



MINISTRY OF HEALTH OF UKRAINE  
NATIONAL UNIVERSITY OF PHARMACY  
Faculty of Pharmacy  
Department of Pharmacognosy and Nutriciology

**RESOURCE SCIENCE OF MEDICINAL PLANTS**

**WORK PROGRAM  
of educational component**

training for \_\_\_\_\_ the second (master's) level  
(Higher Educational Level Name)  
specialty \_\_\_\_\_ «226 Pharmacy, Industrial Pharmacy»  
(Code and Specialty Name)  
knowledge industry \_\_\_\_\_ «22 Healthcare»  
(Code and Knowledge Field Name)  
of educational program \_\_\_\_\_ «Pharmacy»  
(Educational Program Name)

2023 year

The work program of the educational component «Resource science of medicinal plants» in specialty 226 «Pharmacy, Industrial pharmacy» educational program «Pharmacy» (4.10д)\*англ for applicants for higher education 5 year of study.

EDUCATIONAL COURSE TEAM:

KYSLYCHENKO Viktoriia, head of the Department of Pharmacognosy and Nutriciology, doctor of pharmaceutical sciences, professor; KRIVORUCHKO Olena, professor of the higher education institution of the Department of Pharmacognosy and Nutriciology of the National University of Pharmacy, Doctor of Pharmacy. Sciences, professor; TARTYNSKA Ganna, associate professor of the institution of higher education of the Department of Pharmacognosy and Nutriciology of the National University of Pharmacy, candidate of pharmacology. Science, associate professor; SKREBTSOVA Kateryna, associate professor of the institution of higher education of the Department of Pharmacognosy and Nutriciology of the National University of Pharmacy, candidate of pharmacology. Science, associate professor.

Work program were reviewed at the Department of Pharmacognosy and Nutritiology meeting  
Record from « 1 » of September 2023 № 1

Head of the Department \_\_\_\_\_



Prof. Viktoriia KYSLYCHENKO

Work program has been approved at the meeting of the Methodical Commission of chemical disciplines session  
Record from « 5 » of September 2023 № 1

Head of the Specialized Committee \_\_\_\_\_



Prof. Viktoriya GEORGIYANTS

## 1. Description of the educational component

**Language of study:** *English*

**Status of the educational component:** *selective*

**Prerequisites for studying the educational component:**

a) is based on the knowledge acquired by graduates in the study of Latin, botany, organic chemistry, biological chemistry, analytical chemistry, biophysics, physical and colloid chemistry, normal and pathological human physiology;

b) lays the foundations for the study of higher education in pharmaceutical and toxicological chemistry, pharmacology, drug technology, perfumery and cosmetics technology, clinical pharmacy, which involves the integration of teaching with these disciplines and the formation of skills to apply knowledge of pharmacognosy in further education and professional activities.

The subject of educational component study “Resource science of medicinal plants” is the study of biological, biochemical and medicinal properties of plants, natural plant material and products from it.

**Information content of the educational component.** 3,0 ECTS credit 90 hours are assigned to the study of the educational component.

## 2. Objectives and tasks of the educational component

**The purpose of teaching the educational component** “Resource science of medicinal plants” is studying the resources of the world flora for the needs of the human healthcare and obtaining the data necessary for the development of the program of rational usage, protection and reproduction of MP resources, as well as the knowledge on medicinal plant industry. “Resource science of medicinal plants” is a part of general botanical resource science, that studies the consistent patterns of spreading, exploration of MP reserves, development of optimal (rational) operating modes of their resources, their protection and reproduction.

