Ministry of Health of Ukraine
Bogomolets National Medical University

WORKBOOK
for independent work of students
(classroom and extracurricular) in the discipline
«Medicinal products of plant origin»
Study guide.

Selected discipline «Medicinal products of plant origin»

Direction of study 22 «Healthcare»

Specialty 226 «Pharmacy, industrial pharmacy»

Department «Pharmacognosy and Botany»

Student_____

Course_____

Group_____

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The workbook has been compiled to optimize the assimilation of knowledge in practical classes in the discipline «Medicinal products of plant origin» by full-time, evening and part-time students of the Faculty of Pharmacy, majoring in «226 Pharmacy, Industrial Pharmacy».

INTRODUCTION

The selected discipline «Medicinal products of plant origin» is an important component of pharmaceutical disciplines. On the one hand, it is a continuation and the final stage of the botanical education of a pharmacist, and on the other hand, it is necessary for pharmacognosy, since the development of new effective herbal medicines and their introduction into medical practice is impossible without identifying the raw material base of specific plant species, finding out whether they can be used from the natural environment, grown or imported.

Research on the diversity of medicinal plants as a source of medicinal plant material is being conducted worldwide, but its focus and nature vary from country to country. These differences are related to the peculiarities of a country's economy, traditions, abundance of plant resources, accessibility and development of the territory.

The materials published in the workbook are aimed at familiarizing future specialists with international priorities in the field of study, use and protection of medicinal plants and Ukraine's participation in the international market of herbal medicines and substances. The structure of the materials in the workbook corresponds to the curriculum and the textbook. The appendixes contain information materials necessary for students to complete assignments on specific topics.

In preparing the manual, original materials from our own research, materials from appendixes to the SFU, the State Register of Medicines of Ukraine, domestic and foreign scientific publications were used.

CONTENT

Topic 1. Regulatory basis for the creation of medicinal products of plant origin.

Aims: to learn the basic basic regulatory framework for the development of medicinal products of plant origin.

To know: terms fixed in regulatory documents on the creation of herbal medicines.

Be able to: interpret the methods and objects of creation of modern herbal medicines through the prism of pharmaceutical botany and pharmacognosy.

Educational tasks

Task 1. To learn the terms used in regulatory documents on the development of medicinal products of plant origin.

Task 2. Analyzing certain pharmacopoeial articles and regulatory documents governing the development and creation of medicinal products of plant origin.

Give definitions of the concepts.

Phytotherapy –_____
_____
_____

Medicinal plants – _____
_____
_____

Medicinal plant raw materials – _____
_____
_____

Preparations of plant origin – _____
_____
_____

Standardized herbal preparation – _____
_____
_____

Plant substances – _____
_____
_____

Task 3. Write the definition of the main terms and concepts in the protocol according to the Law of Ukraine «On Medicines».

Medicinal product – _____
_____
_____
_____

Green patent – _____
_____

Active pharmaceutical ingredient – _____
_____
_____
_____

Excipient – _____
_____
_____

State Pharmacopoeia of Ukraine – _____
_____
_____
_____

Pharmacopoeia article – _____
_____
_____

Quality of the medicinal product – _____
_____
_____
_____
_____

Term of validity of medicinal products –
_____
_____
_____

Task 4. Make a description of the plants of official medicine in the protocol according to the scheme.

Object No. 1–2		
Diagnostic features	Name of the species of medicinal plant (Latin)	Name of the species of medicinal plant
Life form		
Underground organs		
Stem		
Leaves		
Flowers		
Raw materila		
Object No. 3–4		
Life form		
Underground organs		
Stem		
Leaves		
Flowers		
Raw material		
Object No. 4–6		
Life form		
Underground organs		
Stem		
Leaves		
Flowers		
Raw material		

Task 5. Create an algorithm and characterize each stage of cultivation and harvesting of plant materials.

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INDEPENDENT EXTRACURRICULAR WORK OF STUDENTS FOR TOPIC 1

Topic 1: Basic definitions and content of terms used in regulatory documents on the development of medicinal products of plant origin.

Task 1. Write the definitions of the main terms and concepts in the protocol.
Terms:

State Register of Medicinal Products of Ukraine:
_____
_____

Pharmaceutical form:
_____
_____

Products «in bulk»:
_____

_____

_____

Task 2. Make a table and give a brief description of the history of the use of plants in medical practice.

IV-II thousand years BC. The civilization of the Shuvers	Medicinal plants were used in various forms: fresh, as powders and tinctures, as water and wine solvents.
VI century BC. Ancient Egypt	«Ebers papyrus» :

_____Signature of the teacher

Topic 2. Wild and cultivated medicinal plants as a source of raw materials for the creation of medicinal products of plant origin.

