how to guess the meaning of new words from the context;
- learn how to find meanings of new words by using dictionaries (hard copied or online dictionaries);
- learn how to find, read, and understand information and professional texts in online environment.

Activities

1. Lectures, instructions and explanations, discussions;
2. Reading activities and exercises;
3. Practice in developing vocabulary;
4. Pair and group work; individual consultations with the trainer/instructor;
5. Work in *online* environment (access to digital repositories, professional portals).

Materials

1. Writing paper, markers, pencils, erasers,
2. Printed materials (instructions, selected texts, browsing protocols),
3. Dictionaries,
4. Computers with internet access, *online* environment.



Developing reading skills in English language for agricultural purposes

Teacher	Milevica Bojović
University	University of Kragujevac, Faculty of Agronomy in Čačak
Course	Developing reading skills in English language for agricultural purposes
Target	Agricultural Extension Service
Type	blended
Duration	2 days - 16 hours



Description

The purpose of the course is to increase the agricultural advisors' competences in English as a foreign language for agriculture. Reading presents an essential skill in learning a foreign language and is vital for the concept of life-long learning. Development of reading skills in a foreign language (English language in agriculture) would provide the agricultural advisors' with the essential tools for efficient reading comprehension, understanding, analyzing, and evaluating in the process of searching and finding information. This would help the advisors to understand the texts in English language better; thus they will acquire and increase their knowledge in the field of agriculture and biotechnology so that they could transfer it to the end users (producers, farmers, stockmen).

Contents

1. What is reading? Explanation of the process, examples, experiences.
2. Types of reading - skimming, scanning, intensive reading, extensive reading.
3. Reading strategies in English as a foreign language
 - Previewing - e.g. reviewing titles or section headings to get a sense of the structure and content of reading selection
 - Predicting - e.g. using knowledge of the subject matter to make predictions about content and vocabulary and check comprehension
 - Skimming and scanning - reading for general or main ideas in the texts and reading for specific facts or a piece of information
4. Strategies for improving reading comprehension
 - Pre-reading, while-reading, and post-reading activities
 - Finding main ideas and supporting details in the text
 - Determining purpose of the text, tone, relationships in the text
5. Strategies for increasing vocabulary in English language
 - Determining the meaning of the words, phrases, sentences from the context
 - Using dictionaries (hard copied and *online* dictionaries)
 - Pronunciation
6. Strategies for reading in *online* environment - searching for information, selecting and evaluating information.



Course objectives

- to assist learners to develop reading comprehension skills and understand written texts in English as a foreign language for agricultural purposes;
- to assist learners to develop vocabulary and terminology in English for agricultural purposes;
- to assist learners to develop skills for finding, selecting and understanding information and texts in *online* environment.

Course outcomes

Objectives

Learners will:

- learn that different written materials are to be read in different ways;
- learn to find the main ideas and supporting details in a text;
- learn to interpret information found in the text;
- learn how to guess the meaning of new words from the context;
- learn how to find meanings of new words by using dictionaries (hard copied or *online* dictionaries);
- learn how to find, read, and understand information and professional texts in *online* environment.

Activities

1. Lectures, instructions and explanations, discussions;
2. Reading activities and exercises;
3. Practice in developing vocabulary;
4. Pair and group work; individual consultations with the trainer/instructor;
5. Work in *online* environment (access to digital repositories, professional portals).

Materials

1. Writing paper, markers, pencils, erasers,
2. Printed materials (instructions, selected texts, browsing protocols),
3. Dictionaries,
4. Computers with internet access, *online* environment.



Importance of plant breeding in food production

Teacher	Milomirka Madić
University	University of Kragujevac, Faculty of Agronomy in Čačak
Course	Importance of plant breeding in food production
Target	Agricultural Extension Service
Type	online
Duration	2 days - 16 hours



Description

Food production is based on scientific achievements and their use depending on environmental factors and economic development. Cultivars and hybrids created by breeding and crop management using optimum farming technologies under particular environmental conditions play an important role in plant food production. Breeding has resulted in new cultivars and hybrids that give yields several times as high as those of earlier selections and natural populations, thus greatly contributing to food supply. The need to ensure the security of food supply has given rise to new approaches to breeding based on recombinant DNA manipulation. Biotechnological methods have led to the development of genetically modified crops through the incorporation of desirable genes from evolutionarily distant species. Side effects of GM foods, high biosphere pollution levels and substantial climate change have prompted the need for safe food production, eventually resulting in a tendency to adopt organic production systems and practices, characterized by low yields and product safety control. Through its development and achievements, conventional breeding has given rise to new approaches to cultivar development and production (organic production and genetically modified food).

Contents

Traditional breeding programs have led to improvements in numerous morphological, anatomical, physical and biochemical traits through specific gene combinations in newly developed genotypes i.e. cultivars and hybrids. Breeders have managed to make targeted corrections of many shortcomings in plants due to the development of molecular biological methods and biotechnology, referred to as the biotechnological revolution period. Accomplishments in this field have disturbed homeostasis in scientific, professional and political organizations, and in the human population around the world. Biotechnology has produced transgenic organisms as carriers of genes of distantly related species, thus inciting doubts and fear of GM crops and resulting products. Conversely, the incorporation of desirable genes builds confidence due to a more powerful approach to disease management, biofortification and gene therapy. Under present biotech revolutionary conditions, the agri-food sector in Serbia still lacks implementation of high technologies in companies and products. Conflicting views on genetically



modified organisms have enhanced activities related to the intensification of organic production. In recent years, organic farming has been developing intensively and in a more organized manner, in line with regional development and biodiversity conservation requirements. Great efforts have been made to create cultivars under organic selection principles and exclude GMO cultivation.

Objectives

1. Gain knowledge of the importance of new plant breeding technologies and their procedures
2. Contribute to developing competence in using online courses

Activities



The first activity will be to assess extension officers' level of knowledge of the topics. Then, course participants will become familiar with basic conventional (traditional) breeding practices and genetic modifications. Thereafter, they will be actively involved in solving problems related to both advantages and disadvantages of the methods used as well as in new technologies in creating cultivars and hybrids. Once the course topics have been covered, participants' level of knowledge will be assessed by online tests.

Materials

Computer equipment, internet access



Carbohydrates in human nutrition

Teacher	Mirjana Radovanović	 
University	University of Kragujevac, Faculty of Agronomy in Čačak	
Course	Carbohydrates in human nutrition	
Target	Agricultural Middle Schools	
Type	online	
Duration	1 day - 8 hours	

Description	The course is intended for teachers of secondary schools of agriculture and food technology. The purpose of the course is to familiarize teachers with current research in the field of carbohydrate human nutrition and develop critical thinking about the quality of food rich in carbohydrates today. Also, the purpose is to acquire the skills of creative teacher education of the young, to look at new opportunities for knowledge transfer and create their own approaches to education in this field.
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Contents	<ol style="list-style-type: none">1. The importance of carbohydrates in the human nutrition.2. Processing of raw materials rich in carbohydrates.3. Nutritional quality of products.4. New aspects in carbohydrates nutrition.
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Objectives	Raising the competence of teachers to model patterns of a healthy lifestyle among students in the field of the use of carbohydrates.
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Activities	<ol style="list-style-type: none">1. Identifies the existing knowledge about: carbohydrates, processing of raw materials rich in carbohydrates and importance in the human nutrition2. Reads the recommended scientific articles and independently collect data with subject in this field3. Develops lessons of active learning, for example: quiz about carbohydrates nutrition, practical preparation and consumption of some foods (wheat germs and ways of consuming, preparing food from ingredient nutritionally richer with desirable carbohydrates, eg. advantages of the use of honey in the nutrition compared to sucrose etc.).4. Actively participate in online discussions, suggests topics and is supported by the facts. Opening the forum topics: "Creative ideas for transferring the knowledge acquired from the course carbohydrates for human nutrition"5. Active use of an electronic learning system (online course)
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Materials	Computers with Internet and access to scientific journals.
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Organic animal husbandry

Teacher	Simeon Rakonjac
University	University of Kragujevac, Faculty of Agronomy in Čačak
Course	Organic animal husbandry
Target	Agricultural Extension Service
Type	classic
Duration	2 days - 16 hours



Description The course is designed for advisors agricultural extension services. Through this course, they acquire the basic knowledge about legal regulation that follows the organic livestock production. Another aim of the course is to introduce the main challenges, benefits and problems associated with this form of agricultural production. Organic livestock production is rapidly evolving and the demand for organic products is increasing. On the other hand, there is still a large number of dilemmas and ambiguities related to this matter, especially for primary agricultural producers. For this reason, it is necessary to further educate and inform advisers, because it is the surest way to new information as soon as possible find the way to the farmer. Massification of certified organic production would be increased multiple times the value of traditional agricultural products, contributed to the development of rural areas and slowed down the negative trend the migration of the rural population.

