Odessa National Medical University

Department of General and Clinical Pharmacology and Pharmacognosy

methodological developments
workshops
for full-time department faculty

Discipline: "Resursovedenie medicinal plants"
Lesson number 8 "The raw material base of medicinal plants in Ukraine.
Geographical and Phytocenological Attachment LR Ukraine, which are included in herbal domestic production"

Course 3 Faculty medico-pharmaceutical

approved by
in the methodical meeting of the Department
August 28, 2025
Protocol № 1
Head. Department of

_____ prof.Rozhkovsky YV

Odessa 2025

Subject of practical lesson number 8: "Accounting of medicinal plants resources, the principles of their management and protection. Solution of problems with resursovedenie: definition of productivity and operational stocks of wild medicinal plant raw materials "- (8 hours.)

1. Background. The main work off-site (final) stage of learning resources of wild herbal drugs is carrying out calculations, that is, the actual processing of the material definition of the areas, the RL yields obtained during the expedition stages. For this work, too, developed a methodology, based on the principles and methods of variation statistics. The knowledge of this technique, mastering it by solving situational tasks and calculated - it is very important to obtain reliable results with real-definition RL resources.

2. Purpose of the activity:

- apply theoretical knowledge and the existing methodology for determining the RL resource when choosing a method resursovedcheskih research specific species of wild LR and RL;
- apply the methods of variation statistics field for the treatment of materials determine yield and specific LR margin calculations of their raw materials;
- to elect the rational exploitation of natural resources regime for specific HR.

2.1. Learning Objectives:

-know (The level of assimilation of Bespal'ko -II):

1. Methods of determination of RL yield according to the current method.
2. Formula for the calculation of average yields RL, biological and operational stocks of raw materials LR.
3. Current requirements for the rational exploitation of the natural resources of the Republic of Lithuania

- to be able (Mastering level -III):

1. Select best ways to determine the yield of specific LR depending on their biological characteristics and growth conditions.
2. Apply specific examples digested statistical processing technique resursovedcheskih field studies.
3. Using lookup tables with information about the output of dry raw material, the order of the exploitation of natural thickets of specific species.

2.2. Educational goals:

-sposobstvovat formation of ecological outlook and liability for future pharmacists the use of natural resources, the RL.

3. Interdisciplinary integration:

number pp	**discipline**	**Know**	**be able to**

one.	**previous** Medical botany	Phase of development, the environmental conditions of growth of medicinal plants;	To assess the current conditions of growth of specific types of LR
2.	pharmacognosy	The effect of various factors on the contents of the main storage and a bar RL	Choosing optimum blank areas and periods native RL
3.	Intra integration (the topic of this discipline, which integrates that which is studied) ...	Resursovedenie as science and academic discipline. The raw material base of medicinal plants in Ukraine. The use of herbal medicines in the Republic of Lithuania and the modern world medical practice. Accounting for medicinal plant resources, the principles of their management and protection. Cultivation of Latvia in Ukraine and the world.	develop: on the harvesting instructions, drying and storage of raw wild higher plants, algae, lichens and fungi, newsletters; make reports for doctors and advise the public on matters related to the harvesting and use of raw materials and products of natural origin.

4. Content of the topic

The theoretical material topics outlined in the text of the lecture number 5 and the following sources of information:

1. Heinrich M., Barnes J., Prieto-Garcia J., Gibbons S., Williamson E. M. Fundamentals of Pharmacognosy and Phytotherapy. 3rd ed. Elsevier, 2023. 282 p.
2. Medicinal Plant Resources : textbook / V. M. Minarchenko et al. Kyiv : Palyvoda A. V., 2019. 128 p.
3. Bioprospecting of Ethnomedicinal Plant Resources: Sustainable Utilization and Restoration / ed. by G. Shukla et al. CRC Press, 2024. 466 p.
4. Medicinal Plants: Bioprospecting and Pharmacognosy / ed. by A. B. Sharangi, K. V. Peter. Apple Academic Press, 2022. 602 p.
5. Van Wyk B. E., Wink M. Medicinal Plants of the World. 2nd ed. CABI, 2017.

