

## PEDAGOŠKO DELO

Čebelarstvo je vključeno v vse študijske programe Fakultet za kmetijstvo in biosistemske vede:

### I. Visokošolski in univerzitetni študijski program

- predmeti: medonosna čebela in osnove čebelarjenja
- - čebelji pridelki in trženje



Poskusni sedemsatni panji

### II. Magistrski študijski program Kmetijstvo

- predmet: Čebelarstvo II

### III. Doktorski študijski program Kmetijstvo

Raziskovalna in razvojna dejavnost:

- Biologija, patologija in drugi notranji in zunanji, okoljski vplivi na razvoj čebel.
- Proučevanje razvoja varoj in zatiranje varoj, *Varroa destructor*
- Čebelje bolezni in z njimi povezane tehnologije čebelarjenja, sonaravno čebelarjenje
- Tehnologija čebelarjenja, vzreja čebel, s poudarkom na vzreji kranjske čebele, *Apis mellifera carnica*, vzreja kakovostnih čebeljih matic
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A. Mikroskopiranje v laboratoriju; B. Laboratorijski poskusi s čebelami v kletkah

### Raziskovalni interesi:

- Čebelarstvo, vzreja čebel, s poudarkom na vzreji kranjske čebele, *Apis mellifera carnica*, vzreja kakovostnih čebeljih matic
- Biologija, patologija in drugi notranji in zunanji, okoljski vplivi na razvoj čebel.
- Proučevanje razvoja varoj in zatiranje varoj, *Varroa destructor*
- Čebelje bolezni in tehnologije čebelarjenja



Poznavanje biologije čebelje družine je osnova izvajanja tehnoloških ukrepov čebelarjenja. A: pregled čebelje družine; B: čebele na medenem satju v panju.

## I. visokošolski in univerzitetni študijski program

### Predmet 1.

### MEDONOSNA ČEBELA IN OSNOVE ČEBELARJENJA

#### Vsebine:

Obravnava se sistematika medonosne čebele, zgradba in delovanje organskih sistemov, razmnoževanje, ontogenetski razvoj, funkcija različnih kast in socialno življenje čebel. Predstavljen je letni razvojni cikel družine in značilnosti posameznih razvojnih obdobj, prehrana čebel.

Nepravilnosti v razvoju družine, ter infektivni in neinfektivni dejavniki; bolezni, škodljivci in zastrupitve čebel.

Higiena v čebelarstvu. Zgodovinski pregled čebelarjenja, razvoj panja, sodobna tehnologija čebelarjenja, prevozni čebelnjaki, pribor in oprema. Selekcija v čebelarstvu in vzreja čebeljih matic.

#### Cilji in kompetence:

Slušatelji poznajo osnove sistematike in biologije medonosne čebele in razumejo delovanje in organizacijo čebelje družine, ter poznajo nefiziološka stanja čebelje družine. Cilj programa je temeljito poznavanje čebelarjenja kot kmetijske dejavnosti in tehnoloških problemov v čebelarstvu, ter poznavanje zakonodaje s tega področja. Študent tekom izobraževanja mora dokazati da strokovna vprašnja rešuje učinkovito, rešitve uporablja organizirano, s potrebno spretnostjo ki jo zahteva problematika. Prepozna in definira možnosti razvoja novih pristopov na področju tehnologije čebelarjenja v povezavi s kmetijstvom.



Plemenilniki na plemenilni postaji; Mating nuclei at honey bee queens mating station

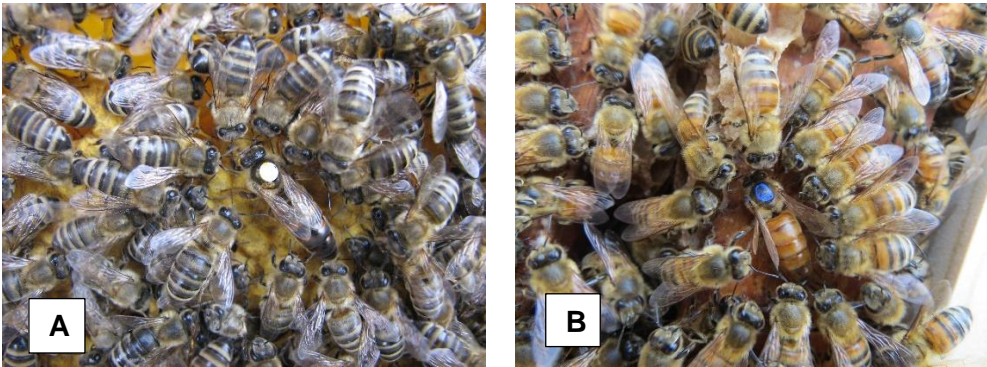
## **Predmet 2** **ČEBELJI PRIDELKI IN TRŽENJE**

