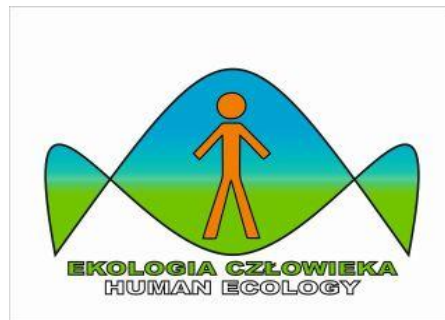


III Międzynarodowa Konferencja „Ekologia człowieka”

The 3rd International Conference 'Human ecology'

Lublin, 19-20.06.2018
Poland



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Słowo wstępne

Konferencja „Ekologia człowieka” wyrasta z dążenia do integracji wielu dziedzin nauki, zajmujących się szeroko pojmowaną problematyką ekologiczną. Jej historia sięga roku 2014, to jest pierwszej konferencji która odbyła się w Łodzi, i roku 2016, kiedy w Szczecinie obradowano nad wpływem środowiska na życie człowieka.

Międzynarodowa konferencja pod hasłem „Ekologia człowieka” w Lublinie jest trzecim z kolei spotkaniem ludzi nauki. Jej celem jest rozwój współpracy przedstawicieli nauk przyrodniczych, medycznych, matematycznych i humanistycznych w zakresie problematyki dotyczącej relacji człowiek – środowisko.

Dziękujemy wszystkim uczestnikom za udział w konferencji, członkom Komitetu Naukowego za wsparcie tej inicjatywy, a Organizatorom za wielomiesięczny trud włożony w przygotowanie tego interdyscyplinarnego spotkania. Liczymy na to, że ta konferencja stanie się dla Państwa interesującym forum wymiany myśli a niniejsze opracowanie w formie książki abstraktów będzie przypominało o idei spotkania w Lublinie. Zapraszamy do udziału w kolejnych edycjach konferencji.

Dr hab. Mirosława Chwil
Przewodnicząca III Międzynarodowej Konferencji „Ekologia człowieka”

Dr Michał Marian Skoczylas
Wiceprezes Sekcji Ekologicznej Polskiego Towarzystwa Lekarskiego

Lublin, 19-20 czerwca 2018 roku

Foreword

The conference ‘Human ecology’ arises from the desire to integrate many fields of science, dealing with broadly understood human ecology. Its history dates back to the year 2014, when it was held for the first time in Łódź, and the year 2016, when the influence of the environment on human life was discussed in Szczecin.

The International Conference ‘Human ecology’ in Lublin is the third meeting of people of science. Its aim is to develop cooperation between representatives of particular natural and medical sciences, mathematics and humanities in the field of human-environment relations.

We would like to thank all conference participants and members of the scientific committee for the support of this initiative and the organizers for many months of effort put into the preparation of this interdisciplinary meeting. We hope that this conference can be an interesting forum to exchange ideas and this book of abstracts remind you about the idea of the meeting in Lublin. We invite you to participate in the next editions of the conference.

Mirosława Chwil, PhD, assoc. prof.
Chairwoman of the 3rd International Conference ‘Human ecology’

Michał Marian Skoczylas, MD PhD
Vice-president of the Section of Ecology in the Polish Medical Association

Lublin, 19-20 June 2018

Skrócony opis programu III Międzynarodowej Konferencji „Ekologia Człowieka”
The brief description of the program of the 3rd International Conference ‘Human ecology’

Lublin, 19 czerwca 2018 roku – wtorek

Lublin, 19 June 2018 – Tuesday

10.00 - 10.15 Otwarcie obrad / Opening of the conference

Prof. dr hab. Janusz Kalbarczyk

Dr Michał Skoczylas

I Sesja plenarna / The 1st plenary session

Przewodniczący / Chairmen

Prof. Robert Pokluda

Prof. Elżbieta Weryszko-Chmielewska

Prof. Janusz Kalbarczyk

Dr Michał Skoczylas

10.15-10.35 Agronomists job don't reduce natural resources to meet today's needs without compromising the needs of future generation (prof. dr hab. Shaban Nidhal, Kadhum Eman, University of Forestry-Faculty of Agriculture, Sofia, Bulgaria)

10.35-10.55 Mushroom polysaccharides as a tool for mycotoxin control: an overview (mgr Jelena Loncar, prof. Slaven Zjalić, University of Zadar, Croatia)

10.55-11.15 Medical plants is the meeting point for nations, cultures and scientists (dr Vitalijus Naumavičius, Vinius University, Lithuania)

11.15 – 11.45 coffee break

II Sesja plenarna / The 2nd plenary session

Przewodniczący / Chairmen

Prof. Nidal Shaban

Prof. Marzena Błazewicz-Woźniak

Assoc. Prof. Bożena Denisow

- 11.45-12.05 Aspects of vegetable production quality in the conditions of sustainable horticulture (prof. dr hab. Robert Pokluda, Mendel University in Brno, Czech Republic)
- 12.05-12.25 The outline of the history of human ecology in the middle of the twentieth century (lek. Nadia Marquette de Susa, UNIVAS, Pouso Alerge, Brazil, dr n. med. Michał Skoczylas, Pomeranian Medical University in Szczecin, Poland)
- 12.25-12.45 Importance of sustainable alfalfa (*Medicago sativa* L.) production in the mediteranean region of Croatia (Prof. dr hab. Maćešić Dubravko, Prof. Dr hab. Darko Uher, University of Zagreb, Croatia)
- 12.45-13.05 Modern nuclear magnetic resonance (NMR) spectroscopy provides unprecedented ability to glimpse the processes of life in atomic detail (dr Łukasz Wieteska, University of Leeds Faculty of Biological Sciences, United Kingdom)
- 13.05-13.20 Horizon 2020 – funding source of research activity within life sciences (dr inż. Andrzej Stępniewski, Regional Contact Point for European Research Program, Poland)
- 13.20-14.00 Lunch break
- 14.00-14.30 Poster session

Obrady w sekcjach / Sessions in sections

Sekcja 1. Środowiskowe aspekty żywienia człowieka

Section 1. Environmental aspects of human nutrition

Przewodniczący / Chairmen	Assoc. Prof. Ireneusz Sowa
	Assoc. Prof. Katarzyna Dzida
	Assoc. Prof. Anna Kasprzyk

14.30 – 16.00

1. Antioxidant activity of probiotic bacteria (Michalak Magdalena)
2. Bitter gourd (*Momordica charantia* L.) production for food and medicine use (Gałczyńska Anna, Xia X.Z., Krejpcio Z., Król E., Zhang X. Y, Hołubowicz R.)
3. The influence of dried oregano on the quality of rapeseed oil cold pressed (Krajewska Marta)

4. The effect of elimination diet on the growth and development of children with food hypersensitivity (Stodolak Anna, Zychowicz Joanna, Widerska-Kurzawa Alicja)
5. Healthiness of food intake by the population in Poland (Laskowski Waclaw)
6. Comparative evaluation of the nutritional value and the content of bioactive compounds in super foods products (Król Katarzyna, Ponder Alicja, Kopczyńska Klaudia)
7. Medicinal properties of cultivated mushrooms (Dawidowicz Luiza, Siwulski Marek)
8. Solvent based inks used in the manufacture of flexible food packaging made of paper or plastic film (Zakrzewska Małgorzata, Podsiadło Halina)
9. Estimate of mercury content in the liver of sheep kept in indoor system (Pacholik Ewa Hanna, Głowacz Krzysztof, Skibniewska Ewa, Kołnierzak Marta, Kmiec Hubert)

Sekcja 2. Człowiek a środowisko

Section 2. Man and the environment

Przewodniczące / Chairwomen	Dr Grażyna Szymczak Assoc. Prof. Krystyna Piotrowska-Weryszko Dr Karolina Pitura
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14.30 – 17.00

1. Human safety in recreational places - sanitary quality evaluation of parks in Łódź (Gawor Weronika, Lis Szymon)
2. Health and social consequences of the Aral Lake disaster (Mętrak Monika)
3. Serious bird strike accidents to civilian and military aircrafts since the inception of aviation to the present times - human and ornithological dimensions (Kitowski Ignacy).
4. The development of renewable energy sources in Poland (Kozłowski Kamil)
5. Field margins and road verges as refuge areas for forage flora and pollinators (Jachula Jacek)
6. The effect of opioids in patients treated, addicted to psychotropic changes (preliminary report) (Lorek Małgorzata, Kamiński Piotr, Feit Julia, Gorzelańczyk Edward)

7. The production of biofuels from waste - opportunity to improve the natural environment (Jeżowska Aleksandra, Kozłowski Kamil, Brzoski Michał, Chelkowski Dawid, Dach Jacek)
8. Composting as a natural method of organic waste management (Chelkowski Dawid, Kozłowski Kamil, Jeżowska Aleksandra, Czekala Wojciech)
9. Rainwater retention in housing estates as an element of improving the living conditions of residents (Szczepanek Jarosław, Trzaskowska Ewa)
10. Are selected environmental antiandrogens induce disordered preantral follicle maturation - in vitro studies (Gorczyca Gabriela, Duda Małgorzata)
11. Photonic crystals as an innovative material for securing documents (Zwierzchaczewska Magdalena, Podsiadło Halina)
12. Criteria for assessing the impact on people of objects using renewable energy sources in methods of visual impact identification (Szumilas-Kowalczyk Hanna, Szymański Marek, Giedych Renata)
13. Assessment of the management and recreational use of the "Głowacki" gully in Nałęczów (Skarżycka Anna, Kałamucka Wioletta, Rodzik Jan, Błaszczak Małgorzata, Caban Dabniel, Żuraw Beata)
14. Medicinal and cultivated mushrooms-chosen application in human health management (Zięba Piotr, Sękara Agnieszka)
15. Nivolumab-induced interstitial pneumonia in a patient treated for lung cancer (Terlecka Paulina, Krawczyk P., Chmielewska I., Szczyrem M., Milanowski J.)

Sekcja 3. Problemy botaniki w ekologii człowieka

Section 3. Problems of botany in human ecology

Przewodniczące / Chairwomen	Prof. Elżbieta Weryszko-Chmielewska
	Assoc. Prof. Mirosława Chwil
	Assoc. Prof. Renata Matraszek

14.30 – 15.30

1. Aesthetic values of plantings of early spring alliaceous perennials in the urban space of Lublin (Skarżycka Anna, Basara Oskar, Więclaw Paweł, Kucherevych Vitalii, Wrona Katarzyna, Żuraw Beata)

2. Analysis of human health protection in connection with the use of plant protection products (Paluch Sylwia)
3. Influence of chilling and light stress on metabolic profile of *Origanum vulgare* L. in juvenile stage (Szczalba Maciej, Sękara Agnieszka)
4. Is the quality of raw hyssop dependent on nitrogen nutrition? (Zdulski Jan, Dzida Katarzyna, Tymoszuć Karolina, Rydzewki Hubert)
5. Antioxidant activity of *Rubus ideaus* fruits (Kostryco Mikołaj, Chwil Mirosława)
6. Effect of calcium foliar feeding on the calcium content in the epidermis cells of *Malus domestica* Borkh. cv. 'Szampion' fruits (Kowalik Piotr, Michałojć Zenia, Chwil Mirosława)

Sekcja 4. Sekcja epidemiologiczna

Section 4. Epidemiology

Przewodniczący / Chairman

Assoc. Prof. Magdalena Wójciak-Kosior

Dr Michał Skoczylas

Dr Vitalijus Naumavičius

15.30 – 16.00

1. Assessment of surface water quality from the Tarkawica region based on physicochemical indicators and heavy metals concentration (Miształ Karolina)
2. The impact of choosing a lifestyle on the health of the individual (Wierzbicka Barbara, Stodolak Anna)
3. The relationship between body mass index and selected anthropometric parameters in overweight and obese individuals (Banach Katarzyna, Libera Justyna, Skorek Paulina, Glibowski Paweł)

Sesja posterowa / Poster session

1. Bojadżijewa Iwona. Environmental degradation and its health consequences as factors supporting democratization process.
2. Chernectskyy Mykhaylo. Micromorphology of leaves of two *Veronica* L. species.

3. Chwil Mirosława, Kostryco Mikołaj. Ultrastructure of floral nectaries in plants from the genus *Exochorda* Lindl.
4. Chwil Mirosława, Matraszek-Gawron Renata. Biologically active compounds in roots and leaves of plants from the genus *Hemerocallis*.
5. Czarnecki Zbigniew, Chwil Mirosława. Ecological features of leaf epidermis in selected grass species.
6. Ćwintal Marek, Dziwulska-Hunek Agata, Przybylska Anna. Ecological aspects of the cultivation and utilisation of small-seed legumes in sustainable agricultural production.
7. Dawidowicz Luiza. *Pleurotus pulminarius* (Fr.) Quel. – cultivated mushroom with health-promoting properties and high nutritional value (*Pleurotus pulmonarius* (Fr.) Quel. – grzyb uprawny o właściwościach prozdrowotnych i wysokiej jakości odżywczej).
8. Dmitruk Marta, Sujak Agnieszka, Sulborska Aneta, Budzeń Małgorzata, Pomorski Jacek. Effect of pre-sowing laser stimulation on pollen production of *Lavatera thuringiaca* L. flowers.
9. Domaciuk Marcin, Pociupany Martyna. Effect of taxol and *Rhodiola rosea* extract on mitotic divisions in apical root meristems in *Allium cepa*.
10. Dzida Katarzyna, Kuśmierz Małgorzata, Inglot Gabriela, Ciciak Agata. *Lavandula angustifolia* L. valuable healing and oil plant.
11. Dzida Katarzyna, Michałojć Zenia, Jarosz Zbigniew, Pitura Karolina, Skubij Natalia. Content of essential oil in the basil herb depending on the potassium nutrition.
12. Flaieh Hamed Kassar, Mariusz Szymanek. Effect of tillage practices on greenhouses gases.
13. Gawor Weronika, Lis Szymon. Human safety in recreational places - sanitary quality evaluation of parks in Łódź.
14. Jachimowicz Karolina, Konarska Jagoda, Kostecka Małgorzata. Plastic products containing alternatives to bisphenol A (BPA) - are they certainly better for human health?
15. Kamińska Magdalena, Sulborska Aneta, Weryszko-Chmielewska Elżbieta, Sawidis Thomas. Secondary metabolites in the secretory tissues of *Rhododendron luteum* Sweet (Ericaceae) flowers.
16. Karczmarz Katarzyna, Mackoś-Iwaszko Ewa, Renda Joanna. Influence of trees on human's health in the city.

17. Karczmarz Katarzyna. The use of effective microorganisms in the aspect of ecological protection of roses.
18. Kasprzyk Anna, Czarnecki Zbigniew. Wild boar meat (*Sus scrofa scrofa*) – natural raw material and food product.
19. Konarska Agata. Microstructure and the location of bioactive substances in fruit of *Lycium barbarum* L.
20. Kopacki Marek, Skwaryło-Bednarz Barbara, Jamiołkowska Agnieszka. Ecological plant protection of rosemary growing under cover.
21. Kowalik Piotr, Chwil Mirosława, Michałojć Zenia M. Effect of foliar feeding with calcium on the ultrastructure of epidermis and hypodermis cells in *Malus domestica* Borkh cv. ‘Szampion’ fruits
22. Kowalska Magdalena, Mach Marzena, Olechowska Karolina, Wydro Paweł. The influence of PEGylated lipid on the properties of cationic liposomes.
23. Mach Marzena, Olechowska Karolina, Kowalska Magdalena, Wydro Paweł. The influence of triesters of phosphatidylcholine on model bacterial membranes.
24. Matraszek-Gawron Renata, Chwil Mirosława. Antidepressant activity of selected species from the genus *Hemerocallis*.
25. Miszczuk Aneta, Trzaskowska Ewa. Shaping public spaces eliminating the effects of urban heat island in the aspect of human health.
26. Młynarczyk Karolina, Walkowiak-Tomczak Dorota, Szwengiel Artur. The effect of origin and cultivar of elderberry on the health quality of the obtained juice.
27. Noaema Ali Hulail, Sawicka Barbara, Pszczołkowski Piotr, Kiełtyka-Dadasiewicz Anna. Effective microorganisms in agriculture and food processing.
28. Olechowska Karolina, Mach Marzena, Kowalska Magdalena, Wydro Paweł. The influence of anticancer drug – Minerval – on model lipid membranes.
29. Piotrowska-Weryszko Krystyna, Konarska Agata, Weryszko-Chmielewska Elżbieta, Kubik-Komar Agnieszka. The risk of allergy caused by *Ambrosia* (L.) pollen in the region of Lublin.
30. Pitura Karolina, Jarosz Zbigniew, Dzida Katarzyna. The influence of humic acids on the chemical composition of Chinese cabbage in soilless cultivation.
31. Pitura Karolina, Jarosz Zbigniew, Wolańska Ewa, Samborski Dariusz, Hendzel Barbara, Szybiński Volodimir. The content of micronutrients in vegetables grown in Lviv and Lublin regions and the conditions of mineralized tooth tissues of 15-year-old women.

32. Połec Karolina, Bernaś Beata, Dymek Michał, Rachwalik Rafał, Sikora Elżbieta, Hąc-Wydro Katarzyna. The impact of hop cone extract on the properties of lipid systems imitating membranes of bacterial plant pathogens - the investigations on the possibility of the application of plant extracts as ecological plant protection products.
33. Prażak Roman. Evaluation of salt stress tolerance in *Aegilops* L. with *Triticum aestivum* L. hybrid lines.
34. Rydzewski Hubert, Dzida Katarzyna, Tymoszek Karolina, Zdulski Jan. Aromatic plants of the *Lamiaceae* family in the horticulture therapeutic gardens.
35. Rysiak Krystyna, Szymczak Grażyna. Potential application of groundcover plants.
36. Sawicka Barbara, Ali Hulail Noema, Barbaś Piotr, Skiba Dominika, Bienia Bernadetta. Environmentally friendly methods used to improve the quality seed potatoes.
37. Skoczylas Michał, Kaliszczuk Danuta. Didactic contents in the field of human ecology in school textbooks 'Podręcznik do nauki o przyrodzie żywej i martwej' by Gajówna, Żłobicki and Adwentowski from 1934 and 'Wiadomości o przyrodzie' Obiezińska and Ziemecki from 1964.
38. Skubij Natalia, Dzida Katarzyna. Effect of natural fertilization on the content of active components in the inflorescences of narrow-leaved lavender (*Lavendula angustifolia* L.).
39. Sowa Ireneusz, Wójciak-Kosior Magdalena, Dresler Sławomir, Staniak Michał, Sawicki Jan, Zielińska S. Pre-treatment of *Chelidonium majus* samples using silica covered with polyaniline.
40. Sulborska Aneta, Kamińska Magdalena, Matysik-Woźniak Anna, Piotrowska-Weryszko Krystyna, Weryszko-Chmielewska Elżbieta. Histochemical characteristics of ivy (*Hedera helix* L.) leaves.
41. Szczałba Maciej, Sękara Agnieszka. Analysis of mRNA expression of leptin receptors in the chorioallantoic membrane of chicken embryos after *in ovo* administration of bisphenol A.
42. Szczepanek Jarosław, Trzaskowska Ewa. Rainwater retention in housing estate as an element of improving the living conditions of residents.
43. Ślusarczyk Joanna, Malinowska Eliza, Krzyczkowski Wojciech. Possibilities of biotechnological application of mycelium the white-rot fungus (*Hericium erinaceum* (Bull.: Fr. Pers.) - microscopic examinations.

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47. Tymoszuik Karolina, Jachuła Jacek, Rydzewski Hubert, Zdulski Jan, Denisow Bożena. The use of pollinator-friendly plant species in hortitherapeutic gardens.
48. Tymoszuik Karolina, Rydzewski Hubert, Jachuła Jacek, Denisow Bożena. Silvotherapy – a novel therapy to support treatment of people with physical and intellectual disabilities.
49. Wach Dariusz, Błażewicz-Woźniak Marzena, Patkowska Elżbieta. Influence of intercrop plants and varied tillage on soil reaction and macronutrient content in the soil under carrot cultivation.
50. Woźniak Aleksander, Jarosz Zbigniew, Błażewicz-Woźniak Marzena. The influence of the soil reaction and humic acid on the content of cadmium in lettuce (*Lactuca sativa* L.).
51. Wójciak-Kosior Magdalena, Strzemski Maciej, Tuszczyk-Rotko Katarzyna, Sowa Ireneusz, Agacka-Mołdoch Monika, Mołdoch Jarosław. Voltammetry vs chromatography – determination of volatile compounds in *Carlina* root extract.
52. Wójcik Aneta, Broniatowski Marcin. Studies on the effects of polycyclic aromatic hydrocarbons on mitochondrial phospholipids in model membrane.
53. Zięba Piotr, Kobak Rafał, Sękara Agnieszka. The effect of supplementation of substrates for the oyster mushroom cultivation with residues from Apiaceae crops.

19.00-22.00 Uroczysta kolacja / Gala dinner

Lublin, 20 czerwca 2018 roku – środa

Lublin, 20 June 2018 – Wednesday

Wyjazd studyjny w Muzeum Wsi Lubelskiej

Study trip in the Open Air Village Museum in Lublin

Godz. 9.30 – wyjazd autokaru konferencyjnego z parkingu przy Centrum Sportowym UP w Lublinie, ul. Głęboka 31 / conference bus departure from parking near the building of Sport Center of the University of Life Sciences in Lublin, 31 Głęboka Street

Godz. 10 – 12.30 – zwiedzanie Muzeum Wsi Lubelskiej, al. Warszawska 96 / a visit the museum, 96 Warszawska Avenue

Godz. 12.30 – 13.30 obiad w muzeum / lunch in the museum

Godz. 13.30 – powrót na ul. Głęboką 31 / return to 31 Głęboka Street

Abstrakty

w kolejności jak w programie (powyżej)

Abstracts

in the order as in the program above

Agronomists job don't reduce natural resources to meet today's needs without compromising the needs of future generation

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The agronomist, as a food designer, optimizes the production process within the agri-food chain, inspired by principles of providing a healthy and nourishing food, meeting the needs at a global scale, reducing food waste, ensuring safety of production, health and wellbeing of final consumers. To get a qualitatively high content of food it is necessary that quality measurements characterize the whole production steps along the food chain, starting from the phase of first production, to the processing one, to the following phase of distribution. The Agronomists' job has to tend toward actions which do not reduce natural resources, in order to meet today's needs without compromising the needs of future generations. In a world increasingly crowded, where resources should be managed with social conscience and fairness, the safeguarding of sustainability is an ethical and environmental duty of the professionals. At a time when millions of people still suffer from hunger, misuse of resources is intolerable, not only in an ethical point of view, but also on an environmental basis, as it represents a useless waste of natural resources.

Mushroom polysaccharides as a tool for mycotoxin control: an overview

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Mycotoxins are secondary metabolites, toxic for animals and humans, produced by some fungal species during their growth and released in growing media. About 400 molecules are considered mycotoxins, but due to the different toxicity they are not equally considered by scientist and legislators. Among the most important and studied mycotoxins are aflatoxins, ochratoxin A, patulin and a group of mycotoxin produced by *Fusarium spp*, often named as fusarium toxins. The legislations of almost all the countries in the world limit their presence in food and feed. Contamination of food and feed stuff with these mycotoxins can present a serious health hazard for animals and humans and can hardly impair animal production. Actual control strategies, none of which achieved the definite solution, are based mostly on the use of chemicals. In the last decades the request for more environmental friendly strategies for mycotoxin control is continuously growing. Mushroom polysaccharides showed to be very good candidate for the control of mycotoxin presence in food and feed with much lower environmental impact. Over the years many researches published in the prestigious scientific journals has showed that mushroom polysaccharides not only don't have toxic effects on humans and animals, but on the contrary can have some healing effects, enhancement of immune system above all. Furthermore, the ability of mushroom polysaccharides to control biosynthesis of different mycotoxins has been widely reported. The most studied mushroom derived agents of mycotoxin control are the polysaccharides from *Trametes versicolor* (TVP). Their structure is partially characterized and it has been proven that the mechanism of their action involves stimulation of the cell antioxidant system in mycelia of toxigenic fungi. In fact, the presence of TVP stimulated an anticipated antioxidant response in fungal cells, which helped the cell to maintain the oxidative status and thus inhibit the synthesis of aflatoxins. Moreover, TVP showed a very efficient and long lasting control of the synthesis of other mycotoxins like ochratoxin A and fumonisins B. Polysaccharides of other mushroom species, like *Lentinula edodes* and *Schizophyllum commune*, showed the ability to control the biosynthesis of different mycotoxins. Again, like TVP, this polysaccharides were able to control toxin synthesis both in afla and ochratoxigenic fungi. The study of the structure of these polysaccharides and their mechanism of action is ongoing. The biggest challenge is to find if there is any common structure in this polymers and whether one or more fungal membrane receptors are involved in the mechanism of their action. Unrevealing of these questions could help the design of novel more environmental friendly tool in a challenge against the mycotoxins which will be effective in the control of more mycotoxins simultaneously, thus reducing health hazard for animals and humans.

