

**CONTENT MODULE 6**  
**PLANT SYSTEMATICS 2. REVIEW OF SOME FAMILIES OF ANGIOSPERMS AND**  
**GYMNOSPERMS AND THEIR MEDICINAL REPRESENTATIVES.**

**Laboratory class № 15**

**The Solanaceae (Potato) Family, the Lamiaceae (Mint) Family**

**Aim of the lesson:** to learn Ukrainian and Latin names, specific features of families and medicinal plants, presence of certain groups of biologically active compounds, resources, significance, and use; to learn to distinguish species-specific diagnostic features and to identify medicinal plants on herbarium specimens.

**Homework**

**The main theoretical questions for independent work.**

1. Learn characteristic *Solanaceae* (Potato) Family, the *Lamiaceae* (Mint) Family and their representatives. Learn English and Latin name of the family and plants.
2. Study herbarium samples.

**Task 1. Choose correct answer.**

1. A vegetable and medicinal annual plant with white, single and rotate flowers and yellow, green and red berry-like fruits, is defined as...

- A *Mentha piperita*, B *Capsicum annum*, C. *Solanum tuberosum*,  
D. *Daucus sativa*, E. *Hyoscyamus niger*.

2. There is poisonous plant with an unpleasant odour, it has pubescent glandular hairs; its leaves are pinnatilobate or large-stellar; the flowers are yellowish-brown with a net of dark violet veins. The fruit is bilocular capsule with a lid. This is ...

- A. *Atropa belladonna*, B. *Digitalis purpurea*, C. *Hyoscyamus niger*,  
D. *Datura stramonium*, E. *Vinca minor*.

3. Funnel-shaped yellowish flowers of poison tobacco are aggregated at the apex of stems; they grow in one direction during the flowering and form ...

- A *dichasium*, B *pleiochasium*, C *corymb*, D *panicle*, E *bostryx*.

4. Prickly, light-gray, many-seeded capsule, which opens with four valves by maturation, belongs to...

- A. *Hyoscyamus niger*, B. *Papaver somniferum*, C. *Digitalis purpurea*,  
D. *Datura stramonium*, E. *Linum usitatissimum*.

5. An aromatic plant, densely pubescent with glandules has a tetraquetrous stem, and a spiked inflorescence: a thyrus of whorls *dichasium*, a bilabiate corolla and a coenobium fruit. Most probably, this plant belongs to the family of ...

- A. *Solanaceae*, B. *Lamiaceae*, C. *Brassicaceae*, D. *Apiaceae*,  
E. *Scrophulariaceae*.

6. The cenocarpous fruit of the *Lamiaceae* family is formed with two accrete carpels, and while maturing, it is separated into four loculus with a false septum. Its name is ... .

- A *cremocarp*, B *regma*, C *coenobium*, D *kalatch*, E *sterigma*.

## Laboratory work

**Task 1.** Carry out morphological analysis of herbariums, flowers and fruits of the plants *Solanaceae Family*. Write down general characteristic of family according to the plan.

1. Life forms:

2. Underground organ:

3. Leaf position:

4. Leaves:

5. Inflorescences:

6. Perianth:

7. Calyx:

8. Corolla:

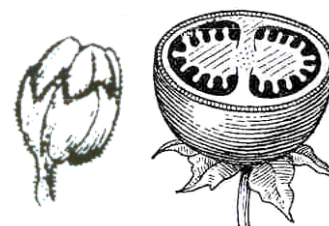
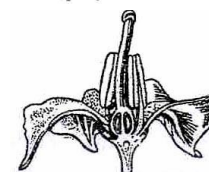
9. Androecium

10. Gynoecium:

11. Flower formula:

12. Fruits

13. Chemosystematic feature:



**Task 2.** Remember English and Latin name of the representatives of *Solanaceae Family* and write down their diagnostic features.

№	English, Latin name	Diagnostic features
1	<b>Potato</b> <i>Solanum tuberosum</i>	
2	<b>Chili pepper</b> <i>Capsicum annuum</i>	
3	<b>Poison tobacco, Henbane, Belene or Hog's-been</b> <i>Hyoscyamus niger</i>	

4	<p style="text-align: center;"><b>Datura, Stamonium, Jimestown-weed or Devil's-trumpet</b> <i>Datura stramonium</i></p>	
5	<p style="text-align: center;"><b>Belladonna or Deadly nightshade</b> <i>Atropa belladonna</i></p>	

**Task 3.** Carry out morphological analysis of herbariums, flowers and fruits of the plants *Lamiaceae Family*. Write down general characteristic of family according to the plan.