Aims: to acquire knowledge of the diversity of medicinal plants as a source of raw materials for the creation of medicinal products of plant origin.

To know:

- medicinal plants of domestic and foreign origin in the State Pharmacopoeia of Ukraine;
- the main groups of biologically active substances present in the medicinal products;
- belonging of similar in content of biologically active substances of the medicinal products to certain taxonomic ranks (genera, families);
- to distinguish among the medicinal plants of Ukraine introduced, cultivated and wild-growing medicinal plants;
- closely related species of medicinal plants;
- rules of collection and primary processing of medicinal plant materials (good practice of cultivation and collection of raw materials of plant origin. Collection and primary processing of medicinal plant materials).

Be able to:

- identify closely related wild and cultivated medicinal plants;
- to distinguish between types of raw materials;
- identify the diagnostic features of a particular family, genus of drugs.

Educational tasks

Task 1. To analyze information of wild and cultivated plants used for the production of medicines in Ukraine. To acquire knowledge on the use of a variety of medicinal plants of different systematic groups for the creation of herbal medicines.

Task 2. Give examples of medicinal plant species that have similar uses and belong to the same family. Present the results in the form of a table.

Family: *English*._____*Latin*_____	
action: vitamin_____	
Medicinal plant	Raw material
Medicinal plant	Raw material
Medicinal plant	Raw material

Medicinal plants	Raw material

action:__ anti-inflammatory _____	
Medicinal plants	Raw material
Medicinal plant	Raw material
Medicinal plant	Raw material
Medicinal plant	Raw material
action:___ choleretic_ _____	
Medicinal plant	Raw material
Medicinal plant	Raw material
Medicinal plant	Raw material
Medicinal plant	Raw material

Task 3. Give examples of the types of medicinal products whose raw

materials in Ukraine and your home country are collected only from cultivated plants. Present the results in the form of a table.

Medicinal plant	Raw material
Medicinal plant	Raw material
Medicinal plant	Raw material
Medicinal plant	Raw material
Medicinal plant	Raw material
Medicinal plant	Raw material
Medicinal plant	Raw material
Medicinal plant	Raw material
Medicinal plant	Raw material
Medicinal plant	Raw material

Task 4. Write a list of Latin names of natural and cultivated plant species in Ukraine and in your home country in the class report.

Medicinal plant	Raw material

Task 5. Give examples of the use of cultivated and wild medicinal plant species in medicines.

_____
_____
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INDEPENDENT EXTRACURRICULAR WORK OF STUDENTS FOR TOPIC 2

Topic 2. Wild and cultivated medicinal plants as a source of raw materials for the creation of medicinal products of plant origin.

Task 1. To analyze medicinal products of herbal origin from the State Register of Medicinal Products of Ukraine in terms of plant components.

№	Type of medicinal product	Medicinal plant
1.	Phytolyte	
2.	Immunophyte	
3.	Urocholum	
4.	Neprophyt	
5.	Cardiophyt	

Task 2. Describe the rules for collecting different types of medicinal plant raw materials.

№	The type of raw material	Terms and features of harvesting
1.	Herb	

2.	Roots	
3.	Fruits	
4.	Flowers	
5.	Leaves	

Task 3. Provide examples of medicinal plants of domestic origin in the State Pharmacopoeia of Ukraine and the Pharmacopoeia of your country.

№	Plant species	Type of raw material
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

_____Signature of the teacher

Topic 3. The influence of external conditions on medicinal plants and their accumulation of biologically active compounds.

Aims: to acquire knowledge about the impact of external conditions on medicinal plants and their accumulation of biologically active compounds.

To know:

- dependence of accumulation of biologically active compounds by plants in different soil and climatic conditions;
- main groups of biologically active compounds associated with the accumulation of certain harmful substances;
- peculiarities of growing medicinal plants;
- dependence of the synthesis of biologically active substances by medicinal plant species on the chemical composition of the substrate; ecological and coenotic affiliation of the main types of medicinal plants.

Be able to:

- analyze the threats to the use of medicinal plants in different countries of the world;
- explain the relationship between weather conditions and the quality of raw materials of medicinal plants;
- to recognize the types of medicinal plants that can actively accumulate toxic substances;
- identify among medicinal plants species with a priority ability to accumulate nitrates, heavy metals, radionuclides.

Educational tasks

Task 1. To analyze the information on the influence of soil and climatic conditions on medicinal plants and their accumulation of biologically active compounds.

Task 2. Give examples of medicinal plants that have a priority ability to accumulate toxic substances.

Plant species	Medicinal raw materials	The main biologically active substances	Toxic substances

Task 3. Characterize the regularities of accumulation of pollutants in medicinal plant materials.

1._____
_____
_____
2._____
_____
_____
3._____
_____

Task 4. Give examples of medicinal plant species characterized by the highest level of 137Cs accumulation.