5. Plan and organizational structure of classes

number	The basic stages of employment, their functions and content	Ouch. goals in development levels	training and controls	Methodological materials. ensuring and the control of knowledge	duration min., or %
one.	**preliminary stage** Organizational measures. The wording of the objectives. Checking homework	II		Methodological developments; test items	1 minute. 2 minutes. 7 min.
2.	**The main stage.** *Location* - training room. Carrying out practical work	II-III	Maps, slides, herbaria, background and scientific literature	Methodical development - "Resursoznavstvo medicinal plants. Laboratory Journal "	130 min.
3.	**The final stage.** Location - training room. Check final level of knowledge. Inspection and assessment of practical skills. Checking and signing of the protocols in the laboratory journal. Scoring knowledge. Summing up the lessons and homework wording.	II-III II-III			15 minutes. 10 min. 10 min. 5 minutes.

6. Materials of methodical maintenance of employment.

6.1. control materials for the preparatory phase of exercises

Test questions:

1. With what accuracy you need, according to the procedure to determine the average yield of wild LR?
2. How is it possible to determine the productivity of herbaceous plants, the raw material of which underground organs?
3. In contrast than the coefficient of shrinkage and% yield of dry material?

4. What is the difference between the two indices of raw materials inventory: biological and operational?
5. How to calculate the operating margin LR raw materials?
6. What factors depend on the period of the Republic of Lithuania recovery?
7. How to calculate the amount of the annual operating LRS?

tests:

1. What is the minimum number of sample count units of 1 m2 is necessary to lay within the thickets in determining the yield of lily of the valley, if its projective cover is 20-30%?
A. 4-6
B. 7-10
V. 10-15
G. 15-25
D. 25 or more

2. In one of the districts of Cherkasy region. on an area of 4 hectares of forest meadows scattered grows centaury ordinary. Choose the best way to integrate it yields:
A. At the trial count units
B. By coating projective
B. According to model instances
G. On-eye.
D. According to the calculations tables

3. Determination Helichrysum stock density of sand can be carried out
A. Only by accounting areas
B. Only in the projective cover
B. Method of accounting areas or covering proektivnymu
G. The method of model instances
D. On the eye.

4. Determination of stock density Oregano can be carried out
A method of model instances
B. Only a universal method (count units)
B. Only on projective cover
G. On the count units or projective cover
D. The calculation tables

5. Definition of sedge stock density can be carried out
A. Only the method of model instances
B. Only by accounting areas
B. By projective cover
G. On the count units or the method of model instances
D. On Eye

6. Offer the best method for determining yields buckthorn fruits
A. Count Units
B. from specimens (branches)
B. projective cover
G. on trial count units of 1 m2
D. One can determine by any standard method

7. Annual preform RL is only possible for
A. Trees and bushes in which the RL is, fruits, seeds
B. Trees and bushes in which the RL are leaves, flowers
B. Buryanov
G. annuals and biennials
D. monocarpic

8. The smallest recovery period after workpiece RL usually in herbaceous
A. Buryanov
B. ephemeroids
B. meadow plants
G. forest plants
D. steppe plants

6.2. Materials of methodical maintenance of the main phase of occupation

Methods of operation, performing the steps of:

A) Assimilation metric units used to determine resource indicators. Emphasize! the need to bring them to a common view: I - in m2; m or kg - weight in grams of freshly RL - into the mass of air-dry using K shrinkage; % Yield - in Kusushki.
B) Introduction to the look-up tables, the choice of the necessary data.
B) Solving typical computing tasks on resursovedeniyu. Underline (!) That there is a special program for Exel mean value calculations in the range of M ± m.
D) Relationship with the content of inventory records and certificates of discovered reserves of wild medicinal plant raw materials. Filling the appropriate form to the results the decision of situational problems.
D) Homework: to solve their own problems on several resursovedeniyu that can be offered to the practical part of the comprehensive state examination.

List of educational and practical tasks to be carried out during the practical sessions:

Exercise 1. Define metric units, which are used in calculating the results of research resursovedcheskih - fill in Table 27.

Table 27.