Contents Course contains the following lessons:

1. Legal regulations that follows organic livestock production (Introduction to the Regulations on the method of rearing, nutrition and health care, then the necessary conditions for the certification of this type of production).
2. Specific features, advantages and problems of organic rearing of cattle, sheep, pigs and poultry,
3. Production of organic food for animals ,
4. The hygiene measures and healthy risks in organic livestock production,
5. Quality of organic products,
6. Economic feasibility of organic production.

Objectives

1. Better acquainted to advisers with all segments of organic livestock production,
2. Training advisers to autonomously solve specific problems in this field,
3. Introduction advisers to the results of scientific research in this field, with the aim that they would be able in an argumentative way can promote this kind of production in primary agricultural producers,
4. To consultants acquire the knowledge about the rules and the procedures necessary for the certification of this type of production.



Activities



This course is based on the principle of the workshop, where, besides to presentations of lecturers, also expected to all the participants of the course engage in a discussion. Before the start of each teaching unit, participants will do a short test. The test will contain several of basic questions about themes to be addressed. In this way, the lecturer will gain insight into existing knowledge course participants on the given subject. Thus, their exposure and access to adapted existing knowledge course participants. After that, the lecturer presents the basic things related to teaching unit which processes and opens the discussion by suggesting topics for which he believes that are fundamentally important. From course participants are expected to actively discuss a given topic and themselves suggest new topics to discuss. Also, the course participants - advisors, will present its experience in the field related to organic livestock production, frequently asked questions, concerns and attitudes of farmers about this topic. The aim is that through discussion formulate joint conclusions fundamentally important matters related to each teaching unit, as well as to provide answers to frequently asked questions advisors by farmers. At the end of the course, participants will again do all the tests that they were doing at the beginning of each teaching units, all in order to evaluate the success rate and the level of new knowledge.

Materials

One notebook computer and video screen for Power Point presentations and the previously prepared brochure.



European corn borer and western corn rootworm – interaction and influence

Teacher	Snežana Tanasković, Jelena Mladenović	 
University	University of Kragujevac, Faculty of Agronomy in Čačak	
Course	European corn borer and western corn rootworm – interaction and influence	
Target	Agricultural Middle Schools & Agricultural Extension Service	
Type	blended	
Duration	2 days - 16 hours	

Description	The purpose of the course is to introduce the teachers and agricultural advisors' in biology, spread, interactions between pests and harmful effects in the crop. Development of possibility of early visual detection and identification in the field enable the teachers or advisers transmitting useful information about appropriate time and way of control.
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Contents	The target groups are the teachers and agricultural advisors. 1. Systematic place, dispersion, spread, switches for host plant; 2. Bio-ecology of pests; 3. Harmfulness in the crop; 4. Monitoring strategy in different crops; 5. Influence of different host plant at emergence of pest; 6. Strategy in application of insecticide; 7. Influence in agro-ecosystem.
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Objectives	1. Assist learners to develop new knowledge applicable in the production; 2. Enable application of new monitoring method of pest appearance in the crops; 3. Enable new control method of pest in Serbian field.
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Activities	1. <i>Online</i> check knowledge about monitoring and control ECB and WCR; 2. Lecture, explanation and discussion; 3. Recognition of symptoms in different part of vegetation; 4. Biochemical deference's and host plant influence on pest appearance; 5. Selection of monitoring method, axes to PIS; 6. Analyzing the optimal solutions and appropriate action in different crops at the bases of last vegetation case; 7. Pair and group work; 8. Individual consultations with the trainer/instructor; 9. Work in <i>online</i> environment (access to digital repositories, professional portals).
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Materials

1. Writing paper (manuals for identification of different insect stages, symptoms, protocols for early detection, selected papers and text)
 2. Computers with internet access, *online* environment.
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Alien invasive species – introduction, spread and influence in the environment

Teacher	Snežana Tanasković, Goran Marković, Dalibor Tomić, Jelena Mladenović, Dušan Marković, Milevica Bojović
University	University of Kragujevac, Faculty of Agronomy in Čačak
Course	Alien invasive species – introduction, spread and influence in the environment
Target	Agricultural Middle Schools and Agricultural Extension Service
Type	blended
Duration	3 days - 24 hours



Description	The purpose of the course is to increase knowledge about alien invasive species as completely new and unknown members in ecosystem, their influence to autochthonous flora and fauna, ways of introduction, risks of new introduction and implementation of this new knowledge in practical work.
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Contents	<ol style="list-style-type: none">1. The target groups are the teachers and agricultural advisors.2. Alien invasive insect species;3. Alien invasive species in aquatic ecosystem;4. Alien invasive plant species;5. Strategy in monitoring of introduction or for early detection, eradication and control methods;6. Influence at quality of the biotope and ecosystem;7. Application of GIS;8. Adequate vocational use of new terminology in Serbian language.
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Objectives	<ol style="list-style-type: none">1. Develop new knowledge about alien invasive species terrestrial and aquatic ecosystem;2. Understand the ways of introduction and spread;3. Assist learners to develop skills for different aspect of inventory and control measure;4. Understand influence to the biotope and autochthonous flora and fauna;5. Assist learners to develop skills for use the GIS;6. Develop new knowledge about correct use of new, vocational terminology.
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Activities	<ol style="list-style-type: none">1. Check knowledge about alien invasive species;2. Lecture, explanation and discussion;3. Recognition of present organism in the environment;4. Biochemical change in the biotope;5. Selection of monitoring method and inventory during vegetation;
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Izgradnja kapaciteta
srpskog obrazovanja
u oblasti poljoprivrede
radi povezivanja sa društvom

Coordinator:
University of Belgrade
Faculty of Agriculture

Koordinator:
Univerzitet u Beogradu
Poljoprivredni fakultet

6. Pair and group work;
7. Individual consultations with the trainer/instructor;
8. Work in online environment (access to digital repositories, professional portals, EPPO, GIS, vocabulary).

Materials

1. Writing paper (manuals for identification of different species, selected papers and text)
2. Computers with internet access, online environment.

**Building Capacity
of Serbian Agricultural
Education
to Link with Society**



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State University of Novi Pazar

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Microorganisms – producers of energy and nutrients

Teacher	Braho Ličina
University	State University of Novi Pazar
Course	Microorganisms – producers of energy and nutrients
Target	Agricultural Middle Schools
Type	blended
Duration	1 day – 8 hours



Description

Producing energy and nutrients (especially proteins) by the sustainability methods is one of the biggest modern and probably future problems. Potential using of the agricultural waste generated in Serbia is not enough and little known to the public. Aims of the course are presenting of wide spectrum before known and the newest practical methods using microorganisms in producing and reducing organic and non-organic (especially fixation of nitrogen), avoiding emission of the pollutants (pollutants generated in process reducing agricultural, fertilizers ...) and synchronous potential possibility producing the clean energy. There are aims to meet possibilities producing nutrients by the microorganisms from used materials and/or agricultural waste. Certainly, everything is based on active learning, relying on prior knowledge as a base and applying newer, less known methods, techniques and skills in agriculture, technology and production of energy. We're expecting from users to become prepared and motivated for applying e-learning and transferring to others (students, farm producers).

Contents

1. Microorganisms in biosphere-circling materials
2. Biodegradation
3. Producing of energy
4. Microorganisms in producing of food
5. Microorganisms in agricultural production

Objectives

1. Restoring of prior knowledge (especially reducing natural and synthetic materials) and systematization of knowledge about metabolism of microorganisms.
2. Applying new knowledge of metabolism of microorganisms, understanding importance of reusing it to get higher yield and genetic non-modified organisms.
3. Introducing (motivating) for permanent education and distance learning (giving instructions and advices to participants-how to use contemporary literature and scientific articles).
4. Understanding importance development organic agriculture, producing clean



energy and achieving of partial energetic independence.