Medical plants is the meeting point for nations, cultures and scientists

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Every country has a different number of medicinal plant species with consequently various taxonomic composition and levels of their medical recognition and application in practical therapy. The concept of medicinal plant is a complex of experiences and data defining those experiences, formed in course of human – environment interaction. General number of medicinal plant species and their taxonomic composition mostly depends on the territory of specific country and its geographical position. Medical plant usage in health promotion and therapy is determined by the following factors: 1) ethnomedical traditions in a particular country, 2) qualification of specialists working in the area of phytotherapy (medics, botanists), 3) universal accessibility of data on medicinal plants.

As research on medicinal plants is conducted by scientists of various scientific areas, data of the research are consequently presented in publications of highly variant sorts (such as publications of botany, medicine, biochemistry, pharmacy). Thus a somewhat “chaotic situation“ developed regarding data on medicinal plants, as there is a fair amount of diverse data available on medicinal plants that are not inter-coherent and has been only analysed one-sidedly. We have sad situation “*Blind men and an elephant*”.

The creation of an integral analytical database will enable successful accumulation of diverse biomedical data. The concept of medicinal plant and original system for medicinal plant analysis – “Medicinal plant evaluation model” was used in the investigation on native vascular medicinal plants in Lithuania (NLVMP). This analysing system can be used for investigation off every country plants, for cooperation sanctifiers from various branches of science and integration data from various cultures.

Aspects of vegetable production quality in the conditions of sustainable horticulture

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To assure the expected quality of vegetable production the farmer should focus on all agroecological conditions in cultivation system. There are many conflicts of interest, mainly based on market-oriented strategy and demands for bulky production. The higher inputs to the production cycles do not bring the better quality of products. The sustainability of horticultural production can contribute to maintaining of qualitative parameters, as expected by the customer. The subsidies on governmental basis, the individual interest of farmer in sustainable production, and the increased demands for safe and nutritious food from the customer can generate stronger impact for developing of ecologically oriented production in vegetable sector.

In most European countries the movement towards environmental friendly horticulture is recorded within last decades. Many countries shift from the conventional production techniques to the integrated systems. Similarly, the higher interest in organic production can be found in many cases. However fully organic vegetable production is still far away to the higher economical impact, if compared to the integrated production system. The positive effect of such approach leads to the better natural resources exploitation, but also to the higher understanding what the internal quality of vegetable means. Customers start to be more focused on taste, sugars, vitamins, antioxidants or other parameters of vegetable they consume, which are mostly connected to the local production. The shorter way from the field to the fork, the higher benefits for all system. This is “byproduct” of sustainability in horticulture, which generate less fuel consumption, less transportation and keep more activities on the rural areas typical for agriculture.

We have to be aware of the application limits of abovementioned approach to the total vegetable production. Just because of the high market demands for constant supply of many species on whole-year basis and climatic limitations of particular regions. But the “spin is on” – if people search for better quality of local food, the soon will be this demand a standard for most of vegetable on the goods shelves of each single shop. Hopefully the bright future of diverse vegetable sector is not an illusion, but reality.

The outline of the history of human ecology in the middle of the twentieth century

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Introduction and aim. The range of the field of human ecology is very wide because of its interdisciplinary character. The aim of the study was to specify how broad was information in this branch of the science in the middle of the 20th century.

Method. A review of literature with the name of ‘human ecology’ and publications themed in this field was carried out.

Results. Information collected from the literature was presented in the following issues:

- 1) Terms appearing in the literature in the close sense with human ecology are among others epidemiology, preventive medicine, nutrition and morbid ecology (e.g. Banks 1950).
- 2) In the 1960s, only pneumonia, gastroenteritis and tuberculosis from the group of infectious diseases contributed to the group of the most common causes of death in the population of the City of São Paulo, Brazil, which was a result of the significant improvement in comparison with 1901 when there were also acute bronchitis, meningitis and malaria among them (Buchalla et al. 2003).
- 3) Some health disorders were described in the context of the impact of the environment on the human being or incomplete adaptation of the human body to the environment, for example eccrine miliarias (Sargent and Slutsky 1957).
- 4) The origins of venereology in Poland are dated back to the 16th century (dr Wojciech Oczko, 1537-1599) but after the Second World War, the development of venereology accelerated significantly in the field of health care. In 1948, the "W" Action was initiated, the aim of which was to combat venereal diseases through free access to treatment. The establishment of scientific-research and control institutions (Warsaw) and the post-graduate education school for medical doctors (Bydgoszcz) happened from 1949 to 50s. (Koronowska 2010). The research in the field of epidemiology was taken among others by Polish Society of Epidemiologists and Infectious Diseases Physicians (Kuryłowicz 1971).
- 5) Human ecology was taught in the interdisciplinary ways, e.g. at Cambridge University (since ca 1938), at University of North Carolina (since 1952) and at Boston University School of Nursing (since 1953) (Banks 1954, Hargrove et al. 1957, Bakst and Malamud 1957, Sommermeyer et al. 1957).

Conclusion. Human ecology was clearly distinguished in the middle of the 20th century, influenced the analysis of health disorders and had its own didactics.

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Importance of sustainable alfalfa (*Medicago sativa* L.) production in the mediteranean region of Croatia

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Alfalfa (*Medicago sativa* L.) has a long association with many ancient civilizations, and continues to contribute to agriculture through present times as the most important perennial forage crop in Croatia. Alfalfa is one of the world's most versatile crops. It is grown in environments ranging from burning hot Mediteranean regions of Dalmatia to cool high mountain valleys in Gorski Kotar and Lika, from the frozen continental climate of Slavonia region to the warm areas beside the Adriatic coast. It is also very important source of protein, appreciated in the nutrition of ruminants for its high palatability, quick passage and overall beneficial influence on the feed rations' structure. The aim of this study was to enhance alfalfa production in Mediterranean region by alfalfa seed inoculation, with efficient *Sinorhizobium meliloti* strains, in order to reduce/avoid use of mineral nitrogen fertilizers, and enable qualitative and cost effective production of high quality forage on dairy farms in that area. Field trial was established at the dairy farm in Ninski Stanovi, near the city of Zadar. The lowest yields of fresh forage and dry matter were significantly determined on untreated plots without seed inoculation on all four tested alfalfa cultivars (Mirna, Daisy, OS 66 and Orca) in both experimental years (2009/10). The total of fresh forage yields were ranging from 39.0 t ha⁻¹ (control), up to 72.5 t ha⁻¹ on plots inoculated with strain "2011", and 73.5 t ha⁻¹ on plots inoculated with strain "OS 6". Values of total dry matter yields for both experimental years ranged from 9.52 t ha⁻¹ (control), up to 17.64 t ha⁻¹ on plots inoculated with strain "OS 6", and 17.88 t ha⁻¹ on plots inoculated with strain "2011". The results of this study clearly showed that inoculation with selected *Sinorhizobium meliloti* strains may improve sustainable alfalfa production in Mediterranean region, and may contribute to more efficient forage production for dairy farms under particular agro ecological conditions of Croatia.

Modern nuclear magnetic resonance (NMR) spectroscopy provides unprecedented ability to glimpse the processes of life in atomic detail

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During last decades nuclear magnetic resonance (NMR) spectroscopy became one of the most powerful analytical technique available to biological sciences and especially structural biology. From the beginning the most valued feature of NMR spectroscopy was the ability to acquire information in highly similar to the native environment and in the non-destructive way. Contrary to other techniques, it provides information about system dynamics preserving nearly all-atom resolution. The main limitations including low sensitivity and size of the studied molecules, have been recently to the high extent overcome by improving the hardware (high magnetic fields, cryo-probes), introducing more advanced pulse sequences as well as developing the new labeling schemes. Today NMR spectroscopy is being successfully applied in structural biology for protein structure calculations, evaluation of the system dynamics and mutual interactions with unprecedented details. Provided information not only broaden our knowledge of life in molecular scale, but is also useful in modern medicine allowing for more efficient drug design and serve as analytical tool in metabolomics.

Using detailed examples of human proteins, which are important in terms of health and disease (Hsp70 protein family, FGFR2 receptors and β -amyloids), I will discuss the use of NMR spectroscopy in tracking the functional cycle, dynamics and regulation of protein machines as well as drug design studies and data processing.

Antioxidant activity of probiotic bacteria

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Civilization diseases are one of the most serious problems of the 21st century, which are mainly faced by highly developed countries. These include atherosclerosis, arthritis, diabetes, neurodegenerative diseases, cardiovascular diseases or cancer. It is widely believed that their formation and development is responsible for both poor diet, low physical activity, as well as the consumption of stimulants. Numerous studies indicate that oxidative stress is the process underlying these diseases.

Oxidative stress is the process during which the balance between the intensity of oxidation processes that induce the formation of reactive oxygen species (ROS) and the antioxidant system is disturbed. This leads to numerous adverse changes in the cells of the body, which include damage to proteins, mutations in DNA, and oxidation of cell membrane phospholipids, which ultimately leads to a reduction in cell viability.

In the fight against oxidative stress, compounds with antioxidant properties play a significant role. Particular attention should be paid to the potential antioxidative properties of probiotic bacteria, which are known for their beneficial effects on human health. As recent studies show, their consumption in the form of dietary supplements may reduce oxidative damage and modify the activity of key antioxidant enzymes in human cells.

In recent years, there has been an increase in the number of publications that focus on finding and characterizing new strains of lactic acid bacteria (LAB), studying their antioxidant activity and industrial implementation, which may provide perspectives for enriching the diet with new antioxidants.

Bitter gourd (*Momordica charantia* L.) production for food and medicine use

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Bitter gourd (*Momordica charantia* L.), called also bitter melon, karalla, or balsam pear, originates from South Asia (Chen *et al.*, 1996, Zhang *et al.*, 2013). The plant is almost unknown in Poland. It is a cucurbit vegetable species which has been known and used in the Far East countries, especially in China, Japan and Korea for thousands of years (Ma *et al.*, 2009). It is an annual, herbaceous and climb growing species produced in tropical areas of Asia, Amazon, Eastern Africa and the Caribbean Islands (Sun and Wang, 2008). Its cultivars are derived from the local wild types and populations, through plant utilization and habitat modifications, accelerated greater diversity among cultivated strains than wild types (Yaldiz, 2013). Bitter gourd has been known for many thousand years in Asia as a food and medicine. In the past, only its fruits were used for treating e.g. diabetes. Nowadays, after more advanced research in medicine, practically, all of them are used. The paper describes different production ways of bitter melon fruits. The botanical characters of the plant were shown in terms of the potential organ use for processing. There is also an information about nutritional value of the fruits and the most important active compounds obtained from different parts of the fruit used in medicine. Also the possible effects of the plant on human health were discussed. A large part of the paper comes from original Chinese publications and books.

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The influence of dried oregano on the quality of rapeseed oil cold pressed

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The aim of the study was to determine the effect of dried oregano on the chemical properties of rapeseed oil cold pressed. The study analyzed pure rapeseed oil and containing different amounts of dried oregano: 0,5%, 1%, 1,5%, 2%, 2,5%. The oils were determined: acid number (LK), peroxide value (PV) and oxidative stability using test Rancimat. Markings were made directly after extrusion and after 7 and 14 days after of addition.

The acid value of oil after extrusion is 1,6 mg KOH / g (the value given in the Codex Alimentarius $LK \leq 4$ mg KOH / g) and the peroxide value is 4,9 meq, with the standard of 15 meq $O_2 \cdot kg^{-1}$. The oils with additives of LK and LN were less decreased with increasing additive. Rancimat test revealed that the induction time after pressing of the oil was 5,4 h. After 7 and 14 days, the value for pure oil decreased, while the additives in oils induction time increased gradually with increasing.

The results show that the dried oregano effectively reduced the oxidative changes occurring during storage of rapeseed oil.

The effect of elimination diet on the growth and development of children with food hypersensitivity

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Background. Food hypersensitivity and food allergy constitute a considerable issue in contemporary societies, especially in developed countries. The growing number of alimentary products starts to elicit various and individualized clinical symptoms and signs in vulnerable populations. As this problem most frequently involves infants and young children, it seems reasonable to study its influence on long-term growth and development of children, particularly as the appropriate nutrition using elimination diets shows numerous benefits to health and it is a universally recommended method of treatment.

Objectives. This work tends to study the influence of several aspects of nutrition, including dietary supplements and elimination diet, on the chosen parameters of growth and development in preschool children.

Material and methods. The study participants included the children at the preschool age (up to 4) attending nurseries and kindergartens in Wrocław and Strzelin. Their parents were given a questionnaire which consisted of two parts: general – collecting demographic and health history data, and the second, specific - assessing information on dietary habits, using supplements, and application of elimination diets in individuals with diagnosed food intolerance.

Results. The study group consisted of 45 children: 21 boys (47%) and 24 girls (53%). About 67 percent of them (n = 30) had food hypersensitivity diagnosed and the remaining part was perfectly healthy in this aspect. Food intolerance was more frequent in girls than in boys (35,5% and 31%, respectively).

The average age of introducing elimination diet was 13,4 months and the principal eliminated products were: dairy, nuts, eggs, tropical fruits, cocoa and gluten. The majority of affected children (67%) required elimination of only 1-2 products.

Using probiotics and symbiotics had no influence on growth and development of children in the study group, similarly as the application of vitamin D3 and the mode and time of delivery. Some relevant differences were found regarding correlation between breastfeeding and the body mass and body length ($p < 0,05$, both), in favor of the breastfed group. The similar effect was detected as to the introduction of solid food products an body mass in the second year of age and thereafter. Finally, children with food intolerance had lower body mass and length in the first, second year of age and in the time of collecting data than their healthy counterparts.

Conclusions. Breastfeeding has a beneficial effect on the growth and development of children, unless they cannot tolerate it. Similarly, introduction of solid products according to dietary recommendation also correlates with better growth of children, including those with food intolerance. This may be especially important in the latter group which is specifically more prone to malnutrition and retarded growth. The time of diagnosis, the number and type of eliminated foods and the prompt introduction of elimination diet may lead to beneficial health outcomes in children with food intolerance, but the final conclusions require studies on larger groups of participants.

Healthiness of food intake by the population in Poland

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Consuming food is a necessity, it has a direct impact on human health. The level and structure of food consumption are known from surveys of household budgets, annual study performed by Central Statistical Office in Warsaw. About 37,000 households participate in this study. The result of this study is, among others, a comprehensive collection of data on the quantitative, monthly food intake. Having access to individual data about the consumption level of nearly 100 food products in each household examined, the composition of nourishment, density and nutritional quality indexes was established. Comparative analysis with recommendations, analysis of differentiation, and search of patterns and regularities in shaping the quality of health were carried out.

Comparative evaluation of the nutritional value and the content of bioactive compounds in super foods products

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Superfoods are foods — mostly plants, for example acai, goji— thought to be nutritionally dense and thus good for one's health. However, there are no specific criteria for determining what is and what is not a superfood. 'Superfood' is more of a marketing term for foods that should provide health benefits. Consuming foods with high source of nutrients (as many so-called superfoods are) is certainly a good idea. Superfoods have extra-large doses of vitamins and minerals that can help us ward off diseases and live a longer and provide a healthier life. Some of the nutrients that certain superfoods contain include antioxidants, thought to ward off cancer; unsaturated fatty acids, thought to prevent heart disease; fiber, thought to prevent diabetes and digestive problems; or phytochemicals, the chemicals in plants responsible for deep colors and smells, which can have numerous health benefits. The "exotic fruit of the year" will surely be on any superfood list, too. This might be acai berry, goji or pomegranate. These fruits might be healthful, but scientific studies do not show that they are more healthful than other, less exotic (and therefore less expensive) fruits, such as blueberries. Some of these fruits may be particularly dense in certain kinds of nutrients.

Medicinal properties of cultivated mushrooms

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Mushrooms have been valued for their exquisite taste and unique aroma for centuries. The awareness that they also have numerous pro-health properties is relatively new. It was only in the last two decades that they were included in functional foods, even though Hippocrates wrote about their healing properties in 400 BC. Much more often the mushrooms were used and are still using in folk medicine of the Far East. In China, the healing properties of *Ganoderma lucidum* and *Lentinula edodes* have been known for more than 2,000 years.

One of the definitions says that food can be considered as a functional food if it has been proven to have beneficial effects on one or more functions of the body. Mushrooms have been recognized as functional foods due to the content of many nutrients and bioactive substances and a documented, beneficial effect on human health. Their main advantage is the high efficiency of substances contained in fruiting bodies. A positive effect on health can be obtained directly by eating fruiting bodies or using preparations containing fungal extracts in the form of capsules, tablets, drops and powders.

Fresh fruiting bodies of mushrooms contain on average 85-94% of water. The dry mass of the fruiting bodies contains highly absorbed protein in a much higher amount than in fruits and vegetables. For this, fungal proteins contain all exogenous amino acids. The main component of the dry mass of fruiting bodies are carbohydrates, including polysaccharides, among others β -glucans and chitin. Due to the low content of lipids, mushrooms are low in calories. Over 70% of fats are unsaturated fatty acids. Mushrooms also provide vitamins, mainly from group B, but also contain niacin, folic acid and vitamins C and D. They are rich in elements such as iron, phosphorus, potassium, sodium, magnesium, zinc, copper, manganese, calcium, molybdenum and selenium. An important group of compounds contained in mushrooms are polyphenols that have antioxidant activity.

Mushrooms have been used in folk medicine for long time. It is reported that 2000 species can be eaten without harm to health, while 700 have scientifically proven pharmacological properties. Biologically active compounds are contained not only in fruiting bodies but also in mycelium (pure cultures), in sclerotas and filtrates from liquid cultures. The best-known substances found in mushrooms with therapeutic effects are polysaccharides (including lentinan, pleuran, schizophyll, scleroglucan, grifolan) and polysaccharide-protein complexes (including krestin, ganoderan). Their anti-cancer, immunostimulatory, hypoglycemic and antioxidant effects have been documented. Lectin found in the mushrooms have a positive effect on the human immune system and stimulate the maturation of immune cells. Triterpenoids contained in fungi have antiviral activity (including against HIV1 and herpes virus) and lowering blood pressure and blood cholesterol, as well as protective for blood vessels and heart. Phenolic compounds in mushrooms are strong antioxidants. Their anti-inflammatory, anti-cancer and nervous system stimulation has been proven. Mushrooms are a source of natural antibiotics, having antibacterial and antifungal properties due to the content of chitosans and chitin. They are used, among others in the treatment of open wounds as they accelerate their healing and prevent the formation of extensive scars. Water and alcohol extracts of mushrooms have antiallergic, anti-inflammatory and analgesic properties as well as protection for many organs (brain, heart, liver, pancreas).

Solvent based inks used in the manufacture of flexible food packaging made of paper or plastic film

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Preliminary. Most of all foodstuffs sold on European market are in printed packaging packaged. The need to protect the consumer demands that packages do not in any way contaminate the food packaged inside them. There are various interactions between the packaging and the product packed in it. It depends on the packaging design, packaging methods and raw materials used to make it and the ready packaging.

Background information. The food packaging should have full protection of packaged food from external factors. In the packaging industry, plastic packaging is widely used. Regulation (EC) No 1935/2004 requires that materials and articles which, in their finished state, are intended to be brought into contact with foodstuffs or which are brought into contact with foodstuffs, must not transfer any components to the packed foodstuff in quantities which could endanger human health, or bring about an unacceptable change in the composition or deterioration in organoleptic properties.

Provided that flexographic solvent based inks products are used in accordance with the information given in the Technical Data Sheet and are correctly processed, and provided that the food packaging is designed in a way that there is no intended direct food contact with the print, products will in principle allow compliance of the final product with Regulation (EC) No 1935/2004.

Resolution AP (89) on the use of colorants in plastic materials coming into contact with food. Printing inks, coatings and varnishes may only contain constituents that are contained in an inventory list.

Conclusion. The food packaging is all the time at the center of attention. The regulations, domestic and foreign, in particular the EU ensures the safety not only food packaging in packaging manufacturers and food producers but mainly consumers.

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Estimate of mercury content in the liver of sheep kept in indoor system

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The environment has been changing for decades as a result of human activity. The rapid development of agriculture and industry is having a huge impact on changes in the chemical composition of atmospheric air, soil, water and food products from plants and animals. Emissions of heavy metals are particularly dangerous. Heavy metals include elements with an atomic number greater than 20 and a density greater than $4,5 \text{ g/cm}^3$. They are neurotoxic, nephrotoxic, allergenic and mutagenic. In nature, they occur in dispersion. Mercury is extremely active, both biologically and chemically, it can move rapidly between ecosystems. It is found in all animal tissues, and its circulation in nature is cyclic. The most serious problem is that this element, once introduced into the environment, remains in the environment forever. Monitoring studies on sheep tissue show that the content of heavy metals varies widely depending on the farming system, the age of the animals and the location of livestock buildings. The aim of the study was to analyze the content of mercury in the liver of sheep from the region of Łódź, kept in indoor system. Trials from 60 animals have been analysed. Samples from animals were collected in autumn and spring. The results were obtained using atomic absorption spectrometer for determination of total mercury AMA254.

Introduction. In recent decades, people lead a sedentary lifestyle. At the same time, people are becoming more aware of the need for physical activity to maintain the health of the body. In spare time, more and more people are choosing different forms of outdoor activities. Unfortunately, the development of civilization results in increasing anthropogenic pollution of environment. Human exposition to variety of contaminants, results in many health problems, among others superficial, pulmonary and cardiovascular diseases. In recent years, particular attention has been paid to the risks associated with air pollution (smog). According to Environmental protection services Łódź belongs to areas with high air pollution.

The aim of the study. The aim of the studies was the microbiological air quality evaluation in relation to the level of chemical pollution of recreational areas in Łódź in the period from 2016 to 2018.

Material and methods. The studies were conducted in Źródlińska Park, 3rd May Park, Piłsudski Park in Łódź. Samples were obtained in November and December 2016, December 2017 and March 2018. Total number of bacteria and fungi were determined by Koch Sedimentation Method. Fungi were identified by microscopic examination. Weather conditions and concentration of pollutants were obtained from Weather Underground database and Voivodeship Inspectorate for Environmental Protection in Łódź database. Obtained results were compared to air standards: PN-Z- 04111/02:1989 and PN-Z-04111/03:1989. The statistical analysis of obtained data was performed with STATISTICA software.

Results. The total number of bacteria in the air was 122,17-349,3 cfu/m³ (min-max cfu/m³) in 2016; 3,5-105,66 cfu/m³ in 2017-2018. The total number of fungi in the air were 0-52,42 cfu/m³ in 2016; 3,5-17,47 cfu/m³ in 2017-2018. To identified fungal species belong among others: *Aspergillus fumigatus*, *Paecilomyces variotii*, *Absidia cylindrospora* and *Alternaria longipes*. The level of smog during sampling were PM10: 72.83µg/m³, CO: 0.69mg/m³ benzene: 2.06µg/m³ NO_x: 93.23µg/m³ in 2016; and PM10: 22.03µg/m³, CO: 0.38mg/m³, benzene: 0.84µg/m³ NO_x: 33.5µg/m³ in 2017-2018.