Indicator	*The unit of measurement result*
The area of thickets, array	ha; m2 (1 hectare = 10,000 m2)
mass of raw material to the sample area	sirogo abo g dry weight

Yield (stock density) materials	g / m2
The biological reserve of raw materials	Abo T sirogo kg (dry) weight
The yield of dry feed with crude	%
The coefficient of shrinkage of raw materials	Vihod ÷ 100%
Operational stocks of raw materials	Cg abo T air-dry weight
Possible volume of blanks	Kg / year abo T / year of air-dry raw material

Task 2. Solve case studies:

Task 1: Over a length of 150 m and a width of 20 m between the sea shore and estuary near railway station Bugaz (s.Zatoka) increases immortelle sand. 15 plots credential area of 1 m2 was laid When the resource examination. freshly raw mass from each plot was respectively 8 g, 9 g, 6 g, 8 g, 5 g, 13 g, 7 g, 9 g, 7 g, 6 g, 10 g, 5 g, 19 g, 13 g 12 Calculate the yield, biological and operational stocks of raw materials in the thickets. Specify which method the yield was determined. Fill out the inventory.

decision:

S = 150 m x 20 m = 3,000 m2

M = (8 + ... + 12): 15 = 9.13 g / m2 m = 1,09

Yield 9.1 = 1.09 (g / m2). Accuracy test: 1.09: 9.1 = 0.12 (12%).

Biological stock = MS = 9,1 g / m2 of 3000 m2 = 27300 g = 27.3 kg wet weight.

Operating margin = (M - m) S = 24,030 g = 24.03 kg wet weight and the dry shrinkage K = 24.03 = 0.25 = 24.03 6.01 kg dry feed.

Yields were determined by trial count units via the main raw materials and weighing each section.

Task 2: Investigated portion bush-xeropolum area of 200 x 30 m on the slopes of the western shore of Big Ajalyk (Dofinovskogo) estuary near to. Vapnyarka. 2 laid transects 10 m wide and 500 m long each, on which segments of length 20 by 10 steps (step length 70 cm) is calculated number of commodity wild rose bushes. The following data were obtained: 4, 1, 3, 1, 2, 0, 3, 0, 1, 1, 3, 2, 1, 4, 2, 3, 3, 0, 2, 4. The average mass of freshly collected on hypanthium one model instance was 0.6 kg. Calculate the yield, operating margin and the amount of possible herbal drug preparations. Specify which method the yield was determined. Fill out the inventory.

decision:

S = 6000 m2. Area = area accounting July 10 = 70 m2

Counting the number of bushes in one registration area (70 m2) = M = 2; m = 0,86

Calculating yield: 0.6 kg 2 ± 0,86 0,6 = 1,2 ± 0,5 (kg / 70 m2).

The end result yields: 1,2 70 ± 0,5 70 = 0,017 ± 0,007 (kg / m2).
Operating margin = 6000 m2 (0,017- 0,007) kg / m2 = 60 kg wet weight = 60 21 = 0.35 kg dry weight. 0.35 - a coefficient of shrinkage hips feedstock.
Displacement possible annual preform hips = operational reserve.
Yields were determined by modeling copies.

Task 3: Thickets of sedge in the floodplain of the Dniester near the village. Beacons occupy an area of 400 x 100 m Number of commodity items determined by 20 pieces of route stroke by 20 steps in the band width of 1 m average pitch length of 70 cm to obtain the following data: the average weight of a model instance of 45 g, the amount of commodity items on segments -... 8, 5, 3, 0, 4, 6, 3, 0, 10, 11, 13, 5, 3, 7, 6, 5, 5, 10, 8 6. Calculate yield, biological and industrial raw materials and a possible reserve the amount of the annual herbal drug preparations. Specify which method the yield was determined. Fill out the inventory.
decision:
S = 40000 m2. Area accounting portion = 1 = 14 (m2)
Counting the number of plants per 1 oblik.dilyantsi (14 m2) = M = 5.9; m = 1,15
Yield = 45g 5,9 ± 1,15 g 45 = 265,5 ± 51,75 (g / 14 m2) = 19 3.7 g / m2.
Biological stock = 19 g / m2 760000 = 40,000 m2 g = 760 kg wet weight.
Operating margin = (19-3,7) 40000 = 612000 (g) = 612 kg wet weight = 612 0.3 = 183.6 kg dry weight. 0.3 - shrinkage factor is of raw calamus.
Displacement annual blanks = ekspl.zapas: frequency = 183.6 preform 8 = 22,95 kg. Frequency of preparation - 1 time in 8 years.
Yields were determined by modeling copies.