5. Promoting organic agriculture and sustainable development in order to present them to students during school and the general public

Activities

1. Access - an introduction to the topic, access *Moodle* and the course
2. At the beginning of each topic - recovery of previously acquired knowledge.
3. The teacher sets the task (the test), the participants resolved using *Moodle*, followed by discussion participants exchanged knowledge and information
4. Monitoring lectures using *Power Point* presentations, video material and schemes (with occasional discussions with the lecturer)
5. Work in pairs - troubleshooting and "I want to know"
6. (Finding and quickly use scientific papers on topics " Microorganisms producers of clean energy " and "Microorganisms 'helpers' in agricultural production")
7. Development of the project - troubleshooting II ("Promoting organic agriculture and sustainable development" at the school level and/or a particular institution/organization the type of network (community) of agricultural producers, the municipal organization for agricultural development, environmental protection ...)
8. Presentation of results and discussion
9. Conclusion and course evaluation

Materials

1. Computer room with internet portal *Moodle*
2. Panel + scheme
3. *Power Point* presentation
4. Video material
5. Printed materials



Biological Aspects of Soil Fertility

Teacher	Dalibor Stojanović
University	State University of Novi Pazar
Course	Biological Aspects of Soil Fertility
Target	Agricultural Middle Schools
Type	blended
Duration	1 day - 8 hours



Description

The soil, i.e. pedosphere, represents one of the most endangered, most difficult to recover and most tender life channels. Constant growth of human population on the planet Earth progressively increases the need for quality food, which is why the conventional agriculture and urbanization are most common threats to soil quality. Production of the majority of sustaining food is inseparably connected to the cultivated land and to the sole characteristic of the soil - fertility. In addition to physical and chemical features of the soil, fertility mostly depends upon the biogenic components of the system, i.e. the qualitative and quantitative composition of the pedobionts.

Main aim of this course is to expand the participants' knowledge of: characteristics and possibilities of improvement of soil fertility, process of pedogenesis, elementary groups of pedobionts, and of degradation problems and practical aspects of soil protection, all using the active learning method. Differences between the conventional use of soil and the use in organic agriculture will be the main focus of this course.

Contents

1. Pedogenesis; fundamental pedogenetic processes; soil horizons
2. Physical and chemical properties of the soil; soil colloids
3. Pedobionts: classification and characteristics of the soil organisms
4. Extraction of the pedobionts from the substrates and their analysis
5. Conventional / organic agriculture – differences in soil farming and treatment

Objectives

1. Renewing, expanding and systemizing the basic knowledge of pedosphere, with particular interest in biogenic components.
2. Preparation of the participants for individual analysis of soil quality based on the quantitative and qualitative properties of the fauna.
3. Demonstration of the active learning system in the example of soil biology
4. Demonstration of the e-learning system in the *Moodle* learning platform

Activities

1. Introductory lecture - Introduction of the subject, course instructions, not longer than 15 minutes.



2. Participants place the soil samples in the *Tullgren-Berlese* apparatus, they are being presented with the methods of causing and extraction which are all new to them. It is essential that this part of the course is performed immediately after the Introduction in order to execute the extraction of the soil organisms from the substrates during the lecture.
3. Execution of the main part of the course using the combination of the lecture and individual work of the participants:
 - presentation of the study units - using the *PowerPoint* presentation
 - participants read the given textual material and follow the video presentation, which thematically follows the *PowerPoint* presentation (individual work, use of *Moodle* platform)
 - knowledge testing using the quiz via the *Moodle* application (individually)
 - getting to know the key procedures in determination of fundamental pedobiontic groups
4. Dividing the participants into groups and delegating the work within the given groups in order to analyze the material that was extracted from the samples (determination of the organisms, weighing the biomasses, estimation of the degree of soil pollution based on the results and data on composition and volume of organisms, all according to formal literature standards (group cooperation))
5. Group work
6. Group reports and intergroup discussion regarding the obtained results
7. Final exam - testing via the *Moodle* system, analysis of the new standardizes sample (artificially formed, with precisely determined amount and type of organisms, i.e. values needed for the typification of soil condition) according to standard and predetermined protocol.

Materials

1. *Tullgren-Berlese* apparatus (affordable and easy to be improvised with, made with extremely inexpensive parts such as: light bulb, funnel, plastic tube, colander and fixative jar)
2. Soil samples volume 20x20x20cm with three different types of surface and/or vegetation (e.g. silicate and limestone; off the meadow, forest, field ;...)
3. Binocular magnifying glass - for separation and determination of the organisms (number of magnifying glasses depends upon the number of participants - one glass on five participants, on average)
4. *Power Point* presentation
5. *Moodle* application
6. Printed material for organism determination and literature needed for the estimation of soil condition based on the determined organisms and their amount.



Recombinant DNA Technology

Teacher	Dejan Mirčić
University	State University of Novi Pazar
Course	Recombinant DNA Technology
Target	Agricultural Middle Schools
Type	blended
Duration	2 days - 16 hours



Description	<p>Recombinant DNA technology is relatively new technology created upon the findings in molecular biology, enzymology of the nucleic acids and in molecular genetics of bacteriophages and plasmids. It encompasses the variety of standard techniques that are already being used in biochemistry and molecular biology, but it also incorporates the entire set of newly developed methodologies. The methodology mainly implies the use of restriction endonucleases and DNA cloning.</p> <p>Considering that this technology is vastly applied in the medicine, pharmacy, agronomy, veterinary medicine but also in the environmental science, the main aim of this course is to explain and describe the aforementioned technologies to the teachers using the active learning method. Furthermore, the aim is to point out the significance of the development of the aforementioned disciplines with respect to these technologies and their future perspective and potential in the development of the agricultural production and technology in general. Teachers will be able to put the acquired knowledge to the use with their own students, which will have further effects on the students' motivation in their work and studies.</p>
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Contents	<ol style="list-style-type: none">1. Recombinant DNA technology2. Restriction enzymes3. DNA cloning4. Genetic engineering and transgenesis5. Gene therapy
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Objectives	<p>The aim of the course is for the participants to:</p> <ol style="list-style-type: none">1. Affirm and expand their knowledge in molecular biology and molecular genetics.2. Acquire the knowledge and understand the specificity of the use of restrictive enzymes and DNA cloning technologies.3. Comprehend the general significance of the current use of these technologies in the agricultural production, livestock farming and food industry, as well as
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the development trends of this contemporary methodology and its possible broader use in the future.

4. Simulate the execution of the bacterial genome sequencing technology which is used in food industry with the use of virtual laboratory.

Activities

1. Introductory lecture - Introduction of the subject, presentation of the instructions regarding the course, participants' registration on the *Moodle* platform and the initiation of the course.
2. Short discussion of the DNA structure and function with active involvement of the participants and the preparations for the main part of the lecture.
3. Execution of the study units following the schedule presented in the Contents using the *Power Point* presentation, short films on the internet and computer simulation.
4. Upon the completion of the study units, the participants commence the practical part of the course, i.e. individual problem solving in the virtual laboratory on the subject of genome sequencing and data search in the genome laboratory.
5. Upon the task completion, the collective evaluation of the results of the virtual experiment and the discussion of the possible errors will ensue. The participants compare the results and discuss the solutions with the assistance of the lecturers if further explanation is required.
6. After the examination of the practical use, the final theoretical exam in the *Moodle* application will follow.

Materials

1. *Power Point* presentation
2. *Moodle* application
3. Computer simulations of the virtual experiment
4. Video recordings and animations
5. Printed material for recording the results of the practical part



Application software

Teacher	Edin Dolićanin
University	State University of Novi Pazar
Course	Application software
Target	Agricultural Middle Schools
Type	blended
Duration	1 day - 8 hours



Description

Application programs are programs that allow users to use them to solve various computer problems. It is most of the programs used by computer users for everyday work, and called user software.

The purpose of this course is that students acquire basic knowledge about the use and possibilities of application software as well as to enable their use in data processing, presenting lectures, creating quizzes and tests, finding literature and teaching materials.

The course includes a series of lectures on the basic functions, options and instructions for the practical implementation of application software. The course will be realized through direct communication teachers and students, as well as individual work on the computer.

Contents

1. Hardware
2. *Windows OS*
3. Introduction in *Moodle*
4. *Word*
5. *Excel*
6. *PowerPoint*
7. Basic of internet

Objectives

1. Gaining knowledge and understanding of the basic operation of application software
2. Development of self-implementation of application software in daily practice

Activities

1. Introduction to the course will begin with a discussion with the students to check the level of information about the application software.
2. Each topic will be implemented through individual work of students, who will get a specific task in accordance with prior knowledge. Participants will choose the appropriate topic in the field of agriculture, veterinary or food processing that should be dealt with the use of application software.
3. Using *Moodle* applications, participants will create lessons and quizzes for high



school students

4. After each covered topics, participants will apply the knowledge gained through independent practical work on the computer.
5. Checking the knowledge of participants will be carried out through tests (3 in total) and quizzes on *Moodle* (3 in total). Checking for *Moodle* will be carried out by direct communication trainers and trainees.