_____
_____
_____

Task 5. Work out the tests. Underline the correct answer.

1. The amount of moisture and humidity impact the amount and composition of active ingredients in plants. What substances can accumulate in a plant under conditions of high humidity?	6. BAS are formed in certain plant organs in the presence of appropriate enzymes and only at certain stages of development. Indicate in which phase of the vegetation flavonoids are formed in the grass.

A.Tannins.
B.Flavonoids.
C.Vitamin C.
D.Carotenoids.
E.Alkaloids.

2. Geographical latitude and longitude, altitude significantly impact the accumulation of bioactive substances. Which bioactive substances are accumulated in plants of southern latitudes?
A.Tannins.
B.Essential oils.
C.Alkaloids.
D.Flavonoids.
E.Fatty oils.

3. The accumulation of nitrate is a species-specific characteristic of plants. From the list of plants below, select those that are nitrophilic.
A.Anethum graveolens .
B.Rosa canina.
C.Urtica dioica.
D.Tussilago farfara.
E.Plantago major.

4. Plants can accumulate radionuclides in different ways. Indicate the families whose representatives are characterized by the highest accumulation of Cs137.
A.Malvaceae.
B.Ranunculaceae.
C.Ericaceae.
D.Fabaceae.
E.Lauraceae.

5. Plants can accumulate radionuclides in different ways. Indicate the plants that are characterized by the greatest accumulation of Sr90.
A.Mentha arvensis.
A.Flowering.
B.Budding
C.Vegetation.
D.Fruiting.
E.Germination.

7.The chemical composition of plant bioactive substances is influenced by the fertility and mechanical structure, moisture, pH of the soil, its chemical composition and mineral content. Which plant biologically active substances are significantly accumulated in plants growing on dry, stony soils?
A.Coumarins.
B.Essential oils.
C.Tannins.
D.Chromones.
E.Alkaloids.

8. A close relationship has been established between the content of certain macro- and microelements in the soil and the production of certain groups of bioactive substances by plants. What are the biologically active substances in plants that selectively absorb molybdenum, vanadium, and tungsten?
A.Saponins.
B.Vitamins.
C.Cardiac glycosides.
D.Polysaccharides.
E.Organic acids.

9. It was found that there is a dependence between the accumulation of certain groups of biologically active compounds in plants and the concentration of trace elements. Which of the following plants accumulate zinc?
A.Padus avium.

B.Urtica dioica. *C.Convalaria majalis.* *D.Laurus nobilis.* E.*Malus domestica*	*B.Betula pendula.* *C.Viola tricolor.* *D.Rosa canina.* *E.Chelidonium majus.* 10. From the list below, select those plants that actively concentrate toxic substances. A. *Malus domestica.* *B. Rubus ideus.* *C. Tanacetum vulgare.* *D. Achillea millefolium.* *E. Plantago major.*

INDEPENDENT EXTRACURRICULAR WORK OF STUDENTS FOR TOPIC 3

Topic 3. The influence of external conditions on medicinal plants and their accumulation of biologically active compounds.

Task 1. Group species of medicinal plants by their ability to accumulate various toxic substances. Present the results in the form of a table.

Group of toxic substances	Examples of medicinal plant species

Task 2. List the names of plant species whose synthesis of biologically active compounds depends on the content of copper, manganese, and cobalt in the soil in the class report.

Examples of medicinal plant species	Medicinal plant raw materials	The main biologically active substances	Soil microelements

Task 3. Describe the features of the accumulation of essential oil in plants depending on external factors. Give examples.

1._____
_____
_____

2._____
_____
_____

3._____
_____
_____

Task 4. Describe the features of the selection of components in the

development of herbal medicines based on essential oils.

Name of the medicinal plant, family and raw material	Active substances	Pharmacological action

_____Signature of the teacher

Topic 4. Medicinal plants of the subclasses Ranunculidae and Dilleniidae in domestic and foreign medical products.

Aims: to acquire knowledge about medicinal plants and their raw materials of the subclasses Ranunculidae and Dilleniidae in domestic and foreign medicines.

To know:

- dependence of the systematic affiliation of medicinal plants and the main groups of biologically active compounds;
- the main groups of biologically active compounds associated with the species of medicinal plants of the family Ranunculaceae and Papaveraceae;
- herbal domestic and foreign medicinal products, peculiarities of their selection and correlation in traditional and homeopathic medicinal products;
- the main groups of biologically active compounds associated with *Hypericum perforatum*, *Althaea officinalis*, *Vaccinium vitis-idaea*, *Erysimum diffusum*, *Capsella bursa-pastoris*;
- the effect of basic biological compounds for the development of targeted drugs.
-

Be able to:

- interpret the purpose of creating multi- and single-component medicines from medicinal plants of the families Ranunculaceae and Papaveraceae;
- explain the relationship of the component composition of herbal medicines;
- identify medicinal products based on flavonoids and alkaloids;
- peculiarities of selection and ratio of components in traditional and homeopathic medicines.