task 4: In the area of 5 x 500 m in Quarter 8/14 Palyanetskogo forest area increases in Savranskii ordinary lily. 15 plots credential area of 1 m2 was laid When the resource examination. freshly raw mass from each plot was, respectively: 49 g, 53 g, 60 g, 50 g, 80 g, 55 g, 67 g, 69 g, 70 g, 72 g, 80 g, 55 g, 48 g, 44 g, 45 was calculated productivity, operational stocks of raw materials and the possible amount of the annual billet. Specify which method the yield was determined. Fill out the inventory.
decision:
S = 2500 m2.
M = 59,8 g / m2; m = 5,75. Yield = 59,8 ± 5.75g / m2.
Operating margin = (59,8-5,75) 2500 = 135125 (g wet weight) = 135.13 kg wet weight = 135.13 0.2 = 27,03 kg dry weight. 0.2 - is the coefficient of shrinkage grass lily.
Annual harvest = 27.03 5,4kg = 5. Frequency of blanks - 1 in every 5 years.
The yield was determined by accounting areas through the collection and weighing of raw materials.

Problem 5: On steppe stony slopes near the village. Altestovo Belyaev in the area over an area of 60 hectares is growing thyme dvovidny. When the resource examination revealed that this kind of growing single dense spots, which together

account for about 12% of the slope area. 20 "spots" laid credentials portions of 1 m2, which define the projective cover thyme. The following data were obtained: 16, 20, 23, 17, 50, 35, 30, 40, 45, 30, 38, 40, 50, 28, 80, 55, 22, 25, 26, 75%. Previous studies of this type was set to "rate" 1% projective coverage - 2.8 g of wet weight. Calculate

Activity 3. Fill the inventory lists of identified thickets LR (fill in the table. 28-32).
Sample sheet filling:

Inventory lists specific types of bushes Thymus dimorphus

number	*The locality*	*plant community*	*The area of thickets, ha*	*Proek-tively covered-s,%*	*Vintage-ness, g / m2*	*Operating margin-th raw kg (vozd.suh).*
one	*Altestovo. Bilyaevskogo area*	*Kamyanistaya steppe*	*7.2*	*37.3*	*104.4 ± 16.38*	*1585*

Task 4. Make inquiries about the operational reserves of certain types of herbal drugs and possible volumes of their annual preparations in the areas of Odessa region, where surveys have been conducted (fill in the table. 33-37).

Sample preparation help-see. With 78 Navch.posibnik ONMedU, as well as:
Information about the identified operational and possible reserves
Annual harvesting rhizome

Region, district	*Operational stocks of raw material, kg*	*The volume of possible annual billet, kg*	*Area, ha*
Odessa, Belyaevsky	*183.6*	*22.95*	*four*

task 5(Home). Using data from the recommended reference books and based on previous knowledge, to analyze the possibility of using the raw material base of species of flora of the south of Ukraine, closely related species of officinal LR source LSR (fill in Table 38 ..)

Table 38

Name RL	The name of the officinal species - source LSR	Distribution in Ukraine	Blizkosrodnenye flora of Southern Ukraine
	Achillea millefolium		
	Crataegus sanguinea		
	fragaria vesca		
	Hypericum perforatum		
	Ononis arvensis		
	plantago lanceolata		

	rosa canina		
	rosa cinnamomea		
	Thymus serpyllum		
	valeriana officinalis		

6.3. Materials control the final phase of occupation

Questions for self-control:

1. In some cases, you need to recalculate the undergrowth area when determining the stock of raw materials?
2. In some cases it is necessary to adjust the accounting area of land?
3. In some cases, you need to choose the least vulnerable of the proposed operation (most of the proposed frequency for this kind of blank)?
4. How is calculated and reported annual volumes of raw blanks possible to find stocks of certificates.
5. What is the sequence of operation of the identified industrial thickets HR and how it relates to the amount of possible annual herbal drug preparations?
6. Explain with examples the possibility of solving the problem of the natural resource base through the RL operation of closely related species resources.