Evaluation of knowledge:

Activity	Points
Test (3 x 15)	45
Quiz (3 x 15)	45
<u>Moodle (1 x 10)</u>	<u>10</u>
Total	100

Materials

1. *PowerPoint* presentation
2. *Moodle* application
3. Printing papers



ICT in Agriculture

Teacher	Irfan Fetahović	
University	State University of Novi Pazar	
Course	ICT in Agriculture	
Target	Agricultural Middle Schools	
Type	blended	
Duration	1 day - 8 hours	

Description

We live in an era of rapid development and pervasive use of information and communication technologies (ICT). Global tendencies are directed towards further expansion and advancement of these technologies because of the positive effects they make on people and economy. The phrase "pervasive and ubiquitous computing" can be heard very often both in academic and industrial circles, representing a vision in not so distant future, where humans and natural environment, on one side, and ICT technologies, on the other side, are interconnected with different lines and mediums, creating an active and interdependent network. Let us mention several technologies we cannot imagine our future without: Internet and its services, database systems technologies, decision support systems and artificial intelligence, smart sensor networks. The fact is the world depends on ICT and we must expand our ICT knowledge and skills so we can be prepared to use them in ever changing world.

The aim of this course is to expand knowledge of course participants in the area of ICT with special reference on using these technologies in agriculture and food production.

Contents

1. Introduction. Computer systems. Personal computer
2. Computer software and its application
3. Development and application of computer networks and the Internet
4. Wireless networks and standards
5. Smart sensor networks and their application in agriculture
6. Database systems, information systems and application

Objectives

1. Enhancement and expansion of ICT knowledge and skills, with emphasis on using these technologies in agriculture
2. Acquiring knowledge and understanding specifics of using ICT in agriculture
3. Comprehensive review of current ICT usage in modern agriculture and food production
4. Creating insight of future ICT usage and significance in agriculture



Activities

1. Introduction lecture - basic introduction, course information, registration of course participants on *Moodle* platform, and accessing the virtual course on the platform
2. Teaching lecture units according to the schedule which is defined in the course contents, by using *PowerPoint* presentations, video presentations, computer tools and software
3. Assessment of knowledge is planned after every lecture unit, by using tests on Moodle course
4. Final exam - test on Moodle course, and examining participants' computer skills

Materials

1. *PowerPoint* presentations
2. *Moodle* platform
3. Software tools
4. Video presentations
5. Printed material



The Chemistry of Fruits and Vegetables

Teacher	Milan Dekić
University	State University of Novi Pazar
Course	The Chemistry of Fruits and Vegetables
Target	Agricultural Middle Schools
Type	blended
Duration	1 day - 8 hours



Description

Knowing and understanding the chemistry of fruits and vegetables is important for many aspects including nutrition, health and food technology. Choosing the appropriate raw materials and manufacturing process, knowing the biochemical and other reactions that occur during processing and storage and other aspects of manufacturing processes are closely related to the chemical composition of raw materials. The main goal of this course is to emphasize the importance of knowing the chemical composition of fruits and vegetables, to renew, broaden and systematize knowledge in this area, to emphasize practical aspects of fruit and vegetable processing and recognize some problems in this area. This course also focuses on building skills in the using of e-learning portal *Moodle*.

Contents

1. Macroconstituents of fruits and vegetables: water, carbohydrates, lipids and proteins
2. Microconstituents of fruits and vegetables: organic acids, vitamins, mineral substances, pigments, aromatic components, polyphenolics, alkaloids etc.

Objectives

1. Renewal, broadening and systematization of knowledge concerning the chemistry of fruits and vegetables
2. Some frequent problems in fruit and vegetable processing, from raw material to product (and beyond, to consumers) and measures that can be taken to overcome the problems
3. Building skills of participants in the using of e-learning portal Moodle

Activities

1. Review of previously acquired knowledge and experience about the subject
2. Introductory presentation
3. Some technical information about the course
4. *Moodle* user registration and accession to the course
5. Performing conceptually the same tasks concerning the topics given in the Course Content (two blocks are planned according to Course Content) in



the following manner:

- Theme introduction (lecture using *PowerPoint* presentation)
 - Course participants review the existing literature on the subject in question (e-books, multimedia resources, internet etc.) (completed individually or in pairs)
6. Dividing and working in small groups for some problem-based learning
 7. The possibilities of use of Moodle in teaching and learning
 8. Course final examination in *Moodle* (individually only)

Materials

1. *PowerPoint* presentation
2. *Moodle* application
3. Printed material



Endocrine regulation of animal behavior

Teacher	Nataša Đorđević
University	State University of Novi Pazar
Course	Endocrine regulation of animal behavior
Target	Agricultural Middle Schools
Type	blended
Duration	1 day - 8 hours



Description

Endocrine regulation of behavior is closely related to the survival, reproduction and health preservation of the animals. Method of keeping, treatment, nutrition and the relationship of humans to the animal may disrupt the regulation mechanisms, which is reflected by the change of the behavior of animals, and therefore the survival, health and reproductive success.

The purpose of this course is to get the participants acquainted with the latest scientific research in the field of endocrine regulation of animal behavior; to point out the environmental factors that disrupt the regulation mechanisms and lead to behavioral changes, reproductive failure and disease; to integrate the existing and new knowledge about the importance of a complex hormone-brain-behavior system for the survival, health and reproduction of animals.

The course includes a series of lectures on specific forms of animal behavior related to the survival, reproduction and care of offspring. The mechanisms of hormonal regulation of certain forms of animal behavior, the brain control of the hormones secretion and how the hormones affect the brain will be presented by the course. The effects of animal behavior endocrine regulation disorders on the survival, health and reproductive success of animals will also be presented.

Contents

1. Neuroendocrine basis of animal behavior
2. HPA axis and the physiological response to stress
3. Endocrine basis of animal aggressive behavior
4. Reproductive behavior
5. Animal maternal behavior
6. Ingestive behavior of animals
7. Pheromones and chemical communication in animals
8. Circadian regulation of endocrine functions and seasonal rhythm of animals

Objectives

1. Presentation of the latest scientific research in the endocrine regulation of animal behavior.
2. The integration of the existing and new knowledge about the importance of animal behavior for the survival, health and reproduction of animals.



3. Adoption of the concept of the behavioral dependence on the hormonal status of animals through the recognition of specific forms of conduct and regulatory mechanisms in the given examples.
4. Enabling the participants to independently make conclusions about the consequences of the disrupted endocrine regulation of behavior.

Activities

1. Introduction to each topic will begin with a discussion of generally known forms of animal behavior, with the aim to raise questions and define the issues related to the content of a topic.
2. The main part of the topic, which refers to the secretion, function and regulation mechanisms of hormones in certain forms of behavior, will be presented through discussion with participants and teaching method. The secretion of hormones and mechanisms of action will be presented via computer animation or in the form of pictures or diagrams in Power Point presentations.
3. After the main part of the topic is done, the checking of the knowledge acquired by the course participants will be carried out by using the quiz (total 8), with the use of *Moodle* application.
4. During the course, after each unit, participants will do project tasks (3 altogether). Project tasks will be carried out in groups (3-5 students). Within each project task, a group of participants should recognize the behavior and define the regulation mechanisms, based on a short film showing the specific behavior of animals. Upon completion of the project activities, participants will exchange group results and correct the wrong answers through a discussion.
5. At the end of the course students take a final exam in the form of a test using *Moodle* application.

Evaluation of knowledge:

Activity	Points
Quiz (8 x 2)	16
Project tasks (3 x 8)	24
<u>Final exam</u>	<u>60</u>
Total	100

Materials

1. *PowerPoint* presentation
2. Computer animation
3. *Moodle* applications
4. Printed materials



Technology of starch and modified starch

Teacher	Svetlana Jeremić
University	State University of Novi Pazar
Course	Technology of starch and modified starch
Target	Agricultural Middle Schools
Type	blended
Duration	2 days - 16 hours



Description

Starch is the one of the most widespread polymers of glucose and one of the major carbohydrate which is used in the human diet. Because of its significance, the technology of production and processing of starch developed and thrived for centuries. Today starch processing is one of the most important industrial branches. For this reason, for Agricultural High School teachers is very important to gain more knowledge on the quality of raw materials used in the manufacture of starch, as on the quality and using of starches from different botanical genesis. Since growing conditions of corn, wheat and potatoes, that are the basic raw materials in European Union for production of starch, and then modified starch, influence to the quality and quantity of starch, and to the possibility of its further use, thereby and cost-effectiveness of its processing.