Conclusions. The total number of bacteria in the air did not exceed the permissible values, it was below 1000 cfu/m³. Based on the analyzes, it can be stated that the conditions in the examined parks allow for their safe use. Statistical analysis show strong relation of the total number of bacteria with amount of PM10 and benzene in air. It can be stated that air pollution increase amount of bacteria in the air.

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Health and social consequences of the Aral Lake disaster

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The Aral Lake, once the fourth biggest lake in the world, was an oasis for plants, animals and people, located in the desert on the Kazakh-Uzbek border. This huge water body (66 000 km²) influenced local climate, supported fishing industry and enabled development of tourist infrastructure. However, construction of irrigating channels, that had begun in the 1940-ties, triggered a series of profound environmental changes. The channels led waters from the rivers supplying the Aral Lake (Syr Darya and Amu Darya) into newly established agricultural regions, where cotton was planted. Quickly and cheaply built channels were defective (mostly open and unsealed), leading to irreversible losses of up to 70% of the carried water via evaporation and leakages. Today the river water input to the Aral Lake is estimated at 4 km³ annually, while in the 1960-ties it used to be around 60 km³.

As a result water level in the Aral Lake dropped quite fast – in the years 1960-2000 the surface of the lake decreased by 60% and its shoreline receded even by 100 km. The existing harbors were cut off from the access to water, which, combined with a tenfold increase in water salinity, led to the collapse of the fishing industry. Exposed lake sediments started to erode quickly and have been generating vast amounts of dust, transported over long distances. The dust is significantly enriched in pesticides washed from the fields and toxic metals supplied by industrial facilities located along the rivers. Simultaneously, ineffective methods of drainage led to increased salinity of agricultural soils in the basin of the Aral Lake, as the excess water evaporated from the fields leaving precipitated salts behind.

The observed changes led to deterioration in health of the local population. Decline in air quality can be linked to increase in the incidence of respiratory and cardiovascular diseases, while increased salinity of soil and water results in higher rate of kidney problems. Due to the limited access to clean drinkable water, people in the basin of the Aral Lake are prone to parasitic infections and disease of digestive system, including diarrhea, which significantly increases infant mortality in this area. Collapse of tourism and industry left thousands jobless and on the brink of poverty, forcing them to migrate. People of Russian descent employed for maintenance of the existing infrastructure, left for their motherland, while Uzbeks and Kazakhs sought refuge in different parts of their countries.

Currently Uzbek and Kazakh governments try to mitigate environmental, social and economic consequences of the Aral Lake disaster. However, their efforts (e.g. building of the Kokaral Dam or planting the halophyte cover over exposed lake sediments) remain insufficient.

This review is a part of an ongoing collaborative work within the framework of COST action CA16233: Drylands facing change: Interdisciplinary research on climate change, food insecurity, political instability.

Serious bird strike accidents to civilian and military aircrafts since the inception of aviation to the present times – human and ornithological dimensions

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The dynamic development of the civil and military air traffic in recent decades has been severely restricted by collisions with birds. Currently, around 20,000 bird strikes are recorded annually worldwide, the vast majority of a harmless character. In addition to harmless cases of collisions with birds, serious accidents take place. Unfortunately, critical accidents happen where the aircrafts are destroyed beyond repair or people killed. The presentation will demonstrate the biogeography of hot spots of serious bird strike accidents, with particular emphasis on the area of Europe. The structure of bird species involved in serious accidents and other parameters characterizing these collisions, including human mortality, will be analyzed. During the examination special attention will be paid to serious accidents involving military aircrafts, including those that are nuclear weapon carriers. The presentation will show favorable conditions to the increase in serious accidents, on the one hand. On the other hand, factors and procedures that will help to minimize the number of such accidents will be indicated.

The development of renewable energy sources in Poland

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Global climate change and the risks generated by conventional electricity and heat produce systems cause increase the share of renewable energy sources in national energy systems. Increase in pollution of the environment, which is seen around the world, contributes to the search for new technologies, environment-friendly. For almost 15 years, around the world, observed to increase the use of RES installations. Similarly, in Poland. This allows for decentralisation of energy production and increase energy security.

Currently, most renewable energy in our country, is produced from wind. However, as a large potential sees in biomass. It may be a good quality source for the production of solid, liquid and gas biofuels. The goal of the paper was to prepare a review of renewable technologies and a description of the current situation in the renewable energy sector in Poland. Actually, this sector is one of the biggest area for new investments.

Field margins and road verges as refuge areas for forage flora and pollinators

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The current decrease of pollinator diversity and population size is an issue raised worldwide. The phenomenon threatens the stability and yield of food crops, and thus might negatively affect human nutrition and health. The pollinating insects decline is also likely to have severe consequences for the biodiversity of wild plant species and ecosystem function. Changes in agricultural land management (extensive use of pesticides, loss of natural habitats, introduction of vast crop monocultures) are listed among main factors responsible for pollinator loss. Properly managed ‘bee pastures’ can help mitigate negative effects of intensified land use. The detailed data on blooming phenology, nectar and pollen production of forage plants is however necessary for the selection of most valuable plant species for pollinators.

Forage flora of field margins and road verges was evaluated in four chosen rural municipalities in Lublin Upland (SE Poland) in 2016-2017. Species richness (S) of forage flora was measured and flora diversity and evenness was expressed using Shannon-Wiener (H') and Pielou (J') indexes, respectively. Then, blooming phenology, sugar and pollen yield of most frequent and/or most abundantly blooming forage species were assessed.

The mean number of forage species and diversity were higher for field margins than for road verges ($S = 47.8 \pm 9.5$, $H' = 1.89 \pm 0.57$ and $S = 25.5 \pm 4.5$, $H' = 1.32 \pm 0.20$, respectively). The earliest blooming species (from the third decade of April) were *Lamium album* and *Rorippa sylvestris*. The number of flowering species increased gradually and from the middle of June to the first decade of September about 80% of studied species were in bloom. *Ballota nigra*, *Berteroa incana*, *Lamium album*, *Linaria vulgaris* and *Medicago sativa* bloomed until the second decade of October. Among highest sugar-yielding species were *Lamium album* (21.56 g/m²) and *Ballota nigra* (16.28 g/m²). For the species also highest pollen yield was calculated: 3.66 g/m² for *Ballota nigra* and 3.19 g/m² for *Lamium album*.

Based on phenological data, it can be concluded that forage flora of field margins and road verges can ensure continuity of floral food resources throughout vegetation season. Valuable forage plants can be found in the habitats, however, spread of non-forage (e. g. *Dactylis glomerata*, *Bromus* sp.) and invasive species (*Solidago* sp., *Bunias orientalis*) should be monitored.

The effect of opioids in patients treated, addicted to psychotropic changes (preliminary report)

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Opioid drugs have been widely used for pain treatment, sometimes as antitussive or anti-diarrheal agents. Abuse and dependence on opioid analgesics is a serious global problem, affects health, social and economic well-being of all societies. The use of opioids is associated with the possibility of side effects and clinically significant, though poorly understood and described effects on the endocrine system (opioid endocrinopathy) and immunological system; on the whole condition of the body.

The production of biofuels from waste – opportunity to improve the natural environment

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Currently, we have to face many environmental problems. Due to higher and higher carbon dioxide emission and problems with exploitation coal deposits, we have to increased use of renewable energy sources. Taking into consideration increasing number inhabitants of earth new problem appeared. More people means bigger production of waste. Storage of waste from the agricultural and food industry is very problematic because this requires larger areas intended for landfills and more energy for neutralization waste from animal farms. The aim of this study is to review the available waste management methods for energy purpose.

One way of waste management is to produce biofuels - fuels resulting from the biodegradation of plant and animal components, called biomass. Among liquid biofuels, we distinguish bioethanol, bioethanol and biodiesel, which may replace or be a gasoline additive and be use in cars or in buses of city communication. Biofuels in gas form are hydrogen, biogas (it can be of agricultural origin, from sewage treatment plant or landfills) and wood gas. We can use biogas to cover the needs of animal farms for electricity and heat. We can also process biomass to solid biofuels like pellets or briquette, where main substrate is waste from wood industry. They are good quality fuel, which can be low-cost, low-carbon alternative to coal. They are becoming more and more popular in house heating.

Using waste for production energy have a lot of advantages. Among them we stand out lower emission of greenhouse gases to atmosphere, decentralization of energy production, reduction of damage associated with the extraction of coal from deeper sources and also reduction of areas designated for landfills.

Composting as a natural method of organic waste management

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Organic waste production is an inseparable element of the functioning of the agri-food industry, including, among others, kitchen waste, food leftovers and biomass from the care of greenery. In Poland, over 1.8 million tons of plant waste was generated and nearly 257 thousand tons of mixed food waste in 2014. This creates the necessity of rational management and preventing the entry of biogenic pollutants into the environment. One of the ways to process the abovementioned waste are biological methods, which include composting. It is a process that takes place in the presence of oxygen and is environmentally friendly mainly for two reasons: it allows you to manage the waste generated and allows the production of soil improver in the form of compost. The composting process has a very high potential mainly in the area of processing of plant waste from the care of greenery or as a method of treatment of sewage sludge. Also, agricultural wastes such as manure and chicken droppings are materials susceptible to the composting process, which has a positive impact on their management options.

The aim of the study was to present the possibilities of using organic waste in the composting process. In addition, the method of conducting the process on a laboratory scale and issues related to good laboratory practice in the discussed topic were presented. The work also discusses the basic physicochemical parameters, i.e. temperature, humidity, dry matter (TS) and organic dry matter (VS), as well as points concerning the quantitative and qualitative measurements of gas emissions (O_2 , CO_2 , CH_4 , NH_4 , H_2S).

Rainwater retention in housing estates as an element of improving the living conditions of residents

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As a part of civilization development, man has been establishing urban centers since the ancient times, interfering with the natural environment. This was primarily due to defense considerations. Nowadays, city centers perform many functions, they are a place of residence, work, they offer access to culture, entertainment and health care. In the urbanization process in urban areas, the intensity of development increases. New areas, often valuable in terms of nature or landscape, are allocated for investments. The problem is the increasing sealing of surfaces in cities (streets, pavements, parking lots), accelerating surface runoff. In order to address the problems associated with the discharge of rainwater from urban areas, the storm sewer system is most often used, which together with the development of buildings is becoming more and more burdensome and in order for it to function properly requires financial outlays for modernization or expansion. Disturbances of the water circulation in urbanized areas affect the water, temperature and air quality, contributing to climate change. Increasingly, we are dealing with the urban heat island - the temperature in cities is higher than in the surrounding areas. Car exhaust and so-called low emissions lead to an increase in the concentration of harmful dust and chemical compounds in the air (PM₁₀, PM_{2,5} dioxins, furans). The result of progressing climate changes in Poland are floods, droughts and increased intensity of occurrence of extreme phenomena (heavy rains, storms)

In order to improve the living conditions of city dwellers, pro-environmental investments supporting the development of ecosystem services, i.e. services provided by the natural environment to human beings, are necessary. The green and blue infrastructure play a major role in improving the microclimate of cities. Green areas in the urban space are all green areas: parks, squares, green areas, undeveloped river valleys, ravines. The blue infrastructure that is closely related to green includes watercourses, surface waters and wetlands and swamps. Greenery in the city plays a very important environmental and aesthetic role. Trees, and in particular greenery of a bunk type, filter the air well and emit pro-healthy phytoncides. Retention of rainwater at the source of precipitation, and thus also in intensively urbanized areas, contributes to reducing the negative effects of climate change, which have a direct impact on living conditions in cities. The article is a review of currently used methods of rainwater management in cities, showing the positive impact of greenery and water retention in the city on the quality of living conditions, which translates into quality of life and health.

Do selected environmental antiandrogens induce disordered preantral follicle maturation? In vitro studies

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The female gonads – ovaries – perform two functions in the female reproductive system: firstly, they are a source of steroid hormones, and second – they create an appropriate environment for the maturation of the oocyte, which is crucial for the reproductive success of a given species, including humans. The functional unit in mammalian ovaries is the ovarian follicle, which contains a single oocyte that is surrounded by follicular cells (granulosa and theca). When ovarian follicles appear for the first time in the prenatal or neonatal period, they form as primary. Their ovarian pool called the ‘ovarian reservoir’ is the main factor affecting fertility potential because it represents the total population of ova during the reproductive life of the female. Folliculogenesis is a process in which the primary follicles are recruited, begin to grow and develop into the preovulatory stage. It is worth mentioning that almost 90% of the developing follicles die by the process of atresia. Only a small part will ovulate and will release the mature oocytes. Transition and activation of primary follicles takes place in response to a whole range of intra- and extra-ovarian signals. These are steroid hormones, gonadotropins and growth factors acting by auto/paracrine way. In addition, there are concerns about the potential harmful effects of toxic substances, such as environmental chemicals and *Endocrine Disrupting Compounds (EDCs)*. That is why this study was conducted to determine whether experimentally induced androgen deficiency during in vitro culture of porcine preantral follicles affects their development.

Fragments of the porcine ovarian cortex (1mm / 1mm) were cultured *in vitro* for 8 days with the addition of androgen – *testosterone (T)*, antiandrogens: *2-hydroxyflutamide (2-Hf)* or *vinclozolin (Vnz)*, alone or in combination with T. The cultures were terminated after 2-, 4-, 6- and 8 days. FSHR (*follicle-stimulating hormone receptor*), GDF-9 (*growth differentiation factor 9*), KL (*kit ligand*) / c-Kit (*receptor tyrosine kinase*) and selected markers of apoptosis / autophagy at the mRNA (*messenger RNA*) and protein level were determined. In addition, the aforementioned proteins were localized using *immunohistochemistry (IHC)*. The morphology of the growing follicles and progression of antrum formation were investigated every 2 days. The results of this study confirmed that androgens are involved in the early development of ovarian follicles by: (1) demonstrating the effect of androgens on the rate of antrum formation, (2) showing changes in the expression of all tested proteins in cultured follicles in the presence of both androgens as antiandrogens, (3) demonstrating for the first time that environmental anti-androgen adversely affects the survival of the follicles.

Thus, deleterious effects of androgen deficiency on ovarian follicles development at antrum formation stage were demonstrated, what may negatively influence reproductive function in mammals. In the light of accumulating evidence indicating the rising presence of EDCs in the environment, it seems important to establish how these compounds that block or mimic endogenous androgens action influence the initiation of folliculogenesis within the ovary.

Photonic crystals as an innovative material for securing documents

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Preliminary. Light is always important for a human being. Modern technology is slowly replacing conventional electronics, replacing it with light, which is not only for observing the world, but also for communication, because it is the basis for the circulation of information in all civilization. The electron- controlled signal is converted into a photon flow. One of the latest revolutions in science and technology is the discovery of photonic crystals, which does not contain pigments, and consist of layers with a periodic change in the refractive index, which causes variable color perception.

Background information. The photonic crystals are macroscopic, periodic dielectric structures showing, analogously to energy bands and gaps in semiconductor crystals, spectral gaps for specific electromagnetic waves [2]. They consist of at least two materials with different refractive index, therefore, under certain conditions, the waves are prevented from propagating for a given range of their spectrum. They are able to control the transmission of light in a desirable and designed way by introducing defects to their structure [3].

Depending on the number of directions in which there are changes in the refractive index, the crystals are distinguished:

- one-dimensional,
- two-dimensional,
- three-dimensional [4].

The most important properties of photonic crystals are:

- photonic no-break, as a spectral break for specific electromagnetic waves,
- the phenomenon of "slow light", which is used to reduce noise during transmission of information,
- negative refractive index, which causes the light to reflect off the surface differently than it is explained in Snellius' law [4].

Maxwell equations are used to create the crystal, allowing to predict whether an electromagnetic wave of a specific frequency and length will propagate in the crystal. This allows to describe the properties and interdependence of electric and magnetic fields and to demonstrate the existence of a photonic band gap.

Conclusion. In recent years, photonic crystals have found a very great exploitation in many areas of science and technology, including for securing documents or for the production of metamaterials [5]. Conducting experiments related to the exploration of knowledge about them is very expensive. It has not been possible - until then - to develop conditions for their mass production.

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Criteria for assessing the impact on people of objects using renewable energy sources in methods of visual impact identification

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The identification of the impact of objects using renewable energy sources (RES) on people is one of the problems associated with locating new renewable energy devices. The impact of many RES facilities can lead to visual pollution. Therefore, residents of areas that are close to the planned investments often try to prevent the construction of such facilities. Concerns are related to changing the nature of the landscape and distorting the existing scenery, which can significantly affect the quality of life. In the literature on the subject of methods for assessing visual impact on the landscape, the impact on people is examined by various criteria. The aim of this work was to review methods of visual impact assessments, which contain assessment criteria directly related to the impact on people living or visiting places near facilities that use RES. As part of the research, a classification of methods for assessing the visual impact of RES facilities was developed based on the criteria for assessing impact on people. The possibility of using these evaluation criteria in the framework of EIA and SEA procedures in Poland was also analyzed. The results of the research will be used in further works on visual impact assessment methodology, which could be part of the EIA and SEA procedures in Poland.

Assessment of the management and recreational use of the “Głowacki” gully in Nałęczów

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The Węglin Północny district, located in the south-western part of Lublin, particularly features single-family housing. Greenery along roads is dominated by deciduous trees and shrubs, including fruit trees. Perennials occur sporadically, particularly in the entrance zone. In sections adjacent to longer sides of plots, lawns are usually maintained. An exception is the roadside area in the Szwejka Street at the linking section providing access to properties from No. 75 to No. 87. Owing to the initiative of the district's residents, in 2011, 20 thousand early spring perennials were planted on the scarp at the pavement. From 2014, students of the University of Life Sciences in Lublin from majors: landscape architecture, horticulture, environmental protection, and forestry joined the action of decorating the scarp. Over 5 years, 25 thousand perennials were planted, funded by the Independence Foundation (Fundacja Niepodległości).

Currently, from March to May the scarp features a range of colours from white, through pink and blue, to yellow and red. The colours are displayed by flowers of numerous species and cultivars from the following genera: *Allium*, *Colchicum*, *Crocus*, *Galanthus*, *Hyacinthus*, *Iris*, *Muscari*, *Ornithogalum*, *Puschkinia*, *Scilla*, *Tulipa*. The planting also represents an important ecological aspect, because a large majority of the introduced species have flowers valuable from the beekeeping point of view, constituting a source of protein (pollen supply) and sugar (nectar) for pollinating insects.

Another advantage of the place is its educational value. It is visited not only by residents of the district passing it on their way to the bus stop, shopping centre, or church, but also by children brought here by teachers from nearby kindergartens and schools. It is exceptionally charming. Anyone visiting the place is eager to return the following spring to benefit from the aesthetic impressions and document them in photographs.

Interest in the square encouraged systematising issues mentioned during conversations with residents, and developing a questionnaire further used to survey a group of passers-by in 2015. A total of 25 persons participated in the survey, dominated by women aged 26-35. All respondents considered the area in the Szwejka Street attractive due to the early blooming of perennial plants, their colour, and number. Residents were in favour of the introduction of blooming perennials on the square in summer. 90% of respondents confirmed the need of protection of wild pollinating insects.

Residents evaluated green areas along roads in the Węglin Północny district as average, and pointed to the need of improvement of the aesthetics of roadsides. Comments concerned a low number of trash cans, benches, playgrounds, and squares. Moreover, the necessity of more intensive maintenance of the existing greenery through trimming tree branches and shrubs intruding onto roads and pavements was recognised. In open questions, decoration of further roadsides was suggested, as well as the creation of an educational path referring to names of streets, with information boards and thematic areas. Roadsides could fulfil an educational function, and would become a place of meetings of residents.

Medicinal and cultivated mushrooms-chosen application in human health management

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Mushrooms cultivation is one of the fastest developing branches of horticulture, with world production over 10 million tons in 2014. The medicinal functions of mushrooms are attributed to more than 700 species. The basic group of biologically active compounds are β -glucans. Their immunomodulating effect has been proven and used in cancer therapy and many other lifestyle diseases. Mushrooms contain also polyphenols, vitamins from group B and full spectrum of macro and microelements important in human diet. Cultivation of mushrooms could be more important part of agriculture with respect to economical, sociological, and ecological inputs. Most of the cultivated mushrooms are saprobiontic, they can easy recycle food industry wastes to new products used in food, cosmetic and pharmacological industries. of the aim pf present study was evaluation of the impact of substrate on biochemical content of mushroom fruit bodies. Two species of cultivated mushrooms were selected for the study: *Pleurotus ostreatus* and *P. eryngii* and two common species collected from the natural environment: *Trametes versicolor* and *Schizophyllum commune*. *Pleurotus* mushrooms were grown on 3 different substrates – wheat straw, straw with beech sawdust and straw with linden wood chips. There were significant differences in β -glucans content, antioxidant activity and polyphenol content, as well as in macro and microelement contents and heavy metals in all analyzed samples of fruit bodies. Results implied that mushrooms fruit chemical composition is highly determined by the substrate composition.

Nivolumab-induced interstitial pneumonia in a patient treated for lung cancer

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Lung cancer is a disease with a very poor prognosis. It is the main cause of mortality due to malignant tumors in the world. In the treatment of lung cancer, in addition to standard platinum-based chemotherapy, molecular-targeted therapies and immunocompetent drugs are increasingly widely used. Immunotherapy involves stimulating the patient's immune system and directing him to fight cancer. One of the available immunocompetent agents is nivolumab, a monoclonal antibody that binds to the PD-1 receptor (programmed death 1). The efficacy of nivolumab has been demonstrated in some patients with non-small cell lung cancer. Unfortunately, as with any drug, also nivolumab carries the risk of side effects. We present a case report of a patient with a nivolumab-induced interstitial lung disease (ILD) as a complication of therapy.

In 64-year-old patients with numerous cardiological burdens, squamous cell carcinoma of the right lung was diagnosed at stage IIIA (T3N1M0). First-line chemotherapy (cisplatin and navelbine) was initiated and turned out to be ineffective (progression after 4 cycles), as well as mediastinal radiotherapy (66 Gy/ 30 fractions). Due to the progression, the patient was qualified for treatment with nivolumab in the expanded access program. After the third course of treatment, bilateral interstitial pneumonia was diagnosed. *Acinetobacter baumannii* was detected in purulent secretion from the bronchial tree collected during bronchoscopy. Despite intensive treatment, targeted antibiotic therapy and glucocorticosteroid therapy, no clinical improvement was achieved. The patient died one week after the first manifestation of interstitial pneumonia.

Nivolumab may cause serious side effects, which include interstitial pneumonia, the occurrence of this disease is often associated with high mortality.

Aesthetic values of plantings of early spring alliaceous perennials in the urban space of Lublin

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The Węglin Północny district, located in the south-western part of Lublin, particularly features single-family housing. Greenery along roads is dominated by deciduous trees and shrubs, including fruit trees. Perennials occur sporadically, particularly in the entrance zone. In sections adjacent to longer sides of plots, lawns are usually maintained. An exception is the roadside area in the Szwejka Street at the linking section providing access to properties from No. 75 to No. 87. Owing to the initiative of the district's residents, in 2011, 20 thousand early spring perennials were planted on the scarp at the pavement. From 2014, students of the University of Life Sciences in Lublin from majors: landscape architecture, horticulture, environmental protection, and forestry joined the action of decorating the scarp. Over 5 years, 25 thousand perennials were planted, funded by the Independence Foundation (Fundacja Niepodległości).

Currently, from March to May the scarp features a range of colours from white, through pink and blue, to yellow and red. The colours are displayed by flowers of numerous species and cultivars from the following genera: *Allium*, *Colchicum*, *Crocus*, *Galanthus*, *Hyacinthus*, *Iris*, *Muscari*, *Ornithogalum*, *Puschkinia*, *Scilla*, *Tulipa*. The planting also represents an important ecological aspect, because a large majority of the introduced species have flowers valuable from the beekeeping point of view, constituting a source of protein (pollen supply) and sugar (nectar) for pollinating insects.