Educational tasks

Task 1. To work out the information on the variety of forms of herbal medicines.

Task 2. Give examples of biologically active substances of plants of primary and secondary synthesis.

1.1._____
_____
_____

1.2. _____
_____
_____

Task 2. Give examples of types of medicinal products and single-component medicinal products from medicinal plants of the Ranunculaceae and

Papaveraceae families.

Species of medicinal plants	Medicinal plant raw materials	The main biologically active substances	Medicinal product(s)

Task 3. Give examples of multicomponent medicines from medicinal plants *Hypericum perforatum*, *Althaea officinalis* and other types of medicinal products.

Medicinal product	Other types of medicinal plants

Task 4. Provide a list of species of medicinal plants of the subclass Dilleniidae that are included in multicomponent preparations.

№	Species of medicinal plant	List of medicinal products
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		

Task 5. Specify the main methods of analysis of medicinal products of plant origin.

_____

_____

_____

INDEPENDENT EXTRACURRICULAR WORK OF STUDENTS FOR TOPIC 4

Topic 4. Medicinal plants of the subclasses Ranunculidae and Dilleniidae in medicines.

Task 1. To characterize the process of creating medicinal products of plant origin.

1.1. Safety and quality factors

1.2. Контроль якості

1.3. Stages of productio

Task 2. Give examples of the selection of components of a medicinal product whose main active ingredients are flavonoids.

Active substance	Properties

Task 3. Give examples of the selection of components of a preparation containing simple phenols as its main active ingredients.

Active substance	Properties

_____Signature of the teacher

Topic 5. Medicinal products of plant origin (from raw materials of plant species of the family Asteraceae)

Aims: to acquire knowledge about medicinal plants and their raw materials of the Asteraceae family in medicines.

To know:

- dependence of the systematic affiliation of medicinal plants and the main groups of biologically active compounds;
- herbal medicines, features of their selection from medicinal plants of the family Asteraceae;
- the effect of basic biological compounds for the development of medicines for specific purposes;
- species diversity of medicinal plants of the family Asteraceae in the flora of Ukraine and your country.

Be able to:

- to interpret the purpose of creating multicomponent and single-component medicines from medicinal plants of the family Asteraceae;
- determine the resource value of medicinal plant species of certain botanical and geographical zones;
- to identify among medicinal plants species of resource importance;
- to evaluate the diversity of medicinal forms of plant origin, which use raw materials of species of the genera *Achillea*, *Matricaria*, *Echinacea*.

Educational tasks

Task 1. Process information on the diversity of medicinal plants of botanical and geographical zones of Ukraine and your country.

Task 2. Give examples of species of medicinal plants and single-component medicinal products from medicinal plants of the family Asteraceae.

Species of medicinal plants	Medicinal plant raw materials	The main biologically active substances	Medicinal product(s)

Task 3. Give examples of multicomponent medicines from medicinal plants of the Asteraceae family and other types of medicinal plants.

Species of medicinal plants of the family Asteraceae medicinal product	Other species of medicinal plants

Task 4. Give a list of species of medicinal plants of the family Asteraceae that are included in multicomponent medicines.

№	Species of medicinal plant	List of medicinal products
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		

Task 5. Give a brief description of databases on medicinal products of plant origin.

Cochrane Base	
Medline base	

INDEPENDENT EXTRACURRICULAR WORK OF STUDENTS FOR TOPIC 5

Topic 5. Medicinal products of plant origin (from raw materials of plant species of the family Asteraceae).

Task 1. To characterize medicinal plants of the family Asteraceae in terms of the content of the main biologically active substances and action.

Species of medicinal plants	Medicinal plant raw materials	The main biologically active substances	Action

Task 2. Describe the advantages and disadvantages of multi-component fees.

_____
_____
_____
_____
_____
_____
_____
_____
_____

Task 3. To characterize the systematic affiliation of medicinal plants in the medicinal products Nephrofyt, Gastrophyt, Cholle-gran.

Nephrofyt		
Species	Genus	Family
Gastrophyt		
Species	Genus	Family
Cholle-gran		
Species	Genus	Family

_____Signature of the teacher

Topic 6. Medicinal products of plant origin (from raw materials of plant species of the family Lamiaceae)

Aims: to acquire knowledge about medicinal plants of the Lamiaceae family and their raw materials in medicines.