Industry production of starch hydrolysates, and therefore starch-based sweeteners, strong growth from year to year. The development of starch hydrolysate technology today attaches great importance. Cost-effectiveness of starch-based sweeteners however, depends on the quality of starch, and thus the quality of the starting raw materials.

Teachers of Agricultural High School during this course will acquire basic theoretical knowledges about the starch production and modified starch production technologies, then theoretical knowledges about methods of testing the quality of starch, as well as depending of the production cost-effectiveness on the quality and the botanical genesis of the starting raw material. That acquired knowledges they will be able to use later in order to enrich the teaching process, in terms of connectivity, for example knowledges about different melioration applications with aim at obtaining raw materials of adequate quality. Also, knowledge of starch production technology from different raw materials could be used for organizing additional workshops within the agricultural high schools.

Our country has the potential to maybe one day be exporter of some of the raw materials used in the production of starch, or to achieve significant results in that area. On the other hand, teachers in agricultural high schools educate workpeople who are trained in an organized and planned agricultural production. Therefore, it is important to first teachers acquire basic knowledges about the technologies of production of starch and modified starches, and thus the knowledges of how the



success of this technology depends on the quality of the starting material, and then to be able to transfer this knowledges to their students. In order to farmer produce quality and market competitive raw material for the technological process, it is necessary to know the basics of the technological process. This type of knowledge is useful to demonstrate to the students the applicability of the knowledge they acquired in school, and enables them to better monitor and understand the requirements in the field of agriculture and technology generally. This kind of knowledge can raise the motivation of students to learn and work. The aim of Course in Technology of starch and modified starch is that teachers of secondary agricultural schools gain new and expand existing knowledges in the field of physico-chemical properties of starch and starch granule, then to gain theoretical knowledges about the different possibilities and ways of using starch-iodine reaction as a method for qualitative and quantitative analysis of starch. A significant part of the Course in Technology of starch and modified starch will be devoted to the description and characterization of starch hydrolysis methods and technological procedures for obtaining a starch hydrolysate, as well as the importance and possibilities of their application in various fields of industry.

Contents

1. Physico-chemical properties of starch. The structure of the starch granule
2. Starch-iodide reaction - Qualitative and quantitative analysis of starch
3. Amylases and their action on the starch
4. Raw materials for the starch production. Production assortment of starch industry
5. Technology of starch hydrolysis. Production and application of starch-based syrups
6. The production and application of crystalline glucose
7. Production and application of D-sorbitol
8. Dextrin - production and application of high-fructose syrups

Objectives

1. Establishing and expanding the level of existing knowledges in the field of physico-chemical properties of starch molecule of and starch granule.
2. Understanding the description, characteristics and possibilities of applying methods of qualitative and quantitative analysis of starch using the reaction of starch with iodine.
3. Acquisition of the basic theoretical knowledges about types of amylase enzyme as a catalysts in the process of hydrolysis of starch, as well as the mechanisms of their action in starch enzymatic catalysis.
4. Acquiring knowledges about basic characteristics of technological processes (description of the procedure, characterization, advantages and disadvantages) of extracting the starch from corn, potato and wheat as a primary sources for industrial starch obtaining. Defining the starch industry production assortment.



5. Understanding the description and characteristics of the technological process for the hydrolysis of starch and starch syrup obtaining, as well as acquiring information about the possibilities of application of starch syrup in industry.
6. Understanding the description and characteristics of the technological process for preparing a crystalline glucose as one of the most widely used starch-based sweeteners. Defining the importance and application of crystalline glucose in the diet.
7. Acquiring knowledges about basic characteristics of technological procedures for production some other significant modifications of starch and starch-based sweeteners, such as D-sorbitol, dextrin and high-fructose syrups, and the formulation of possibilities of their application in various types of industry.

Activities

1. It is planned that the course is two days (16 hours), so the first day it will be talking about topics related to the processes of production and processing of starch, and the second day on topics related to obtaining, processing and application of starch-based modifications.
2. Introduction to each teaching unit imply that the teacher (instructor), through discussion with participants of course, determines amount of their current knowledge related with the subject, and that through discussion with the participants of the course, encouraging their mutual discussion and exchanging of information, refreshes and amendments their knowledges and information related to the teaching unit
3. After determining the current level of knowledges of the participants, the teacher (instructor), if it is judged to be necessary, supplements their knowledges with new information and facts, to the level of knowledge that is necessary for participants to have as a basis for further work. If necessary, the instructor can use a *PowerPoint* presentation (especially when it is necessary to describe the construction and operations of certain machines used in a particular process)
4. Registration of the participants on *Moodle*.
5. Further work would involve gaining knowledges of the relevant details relating to a given topic (the details relating to the description and characteristics of method, or a description and characteristics of the specific techniques). The details concerning a given subject, couipants individually learn using *Moodle* (online) teaching material.
6. After processing the given topic, course participants work individually tests on *Moodle*, which include checking the level of knowledge, understanding, as well as possibility of analysis given issue.
7. The results of the tests instructor and students see immediately, so it would be able to analyze them. Doing on-line tests the students themselves, as the instructor, could see the extent to which course participants have mastered a



certain issue. It would pointed out to each of participants which part of lecture and why he/she did not understand and/or adopt. On the other hand, to the instructor it would be an indicator to which topic should be given more or less attention, or should change approach to an issue.

8. Then through mutual discussion among participants about particular issues, coordinated by the instructor of the course, could be clarified ambiguities.
9. At the end of each working day, and after rounding a whole, the course participants divide into smaller groups. Each group receive a task in which it is necessary to select the most appropriate conditions for specific technological operation (selection of raw materials, hydrolysis conditions and/or machines for specific technological operations). It is necessary that group explain its choice. After finishing the task, groups exchange opinions and views and discuss about their proposed solutions.

Materials

1. The computer and projector for theoretical introduction to the teaching unit.
2. The computer with the possibility of using *Moodle* applications
3. Board
4. Printed materials

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Project management in agriculture

Teacher	Andrea Katić
University	EDUCONS University
Course	Project management in agriculture
Target	Agricultural Middle Schools/ Agricultural Advisory Service
Type	classic
Duration	2 days – 16 hours



Description

Approaching the EU will bring new opportunities for Serbia, including European funds. The agricultural sector requires the preparation for pre-accession funds for agriculture (IPARD) that Serbia receives because of its candidate status. Applying for EU funds is a complex process and funds are allocated exclusively for pre-planned and developed programs/projects. Planning and preparing of project proposals and project documents require professional knowledge and skills in project management in accordance with EU standards. The purpose of the course is to educate people in the agricultural sector in the field of EU funds and project management in order to prepare for future challenges.

Contents

1. Functioning of EU funds and funds for Serbia for agriculture (IPARD) - 2h
Topic is related to the functioning of the EU funds earmarked for Serbia with a special emphasis on the IPA Component V (IPARD) relating to rural development.
2. The term of the project, the phases of the project cycle - 1h
The theme provides the main characteristics of the project in all its phases, which can be defined as a set of activities aimed for accomplishing a specific goal within a specified time, through the use of certain resources (financial, material or human).
3. The Logical Framework Approach (LFA) - 3h
LFA is a tool for analysis, presentation and management that allows planners and managers to: analyze the existing situation during project preparation; Establish a logical hierarchy towards a goal that should be reached; Identify certain potential risks; It represents a useful basis for evaluation during and at the end of the project; Determines which is the best way to monitor and evaluate the effects and results; It provides a summary of the project in a standardized format.
4. Project documentation - 5h
A topic is related to education for containing the project application. It explains what the project objectives, results, activities, indicators ... etc.
5. The importance of team work on the project - 1h
Project management is closely connected with the team and team work. Project management requires a successful team and a successful team teamwork is required because the team is not a group of people who had gathered for no



reason.

6. Human Resource Planning Project - 1h

Topics cover all aspects of people management and interpersonal relationships, including leadership, management, conflict management, evaluation, etc.

7. Planning project costs - 2h

A topic is related to the assessment of the costs of all project resources, budgeting and monitoring of project costs to implement this project within budget.

Objectives

The course participants will be trained to work in the project team, the design and development of project ideas in the field of agriculture in the EU methodology.

Activities

The first part of the course provides participants get acquainted with the functioning of the EU funds earmarked for Serbia with a special emphasis on the IPA Component V (IPARD) relating to rural development. Within the framework of second thematic area, the teacher will introduce participants to the basic characteristics of the project and all its stages, after which everyone will jointly analyze practical examples of good practices and completed projects in agriculture financed by the EU.

In the next part of the course, participants will be become familiar with the way of the logical framework (LFA), which is an analytical tool for presenting project proposals in a structured way. LFA is an internationally recognized method for planning and managing projects that are used by the European Commission, the United Nations and other donors.