**The main tasks** of the educational component “Resource science of medicinal plants” are:

- to define the terms medicinal plant (MP), medicinal plant material (MPM), biologically active compounds (BAC);
- to come to understanding the identity and quality of the MPM;
- to explain the methods of collection, drying, storage of MPM depending on the group and class of BAC;
- to apply the characteristic of medicinal plants and MPM in professional activity;
- to develop a plan of procedures on rational plant material collection;
- to use the knowledge about chemical composition of MPM on collection, storage and analysis of the raw material of herbal and animal origin and medicines;
- to make a conclusion about the raw material quality based on the results of pharmacopoeial analysis;
- to interpret the correlation between the chemical structure of BAC and pharmacological activity;
- to develop information letters, report for doctors and consult the people on the questions connected with MP, raw material and medicines of natural origin.
- revealing among the wild flora the species, medicines of which show expressed pharmacological activity; development of general guidelines, methods of long-term and current resource estimation of a territory;
- rational arranging of MPM collection, forming careful attitude to the environment, rational usage of plant resources; rational MPM collection based on their regional assignment, relevant calendar terms (collection periodicity) of MP brushwood exploitation, organization of their protection and reproduction.

## 3. Competence and planned educational outcomes

Educational component « Resource science of medicinal plants » ensures the acquisition of applicants for higher education the following **competences**:

**integral:** the ability to solve typical and complex specialized problems and practical problems in professional activities in the field of health care, or in the learning process, which involves research and / or innovation and is characterized by complexity and uncertainty of conditions and requirements;

**general:**

GC 6. Knowledge and understanding of the subject area and understanding of professional activity.

**special (professional):**

PC 16. The ability to organize and carry out the procurement of medicinal plant raw materials in accordance with the rules of the Good Practice of Cultivation and Collection of Raw Materials of Plant Origin (GACP), as a guarantee of the quality of medicinal plant raw materials and medicines based on them. The ability to predict and calculate ways

to solve the problem of preservation and protection of thickets of wild medicinal plants, in accordance with current legislation.

PC 20. Ability to develop methods of quality control of medicinal products, including active pharmaceutical ingredients, medicinal plant raw materials and auxiliary substances using physical, chemical, physico-chemical, biological, microbiological, pharmacotechnological and pharmaco-organoleptic control methods.

Integrative final **program learning outcomes** (PLO), the formation of which is facilitated by the educational component «Nutriciology»:

PLO 7. Perform professional activities using creative methods and approaches.

PLO 28. Organize and carry out rational procurement of medicinal plant raw materials. Develop and implement measures for the protection, reproduction and rational use of wild species of medicinal plants.

As a result of studying the educational component, the applicant for higher education will be *know*:

- regulatory framework of using resources of wildy grown MP at current stage;
- life forms of plants, influence of geographical and ecological factors (light, water, temperature, substrate) on the features of morphological and anatomical structure and functioning of plant organisms;
- species of medicinal plants growing in Ukraine and introduced ones;
- species of medicinal plants that do not grow in Ukraine, but are the sources of raw material for the production of phytomedicines and special food products, present in pharmacies;
- species of medicinal plants that are included in the State Pharmacopoeia of Ukraine;
- natural habitats of medicinal plants;
- characteristic of raw material base of wildy grown MP;
- rules of determination of productivity, operational reserve and possible volume of annual collection;
- organizing and general rules of collection, drying and storage of MPM;
- major procuring organizations and their functions;
- system of state measures on MP rational usage and protection in Ukraine;
- methods of MP resources record;
- methods and approaches to rational MP usage with account of current legislation and regulatory acts on nature protection;
- safety arrangements and precautions while working with MP and MPM;
- system of standardization and certification of MPM, phytoremedies in Ukraine, documenting the results of MPM analysis, legal effect of the certificate.

*be able to*:

- orientate in current challenges of providing pharmaceutical industry with MPM;
- predict and find prospective species of plants - the sources of certain biologically active compounds;
- estimate resources of MPM in certain brushwood areas;
- elaborate and predict the efficacy of rational usage and reproduction of plant resources;
- organize and carry out collection, acceptance and standardization of MPM, including in field conditions;
- carry out measures aimed at storage and multiplication of MP brushwood and plants included into the Red Book of Ukraine;
- organize agrotechnical measures and carry out expert estimation of their effectiveness;
- carry out collection and drying, primary processing and storage of MPM;
- distinguish admixtures of morphologically related species on collection, acceptance and certifying of MP;
- calculate productivity, operational reserve and possible volume of annual collection of wild plants.

