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**RESOURCE SCIENCE OF
MEDICINAL PLANTS**

COPY-BOOK

**Ministry of Health of Ukraine
National University of Pharmacy
Department of the Chemistry of Natural Compounds and
Nutriciology**



**RESOURCE SCIENCE OF
MEDICINAL PLANTS**

COPY-BOOK

_____ year student of _____ group

Speciality “Pharmacy”,

Faculty for Foreign Citizens’ Education

**Kharkiv
NUPh
2020**

UDC 615.32

R 43

Approved at the meeting of the Central Methodical Commission of NUPh.
Examination Record from February 13, 2019 № 3.

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R 43 Resource science of medicinal plants. Copy-book / V.S. Kyslychenko, L.V.
Lenchyk, V. Yu. Kuznietsova, I.O. Zhuravel, O.A. Kyslychenko, H.S.
Tartynska / edited by V.S. Kyslychenko. Kharkov: NUPh, 2020. – 32 p.

The copy-book is intended for full-time and part-time students of the specialty
226 "Pharmacy, industrial pharmacy" of educational programs "Pharmacy" and
"Technology of perfume and cosmetics" for self-preparation and work in practical
classes.

For students studying pharmacognosy in higher pharmaceutical and medical
educational establishments.

UDC 615.32

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Lesson 1**Topic. Choosing objects for a resource study. Working out a calendar plan of region's resource study.****Aim:** to teach students to:

- choose objects for immediate resource study;
- work out a calendar plan of region's resource study taking into account periods of the medicinal plant material (MPM) collection.

Laboratory work

Task 1. Choose plant objects for a resource study of forest medicinal plants of Ukraine, give them a geobotanical characteristic.

Task 2. Choose plant objects for a resource study of steppe and meadow medicinal plants of Ukraine, give them a geobotanical characteristic.

Task 3. Choose plant objects for a resource study of marsh medicinal plants of Ukraine, give them a geobotanical characteristic.

Task 4. Choose plant objects for a resource study of weed medicinal plants of Ukraine, give them a geobotanical characteristic.

Indicate the following for chosen plants:

- Latin names of plants and their families;
- kind of raw material;
- collection terms;
- phytocenological belonging (forest, steppe, meadow, marsh phytocoenosis or weed);
- advisability of resources study (+ / -).

English and Latin names of medicinal plant, MPM and family	Terms of collection	Phytocenological belonging	Advisability of resources study
Alder Buckthorn Frangula alnus Alder Buckthorn bark Cortex Frangulae Rhamnaceae	III	Forest	+
Alder			
Aniseed			

English and Latin names of medicinal plant, MPM and family	Terms of collection	Phytocenological belonging	Advisability of resources study
Bearberry			
Belladonna			
Bilberry			
Birch			
Cayenne pepper			
Coltsfoot			
Common buckthorn			
Common madder			

English and Latin names of medicinal plant, MPM and family	Terms of collection	Phytocenological belonging	Advisability of resources study
Common periwinkle			
Common plantain			
Common valerian			
Corn			
Cowberry			
Dog rose			
Elecampane			
Ephedra			

English and Latin names of medicinal plant, MPM and family	Terms of collection	Phytocenological belonging	Advisability of resources study
Ergot			
Eucalyptus			
German chamomile			
Ginkgo			
Hawthorn			
Henbane			
Hops			
Horse chestnut			

English and Latin names of medicinal plant, MPM and family	Terms of collection	Phytocenological belonging	Advisability of resources study
Horsetail			
Immortelle			
Lily-of-the-valley			
Linseed			
Liquorice			
Marigold			
Marshmallow			
Motherwort			

English and Latin names of medicinal plant, MPM and family	Terms of collection	Phytocenological belonging	Advisability of resources study
Nettle			
Oak			
Opium poppy			
Passionflower			
Peppermint			
Pot marjoram			
Purple foxglove			
Sage			

English and Latin names of medicinal plant, MPM and family	Terms of collection	Phytocenological belonging	Advisability of resources study
Spring Adonis			
St. John's wort			
Stramonium			
Thyme			
Grecian foxglove			
Wormwood			
Yarrow			

Make a calendar plan of an expeditional resource study of chosen objects

Lesson 2

Topic. Preparation of crude drug.

Aim: to teach students to:

- Give characteristic of methods of collection MPM;
- Choose correct method of storage MPM;

Laboratory work

Task 1. Choose one of the following crude drugs (herb or leaves) and characterize the way of its collection and storage using Scheme 1:

Task 2. Choose one of the following crude drugs (roots or rhizomes) and characterize the way of its collection and storage using Scheme 2:

Task 3. Choose one of the following crude drugs (seeds or fruits) and characterize the way of its collection and storage using Scheme 3:

Common fig; Bearberry; Dog Rose; Marshmallow; Coriander; German Chamomile; Immortelle; St. John's Wort; Lily-of-the-Valley; Belladonna; Peppermint; Gum Tree.