### **Vsebina:**

Pridobivanje čebeljih pridelkov (med, cvetni prah, matični mleček, propolis, vosek, strup), naravni pogoji medenja, zagotavljanje kvalitete na nivoju pridelave, predelave, shranjevanja. Pogoji kvalitete (higiena pri pridelavi, v panju, osebna higiena, ureditev prostorov, uporaba terapevtskih sredstev in zaostanki le-teh v pridelkih). Dobra čebelarška praksa, točenje medu (vrste in ustreznost točil, prostor), ugotavljanje zrelosti medu (lastnosti, vlaga, pravilniki), utekočinjanje medu (način, temperatura, kristalizacija), skladiščenje (poreklo, pogoji), o analizi medu (ocena, vzorčenje, organoleptična ocena, analiza cvetnega prahu, melisopalinologija), ugotavljanje kvalitete, embalaranje, deklaracija (vrsta, poreklo). Postopki pridobivanja cvetnega prahu in shranjevanja (sušenje, zamrzovanje, konzerviranje), poraba in razmere na trgu. Pridelava, predelava, uporaba matičnega mlečka (fermentiranje, pokvarljivost). Pomen voska v panju in izven panja. Pregled zakonodaje in drugih aktov s področje kvalitete pridelkov, ter razmere na trgu (ponudba, povpraševanje). Trženje v čebelarstvu: čebelji pridelki, plemenski material. Odnosi na trgu, promocija čebeljih pridelkov in izdelkov. Sodelovanje deležnikov na trgu.

### **Cilji in competence**

Slušatelji razumejo pogoje in metode pridelave čebeljih pridelkov, - poznajo karakteristike kakovosti, ter možnosti predelave in zviševanje tržne vrednosti pridelkov in izdelkov, - analizirajo problematike pri zagotavljanja higienskih in veterinarsko sanitarnih pogojev pri pridelavi neoporečnih pridelkov, - razumejo normativno ureditev, - vrednotijo razmere na trgu, -vrednotijo promocijske pristope na trgu. Cilj programa je tudi spodbujati nove pobude pri trženju čebeljih pridelkov in spoznavati različne oblike prodaje.



A: *Apis mellifera carnica*; B: *Apis mellifera ligustica*

## ENGLISH

### Study programs of the Apiculture

#### HONEY BEE AND ELEMENTARY KNOWLEDGE OF APICULTURE

##### Content

In separate themes the systemic of honeybee and introduction into bee strains is discussed. Further themes are anatomy and function of organic systems, reproduction, bee development, function of casts in bee colony, the life of individual bee and social organization of the colony, seasonal bee colony development, characteristics of developmental stages, bee nutrition.

Abnormalities in colony development, infective and ineffective influences; diseases, predators and intoxications, preventive measures, diagnosis and hygiene in beekeeping. Historical review of beekeeping, hive development, contemporary beekeeping, transhumance of bees, beekeeping equipment. Queen rearing and selection in beekeeping. Legislation and standards and project work in beekeeping.

##### Objectives and competences:

Students acquire the theoretical and practical foundations of honey bee and beekeeping. They understand basic knowledge of bee systematic and biology of honey bee. They are able to demonstrate organization and function of honeybee colony, and show non-physiological status of honeybee colony.

Students should demonstrate that they are able to solve problems in beekeeping sector professionally, using organized approach and with needed understanding conditions in the field. They understand and evaluate the beekeeping as the part of agriculture and solve technological problems, understand regulations and use independent practical and research solutions in apiculture.



A: Laboratory experiments with caged bees; Laboratorijski poskus s čebelami v kletkah;  
 B: Varroa mites on honey bee larvae in the Laboratory; Varoje na ličinkah v laboratoriju

## HONEYBEE PRODUCTS AND MARKETING

### Content

Production of honeybee products (honey, pollen, royal jelly, propolis, wax venom), the environmental conditions for honey production. The quality of production, remodeling, storing, marketing; conditions of quality (hygiene in production, in the hive, personal hygiene, arrangement of the factory hall, the use of therapeutics, medicaments). Good beekeeping practice, honey extraction, establishing high quality of honey (quality characteristics, regulations), liquefying and storing the honey, honey analyses (melisopalinology), packaging, declarations. Procedure of pollen production (humidifying, freezing, conservation), and situation on the market. Production, properties and remodeling of royal jelly (fermentation, deteriorations), the value of wax in the hive and processing. Antibacterial properties, the use of products in medicine (bee venom), legislations in the field of bee products, the prospects on the market. Marketing of bee products and breeding material. Honey bee products on the market. Collaboration between stakeholders on the market.

### Objectives and competences:

Students understand conditions and methods of production the harvest, - demonstrate characteristics the quality and possibilities of remodeling and increasing the value of honey bee products on the market, -they analyze enquiries for hygienic and veterinary

sanitary measures in beekeeping production, -apply legislations and promotion new initiatives and marketing bee products and different approach to the market.



A. Honey bee queen in transport cage ready for shipping B. Honey processing factory with incubators, and honey homogenizers for mixing, blending, and homogenizing various kinds of honey.

## II. Magistrski študijski program Kmetijstvo

### - Doktorski študij na področju čebelarstva

#### ČEBELARSTVO II

##### Vsebina:

Raziskovalna problematika na področju sistematike čebel, biologije, patologije čebel, tehnologije čebelarjenja.

