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REPORT ON THE SIXTH INTERNATIONAL “FASCINATION OF PLANTS DAY” (FoPD) AT THE FACULTY OF BIOLOGY OF SOFIA UNIVERSITY “ST. KLIMENT OHRIDSKI”

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Abstract. The sixth international “Fascination of Plants Day” (FoPD) was organized on 18th of May 2022 in the Faculty of Biology of Sofia University together with the Agrobioinstitute of the Agricultural Academy. Guests were welcomed by exhibition of plants grown in the Faculty’s greenhouse and educational stand of the student club SKOREC consisting of a rich palette of volunteer activities related to expanding students’ knowledge of biodiversity and its conservation. The event aimed at popularization of plant science and its significance for life on Earth. The fascination of medicinal, crop and ornamental plants, as well as microalgae, was discussed in respect to their importance and functional characteristics. Curious facts about plants were demonstrated by practical demonstrations. Students from different degrees, PhDs, MSc, BSc, were involved in visual presentations on research projects funded by Sofia University and Ministry of Education and Science. The overall participation of students was major achievement since this promoted the formation of additional professional competencies in real environment. Moreover, pupils from higher schools participated in a drawing/photo contest organized to draw their attention to the plant world from an entertaining point of view.

Key words: Bulgaria, Faculty of Biology, plant science, professional competencies, students

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How is organized FoPD worldwide, in Europe and in Bulgaria? All information about the FoPD plant scientists' initiative can be accessed via www.plantday18may.org. Fascination of Plants Day is supported world-wide by a network of National Coordinators who voluntarily promote and disseminate the activity within their countries and turn it into a success story. To organize an event in your country, one should contact the National Coordinator on the FoPD country page (<https://plantday18may.org/countries/>). Scientific institutions, universities, botanical gardens, and museums, together with farmers and companies, open their doors. For 2022, nearly 56 countries joined the 6th edition of FoPD worldwide to offer over 820 plant-based outreach activities for all interested people from toddlers to grandparents (<https://plantday18may.org/statistics/>). In Bulgaria, FoPD has been organized every two years since 2015 when plant-related institutions organize events to explain facts about plants (Zhiponova et al. 2021).

What is the significance of plant science today?

The goal of plant scientists is to reveal how important are plants for our life - the air we breathe, the food we eat, for health, for building our homes, for decoration. The significance of plant organisms for the life is sometimes underestimated and we aim to make people enthusiastic and fascinated by plants, as well as to explain the need to make research on them. This year we demonstrated scientific aspects of medicinal, crop and ornamental plants, as well as microalgae, suggesting how these organisms work and how this can be used in practice for food, health, and sustainable agriculture. The research is fundamental, and we try to engage students who are interested to work in this field and help us. Together, seniors and students, we explained strategies that are conducted together with the Bulgarian Academy of Sciences and the Agricultural Academy. We participate and present projects supported by the National Research Fund of Ministry of Science and Education and by the Research Fund of Sofia University.

results

How is organized FoPD in the Faculty of Biology of Sofia University? The Faculty of Biology of Sofia University participates each time together with the Agrobiointitute of Agricultural Academy. This year different events were organised (Table 1; Figs. 1-10). In FoPD participate colleagues interested in animal biology and other directions because plants take place there, too. There is interaction between different disciplines, and we use FoPD to show how fascinating plants are. Major target groups are students, pupils, children, who we want to ignite attention and educate them to respect nature. We involve young people to participate and present the fundamental data and results in a popular way. In this way we

demonstrations were performed in the Faculty's Lobby. In total, the participants included: 40 BSc, 4 MSc, and 5 PhD students; one pupil from the American College of Sofia; 4 senior researchers from Agrobioinstitute; 15 members of the Faculty of Biology. Nearly 40 children participated in the drawing/photo contest.