Tests and situational tasks:

1. It is known that trade dress yellow lily acquire at 7-8 years of age. Suggest optimum frequency of this kind of raw material workpiece LR.
A: not more than 1 time in 8 years.

2. It is known that presentation marshmallow acquires 5-6 years of age. Suggest optimum frequency of this kind of raw material workpiece LR.
A: not more than 1 time in 6 years.

3. It is known that the recovery spring bushes goritsveta after preform occurs steppe zone of Ukraine for 10 years. Offer a mode of sustainable harvesting RL adonis spring within nature reserves in the steppe zone of Ukraine.
Answer: No more than 1 time in 11 years.

4. The organization of native raw blanks waybread recommended to use the calculated density determination table margin projective coating. Determine the yield (density reserve) and biological stock raw psyllium on bushes 700 m2 with an average projective covering 12% of this species, leaf length of 10 cm, using the calculated table data (p. 77, Navch.pos. ONMedU)
A: The average yield = 0.045 kg / m2. Biological stock = 31.5 kg.

5. When the resource examination bush tansy count units of area 1 m2 of the raw material collected, the average wet weight of which was 150.0 + 10.0 g Calculate

biological and industrial supply RL this plant thicket of 1200 m2 and the amount possible when the annual blanks their recommended frequency of 1 every 2 years.
A: The biological stock = 180 kg operational margin K = 168 x volume shrinkage kg possible blanks = 168 x R 2 (kg / year).

6. A public pharmacy network is implemented packed herb horsetail. View horsetail subject workpiece is pharmacopoeia and is used in medicine:
A. Equisetum pratensis
B. Equisetum hyemalis
B. Equisetium sylvaticum
G. Equisetum arvensis
D. Equisetum ralustris

7. Pharmacy patient appealed with a request to release the leaves of bilberry. What RL that is available, it may be offered as a substitute:
A. Folium Uvae ursi
B.Rhizoma Calami
B. Rhizoma et radix Sanquisorbae officinalis
G. Herba Achilleae millefolii
D. Radix Taraxaci officinalis

8. While the workpiece may hit lily leaves impurities:
A. Digitalis purpurea
B. adonis spring
B. Solomon's seal drug
G. zheltushnik gray
D. woolly foxglove

9. When harvesting root marshmallow admixture may be
A. tansy
B. LAVATERA Thuringian
B. Taraxacum officinale
G. Waybread
D. Common chicory

10. When harvesting the leaves mother and stepmother admixture may be:
A. Oregano
B. Burdock
B. Althea officinalis
Mr. Adonis spring
D. Waybread

11. Bear eyelet is uroseptichnim means. Permissible admixture to the raw materials can be considered:
A smoke tree leaf

B leaf foxglove
The sheet cranberries
Mr. nettle leaf
A list mother and stepmother

12. Medicinal vegetable raw Rhamnus cathartica used as a laxative. Specify that unacceptable impurities of this plant?
A. The fruit buckthorn olhovidnoy
B. The leaves of buckthorn laxative
V. Bark of buckthorn
G. Flowers buckthorn
D. Bark of buckthorn

13. The analysis presented in the RL is a shiny black drupes 6-8 mm in diameter, a large bone, very sturdy, spherical, light brown, with a seed, sweet taste, slightly astringent. Diagnose such LSR follows the fruits:
A blueberry
B wild cherry
The chokeberry
Mr. buckthorn
A hawthorn

14. Of all the series, growing in Ukraine, officinal species, is a diuretic and diaphoretic, it is considered
A. Bidens cernua
B. Bidens radiata
B. Bidens tripartita
G. Bidens frondosa
D. Bidens orientalis

15. In Ukraine, the growing number of species of Potentilla, but pharmacopoeia that contains tannins, are:
A. Potentilla erecta
B. Potentilla argentea
B. Potentilla pilosa
G. Potentilla impolita
D. Potentilla anserina

16. When harvesting medicinal plant raw materials to avoid hitting possible impurities. Which type of herbal drugs pharmacopeia possible admixture is an herb mugwort:
A. Herba Millefolliae
B Herba Polygonii aviculare
B. Herba ARTEMISIA annuae
G. Herba ARTEMISIA absinthiae

D. Herba Leonuri cardiacae

6.4 Materials of methodical maintenance of self-students: orienting map for the organization of independent work of students with textbooks, Count of logical structure of employment and the like.