Scheme 1

English and Latin name _____

Crude drug _____

Family _____

Description of the plant _____

Geographical spreading (habitat) _____

Collection _____

Primary processing _____

Drying conditions _____

Description of the crude drug _____

Storage conditions _____

Usage, medicines on its basis _____

Recommendations on protection of the species _____

Scheme 2

English and Latin name _____

Crude drug _____

Family _____

Description of the plant _____

Geographical spreading (habitat) _____

Collection _____

Primary processing _____

Drying conditions _____

Description of the crude drug _____

Storage conditions _____

Usage, medicines on its basis _____

Recommendations on protection of the species _____

Scheme 3

English and Latin name _____

Crude drug _____

Family _____

Description of the plant _____

Geographical spreading (habitat) _____

Collection _____

Primary processing _____

Drying conditions _____

Description of the crude drug _____

Storage conditions _____

Usage, medicines on its basis _____

Recommendations on protection of the species _____

Date _____

Lesson 3

Topic. Exposure of region's medicinal raw material brushwood massifs according to the literature and report data. Composing routes. Description of associations that include medicinal plants.

Aim: to teach students to:

- find area of distribution of wild medicinal plants of the region;
- compose working routes according to the literature and report data;
- describe a plant community (association) by all features.

Laboratory work

Task 1. Choose the route for studying resources of medicinal plants growing in the needleleaf forests of Izyumski region, Kharkivska oblast. Describe the association that includes chosen plants using Scheme 2.

Task 2. Choose the route for studying resources of medicinal plants growing in the broadleaf forest of Izyumski region, Kharkivska oblast. Describe the association that includes chosen plants using Scheme 2.

Task 3. Choose the route for studying resources of medicinal plants growing in the meadows of Izyumski region, Kharkivska oblast. Describe the association that includes chosen plants using Scheme 2.

Task 4. Choose the route for studying resources of medicinal plants growing in the marshy areas of Izyumski region, Kharkivska oblast. Describe the association that includes chosen plants using Scheme 2.

Information

Plant community or "**phytocoenosis**" is a collection of plant species within a designated geographical unit, which forms a relatively uniform patch, distinguishable from neighbouring patches of different vegetation types. The components of each plant community are influenced by soil type, topography, climate and human disturbance.

As a most important part of biocoenosis and biogeocoenosis, plant community forms organic substances, which are necessary for heterotrophic organisms and human nutrition, and excrete metabolism products into the environment (oxygen and carbon dioxide). Leaving died out organs in or on the soil the plants contribute to the soil formation, and their overground parts take part in the microclimate formation.

There are different types of plant communities: forests, steppes, meadows, marsh, desert, tundra etc. A forest is the most complicated (due to the plentitude of species) plant community. A typical forest is composed of the overstory (or upper tree layer of the canopy) and the understory. The understory is further subdivided into the shrub layer, herb layer, and sometimes also a moss layer. In some complex forests, there is also a well-defined lower tree layer.

Forests can be classified in different ways and to different degrees of specificity. One such way is in terms of the "biome" in which they exist, combined with leaf longevity of the dominant species (whether they are evergreen or deciduous). Another distinction is whether the forests are composed predominantly of broadleaf trees, coniferous (needle-leaved) trees, or mixed.

- *Boreal* forests occupy the subarctic zone and are generally evergreen and coniferous.
- Temperate zones support both broadleaf *deciduous* forests (e.g., temperate deciduous forest) and *evergreen coniferous* forests (e.g., temperate coniferous forests and temperate rainforests). Warm temperate zones support *broadleaf evergreen* forests, including laurel forests.
- *Tropical* and *subtropical* forests include tropical and subtropical moist forests, tropical and subtropical dry forests, and tropical and subtropical coniferous forests.

Tundra is a biome where the tree growth is hindered by low temperatures and short growing seasons. In tundra, the vegetation is composed of dwarf shrubs, sedges and grasses, mosses, and lichens. Scattered trees grow in some tundra.

Taiga, also known as the boreal forest, is a biome characterized by coniferous forests. The taiga or boreal forest has a subarctic climate with very large temperature range between seasons, but the long and cold winter is the dominant feature.

Coniferous trees are the dominant plants of the taiga biome. Taiga trees tend to have shallow roots to take advantage of the thin soils, while many of them seasonally alter their biochemistry to make them more resistant to freezing, called "hardening". The narrow conical shape of northern conifers, and their downward-drooping limbs, also help them shed snow.

Temperate coniferous forest is a terrestrial biome found in temperate regions of the world with warm summers and cool winters and adequate rainfall to sustain a forest. In most temperate coniferous forests, evergreen conifers predominate, while some are a mix of conifers and broadleaf evergreen trees and/or broadleaf deciduous trees. Many species of trees inhabit these forests including cedar, cypress, douglas-fir, fir, juniper, kauri, pine, podocarpus, spruce, redwood and yew. The understory also contains a wide variety of herbaceous and shrub species. Structurally, these forests are rather simple, generally consisting of two layers: an overstory and understory. Some forests may support an intermediate layer of shrubs. Pine forests support an herbaceous understory that is generally dominated by grasses and herbaceous perennials.