Participating Organization

Agrobioinstitute, Agricultural Academy

(Fig. 2)

(Funding: EU & National Science Fund of Ministry of Education and Science)

Green house of Faculty of Biology
(Fig. 1 and 3) (Funding: EU)

SKOREC
(Fig. 4)

Projects of PhD students
(Fig. 5)
(Funding: Fund for scientific investigations of Sofia University "St. Kliment Ohridski")

Information - Topics, Participants and Funding

"LEGUMES AND THEIR IMPORTANCE TO ANIMALS AND HUMANS AND THE ENVIRONMENT"

Prof. Anelia Iantcheva, Assoc. Prof. Mariana Radkova

Project: "Translating knowledge for legume-based farming for feed and food systems" with the acronym "Legumes Translated" ID 817634, 11.2018-04.2022, funded by the EU;

Project: "Functional and bioinformatics analyses of GRAS transcription factors related to the response of abiotic and biotic stress in annual (*Medicago truncatula*) and perennial (*Medicago sativa*) alfalfa" DN 16/9 from

12.2017- May 2022 funded by the National Science Fund of Ministry of Education and Science

"PHYTOPATHOGENIC FUNGI" Assist. Prof. Dr. Aneta Lyubenova "IN VITRO PLANTS" Assist. Prof. Dr. Lilia Georgieva

"PLANTS ARE FASCINATING"

Aneliya Raycheva, MSc (Department of Plant Physiology)

Project: Center of Competence:

BG05M2OP001-1.002-0012-C01, 2018-2023:

"Sustainable utilization of bio-resources and waste from medicinal and aromatic plants for innovative bioactive products" funded by Operational Program "Science and Education for Smart Growth" - 2018, co-financed by European Union via European Regional Development Fund

NATURE CONSERVATION AND EDUCATIONAL CLUB in the Faculty of Biology, University of Sofia

(<https://www.facebook.com/groups/170251143796/about>) Yana Skordeva, Plamen Petrov, Martina Range Iova, Andrey Kolev, Vyara Ivanova, Yuzelim Komarevska, Miglena Sashkova Supervisor: Assist. Prof. Atanas Grozdanov

"POSSIBILITIES FOR APPLICATION OF PROMISING STRAINS OF MICROALGAE IN THE PROCESSES OF PHYCOREMEDIATION"

Zornitsa Karcheva (Department of Plant Physiology)

Supervisor: Assoc. Prof. Ganka Chaneva; Project № 80-10-13/10.05.2022

"AEROTERRESTRIAL ALGAE FROM MEGALITHIC COMPLEXES IN HASKOVO DISTRICT"

Miroslav Ivov Androv (Department of Botany) Supervisor: Prof. Maya Stoyneva-Gartner; Project № 80-10-47/10.05.2022

"AQUAPONICS AS A PHYTOEFFECTOR FOR THE TERRESTRIAL ORCHID *LUDISIA DISCOLOR*"

Alexander Tomov (Department of Plant Physiology)

Department
Biophysics and Radiobiology (Fig. 6)
Department of Biology
Education
(Fig. 7)

Department of Plant
Physiology
(Funding:
Bulgarian
National Science Fund of Ministry of
Education and Science)
(Fig. 8 and 9)

Supervisor: Assoc. Prof. Miroslava

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Zhiponova; Project № 80-10-69/11.05.2022 59 Information - Topics, Participants and Funding

Participating Organization

“TAXONOMIC CHARACTERISTICS OF
STREPTOPHYTES IN THE LIVING
ALGAE COLLECTION OF UNIVERSITY
OF SOFIA "ST. KLIMENT OHRIDSKI

(ACUS)”

Kristian Rosenov Ivanov (Department of Botany)

Supervisor: Assoc. Prof. Blagoy Uzunov;
Project № 80-10-95/13.05.2022

“INFLUENCE OF LIGHT QUALITY ON THE BIOACTIVE POTENTIAL OF GREEN MICROALGA *COELASTRELLA* SP. BGV”

Zhaneta Georgieva (Department of Plant Physiology)

Supervisor: Assist. Prof. Detelina Petrova;
Project № 80-10-184/27.05.2022

“HOW TO TALK WITH PLANTS?”