Another advantage of the place is its educational value. It is visited not only by residents of the district passing it on their way to the bus stop, shopping centre, or church, but also by children brought here by teachers from nearby kindergartens and schools. It is exceptionally charming. Anyone visiting the place is eager to return the following spring to benefit from the aesthetic impressions and document them in photographs.

Interest in the square encouraged systematising issues mentioned during conversations with residents, and developing a questionnaire further used to survey a group of passers-by in 2015. A total of 25 persons participated in the survey, dominated by women aged 26-35. All respondents considered the area in the Szwejka Street attractive due to the early blooming of perennial plants, their colour, and number. Residents were in favour of the introduction of blooming perennials on the square in summer. 90% of respondents confirmed the need of protection of wild pollinating insects.

Residents evaluated green areas along roads in the Węglin Północny district as average, and pointed to the need of improvement of the aesthetics of roadsides. Comments concerned a low number of trash cans, benches, playgrounds, and squares. Moreover, the necessity of more intensive maintenance of the existing greenery through trimming tree branches and shrubs intruding onto roads and pavements was recognised. In open questions, decoration of further roadsides was suggested, as well as the creation of an educational path referring to names of streets, with information boards and thematic areas. Roadsides could fulfil an educational function, and would become a place of meetings of residents.

Analysis of human health protection in connection with the use of plant protection products

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Plant protection products were already used on a mass scale in the years 50 of the 20th century. The increase in the popularity of pesticides results from the effectiveness of combating harmful organisms and improving the condition of crops. Agriculture aims to obtain the best possible yields, usually using synthetic protection measures. The ease of use and cost-effectiveness of treatments make the chemical preparations of basic importance in modern plant protection. Exposure to pesticides is widespread because contaminants can enter the human body along with food and contaminated air. Long-term use of pesticides has a negative impact on living organisms and the environment. The most vulnerable group of people are farmers, when applying pesticides, pregnant women, breastfeeding women and young children. Therefore, it is very important to constantly analyze the use of these agents, procedures that will help reduce the negative impact on the living organism and increase human awareness in this thematic area.

Influence of chilling and light stress on metabolic profile of *Origanum vulgare* L. in juvenile stage

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The aim of the study was to evaluate effects of chilling and light stress applied to young plants of *Origanum vulgare* L. on content of selected compounds. Juvenile plants have been cultivated in phytotron chamber in three different regimes:

a, temperature 5°C, light intensity of 0, 100 and 250 $\mu\text{mol} \cdot \text{m}^2 \cdot \text{s}^{-1}$ for 7 days

b, temperature 18°C, light intensity of 0, 100 $\mu\text{mol} \cdot \text{m}^2 \cdot \text{s}^{-1}$ for 7 days

c, temperature 18°C, light 250 $\mu\text{mol} \cdot \text{m}^2 \cdot \text{s}^{-1}$ for 7 days (control)

Analyses proved significant influence of applied stress factors on dry matter, soluble sugars, chlorophyll pigments and compounds associated with antioxidant activity. An increase of dry matter, soluble sugars and L-ascorbic acid after chilling in limited light intensity. Decrease of photosynthetic pigments under chilling conditions was observed. The highest content of total phenols and the highest antioxidant activity was observed for plants subjected to chilling in light intensity equal to 100 $\mu\text{mol} \cdot \text{m}^2 \cdot \text{s}^{-1}$.

Two important effects were observed:

a) an increase of dry matter, soluble sugars and L-ascorbic acid after chilling in limited light intensity

b) a decrease of photosynthetic pigments under chilling conditions was observed. The highest content of total phenols and the highest antioxidant activity were observed in plants which were exposed to chilling and light intensity equal to 100 $\mu\text{mol} \cdot \text{m}^2 \cdot \text{s}^{-1}$.

Is the quality of raw hyssop dependent on nitrogen nutrition?

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Hyssop (*Hyssopus officinalis* L.) belongs to the *Lamiaceae* family plants. It comes from the Mediterranean region and therefore prefers a warm and dry climate. In our country, it grows equally well and does not freeze in winter. It grows up to 60 cm, blooms in blue or purple, and has a strong, pleasant smell. The plant is eagerly visited by bees and butterflies, thus it can be planted as a bee forage in our gardens because of its melliferity. Hyssop is currently not widely used in medicine despite of its well-established traditional use. Throughout history, many historic healers have appreciated the medicinal properties of hyssop. It has been known since antiquity in the treatment of respiratory and digestive diseases. It helps in coughing, relieves throat inflammation and makes it easier to cough up. Hyssop is perfectly suited as a seasoning for meat, fish and bean dishes. The plant was considered a holy herb and came to Poland together with the monks. In the Middle Ages, it was only cultivated in monastery gardens.

Research into bactericidal and fungicidal action of plant extracts is currently underway. Researchers have proven its action against *Candida* spp. as well as G+ and G- bacteria.

In order to determine the optimal way of feeding the plants with nitrogen, studies were carried out in which the influence of nitrogen fertilizer type and nitrogen dose on the fresh hyssop yield, the content of essential oil, L-ascorbic acid and macroelements in hyssop herb, was analyzed. For plant nutrition, calcium nitrate, ammonium nitrate and urea at a dose of 0.2, 0.4, 0.8 g N · dm⁻³, were applied. Plant harvesting was done in the growth phase before flowering. The highest yield of fresh hyssop mass was obtained after the use of calcium nitrate, lower after the administration of ammonium nitrate, and the lowest - urea. A similar tendency of the influence of tested nitrogen fertilizers was recorded in the dry matter content in hyssop herb. The highest amount of L-ascorbic acid was found in hyssop plants fed with ammonium nitrate. Tested type of nitrogen fertilizers also influenced the content of essential oil in the hyssop raw material. Greater amount of oil characterized plants fed with both ammonium nitrate and urea as compared to those fed with calcium nitrate. Synthesis of essential oil in the plant also depended on the nitrogen dose used. There was a significant increase in the concentration of oil in raw material along with the increase in the administered dose of nitrogen.

Based on the results obtained, for the cultivation of hyssop in containers, in order to obtain the highest quality yield, it is recommended to use ammonium nitrate in a dose of 0.4 g N · dm⁻³ substrate.

Antioxidant activity of *Rubus idaeus* fruits

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The raspberry (*Rubus idaeus* L.) is a plant from temperate climate. Two types of shrubs have been distinguished: one type producing fruits on two-year-old shoots and the other one repeating fruiting. In Poland, the raspberry fruit yield was 129 100 tons in 2016. Currently, the cultivation of raspberry shrubs is increasing rapidly in many countries due to the growing fruit consumption and processing as well as the use of raspberry fruits in the pharmaceutical and cosmetics industries. The *Rubi fructus* raw material is a valuable source of biologically active compounds with a broad spectrum of pharmacological activity. The aim of the study was to determine the antioxidant activity and the content of selected nutrients in the fruits of three *Rubus idaeus* L. cultivars grown in the area of the Lublin Upland.

The antioxidant activity of *R. idaeus* 'Pokusa', 'Polana', 'Polka' fruits was assessed with three methods. The total content of phenolic compounds was determined with the Folin-Ciocalteu method. The antioxidant capacity reflecting the ability to reduce iron ions was determined with the FRAP method. The antioxidant activity was determined with the DPPH reagent method.

The juice and extracts from the three analysed raspberry cultivars exhibited high antioxidant activity. Based on the DPPH method and the AE coefficient, the highest antioxidant capacity among the analysed cultivars was detected in 'Polka' fruit juice, while 'Polana' was characterised by the lowest value. The greatest capacity of reduction of iron ions was exhibited by the 'Pokusa' cultivar and the lowest value was found for 'Polka' (FRAP method). In terms of the increasing content of polyphenolic compounds in the juice, the raspberry fruits can be ranked as follows: 'Pokusa' < 'Polana' < 'Polka'.

Effect of calcium foliar feeding on the calcium content in the epidermis cells of *Malus domestica* Borkh. cv. 'Szampion' fruits

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In addition to their function of a secondary transmitter, calcium ions reduce the effects of various stresses by neutralisation of reactive oxygen species induced in adverse conditions. Calcium is a component or activator of many important enzymes. As a component of respiratory enzymes, this element determines fruit firmness. It regulates the activity of many enzymes in cells, e.g. it inhibits the action of potassium-dependent enzymes. Thus, it exerts an indirect effect on energy metabolism and respiration rate. The aim of the study was to determine the quality and quantity of calcium ions in selected elements of epidermis cells in *Malus domestica* cv. 'Szampion' fruits in relation to varied calcium foliar feeding.

'Szampion' apple trees received foliar feeding with $\text{Ca}(\text{NO}_3)_2$, CaCl_2 , Librel Ca, and the control every two weeks between the third decade of June and the third decade of September. Mature fruits were subjected to qualitative and quantitative microanalysis and the content of Ca ions in the cell wall, plasmalemma, or cytoplasm was determined. The analyses were performed using a high-resolution transmission electron microscope JEM 1400 (JEOL Co.) and a digital microscope equipped with an X-ray microanalyser (EDS INCA Energy TEM) and an 11 Megapixel TEM Morada G2 camera (EMSIS GmbH).

There were differences in the calcium content in the selected elements of the fruit epidermis cells between the control combination and the calcium-supplemented fruit. At the cellular level, the highest concentration of calcium ions was found in the middle lamella, followed by the cell wall, plasmalemma, and cytoplasm. In terms of increasing concentrations of Ca^{+2} cations in the cytoplasm, the calcium content was ranked as follows: control < $\text{Ca}(\text{NO}_3)_2$ < CaCl_2 < Librel Ca. The results of the qualitative calcium analysis at the ultrastructural level of the epidermis provide important data that can be used in practice to select an appropriate calcium formulation ensuring production of high quality fruit with a favourable composition for human health.

Assessment of surface water quality from the Tarkawica region based on physicochemical indicators and heavy metals concentration

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Water, as a substance surrounding us from all sides, has always found its place in our beliefs. Most and maybe even every religion gives it many meanings. Its symbolism is very diverse. It carries death and evil, and at the same time is life-giving and gives rest. It can be noticed that rivers and streams are a symbol of good and joy, while seas as powerful elements carry fear with them. The atmosphere and gravity make the amount of water on our planet permanent and practically unchanged. It is estimated that there are $1.337 * 10^6$ km³ of water on Earth. Only less than a percent (about 0.78%) of water resources is fresh water that humans can use directly. Poland is one of the countries that are poor in water. In terms of water resources, it is on one of the last places in Europe. The size of these resources is influenced by the amount of precipitation and the ability to retain them. The highest water consumption is observed in agriculture, for irrigation of crops. This accounts for almost 70% of all water resources used by humans. In Europe, irrigated land ranges from 3% in the northern part of the continent to 30% in the south of all crops. In Poland, only about 1% of crops are irrigated. It is now believed that in the near future, the lack of sufficient water may be a limiting factor in the production of human food and animal feed.

The impact of choosing a lifestyle on the health of the individual

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Modern man is more and more preoccupied with health, which is becoming one of the most important aspects of his life. Health is not only the object of corrective actions, but it is becoming the object of preventive actions. The man has no direct influence on anything, he cannot avoid certain events. There are also some factors that a person cannot basically change – for example genetic factors, age or gender.

Health promotion experts determine the desired health-promoting lifestyle both at the individual and group level. One of the most important issues that arises in the context of lifestyles is the concept of choice. The choice is always made in relation to the society, the environment with which the individual wants to identify. It applies to almost all spheres of everyday life such as hygiene, clothing, physical activity and nutrition. Emphasizing the aesthetic benefits of a pro-health lifestyle means that some people strive for perfection and are focused only on themselves. They are convinced that if they follow a rigorous diet, they will not experience diseases that plague modern societies. The media message regarding a healthy lifestyle is dedicated mainly to young and well-off people. Health becomes a commodity and it is increasingly difficult to distinguish between lifestyle and prophylaxis.

This paper aims to depict various detrimental effects of promoting some specific lifestyles, including temporary fads and dietetic trends, as well as their potential negative influence of the health of individuals and societies.

Key words: lifestyle, health status, individual choice, health promotion, temporary health-related trends.

The relationship between body mass index and selected anthropometric parameters in overweight and obese individuals

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The increase in the prevalence of overweight and obesity in both developed and developing countries is associated with musculoskeletal and other non-communicable diseases. To address this, an accurate measure of body adiposity, bearing in mind several shortcomings of body mass index (BMI), should be used.

The aim of this study was to compare selected anthropometric parameters in the obese and overweight groups, with particular emphasis on evaluate the BMI as a proxy for percent body fat (%BF) and to determine its association with fat-free mass (FFM).

Body composition was measured using validated bio-impedance (BIA) equipment (SECA mBCA 515) in a self-selected sample of 80 adults aged 18-50 years, of which 40 were overweight with a mean BMI of 27,25 ($\pm 1,6$) kg/m², and 40 were obese, with a mean BMI of 34,92 ($\pm 4,0$) kg/m². Both groups consisted of 17 men and 23 women. Body adiposity indices were assessed using BMI and % BF ≥ 25 (for men) or ≥ 30 BF% (for women).

In the overweight group (mean \pm SD; age: 30,33 \pm 10,1 years; height: 1,71 \pm 0,1 m; weight: 79,75 \pm 10,6 kg) there was an average percentage of body fat at 31,76 ($\pm 7,2$) %. In the obesity group (mean \pm SD; age: 30,70 \pm 8,6 years; height: 1,72 \pm 0,1 m; weight: 104,1 \pm 16,2 kg) this value was 40,42 ($\pm 6,0$) %. There was a strong and positive statistical relationship between BF% and BMI when both were paired without controlling for gender and age. Increment of BMI was positively correlated with an increase in the percentage of skeletal muscle and the overall content of FFM. In obese group, the total body water content was lower than in overweight group: 43,9 ($\pm 4,1$) % vs 49,96 ($\pm 4,9$) %. A similar relationship was reported for extracellular water. There were no statistically significant differences regarding the phase angle (PA) value in both groups.

This study support the importance of BIA analysis to predict body fat percentage / obesity, in a population.

Environmental degradation and its health consequences as factors supporting democratization process

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The aim of the presentation is to look at environmental degradation and related health problems as factors supporting the democratization process. At the theoretical level I refer to the concept of "risk society" theorized in the 1980s by the German sociologist Ulrich Beck as well as to the actor-network theory in the version proposed by Bruno Latour. Beck points out that environmental risks can not be considered solely on the basis of biological-naturalistic criteria, and thus from the perspective of the "hard" science. Environmental problems are inseparable from the political, economic and social spheres. According to the German sociologist environmental threats have even political potential and can lead to reconfigurations in the field of power. As a result scientific knowledge is also directly related to the sphere of politics, because without the former, it is impossible to address – often invisible – environmental risk. Beck's tendency to overcome the division between nature and culture is developed in the writings of Bruno Latour. The French sociologist of science proposes to give to non-human actors an agency in negotiating the shape of the collective (this is how he calls an extended society). Change is made possible by reconfiguration of the network – an assemblage of people, technologies, natural factors etc. Democratic nature of this postulate consists, among others, on the inclusion of new elements within these negotiations.

In my presentation, I refer to two cases: 1) discussions about environmental degradation conducted at the Round Table in 1989 (at the so-called "sub-table for ecology") and 2) debates about air pollution which took place in 2013-2015. Based on these examples, I show how knowledge and technologies become crucial not only for pursuing a life in a cleaner and safer environment, but also for increasing the participation of citizens in negotiations related to the shape of the community.

During 1980s 30% of the Polish population lived in areas classified as polluted. It was also the time of increased activity of ecological movements against the devastating impact of industry on the environment and human health. Increase in the access to knowledge about threats or establishment of a social control over the state of the environment in Poland were only some of the demands raised during the meetings of the "ecological sub-table". Today – although we live in an incomparably cleaner country – ecological postulates are gaining strength, especially in the field of air quality and its health consequences. Citizens' initiatives, the popularity of phone apps providing current air status or bottom-up monitoring in areas which are not covered by state control can be interpreted in terms of a "green" democratization. A further analysis of the social composition of groups making democratizing claims in both of the cases discussed will also allow to indicate shortcomings of the aforementioned theoretical frameworks and limitations of these mechanisms of democratization.

Micromorphology of leaves of two *Veronica* L. species

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Representatives of the genus *Veronica* L. (Plantaginaceae) are known as medicinal, melliferous, and ornamental plants and are sometimes regarded as weeds. The name of the genus comes from Saint Veronica from the Gospel. The genus includes 198 species and over 200 taxa of infraspecific rank. These are mostly perennials, shrublets, and annual plants. They occur on all continents except Antarctica. The species are most numerous in the area of Eurasia, where they grow in humid or dry conditions in lowlands and high in the mountains. The Polish flora comprises 35 *Veronica* species. Some of them are very rare, endangered with extinction, or extinct in our country. Therefore, they are enlisted in the 'Polish Red Data Book of Plants', are included in the 'Polish red list of pteridophytes and flowering plants' and in Polish regional red lists or they are legally protected in Poland.

The paper presents the results of investigations of the micromorphology of the leaf surface in two native xerothermic species from the genus *Veronica* in the ecological and taxonomic aspect.

The research material included typical leaves of *Veronica austriaca* L. and *V. prostrata* L. from the collection of the UMCS Botanical Garden in Lublin, where the species were introduced from natural habitats in the Lublin region. The micromorphology of the leaf blade surface was analysed using scanning electron microscopy (SEM).

The surface of the leaves of the analysed species has common features although there are also taxon-specific differences. The epidermis on both sides of the leaf blade bears multicellular non-glandular and glandular trichomes. The non-glandular trichomes are uniradial and composed of 3 cells. Their length varies depending on the area on the leaf blade. The trichomes in *V. prostrata* are approx. 70 µm long while those on the nerves are 3-fold longer. The difference in the trichome parameters is evident in *V. austriaca* as well – the trichomes on the leaf blade are on average 180 µm long and those on the nerves are 280 µm. Additionally, the density of non-glandular trichomes on the leaf nerves is 2-3-fold higher than their density on the other area of the leaf blade. The glandular trichomes are 2-celled (*V. prostrata*) or 4-celled (*V. austriaca*) glandular structures located on a 2-celled stalk. Their length varies between the species and is on average 37 µm (*V. prostrata*) and 60 µm (*V. austriaca*). The epidermal cells in the top view are convex and have a polygonal isodiametric or slightly elongated shape. The cuticle surface of such cells is striated rather than smooth. The cuticle surface is covered with different-sized and irregularly shaped lumpy wax structures. Numerous cuticular striae and wax structures can be observed in *V. austriaca*. The cells of the abaxial epidermis in the analysed species are clearly smaller than the cells of the adaxial epidermis. The species have amphistomatic leaf blades with a greater number of stomata on the abaxial side. The cuticle of the stomatal cells forms thickened external cuticular ledges. The stomatal cells are approx. 24 µm long in *V. prostrata* and slightly longer, i.e. 30 µm, in *V. austriaca*.

The analysis of the leaf micromorphology of the analysed *Veronica* species revealed the traits of these xeromorphic plants; the species-specific traits and collected documentation can be helpful in identification of medicinal raw materials.

Ultrastructure of floral nectaries in plants from the genus *Exochorda* Lindl.

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Plants from the genus *Exochorda* belong to the family Rosaceae, subfamily Spiraeoideae, and originate from China and Central Asia. The shrubs from this genus are classified into ornamental plants. Some researchers describe *E. racemosa* as a wild edible plant. Analysis of nutrients contained in young leaves, stems, buds, and flowers of the species has demonstrated their high nutritional value. The content of heavy metals and pesticide residues meets the allowable amounts specified in food standards. Various organs of the species exhibit a rich composition of flavonoids. Leaf extracts have been found to have antibacterial activity.

The aim of the study was to determine the structure of the epidermis of floral nectaries in *Exochorda racemosa* (Lindl.) Rehder and *E. macrantha* Schneider. The nectaries were analysed with the use of bright-field light microscopy as well as fluorescence, scanning, and transmission electron microscopy.

The analysed flowers had a white fivefold perianth. They formed a raceme. The stamens were gathered in groups at the base of corolla petals. The hypogenous pistil had a spherical ovary and five short styles with a flat stigma. The nectary tissue occupied the adaxial surface of the receptacle between the ovary and the filament base. The surface of the nectary epidermis exhibited striated cuticular ornamentation. The stomata were arranged over the entire nectary surface below the surface of other epidermis cells. The observations of the ultrastructure of the nectary cells revealed different-height protuberances of the outer epidermis cell wall. The adjacent epidermis cells closely adhered to each other and to nectary parenchyma cells. A greater number of mitochondria were located near the cell wall and around the cell nucleus and plastids than in the other areas of the protoplast. ER in the form of longitudinal tubules was located at the wall and in other regions of the cytoplasm. Cortical RER and Golgi apparatus were concentrated along the cell walls. The cell nucleus with a distinct chromatin stroma had a circular or slightly elongated outline and occupied the central part of the protoplast. These cells contained small vacuoles or sometimes one large vacuole.

Biologically active compounds in roots and leaves of plants from the genus *Hemerocallis*

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The genus *Hemerocallis* represents the family Asphodelaceae and subfamily Hemerocallidoideae. It originates from Asia, mainly from areas of China and Japan. It comprises 50 species. Growers still acquire new varieties of daylilies with decorative colours and shapes of the perianth. More than 40000 varieties have been officially registered in the American Hemerocallis Society. These plants are one of the most economically profitable ornamental plants. *H. fulva* roots and leaves are used in folk medicine.

The aim of the study was to determine biologically active compounds in the organs of plants from the genus *Hemerocallis* and their phytotherapeutic effects based on a review of original scientific literature.

The following compounds have been identified in the roots of *H. citrine* and *H. flava*: (E)-p-methyl cinnamic acid, α and β -boswellic acid, 11-keto- β -boswellic acid, 11 α -hydroxy-3-acetoxy-beta-boswellic acid, 24-diene-21-oic acid, 3 α -acetoxy-11-oxo-12-ursene-24-oic acid, 4-dihydroxyl cinnamic acid, vanillic acid, ω -feruloyloxy acid, 2-diol, 25(R)-spirostan-4-ene-dione, 2-hydroxychrysophanol, 2-methoxy-butusifolin, 3-oxolanosta-8, 3 α and 3 β -hydroxylanosta-8, 5-hydroxydianellin, 6-methyluteolin, 7-hydroxynaphthalide, aloe-emodin, anthraquinones, chrysophanol, dianellin, flavone, hecogenin, hemerocallin, fatty acid, hemerocallone, hopane-6 α , kwanzoquinones, naphthalene glycoside, obtusifolin, rhein, β -sitosterol, α -tocopherol, stigmast-4-en-3-one, stigmast-4-en-3 β -ol, terresoxazine, and 2, 4, 6-trihydroxy-4-methoxy-3-methylchalcone. Hemerocallin is a neurotoxic and poisonous compound identified as 2,2'-bi(1,8-dihydroxy-6-methyl-7-acetyl naphthalene). *H. fulva* roots were used in folk medicine to treat jaundice, bladder diseases, and mastitis. Leaves of this species were found to contain adenosine, isorhamnetin-3-O- β -D-6'-acetylgalactopyranoside, lariciresinol, phlomuroside, pinnatanine, quercetin 3,7-O- β -D-diglucopyranoside, quercetin 3-O- β -D-glucoside, quercetin 3-O- α -1-rhamnopyranosyl-(1 \rightarrow 6)- β -D-glucopyranosyl-7-O- β -D-glucopyranoside, roseoside, and 1',2',3',4'-tetrahydro-5'-deoxy-pinnatanine. In Asian countries, these organs were used to treat inflammations and jaundice.