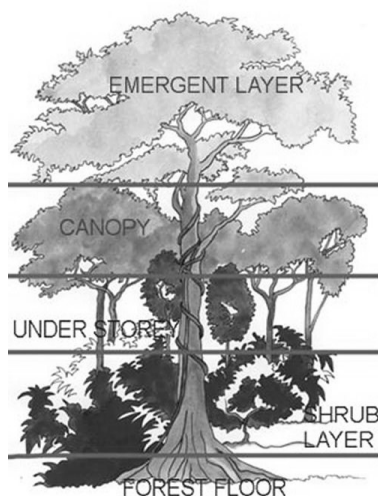
Mixed forests are a temperate and humid biome. The typical structure of these forests includes four layers. The uppermost layer is the canopy composed of tall mature trees ranging from 33 to 66 m high. Below the canopy is the three-layered, shade-tolerant understory that is roughly 9 to 15 m shorter than the canopy. The top layer of the understory is the sub-canopy which is composed of smaller mature trees, saplings, and suppressed juvenile canopy layer trees awaiting an opening in the canopy. Below the sub-canopy is the shrub layer, composed of low growing woody plants. Typically the lowest growing (and most diverse) layer is the ground cover or herbaceous layer. Characteristic dominant broadleaf trees in this biome include oaks, beeches, maples, and birches. The term "mixed forest" comes from the inclusion of coniferous trees as a canopy component of these forests. Typical coniferous trees include: Pines, firs, and spruces.

Tropical and subtropical moist broadleaf forests (TSMF), also known as tropical moist forests, are a tropical and subtropical forest biome.

The biome includes several types of forests:

✓ **Lowland equatorial evergreen rain**

forests, commonly known as tropical rainforests, are forests which receive high rainfall (more than 2000 mm, or 80 inches, annually) throughout the year. A tropical rainforest is a place roughly within 28 degrees north or south of the equator. Tall, broad-leaved evergreen trees are the dominant plants, forming a leafy canopy over the forest floor. Taller trees, called emergents, may rise above the canopy. The upper portion of the canopy often supports a rich flora of epiphytes, including orchids, bromeliads, mosses, and lichens, who live attached to the



branches of trees. The undergrowth or understory in a rainforest is often restricted by

the lack of sunlight at ground level, and generally consists of shade-tolerant shrubs, herbs, ferns, small trees, and large woody vines which climb into the trees to capture sunlight. The relatively sparse under story vegetation makes it possible for people and other animals to walk through the forest. In deciduous and semi-deciduous forests, or forests where the canopy is disturbed for some reason, the ground beneath is soon colonized by a dense tangled growth of vines, shrubs and small trees called jungle. The rainforest is divided into five different layers, each with different plants and animals, adapted for life in the particular area. These are: the ground layer, the shrub layer, the understory layer, the canopy layer and the emergent layer. Only the emergent layer is unique to tropical rainforests, while the others are also found in temperate rainforests.

✓ **Moist deciduous** and **semi-evergreen seasonal** forests, receive high overall rainfall with a warm summer wet season and a cooler winter dry season. Some trees in these forests drop some or all of their leaves during the winter dry season.

✓ **Montane rain** forests, some of which are known as cloud forests, are found in cooler-climate mountainous areas.

✓ **Flooded** forests, including freshwater swamp forests (forests which are inundated with freshwater, either permanently or seasonally; they normally occur along the lower reaches of rivers and around freshwater lakes) and peat swamp forests (tropical moist forests where waterlogged soils prevent dead leaves and wood from fully decomposing, which over time creates thick layer of acidic peat; peat swamp forests are typically surrounded by lowland rain forests on better-drained soils, and by brackish or salt-water mangrove forests near the coast).

Tropical and **subtropical coniferous** forests are a forest biome. They are located in regions of semi-humid climate at tropical and subtropical latitudes.

Tropical dry forests are characteristic of areas in the tropics affected by seasonal drought. The seasonality of rainfall is usually reflected in the deciduousness of the forest canopy, with most trees being leafless for several months of the year. On very poor soils, and especially where fire is a recurrent phenomenon, woody savannas develop.

A **bog** is a wetland that accumulates acidic peat, a deposit of dead plant material—often mosses or lichens. Bogs occur where the water at the ground surface is acidic, either from acidic ground water, or where water is derived entirely from precipitation, when they are termed ombrotrophic (rain-fed). Water flowing out of bogs has a characteristic brown color, from dissolved peat tannins.

A **swamp** is a wetland with some flooding of large areas of land by shallow bodies of water. A swamp generally has a large number of hammocks, or dry-land protrusions, covered by aquatic vegetation, or vegetation that tolerates periodical inundation. Coniferous swamps are forested wetlands in which the dominant trees are lowland conifers such as northern white cedar, Black spruce, White spruce, White pine, and deciduous trees such as Balsam fir, Red maple, American elm, Balsam poplar etc. Common plants found in the shrub swamps include alders, willows, elderberry and highbush blueberry.

A **meadow** is a field vegetated primarily by grass and other non-woody plants (grassland). It is characterized by a great diversity of mainly perennial grasses that form more or less close herbage. The richest flora is on flood-meadows (an area of grassland or pasture beside a river).