1. Life forms:

2. Underground organ:

3. Stem:

4. Leaf position:

5. Leaves:

6. Inflorescences:

7. Perianth:

8. Calyx:

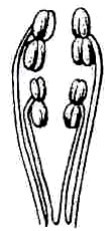
9. Corolla:

10. Androecium

11. Gynoecium:

12. Flower formula:

13. Fruits



14. Chemosystematic feature:

**Task 4.** Remember English and Latin name of the representatives of *Lamiaceae Family* and write down their diagnostic features.

№	English, Latin name	Diagnostic features
1	<b>Common origanum</b> <i>Origanum vulgare</i>	
2	<b>Lemon balm</b> <i>Melissa officinalis</i>	
3	<b>Garden sage</b> <i>Salvia officinalis</i>	
4	<b>Peppermint</b> <i>Mentha piperita</i>	
5	<b>Motherwort</b> <i>Leonurus cardiaca</i>	
6	<b>Garden thyme</b> <i>Thymus vulgaris</i>	
7	<b>Wild thyme</b> <i>Thymus serpyllum</i>	
8	<b>Compass-weed, rosemary</b> <i>Rosmarinus officinalis</i>	

## Laboratory class № 16

### The Asteraceae (Sunflower) Family.

**Aim of the lesson:** to learn Ukrainian and Latin names, specific features of the family and medicinal plants, presence of certain groups of biologically active compounds, resources, significance, and use; to learn to distinguish species-specific diagnostic features and to identify medicinal plants on herbarium specimens.

#### The main theoretical questions for independent work.

1. Learn characteristic *Asteraceae* (Sunflower) Family) and their representatives. Learn English and Latin name of the family and plants.
2. Study herbarium samples.

### Homework

#### Task 1. Choose correct answer.

1. The presence of achene fruits, articulate lactifers, essential-oil glandules are typical for the family of ...  
A. *Solanaceae*, B. *Scrophulariaceae*, C. *Lamiaceae*, D. *Asteraceae*, E. *Alliaceae*.
2. The inflorescences studied are composed of flowers with corollas of various forms: ligulate, false-ligulate, tubular, which is typical for the ... family.  
A. *Lamiaceae*, B. *Asteraceae*, C. *Solanaceae*, D. *Fabaceae*, E. *Alliaceae*.
3. The inflorescence of *Cichorium intybus* has a flower with five petals, growing into a short, narrow tube, which moves into a long fivepoint bend. So, the corolla of this flower is...  
A *funnelform*, B *tubular*, C *bilabiate*, D *ligulate*, E *false-ligulate*.
4. A perennial cosmopolitan has a root leaf rosette and yellow ligulate flowers collected in the anthodium inflorescence. It is ...  
A. *Carum carvi*, B. *Taraxacum officinale*, C. *Plantago major*, D. *Salvia officinalis*, E. *Artemisia absinthium*.
5. The plant from the *Asteraceae* family studied is used as a stimulant of the immune system, the central nervous system (CNS), and to improve sexual potency. It has single anthodiums, big apical marginal flowers with an elongated, bidentate corolla, purple or dark red. It is...  
A. *Taraxacum officinale*, B. *Echinacea purpurea*, C. *Chamomilla recutita*, D. *Artemisia absinthium*, E. *Achillea millefolium*.
6. The achenes of *Calendula officinalis* are arcuate and hamous, with a narrow top. Their surface is ...  
A *felt and hairy*, B *smooth*, C *prickly*, D *soft-hair*, E *bristly*.

### Laboratory work

**Task1.** Carry out morphological analysis of herbariums, flowers and fruits of the plants *Asteraceae Family*. Write down general characteristic of family according to the plan.