Ecological features of leaf epidermis in selected grass species

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The Poaceae family comprises numerous species of plants with high taxonomic diversity representing 12 subfamilies. Grasses play an important role as fodder, anti-erosion, quicksand reinforcing, halophilic, lawn, and ornamental species. The various taxa grasses are characterised by a large variability of morphological features.

The aim of the study was to determine the micromorphology of the leaf epidermis in four grass species: *Bromus inermis* Leys, *Dactylis glomerata* L., *Festuca arundinacea* Schreb., and *Phleum pratense* L.. Comparative analyses were carried out using scanning electron microscopy.

The surface of epidermal cells was covered by a cuticle with characteristic structural ornamentation in the form of clustered and densely arranged plates. In the epidermis, Amaryllidaceae-type stomata were located below the other epidermis cells and along the longer cell axis. There were short conical non-glandular trichomes, which were tapered at the apex and enlarged at the base. The trichomes were arranged singly in rows. The frequency of occurrence of trichomes and the distance between the rows depended on the species. A furrowed cell arrangement was visible on the adaxial epidermis surface. In *B. inermis*, there was a lingule with an unevenly serrated margin. The leaf margin exhibited short sharp teeth arranged in two rows. The cross section showed 5-7 water cells in a flabellate arrangement. There were three rows of short conical non-glandular trichomes at the *D. glomerata* leaf margin. Water cells were also visible in the central part of the leaf. The epidermis cells in the *F. arundinacea* leaf formed characteristic ribs. The conical non-glandular trichomes were sparsely distributed. Lamina margins had one row of teeth. The leaves of *P. pratense* exhibited small ribs and sparsely arranged conical trichomes. The characteristic features of leaf micromorphology, e.g. trichome structure, stomatal topography, stomatal index, and cuticular ornamentation, can be auxiliary indicators to be used in identification of related taxa.

Ecological aspects of the cultivation and utilisation of small-seed legumes in sustainable agricultural production

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The significance of cultivating the more important species of perennial legumes in sustainable agriculture is discussed based on scientific literature. The key characteristics setting these plants apart among other crop species with regard to their pro-environment impact, including impact on the soil and non-soil environment, are highlighted. With regard to the impact on the soil, attention is drawn to the ecological value of these crops from the economic perspective such as the symbiotic atmospheric nitrogen fixation, the highest positive balance of organic matter and the structure-forming effect of the root system improving the physical properties and biological activity of the soil.

With regard to agrotechnology, it is indicated that the seed material can be enriched using the pre-sowing stimulation of seeds with electromagnetic agents, a more environmentally friendly method in comparison with chemical preparations. Particular emphasis is put on the low expenditure on the chemical protection of this group of plants and their suitability for the reclamation of degraded soils and introduction in the form of catch crops acting as a factor compensating the negative effects of inadequate crop rotation.

The significance of small-seed legumes as bee forage and plants enhancing biodiversity in the natural environment is shown.

With regard to fodder use, it is stressed that the main species can be cultivated in field conditions and permanent grasslands, in monoculture and in mixes with grasses. These plants are characterised by a wide range of fodder use (green fodder, hay, hay silage, dry fodder, protein concentrates) and flexibility in shaping the quality of the material according to the nutritional needs of animals from various use groups. Legumes can be the raw material for obtaining natural high-protein and highly digestible fodder, with an advantageous amino acid composition including pigments (chlorophylls, carotenoids), vitamins and minerals. It is emphasised that this plant group has preferential status in agri-environmental schemes and their cultivation is eligible for subsidies.

Pleurotus pulmonarius (Fr.) Quel. – cultivated mushroom with health-promoting properties and high nutritional value

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Oyster mushroom *Pleurotus pulmonarius* (Fr.) Quel. belongs to the kingdom of *Fungi*, phylum *Basidiomycota*, class *Agaricomycetes*, order *Agaricales*, family *Pleurotaceae*, genus *Pleurotus*. In the literature an old Polish name “pulmonary oyster” can be found. In natural conditions *Pleurotus pulmonarius* occurred on all continents, the most often in North America. In the natural environment, in Central Europe, it is encountered on dead tree stumps especially deciduous trees. This mushroom occurs often in the form of groups consisting of several larger and smaller specimens that arise from a common base or imbricately are arranged one above the other.

Pleurotus pulmonarius is easy to grow, because its mycelium is very invasive towards the substrate composed from cellulose-containing materials. It can be grown on substrates prepared on the base of straw and various types of agricultural, horticultural and forestry wastes. On an industrial scale is grown primarily in North America, Asia and New Zealand.

A genus of oyster mushroom (*Pleurotus* spp.) is represented by many species. The fruiting bodies of oyster mushrooms, besides button mushrooms (*Agaricus* spp.) are among the most frequently purchased and consumed mushrooms in Poland. In addition to the culinary qualities of fruiting bodies of *Pleurotus pulmonarius* it has high nutritional value (proteins, fiber, vitamins, minerals) and the content of biologically active substances with proven health-promoting properties. The biological activity of these mushrooms has been confirmed in several laboratory tests and clinical trials, which showed among others their antitumor, antibacterial, antiviral, antifungal, immunomodulatory, anti-inflammatory, anti-allergic, anti-atherosclerotic, hepatoprotective, lowering blood sugar and blood cholesterol effect. This mushroom is low in calories due to the limited content of lipids and starch. In China and many others Asian countries they are considered as a healthy food.

During the last several years there has been a very dynamic development of production of edible and medicinal mushrooms. The development of low-cost and simple method for the production of *Pleurotus pulmonarius* can contribute to the introduction of this species into commercial cultivation in Poland. The determination of morphological and qualitative characteristics of the type of the substrate and growing conditions allow optimizing production in order to obtain the best yield of fruiting bodies with the best characteristics, for consumption and as raw material for obtaining biologically active substances.

Medicinal properties of cultivated mushrooms

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Mushrooms have been valued for their exquisite taste and unique aroma for centuries. The awareness that they also have numerous pro-health properties is relatively new. It was only in the last two decades that they were included in functional foods, even though Hippocrates wrote about their healing properties in 400 BC. Much more often the mushrooms were used and are still using in folk medicine of the Far East. In China, the healing properties of *Ganoderma lucidum* and *Lentinula edodes* have been known for more than 2,000 years.

One of the definitions says that food can be considered as a functional food if it has been proven to have beneficial effects on one or more functions of the body. Mushrooms have been recognized as functional foods due to the content of many nutrients and bioactive substances and a documented, beneficial effect on human health. Their main advantage is the high efficiency of substances contained in fruiting bodies. A positive effect on health can be obtained directly by eating fruiting bodies or using preparations containing fungal extracts in the form of capsules, tablets, drops and powders.

Fresh fruiting bodies of mushrooms contain on average 85-94% of water. The dry mass of the fruiting bodies contains highly absorbed protein in a much higher amount than in fruits and vegetables. For this, fungal proteins contain all exogenous amino acids. The main component of the dry mass of fruiting bodies are carbohydrates, including polysaccharides, among others β -glucans and chitin. Due to the low content of lipids, mushrooms are low in calories. Over 70% of fats are unsaturated fatty acids. Mushrooms also provide vitamins, mainly from group B, but also contain niacin, folic acid and vitamins C and D. They are rich in elements such as iron, phosphorus, potassium, sodium, magnesium, zinc, copper, manganese, calcium, molybdenum and selenium. An important group of compounds contained in mushrooms are polyphenols that have antioxidant activity.

Mushrooms have been used in folk medicine for long time. It is reported that 2000 species can be eaten without harm to health, while 700 have scientifically proven pharmacological properties. Biologically active compounds are contained not only in fruiting bodies but also in mycelium (pure cultures), in sclerotas and filtrates from liquid cultures. The best-known substances found in mushrooms with therapeutic effects are polysaccharides (including lentinan, pleuran, schizophyll, scleroglucan, grifolan) and polysaccharide-protein complexes (including krestin, ganoderan). Their anti-cancer, immunostimulatory, hypoglycemic and antioxidant effects have been documented. Lectin found in the mushrooms have a positive effect on the human immune system and stimulate the maturation of immune cells. Triterpenoids contained in fungi have antiviral activity (including against HIV1 and herpes virus) and lowering blood pressure and blood cholesterol, as well as protective for blood vessels and heart. Phenolic compounds in mushrooms are strong antioxidants. Their anti-inflammatory, anti-cancer and nervous system stimulation has been proven. Mushrooms are a source of natural antibiotics, having antibacterial and antifungal properties due to the content of chitosans and chitin. They are used, among others in the treatment of open wounds as they accelerate their healing and prevent the formation of extensive scars. Water and alcohol extracts of mushrooms have antiallergic, anti-inflammatory and analgesic properties as well as protection for many organs (brain, heart, liver, pancreas).

Effect of pre-sowing laser stimulation on pollen production of *Lavatera thuringiaca* L. flowers

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Lavatera thuringiaca L. belonging to the *Malvaceae* family is a wild species growing in the south-east Europe and east Asia. In Poland, it occurs mainly in southern part of the country on relatively dry hills, in the bushes and by the roadside. It is known as an ornamental and melliferous plant, formerly cultivated for medicinal purposes and for fiber. Due to the production of a large amounts of organic matter, research on utilization of this plant for feed and in the paper industry was carried out in Poland. In 2015 the pollen productivity of two-year-old *Lavatera* plants, growing on experimental plot of the University of Life Sciences in Lublin located in Felin district was investigated. Pollen production was determined using the ether method by Warakomska. Pollen grains were collected from plants growing in 6 experimental combinations done in 4 replications. Seeds treated directly by laser light for 1 minute (L_1), 5 min (L_5), 10 min (L_{10}), 15 min (L_{15}), 30 min (L_{30}) and untreated seeds (K-control) were sown.

Experimental observations showed that *Lavatera* pollen grains are single, spherical and polar. They have a spine of different sizes and a numerous round-shaped pores. The average diameter of pollen grains ranged from 101.7 μm (L_5) to 109.0 μm (L_{15}). The weight of pollen obtained from 1 flower for each combination was as follows: K - 10.0 mg, L_1 - 9.5 mg, L_5 - 10.8 mg, L_{10} - 12.0 mg, L_{15} - 10.6 mg and L_{30} - 10.7 mg, while the average number of flowers, which affects the overall pollen production by the plant was respectively K -68; L_1 - 144; L_5 - 153; L_{10} - 119; L_{15} - 203; L_{30} - 135. The pollen mass calculated from 1 plant was in the range between 680 mg (K) - 2 140.1 mg (L_{15}). The combination marked as L_{15} (37.5 g) was characterized by the highest pollen yield obtained from 1 m^2 while the lowest pollen yield was found in control (12.2 g).

Effect of taxol and *Rhodiola rosea* extract on mitotic divisions in apical root meristems in *Allium cepa*

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Introduction. The cell cycle consists of a series of events taking place in a eukaryotic cell and leading to its division. It is composed of 4 separate phases: the G₁ phase, S phase, and G₂ phase (collectively referred to as the interphase) and the M phase (Mitosis). In turn, the M phase consists of two closely interrelated processes, i.e. karyokinesis resulting in separation of cell chromosomes between the two subsequent daughter cells, and cytokinesis, which leads to division of the cytoplasm and formation of separate cells. Changes occurring during mitosis are continuous and are divided into four stages: prophase, metaphase, anaphase, and telophase

Aim. The aim of the study was to demonstrate changes induced by taxol and *Rhodiola rosea* extract in the divisions of the apical root meristems in *Allium cepa* roots.

Material and methods. In the experiment, apical meristems of *Allium cepa* roots were incubated for 2, 4, 8, 12, 16, and 24 h in a solution of a *Rhodiola rosea* (golden root) extract and in taxol and *Rhodiola rosea* extract solutions. The phytochemical composition of *Rhodiola rosea* contains a long list of active compounds, e.g. pro-anticyanide tyrosol, salidroside glycoside, and phenol alcohol. The active compounds contained in the rhizomes include organic acids: succinic, citric, malic, and oxalic acids, tannins, sugar wax: sucrose and glucose, and microelements: zinc, boron, copper, and large amounts of manganese.

Taxol (chem. – paclitaxel) is a chemical compound isolated from *Taxus brevifolia*. Two taxanes, i.e. taxol and cephalomannine, are the most frequently investigated compounds due to their antitumour properties. The activity of taxol prevents separation of protein units from microtubules, thereby leading to depolymerisation and, consequently, damage to dividing cells. In turn, the abnormal structure of the spindle microtubules was found to prevent completion of mitosis.

Results and conclusions. The experiment has shown that incubation of *Allium cepa* roots in the extract from *Rhodiola rosea* roots and rhizomes inhibits mitotic divisions in cells, thus serving a potential role of an anticancer agent. Incubation in the mixture of the *Rhodiola rosea* extract and the taxol solution as well as in the *Rhodiola rosea* extract alone induced a number of metabolic and anatomical changes that were ultimately related to inhibition of cell divisions. The incubation in the *Rhodiola rosea* extract (2 h, 4 h) and in the taxol and *Rhodiola rosea* extract mixture (2 h, 4 h) indicated typical and numerous mitotic divisions. The number of the divisions was clearly reduced after the 8- and 12-h incubation, leading to intense shrinkage. The 16- and 24-h incubation resulted in complete inhibition of cell divisions.

Lavandula angustifolia L. valuable healing and oil plant

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Lavender (*Lavandula angustifolia* L.) is a valuable plant originated from the Mediterranean region, where it occurs in natural conditions. Due to its origin, it has high thermal and luminous requirements, but moderate water requirements. For proper growth and development, lavender requires medium-compacted soils. Currently, it is mainly grown in Provence. So far 21 species have been selected within the variety. It is a chamaephyte that belongs to the Lamiaceae family. It grows up to a height of 30-60 cm, has a bundle root, a four-angular stem, and spiky inflorescences composed of several floral whorls. Lavender's raw material is a dried flower (*Lavandulae flos*), which contains essential oil in an amount not less than 13 ml/kg (1.7%), moreover there are tannins, coumarins, phytosterols and mineral salts. The raw material of lavender is used primarily in cosmetics and aromatherapy. High content of active compounds in lavender causes that the raw material also has a cholagogic and calming effect. The main components of the essential oil are linalool acetate (60%), linalol (30%), terpenes, ocymenes, cineol, lawandulol, as well as its acetate. The quantitative and qualitative composition of the oil is variable and depends on genetic factors, place of cultivation, climatic and ontogenetic conditions.

Content of essential oil in the basil herb depending on the potassium nutrition

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Properly balanced and varied nutrition of plants, including: nitrogen, potassium or phosphorus, is very important in herbal production. Potassium fertilization has a huge impact on the quality and quantity of yield through the influence on the water management of plants. Herb of basil contains from 0.04% to 1.5% of essential oil. The main components of the oil are: the isomer of anethole - estragole, i.e. methylchavicol, cymene (liquid terpenic hydrocarbon), linalool and citral, α -pinene, cineol, thymol and eugenol, as well as sesquiterpenes and other compounds. The activity of essential oils depends on the qualitative composition of the compounds found within.

The experiment with common basil was carried in the greenhouse of the Department of Plant Cultivation and Nutrition, University of Life Sciences in Lublin. The research factors were: fertilizer type (potassium salt, potassium sulfate, mixture of potassium salt with potassium sulfate 1:1 K) and potassium dose (0.5, 1.0, 1.5 K \cdot dm⁻³ of substrate).

The concentration of essential oil in basil herb ranged from 0.3% to 0.55%. The use of the lowest dose of potassium in the form of K₂SO₄ resulted in the accumulation of the largest amount of essential oil. However, the lowest amount of essential oil was found in plants fertilized with the lowest dose of potassium (0.5 g \cdot dm⁻³) in the form of KCl+K₂SO₄. After using a higher potassium dose by 100% in relation to the initial dose, the contents of cineol <1.8->, linalool, elemene<beta>, bergamotene <alpha-trans->, germacrene D, cadinene <gamma-> and cadinol <epi-alpha-> increased. A reverse dependence was found in the methylchavicol content. The type of potassium fertilizer also differentiated the concentration of the main compounds of basil oil. The highest amount of cineol<1.8->, linalool, methylchavicol and bergamotene<alpha-trans-> was obtained after the use of potassium chloride.

The most preferred composition of basil herb essential oil was obtained using the average dose of potassium (1 g K \cdot dm⁻³) in the form of KCl.

Effect of tillage practices on greenhouses gases

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The climate change caused by an increase in greenhouse gases is the most serious issue in the global nowadays. It is known that before the industrial revolution, the amount of the greenhouse gases in the atmosphere has remained relatively constant. But the concentration of various greenhouse gases has increased. carbon dioxide amount has increased by approximately more than 30% since pre-industrial period and is currently increasing at an unprecedented rate of about 0.4% per year, mostly due to the combustion of fossil fuels and deforestation.

The major greenhouse gas is the carbon dioxide (CO₂). However, most of CO₂ comes from fossil fuels and land-use change. Methane (CH₄) and nitrous oxide (N₂O), which mostly come from agriculture and waste, are also considerable GHGs effected. One of the main cause of the environmental imbalance is the fossil fuel that used in the industrial development; however, agricultural practices of the modern production technologies are the prime factors that adding greenhouse gases or reducing them by environmentally friendly eco-development. Tillage is the mechanical operation of soil applied to improve soil characteristics such as soil strength, infiltration, soil water preservation, soil temperature and prepare appropriate seedbed to germination. It breaks apart soil aggregates, allowing soil particles to move separately or be forced closer together. Exposing soil particles to the air also causes more decomposition of soil organic matter which is important for soil aggregate stability. In general tillage system divided into mean type conventional tillage, is invariably deeper (20–35 cm) and involves the inversion of the soil, and conservation tillage which includes reduced tillage and no-tillage. It was recorded a significantly increased in the global warming under conventional tillage systems (26–31% higher than no-tillage systems). on the other hand, reduced tillage practices have been known to minimize GHG emissions through the decreased use of fossil fuels in field preparation and by increasing carbon sequestration in soil. also, the adoption of no-tillage practice would be beneficial for GHG reduction.

Lavandula angustifolia L. – valuable healing and oil plant

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Lavender (*Lavandula angustifolia* L.) is a valuable plant originated from the Mediterranean region, where it occurs in natural conditions. Due to its origin, it has high thermal and luminous requirements, but moderate water requirements. For proper growth and development, lavender requires medium-compacted soils. Currently, it is mainly grown in Provence. So far 21 species have been selected within the variety. It is a chamaephyte that belongs to the Lamiaceae family. It grows up to a height of 30-60 cm, has a bundle root, a four-angular stem, and spiky inflorescences composed of several floral whorls. Lavender's raw material is a dried flower (*Lavandulae flos*), which contains essential oil in an amount not less than 13 ml/kg (1.7%), moreover there are tannins, coumarins, phytosterols and mineral salts. The raw material of lavender is used primarily in cosmetics and aromatherapy. High content of active compounds in lavender causes that the raw material also has a cholagogic and calming effect. The main components of the essential oil are linalool acetate (60%), linalol (30%), terpenes, ocymenes, cineol, lawandulol, as well as its acetate. The quantitative and qualitative composition of the oil is variable and depends on genetic factors, place of cultivation, climatic and ontogenetic conditions.

Plastic products containing alternatives to bisphenol A (BPA) – are they certainly better for human health?

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Bisphenol A belongs to the chemical compounds of the phenols. Under the name BPA, its chemical compound 2,2-bis (p-hydroxyphenyl) propane. For years, it has been used in the production of plastics and epoxy resins. It is also used in food and cosmetics as an antioxidant. Its carcinogenic, teratogenic and estrogenic properties have been proved. Its influence on hypoplasia in children and hormonal disturbances of pregnant women is discussed. Bisphenol A may interfere with the functioning of thyroid hormones, lower libido, cause erectile dysfunction and suppress DNA methylation. It indicates that BPA is harmful to human health. Nevertheless, it is still a component of many products. However, increasingly it can be heard about BPA-free products, which are supposed to be an alternative to the harmful bisphenol. There are available on the market bottles made of bio-plastic, Tritan or almost similar in name - BPS. Are BPA-free bottles better for human health? It turns out that they also release harmful substances, which are often even worse than those containing BPA. The publication was based on a review of the Polish and English literature. The research material consists of scientific articles referring to the discussed subject.

Secondary metabolites in the secretory tissues of *Rhododendron luteum* Sweet (Ericaceae) flowers

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Rhododendron luteum Sweet is an endemic plant protected in Poland and occurring in a natural habitat near Leżajsk. It grows in isolated localities on the Balkan Peninsula, in Ukraine, and the Caucasus as well. The plant is poisonous to humans and bees. The flowers of this species produce substantial amounts of nectar, from which bees produce honey with intoxicating properties. The ovary surface bears numerous capitate multicellular glandular trichomes, whose viscous secretion covers the ovary, nectary, and petal base.

The aim of the study was to analyse secondary metabolites contained inside and on the surface of glandular trichomes and in the nectary located at the ovary base. Fluorescence microscopy and histochemical assays were used in the investigations.

The cells of the stalks and heads of the glandular trichomes located on the ovary and in the nectaries contained phenolic compounds, including flavonoids and tannins. In the nectaries, they were located in the subglangular parenchyma layer. Lipids and essential oils were detected in the trichomes heads and nectaries. Additionally, the glandular heads contained mucilage and alkaline proteins, whereas acidic proteins were contained in the secretion.

The investigations have demonstrated that the viscous secretion produced by the trichomes was a mixture of various secondary metabolites, which were also present in the trichome cells and some were contained in the nectary cells (mucilage, essential oil, tannins).

Influence of trees on human's health in the city

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Influence of trees on human's living environment is multivariate. They keep right composition of the atmosphere and shape local climate. Numerous of trees release additional substances: some of them may be beneficial for human health (such as phytoncides) and other may be adverse (such as allergens). Their impact on the environment is particularly important in cities, which characterised by an high population density. The purpose of the study was an analysis of high greenery of selected districts of Lublin city, in terms of positive and negative impact of trees on human's health and trying to determine of directions for shaping dendroflora of city in the future.

The use of effective microorganisms in the aspect of ecological protection of roses

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At present, conventional gardening is characterized by high consumption of chemical plant protection chemicals, artificial fertilizers and artificial irrigation of fields. These methods adversely affect the environment, the preparations used are difficult to biodegrade. Intensive horticultural production caused global soil acidification of most farmland (nearly 70%). The use of EM technology can be a good solution for gardening, including the organic sector. Effective Microorganisms (EM) is a composition of microorganisms used for the production of natural fertilizers, organic fertilizers, agents improving the condition of plants and soil, composts. EM preparations do not contain genetically modified species of microorganisms, they contain a mixture of various co-existing microorganisms. The EM vaccine contains lactic bacteria (*Lactobacillus casei*, *Streptococcus lactis*), photosynthetic bacteria (*Rhodopseudomonas palustris*, *Rhodobacter spae*), yeasts (*Saccharomyces album*, *Candida utilis*), actinomycetes (*Streptomyces album*, *Streptomyces griseus*) and molds (*Aspergillus oryzae*, *Mucor hiemalis*) The aim of the research is the use of Effective Microorganisms in the ecological protection of garden roses.

Field studies were conducted in the years 2013-2015 in the Lublin region. The experiment was established on the soil of a good rye complex in triplicate. The study evaluated the effect of two probiotics: EmFarma Plus and Ema5 on the colonization of garden rose plants of 'Rosarium Ueteresen' variety by aphids: *Macrosiphum rosae* L., *Macrosiphum euphorbiae* (Thom.), *Chaetosiphon tetraerhodum* (Walk.), *Metopolophium dirhodum* (Walk.), *Maculolachnus submacula* (Walk.), *Myzaphis rosarum* (Kalt.), *Aphis fabae* Scop .. The preparations were applied in two ways: watering every 3 weeks (EmFarma Plus) and spraying 3 times every 10-14 days (EmFarma Plus, Ema5) and in three concentrations: 5%, 7.5% and 10%. The samples were taken in early spring in the evening, or very early in the morning. The obtained results were compared to the control object. Based on the conducted research, it was found that Effective Microorganisms had a significant impact on limiting the population of aphids colonizing the garden rose. Protective treatments with Effective Microorganisms were most effectively protected by garden roses against *Macrosiphum rosae*, *Mzyaphis rosarum* and *Aphis fabae*. Concentrations of the tested preparations did not significantly affect the reduction in the number of aphids colonizing the rosary variety 'Rosarium Ueteresen'.