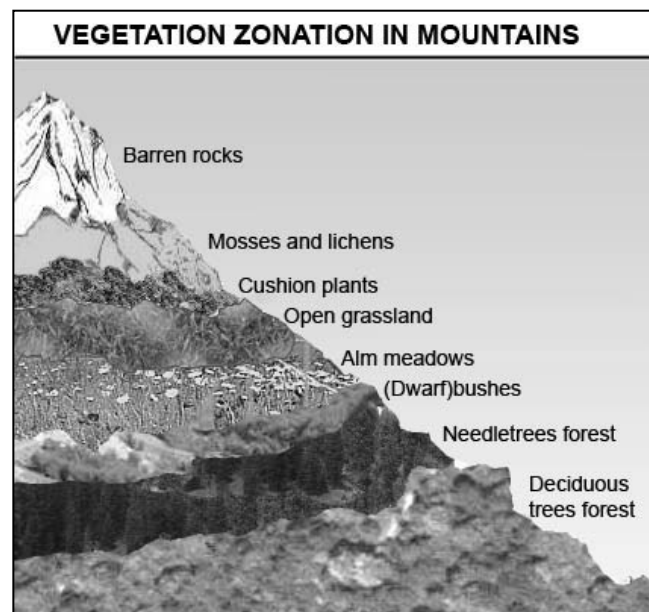
A **steppe** is an ecoregion, in the montane grasslands and shrublands and temperate grasslands, savannas, and shrublands biomes, characterized by grassland plains without trees apart from those near rivers and lakes. The prairie (especially the shortgrass and mixed prairie) is an example of a steppe, though it is not usually called such. It may be semi-desert, or covered with grass or shrubs or both, depending on the season and latitude.

A **desert** is a landscape or region that receives an extremely low amount of precipitation, less than enough to support growth of most plants. Some flora includes shrubs, Prickly Pears, Desert Holly, and the Brittlebush. Most desert plants are drought- or salt-tolerant, such as xerophytes. Some store water in their leaves, roots, and stems. Other desert plants have long taproots that penetrate to the water table if present, or have adapted to the weather by having wide-spreading roots to absorb water from a greater area of the ground. Another adaptation is the development of small, spiny leaves which shed less moisture than deciduous leaves with greater surface areas.

Altitudinal zonation in mountainous regions describes the natural layering of ecosystems that occurs at distinct altitudes due to varying environmental conditions. Temperature, humidity, soil composition, and solar radiation are important factors in determining altitudinal zones, which consequently support different vegetation and animal species.

It is possible to split the altitudinal gradient into five main zones used by ecologists under varying names:

- **Nival Level (Glacier):** Covered in snow throughout most of the year. Vegetation is extremely limited to only a few species that thrive on silica soils.
- **Sub-Nival Level:** The highest zone that vegetation typically exists. Vegetation is patchy and is restricted to only the most favorable locations that are protected from the heavy winds that often characterize this area. Very hearty, low-lying species of lichen, moss and grass tufts typical of arctic zones populate this region. Snow is found in this region for part of the year.
- **Alpine Level:** The zone that stretches between the tree line and snowline. This zone is further broken down into Sub-Nival and Treeless Alpine
 - *Sub Nival:* This area is shaped by the frequent frosts that restrict extensive plant colonization. Much of this region is patchy grassland, sedges and rush



heaths. This region is sometimes used as high altitude grazing land and is often considered particularly able to withstand land use.

- *Treeless Alpine*: Characterized by a closed carpet of vegetation that includes alpine meadows, shrubs and sporadic dwarfed trees. Because of the complete cover of vegetation, frost has less of an effect on this region, but due to the consistent freezing temperatures tree growth is severely limited.
- **Montane Level**: Extends from the mid-altitude forests to the tree line. The exact level of the tree line varies with local climate, but typically the tree line is found where mean monthly soil temperatures never exceed 10.0 degrees C and the mean annual soil temperatures are around 6.7 degrees C. In the tropics, this region is typified by montane rain forest (above 3,000 ft) while at higher latitudes coniferous forests often dominate.
- **Lowland Layer**: This lowest section of mountains varies distinctly across climates and is referred to by a wide range of names depending on the surrounding landscape. Colline zones are found in tropical regions and Encinal zones and desert grasslands are found in desert regions.
 - *Colline (Tropics)*: Characterized by deciduous forests when in oceanic or moderately continental areas, and characterized by grassland in more continental regions. Extends from sea level to about 3,000 feet (roughly 900 m). Vegetation is abundant and dense. This zone is the typical base layer of tropical regions.
 - *Encinal (deserts)*: Characterized by open evergreen oak forests and most common in desert regions. Evaporation and soil moisture control limitation of which encinal environments can thrive. Desert grasslands lie below encinal zones.
 - *Desert grassland*: Characterized by varying densities of low lying vegetation, grasslands zones cannot support trees due to extreme aridity. Some desert regions may support trees at base of mountains however, and thus distinct grasslands zones will not form in these areas.