After meeting with the manner of the logical framework (LFA), course participants will be divided into groups that will make self LFA based on their own project ideas. This is followed by exposure group, comments and gives suggestions from teachers and other participants.

Next topic is related to containing the project application. It explains the project objectives, results, activities, indicators, etc. The participants divided into groups will have the opportunity to make, on the basis of LFA, sketches of the project proposal.

The fifth teaching unit refers to the importance of team work on projects.

Last part of the course is related to human resources planning and planning of the project budget. The participants divided into groups will make projection of project budget and other resources.

The following will be questions, comments, and course evaluation.

Materials

Computer.



Branding of organic products

Teacher	Diona Đurđević
University	EDUCONS University
Course	Branding of organic products
Target	Agricultural Middle Schools/ Agricultural Advisory Service
Type	classic
Duration	1 day – 8 hours



Description

Active work at the national level, on adoption of the National Action Plan for Organic Production of the Republic of Serbia 2015-2020 year, indicate a serious intention to develop and strengthen the sector of organic production and market of organic products in the Republic of Serbia, as well as the competitiveness of domestic organic products in foreign markets. As the statistics indicate a trend of increasing of areas under organic production, it is necessary to work on branding of organic products in order to achieve competitiveness in the market. The main purpose of this course is to point out to participants the importance of branding of organic products, and to provide practical knowledge about strategies of branding and brand management, in order to successful positioning of organic products in the domestic market and differentiation in foreign markets.

Contents

1. The importance of the brand in organic production
2. Brand building
3. The choice of brand name
4. Creating a strategy of branding of organic products
5. Brand Management
6. Strategies of positioning and differentiation of organic products
7. Brand communication
8. Brand management over time

Objectives

1. Identification of the importance of branding of organic products
2. Getting knowledge about ways to build brand
3. Identifying the criteria for the selection of brand names
4. Defining the strategies of branding of organic products
5. Getting knowledge about brand management
6. Identifying strategies of positioning and differentiation of organic products
7. Recognizing the principles of communication and brand management over time, aimed at achieving long-term market success

Activities

At the beginning of the course, participants will do a short test, which results



should indicate the level of knowledge of participants about branding of organic products.

The lecturer introduces participants to the concept and importance of branding of organic products. The participants through group discussion analyze, together with the lecturer, the importance of branding in today's market.

In the next two teaching units, lecturer introduces participants to the ways of brand building and strategies of building of brand value, after that participants will be divided into groups. Each group gets materials, different examples of market-renowned brands, and should identify the criteria for selection of brand names, after which each group presents its conclusions, the lecturer analyses conclusions, and points to the common conclusions.

After this exercise, the participants will be introduced with strategies of branding, and then together will discuss on the topic of Implementation of strategies of branding in organic production. The discussion should lead the participants, with the help of lecturer, to the common conclusions about successful strategies of branding of organic products.

In the next part of the course, participants will be introduced with the theoretical basis of brand management. Lecturer mentions successful examples from practice.

Participants will be divided into new groups and get materials, different case studies related to the strategies of positioning and differentiation of organic products. The task of each group will be to analyze and identify implemented strategies in the given case study. Each group will present their conclusions.

The following is the group discussion on the topic of Brand communication and brand management over time, which lecturer starts by analyzing examples from practice and participants should recognize the principles of communication and brand management over time.

After group discussion, at the end of the course, the common conclusions about strategies of branding in the sector of organic production that could lead to the achievement of long-term market success will be pointed out.

The evaluation of the course.

Materials

Projector, laptop, whiteboard and markers for the board, papers for additional material for the course participants.



Bioremediation in agriculture

Teacher	Gordana Racić
University	EDUCONS University
Course	Bioremediation in agriculture
Target	Agricultural Middle Schools
Type	classic
Duration	2 days - 16 hours



Description

The main objective of the course is teachers' education on the application of environmentally friendly methods in agriculture. The course will consist of a review of the basic methods for remediation and revitalization of soil, with a focus on the use of microorganisms to detoxify soil in order to prepare for agricultural production. The agricultural farmlands are exposed to dangerous xenobiotics through distinct pollution from the environment. From these compounds the most outstanding problems are related to the following two groups of pollutants: POP (Persistent Organic Pollutants) and PAHs (Polycyclic Aromatic Hydrocarbons), such as heavy metals which are recognized as being directly toxic to biota. Even if present in small concentrations they are dangerous as all have the quality of being progressively accumulated higher up the food chain. Their relative toxic/carcinogenic potencies are compound specific. Therefore a continuously detoxifying technology for soil is needed in the course of agricultural production. Examples from practice and personal experience of the lecturers will contribute to a better understanding for applying the method of bioremediation, with additional emphasis on the sustainability and economic viability of this method.

Contents

1. Remediation and revitalization of soil
2. Bioremediation
3. Ecology of microorganisms
4. Bioremediation in conventional and organic agriculture
5. Organic and inorganic pollutants in agriculture
6. Soil monitoring in agriculture
7. Application of microbiological and molecular methods in agriculture
8. Practical work in the laboratory (PCR-polymerase chain reaction)
9. Sustainable development and bioremediation in agriculture
10. The economic benefits of the application of bioremediation in agriculture

Objectives

The aim of the course is to determine the current knowledge of teachers in the field of the application of environmentally friendly methods in agriculture. The course should provide understanding of the basic role and importance of microorganisms in natural and agroecosystems, interactions between plants and



microorganisms, microbial adaptations to different environmental conditions and use of bioremediation as a novel technology. Also, during the course teachers will have the possibility of mastering basic laboratory techniques used in biotechnology.

Activities

The course will begin with a test in order to determine the level of knowledge and experience of the participants in the application of bioremediation technologies in agriculture. Based on the results of the test duration of specified activities will be determined in order to be successful in achieving goals of the course. The first day of the course, envisages introduction of the participants to the basic concepts in microbiology, organic and conventional agriculture and bioremediation of soil. At the end of the each unity, the lecturer will refer to the discussions, where he will show to the teachers the advantages and disadvantages of the application of bioremediation methods both in biotech and economic terms through good practice examples. At the end of the day participants will be awarded the material on the advantages and disadvantages of the application of bioremediation, which they will be supposed to read and prepare for the next day. The second day of the course, the lecturer will start with organizing a debate, where participants will be divided into two groups, one of which will have to prepare a presentation on the advantages and other on disadvantages of bioremediation. During the debate, speakers will show teachers scientifically and practically confirmed facts about exposed presentations. After introducing with various methods of application of the method of bioremediation in agriculture course participants will be divided in groups and according to the materials provided jointly analyze the presented conclusions from the debate organized on the advantages and disadvantages of this method. This exercise involves the division of the group, work in groups, presentation of groups and conclusions. After this exercise, the participants of the course will be conducted to the laboratories tour, where they will be presented methods used in classical and molecular methods of analysis of microorganisms. Participants in groups will determine the importance and effects of application of certain methods, and then based on their findings and observations appropriate methods for the determination of the indigenous strains of microorganisms in soil will be applied. At the end of the course lecturer will present the results of laboratory analysis of the participants. The course ends by performing the most relevant new information on the potential application of bioremediation methods in agriculture by the participants of the course (group discussion).

Materials

Classroom, projector, whiteboard and markers, laboratory, laboratory supplies and chemicals necessary for the experiment (the standard method of cultivation of microorganisms, metagenomics), scientific works in the field of bioremediation.



Sustainable water management in agriculture

Teacher	Ljiljana Ćurčić
University	EDUCONS University
Course	Sustainable water management in agriculture
Target	Agricultural Middle Schools
Type	classic
Duration	2 days - 16 hours



Description

The aim of modern water management policy is to set up guidelines and framework for water protection, both in agriculture and other branch of industries, through planning and taking measures to ensure the sustainable management of water and through establishment and development of human resources in a systematic and organized way. The introduction of modern political, economic, environmental and technical instruments for rational use of water is going to be crucial in this process. Therefore, continuous improvement and enhancement of the gained knowledge in the field of sustainable water management is necessary.

This course will enable development and strengthening of teacher's professional competence on sustainable water management in agriculture by obtaining of new theoretical and practical knowledge. An important aspect of the course is a critical assessment of scientific papers on innovative sustainable agricultural practice.

Contents

Water resources in the world and Republic of Serbia. The legal framework for water management in agriculture (domestic and foreign regulations). The institutional framework for water management in the Republic of Serbia. Economic aspects of water management in agriculture. Water pollution sources. Water monitoring. Water use in agriculture. Water treatment technologies. Climate change and water management in agriculture.