1. Life forms:

2. Underground organ:

3. Leaf position:

4. Leaves:

6. Inflorescences:

7. Flowers:

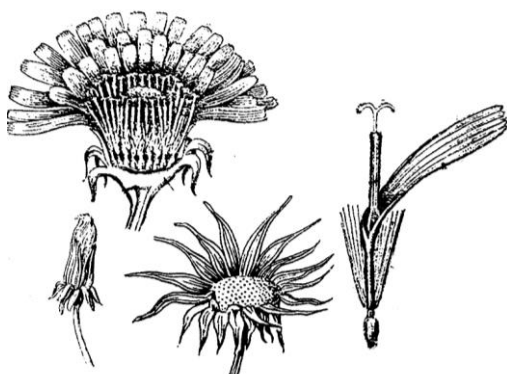
8. Flower formulas:

9. Fruits

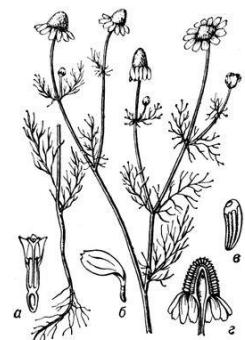
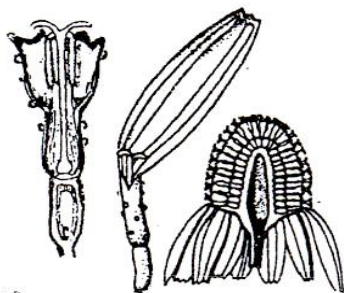
10. Chemosystematic feature:

**Task 2.** Prepare and describe the inflorescences. Write down the flower formula. Look at the fruit. Sketch parts of flowers. Label the diagram.

**Object 1: Dandelion or Cankerwort**



**Object 2: Rounded chamomile**



**Task 3.** Remember English and Latin name of the representatives of *Asteraceae* **Family**, write down their diagnostic feature.

№	English, Latin name	Diagnostic features
1	<p style="text-align: center;"><b>Arnica, mountain arnica</b> <i>Arnica montana</i></p>	
2	<p style="text-align: center;"><b>Common yarrow</b> <i>Achillea millefolium</i></p>	
3	<p style="text-align: center;"><b>Purple cone-flower</b> <i>Echinacea purpurea</i></p>	
4	<p style="text-align: center;"><b>Dandelion or Cankerwort</b> <i>Taraxacum officinale</i></p>	
5	<p style="text-align: center;"><b>Great burdock</b> <i>Arctium lappa</i></p>	
6	<p style="text-align: center;"><b>Pot marigold</b> <i>Calendula officinalis</i></p>	
7	<p style="text-align: center;"><b>Elegampane inula, Elf dock, Elfwort, Hourse-heal or Yellow starwort</b> <i>Inula helenium</i></p>	

8	<p><b>Colt's foot, Bool's foot or Saw-foot</b> <i>Tussilago farfara</i></p>	
9	<p><b>Common tansy or Ginger plant</b> <i>Tanacetum vulgare</i></p>	
10	<p><b>Common wormwood or Absinthium</b> <i>Artemisia absinthium</i></p>	
11	<p><b>Lady's-milk</b> <i>Silybum marianum</i></p>	
12	<p><b>Bur marigold, Tickseen or Beggar ticks</b> <i>Bidens tripartita</i></p>	
13	<p><b>Common camomile or German camomile</b> <i>Matricaria chamomilla</i></p>	
14	<p><i>Wild mrigold</i> <b>Rounded chamomile</b> <i>Chamomilla suaveolens</i></p>	
15	<p><b>Immortele or Yellow everlasting daisy</b> <i>Helichrysum arenarium</i></p>	



## Laboratory class № 17-18

### Medicinal plants of the different families

**Aim of the lesson:** to learn Ukrainian and Latin names, specific features of types of medicinal plants and various families common in Ukraine, presence of certain groups of biologically active compounds in them, resources, significance, and use; to learn to distinguish species-specific diagnostic features and to identify medicinal plants on herbarium specimens.

### Homework

#### The main theoretical questions for independent work.

1. Learn characteristic Medicinal plants of the different families and their representatives. Learn English and Latin name of the family and plants.
2. Revise the practical material the topical of practical classes 6-8.
3. Study herbarium samples.

#### Task 2. Choose correct answer.

1. The herbaceous plant of the *Malvaceae* family, which is used as an expectorant and coating agent, is analyzed. The leaves are simple, three- or palmately lobed, flowers are large, pink, axil, form racemose inflorescences, the fruit is calatch. This plant is ...

A. *Potentilla erecta*, B. *Althaea officinalis*, C. *Fragaria vesca*, D. *Tussilago farfara*,  
E. *Thymus serpyllum*

2. Periwinkle (*Vinca minor*) has vegetative shoots which crawl on the ground and root. These shoots are ...

A *climbing*, B *recumbent*, C *creeping*, D *scrambling*, E *clinging*.