h, m
30

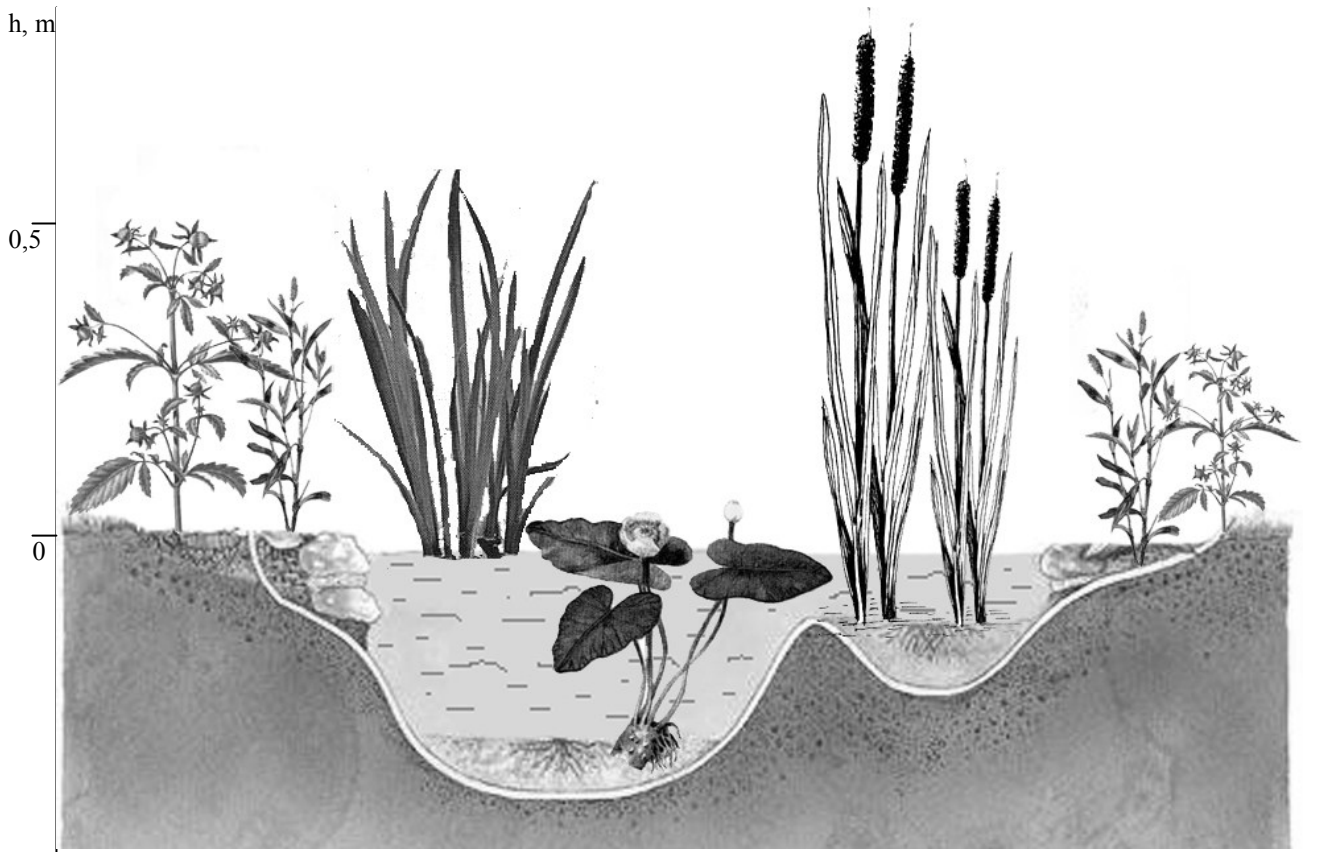


6 5 1 2 4 3
1 – Oak; 2 – Lime; 3 – Acer; 4 – Lily-of-the-Valley (abundantly); 5 – Ground-elder(abundantly); 6 – Angular Solomon's-seal (singly).

h, m
50



6 1 4 5 2 8 3 7
1 – Pine; 2 – Rowan; 3 – Birch; 4 – Red Elder (singly); 5 – Raspberry (abundantly); 6 – Immortelle (abundantly); 7 - Wild Thyme (singly); 8 - Male Fern (singly).



1 – Three-lobed Beggarticks (rarely); 2 – Redshank (abundantly); 3 – Calamus (abundantly); 4 – Common Bulrush (abundantly); 5 – Yellow Water-lily (rarely).



1 – Elecampane (abundantly); 2 – Garden Angelica (singly); 3 – Marshmallow (abundantly); 4 – Great Burnet (rarely); 5 – Field Restharrow (rarely); 6 – Common Centaury (singly).

Phytocoenosis description form

Author _____ Description № _____
" ____ " _____ 20 __.