Pb and Cd contents in the wild boar tissues

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The aim of the study was to determine of Pb and Cd contents in the wild boar tissues. The experimental material included 48 wild boars, from which samples of sirloin (*musculus longissimus lumborum*) and liver were collected for the analysis. A significant effect of the groups on the toxic elements content in the sirloin and liver was demonstrated. The Pb concentration in the sirloin and liver was significantly lower than the threshold values for these elements, i.e. it accounted for 71 % i 38,7 % of the allowable content of this element in pork meat and liver; the Cd concentration it accounted for 33,4 % i 82,3 % of the allowable content of this element.

Wild boar meat (*Sus scrofa scrofa*) – natural raw material and food product

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Introduction. Healthy food can be an excellent food product used in the prevention of diet-related diseases. Free-living animals are provided with well-being and unrestricted access to natural pastures, thus making a free choice of food [Szymańko et al., 2007]. This way of feeding means that wild fair game meat, unlike meat from farm animals, does not contain residues from high-yielding farming technology [Zin and Mroczek 2016]. Lusky et al. [1994] confirmed that the raw material obtained from carcasses of wild boars was not contaminated by environmental pollution (e.g. heavy metals, pesticides, radioactive elements). The unique taste of wild animals meat results from the diet of these animals composed of grass, herbs, leaves, shoots and bark of young trees, cereals, acorns, mushrooms and forest fruits.

Aim. The aim of the study was assessment of the nutritional and culinary value of wild boar meat on the background of literature review.

Results. Wild meat is a source of wholesome protein and is characterized by a high content of this ingredient, with a reduced content of fat. The protein content depending on age, sex and the type of muscle and nutritional base ranges from 21.15 to 23.7% [Dannenberger et al., 2013]. In pork the average protein content is 22.1% [Kasprzyk 2015], in beef has a value of 16-21%, in veal from 18 to 23% and in mutton 15-18% [Kunachowicz i in., 2005]. The intramuscular fat content in wild boar meat is generally optimal (from 1.5% to 2%) and similar to pork meat. Wild boar has a lower cholesterol content than pork and a higher content of potassium, calcium, zinc, copper and iron compared to pork. The observed normal ratio of sodium to potassium proves that wild boar can contribute to lowering blood pressure. It is also a valuable source of vitamins, among others A, B6, B12, D and E [Dannenberger et al., 2013; Sales and Kotrba 2013, Skobrak Bodnar and Bodnar 2014].

Conclusion. Thanks to its properties wild boar meat can be a valuable complement and variety of a diet.

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Microstructure and the location of bioactive substances in fruit of *Lycium barbarum* L.

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Fruits of *Lycium barbarum* L. ('Goji berries') referred to as functional food, have long been used in folk herbal traditional medicine because of their therapeutic properties, e.g. immunostimulant, antiaging, energizing, protective, adaptogenic, antioxidant, and anticancer activity.

The fruit microstructure was analysed using light, scanning and transmission electron microscopies. Additionally, the distribution of bioactive compounds in *L. barbarum* drupe tissues was assessed with fluorescence and histochemical tests.

The analysis of the microstructure has shown that the fruit is covered by a thin skin with an amorphous cuticle and a layer of amorphous epicuticular waxes on the surface. The skin is composed of a single-layered epidermis with thickened walls and one layer of hypodermis with slightly thickened periclinal walls. The pericarp cells (hypodermis and parenchyma) contain different types of chromoplasts, which most often contained exhibited fibrils of crystallised carotenoid pigments and phytoferritine deposits.

The results of the histochemical and fluorescence tests demonstrated that the secondary metabolites with high phytotherapeutic importance were mainly located in all layers of the pericarp and seeds and, specifically, in the drupe exocarp and endocarp. The phytochemicals were represented by polysaccharides (LBP), lipid compounds (carotenoids, essential oils, steroids sesquiterpenes), polyphenols (flavonoids and tannins), and alkaloids. This study, which is the first report of the microstructure and localisation of bioactive compounds in 'Goji berries', is a valuable complement of phytochemical analyses and can be helpful for enhancement of the therapeutic effect of the fruit as well as preliminary assessment of the medicinal potential in the search for new pharmaceuticals. Moreover, detailed anatomical studies are crucial for exploration of determinants of fruit quality and useful for identification of diagnostic taxonomic traits.

Ecological plant protection of rosemary growing under cover

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Rosemary (*Rosmarinus officinalis* L.) is popular herbal plants in Poland. Due to the fact that the plant is not frost resistant it is grown mainly in foil tunnels or greenhouses. Rosemary (*Folium rosmarini*) is a valuable spice. Pharmaceutical ingredients are also herb and essential oil of rosemary. The health of rosemary plants is spoiled by many soil-borne and air-borne pathogens and insects. Rosemary leaves are susceptible to gray mold (*Botrytis cinerea*), powdery mildew and leaf blotch. Especially dangerous pests for this species are aphids (*Aphidoidea*) and leafhoppers (*Cicadellidae*), because they are vectors of viruses. They drain the juices from the leaves causing them to twist and fall. Ligurian leafhoppers (recently popular in Poland) often damage the leaves of rosemary plants. This insect is sensitive to numerous insecticides, but most often they are banned in organic production. The aim of investigation was to determine the influence of the diseases and pests on the quality of rosemary growing under cover according to rules of ecological plant protection. The most effective turned out to be biopreparations, plant extracts, insect screens, the use of kaolin clay and vacuum cleaners.

Effect of foliar feeding with calcium on the ultrastructure of epidermis and hypodermis cells in *Malus domestica* Borkh cv. 'Szampion' fruits

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Calcium serves a number of important structural, biochemical, and physiological functions in plants. Among others, it has an impact on the process of stomatal opening and closing, which allows plants to limit transpiration and to carry out effective water management in adverse conditions. Ca^{+2} ions determine correct hormonal balance in plants. They reduce the synthesis of ethylene in fruits and delay fruit aging. They also participate in cell metabolism and formation of the cell wall.

The aim of the study was to compare the ultrastructure of epidermis and hypodermis cells of *M. domestica* Borkh. cv. 'Szampion' receiving foliar fertilisation with calcium: $\text{Ca}(\text{NO}_3)_2$, CaCl_2 , and Librel Ca and in control fruits. Observations of the fruit epidermis and hypodermis cells were performed with the use of transmission electron microscopy (TEM).

The comparative studies demonstrated differences in the structure of epidermis and hypodermis cells between calcium-fertilised fruits and the control. The wall of epidermal and hypodermis cells of the control fruits exhibited numerous evaginations and sometimes discontinuities. The epidermis cell wall was characterised by deep, darker, irregularly shaped invaginations sometimes reaching the middle lamella. Due to the destruction or partial disintegration of the fibrillar system, translucent hollow regions were visible in the middle lamella. Some cells exhibited hypertrophy or narrowing of the middle lamella. The cells walls were sometimes disintegrated. A periplasmic space was observed between the cell wall and the plasmalemma. The protoplast was characterised by a dense cytoplasm, a lobular nucleus, and numerous pleomorphic mitochondria located near plastids. The tonoplast surrounding one large or several small vacuoles was discontinuous. The epidermis and hypodermis cells of fruits fertilised with $\text{Ca}(\text{NO}_3)_2$ had a normally developed cell wall with a dark-stained regularly shaped lamella. A similar structure of cell walls was observed in fruits fed with CaCl_2 and Librel Ca. The plasmalemma formed vesicle-like invaginations towards the protoplast. Numerous transport vesicles and ER were located near this membrane. The tonoplast in the cells of the calcium-fed fruits preserved continuity. In turn, the plasmalemma in the hypodermis cells adhered to the cell wall and formed invaginations. Transport vesicles appeared in the vicinity of this membrane. The parietal cytoplasm layer contained amyloplasts, numerous mitochondria, and Golgi apparatus. Flocculent sediment was observed at the tonoplast. The cell sap contained abundant dark precipitates.

The influence of PEGylated lipid on the properties of cationic liposomes

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Cationic liposomes are promising carriers of drugs and genetic material which leading to increased interest in their properties. The DC-Cholesterol (3β -[N-(N',N'-dimethylaminoethane)-carbamoyl]cholesterol) is an example of compound which due to its amphiphilic character exhibits low cytotoxicity, whereby is a good candidate for creation vesicles for drug encapsulation [1]. One of the ways to improve the circulation time of cationic liposomes in the blood is usage of poly-(ethylene glycol) (PEG) as a polymeric steric stabilizer. PEG is a linear polyether diol which is characterized by biocompatibility, lack of toxicity, low immunogenicity and excellent excretion kinetics. Surface modification of liposomal formulations with PEG is achieved among others by: physical adsorption of the polymer onto the surface of the vesicles, or covalent attachment of reactive groups onto the surface of liposomes. At present, the most popular method of PEG incorporation on the liposomal surface is anchoring the polymer in the liposomal membrane via a cross – linked lipid, such as DSPE-PEG350 (1,2-distearoyl-sn-glycero-3-phosphoethanolamine-N-[amino(polyethylene glycol)-350]), during liposomes preparation. This PEGylated liposomes display prolonged blood circulation, whereby enhances the distribution in targeted tissues. What is more, the presence of PEG chains on the liposomal surface increases drug solubility and avoids the liposomal aggregation, improving stability of vesicles [2].

The aim of the research was to investigate the interactions of DC-Cholesterol stabilized by DSPE-PEG350 with POPC – phospholipid naturally occurring in animal cells. The studies were conducted with the usage of Langmuir Monolayer Technique which allows for registering the dependence of the surface pressure (π) from the surface per single molecule in the monolayer (A). The morphology of surface films, formed at various points of π - A isotherm, was examined with application of Brewster Angle Microscopy (BAM). Moreover, for all investigated lipid systems were formed liposomes and liposomal formulations with DPH and calcein. The liposomal formulations were researched with using of Dynamic Light Scattering (DLS) and Spectrofluorimetry.

The obtained results of research proved that presence of DC-Cholesterol, stabilized with using of DSPE-PEG350, significantly changes the properties of artificial model membranes. What is more, addition of DSPE-PEG350 (polymeric steric stabilizer) in cationic liposomes changes their stability, permeability and anisotropy.

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The influence of triesters of phosphatidylcholine on model bacterial membranes

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In last time, bacteria which exhibit multi-drug resistance have been appeared. It caused by unsuitable use of antibiotics, namely they are administrated in inadequate cases or inappropriate manner. For this reason, many studies which focused on search new antibacterial drugs are being carried out. Therefore, the special attention has been paid to cationic lipoids. These compounds are characterized by amphiphile structure and positive charged that may modificate the properties of bacterial membrane and demonstrate antibacterial activity. One of the group of cationic lipoids are the triesters of phosphatidylcholine (EPCs) which as the derivatives of natural phosphocholines exhibit lower cytotoxicity to human cells.

The purpose of research was to verify the effect of the two cationic lipoids – 1-palmitoyl-2-oleoyl-sn-glycero-3-ethylphosphocholine (EPOPC) and 1,2-dipalmitoyl-sn-glycero-3-ethylphosphocholine (EDPPC) on model bacterial membranes. Langmuir technique and liposomes were used as a model membranes. The survey included the analysis of the impact of selected EPCs on the molecular organization of mixed phosphatidylethanolamine/phosphatidylglycerol/cardiolipin system. Moreover, to verify the antibacterial activity of investigated cationic lipoids the *in vitro* tests on *Escherichia coli* (Gram-negative) and *Staphylococcus aureus* (Gram-positive) strains were performed.

The obtained results showed that the incorporation of EPOPC or EDPPC molecules into model bacterial membranes affects their properties. The presence of investigated EPCs in model membranes causes an increase of their fluidity and a decrease of ordering of the phospholipid acyl chains. Furthermore, the studied cationic lipoids influence on character of intermolecular interactions between lipids. Moreover, the investigations proved that the addition of cationic lipoids change stability and permeability of the model biomembranes. Also, the *in vitro* tests performed on *Escherichia coli* and *Staphylococcus aureus* strains prove that examined EPCs has some bacteriostatic properties.

Antidepressant activity of selected species from the genus *Hemerocallis*

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The flower and bud parts of daylilies, especially *Hemerocallis citrina* Baroni or *H. fulva* L., were used in Chinese folk medicine as an anti-inflammatory, analgesic, and antipyretic agent as to increase lactation in breast-feeding women. Extracts from these organs were used as a sedative to relieve mood changes, in states of emotional disorders, insomnia, and enhancement of memory. The neurological action of daylily flowers has been confirmed by modern pharmacological and clinical research. Daylily flowers contain many different biologically active compounds, e.g. flavonoids, phenolic acids and their derivatives, di- and tri-terpenes, essential oils, steroid saponins, amino acids, alkaloids, and polysaccharides. However, the neurological effects of these compounds are still poorly documented. Therefore, studies are conducted on the effect of active compounds contained in various organs of many species of the genus *Hemerocallis* to assess the possibility of their application as a potential alternative for pharmacological alleviation of various diseases, including depression symptoms.

The aim of the study was to determine the anti-depressant effect of active compounds contained in various organs of selected species from the genus *Hemerocallis* based on information available in the original scientific literature.

As shown by rodent experiments, the antidepressant action of ethanol extracts from daylily flowers (HCE) is attributed to their beneficial effects on the dysfunction of monoamine neurotransmitters as well as enhanced expression of the brain-derived neurotrophic factor and its protein receptor (BDNF-TrkB) in the brain region of frontal cortex and hippocampus. It has been shown that the antidepressant activity of HCE is supported by the serotonergic (5-HT(1A) and 5-HT(2) receptors), noradrenergic ($\alpha(1)$ -, $\alpha(2)$ - and β -adrenoceptors), and dopaminergic (D(2) receptor) systems as well as the elevation of the levels of monoamine neurotransmitters serotonin (5-HT), noradrenaline (NA), and dopamine (DA) in the brain. It has also been postulated that the antidepressant and anti-inflammatory effect of HCE results from inhibition of the nuclear NF kappa B transcription factor (*NF- κ B*; Nuclear Factor kappa B). Results of many investigations have demonstrated that *H. citrina* flower extract reversed the adverse stress-induced behavioural changes in rodents. Phenolic acid derivatives and numerous flavonoids, including rutin, are the main HCE components with the attributed antidepressant effect.

Shaping public spaces eliminating the effects of urban heat island in the aspect of human health

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The purpose of urban agglomerations is to provide the residents with the best living conditions. Adapting cities to the changing climate and extreme weather phenomena and protecting against smog is an increasing problem. An especially troublesome phenomenon, and even dangerous is the urban heat island occurring in the centers of cities with dense buildings, where there is a small share of greenery. Its occurrence is strongly felt during the summer months. Long-term periods of increased solar irradiance during the day and elevated temperature of the air, which persists also at night, have some drawbacks to the occurrence / intensification of diseases such as: allergy, asthma, cardiovascular diseases. Atmospheric pollutants and specific climatic conditions favor the growth of allergenic potential of vegetation, facilitate the penetration of allergens into the respiratory tract and intensify the course of the allergic reaction. There is also a correlation between climate change and the increase in mortality caused by these diseases. The blue and green infrastructure and the synergy between water and greenery in the city have a very large impact on leveling the urban heat island phenomenon. Even if the retained rainwater accumulated in the retention reservoirs affects the irrigation of urban vegetation.

Further, harmonious development of cities is possible only taking into account climatic factors in planning works. And because there is no place for natural vegetation in a dense urban building, activities could focus on public spaces. Improvement of living conditions of residents, and thus improvement of the quality of public spaces may occur as a result of skilful melioration of the climate. It is possible through appropriate use of green areas properties and appropriate layout of the buildings that increases horizontal and vertical air exchange.

The effect of origin and cultivar of elderberry on the health quality of the obtained juice

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Due to their health-promoting properties, elderberry fruit is increasingly used in the food and pharmaceutical industries, including for juice production. However, it is worth noting that the fruits of this plant also contain certain amounts of cyanogenic glycosides, mainly sambunigrin, which can be harmful to the body with higher consumption. The aim of the study was to evaluate selected bioactive properties, as well as the content of sambunigrin in elderberry juice, depending on the cultivar or place of fruit harvesting. The juices were obtained both from fruits of wild elderberry and cultivars (Sampo, Haschberg, Samyl), by direct cold pressing using a hydraulic press, and then pasteurized (90°C, 5 min). The prepared juices were subjected to spectrophotometric measurements of antioxidant activity, total polyphenol and anthocyanins content as well as the content of sambunigrin by RP-UHPLC-ESI-MS method. The highest antioxidant activity and content of phenolic compounds was found in juice obtained from fruits of Haschberg cultivar, while the lowest values of these parameters were recorded in juice of Samyl cultivar. The highest content of anthocyanins was also found in the fruit juice of the Haschberg cultivar, while the least of these compounds contained juice prepared from wild elderberries as well as from Samyl cultivar. Between the antioxidant activity, polyphenols and anthocyanins content in the studied juices, a significantly high correlation at 0,96 – 0,98 was observed. The content of sambunigrin ranged from 0,96 to 19,04 µg / ml of juice, with the lowest concentration of this compound being recorded in juice of Sampo cultivar, whereas the largest amounts of sambunigrin were found in juice of wild elderberry fruits. Although not all juices obtained from fruits of cultivars were characterized by a higher antioxidant capacity and bioactive compounds content than juices from wild elderberry, all of them showed a lower content of harmful sambunigrin. Therefore, in order to produce elderberry juice, it is worth choosing fruit from plantation such as Haschberg and Sampo cultivars, which have a high health-promoting potential and are more safe to consume.

Effective microorganisms in agriculture and food processing

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Continuous and excessive use of chemical fertilizers and pesticides causes ecological and health threats, as well as worsens the health condition of the soil, causing a drop in crop yields. In these circumstances, organic sources play an important role in improving soil fertility and crop productivity. In Poland as well as in the world, interest in natural products such as effective microorganisms (EM), fertilizers and plant protection products of biological origin is growing and plant extracts, although until recently the use of microorganisms on a large scale in plant cultivation was met with ignorance. Azotobacter, Phosphobacteria and Bacillus have been recognized as the cheapest fertilizer ingredients improving soil health and fertility in order to optimally produce plants. The ability of Azotobacter and Phosphobacteria to proliferate in the rhizosphere of crops suggests an increased availability of nutrients for plants. The use of various bioregulators of growth, biofertilizers and plant extracts, alone or in combination with others as spraying seeds, soil or leaves can stimulate germination and growth of crops and thus increase yield and improve its quality. EMs has great potential for biological interaction through specialized enzymes that have the ability to transform nuisance chemicals into useful forms. Effective microorganisms send signals to the plants that prepare them for early repulsion of the pathogen attack and help in the production of disaccharides, which is trehalose, which has the ability to protect the entire plant when it is in a drought or high salinity. Trehalose prevents the formation of crystals in water, because hydrogen bonds are formed in it, while its aqueous solutions, dried, form a glaze, which is an ideal compound to protect plants from drought and high temperatures. Plant extracts are also a valuable source of nutrients, bioactive compounds and show great potential for growth and development of plants, protecting them from biotic and abiotic stress. The interest in plant extracts is constantly growing due to the tendencies of sustainable agriculture, which primarily consider environmental protection. Much attention was also devoted to preparations based on natural substances and the possibility of their use in the cultivation of plants. Therefore, raw materials are sought, whose extracts can act as biostimulators and plant protection agents and can be used as components of "natural" fertilizers. However, their effect depends on the type of crop, soil and environmental conditions. Therefore, taking into account the sustainable development of agriculture, a review of the literature on biofertilizers, effective microorganisms and plant extracts and their role in agriculture and food processing.

The influence of anticancer drug – Minerval – on model lipid membranes

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As a number of illnesses are connected with alternations in membrane functioning and cellular functions are generally related to the activity of specific proteins, most drugs are designed to interact directly with these proteins and alter their activity. However it was proved that many pathological states are associated with anomalies in the types and levels of membrane lipids [1]. For example, modifications in the membrane lipid composition or structure have been described in various cardiovascular pathologies, Alzheimer's and cancer diseases. Taking into account that most of the proteins associated with cancer-related pathways are sensitive to their lipid environment, it is conceivable that therapies based on regulation of biomembrane properties could be applied to treat cancer diseases. These new therapeutic approach, termed Membrane Lipid Therapy (MLT), involves use of synthetic or natural compounds to modify the structure of cell membrane. This alternations influence the localization and activity of pivotal membrane proteins with subsequent modulation of important cellular functions, cell signaling pathways or gene expression [2].

2-hydroxyoleic acid (HOA, Minerval) is MLT drug with confirmed anticancer activity [3]. As its molecular mechanism of action is not fully elucidated but attributed to changes especially in domain properties, in-depth analysis of the interactions of this compound with membrane lipids and its influence on raft-like structure properties is required. In presented study Langmuir monolayers and liposomes were applied to mimic biological membranes composed of sphingomyelin (SM), palmitoylcholine (POPC) and cholesterol (Chol). The equimolar mixture of SM/POPC/Chol is commonly used as model of lipid raft [4]. Due to the fact that membrane fluidity plays an important role in cell functioning, also systems with lower cholesterol content were investigated. Thus the effect of HOA in dependence of the fluidity of model membranes has been examined.

The received findings reveal that incorporation of Minerval provokes chain-disordering, fluidization and increase in permeability of the studied systems. Experiments conducted on both, monolayers and bilayers, show that the strongest HOA effect is observed for raft like system, what indicate that its molecular mechanism of action is closely related to interactions in lipid rafts.

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The risk of allergy caused by *Ambrosia* (L.) pollen in the region of Lublin

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Ragweed pollen grains contain the strongest allergens known in the plant world and they can be a cause of allergy at the turn of summer and autumn. *Ambrosia artemisiifolia* L. (Asteraceae), which is one of 45 species belonging to the genus *Ambrosia*, is most frequently found. It is native to the eastern coast of North America and at the beginning of the 20th century it was introduced to Europe where it has naturalized in some areas located between 42° and 50° of northern latitude. Ragweed plants have mostly spread in the Balkan area and in the Rhöne valley in France and Northern Italy. Factors promoting colonization of new areas by ragweed include the following: changes in lifestyle and land use, increased suburban areas, and the reduction in cropped areas, while lately also the probable impact of climate warming. *Ambrosia artemisiifolia* most frequently inhabits suburban areas where its pollen causes most allergies.

In Canada it has been demonstrated that pollinosis symptoms related to the occurrence of pollen grains of this taxon appear already at very low airborne concentrations of this pollen, 1 - 3 pollen/m³, whereas in France it has been found that symptoms of sensitivity to ragweed pollen allergens occur at a threshold concentration of 5 pollen/m³. Allergenic proteins contained in *Ambrosia* pollen belong to the major pollen allergens.

The aim of this study was to compare *Ambrosia* pollen seasons in central-eastern Poland based on an analysis of pollen concentrations of this taxon in Lublin over the period 2001-2017.

The ragweed pollen season started earliest on July 26 (2014) and latest on August 13 (2001), and it lasted on average until the end of September. Over the study period, maximum daily concentrations of ragweed pollen greatly varied and ranged 5 pollen/m³ - 311 pollen/m³. Peak concentrations were recorded during the period between August 20 and October 4. On average, 10 days with a concentration exceeding 5 pollen/m³ were recorded in Lublin. The number of days with a concentration exceeding the threshold value ranged from 1 (in 2013) to 21 (in 2014). The risk of occurrence of pollen allergy symptoms associated with the presence of airborne ragweed pollen at a concentration above 5 pollen/m³ was found to occur in the period between August 2 and October 10.