3. A small, flat, oblong-elliptical winged nut is typical for ...

A *Schisandra chinensis*, B *Sambucus nigra*, C *Vinca minor*, D *Betula pendula*,  
E *Juglans regia*.

4. The leaves are petiolar, imparipinnately compound typical for ...

A *Rumex confertus*, B *Chelidonium majus*, C *Vinca minor*, D *Sambucus nigra*,  
E *Aesculus hippocastanum*.

5. A perennial plant has an oblong, flat, light-brown achene with hairy falling pappus and hydrophilous rhizome. It is ...

A. *Convallaria majalis*, B. *Hypericum perforatum*, C. *Vinca minor*,  
D. *Valeriana officinalis*, E. *Plantago major*.

6. The tree was indetifined, the leaves are alternate, long petiolar, palmately compound, without stipules. The flowers collected into pyramidal thyrsus – of raceme bostryx. Fruit – one-seeded, rounded, covered thorns capsule. This is features genus ...

A. *Aesculus*, B. *Rhamnus*, C. *Quercus*, D. *Hippophae*, E. *Apium*.

7. The following fruit is studied: spherical box with spikes, which is opened by three bracts, contains one large, brown, shiny seed with a light dim spot. This is a fruit of ...

A. *Datura stramonium*, B. *Papaver somniferum*, C. *Aesculus hippocastanum*,  
D. *Plantago major*, E. *Hipericum perforatum*.

8. As for thir shape and form, oak (*Quercus robur*) leaves are ...

A *pinnatisected*, B *tripartite*, C *pinnatilobate*, D *palmatilobate*, E *palmatisected*.

9. Male inflorescences of the oak (*Quercus robur*) are thyrsus. The main axis is drooping, elongated, thin, carried dichasium from several staminate flowers. So, oak (*Quercus robur*) inflorescence is a ...  
*A raceme, B spadix, C compound corymb, D compound catkin, E head.*
10. The opposite branches of the buckthorn (*Rhamnus cathartica*) are shortened, often ended with a thorn, which is a modification of ...  
*A a leaf, B a shoot, C stipules, D a petiole, E a flower bud.*
11. One of diagnostic features of common St.John's (*Hypericum perforatum*) is presence of ... on petals and leaves.  
*A thorns, B long burning emergens, C bright scales, D dark and light conceptacles, E dark laticifers along the veins.*
12. Leaves of common snowball (*Viburnum opulus*) are simple, opposite petiolar, 3-5 lobate, and its inflorescence is ...  
*A simple umbel, B umbel thyrsus, C double dichasium, D spike-like raceme, E pyramidal thyrsus.*
13. The indication to plant domination is laid down in the name of one of the following species, namely ...  
*A. Hypericum perforatum, B. Betula verrucosa, C. Thymus serpyllum, D. Laurus nobilis, E. Urtica dioica.*
14. The apocarpous fruit of *chinese magnolia*(*Schizandra chinensis*) consists of fleshy berry-like red carpels that are not explosive and have a distinct abdominal suture. This fruit is ...  
*A aggregate-accessory fruit, B fleshy follicle, C fleshy polyfollicle, D collective berry, E fleshy loment legume.*
15. As antipyretic, it is recommended to use ...  
*A fruits of Quercus robur, B inflorescence of Tilia cordata, C flower of Crataegus sanguinea, D leaves of Padus racemosa, E rhizomes of Convallaria majalis.*
16. Among the following plants, one has the fruit capsule with a light brown, flattened, shining, smooth, slippery seed, which in the case of moistening forms mucus. It is...  
*A. Hypericum perforatum, B. Digitalis purpurea, C. Ledum palustre, D. Linum usitatissimum, E. Betula verrucosa.*
17. Yellow-orange elongated drupe nutlets, rich in vitamins and fatty oil, are collected from female specimens of a thorny bush ...  
*A. Rhamnus cathartica, B. Hippophaë rhamnoides, C. Sambucus nigra, D. Amygdalus communis, E. Prunus spinosa.*
18. Plants that have an effect on blood system and its coagulation include common yarrow (*Achillea millefolium*), common snowball (*Viburnum opulus*), horse chestnut (*Aesculus hippocastanum*) and ...  
*A. Hippophae rhamnoides, B. Plantago major, C. Vinca minor, D. Tilia cordata, E. Linum usitatissimum.*
19. While analysing sedative tea, we identified yellowish-green multiple fruits, "strobiles", formed by tiled bracts and fruitlets of nutlets, which are typical for ...  
*A. Alnus glutinosa, B. Humulus lupulus, C. Schizandra chinensis, D. Juniperus communis, E. Ephedra distachya.*

## Laboratory work

**Task 1.** Carry out morphological analysis of herbariums and figures, flowers and fruits of the **medicinal plants of the different families**. Write down general characteristic of family according to the plan.