Prof. Vasilii Goltsev, Assoc. Prof. Margarita Kouzmanova, Assist. Prof. Momchil Paunov, Assist. Prof. Kolyo Dankov, Assist. Prof. Boyana Angelova

“PHOTOTROPISM”

Tsvetomir Favliyanov (BSc 4y, Geography & Biology)

“PROOF OF THE TRANSPORT OF SUBSTANCES IN THE PLANT

ORGANISM” Alex Atanasov (BSc 4y, Biology and Chemistry); Simona Georgieva (BSc 4y, Geography & Biology)

“MICROSCOPIC OBSERVATION OF PLANT CELLS” Desislava Trenovska (BSc 4y, Geography & Biology); Katerina Damyanova (BSc 4y, Biology & English Language); Hristina Vylcheva (BSc 4y, Geography & Biology)

“CHLOROPHYLL PRINTING”

Radost Durchova (BSc 4y, Biology and Chemistry)

“HOW TO GROW AVOCADO?”

Viktoria Roseva (BSc 4y, Biology and Chemistry)

“THE BEAUTIFUL VIOLETS”

Pavel Veselinov (BSc 4y, Biology and Chemistry)

“HOME EXPERIMENT WITH PLANTS”

Dimitrina Terzieva (BSc 4y, Biology and Chemistry)

“LET’S RECOGNIZE CONIFERS QUICKLY AND EASILY” Ivona Ivanova and Rositsa

Spasova (BSc 3y, Teacher of natural sciences in the basic level of education)

Supervisor: Assoc. Prof. Kameliya Yotovska

“COULD CATMINT PROTECT US FROM THE MICROBES AROUND US?” Anna

Zaharieva (BSc 3y, Biotechnology), Ana-Maria Nedelcheva (BSc 4y, Molecular Biology), Kalina Simeonova (BSc 4y, Molecular Biology), Muhammed Mohammed (BSc 4y, Molecular Biology), Mihaela Stoyanova

Supervisors: Assist. Prof. Detelina Petrova, Assoc. Prof. Miroslava Zhiponova

“CATNIP - A NATURAL PROTECTOR OF THE HUMAN BODY” Desislava Prinareva, Daniel Petkov, Yordan Ilinski, Kiril Stamboliyski, Vasil Stamenov, Vanesa Ivanova (all BSc 4y, Molecular Biology), Antoana Tsekova (scholar in American College of Sofia)

Supervisors: Assoc. Prof. Miroslava Zhiponova, Assist. Prof. Detelina Petrova

Participating Organization

Kids’ Corner (Fig. 10)

Information - Topics, Participants and Funding

“INVESTIGATION OF THE EFFECT OF EXOGENOUS CYTOKININS ON THE ACTIVITY OF ENZYMATIC ANTIOXIDANTS IN IN VITRO

CULTURED CATMINT (*NEPETA NUDA* L.)” Alexandra Stoyanova, De sislava Stanoeva, Iva Varbacheva, Laura Yankova, Mario Marinov, Simona Svetlinova, Slaveya Kostadinova, Tsvetan Tsvetanov (all BSc 4y, Molecular Biology)
 Supervisors: Assoc. Prof. Miroslava Zhiponova, Assist. Prof. Detelina Petrova
 “WHY DO CATS GO CRAZY OVER CATNIP (*NEPETA NUDA* L.)?” Gabriela Kalafirova & Margarita Popova (BSc 3y, Molecular Biology) Supervisors: Assist. Prof. Marieta Hristozkova, Assist. Desislava Mantovska
 “NEPETA NUDA FOR NATURAL COSMETICS” Stefani Petrova, Tereza Georgieva, Alisa Marinkov, Vesela Balabanova-Bozushka (MSc 1y, Plant Biotechnology)
 Supervisor: Assoc. Prof. Zhenya Yordanova

Project: № KP-06-N56/9/12.11.2021
 “Interdisciplinary biotechnological approach for analysis and modulation of the biological potential of the medicinal plant *Nepeta nuda*” funded by Bulgarian National Science Fund and by the Ministry of Education and Science of Bulgaria
 Contributors: Products including *N. nuda* were designed by the support of My Lavanda Skincare Essentials
 (<https://www.facebook.com/MyLavanda/>;
https://www.instagram.com/mylavanda_bg/),
 Chocolaterie (<https://chocolaterie.org/>),
 Advertising agency Staks (www.staks.net),
 BaBka.handknitting (<https://www.instagram.com/babka.handknitting/>).