Objectives

The course will enable the participant to:

1. Gain knowledge about legal and institutional framework for water management
2. Understand economics of water management in agriculture
3. Gain deep insight into the water pollution sources and water management
4. Be able to critically read scientific papers on sustainable use of water in agriculture
5. Obtain knowledge of the innovative water treatment technologies
6. Be aware of the main linkages between climate change and water management in agriculture



Activities	<p>Course will start with an assessment test for all participants which will determine their level of knowledge on sustainable water management in agriculture. Based on test results, the scope of certain activities in the course will be more precisely defined in order to fulfill all course goals.</p> <p>The first part of the course will provide a discussion with course participants on water resources in the world and Republic of Serbia. In the next part of the course, teacher will introduce participants to the legal regulative in the area of water management (national and international regulations) and the institutional framework on water management in the Republic of Serbia.</p> <p>Also, participants will gain knowledge in economic aspects of water management in agriculture. Through the Water pollution sources workshop, participants will analyze the possible water contamination sources (biological, chemical, thermal, radioactive pollution).</p> <p>In the next section the course, participants will learn more about water monitoring. After that, participants will be divided into groups and analyze different scientific papers on sustainable use of water in agriculture.</p> <p>Afterwards, course participants will be introduced with innovative water treatment technologies. The last part of the course involves group discussion regarding the main linkages between climate change and water management in agriculture.</p>
Materials	<ol style="list-style-type: none">1. Computers and projector2. White A4 papers, pencils, blackboard3. Scientific papers on sustainable agricultural practice



Specifics of organic crop production

Teacher	Milanko Pavlović	
University	EDUCONS University, Faculty of Ecological Agriculture	
Course	Specifics of organic crop production	
Target	Agricultural Middle Schools	
Type	classic	
Duration	1 day – 8 hours	

Description	<p>The course is intended for teachers employed in secondary schools in the education of agriculture, food production and processing in order to enable continuous and sustained training, competence development, monitoring and implementation of new knowledge in these areas. Production of crop plants is the basis of organic agriculture in the production of safe and high-value food and a prerequisite of organic livestock production. In the system of sustainable agricultural management organic farming is characterized by a wide range of specific formulated in the methods of organic crop production, whose implementation is mandatory and necessary for carrying out these activities. The purpose of the course is that teachers increase their knowledge in the field of production of crop plants and point out the special features and requirements in the system of organic production. This primarily relates to the preservation and improvement of natural resources, biodiversity, application of appropriate technology cropping process by encouraging self-regulation to protect the environment, conversion of other agricultural systems in organic production, application of the principles of good practice in food production. Besides contributing to the expansion of knowledge about crop production rate should contribute to the acquisition of the competences of teachers in knowledge transfer agricultural schools within the subject of organic production.</p>
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Contents	<ol style="list-style-type: none">1. Agricultural systems and sustainable agricultural production2. Specifics of organic crop production3. Technology of cropping and crop rotation in the system of organic production4. Organic production of grain5. Organic production of fodder plants6. Alternative plant species in organic farming7. Seed crop plants in organic production
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Objectives	<ol style="list-style-type: none">1. Do teachers gain new knowledge about the specifics of organic crop production2. To master the procedure of certification and methods of organic crop production
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3. To gain an insight on the specifics of organic production of important field crops
4. Contribute to the development of competencies for teaching and training in the field of organic farming

Activities

In the introductory part of the course, participants update and establish knowledge of basic characteristics of the agricultural system, historical development, diversity and interconnection, through discussion on the set the topic. Lecturer focus discussion on the implementation of the principles and objectives of sustainability in different systems of agricultural production. The analysis of the actual condition of agriculture, the available resources and the rural area of the Republic of Serbia, lecturer and participants point out the possibilities, conditions and benefits of organic farming in the region.

The lecturer introduces students to the requirements of the basic principles of organic agriculture that are transferred to the level of the local peculiarities of the available resources, the conservation of biodiversity and the protection and improvement of agro ecosystems. By asking questions to check the knowledge and experience of participants on characteristics of the most common models applied to agricultural production (traditional and conventional farming), after which the teacher introduces participants to the specificities and differences of organic crop production compared to existing systems. This part will be ended by the joint conclusions.

The next part of the course includes presentations of the methods, techniques and activities adapted cropping technology in organic agriculture. Crop plants constitute the base for agricultural production, especially in organic whose base is mixed vegetable / cattle farm. Technology of production of crop plants is characterized by a wide range of specific at all stages of production, starting with the selection and tillage, choice of species, varieties and hybrids of tending, storage, retention and placement. The course will be based on existing knowledge and experience to analyze the above mentioned stages of production in the existing system, while the lecturer will point out features. Establishing a solid crop rotation and the conversion from conventional to organic agriculture are the main characteristics of this system of growing plants. As part of the exercise, participants will draw up a proposal individually crop rotation and adequate explanation. After discussions, few most acceptable proposals would be defined.

Organic production of grain, forage crops and alternative represent parts of the course where experience, the existing and newly acquired knowledge in a simulation of the ecological production of field crops will be concretized. The teacher will familiarize students with the types of listed groups of crop plants that are interesting for this production and repeat the basic requirements for obtaining organic products. Then each of the participants will choose one plant species and



introduce its organic production method or procedures in obtaining the certificate. Discussion to point out the omissions and irregularities, as well as the differences between conventional and known realize organic production is planned to finish this part.

In the part of the course on organic seed production of field crops, trainer will introduce permitted, conditionally permitted and prohibited techniques of breeding and selection of plants. After that, participants should propose methods and techniques in creating and maintaining the reproduction of the materials. On the basis of existing knowledge about seed production segment, participants, together with teacher, will consider the specifics of organic seed production of field crops, possibilities and ways of production and supply of seeds of crop plants for organic production.

Evaluation will include individually inference according to the sequences course content and test.


Materials

1. Computer / laptop and projector / video screen,
2. TAB and markers for board / paper A0
3. Paper A4 pens



Introduction to the different methods of soil remediation

Teacher	Sonja Ivković
University	EDUCONS University
Course	Introduction to the different methods of soil remediation
Target	Agricultural Middle Schools
Type	classic
Duration	1 day - 8 hours



Description	The main objective of the course is to educate teachers in the field of application of the various methods of remediation. The course will include a review of the basic methods for remediation of sediment with a focus on immobilization of heavy metals in sediment, especially using different types of ligands in order to form complex compounds.
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Contents	<ol style="list-style-type: none">1. Soil remediation2. Metals3. Ligands and complex compounds4. Assessment of the availability of metals in the sediment5. Remediation processes6. Treatment of sediment7. Immobilization of metals with the addition of ligands8. Economic benefits of applying remediation
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Objectives	The main objective of the course is that teachers gain knowledge in the field of methods for soil remediation, with a focus on improving the knowledge and understanding of the methods of remediation by forming complex compounds.
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Activities	Course participants will have an active learning in the classroom, where they will get the necessary knowledge about the goals of the course. The course will be adjusted to the current knowledge of the participants, which will be checked before the start of each segment of the course. At the end of the course, acquired knowledge of the participants will be tested.
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Materials	Classroom, projector, whiteboard and markers, scientific works in the field of soil remediation.
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Fertilization in organic production

Teacher	Olivera Nikolić
University	EDUCONS University
Course	Fertilization in organic production
Target	Agricultural Middle Schools/ Agricultural Advisory Service
Type	classic
Duration	1 day – 8 hours



Description

Fertilizers use in plant production is very actual task due to energetic crises, need of rationalization of agricultural production, ecosystem protection and produce health safety products during the last decades. This agro-technical procedure is, however, an essential part of the system of growing plants, bearing in mind that it is prerequisite of yield quality and level. Fertilization model is just one of essential differences between conventional and organic agriculture. Overmaster and assimilate knowledges about fertilizers permitted in organic production system, techniques of its producing and use and possibilities of use some preparations (microbiological, herbal, etc.) for the purpose of soil improving and plant nutrition are important for successful and economically justified perform of organic production. Use of nature and organic matters instead of synthetic ones in agricultural production is one among ways to significantly reduce serious ecological and healthy problems that contemporary population is faced with In this context, processing of waste into high valuable material plays an important role because it leads to a reduction of the total amount of waste in landfills and risk of ecosystem pollution and ensures the circulation of matter and an ecological balance in the environment. So, it is very important to raise awareness of all affective factors in educational and productive system, producers and consumers of the need for controlled use of chemicals in agriculture and their replacement by natural substances that is included in the system of organic agriculture.