*possess*:

the recipient of a higher education degree (master's degree) must possess general (GC 6) and special (professional) (PC 16, 20) competencies (*expected learning outcomes*).

4. The educational component structure

Names of content modules and topics	The amount of hours				
	full time study (4,10д)				
	the whole amount	including			
l.		sem	prac	self-study	
<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>
<b>Module 1. Choosing objects of a resource study. Composing a calendar plan of resource examination of the region. Exposure of MP brushwood of the region according to the literature and report data. Composure of working routes. Description of associations that include MP. Estimation of the sizes of MPM reserves using methods of registration grounds, model specimens and projecting covering.</b>					
<b>Content module 1. Choosing objects of a resource study. Composing a calendar plan of resource examination of the region. Exposure of MP brushwood of the region according to the literature and report data. Composure of working routes. Description of associations that include MP.</b>					
<b>Topic 1.</b> World flora and its abundance. Tasks of Resource science of medicinal plants.	8	1	-	2	5
<b>Topic 2.</b> Raw material base of MP in Ukraine.	7	1	-	1	5
<b>Topic 3.</b> An Ecosystem. Connections in an ecosystem.	6,5	0,5	-	1	5
<b>Topic 4.</b> Legal status of plant species, prohibition and restrictions of their uses.	7,5	0,5	-	2	5
<b>Control of the content module 1</b>	9	-	-	2	7
<b>The whole amount of hours for the content module 1</b>	<b>38</b>	<b>3</b>	<b>-</b>	<b>8</b>	<b>27</b>
<b>Content module 2. Estimation of the sizes of MPM reserves using methods of registration grounds, model specimens and projecting covering. Working out recommendations on rational collection of MP.</b>					
<b>Topic 5.</b> Methods of MPM productivity determination.	7,5	0,5	-	2	5
<b>Topic 6.</b> Recording of MPM reserves.	6,5	0,5	-	2	4
<b>Topic 7.</b> Composing plans of MPM collection volumes. Execution of cartographic materials.	7,5	0,5	-	3	4
<b>Topic 8.</b> Nature reserve fund. Descriptions, ecological and phytocoenological features, state of natural resources and their protection.	6,5	0,5	-	2	4
<b>Topic 9.</b> Biotechnological aspects of enlargement of raw material base of the sources of BAC.	6,5	0,5	-	2	4
<b>Topic 10.</b> New prospective medicinal plants of the world. Current state of their plant material base.	6,5	0,5	-	2	4
<b>Control of the content module 2</b>	10	-	-	2	8
<b>The whole amount of hours for the content module 2</b>	<b>51</b>	<b>3</b>	<b>-</b>	<b>15</b>	<b>33</b>
<b>Semester credit from the module 1</b>	<b>1</b>	<b>-</b>	<b>-</b>	<b>1</b>	<b>-</b>
<b>Total for Module 1</b>	<b>90</b>	<b>6</b>	<b>-</b>	<b>24</b>	<b>60</b>
<b>The whole amount of hours for the course</b>	<b>90</b>	<b>6</b>	<b>-</b>	<b>24</b>	<b>60</b>

## 5. Content of of the educational component

**Module 1. Choosing objects of a resource study. Composing a calendar plan of resource examination of the region. Exposure of MP brushwood of the region according to the literature and report data. Composure of working routes. Description of associations that include MP. Estimation of the sizes of MPM reserves using methods of registration grounds, model specimens and projecting covering.**

*Content module 1. Choosing objects of a resource study. Composing a calendar plan of resource examination of the region. Exposure of MP brushwood of the region according to the literature and report data. Composure of working routes. Description of associations that include MP.*

**Topic 1. World flora and its abundance. Tasks of Medicinal Plants' Resource Science. Geobotanical bases of Medicinal Plants' Resource Science. Characteristic of phytocenoses.** Influence of development phase of a plant and environmental factors on production and accumulation dynamics of active components.

**Topic 2. Raw material base of MP in Ukraine.** Wildly grown and cultivated MP in Ukraine. Choosing objects of a resource study. Officinal and non-officinal plants of Ukraine.