Art place for children to create and socialize.

CONTEST Participants:

(uploaded photos and paintings at <https://plantday2015bg.wordpress.com>)

- 19 High School "Elin Pelin", Sofia
- 18 High School "William Gladstone", Sofia
- 22 High School "G.S.Rakovski", Teacher: Maya Kenardzhieva
- High School "Britanica", Teacher: Tsvetelina Ivanova
- Second English Language High School "Thomas Jefferson", Teacher: Sevdalina Stoyanova
- Sofia Vocational High School "John Atanasov", Teachers: Nevenka Kostova, Elena Panayotova, Hristo Vasilev

FoPD Links e-mail in Faculty of Biology: rastenia_bg@abv.bg; official site: <https://plantday18may.org/>;

Faculty of Biology site: https://www.uni-sofia.bg/index.php/bul/universitet_t/fakulteti/biologicheski_fakultet2/novini/den_na_ocharovanieta_na_rasteniya_ta_18_maj_2022_g

National Student Television Alma Mater, Sofia, Report:

https://www.youtube.com/watch?v=pMH_ZPa2tVs&ab_channel=AlmaMater61

engage the young people themselves who are part of our projects, which helps them to assimilate plant science and to get motivated and inspired for work with plants. We intend to describe fundamental data in a popular way with the aim to include BSc, MSc and PhD students who present mainly. The academical mentors are just to support and orientate the presentations and demonstrations.

Fig. 1. FoPD in the Faculty of Biology: a - Faculty's lobby; b-d - demonstration of ex vitro adaptation of petunia plant by the Department of Plant Physiology.

By FoPD, a contest was organized for children

In this contest, major role have the colleagues from Department of Biology Education thanks to who we managed connection with teachers (Table 1). In this way we manage to engage early kids who are interested in nature and in plants. When we invite them for participation in FoPD, they also attend the organized activities with plants and animals and get excited. The contest itself did not aim to restrain kids' creativity but to give the freedom to express themselves. This year, the topic of the contest was "Plants - funny and comic", where nearly 40 children from different age groups took part. Students also participated. So, we feel satisfied with the attendance, which was very active and interesting for us, too.

Educational focus - the competence approach in higher education One of the main challenges for higher education is related to the quality of education and training of competent and competitive professionals. The expected

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Fig. 2. Agrobioinstitute presents projects funded by EC and National Science Fund of Ministry of Education and Science: a, b - *in vitro* plants; c - phytopathogenic fungus; d - legumes; e, f - students as researchers. The research topics were illustrated with presentations, demonstration materials, posters, and flyers. A questionnaire on the importance of legumes was prepared for the participants in the event. For all those who filled in the questionnaire correctly, there was also a prize-prepared booklet with recipes for legumes.

results of higher education are described as a set of knowledge, skills and/or competencies acquired by the individual, which he is able to demonstrate after completing his studies. The competence approach is oriented towards achieving these goals (as expected results). The competence approach is related to the new educational paradigm and its application leads to improving the quality of education by making it practically oriented. The application of the competence approach in training changed the learning process from the statistical concept of acquiring knowledge to curriculum to the dynamic perception of competence as a complex of knowledge, skills and attitudes that develop and enrich throughout life.

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Fig. 3 (above). Greenhouse of the Faculty of Biology supported by EU fund of Center of Competence: a-d - ornamental and medicinal plants; b, c - *in vitro* plants.

Fig. 4 (on the right). SKOREC - nature conservation and educational club: a-e - BSc students from SKOREC with art collection. SKORETC presented its traditional educational stand consisting of a rich palette of volunteer activities related to expanding students' knowledge of biodiversity and its conservation. The stand showed a rich exhibition of different types of plants painted by students and turned into posters and stickers. The student volunteers promote the activities of the club and demonstrate the achievements to the new students and the guests of the event.