Ragweed pollen was recorded in the air of Lublin at significant concentrations throughout the entire study period despite that no plants belonging to this genus were found in the city's area. The obtained results prove that it is necessary to regularly monitor airborne ragweed pollen concentrations and control the allergy risk from pollen of this plant.

The influence of humic acids on the chemical composition of Chinese cabbage in soilless cultivation

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Introduction. In soilless cultivation of vegetables, the inability of the substrate to retain nutrients or larger amounts of water is a serious impediment, causing, among others, abrupt EC changes in drainage water and huge losses of components flowing out of the mats along with a transfer constituting 20-30% of the total nutrient solution. A solution that significantly modifies the properties of plant root environment can be regular application with fertigation of preparations containing humic acids.

Material and methods. The experimental plant was pak choi (*Brassica rapa* subsp. *chinensis*) variety White Stem. The greenhouse experiment was established in a complete randomisation system with fertigation in a closed system without recirculation of nutrient solution. Two types of soil were used for growing plants: mineral wool and coconut mats. After harvest a part of the material was dried in the temperature of 105°C, in order to perform the analysis of N-total with the Kjeldahl's method, P colorimetrically determined in samples with the ammonium metavanadate method and K, Ca, Mg were detected by atomic absorption spectrophotometry (ASA).

Results and conclusions. The addition of humic acids to the substrate during the cultivation of plants modified their chemical composition. Chinese cabbage grown with the addition of humic acids contained a higher total nitrogen content (on average 3.98% d.m.) and magnesium (0.57% d.m.) irrespective of the type of substrate. In the dry matter of plants cultivated on coconut mats, the concentration of K, Ca, and Mg was higher in comparison to the content determined in plants cultivated on mineral wool and amounted to 6.80% K, respectively; 2.64% Ca; 0.68% Mg in dry matter.

The content of micronutrients in vegetables grown in Lviv and Lublin regions and the conditions of mineralized tooth tissues of 15-year-old women

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Introduction. The chemical composition of vegetables depends on the species and variety. Also important are cultivation method, fertilization and environmental conditions. Human is unable to synthesizing minerals so he must take them with food, among other things, with plant food. Demand for individual minerals is differentiated and depends on sex and age. The content of micronutrients in plant products may exert an indirect or direct influence on the quality of hard tooth tissues. The aim of the work was to compare the content of micronutrients in selected vegetables and to assess the state of mineralized dental tissues in the aspect of caries disease of 15-year-old women.

Materials and methods. The samples of vegetables were taken from the territory of Ukraine (Czerwonograd), and from the territory of Poland (Sosnowica). Five farms were randomly selected in each town. The analyzed plants were carrot (*Daucus carota* L.) and potato (*Solanum tuberosum* L.). In the dry matter of plants, the content of iron, manganese, zinc and copper was determined using the ASA method (Perkin-ElmerAnalyst 300). Dental examinations were carried out in a group of 15-year-old women in the above-mentioned towns (n-27 Czerwonograd and n-45 Sosnowica). The state of mineralized dental tissues was assessed on the basis of the frequency and intensity of caries expressed by the mean D3MFT number and the SIC index value.

Results and conclusions. Regardless of the species, vegetables grown on the territory of Ukraine contained higher concentrations of iron, zinc and manganese than plants grown in Poland. The content of micronutrients in the dry matter of potato tubers from Czerwonograd was 43.49 mg Fe / kg d.m .; 4.51 mg Mn / kg d.m .; 6.25 mg Zn / kg d.m .; 1.81 mg Cu / kg d.m. At the root of carrot from the territory of Ukraine, 34.11 mg Fe / kg d.m has been noted; 3.27 mg Mn / kg d.m .; 7.25 mg Zn / kg d.m .; 1.84 mg Cu / kg d.m. The average value of D3MFT in the group of 15-year-old women living in Czerwonograd was 4.04, and in Sosnowica - 4.56. The value of the number of D3MFT indicates a significant intensity of caries disease both in the inhabitants of Poland and Ukraine.

The impact of hop cone extract on the properties of lipid systems imitating membranes of bacterial plant pathogens – the investigations on the possibility of the application of plant extracts as ecological plant protection products

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Contemporary agriculture has now serious problems since a growing demand on food leads to intensification of harvest, while the number of plant protection products is systematically limited. The reduction in the number of chemicals used in agriculture results from their strong environmental and human toxicity and development of resistance of pathogens to particular chemicals [1]. Thus, it is required to find new compounds, which could be applied as pesticides instead of synthetic substances. Good candidates seem to be phytochemicals including the essential oils. These plant derived substances are characterized by antimicrobial properties, selective phytotoxicity and relatively short time of biodegradation. Unfortunately, despite all of the advantages, they constitute only 1% to 3% of value of the global plant protection products markets [2]. Our investigations concerned *Humulus Lupulus* (hop cone) extract, which is the mixture of bitter acids, essential oils and phenolic compounds [3,4]. This extract is an important additive both in brewing industry and in cosmetic, food, pharmaceutical and chemistry industry [5]. A wide range of biological activity of hop extract together with its natural origin and low costs of its manufacturing encourage one to search for new applications for this mixture. Its confirmed antibacterial properties suggest that this mixture may be considered as ecological pesticide and may be useful also in agriculture.

The goal of our experiments was to investigate the impact of hop cone extract on the properties of lipid systems imitating membranes of bacterial plant pathogens. Artificial membrane was composed of characteristic bacterial lipids – phosphatidylglycerole (POPG), phosphatidylethanolamine (POPE) and cardiolipin (TOCL). During experiments, the surface pressure-area isotherms were recorded, penetration of extract into the lipid monolayers was studied and the morphology of model membranes was verified in Brewster angle microscopy studies. The experiments were performed for various concentrations of extract, for ternary monolayers mimicking membrane and for particular lipid films. It was found that hop extract causes fluidization of the monolayers and significantly changes their molecular organization. The observed effect was the weakest on POPG and comparable for POPE and mixed monolayer. Moreover, the effect of extract increased with its concentration, but at higher concentrations, the analyzed parameters stabilized. It was concluded that hop extract components incorporate into model bacterial membranes and alter their properties. This in turn may determine hop extract antibacterial properties and give possibility of using it, for example, in agriculture.

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Evaluation of salt stress tolerance in *Aegilops* L. with *Triticum aestivum* L. hybrid lines

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Salinity is one of the most important abiotic stresses limiting agricultural production. A chance to reduce crop-yield losses caused by salinity is a development of cultivars of higher tolerance to this stress. The related genera within the *Triticeae* constitute a pool of many genetic sources that can be used for wheat improvement. The transfer of gene(s) from *Aegilops* species to wheat is possible through crossing. Thus, the utilization of salt tolerant *Aegilops* species offers promise for the obtaining of salt tolerant wheat germplasm. In the present study sixteen *Aegilops kotschy* Boiss. and *Ae. variabilis* Eig. with *Triticum aestivum* L. hybrid lines were investigated. Responses of the selected hybrid lines to NaCl were compared with reactions of their wheat parental forms. The seeds samples (10 seeds per sample) were placed on Petri dishes with filter paper moistened in distilled water with 0 (control) or 200 mM NaCl. In each combination of NaCl concentration, 100 seeds of every forms were germinated. The Petri dishes with seeds were incubated in a thermostat at 20°C. After 2 days the energy of seed germination and after 5 days the capacity of seed germination, maximal length of roots and shoots were assessed. On the basis of shoot length, the tolerance index (TI) to salt treatment was calculated by the formula: $TI = (\text{mean shoot length of treated seedlings} / \text{mean shoot length of control}) \times 100\%$. Mean values of the measurements were compared using the Tukey test. Sodium chloride (NaCl) salt at dose 200 mM led to decrease in seed germination and inhibition of shoot and root elongation. Most of the hybrid lines were found to be more salt-tolerant than the wheat parent components. The highest values for the salt tolerance index were noted in the hybrid lines of wheat with *Ae. kotschy* Boiss.

Knowledge about the health benefits of probiotics and their consumption among young women in Poland

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Probiotics are a source of live and active cultures of lactic acid bacteria that are beneficial for our health. Consuming probiotics improves the health condition of people suffering from disorders of gastrointestinal microbiota. The sale of probiotics as dietary supplements has been steadily growing in Poland. Consequently, it is interesting to examine what age groups consume probiotic supplements and what is the awareness of these people as to the role they play in their organisms.

The aim of the research was to determine the current state of knowledge about probiotics and their properties, as well as the frequency of probiotic consumption among young Polish women aged 18-25. The survey method was used in the electronic and paper version. About 500 women from 16 provinces were surveyed. The research results show that the majority of respondents (89%) know what a probiotic is and are familiar with various properties of probiotics. They are aware that probiotics stimulate the immune system (46%), regulate intestinal functions (40%), support digestion (44%), and reduce the incidence of diarrhea (36%). Some of the respondents also know that probiotics can prevent constipation (22%), alleviate allergies (18%), produce vitamin B and K (17%), lower cholesterol level (17%) and help maintain the right body mass (14%). The smallest number of respondents (11%) are aware of the anti-cancer properties of probiotics. However, 1/3 of the surveyed women are familiar with all the above-mentioned properties of probiotics (29%). Only some people who participated in the survey (39%) consumed probiotics in various forms, most frequently as capsules (33%). The consumption of these dietary supplements was most often correlated with antibiotic therapy (32%) or prophylactic health activities (14%). The beneficial effects of probiotics on the organism were observed often or to a minimal extent by 18% and 15% of the surveyed women, respectively. By far, most respondents learnt about probiotics from the Internet (75%) and at school or university (70%). Others gained this knowledge from books (55%), articles (41%), doctors (40%), media such as the radio, TV, or press (12%), and relatives and friends (10%).

It should be stated that the growing interest in the intake of probiotics among women aged 18-25 is largely due to the increasing knowledge on the subject and the awareness of many health benefits of probiotics, and nowadays the most common source of this information is the Internet.

Antidepressant activity of selected species from the genus *Hemerocallis*

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The flower and bud parts of daylilies, especially *Hemerocallis citrina* Baroni or *H. fulva* L., were used in Chinese folk medicine as an anti-inflammatory, analgesic, and antipyretic agent as to increase lactation in breast-feeding women. Extracts from these organs were used as a sedative to relieve mood changes, in states of emotional disorders, insomnia, and enhancement of memory. The neurological action of daylily flowers has been confirmed by modern pharmacological and clinical research. Daylily flowers contain many different biologically active compounds, e.g. flavonoids, phenolic acids and their derivatives, di- and tri-terpenes, essential oils, steroid saponins, amino acids, alkaloids, and polysaccharides. However, the neurological effects of these compounds are still poorly documented. Therefore, studies are conducted on the effect of active compounds contained in various organs of many species of the genus *Hemerocallis* to assess the possibility of their application as a potential alternative for pharmacological alleviation of various diseases, including depression symptoms.

The aim of the study was to determine the anti-depressant effect of active compounds contained in various organs of selected species from the genus *Hemerocallis* based on information available in the original scientific literature.

As shown by rodent experiments, the antidepressant action of ethanol extracts from daylily flowers (HCE) is attributed to their beneficial effects on the dysfunction of monoamine neurotransmitters as well as enhanced expression of the brain-derived neurotrophic factor and its protein receptor (BDNF-TrkB) in the brain region of frontal cortex and hippocampus. It has been shown that the antidepressant activity of HCE is supported by the serotonergic (5-HT(1A) and 5-HT(2) receptors), noradrenergic ($\alpha(1)$ -, $\alpha(2)$ - and β -adrenoceptors), and dopaminergic (D(2) receptor) systems as well as the elevation of the levels of monoamine neurotransmitters serotonin (5-HT), noradrenaline (NA), and dopamine (DA) in the brain. It has also been postulated that the antidepressant and anti-inflammatory effect of HCE results from inhibition of the nuclear NF kappa B transcription factor (**NF- κ B**; Nuclear Factor kappa B). Results of many investigations have demonstrated that *H. citrina* flower extract reversed the adverse stress-induced behavioural changes in rodents. Phenolic acid derivatives and numerous flavonoids, including rutin, are the main HCE components with the attributed antidepressant effect.

Aromatic plants of the *Lamiaceae* family in the horticulture therapeutic gardens

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Horticulture therapy based on the natural relationship between man and nature, is now one of the more and more often used forms of supporting the treatment of various diseases. It is aimed at supplementing traditional methods of rehabilitation and therapy through active or passive use of garden settlements. Diversity of horticulture therapy, as to the program, includes, for example, various age groups, as well as patients after stroke, accidents, Alzheimer's disease, and mental disorders. The idea of this type of therapy is to improve the physical, mental, social and cognitive state of a person. Contact with nature helps in maintaining and restoring health and well-being. Therapeutic activities can be conducted in gardens located at hospitals, nursing homes, schools and hospices. Horticulture therapeutic use of green areas is particularly popular in Western Europe as well as in the United States, Canada and Australia.

The scent plays a great role in the horticulture therapeutic gardens. Among many decorative and medicinal plants, representatives of the *Lamiaceae* family show rich palette of fragrances. A bouquet of beautiful scents secreted by such species as mint, lavender, lemon balm and rosemary can have a positive effect on the human body, including through aromatherapy. The attractiveness of *Lamiaceae* plants does not have to be limited only to the scent. Diversified in terms of structure and conformation, plants are a rich source of tactile stimuli. Numerous colorful flowers are an accent complementing the functions of therapeutic gardens.

Lemon balm (*Melissa officinalis* L.), medicinal hyssop (*Hysoppus officinalis* L.) and peppermint (*Mentha x piperita* L.) are perfect examples of plants combining decorative features such as decorative leaves, colorful flowers, as well as the fragrance of herb rich in essential oils. The texture of leaves of these species can also be a source of sensory stimuli.

Potential application of groundcover plants

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Contact with nature and plants is necessary to balance the difficult living conditions in large urban agglomerations, and the increasing decline in greenery areas is a sign of recent times. At present, there is a rise in the awareness of the threat posed to such areas. Therefore, there is a need for intensive search for means of conservation of even the smallest green areas. The importance of plants, including ornamental species, in human life is enormous, and their beneficial effect on well-being and health is evident and has always been underlined. The increasing interest in new trends in the art of gardening prompts a search for new solutions in spatial arrangements that will adequately fulfil specific biological, aesthetic, and social functions. Plant species and varieties that grow well even in adverse conditions should be promoted. One of the solutions is the use of groundcover plants. Besides low perennials and deciduous shrubs with a compact habit, this type of plants includes low grasses, ferns, and climbers. The diversity of their varieties, colours, and forms constituting the decorative values provides wide application possibilities. Contact with plants plays a role of a therapeutic factor. It replaces work, improves the ability to concentrate, and provides a sense of usefulness in the case of the elderly, sick, and disabled. Special gardens are established or adapted to the abilities of this group of people e.g. by setting up raised flower beds or drop-down baskets with climbers. Gardening and the garden itself have a positive effect on the physical and mental health of adults and children. The contact of a child with nature develops imagination, memory, and curiosity to explore the world.

The need to use groundcover plants in urban plantings was confirmed by the results of a survey carried out among residents of Lublin and assessing the level of knowledge of the possibilities of application of this group of plants. Over $\frac{3}{4}$ of the respondents indicated a substantial need for introduction of groundcover plants in areas where maintenance of lawns is difficult. The most frequently indicated areas were connected with transport (traffic islands, green belts between road lanes – 13% of the respondents), spaces under park trees (11%), all embankments (15%), housing estate greeneries (18%), representative facilities (17%), and green roofs (10%).

Interesting compositions can be created from groundcover plants taking advantage of their habit, colour, more or less intense flower scent, and attractive colour of leaves. They are an excellent material with considerable potential to be used in the design of greeneries, gardens, and seasonal restaurant gardens.

Possibility of using cover plants

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Environmentally friendly methods used to improve the quality seed potatoes

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Advances in potato seed production, improving the quality and health of seed potatoes may enable unconventional methods, which do not increase the level of crop chemization. Such pro-ecological methods using physical phenomena include ultrasound (sonification). They are used to evoke primary or secondary phenomena. Ultrasonic waves, depending on the frequency and intensity, enable non-destructive testing of the structure of the tested product, as well as not changing its chemical and physical properties. The basis for the operation of ultrasonic energy in plant production can be: increased cell membrane capacity, improved tissue respiration, the emergence of biologically active compounds, effects on body enzymes, changes in the structure of tissue colloids and their hydration, changes in ionic systems of tissues. By affecting plants or biologically active substances, their development, cell division and intracellular divisions can be stimulated, or their growth can be stopped and induced. This technique is also used in agricultural production, especially in seed production. Stimulation of the growth process of sprouts through the overexposure of seed potatoes will allow earlier tuber germination. Tuber samples from field experiment, carried out in the Lubelskie Voivodeship, in the years 2014-2016, on podzolic soil, slightly acidic, were used for the study. The experiment was established in a dependent, split-plot system, in three replications where the first order factors were pre-processing treatments a) the use of sonification of seed potatoes for 6 minutes; b) the use of sonification of seed potatoes for 12 minutes, c) the control object, without sonication, the second order factor was constituted 5 potato varieties. The material for the tests was in the C / A degree. Potato was grown in an ecological system (potato - spring barley - clover with grass used for 2 years - winter triticale + white charlock and spring vetch) no mineral fertilizers were used, and only Novodor and Permasect against potato beetle were used from pesticides. Only a 2-year-old compost (straw + red clover + dung added) was placed under the potato in an amount of 35 t ha⁻¹. The limitation of weeds in this production system consisted in harrowing with weed harrows for emergence, 3 times peeling and single hand weeding just before the last reduction. Potato tubers, before planting, were subjected to immersion sonification using an ultrasonic and bathtub device. Its acoustic power was 200 W at 32 kHz. Sonification took place in an aqueous environment at 18°C for 6 and 12 minutes. At the time of harvest, representative samples were collected for a laboratory experiment with tuber pre-seeding. These tubers were stored under controlled conditions in a potato storage room. Research on sprouting of seed potatoes began on December 2 and ended on March 21. Observations of sprout development, their number and mass were made on 10 dates. The results of the study were statistically calculated using the analysis of variance (ANOVA) as well as the correlation of the Pearson straight line and the multiple regression. The sonication of seed potato did not significantly affect the number of germinate germs or total germination on tubers, but limited the mass of sprouts and shortened the germination period of tubers. This gives the basis for further research on germination physiology, and will enable PIORIN laboratories to stimulate potato varieties, especially those with a long rest period, in advance.

Didactic contents in the field of human ecology in school textbooks 'Podręcznik do nauki o przyrodzie żywej i martwej' by Gajówna, Żłobicki and Adwentowski from 1934 and 'Wiadomości o przyrodzie' Obieziarska and Ziemecki from 1964

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Introduction and aim. Education in the field of human ecology in primary school is one of the widest topics with no strictly defined limits, which results from the interdisciplinary nature of this branch of science. Due to dispersion of didactic contents, it was decided to collect them on the basis of two former Polish textbooks.

Method. The content of school textbooks 'Podręcznik do nauki o przyrodzie żywej i martwej' (*in English 'The textbook to learning about animate and inanimate nature'*) by Gayówna, Żłobicki and Adwentowski from 1934 and 'Wiadomości o przyrodzie' (*in English 'Information about nature'*) by Obieziarska and Ziemecki from 1964 has been analyzed basing on the detection of subject keywords used in the context of the relationship between man and the environment.

Results. Topics of human ecology in the books in order of occurrence in books below:

1) by Gayówna, Żłobicki and Adwentowski (254 pages): nature protection (e.g. main nature reserves in the Second Polish Republic), buffalo breeding in India, artificial pollination of date palms by Arabs, reindeer breeding by Sami people, storage of plant seeds for sowing, history of mineral substances in the cultivated field, chemical fertilizers, obtaining iron from ores, brine and graduation tower, the use of lime for the disinfection of street gutters, kneading clay and porcelain vessels, friction and work – including work of people and animals, center of gravity and balance of bodies (e.g. leaning tower in Pisa, Italy);

2) by Obieziarska and Ziemecki (117 pages): benefit from the forest and its protection, excretion of carbon dioxide during breathing, air pollution in rooms, air movement in the apartment, water in springs and wells, purification of drinking water and waterworks, drying the grain with a stream of warm air, problems in digesting food, infectious diseases of the gastrointestinal tract, the importance of fresh air for health, cold and tuberculosis and preventing them., hurt and dressing, rest and avoiding noise, pollination of flowers by bees, nature protection.

Conclusion. Didactic contents in the field of human ecology are present in textbooks in the form of numerous problems and specific issues for discussion at school. Collecting them and analyzing the history can help in further research on improving teaching.

Effect of natural fertilization on the content of active components in the inflorescences of narrow-leaved lavender (*Lavendula angustifolia* L.)

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Narrow-leaved lavender (*Lavendula angustifolia* L.) is one of the most important plants with medicinal properties used in perfumery and cosmetics. In terms of pharmaceuticals, lavender is a frequently used means to make it easier to fall asleep, improve digestion, warm up, relieve post-traumatic pain and help heal wounds. Herbal raw material is characteristic violet-blue flowers. The quantity and quality of active components of lavender raw material is influenced by a number of factors, among others, environmental variability, which includes plant nutrition and harvest time.

In 2016, a field experiment with narrow-leaf lavender was carried out at an agricultural farm located in the south-eastern part of the Lublin province. The experiment included 20 micro-plots (with an area of 1 m²). The research aimed at determining the effect of the manure dose and the date of harvesting the raw material on the content of essential oil, dry matter, protein and nitrogen in lavender herb. In the experiment, natural fertilizer was used - manure at a dose of 100 and 200 g per plot. The raw material harvest was made on four dates: I - 18.06., II - 02.07., III - 21.07., IV - 14.08.

Obtained results allow to conclude that dose of 100 g·m⁻² manure for plants harvested in the third period had the largest impact on the amount of dry matter of plants. A significant influence of studied factors on nitrogen content (2.55% DM) and protein (15.94%) was recorded, the highest number of which was obtained in the 1st date of lavender inflorescences harvest after feeding plants with a lower dose of manure. Lavender plants showed an increased tendency to accumulate essential oil in flowers during the second and fourth harvesting date after using the highest dose of manure. After applying 100 g manure per m², a significant effect of the dose on the examined quality parameters of lavender was noted, regardless of the date of harvesting the raw material.

Pre-treatment of *Chelidonium majus* samples using silica covered with polyaniline

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Chelidonium majus L. is a rich source of biologically active benzophenanthridine protoberberine and protopine alkaloids and chromatographic techniques are the most common for quantification and isolation of these compounds [1]. However, plant material require appropriate sample pretreatment to concentrate the analyte and remove the interfering components.

The aim of our work was to apply the polyaniline based sorbent (Si-PANI) for solid phase extraction of *Chelidonium majus* alkaloids. The sorbent was prepared by *in situ* polymerization of aniline, directly on silica particles [2,3]. The optimal conditions for SPE were established experimentally.

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Histochemical characteristics of ivy (*Hedera helix* L.) leaves

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Hedera helix L. (Araliaceae) is a climber occurring in Poland in natural habitats and cultivated as an ornamental plant. It is used in medicine and cosmetics and is well known as a nectariferous plant. It is also toxic due to the content of triterpenoid saponins mainly in fruits and leaves. In sensitive persons, contact with the plant may cause skin allergies manifested by eczema and inflammation.

The aim of the study was to determine the location of selected secondary metabolites in the tissues of *Hedera helix* leaves with the use of fluorescence microscopy and selected histochemical assays.

We have shown the presence of tannins in the epidermis and subepidermal parenchyma, phenolic acids in the palisade parenchyma, and resins and essential oils in the secretory channels. The thickened outer walls of the adaxial and abaxial epidermis cells are saturated with lipid compounds (cutinisation). The epidermis and parenchyma cells contain flavonoids. There are multicellular, branched, non-glandular trichomes mainly on the petioles of young leaves and some are located on the abaxial surface of the leaf blades. Lipid and phenolic compounds are contained in the basal cells of the trichomes.