**Topic 3. An Ecosystem.** Connections in an ecosystem. Environmental changes as a result of human activity: environmental pollution; melioration; recovery of one's health – deterioration of environmental "health"; air pollution. Composing a calendar plan of resource examination of a region.

**Topic 4. Legal status of plant species, prohibition and restrictions of their uses.** Laws protecting the species included in the Red Book of Ukraine. Composure of working routes. Description of plant communities including medicinal plants.

*Content module 2. Estimation of the sizes of MPM reserves using methods of registration grounds, model specimens and projecting covering. Working out recommendations on rational collection of MP.*

**Topic 5. Methods of MPM productivity determination.** Exposure of MP brushwood of the region according to the literature and report data.

**Topic 6. Recording of MPM reserves. Location of territories and objects of Nature reserve fund of Ukraine.** Estimation of the sizes of MPM reserves using methods of registration grounds, model specimens and projecting covering. Calculation of biological, operational reserve and possible volume of annual collection of MPM.

**Topic 7. Composing plans of MPM collection volumes. Execution of cartographic materials.** *Food plants as the source of BAC.* Enlargement of raw material base of the sources of BAC using methods of biotechnology.

**Topic 8. Nature reserve fund. Descriptions, ecological and phytocoenological features, state of natural resources and their protection.** Characteristic of phytocenoses.

**Topic 9. Biotechnological aspects of enlargement of raw material base of the sources of BAC.** Composing a project of guidelines on MPM collection. MP cultivation, control over BAC biosynthesis. Ways of influence on the MP productivity.

**Topic 10. New prospective medicinal plants of the world. Current state of their plant material base.** Working out recommendations on rational collection of medicinal plants. Introduction of medicinal plants.

**Semester credit from the module 1**

## 6. Topics of lectures

№	Name of topic	The amount of hours
1.	<b>Topic 1.</b> World flora and its abundance. Tasks of Medicinal Plants' Resource Science. Geobotanical bases of Medicinal Plants' Resource Science.	1
2.	<b>Topic 2.</b> Raw material base of MP in Ukraine. Wildly grown and cultivated MP in Ukraine.	1
3.	<b>Topic 3.</b> An Ecosystem. Connections in an ecosystem.	0,5
4.	<b>Topic 4.</b> Legal status of plant species, prohibition and restrictions of their uses.	0,5
5.	<b>Topic 5.</b> Methods of MPM productivity determination.	0,5
6.	<b>Topic 6.</b> Recording of MPM reserves.	0,5
7.	<b>Topic 7.</b> Composing plans of MPM collection volumes. Execution of cartographic	0,5

№	Name of topic	The amount of hours
	materials.	
8.	<b>Topic 8.</b> Nature reserve fund. Descriptions, ecological and phytocoenological features, state of natural resources and their protection.	0,5
9.	<b>Topic 9.</b> Biotechnological aspects of enlargement of raw material base of the sources of BAC.	0,5
10.	<b>Topic 10.</b> New prospective medicinal plants of the world. Current state of their plant material base.	0,5
<b>Total for Module 1</b>		<b>6</b>
<b>The whole amount of hours</b>		<b>6</b>

7. **Topics of seminars**

Not provided for in the working curriculum.

**8. Topics of Practical lessons**

№	Name of topic	The amount of hours
1.	<b>Topic 1.</b> World flora and its abundance. Tasks of Medicinal Plants' Resource Science. Geobotanical bases of Medicinal Plants' Resource Science.	2
2.	<b>Topic 2.</b> Raw material base of MP in Ukraine. Wildly grown and cultivated MP in Ukraine.	1
3.	<b>Topic 3.</b> An Ecosystem. Connections in an ecosystem.	1
4.	<b>Topic 4.</b> Legal status of plant species, prohibition and restrictions of their uses.	2
5.	<b>Control of the content module 1</b>	2
6.	<b>Topic 5.</b> Methods of MPM productivity determination.	2
7.	<b>Topic 6.</b> Recording of MPM reserves.	2
8.	<b>Topic 7.</b> Composing plans of MPM collection volumes. Execution of cartographic materials.	3
9.	<b>Topic 8.</b> Nature reserve fund. Descriptions, ecological and phytocoenological features, state of natural resources and their protection.	2
10.	<b>Topic 9.</b> Biotechnological aspects of enlargement of raw material base of the sources of BAC.	2
11.	<b>Topic 10.</b> New prospective medicinal plants of the world. Current state of their plant material base.	2
12.	<b>Control of the content module 2</b>	2
13.	<b>Semester credit from module 1</b>	1
<b>Total for Module 1</b>		<b>24</b>
<b>The whole amount of hours</b>		<b>24</b>