Description area _____

Geographical position _____

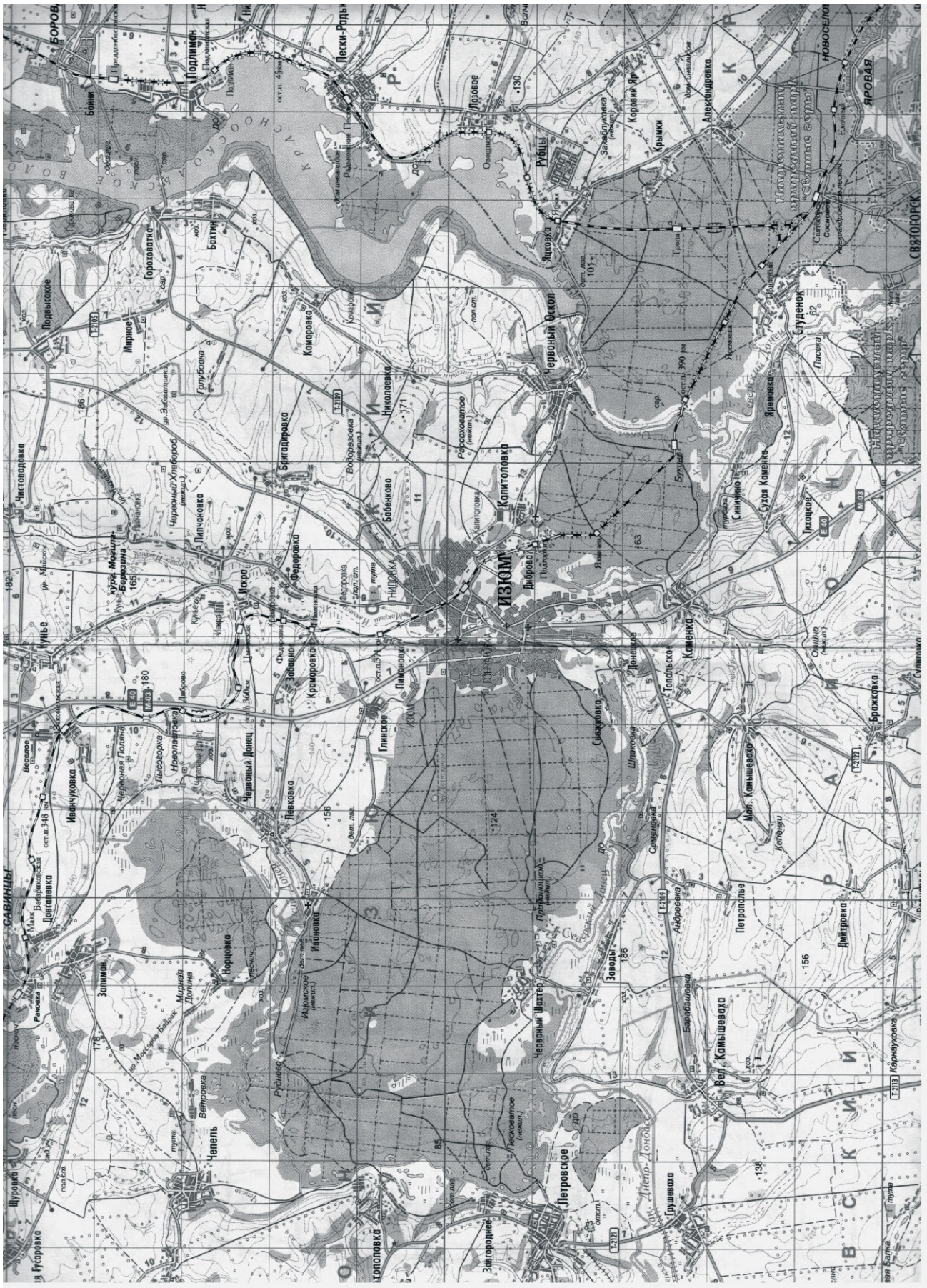
Surrounding _____

Relief _____

Names of medicinal plants included into the association _____

№	Plant name	Layer, sublayer	Height	Development phase	Vitality

Describe the chosen route. Give theoretical proof of the expedition terms, participants content and make a list of necessary equipment.



Date _____

Lesson 4

Topic. The ways of medicinal raw material entry to the Ukrainian market.

Aim: to teach students to:

- compose working routes according to the literature and report data;
- describe a plant community (association) by all features.

Laboratory work

Task 1. Characterize the following medicinal plants according to the source of entry to the Ukrainian market. Divide medicinal plants on 4 groups according to source of this MPM on Ukrainian pharmaceutical market: wide, cultivated, tissue culture, imported. For each medicinal plant indicate the type of raw material, family name, chemical content, medicines and uses:

Ginseng, Thyme, Strophanthus, Dog Rose, Ephedra, Hawthorn, Echinacea, Peppermint, Java Tea, St. John's Wort, Tulip poppy, Bearberry, Nettle, Birch, Purple Foxglove, Cascara, Cornflower, Coriander, Alder Buckthorn, Catechu, Rauwolfia.

Wild	Cultivated	Tissue culture	Imported

Date _____

Lesson 5

Topic. Estimation of the resources amount of medicinal plant material on certain brushwood using methods of registration grounds, model specimens and projecting covering. Working out recommendations on rational collection of medicinal plants.

Aim: to teach students to:

- determine the brushwood area of medicinal plants;
- determine the productivity (density of raw material reserve) of medicinal plants;
- determine the medicinal raw material reserves using methods of registration grounds, model specimens and projecting covering;
- calculate the operational reserve and possible volume of annual medicinal raw material collection, compose inventory list of medicinal plant brushwood and recommendation projects on rational collection of certain medicinal plant species.