The very thick outer walls of epidermal cells with a high cutinisation degree leaf winter hardiness. Compounds triggering cutaneous contact allergies are probably contained in the trichomes as well as inside and on the surface of epidermis cells.

Analysis of mRNA expression of leptin receptors in the chorioallantoic membrane of chicken embryos after *in ovo* administration of bisphenol A

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In the 30s of the last century it has been shown that bisphenol A has estrogen-like effects. This compound is widely used in the plastics industry, including food packaging materials. The aim of this study was to investigate the effect of bisphenol A on the expression of leptin receptors mRNA in the chorioallantoic membrane in chicken embryo. Bisphenol A was injected *in ovo* on the 8th day of embryogenesis. On day 12 of embryonic development the CAM were collected, total RNA was isolated and gene expression analysis by RT-PCR was performed. The results showed an increase in the level of mRNA expression of the long form of the leptin receptor in males after administration of bisphenol A at a dose of 0.5 mg/egg. In females similar increase in expression was observed in the group exposed to BPA at a dose of 2 mg/egg. There was no significant effect of BPA injection on the expression of mRNA of the short form of the leptin receptor in the chorioallantoic membrane of the chicken embryos. The obtained results indicate the sensitivity of the CAM membrane to bisphenol A, possible effect of the compound on the activation and course of leptin-dependent processes occurring in the cell and also different in male and female sensitivity to this compound.

Rainwater retention in housing estate as an element of improving the living conditions of residents

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As a part of civilization development, man has been establishing urban centers since the ancient times, interfering with the natural environment. This was primarily due to defense considerations. Nowadays, city centers perform many functions, they are a place of residence, work, they offer access to culture, entertainment and health care. The intensity of buildings in urban areas increases. New areas, often valuable in terms of nature or landscape, are allocated for investments. The problem is the increasing sealing of surfaces in cities (streets, pavements, parking lots), accelerating surface runoff. In order to address the problems associated with the discharge of rainwater from urban areas, the storm sewer system is most often used, which together with the development of buildings is becoming more and more laden and in order for it to function properly requires financial outlays for modernization or expansion. Disturbances of the water circulation in urbanized areas affect the water, temperature and air quality, contributing to climate change. Increasingly, we are dealing with the urban heat island – the temperature in cities is higher than in the surrounding areas. Car exhaust and so-called low emissions lead to an increase in the concentration of harmful dust and chemical compounds in the air (PM₁₀, PM_{2,5} dioxins, furans). The result of the progressing climate changes in Poland are floods, droughts and increased intensity of occurrence of extreme events (heavy rains, windstorms). In order to improve the living conditions of city dwellers, pro-environmental investments supporting the development of ecosystem services, i.e. services provided by the natural environment to human beings, are necessary. The green and blue infrastructure play a major role in improving the microclimate of cities. Green areas in the urban space are all green areas: parks, squares, greenstone, not built-up river valleys, ravines. The blue infrastructure that is closely related to green includes watercourses, surface waters and wetlands and swamps. Greenery in the city plays a very important environmental and aesthetic role. Trees, and in particular greenery of a bunk type, filter the air well and emit pro-healthy phytoncides. Retention of rainwater at the source of precipitation, and thus also in intensively urbanized areas, contributes to reducing the negative effects of climate change, which have a direct impact on living conditions in cities.

Possibilities of biotechnological application of mycelium the white-rot fungus (*Hericium erinaceum* (Bull.: Fr. Pers.) – microscopic examinations

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Fungi are a valuable source of biologically active compounds preventing many diseases, including neoplastic and cardiovascular ones, and supporting their therapy. Anticancer properties of fungi result from the presence of specific polysaccharides in their mushrooms [1] which are structural components of the fungal cell wall. Mycelium of the white-rot fungus (*Hericium erinaceum* (Bull.: Fr. Pers.) produces polysaccharides showing anticancer and immunostimulating activity. Intracellular polysaccharides (IPS) are structural components of the fungal cell wall and are primary metabolites, whereas extracellular polysaccharides (EPS) are secreted to the culture medium as products of secondary metabolic pathways [1]. In our previous works [2, 3, 4], we have shown that organic selenitriglycerides (Selol) contribute to the increase of biosynthesis of exopolysaccharides (EPS) having antioxidative properties and containing large amounts of selenium.

In this study we examined the influence of organic form of selenium in different concentration (i.e. Selol_{2%} and Selol_{5%} containing 2% and 5% w/w of Se, respectively) on viability of *H. erinaceum* mycelium and on ultrastructural changes in fungal cells, particularly in the cell wall taking place during its development in submerged culture. The mycelium was grown on media containing Selol_{2%}, Selol_{5%} and a mixture of Na₂SeO₃ and Selol and on control medium (no selenium added). The samples of mycelium (pellets) was taken after 3, 8, 15 and 24 days of cultivation, pre-fixed in glutaraldehyde and then immersed into 2% OsO₄. The dehydrated material, washed in propylene oxide, was embedded in an Epon/Spurr mixture. Semithin sections (ca 1 μm) and ultrathin (80 nm) sections were cut and observed in light microscope and analyzed using an electron microscope (TEM). It was shown that mycelium cultured for 3 days in control conditions on standard media contained almost 100% of living cells, with over 80% after 24 days. The addition of Selol_{2%} caused that the amounts of living cells remain at ca 90%. It was found that only Selol_{2%} did not cause any damage to the cell ultrastructure, but it contributed to the thickening of the cell wall, which implied the influence on polysaccharide production. Apparently, Selol helped the cells to cope with toxic activity of inorganic selenium ions. Such changes were not observed in the case of Na₂SeO₃ + Selol_{5%} mixture, in which case cells contained numerous ribosomes and small lipid bodies. Among all of the cultivations performed in the presence of selenitriglycerides, only in the case of that with the addition of Selol_{2%} significant changes were noticed (in particular an increasing number of cell wall layers). The results of the observations imply that the cellular response to selenium induces oxidative stress in the mycelium cells and influences the biosynthesis of polysaccharides.

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Allium ampeloprasum var. *ampeloprasum* (GHG-L) – “odourless garlic” as an alternative to sensitive consumers

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Allium ampeloprasum var. *ampeloprasum*, commonly known as the great-headed garlic (GHG), represents the genus *Allium*, which comprises many plant species that have long been used by humans for nutritional and pharmacological purposes. The most economically important species from the genus *Allium* is *A. sativum* (garlic), which has been grown worldwide for over 6000 years due to the bioactive components present in its underground bulb and young leaves, valuable nutritional values, and multi-directional pharmacological activity. GHG, described as a “garlic-like” plant, is characterised by a considerably weaker odour and a milder flavour than the traditionally cultivated garlic.

The GHG-L investigated in our study is an undomesticated plant non-commercially cultivated in eastern Poland. In this study, we present phylogenetic analyses of GHG-L and comparative analyses of the morphological traits, nutritional values, and health-enhancing properties of GHG-L with garlic. The analysed species grew in the same organic conditions. The first stage of our research was to determine the phylogenetic position of the study material (GHG-L) among other species belonging to the genus *Allium*. The genetic comparative analysis indicates that GHG-L is phylogenetically related to both *A. ampeloprasum* (leek) and *A. sativum*. Analysis of the morphological traits of aboveground and underground shoots, i.e. important parts for both the producer and the consumer, revealed that the habit and size of GHG-L leaves were similar to those of leek. In turn, the underground bulb, which is divided into cloves, is morphologically similar to garlic but differs significantly in terms of the size. The GHG-L bulb is larger (up to approx. 11 cm in diameter) than that in garlic (up to approx. 6 cm in diameter). Biochemical assays of the allicin level were carried out to determine the pharmacological values of GHG-L in comparison with *A. sativum*. That compound is one of the most important biologically active sulphur compounds responsible for e.g. the antibacterial properties of garlic. Determination of the level of allicin in the underground bulb of GHG-L and *A. sativum* showed that it is higher in GHG-L than in garlic. Next, to determine the nutritional values of GHG-L in relation to *A. sativum*, comparative analyses of amino acids, secondary metabolites, and antioxidant activity in the leaves and bulbs of the analysed plants were performed. The analyses showed that GHG-L had better nutritional properties than garlic, and its underground part (bulb) is remarkably richer in biologically active compounds than the aboveground part (leaves).

The presented results allow a conclusion that GHG-L has high consumer values, which substantially exceed the nutritional and health-promoting properties of *A. sativum*; therefore, it is a good candidate for functional foods.

Acid phosphatase activity after exposure to malathion and its metabolites in human plasma *in vitro* – a pilot study

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Malathion (O,O-dimethyl-S-1,2-bis ethoxy carbonyl ethyl phosphorodithionate), a pesticide in the organophosphate chemical family, is the most widely used throughout the world. It is used to control the pests of agriculture crops, ornamentals, green houses, live stocks, stored grains, forests, buildings, and gardens. Organophosphorus pesticides, in addition to their intended effects like the control of insects or other pests, are sometimes found to affect nontarget organisms including humans. Exposure to organophosphorus pesticides is also a potential cause of longer-term damage to the nervous system. Contributing to its popularity is its relatively low acute mammalian toxicity. The toxicity of malathion is compounded by its metabolites and contaminants. Malaaxon, the metabolites produced by the oxidation of malathion in mammals, insects, and plants, is the primary source of malathion's toxicity and it is 40 times more acutely toxic than malathion.

Current studies have been undertaken to investigate the effect of malathion and its metabolites on the activity of acid phosphatase (ACP). The major enzymes of clinical significance in liver function are the aminotransferases or transaminases (AST and ALT) and the phosphatases: acid and alkaline. The increase in ACP enzymatic activity has been diagnosed in many pathological conditions. The ACP activity was assayed spectrophotometrically according to the established method of Wlodarski and Marciniak (1989). The activity of acid phosphatase (ACP) activity in the plasma of experimental groups with malathion did not show a significant difference to the control. This is likely due to the fact that the organelle where this enzyme is localized (lysosome) was not affected by the toxic components of the insecticide. This study shows that the administration of malaaxone and isomalathion to human plasma caused significant changes in biochemical parameters (ACP in plasma). These results are consistent with various previous studies showing that exposure to malathion and other pesticides has led to the induction of severe physiological and biochemical disturbances in experimental animals.

Plants sweeter than sugar – *Stevia rebaudiana* Bertoni and *Lippia dulcis* L.

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The increasing number of people suffering from obesity and related diseases is a result of excessive consumption of sugar and fat-rich products. The imbalance between consumed and expended calories lead to severe health problems. Low-calorie sugar substitutes can help prevent obesity. Such substances can be found in some plants, e.g. *Stevia rebaudiana* and *Lippia dulcis*.

Stevia rebaudiana is a species from Asteraceae family, originating from the South-Eastern part of Paraguay. Its sweetening power depends on the content of steviol glycosides and can be up to 300 times higher than sugar. Many studies have shown that *Stevia* leaves extracts perform anti-inflammatory, immunostimulant, antiviral, and anti-caries activity.

Lippia dulcis (Verbenaceae), it's a plant naturally occurring in Central America. It is reported that the herb is 1000 times sweeter than sugar, and its taste is compared to honey. The sweet taste of *L. dulcis* derives from the high content of hernandulcin. The herb contains also verbasicide, which anti-inflammatory, anti-cancer and analgesic effects are stronger than the available drugs.

Stevia rebaudiana and *Lippia dulcis*, due to high sweetening power can serve as low-calorie sugar substitutes, but also exhibit a range of other health-benefit properties. The use of these plants may help reduce the risk of lifestyle diseases.

The use of pollinator-friendly plant species in hortitherapeutic gardens

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Horticultural therapy (hortitherapy) is a form of unconventional treatment that uses gardening activities and contact with the surrounding nature to improve the effectiveness of conventional therapies. Staying in green areas positively affects cognitive processes. In hortitherapy, colours and fragrance of plants, sounds of insects and birds are important vehicles of the treatment.

Insect pollinators number and biodiversity are in decline. There is a growing interest in creation of floral meadows as a supplementation of floral food resources for pollinators ('bee pastures'). Synanthropic plant species can be used for bee pastures enhancement. Modern gardens should be multi-functional. Our aim was to present a project of a garden that may be considered both as therapeutic and pollinator-beneficial.

A therapeutic garden nook with the use of synanthropic forage plants was designed. Following herbaceous plants: *Hypericum perforatum*, *Securigera varia*; *Trifolium pratense*, *Ballota nigra*, *Lathyrus vernus*, *Lamium album*, *Linaria vulgaris*, *Sinapis arvensis*, *Vicia cracca*, *Convolvulus arvensis* and trees: *Prunus spinosa* and *Prunus cerasifera* were selected for the project. Our previous research allowed us to determine the flowering sequence, sugar and pollen yield of the plants as well as insect visitors composition.

Flowers of the selected plants are a source of food for insects from April to October. The chosen plant species are highly variable in sugar (0.0-21.6 g/m²) and pollen yield (0.05-3.7 g/m²). The mean sugar yield is estimated at 5.3 g/m² and the mean pollen yield is 1.2 g/m². Flowers of the suggested plant species are morphologically diversified and hence, growing together attract a range of insect visitors, i. e. honey bees, bumble bees, butterflies, syrphid flies, beetles. Variable flower colours, floral scents and sounds emitted by insect visitors can stimulate senses.

In the project both human needs (aesthetics, recreation, therapeutic use) and pollinating insects requirements (nectar sugars and pollen availability) are included. Beyond aesthetic and therapeutic value, the garden can be considered as a high nutritionally capable 'bee pasture'.

Silvotherapy – a novel therapy to support treatment of people with physical and intellectual disabilities

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Silvotherapy (forest therapy) is one of the forms of hortitherapy, which includes health-beneficial activities performed in forest areas. It is now becoming more and more popular both in Poland and around the world. Silvotherapy is used as a supplementary therapy to treatment of physical and intellectual disabilities, Alzheimer's disease, autism spectrum disorders or depression. The therapy can be also applied to patients with chronic stress or constitute a part of children's learning process.

Centers of forest therapy offer mainly walks along designated routes in various types of forests. Variety of sounds and scents in forest areas has a calming effect on patients. Many trees and shrubs (e. g. birch, elderberry, juniper, pine) emit phytoncides known for antimicrobial properties, that can help treat chronic respiratory system diseases. In addition to walks, the therapy may involve touching tree trunks with feet or hugging trunks, which makes patients feel relaxed and reduces physiological effects of stress.

A novelty in Poland is forest kindergartens ("Puszczyk" in Bialystok or "Dzika Osada" near Cracow), where regardless of the weather, about 80% of classes are given outdoors. Outdoor activities stimulate senses, develop creativity and boost learning process.

Silvotherapy can be a supplementary therapy to a range of diseases and may be applied to patients of any age. The only limitations of the use of tree therapy are airborne and contact allergies. An interesting new application of tree therapy is forest kindergartens.

Influence of intercrop plants and varied tillage on soil reaction and macronutrient content in the soil under carrot cultivation

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The field experiment was conducted in the years 2010–2012 in Felin Experimental Station of the University of Life Sciences in Lublin (Poland, 51°23'N, 22°56'E), on a grey-brown podzolic soil derived from medium loam. These soils prove difficult in tillage, being prone to densification in rain, and later to formation of soil crust. Before the catch crops were sown the soil contained, on average, 1.06% to 1.15% of humus in the 0–20 cm layer and was mildly acidic (pH in 1 M KCl 5.76–5.90). The content of assimilable phosphorus, potassium and magnesium was: P – 146.8, K – 111.5, Mg – 102.9 mg kg⁻¹ of soil.

The experimental design included two factors: I. Seven species of cover crops: spring rye (*Secale cereale*), oats (*Avena sativa*), common vetch (*Vicia sativa*), white mustard (*Sinapis alba*), tancy phacelia (*Phacelia tanacetifolia*), buckwheat (*Fagopyrum esculentum*), fodder sunflower (*Helianthus annuus*). Cultivation without cover crops was the control; II. Tillage: conventional plough cultivation with a set of pre-winter ploughing 25–30 cm depth; pre-winter tillage with use of stubble cultivator grubber [25 cm depth] and spring growing on ridges.

The sowing of the catch crops took place a year before the vegetables were cultivated, after the harvesting of pre-crop (winter wheat). The catch crops were sown on the same day each year, that is on August 1st, after the wheat was harvested. Directly after the harvest of pre-crop the soil was ploughed (15 cm deep) and harrowed.

Soil samples for chemical analysis in all the years of the study were collected in first decade of April, in June and in October. Samples were collected from a depth of 0–20 and 20–40 cm in accordance with the applicable recommendations. Soil pH_{KCl} was measured potentiometrically (1:2.5 mV) in water and in a 1 mol/L KCl solution, respectively (ISO 10390, 2005). Available P and K were determined by the Egner-Rhiem method and available Mg by the Schachtschabel method.

The results were statistically analysed by analysis of variance, using Tukey's test to evaluate the differences at a significance level of $p=0.05$.

The soil reaction (pH) in the carrot cultivation during the years 2010–2012 was from acidic to slightly acidic and it ranged from pH 4.49 to 6.12. In 2010 there was a substantially greater content of phosphorus (136.6 mg P·kg⁻¹) and potassium (102.4 mg K·kg⁻¹) in soil comparing with the latest years of studies. The tillage system used did not significantly influence the content of K but significantly P and Mg in soil. Irrespective of the year of research, the soil under conventional plough cultivation contained slightly more potassium (95.3 mg K·kg⁻¹) and less phosphorus and magnesium (100.0 mg P·kg⁻¹ and 67.1 mg Mg·kg⁻¹) than in soil under carrot cultivation on ridges (on average 91.7 mg K·kg⁻¹, 109.0 mg P·kg⁻¹ and 67.1 mg Mg·kg⁻¹).

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The influence of the soil reaction and humic acid on the content of cadmium in lettuce (*Lactuca sativa* L.)

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Cadmium is a heavy metal known for its negative impact on human health. With the increasing widespread of cadmium disposition in the soil emerges a danger connected with consumption of edible plants contaminated with cadmium absorbed from the soil. Aim of the performed experiment was to investigate how does different pH (3.5-4.5, 5.5-6.5, 7.0-7.5) of the soil and addition of humic acid (H85) influence the content of cadmium (mg/dm³) in leaves of the lettuce (*Lactuca sativa* L.).

The experiment was performed in greenhouse belonging to the University of Life Sciences in Lublin. During cultivation of the lettuce cadmium was added to the soil in form of cadmium nitrate tetrahydrate (Cd(NO₃)₂·4H₂O). Test groups differed in the range of pH of the soil. Humic acid (H85) was added into chosen samples. Control group was identified in a sample having 5.5-6.5 pH of the soil, where no cadmium and no humic acid (H85) were added. After 90 days of the experiment leaves of the lettuce were separately collected from each sample. The chemical analysis of plant material was done with usage of method ASA (Perkin-Elmer Aanalyst 300 Spectrometer).

The results showed that the lettuce (*Lactuca sativa* L.) accumulated cadmium in leaves. Accumulation of cadmium in leaves of the lettuce depended on the conditions of cultivation. Reaction of the soil had significant impact on the accumulation of cadmium in leaves of the lettuce and with the increase in pH of the soil the content of cadmium that was being absorbed by the plant decreased. Addition of humic acid (H85) had significant impact on accumulation of cadmium in leaves of the lettuce and with addition of humic acid (H85) the level of cadmium content in plants was decreasing. Strength of the impact of humic acid (H85) on accumulation of cadmium in leaves of the lettuce differed for different pH of the soil, and the biggest impact was observed within the sample having pH 5.5-6.5 of the soil and the lowest in the sample having 7.0-7.5 pH of the soil.

Voltammetry vs chromatography – determination of volatile compounds in *Carlina* root extract

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Carlina species are still used in traditional medicine in many European countries mostly for their cholagogic, diuretic, antibiotic, antibacterial, anti-inflammatory and cleansing effects. They are also component of commercially available herbal mix such as "Swedish herbs". Reports on phytochemistry of *Carlina* spp. are scarce and mostly refer to the composition of essential oil and polyphenolic compounds. Polyacetylene - carlina oxide is considered as the main constituent of essential oil with confirm biological activity. This compound has antioxidant, antibacterial, antifungal and antiparasitic properties.

The aim of the work was to develop a voltammetric procedure to determine carlina oxide in *Carlina* plants. Dried root of *Carlina acaulis* L. was applied as a research material. The obtained results were compared with those obtained using high performance liquid chromatography (HPLC-DAD) and gas chromatography (GC-FID).

Studies on the effects of polycyclic aromatic hydrocarbons on mitochondrial phospholipids in model membrane

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Polycyclic aromatic hydrocarbons (PAHs) are persistent organic pollutants, listed as priority environmental pollutants in the Stockholm Convention. The majority of PAHs have anthropogenic sources such as: coal and wood burning, petrol and diesel oil combustions, and industrial processes. The presence of PAHs in the environment poses a risk to human health, mainly because only a few amount of these compounds are biodegradable. As a matter of fact the compound that enters the atmosphere and persists in it can cause respiratory disorders as pulmonary dysfunction and bronchitis. Moreover, because of the PAHs ability to damage fragments of DNA and induce mutations these compounds are carcinogens and mutagens for the human body.

The main aim of this research was to investigate how the incorporation of benzo[a]pyrene and pentacene into model membranes affects phospholipase A2 (PLA2) activity, since no systematic studies on the interaction of PAHs with mitochondrial phospholipids and its relevance to PLA2 activity at the molecular level have been conducted.

Phospholipase A2 is a digestive enzyme that catalyzes the hydrolysis of the sn-2 ester bond of membrane phospholipids, the products of these reaction are a free fatty acid and a lysophospholipid.

Both these products of PLA2 action are important from a biological point of view since they are involved in cell signaling, phospholipid remodeling, signal transduction, and regulation of membrane topology. Additionally, PLA2 prefers aggregated lipid superstructures like monolayer and its activity is linked to the composition, morphology and physicochemical properties of lipid membrane. Also PLA2 site of action are pre-existing membrane defects, domain boundaries and heterogeneities like the presence of molecules that perturb the lipid layer.

Langmuir monolayer technique was used to evaluate the interaction between PAHs and model membranes and the impact on PLA2 activity. The Brewster angle microscopy was used as an additional technique allowing to measure the qualitative changes in the model membranes. Langmuir monolayer was formed by cardiolipin an anionic phospholipid that is the major constituent of mitochondrial membranes of eukaryotes. The results show that the increased PLA2 activity was observed for small quantities of PAHs (about 10%) present in the model membrane, while too much PAH content in the model system can lower the enzyme activity or even lead to its inhibition. Moreover it became clear the existence of a strong correlation between PAHs structure and their ability to incorporate into the model membranes. Benzo[a]pyrene, a medium size angular cluster molecule, is easily incorporated into the model membrane and activate PLA2 by changing the structure of the monolayer. On the other hand, pentacene a linear molecule separates from phospholipid monolayer, it forms multilayer aggregates that lead to an increased activity of PLA2.

The effect of supplementation of substrates for the oyster mushroom cultivation with residues from Apiaceae crops

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Oyster mushroom (*Pleurotus eryngii* DC), commonly known as king oyster, is one of the most interesting cultivated mushrooms. Because of shape and taste similar to *Boletus*, this mushroom is evaluated by gourmets as one of the best among cultivated species, and it becoming very popular, especially in Asia countries. *P. eryngii* has also medicinal properties, referred to highly bioactive polysaccharide pleuran and polyphenols. In natural habitat, *P. eryngii* is non-obligatory parasite of some *Apiaceae* plants like *Eryngium campestre* L. or *Ferula communis*. In this study, *P. eryngii* was cultivated in four different substrates with base of wheat straw supplemented with chopped carrots, parsley or celery roots (4:1 ratio). The control was a substrate supplemented with wheat bran. Results showed that substrate with *Apiaceae* roots gave comparable crop of *P. eryngii* fruit bodies to standard substrate but there was some differentiation in polyphenols and minerals composition of mushrooms fruits from different substrates.

We thank and invite you to participate
in the next meeting – the 4th International
Conference ‘Human ecology’
in Sandomierz in spring 2020

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