9. **Topics of laboratorial lessons**

Not provided for in the working curriculum.

**10. Self-study work**

№	Name of topic	The amount of hours
1.	<b>Topic 1.</b> World flora and its abundance. Tasks of Medicinal Plants' Resource Science. Geobotanical bases of Medicinal Plants' Resource Science.	5
2.	<b>Topic 2.</b> Raw material base of MP in Ukraine. Wildly grown and cultivated MP in Ukraine.	5
3.	<b>Topic 3.</b> An Ecosystem. Connections in an ecosystem.	5
4.	<b>Topic 4.</b> Legal status of plant species, prohibition and restrictions of their uses.	5
5.	Control of the content module 1	7
6.	<b>Topic 5.</b> Methods of MPM productivity determination.	5

№	Name of topic	The amount of hours
7.	<b>Topic 6.</b> Recording of MPM reserves.	4
8.	<b>Topic 7.</b> Composing plans of MPM collection volumes. Execution of cartographic materials.	4
9.	<b>Topic 8.</b> Nature reserve fund. Descriptions, ecological and phytocoenological features, state of natural resources and their protection.	4
10.	<b>Topic 9.</b> Biotechnological aspects of enlargement of raw material base of the sources of BAC.	4
11.	<b>Topic 10.</b> New prospective medicinal plants of the world. Current state of their plant material base.	4
12.	Control of the content module 2	8
<b>Total for Module 1</b>		<b>60</b>
<b>Total amount of hours</b>		<b>60</b>

Tasks for Self-study work

**Topic 1.** Geobotanical bases of Medicinal Plants' Resource Science. Characteristic of phytocenoses. Influence of development phase of a plant and environmental factors on production and accumulation dynamics of active components.

**Topic 2.** Choosing objects of a resource study. Officinal and non-officinal plants of Ukraine.

**Topic 3.** Environmental changes as a result of human activity: environmental pollution; melioration; recovery of one's health – deterioration of environmental "health"; air pollution. Composing a calendar plan of resource examination of a region.

**Topic 4.** Laws protecting the species included in the Red Book of Ukraine. Composure of working routes. Description of plant communities including medicinal plants.

**Topic 5.** Exposure of MP brushwood of the region according to the literature and report data.

**Topic 6.** Location of territories and objects of Nature reserve fund of Ukraine. Estimation of the sizes of MPM reserves using methods of registration grounds, model specimens and projecting covering. Calculation of biological, operational reserve and possible volume of annual collection of MPM.

**Topic 7.** Food plants as the source of BAC. Enlargement of raw material base of the sources of BAC using methods of biotechnology.

**Topic 8.** Characteristic of phytocenoses.

**Topic 9.** Composing a project of guidelines on MPM collection. MP cultivation, control over BAC biosynthesis. Ways of influence on the MP productivity.

**Topic 10.** Working out recommendations on rational collection of medicinal plants. Introduction of medicinal plants.

**11. Criteria and evaluation order of educational outcomes.**

**Scheme of accrual and distribution of points for full-time higher education applicants**

Current testing and independent work											Total	
Module 1												
Content module 1					Content module 2							
T 1	T 2	T 3	T 4	CM1 T 1-4	T 5	T 6, 7, 8			T 9	T 10	CM2 T5-10	60-100
3-5	3-5	3-5	3-5	18-30	3-5	3-5	3-5	3-5	3-5	3-5	12-20	

The criteria for evaluating the knowledge and skills of students of higher education from the educational component " Resource science of medicinal plants" were developed in accordance with the "Regulations on the procedure for evaluating students' knowledge in the credit-modular organization of the educational process at the National University of Pharmacy". The evaluation of the success of a higher education student in the educational component is a rating, presented on a one-point scale and defined according to the ECTS system and the traditional scale adopted in Ukraine.