Contents

1. Influence of use of mineral fertilizers on ecosystem and health safety of food
2. Differences in the fertilization between the conventional and organic agriculture systems
3. Types of fertilizers and preparations permitted in organic agricultural system
4. Limiting factors applying some modern preparations in practice and possibilities of overcome the obvious difficulties
5. Waste processing as way of obtaining valuable substances for plant nutrition and soil improvement
6. Ecological aspect of use of organic fertilizers and microbiological and herbal preparations



Objectives	<ol style="list-style-type: none">1. To provide relevant information to the participants about the basic types of organic fertilizers and contemporary preparations with an additional effect on the quality of production and soil substrate.2. To make participants able to understand substantive differences and advantages of organic and conventional agro systems in terms of fertilization.3. To gain insight into the critical points in the implementation and overall manipulation of organic fertilizers, limiting factors applying some modern preparations in practice and possibilities of overcome the obvious difficulties.4. To raise awareness of the relevance and importance of composting as a method of waste processing and obtaining highly valuable organic matter or fertilizer – compost.5. To raise awareness of the dangers of excessive and uncontrolled use of chemicals in agriculture, the need to popularize organic agriculture where conditions are suitable for that system and its multi-functionality.
Activities	<p>The teacher opens course by a presentation of fertilization in conventional agriculture. Through the discussion, the teacher and the participants determined the positive and negative aspects of mineral fertilizers in agriculture. It represents an introduction in the next part of course devoted to organic fertilizers and preparations allowed in organic agriculture.</p> <p>The teacher presents the most important information about the types of organic fertilizers, preparations used for plant nutrition and soil improvement, preparation and application techniques. Along with the presentation, course participants can view samples of fertilizers and preparations typical for organic agriculture. Course participants share their practical experience in this area (participation in a project, organizing compost on the farm, experimental work in teaching with different kinds of fertilizers, etc.). This part is finished by conclusion about ecological and productive advantages of use of organic fertilizers and critical points in their preparation, keeping and use.</p> <p>The largest part of the course relates to composting as a way to processing of organic waste results in valuable matter - compost, reducing the total amount of waste, stimulate the circulation of matter in nature and contribute to the establishment of ecological balance. Composting will be presented through the proper video and accompanied by analysis and discussion of certain segments.</p> <p>Acquired knowledge will be checked by comparative analysis of mineral and organic fertilizers, which the participants will do in groups and present.</p>
Materials	<ol style="list-style-type: none">1. Computer and video screen2. Whiteboard and markers3. Paper



Innovations in agribusiness

Teacher	Sladana Čabrilo
University	EDUCONS University
Course	Innovations in agribusiness
Target	Agricultural Middle Schools
Type	classic
Duration	1 day – 8 hours



Description

Ability to innovate is one of the critical drivers of competitiveness, economic growth and development in contemporary business. It represents the ability to create product and services which differ from others at the market or to be used by customer in a different manner to cause a change. Innovation is crucial in terms it defines how a company, city, region or country evolves. However, it is possible to innovate exclusively by implementation of new knowledge, which is created only in the learning process.

Agriculture and food industry have been identified as priorities in the future economic development of Serbia. The main objectives of the national and regional strategies related to research and innovation are to increase awareness about the importance of innovation and relevant knowledge about innovation in key sectors such as agriculture, information-communication technology (ICT) and tourism. Thus, the main purpose of the course is to raise the awareness and relevant knowledge about the innovation in agribusiness in order to contribute to future competitiveness of Serbian agribusiness through knowledge dissemination.

Contents

1. The role and importance of innovation and knowledge in business
2. Definition of innovation
3. Innovation process
4. Innovation types
5. Innovation models (closed, open, networked)
6. Open innovation ecosystem
7. Innovation s in agribusiness - case studies

Objectives

1. To have an insight into the role and importance of innovation in agribusiness;
2. To be informed about different innovation types such as product/service innovation, business process innovation and administrative innovation;
3. To get knowledge of new innovation models such as open and networked innovation;
4. To figure out the whole innovation process by understanding all its phases and defining the possibilities of efficiently managing;



5. To get knowledge of open innovations (OIs), all actors in OIs as well as advantages of OIs in relation to closed innovations;
6. To have an insight into open innovation ecosystems and their subsystems;
7. Contribution to competence development of attendants for innovation management in agribusiness.

Activities

The course starts with short test determining attendants' knowledge and attitudes toward innovation in agribusiness. Based on the results, the course timeframe will be precisely defined in order to realize all objectives. The first part of the course tackles the introductory of innovation by consideration of first two headings in contents. Furthermore, the attendants will be introduced with the complex innovation process (from idea to new product/service/process commercialization) and all relevant phases. After that, it is planned that the whole group will together analyze the case studies of innovation in agribusiness. In the next part attendants should consider different types and innovation models with special focus on open innovation and innovation ecosystems. It is followed by the group dividing. Each group will get the materials in order to analyze open and closed innovation ecosystems and identify their advantages and drawbacks. Each group will present its own finding to others. This practice work includes group dividing, group work, group presentation and common conclusions. After this exercise, groups will be given different case studies related to the implementation of open innovations in agribusiness. Groups will define 1) all actors in innovation process, the possibilities to expand innovation ecosystem by means of new rapport between experts in agribusiness (agriculture sector), academic community (education sector) and end users; 2) the main effects of the innovation. Each group will present its own results to other groups. The course ends with group discussion aiming to define the most relevant observations related to the innovation in agribusiness.

Materials

Projector, PC or laptop, board and markers, papers.



Key factors of business idea development in agriculture

Teacher	Vilmoš Tot
University	EDUCONS University
Course	Key factors of business idea development in agriculture
Target	Agricultural Middle Schools/ Agricultural Advisory Service
Type	classic
Duration	1 day – 8 hours



Description

Considering the Strategy of Agriculture and Rural Development of Republic of Serbia (2014-2014) and the need to respect the principle of sustainable development as well as the new role of agriculture in the economy and society, we can conclude that the agriculture is a key resource for development of the region. However, there is either a lack of ideas or a lack of implementation of existing ideas. Both are a result of unfamiliarity with the management process, inadequate planning, organizing, leadership and control as well as restrictions on creating products and values. The main course task is to systematize the knowledge of the participants and emphasize the importance of proper business philosophy creation based on creating value with a purpose of gaining competitive advantage in order to have a viable and possible business venture in the field of agriculture.

Contents

1. Business philosophy (from vision to task)
2. Environmental analysis (external and internal)
3. Creating value opposite to creating products in agriculture
4. Gaining competitive advantage in agriculture
5. Errors in managing change

Objectives

The main course objectives include the following:

1. Understanding the notion of a business idea and its development,
2. Understanding the importance of impact and continuous analysis of the elements of the business environment
3. Understanding the difference between value creation and product creation
4. Understanding the concept and basic elements of a competitive advantage and
5. Recording and managing basic errors in change management

Activities

1. Evaluation of participants prior knowledge on planned topics - entrance test - before the start of the course, participants will do a placement test, which will provide us with insight into the level of prior knowledge
2. Identifying the key elements of external and internal environment that



influence the agricultural organization through a case study to - development of case study on the key impacts on agricultural economy which means that after analyzing a theoretical account of the key elements of external and internal environment of agricultural organizations, participants analyze and through discussion identify all the elements, then define and categorize the criteria of external and internal environment. In cooperation with the lecturer will briefly comment on the results of the work and emphasize the key results of the analysis of case studies

3. Spotting the differences between the product and value - Discussion on the topic: Defining our vision products, with the aim of detecting the lack of competitiveness from the perspective of the market. That is, the goal of the discussion is the analysis of existing strengths compared to the competition as well as the possibility of competition copying our advantages. Lecturer briefly comment on the students' results and findings and also emphasizes key findings. Purpose of commenting on the results of work is coming to the same conclusion and raising awareness among students about the need to create value.
4. Through a group work recording of the advantages and difficulties in carrying value creation - Dividing participants into groups with the task of creating value from existing products and record all the difficulties encountered during operation. Presentation of the teams and joint analysis of the perceived difficulties. Lecturer briefly comment on results and highlights key results of the participants
5. Spotting their own strengths and weaknesses in order to create a competitive advantage - Participants remain in groups and analyze the work of moving from product to value creation of other groups. They also get assigned to perceive strengths and weaknesses and explain the key difference that is created in relation to the competition. Lecturer briefly comment on results and highlights key results of the participants
6. Defining the errors that occur in the development of ideas - Through examples from practice, pointing out the most common mistakes that occur in the process of leading change
7. Course evaluation

Materials

Projector, blackboard, chalk, paper for additional material (case studies, instructions, etc.).