To know:

- common and distinctive biologically active compounds in the raw materials of medicinal plants of the Lamiaceae family;
- the main sources of contamination of raw materials of wild medicinal plants;
- patterns of accumulation of biologically active compounds in medicinal plants depending on natural and climatic conditions;
- domestic and foreign herbal medicines, peculiarities of their selection from medicinal plants of the Lamiaceae family;
- dependence of the content of biologically active substances on the stage of development of medicinal plants.

Be able to:

- explain the action of basic biological compounds for the development of targeted drugs;
- interpret the purpose of creating multi- and single-component medicines from medicinal plants of the Lamiaceae family;
- identify common and distinctive biologically active compounds in the raw materials of medicinal plants of the Lamiaceae family.

Educational tasks

Task 1. To analyze the information on the diversity of Lamiaceae.

Task 2. Give examples of species of medicinal plants and single-component medicinal products from medicinal plants of the family Lamiaceae.

Species of medicinal plants	Medicinal plant raw materials	The main biologically active substances	Medicinal product(s)

<u>Task 3.</u> To give multicomponent medicines from medicinal plants of the Lamiaceae family and other types of medicinal plants.

Species of medicinal plant	Other species of medicinal plants

Task 4. Give a list of species of medicinal plants of the family Lamiaceae that are included in multicomponent products.

№	Species of medicinal plant	List of medicinal products
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		

Task 5. To give a definition and characterize.

GMP (Good Manufacturing Practice) – _____
_____
_____
_____
_____
_____
_____

GACP (Good Agriculture and Collection Practice) – _____
_____
_____
_____
_____
_____
_____

INDEPENDENT EXTRACURRICULAR WORK OF STUDENTS FOR TOPIC 6

Topic 6. Medicinal products of plant origin (from raw materials of plant species of the family Lamiaceae)

Task 1. To characterize medicinal plants of the Lamiaceae family in terms of the content of the main biologically active substances and action.

Species of medicinal plants	Medicinal plant raw materials	The main biologically active substances	Action

Task 2. Answer the following questions.

1. What are the diagnostic features of the stem and leaves of *Mentha piperita*?	
2. The list of plants from the Lamiaceae family accidentally includes a representative of Boraginaceae. Identify this representative: *Symphytum officinalis*, *Mentha piperita*, *Thymus serpyllum*, *Salvia officinalis, Betonica officinalis*.	
3. What part of Lavandula longifolia is used as a medicinal plant material?	
4. Give the Latin name of a perennial plant (family Lamiaceae) that is only cultivated in Ukraine/your country.	

5. What parts of *Salvia officinalis* are harvested for medicinal products?	
6. What flower is characteristic of Lamiaceae species?	
7. Name a member of the Lamiaceae family whose preparations have a sedative effect and relieve spasms of brain vessels.	
8. What are the main active ingredients of most representatives of the Lamiaceae family?	
9. What medicinal product is made from *Thymus serpyllum*?	
10. According to the type of symmetry, flowers of plants from the Lamiaceae family are……	

Task 3. To characterize the systematic affiliation of the LR in the medicinal products Phytosedan, Species sedativae No. 2, Novopasit

Phytosedan		
Species of medicinal plant	Genus	Family
Species sedativae No. 2		
Species of medicinal plant	Genus	Family

Novopasit		
Species of medicinal plant	Genus	Family

_____Signature of the teacher

Topic 7. Medicinal plants, the raw materials of which are most commonly used in medicinal products of plant origin.

Aim: to acquire knowledge about the peculiarities of combining biologically active compounds from valerian officinalis, horsetail, ivy, belladonna, hops, plantain species in medicines.

To know:

- common and distinctive diagnostic features in the raw materials of valerian officinalis, horsetail, ivy, belladonna, hops, plantain species;
- rules for the selection of components of medicinal products for the intended purpose;
- herbal medicinal products, peculiarities of combining these medicinal plants in unidirectional medicinal products;
- mechanism of creation of a medicinal product for a specific purpose.

Be able to:

- explain the action of basic biological compounds for the development of medicines for targeted use;
- identify the main and additional components of the future drug product;
- recognize multicomponent medicinal products with multidirectional action.

Educational tasks

Task 1. To acquire knowledge about multicomponent and single-component medicines of multidirectional action from medicinal plants of valerian officinalis, horsetail, ivy, belladonna, hops, plantain species in medicines; features of their selection and correlation in traditional and homeopathic medicines.

Task 2. Describe the common and distinctive morphological features of Plantago species.

Diagnostic features	*Plantago major*	*Plantago lanceolata*	*Plantago psyllium (P.indica)*
Leaf, venation			
Leaf arrangement			
Inflorescences			
Raw material			

Main active substances			
Medicinal products			

<u>Task 3.</u> Give examples of multicomponent products containing Valeriana officinalis.

Medicinal product/action	Other species of medicinal plants

Task 4. Describe the following medicinal plants: valerian officinalis, horsetail, ivy, belladonna, hops, and plantain in terms of the content of the main biologically active substances and their effects.