Laboratory work

- Task 1. Determine the productivity of medicinal plant raw material using the method of registration grounds as a result of forwarding inspection and calculate its biological reserve.
- Task 2. Determine the productivity of medicinal plant raw material using the method of model specimens as a result of forwarding inspection and calculate its biological reserve.
- Task 3. Determine the productivity of medicinal plant raw material using the method of projecting covering as a result of forwarding inspection and calculate its biological reserve.
- Task 4. Calculate the biological, operational reserve and possible volume of annual collection of medicinal plants.
- Task 5. Fill in the inventory list of medicinal plant brushwood of inspected massif.
- Task 6. Compose an instruction project and give recommendations on rational collection of one of the medicinal plant species.

Sum № 1.

A rectangular ground 100 m x 1500 m is occupied by dog rose. During the resource investigation the number of specimens was determined on 20 sections of route motion 50 steps in a 2 m wide line each. An average step length is 65 cm. An average weight of a model specimen is 0,5 kg. Indicate the method of productivity determination.

№ of ground	Number of specimens on the ground	Calculation
1	12	
2	7	
3	10	
4	6	
5	9	
6	9	
7	5	
8	0	
9	15	
10	11	
11	7	
12	10	
13	12	
14	14	
15	8	
16	10	
17	8	
18	3	
19	12	
20	11	

Sum № 2.

The area of bearberry brushwood is 4,5 hectares. From 1 dm² of each of 15 grounds laid (1 m²) the raw material was collected and the following data (see: table) was obtained. Calculate an average productivity and possible volume of annual collection. Indicate the method of productivity determination.

№ of ground	Mass of raw plant material from 1 dm ² , g	% of projecting covering	Calculation
1	10	70	
2	16	83	
3	11	75	
4	19	85	
5	7	76	
6	17	80	
7	13	85	
8	18	83	
9	15	79	
10	14	83	
11	9	86	
12	16	90	
13	11	88	
14	19	83	
15	20	85	

Sum № 3.

The area of immortelle brushwood is 0,1 hectares. During the resource investigation 20 registration grounds were laid 1 m² each. Mass of newly-collected raw material from each ground was correspondingly: 16 g, 9 g, 18 g, 2 g, 5 g, 12 g, 4 g, 7 g, 8 g, 6 g, 2 g, 6 g, 19 g, 5 g, 11 g, 16 g, 4 g, 15 g, 7 g, 3 g. Calculate an average productivity and possible volume of annual collection. Indicate the method of productivity determination.

Calculation:

Sum № 4.

A ground (1500 m x 120 m) is occupied by marshmallow. The productivity of the brushwood (roots) was $465 \pm 26 \text{ g/m}^2$; the plentitude of the brushwood is 70%. Indicate the method of productivity determination and calculate a possible volume of annual collection.

Calculation:

Sum № 5.

A ground (1800 m x 600 m) is occupied by pot marjoram. The productivity of the brushwood (herb) was $340 \pm 17 \text{ g/m}^2$; the plentitude of the brushwood is 56%. Indicate the method of productivity determination and calculate a possible volume of annual collection.

Calculation:

Sum № 6.

A ground 1500 m long and 500 m wide is occupied by immortelle. During the resource investigation 15 registration grounds were laid 1 m² each. Mass of newly-collected raw material from each ground was correspondingly: 18 g, 19 g, 16 g, 150 g, 80 g, 23 g, 67 g, 190 g, 70 g, 67 g, 100 g, 150 g, 189 g, 43 g, 125 g. Calculate the productivity, biological and operational reserve of the brushwood. Indicate the method of productivity determination. Fill in the inventory list. Compose an instruction project on the raw material collection.

Calculation:

Sum № 7.

A brushwood of calamus occupies the area of 400 m x 100 m. The number of specimens was determined on 20 sections of route motion 20 steps in a 1 m wide line each. An average step length is 65 cm. The following data was also obtained: an average weight of a model specimen is 45 g, the number of goods specimens on the sections was – 10, 15, 12, 15, 17, 6, 4, 13, 21, 0, 11, 14, 8, 17, 15, 17, 11, 3, 15, 5. Calculate the biological, operational reserve and possible volume of annual collection of the raw material. Indicate the method of productivity determination. Fill in the inventory list. Compose an instruction project on the raw material collection.

Calculation:

Sum № 8.

A ground 500 m x 500 m is occupied by lily-of-the-valley. During the resource investigation 15 registration grounds were laid 1 m² each. Mass of newly-collected raw material from each ground was correspondingly: 189 g, 193 g, 160 g, 150 g, 80 g, 230 g, 167 g, 190 g, 70 g, 72 g, 100 g, 150 g, 189 g, 146 g, 125 g. Calculate the biological, operational reserve and possible volume of annual collection of the raw material. Indicate the method of productivity determination. Fill in the inventory list. Compose an instruction project on the raw material collection.

Calculation:

Inventory sheet of a brushwood

№ of brush-wood	Geographical place	Plant community	Area of brush-wood, m	Number of registration grounds	Height, cm	Projecting covering	Productivity, g/m ²	Operational reserve, kg

Operational reserve of the brushwood _____

Possible annual collection _____

Inventory sheet of a brushwood

№ of brushwood	Geographical place	Plant community	Area of brushwood, m	Number of registration grounds	Height, cm	Projecting covering	Productivity, g/m ²	Operational reserve, kg

Operational reserve of the brushwood _____
 Possible annual collection _____

Date _____

Lesson 6

Topic. A taxonomic approach to the study of medicinal plants and animal-derived drugs.