The task (Home). Find the list of tasks to prepare for the state exam similar design tasks resursovedeniyu and solve them yourself.

6. 7. Literature Basic literature

7. Фармакогностичне ресурсознавство з основами інтродукції лікарських рослин / Навчальний посібник. – Полтава: ПДМУ, 2021.
8. Державна Фармакопея України : в 3 т. / ДП «Український науковий фармакопейний центр якості лікарських засобів». 2-е вид. Харків : Науковий фармакопейний центр, 2015. Т. 1. 1128 с.
9. Ресурсознавство лікарських рослин: Практикум / Тржецинський С. Д. та ін. – Запоріжжя: ЗДМУ, 2021.
10. Фармакогнозія: підручник для студентів фармацевтичних факультетів / Посилкіна О. В. та ін. – Харків: НФаУ, 2015–2018 (розділи, присвячені сировинній базі).
11. Тржецинський С. Д., Доля В. С., Денисенко О. М. Ресурсознавство лікарських рослин : навч.-метод. посіб. Запоріжжя : ЗДМУ, 2015. 115 с.
12. Грицик А. Р., Водославський В. М., Мельник М. В. Фармакогнозія. Ресурсознавство лікарських рослин : навч. посіб. Івано-Франківськ : ПП Голіней О. М., 2019. 248 с.
13. Зузук Б. М. Ресурсознавство лікарських рослин : навч. посіб. для студ. вищ. фармац. навч. закл. Вінниця : Нова Книга, 2015. 232 с.
14. Heinrich M., Barnes J., Prieto-Garcia J., Gibbons S., Williamson E. M. Fundamentals of Pharmacognosy and Phytotherapy. 3rd ed. Elsevier, 2023. 282 p.
15. Medicinal Plant Resources : textbook / V. M. Minarchenko et al. Kyiv : Palyvoda A. V., 2019. 128 p.
16. Bioprospecting of Ethnomedicinal Plant Resources: Sustainable Utilization and Restoration / ed. by G. Shukla et al. CRC Press, 2024. 466 p.
17. Medicinal Plants: Bioprospecting and Pharmacognosy / ed. by A. B. Sharangi, K. V. Peter. Apple Academic Press, 2022. 602 p.
18. Van Wyk B. E., Wink M. Medicinal Plants of the World. 2nd ed. CABI, 2017.

Additional literature:

19. Лікарські рослини: Рекомендаційний список літератури (актуальні видання 2024 року) / Уманський НУС.
20. Малопоширені ароматичні види лікарських рослин / Наукове видання. – Берегове: ЗУІ ім. Ф. Ракоці ІІ, 2025.

21. Лабораторний журнал з ресурсознавства лікарських рослин : [посібник] / В. М. Мінарченко та ін. Київ : Паливода А. В., 2018. 94 с.
22. Фармакогнозія : підручник для студ. вищ. навч. закл. / В. С. Кисличенко та ін. ; за ред. В. С. Кисличенко. Харків : НФаУ : Золоті сторінки, 2015. 736 с.
23. Державна Фармакопея України : в 3 т. / ДП «Український науковий фармакопейний центр якості лікарських засобів». 2-е вид. Харків : Науковий фармакопейний центр, 2015. Т. 1. 1128 с.
520 p.

electronic resources

24. Medicinal Plant Names Services (MPNS) Resource. Kew Royal Botanic Gardens. URL: kew.org (дата звернення: 22.03.2026).
25. Ресурсознавство лікарських рослин : презентація лекції. Нац. фармац. ун-т. URL: https://cnc.nuph.edu.ua/wp-content/uploads/2023/09/prezentatsiia_resursoznavstvo-lr.pdf (дата звернення: 22.03.2026).

9.Tema following classes: Cultivation of Latvia in Ukraine and the world. Introduction as the first step towards the creation and enrichment of HR resources. LR gene pool of world medicine in the botanical gardens of Ukraine (excursion to the Botanical Garden - 4 h.).

Methodical recommendations were made by ***associate professor Boyko IA***