Evaluation of the current educational activity (carried out during each class) - test written control, control



of theoretical knowledge, practical skills and abilities.

Evaluation (in points) is reflected in the calendar and thematic plans of practical classes.

The number of points that a student receives at a class is from 3.0 to 5.0 points.

Criteria	points
<ul style="list-style-type: none"> <li>- showed comprehensive and profound knowledge of the theoretical material in the textbook, lectures and additional literature;</li> <li>- replied fully, reasonably, logically on the main and additional questions of discipline;</li> <li>- perfectly fulfilled a written task;</li> <li>- mastered the material, which is made on independent study;</li> </ul>	5
<ul style="list-style-type: none"> <li>- showed complete knowledge of the theoretical material contained in the textbook, the text of the lecture and additional literature;</li> <li>- making minor mistakes, inaccuracies corrected after the teacher's remarks on the main and additional issues of discipline;</li> <li>- fulfilled the written task more than half.</li> <li>- mastered the material, which is made on the independent study is not in full</li> </ul>	4
<ul style="list-style-type: none"> <li>- showed the knowledge of theoretical material on the subject in the amount that is considered necessary and sufficient for the practical part of the study;</li> <li>- fulfilled the written task of making errors in the formulation of conclusions</li> </ul>	3
<ul style="list-style-type: none"> <li>- did not get acquainted with the theoretical material contained in the textbook, the text of the lecture and additional literature.</li> <li>- knowledge is not systematic, fragmentary. The answers are rude, fundamental errors.</li> <li>- did not answer the teacher's theoretical questions</li> <li>- did not fulfill a written task.</li> </ul>	0-2

The system of assessment of knowledge of higher education students in the discipline

Submodules	Modules	Total
	Current control of submodules	
Content module 1	50 points	
Content module 2	50 points	
Total	100 points (min 60 points)	100

The current control of submodules (CM1, CM 2) is a maximum of 100 points, a minimum of 60 points.

The module is considered completed if the applicant has scored from 60 to 100 points.

Assessment of current educational activities (conducted at each lesson) control of theoretical knowledge, practical skills.

For each topic of the module for the current educational activity, students are given points for all types of activities, which at the end of the study of the submodule are summed. Depending on the number of points scored, the student may receive a maximum of 50 points or a minimum of 30 points for studying the submodule.

Current control using standardized methods of knowledge, competences and skills diagnostics is carried out at a laboratory class according to the certain objectives of the topic and during individual work of a teacher for topics not included to the structure of a class and are subject to the independent learning.

Substantial module control (test, written, oral control of theoretical knowledge and practical skills on identification of MPM and determination of its quality).

On estimation of mastering of a topic theoretical and practical preparation of a student is considered, which is evaluated by stocking system (in the form of 0, 1, 2 points).

In case of successful accomplishment of all types of educational work in the module and obtaining minimal 30 points for current educational activity, the student is allowed to complete the final module control.

Control of every substantial module is evaluated at maximum 30 or 50 points depending on the structure of a module.

## 12. Forms of progress and semester supervision of academic achievements

*Current control* of theoretical and practical knowledge in the form of an oral, written and test survey using standardized methods for diagnosing knowledge, abilities and skills is carried out at each laboratory session in accordance with the specific goals of the topic and during the individual work of the teacher for topics that are not included in the structure of the lesson and are developed by the student of higher education independently.

*Control of content modules* - control of theoretical knowledge in the form of an oral, written and test survey of applicants for higher education, as well as practical skills in determining the identity and benignity of MPM. Control refers to knowledge and skills, both acquired in classes, and objects and topics developed independently by students of higher education.

When *studying the educational component* «Resource science of medicinal plants», students of higher education take a semester exam. The exam on pharmacognosy with the basics of resource science is conducted in written form during the exam session, according to the schedule.