Species of medicinal plants	Medicinal plant raw materials	Main biologically active substances	Action

Task 5. Analyze the main provisions of Directive 2001/83/EC of the European Parliament and of the Council.

_____

_____

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INDEPENDENT EXTRACURRICULAR WORK OF STUDENTS FOR TOPIC 7

Topic 7. Medicinal plants, raw materials of which are most often used in medicinal products of plant origin.

Task 1. Give examples of multicomponent medicinal products containing *Humulus lupulus*.

Medicinal product/action	Other species of medicinal plants

<u>Task 2.</u> Give examples of multicomponent medicinal products containing *Hedera helix*.

Medicinal product/action	Other species of medicinal plants

Task 3. Give examples of multicomponent medicinal products containing *Equisetum arvense*.

Medicinal product/action	Other species of medicinal plants

____ Signature of the teacher

Topic 8. Medicinal products of plant origin (from raw materials of gymnosperms and monocots).

Aim: to acquire knowledge about the peculiarities of combining biologically active compounds from raw materials of gymnosperms and monocots in medicines.

To know:

- rules for the selection of components of medicinal products for the intended purpose;
- diversity of gymnosperms and monocots, raw materials or substances of which are included in the medicinal products listed in the State Register of Medicinal Products and the State Pharmacopoeia of Ukraine;
- trends and directions of development of the global market of aromatic and medicinal plants.

Be able to:

- to be guided in the priorities of the use of medicinal plant materials in pharmaceuticals;
- to identify current trends in the use of gymnosperms and monocots in medical practice;
- identify the main and additional components of the future medicinal product;
- determine the quality standards of medicines and phytomaterials.

Educational tasks

Task 1. Provide in the class report a list of names of gymnosperms and monocots used in medicines, indicate their raw materials.

Species names	Raw materials

Task 2. Provide in the table the list of species of graminaceous and monocotyledonous plants of Ukraine included in the SPS Annexes, their biologically active substances, and their use.

№	Species names	Main biologically active substances	Action
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			

9.			
10.			

Task 3. Determine the optimal phenophases and establish a calendar schedule for harvesting medicinal plant materials of different plant species. Present the results in the form of a table.

№	Species names	Medicinal plant raw materials	Optimal phenophases
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Task 4. Describe the principles of herbal medicines according to the State

Formulary of Medicines.

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_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

INDEPENDENT EXTRACURRICULAR WORK OF STUDENTS FOR TOPIC 8

Topic 8. Medicinal products of plant origin (from raw materials of germinative and monocotyledonous plants).

Task 1. Give examples of plant species – fungi and algae and the preparations in which they are used.

Species names	Product	Chemical composition and pharmacological properties

_____Signature of the teacher

Topic 9. Peculiarities of development of medicinal product that used in complex therapy of inflammatory diseases of the respiratory and urinary tract

Aims: to acquire knowledge about the peculiarities of combining biologically active compounds in the complex therapy of inflammatory diseases of the respiratory and urinary tract.

To know:

- conditions and technology of collection of medicinal raw materials;
- peculiarities of combining biologically active compounds in the complex therapy of inflammatory diseases of the respiratory and urinary tract;
- methods of primary processing of medicinal plant raw materials of different morphological groups;
- features of the use of raw materials of medicinal plants with diuretic effect;
- methods of drying of the drug substance used in medical practice;
- rules of storage of the drug products containing various biologically active substances.

Be able to:

- determine the terms of collection of medicinal plant raw materials;
- determine the main and additional components of the future medicinal product;
- justify the purpose and mechanism of creating a medicinal product for the prevention and treatment of inflammatory diseases of the respiratory and urinary tracts;
- choose the right conditions for drying certain medicinal plant raw materials.

Educational tasks

Task 1. To learn about multi- and single-component medicines in the complex therapy of inflammatory diseases of the respiratory and urinary tracts; peculiarities of their selection and ratio in traditional and homeopathic medicines.

Task 2. Specify the species composition of multicomponent medicinal plants in the complex therapy of inflammatory diseases of the urinary tract.

Medicinal product/ action	Species of medicinal plants
Kanefron	

Urolesan	
Urocholum	
Nephrophyt	

Task 3. Specify the species composition of multicomponent medicinal plants in the complex therapy of inflammatory diseases of the respiratory tract.

Medicinal product	Species of medicinal plants
Species pectorals No 1	
Species pectorals No 2	
Bronchophyt	
Bronchophyt-syrup	

INDEPENDENT EXTRACURRICULAR WORK OF STUDENTS FOR TOPIC 9

Topic 9. Peculiarities of the development of medicinal products used in the complex therapy of inflammatory diseases of the respiratory and urinary tracts.

