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Specific Features of Organizing Practical Training in Ecology and Environmental Protection in Higher Educational Institutions

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Abstract: The article presents the results of an experiment conducted to improve the technology of organizing practical classes on the subject "Ecology and Environmental Protection" in higher educational institutions.

Keywords: Population, humidity, hydrophilic, hydathophyte, hydrophyte, hygrophyte, mesophyte, xerophyte.

Introduction: In our country, great attention is paid to bringing higher pedagogical education to a new qualitative level, developing an innovative system for training future teachers, and improving the methodological support for teaching natural sciences based on advanced foreign experiences. The Concept for the Development of the Higher Education System until 2030 sets "Accelerating the processes of studying and applying advanced foreign experiences in improving the quality of education and improving teaching methods" [1] as a priority task. This requires the development of innovative forms, methods and means of education in teaching the Ecology and Environmental Protection course, improving the practical training of future biology teachers through the use of new pedagogical and information and communication technologies, and developing a system of practical tasks aimed at assessing the subject-specific competencies of environmental education.

Main part

Practical classes in ecology and environmental protection are included in the curriculum of the biology specialty and are of great importance in forming the ecological culture of future specialists, general education schools, and specialized vocational colleges. Practical classes help students and pupils consolidate theoretical knowledge, form and further develop practical skills and qualifications.

Below we give an example of our experiences in improving practical classes on the example of one topic. Each class begins with brief theoretical information. Also, materials and equipment, the procedure for performing the work, and tasks are presented.

Subject of the practical class: Morphological differences between plants growing in water and on land.

Purpose of the work. To study the morphological structure of plants growing in water and on land and to determine the differences between them.

Materials and equipment. Tables depicting various communities, herbariums of plants specific to each community, plant samples, magnifying glass, notebook, pencil, ruler.

Theoretical material. The moisture factor is of great importance in the distribution of all organisms on Earth. Lack of moisture is one of the most important features of life on land. Xerophilous plants and animals form an ecological group in arid environments. Mesophiles live in moderate humidity, and hydrophilic organisms live in excess humidity.

All plants are divided into 5 ecological groups according to their water supply or adaptation to humidity conditions: hydatophytes, hydrophytes, hygrophytes, mesophytes, xerophytes.

Hydatophytes - this group of organisms that spend their lives constantly in water, mainly algae.

Hydrophytes are plants that have part of their body outside the water, and the rest in the water layer. This group includes water lilies, water lilies, lanceolates, water lilies, and water lilies. They have a number of characteristics depending on their living conditions, such as a large floating surface, the covering of vegetative organs with a mucous membrane, weak

development of mechanical tissue, the presence of air spaces in cells, and weak development of the root system.

Mesophytes include most cultivated and wild plants. The root system of mesophytic plants is usually well developed, the leaves are often large, flat, soft, fleshy, moderately developed tissues, and the leaves are often hairless.

Xerophytes include plants widespread in steppe, desert, and semi-desert regions. They, in turn, are divided into two groups: sclerophytes and succulents. Sclerophytes are drought-resistant, perennial, rough, often with reduced leaves and spines, a thick cuticle layer, and well-developed mechanical tissue. These include saxaul, yantoq, chalong, wormwood, betaga, etc. Species growing in the sandy deserts of Central Asia can reduce the total amount of water in their body by up to 50%. The root system is diverse (up to 30 meters in the yantoq), the stems are woody. Some species adapt to adverse conditions by undergoing a summer dormancy period. Succulents are perennial plants with a watery, fleshy body. They can store water in their leaves and stems. For example: a cactus can store up to 1-3 tons of water. Signs of adaptation: leaves and stems are usually hairless, the cuticle and wax layers are thick, the root system is located on the surface of the soil.

Procedure for performing work

The morphological characteristics of the leaves of herbarium specimens grown in different environmental conditions are studied using a magnifying glass. The length, width, and thickness of the leaf are measured using a ruler. The degree to which the plant leaves have hairs, i.e., hairless or sparsely hairy, is recorded.

Assignments

Task 1. Distinguish hydrophyte, mesophyte and xerophyte plants from herbariums according to their morphological characteristics.

Task 2. Study the morphological characteristics of the leaves of plant herbariums using a magnifying glass.

Task 3. Determine in which species of the studied plants the phenomenon of metamorphosis occurs and fill in Table 1.

Table 1

Morphological characteristics of plant leaves growing in different locations

Morphological classification of leaves	Elodeya	Shalfey	Yantoq
Shape			
Length, mm			
Width, mm			
Thickness, μm			

Degree of leaf shear			
Nature of hairiness			
Metamorphosis			
Plant habitat Ecological group			

Table 2
Ecological groups and their morphological features

Ecological groups	Distinctive features of the group
Hydrophiles	
Mesophiles	
Xerophiles	

Control questions

1. How have aquatic organisms adapted to the aquatic environment?
2. How have terrestrial plants adapted to grow?
3. Do you know the ecological groups of aquatic plants?
4. Do you know the ecological groups of terrestrial plants?

REFERENCES

Decree of the President of the Republic of Uzbekistan dated October 8, 2019 No. PF-5847 "On approval of the Concept of development of the higher education system of the Republic of Uzbekistan until 2030" // National database of legislative documents, 09.10.2019, No. 06/19/5847/3887.

Duschanova G.M. Botany (Anatomy and morphology of plants. Laboratory exercises).– T: Bookmany print, 2022. pp. 341-355.

Haydarova H., Bahodirova Z., Yakubjonova Sh. Ecology teaching methodology. – Tashkent: Iqtisod-Finance, 2009. pp. 123-129.

Tokhtayev A.S. Ecology. – T.: O'qituvati, 1998. 76-77 pp.

Yakubjonova Sh.T., Ishmu'minov B.B. Ecology and environmental protection.– T: Bookmany print, 2022. 45-49 pp.

Yakubjonova S. T., Ishmuminov B. B. Structure And Reproduction Of Forest Ferns //Journal of Pharmaceutical Negative Results. – 2022. – P. 1560-1562.

Yakubjonova S. T., Amanbaeva Z. A., Ishmo'minov B. B. EKOLOGIYA VA ATROF MUHIT MUHOFAZASI FANIDAN AMALIY MASHG'ULOTLARNI O'QITISHNI INNOVATSION TEXNOLOGIYALAR ASOSIDA TAKOMILLASHTIRISH //Science and innovation. – 2022.

– T. 1. – №. B3. – C. 977-984.

Ishmo'minov, B. B., Yakubjonova, S. T., & Ahmedova, Z. N. (2023). EKOLOGIYA TA'LIMIDA AMALIY MASHG'ULOTLARNI TASHKIL ETISHNING O 'ZIGA XOS XUSUSIYATLARI. Innovations in Technology and Science Education, 2(8), 376-382.