**Representatives:**

№	English, Latin name	Morphological description	Application
1	<p><b>The Ranunculaceae Family</b> <i>Adonis vernalis</i></p> <p><b>The Buttercup Family</b> <i>Spring Adonis</i> <i>p. 194-195</i></p>		
2	<p><b>The Malvaceae Family</b> <i>Althaea officinalis</i></p> <p><b>The Mallow Family</b> Marsh mallow, sweat weed <i>p. 223-224</i></p>		
3	<p><b>The Apocynaceae Family</b> <i>Vinca minor</i></p> <p><b>The Milkweed Family</b> Common periwinkle(r) <i>p. 264</i></p>		
4	<p><b>The Betulaceae Family</b> <i>Betula verrucosa</i></p> <p><b>The Birch Family</b> European birch, white birch <i>p. 209-210</i></p>		
5	<p><b>The Sambucaceae Family</b> <i>Sambucus nigra</i></p> <p><b>The Elder Family</b> European elder <i>p. 262-263</i></p>		
6	<p><b>The Valerianaceae Family</b> <i>Valeriana officinalis</i></p> <p><b>The Valerian Family</b> Common valerian, garden <i>heliotrope</i> <i>p. 263-264</i></p>		

7	<p><b>The <i>Betulaceae</i> Family</b> <i>Alnus glutinosa</i></p> <p><b>The <i>Birch</i> Family</b> European black alder p. 208-209</p>		
8	<p><b>The <i>Fagaceae</i> Family</b> <i>Quercus robur</i></p> <p><b>The <i>Oak</i> Family</b> English oak p. 207-208</p>		
9	<p><b>The <i>Rhamnaceae</i> Family</b> <i>Rhamnus cathartica</i></p> <p><b>The <i>Buckthorn</i> Family</b> Common buckthorn p. 250-251</p>		
10	<p><b>The <i>Rhamnaceae</i> Family</b> <i>Frangula alnus</i> (or <i>Rhamnus frangula</i>)</p> <p><b>The <i>Buckthorn</i> Family</b> Alder buckthorn, black dogwood p. 249-250</p>		
11	<p><b>The <i>Papaveraceae</i> Family</b> <i>Glaucium flavum</i></p> <p><b>The <i>Poppy</i> Family</b> Yellow horned poppy or Tulip poppy p. 199</p>		
12	<p><b>The <i>Papaveraceae</i> Family</b> <i>Chelidonium majus</i></p> <p><b>The <i>Poppy</i> Family</b> Rock poppy Greater celandine p. 198-199</p>		
13	<p><b>The <i>Hippocastanaceae</i> Family</b> <i>Aesculus hippocastanum</i></p> <p><b>The <i>Chestnut</i> Family</b> Horse chestnut p. 228</p>		

14	<p><b>The Juglandaceae Family</b> <i>Juglans regia</i></p> <p><b>The Walnut Family</b> Common walnut p. 210-211</p>		
15	<p><b>The Clusiaceae Family</b> <i>Hypericum perforatum</i></p> <p><b>The St. John's wort Family</b> Common St. John's wort p. 211-212</p>		
16	<p><b>The Viburnaceae Family</b> <i>Viburnum opulus</i></p> <p><b>The Honeysuckle Family</b> Common snowball p. 261-262</p>		
17	<p><b>The Urticaceae Family</b> <i>Urtica dioica</i></p> <p><b>The Nettle Family</b> Common nettle, great nettle p. 225-226</p>		
18	<p><b>The Schisandraceae Family</b> <i>Schizandra chinensis</i></p> <p><b>The Schisandraceae Family</b> Ch. Magnolia See lecture on <a href="http://pamel.kharkiv.edu">pamel.kharkiv.edu</a></p>		
19	<p><b>The Tiliaceae Family</b> <i>Tilia cordata</i></p> <p><b>The Linden Family</b> Small linden p. 222-223</p>		
20	<p><b>The Scrophulariaceae Family</b> <i>Digitalis purpurea</i></p> <p><b>The Figwort Family</b> Purple foxglove, lion's p. 273-274</p>		