Task 1. Give modern pharmacopoeial methods of identification and quality control of medicinal raw materials of plant origin.

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Task 2. Give examples of foreign medicinal preparations of plant origin for inflammatory diseases of the respiratory tract.

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Topic 10. Peculiarities of development of medicinal products used in the complex therapy of diseases of the gastrointestinal tract, nervous and cardiovascular systems

Aim: to acquire knowledge about the peculiarities of combining biologically active compounds in the complex therapy of diseases of the gastrointestinal tract, nervous and cardiovascular systems.

To know:

- rules for the selection of components of medicinal products for the purpose;
- distribution of medicinal plants on the territory of Ukraine/your country;
- peculiarities of the creation of multicomponent medicinal products in the complex therapy of diseases of the nervous and cardiovascular system;
- further use of materials for the development of medicinal products, in accordance with the current legislation of Ukraine.

Be able to:

- apply the rules for the selection of components of medicinal products for the purpose;
- determine the distribution of a certain species and the raw area of medicinal plants based on informational materials;
- determine the main and additional components of the future medicinal product;
- to differentiate different types of medicinal forms of plant origin in the complex therapy of diseases of the gastrointestinal tract, nervous and cardiovascular systems;
- compile a summary report on the resource survey of the region;
- make recommendations on the balanced use of medicinal plant resources of a certain region.

Educational tasks

Task 1. To study the peculiarities of the composition of collections and phytocompositions in different forms of medicinal products.

Task 2. Specify the species composition of multicomponent medicinal plants in the complex therapy of diseases of the cardiovascular system.

Medicinal product/ action	Species of medicinal plants
Cardiophyt-tab	

Cardiophyt tincture	
Cardiotonic phytosyrup cardiac	
Phytochai Health Keys No. 63 Cardiotonic	

Task 3. Specify the species composition of multicomponent medicinal plants in the complex therapy of diseases of the nervous system.

Medicinal product/ action	Species of medicinal plants
Sedavit	

Species pectorals No 2	
Novo-Passit	
Sedafiton	
Phytosed	

Task 4. Prepare a presentation on the use of representatives of the families Lamiacaea, Solanaceae, Asteraceae, Ranunculaceae, Papaveraceae (optional) in medicinal products. Give examples of preparations of domestic and foreign production.

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APPENDIXES

Appendix 1

Table 1. Medicinal plants included in the State Pharmacopoeia of Ukraine

Species	Raw material	Availability of resources*	Links to the Appendices of the DFU
Althaea officinalis	roots, leaves, herb	–, к	1.2
Pimpinella anisum	fruits	к	1.2
Arachis hypogaea	shelled seed	к	1.2
Gossypium hirsutum / інші види *Gossypium*	seed	і	1.2
Menyanthes trifoliata	leaves	–	1.2
Sambucus nigra	flowers	+	1.2
Valeriana officinalis	rhizome with roots	–, к	1.2
Ononis spinosa	roots	–, к	1.2
*Syzygium aromaticum*т = *Eugenia caryophyllus*	flower buds	і	1.2
Hibiscus sabdariffa		і	1.2
Ginkgo biloba	leaves	к,і	1.2

Note*: k – is grown for raw materials, + – natural resources are sufficient for use, – – natural resources are limited, o – the species is under protection, and – raw materials are imported.

Species	Raw material	Availability of resources*	Links to the Appendices of the DFU
Crataegus monogyna *C. laevigata* Допускаться використання *C. sanguinea, C.korolkowii* *C.chlorocarpa* *C.dahurica* *C.alemanniensis* *C.pentagyna* *C.orientobaltica* *C.curvisepala* *C x curonica* *C x dunensis* або їх гібридів	fruits	+ + i i i i + i + i i	1.2
Achillea millefolium	herb	+, к	1.2
Eucalyptus globulus	leaves	i	1.2
Eucalyptus globulus *E. polybractea* *E. smithii*	fresh leaves and fresh apical shoots	i i i	1.2
Hypericum perforatum *H.maculatum* = H. *quadrangulum*	herb	+, к +	1.2
Cocos nucifera	the hard part of the endosperm	i	1.2
Cinnamomum cassia = C. aromaticum	leaves and young branches	i	1.2
Cinnamomum zeylanicum = C. verum	bark	i	1.2
Cinnamomum verum	leaves	i	1.2
Sesanum indicum	seeds	i	1.2
Lavandula angustifolia = L. officinalis	flowering tops of shoots	к,i	1.2
Citrus limon	fresh peel	i	1.2
Tilia cordata *T. platyphyllos* *T x vulgaris*	flowers (inflorescences)	+, к +, к к	1.2
Olea europaea	fruits	i	1.2
Prunus dulcis	seeds	i	1.2