Aim: to acquaint students with medicinal plant chemotaxonomy.

Laboratory work

Task 1. Find similar and distinctive features in the chemical constituents and use of the following plants. Fill in the table indicating similar constituents, Latin names of plants, distinctive features of their use.

Capsicum, Redshank, Sunflower, Rauwolfia, Greater Ammi, Celandine, Restharrow, Belladonna, Aloe, Stramonium, Rowan, Water pepper, Lily-of-the-Valley, Lesser Periwinkle, Liquorice, Dill, Rhubarb, Squill, Strophanthus, Tulip Poppy, Cassia, Dog Rose, Chicory, Henbane, Common Knotgrass, Oleander, Opium Poppy, Hawthorn, Veratrum, Coriander, Plum Poppy, Thermopsis, Coltsfoot, Horse Sorrel, Potato, Onion, Almond, Wild Carrot, Cornflower, Melilot, Madagascar Periwinkle, Fennel, Raspberry, Dandelion.

Papaveraceae	Solanaceae	Apocynaceae

Ericaceae		Rosaceae		Liliaceae
Fabaceae		Apiaceae		Polygonaceae

Write down the conclusion about chemotaxonomic principles and their occurrence in nature:

Main terms:

Abundance – a number of individuals attributed to a certain area and expressed in points (e.g., Drude scale).

Association – a collection of plants in a certain area with 1-2 species domination.

Biological reserve – the size of raw material phytomass formed by all (goods and non-goods) specimens of a certain species on any grounds – whether suitable or not for collection – low-productive, difficult of access or of a small area.

Biomes – similar climatic conditions on the Earth, such as communities of plants, animals, and soil organisms, and are often referred to as ecosystems.

Brushwood – a collection of individuals of one species growing in a plant community on a ground which is suitable for collection.

Collection turnover – a period including a year of collection and the number of years necessary for renewal of raw material resources.

Commercial massif – a few close situated population of medicinal plant, suitable for collection.

Commercial sample – adult plant samples are subject to collect.

Community – the population of organisms that inhabit a particular area and interact with one another.

Ecosystem – a biological environment consisting of all the organisms living in a particular area, as well as all the nonliving (abiotic), physical components of the environment with which the organisms interact, such as air, soil, water and sunlight.

Exploitable volume – amount of MPM formed by commercial sample on suitable for commercial collection area.

Habitat – an ecological or environmental area that is inhabited by a particular species of animal, plant or other type of organism.

Plant community or "**phytocoenosis**" – a collection of plant species within a designated geographical unit, which forms a relatively uniform patch, distinguishable from neighbouring patches of different vegetation types.

Plant environment - Plant associations connected to described plant association.

Population – all the members of one species that live in the same geographic area at the same time.

Possible volume of annual collection – an amount of raw material which is possible to annually purvey on a certain area without a threat for the raw material base. It is calculated as a quotient from division of value of operational raw material reserve on all the collection grounds into collection turnover.

Productivity - amount of MPM, collected from 1m² of population area.

Projective cover (degree) - % of area engaged by projection of aerial part of plants on ground, restricted by quadrat or population.

Quadrat – area 0.25 m² – 10 m² placed within population for calculation quantity, productivity or projective cover.

Range of a particular species is that portion of Earth in which it is found.

Transect – narrow square, used for studying quantity, productivity or projective cover.

Content

Lesson 1. Choosing objects for a resource study. Working out a calendar plan of region's resource study.....	3
Lesson 2. Preparation of crude drug.....	10
Lesson 3. Exposure of region's medicinal raw material brushwood massifs according to the literature and report data. Composing routes. Description of associations that include medicinal plants.....	12
Lesson 4. The ways of medicinal raw material entry to the Ukrainian market..	22
Lesson 5. Estimation of the resources amount of medicinal plant material on certain brushwood using methods of registration grounds, model specimens and projecting covering. Working out recommendations on rational collection of medicinal plants.....	22
Lesson 6. A taxonomic approach to the study of medicinal plants and animal-derived drugs.....	28

Журнал для практичних занять призначений для студентів денної та заочної форм навчання спеціальності 226 «Фармація, промислова фармація» освітніх програм «Фармація» та «Технології парфумерно-косметичних засобів» для самопідготовки та роботи на практичних заняттях.

Для здобувачів вищої освіти, які вивчають дисципліну «Ресурсознавство лікарських рослин» у вищих фармацевтичних та медичних навчальних закладах.

Навчальне видання

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РЕСУРСОЗНАВСТВО ЛІКАРСЬКИХ РОСЛИН

Журнал для практичних занять

За редакцією *В. С. Кисличенко*

Формат 60x84/8. Ум. друк. арк. 1,4. Тираж 60 пр. Зам. № _____.

Національний фармацевтичний університет
вул. Пушкінська, 53, м. Харків, 61002
Свідоцтво суб'єкта видавничої справи серії ДК № 3420 від 11.03.2009.