21	<p><b>The Oleaceae Family</b> <i>Hippophae rhamnoides</i></p> <p><b>The Olive Family</b> <i>Sea buckthorn</i> p. 251-252</p>		
22	<p><b>Cowslip, primrose cowslip</b></p> <p><i>Primula veris</i> See lecture on <a href="http://pamel.kharkiv.edu">pamel.kharkiv.edu</a></p>		
23	<p><b>The Plantaginaceae Family</b> <i>Plantago major</i></p> <p><b>The Snapdragon Family</b> Common plantain, greater plantain p. 275</p>		
25	<p><b>The Cannabaceae Family</b> <i>Humulus lupulus</i></p> <p><b>The Hemp Family</b> Common hop, hop p. 224-225</p>		

## Practical class № 19 - Final test of the Module 2

### Independent work

#### Attention!

#### Themes:

1. Cyanobacteria - representative *Spirulina*;
2. Brown Algae - representative *Laminaria saccharina* (kelp)
3. Fungi – representative *Inonotus obliquus* (Chaga); *Amanita muscaria* (fly agaric, fly Amanita)
4. Lichens (structure and form)
5. Briophyta – mosses
6. Lycophyta – club mosses
7. Polypodiophyta – ferns (representative *Dryopteris filix-mas* -Common Male Fern, Male Fern)
8. Equisetophyta – horsetails (representative *Equisetum arvense* - Field Horsetail, Common Horsetail)
9. Gymnosperms - representative *Pinus sylvestris* (Scots Pine); *Picea abies* (Norway Spruce); *Abies alba* (European silver fir); *Juniperus communis* (Common Juniper); *Ephedra distachya* (Ephedra)

## List literature

### Basic

1. Test items with explains for preparing for license examination KROK-1 «Pharmacy» (BOTANY) / T. M. Gontova [et al.] ; ed. by Ya. S. Kichymasova – Kh. : NUPh, 2017. – 88 p.
2. Pharmaceutical botany : textbook / T. M. Gontova [et al.] ; ed. by T. M. Gontova. – Ternopil : TSMU, 2013. – 380 p.
3. Фотогербарий лекарственных растений = Photoherbarium of medicinal plants : учеб. пособ. для студ. высш. учеб. завед. / Т. Н. Гонтовая [и др.] ; под общ. ред. проф. Т. Н. Гонтовой, доц. В. П. Руденко. – Харьков : НФаУ : Золотые страницы, 2017. – 274 с.

### Additional

4. Chhatwal, G. R. Textbook Of Botany / G. R. Chhatwal, M. P. Singh. – New Delhi, 2002. – 813 p.
5. Kingsley, R. S. Introductory Plant Biology / R. S. Kingsley, S. Jansky, J. E. Bidlack. – 9<sup>th</sup> ed. Mc Graw Hill, 2003. – 624 p.
6. Pharmacognosy : textbook for higher school students / V. S. Kyslychenko [et al.] ; ed. by V. S. Kyslychenko. – Kharkiv : NUPh : Golden Pages, 2011. – 552 p.
7. Sundara Rajan, S. Plant Morphology / S. Sundara Rajan – New Delhi : Anmol Publications PVT, 2002. – 813 p.

### Informational resources

1. Botany in figures [Electronic resource] : text & multimedia lectures / T. N. Gontovaya [et al.]. – Електрон. текстові, граф. дані (1,31 Гб). – Х. : НФаУ, 2012. – 1 електр. опт. диск (CD-ROM); кол. сист. вимоги: ПК 486 та вище; 8 Мб ОЗУ; Win 98, WinXP, Win 7; SVGA 32768 та більше кол. ; 640x480; 4x CD-ROM дисковод; 16 біт. зв. карта. – Диск у контейнері 18x13 см.
2. НФаУ. Система дистанційного навчання. Кафедра ботаніки. Матеріали для самостійної роботи [Електроний ресурс]: сайт. – Режим доступа : <http://pharmel.kharkiv.edu/moodle/> (дата звернення 03.09.2018).
3. НФаУ. Наукова бібліотека [Електроний ресурс] : сайт. – Режим доступа : <http://lib.nuph.edu.ua/> (дата звернення: 03.09.2018).