Raziskave fiziološkega in patološkega razvoja posameznega osebka in socialne organizacije čebel. Nepravilnosti v razvoju družine, ter delovanje infektivnih in neinfektivnih dejavnikov, ter tehnoloških dejavnikov, ki vplivajo na posamezni osebek ter na razvoj čebelje družine in imajo ekonomske posledice v čebelarstvu.

Povezave čebel in okolja, ter dejavniki v okolju, ki vplivajo na razvoj čebel; delovanje FFS na organske sisteme in zastrupitve. Proučevanje vpliva dejavnikov iz okolja na nivoju celice in proučevanje mehanizmov delovanja na čebelji organizem. Čebela kot model detekcije prisotnosti škodljivih substanc v okolju.

Genetika čebel, selekcija in rejski programi v čebelarstvu, vzreja matic, ter raziskovalne teme s teh področij.

Higiena v čebelarstvu in pridelava higiensko neoporečnih čebeljih pridelkov. Proučevanje tehnologije ki vpliva na higiensko pridelavo, ter poznavanje tehnoloških in zdravstvenih vidikov. Preventivni in kurativni ukrepi.

Ocenjevanje kvalitete pridelkov, ekonomika in trženje v čebelarstvu.

### **Cilji in kompetence:**

Študenti v magistrskem študijskem programu pridobijo naslednje kompetence: - razumevanje in analiza bioloških procesov posamezne čebele in čebelje družine, - sposobnost reševanja konkretnih problemov v čebelarstvu in v raziskavah s področja čebelarstva (vzreja, čebelje bolezni, opraševanje, pridelava in uporaba pridelkov, tehnologija), -vrednotiti uporabo raziskovalnih metod in raziskovalne rezultate, -razvoj kritične presoje čebelarskih praks in rezultatov, -sposobnost samostojnega in timskega dela in reševanje zapletenih strokovnih problemov na področju čebelarstva, -analizirati in ustvariti ustrezna raziskovalna orodja za doseg želenih strokovnih in raziskovalnih ciljev.



Razvoj matice v matični satni celici. Queen's development in queen cell.

## **II MSc program in Agriculture**

### **PhD study in Apiculture**

#### **BEEKEEPING II**

##### **Content:**

Research areas in Apiculture includes bee systematic, biology, physiology and function of organic systems, reproduction, bee development, and function of individual bee and social bee organization.

Malformations in colony development, effects of infective and un-infective agents, and technological influences on individual bee and colony development and have economic impact in beekeeping.

Connection between bees and environment and environmental influences on bee development; influence of plant protective substances on bee organic systems and intoxications. The study of environmental triggers in cellular level and the study the action on individual bee level. Bee as a model for detection of damaging substances in environment.

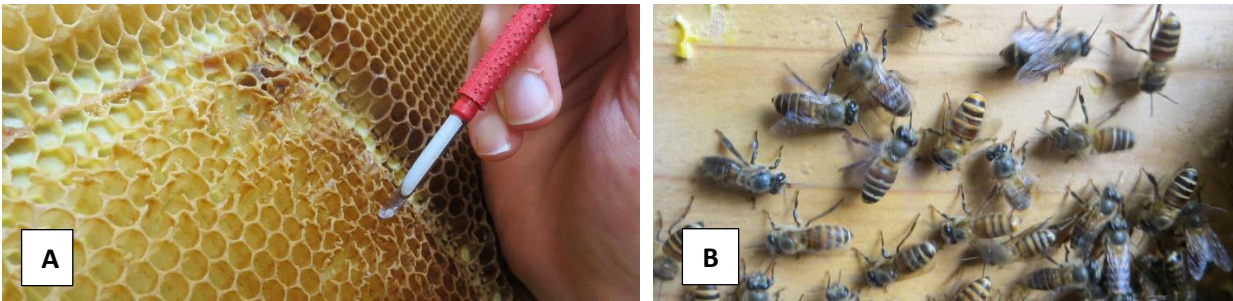
Bee genetic, selection and breeding programs in beekeeping, queen rearing and research in these fields.

Hygiene in beekeeping and production of safe honeybee products. Research of technology which influences on hygienic production and knowledge of technological and health sources. Preventive and curative activities.

Evaluation of the quality of honeybee products and economics in beekeeping and marketing.

### Research interests:

- Apiculture and bee breeding with emphasis on *Apis mellifera carnica* quality queen rearing
- Honeybee biology, pathology and other intra colonial and external, environmental influences on bee development
- Biology and control of *Varroa destructor*
- Honeybee diseases and colonies management



A. Presajanje ličink za poskuse z maticami. Larvae grafting for queen's experiments- B. Azijska čebela *Apis ceranae*. Asian honey bee, *Apis ceranae*.

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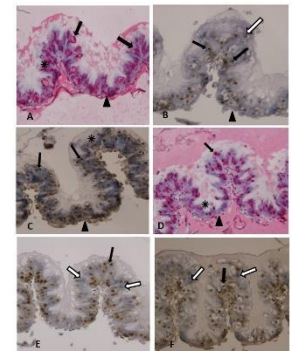
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