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Fig. 5. PhD students presenting projects supported by Fund for scientific investigations of Sofia University "St. Kliment Ohridski": a-e - PhD students from the Departments of Botany and Plant Physiology exploring the microalgae's world; c - aquaponics used in PhD student projects; f - BSc students interested in microalgae.

Fig. 6. “HOW TO TALK WITH PLANTS?”: a-e - members of the Department of Biophysics and Radiobiology reveal scientific approach to understand plants’ state.

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Fig. 7. BSc students from binary specialities: a-e - BSc students and the Department of Biology Education reveal plants’ fascination by attractive demonstrations.

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Fig. 8. Fascination of the catmint *Nepeta nuda* fundamental studies: a-f - BSc students from the specialities Molecular Biology and Agrobiotechnology and the Department of Plant Physiology reveal the properties of the medicinal plant *Nepeta nuda* such as antibacterial, antioxidant, attractant for cats, application in cosmetics; g-j - *Nepeta nuda in vitro* and *ex vitro* plants, and extracts. The project is funded by the National Science Fund of Ministry of Education and Science.

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Fig. 9. Catmint *Nepeta nuda* products for beneficarianife: a-cosmetic cream (supported by MyLavanda Skincare Essentials <https://www.facebook.com/MyLavanda/>; https://www.instagram.com/mylavanda_bg/); b - chocolates (supported by Chokolaterie <https://chokolaterie.org/>); c - disinfectants (lab-made); d-f-cattoys (BaBka.handknitting(<https://www.instagram.com/babka.handknitting/>)).

Educational focus - the competence approach in higher education One of the main challenges for higher education is related to the quality of education and training of competent and competitive professionals. The expected results of higher education are described as a set of knowledge, skills and/or competencies acquired by the individual, which he is able to demonstrate after completing his studies. The competence approach is oriented towards achieving these goals (as expected results). The competence approach is related to the new educational paradigm and its application leads to improving the quality of education by making it practically oriented. The application of the competence approach in training changed the learning process from the statistical concept of acquiring knowledge to curriculum to the dynamic perception of competence as a complex of knowledge, skills and attitudes that develop and enrich throughout life.

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Fig. 10. Kids' corner: a-e - kids are introduced to plant art techniques.

The competence approach in higher education requires the formation of professionals in the following skills: knowledge of basic principles of functioning of the enterprises, develop creative thinking, skills of work in team, also such human qualities as self-awareness and self-esteem, etc. (Le Deist & Winterton

2005; Romanovtseva 2016). The application of the competence approach in higher education is determined by important socio-economic, social, and pedagogical prerequisites. The global preconditions include: the development of technological innovations in products and processes, as well as demographic changes that increase the importance of adaptive learning and work-based learning; the need to replace traditional educational models with results-related utility models; the lifelong learning strategy; initiatives for defining and validating competencies acquired through non-formal and informal learning; the need to improve the skills and qualifications of the workforce and to promote labor mobility by building common reference levels of professional competence; new technologies and complex problems in today's society, which require the creation of multidisciplinary teams of experts with world-class competencies (Song & Zhou 2021; Khutorskoy 2018; Lans et al. 2014).

The substantiated theoretical prerequisites for the use of the competence approach in the preparation of students are an adequate reaction to the change in the values of young people and the attempts to overcome the philosophical and

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psychological contradictions in modern education. Values are a necessary complement to knowledge because they structure and hierarchize goals and knowledge. The acquisition, transformation and use of knowledge is an active process, therefore, a prerequisite for the formation of emotional-volitional and motivational components of competence is the active position of the student (Gaybullayeva & Jonpulatova 2021; Paulsen 2013).

CONCLUSION

Competence is the achievement of compliance between the available cognitive resources of the individual and the requirements of the real environment. In the context of the formation of professional competencies is the participation of students and PhD students in this year FoPD. The young biologists were involved to get enthusiastic about science and to make other students and guests interested, too.

CONFLICT OF INTERESTS

The authors declare that there is no conflict of interests regarding the publication of this article.

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AUTHOR CONTRIBUTIONS

M.K.Z. and K.S.Y designed and wrote the manuscript, and A.V.I. contributed in adding information and improving the manuscript.

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