Prunus dulcis var.amara		i	
Calendula officinalis	flowers (inflorescences)	к	1.4
Passiflora incarnata	aerial parts, flowers, fruits	i	1.2
Triticum aestivum	grain germs	к	1.2
Rosmarinus officinalis	flowering aerial parts	к,i	1.2
*Leonurus car*diaca *L. quinquelobatus*	herb	+ +	1.2
Glycine soya *G. max* = G. hispida	seeds	к к	1.2
Glycyrrhiza glabra *G. inflate* *G.uralensis*	roots and stolons	о, к, i i i	1.2
Melaleuca alternifolia *M. linariifolia* *M.dissitiflora*	leaves and apical shoots	i i i	1.2
Chelidonium majus	herb	+, к	1.2
Atropa belladonna	eaves, flowering tops, fruits	о, к, i	1.3
Ascophyllum nodosum *Fucus vesiculosus* *F. serratus*	slan	i i i	1.3
Glycyrrhiza glabra *G. inflate* *G.uralensis*	roots and stolons	о,к,i i i	1.2
Melaleuca alternifolia *M. linariifolia* *M.dissitiflora*	leaves and apical shoots	i i i	1.2
Crataegus monogyna *C. laevigata* *C. nigra* *C. pentagyna* *C. azarolus*	leaves and flowers	+ + i + i	1.3
Echinacea pallida	roots	к	1.3
Echinacea angustifolia	roots	к	1.3
Echinacea purpurea	roots, herbs	к	1.3
Cassia angustifolia	fruits (beans)	i	1.3
Cassia senna = *C. acutifolia*	fruits (beans), leaves	i	1.3
Urtica dioica	leaves	+	1.3

Urtica urens		+	
Origanum onites *Origanum vulgare* subsp. *hirtum* *Origanum vulgare*	herbs	i +,к +,к	1.3
Mentha x *piperita*	leaves	к	1.3
Cassia angustifolia	fruits (beans)	i	1.3
Humulus lupulus	female inflorescences (cones)	к, +	1.3
Thymus vulgaris *Thymus zygis*	herb	к i	1.3
Thymus serpyllum	herb	+	1.3
Arnica montana	flowers (inflorescences)	–, i	1.4
Cynara scolymus	leaves	i	1.4
Plantago lanceolata	leaves	+, к	1.3
Matricaria recutita = *Chamomilla recutita*	flowers (inflorescences)	+, к, i	1.3
Betula pendula *Betula pubescens*	leaves	+ +	1.4
Melilotus officinalis *Melilotus altissimus*	herb	+, к –,+	1.4
Verbena officinalis	herb	+	1.4
Vitex agnus castus	fruits	i	1.4
Hamamelis virginiana	leaves	i	1.4
Hydrastis canadensis	rhizomes	i	1.4
Quercus robur *Q. petraea* *Q. pubescens*	bark	+	1.4
Datura stramonium	leaves	к, +	1.4
Illicium verum	fruits	i	1.4
Zingiber officinale	rhizomes	i	1.4
Rhamnus purshiana = *Frangula purshiana*	bark	i	1.4
Cola nitida = C. vera *C. acuminate = Stereculia acuminate*	seeds	i	1.4
Cinnamomum verum	bark	i	1.4
Coriandrum sativum	fruits	к	1.4
Frangula alnus = *Rhamnus frangula*	bark	+	1.4
Curcuma xanthorrhiza =	rhizomes	i	1.4

C. xanthorrhiza			
Laminaria japonica *L. saccharina*	slan	i i	1.4
Commiphora molmol	resin	i	1.4
Arctostaphyllos uva-ursi	leaves	–, i	1.4
Digitalis purpurea	leaves	к	1.4
Potentilla erecta = *P. tormentilla*	rhizomes	+	1.4
Plantago major	leaves	+	1.4
Artemisia absinthium	herb	+	1.4
Citrus aurantium ssp. *aurantium* = *C. aurantium* ssp. *amara*	endocarp and mesocarp of mature fruits	i	1.4
Alchemilla vulgaris	herb	+	1.4
Krameria triandra	roots	i	1.4
Chamaemelum nobile = *Anthemis nobilis*	flowers (inflorescences)	к, i	1.4
Silybum marianum	fruits	к	1.4
Ruscus aculeorus	rhizomes	i	1.4
Capsicum annuum var. *minimum* *C. frutescens*	fruits	+ +	1.4
Gentiana lutea	roots		1.4
Cinchona pubescens = *C. succirubra* *C. calisaya* *C. ledgeriana*	bark	i	1.4
Centella asiatica	aerial parts	i	1.4
Cymbopogon winterianus	aerial parts	i	1.4
Salvia officinalis	leaves	к, i	1.4
Artemisia absinthium	herb	+	1.4

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