*Form of control* - semester credit.

## 13. Methodological support

1. Educational work program of educational component
2. Work program of educational component.
3. Calendar and thematic plans of lectures and laboratory lessons.
4. Textbooks, workshops, manuals, methodical recommendations, etc.
5. Materials of computer presentations of lectures.
6. Methodological recommendations for laboratory lessons, as well as independent work of students of higher education.
7. A list of theoretical questions for independent work of students of higher education.
8. List of questions and tasks for current control of knowledge and skills of higher education applicants.
9. List of theoretical questions and practical tasks for the control of meaningful modules, the exam.
10. Collection of MP herbariums and samples of MPM.

## 14. Reading suggestions

### The main reading suggestions

1. Pharmacognosy: textbook for higher school students / V.S. Kyslychenko, L.V. Upyr, Ya.V. Dyakonova, V.Yu. Kuznetsova, I.G. Zinchenko, O.A. Kyslychenko; ed. by V.S. Kyslychenko. – Kharkiv : NUPh : GoldenPages, 2011. – 552 p.; il.
2. Medicinal plants resource science : handbook for students of higher schools / V.S. Kyslychenko, L.V. Upyr, I.G. Zinchenko, O.A. Kyslychenko, S.I. Stepanova; ed. by V.S. Kyslychenko. – Kharkiv : NUPh : Golden Pages, 2012. – 168 p.
3. Pharmacognosy: textbook for students of higher / V.S. Kyslychenko, L.V. Lenchyk, I.G. Gurieva et al.; ed. by V.S. Kyslychenko. – Kharkiv : NUPh : Golden Pages, 2019. - 584 p.

### Supplementary reading suggestions

1. Закон України Про рослинний світ : Закон України від 9 квітня 1999 р. // Відомості Верховної Ради України (ВВР). – 1999. – № 22–23. – С. 198.
2. Червона книга України. Рослинний світ / за ред. Я. П. Дідуха — К. : Глобалконсалтинг, 2009. – 900 с.
3. British Pharmacopoeia Commission, 2016. *British Pharmacopoeia*. London: TSO.
4. European Pharmacopoeia. 8th ed including supplements 1 (2014), 2 (2014), 3 (15), 4 (15), 5(2015). Council of Europe, Strasbourg, France. 2014.
5. Textbook of Pharmacognosy and Phytochemistry - E-Book / Shah B., Seth A. – Elsevier Health Sciences, 2012. – 620 p.
4. WHO Monographs on selected medicinal plants. - Vol. 4. – World Health Organization: Geneva, 2009. – 456 p. Gokhale S. B., Kokate C. K., Purohit A. P. A textbook of Pharmacognosy. 29th Edition. 2017. 284 p.
5. Kumar N. A Textbook Of Pharmacognosy. A.I.T.B.S. Publishers, India. 2010. 502 p.
6. Shah B. N., Seth A.K. Textbook of Pharmacognosy and Phytochemistry. Elsevier. 2010. 587 p.
7. Singh A. A Textbook of Pharmacognosy. Pharma Book Syndicate. 2013. 836 p.
8. Text book of Pharmacognosy and Phytochemistry / A. Dhole, V. Dhole, V. Yeligar, Ch. Magdum. Pharma Career Publication, 2019. 778 p.

### 15. Electronic resources, including the Internet

1. Website of the Department of Pharmacognosy and Nutriciology – [www.cnc.nuph.edu.ua](http://www.cnc.nuph.edu.ua)
2. Website of the NUPh library – <http://lib.nuph.edu.ua>
3. Electronic archive of the NUPh – <http://dspace.nuph.edu.ua>
4. Center for Distance Technologies of the National Academy of Sciences of Ukraine – [pharmel.kharkiv.edu](http://pharmel.kharkiv.edu)
5. NUPh. Online tests – <http://tests.nuph.edu.ua>
6. Vernadsky National Library of Ukraine – <http://www.nbuv.gov.ua>
7. V.G. Korolenko Kharkiv State Scientific Library – <http://korolenko.kharkov.com>