

ORGANIZATION AND PLANNING OF GARDEN AND PARK FACILITIES TAKING INTO ACCOUNT MODERN TRENDS

Nataliya Stoyanets

Doctor of Economic Sciences, Professor

professor of the department of horticulture and forestry

Sumy National Agricultural University, Ukraine

ORCID ID: 0000-0002-7526-6570

The task of the forestry and horticulture industry of Ukraine is to create and grow highly productive, long-lasting and biologically stable forest, field protection, horticulture and other types of artificial plantations from economically valuable tree plants, as well as the cultivation and sale of decorative planting material.

Planting material can be sold both in nurseries and in garden centers created for this purpose. In garden centers, the assortment of decorative plants can be relatively poorer, since the types that are presented should have the greatest demand in a specific locality. Unlike nurseries, garden centers offer, in addition to planting material, other types of services related to design, landscaping and beautification works, plant care).

Nurseries in Ukraine have significant potential, as evidenced by the current trends in the development of private nurseries. For producers, the increase of areas, the mastery of modern technologies, the expansion of the assortment of cultivated plants, the specialization of nurseries for the purpose of producing high-quality planting material, as well as scientific, methodological and professional production support were and remain relevant for producers.

The current state of production of decorative planting material and its provision of landscaping needs in Ukraine is, to a large extent, determined by the latest history of flower and decorative nursery, which covers the period from the moment Ukraine gained independence to the present day. This story has its roots, its characteristic features and features unique to it, and its knowledge probability to predict the future of domestic nurseries. The characteristic features of modern domestic flower and decorative nurseries are: significant expansion of the range of cultivated breeds and types of products; active mastering of modern technologies for growing new types of planting material; a certain spontaneity in the formation of individual nursery elements due to the diversity of producers, the absence of a consolidating center and a scientifically based concept of its development; not always sufficient attention and assistance to producers of floral and decorative products from the state, etc.

Table 1. Stages of planning garden and park activities.

1. Defining Objectives:	<ul style="list-style-type: none"> - Identify the purpose of garden and park activities (e.g., recreational, educational, community engagement). - Determine the target audience or participants for the activities. - Establish specific goals and outcomes to be achieved during the events.
2. Research and Information Gathering:	<ul style="list-style-type: none"> - Utilize search engine capabilities to gather information on different types of garden and park activities. - Explore various ideas, trends, and best practices in designing engaging activities. - Collect data on user preferences, interests, and needs through surveys or feedback channels.
3. Selection of Activities:	<ul style="list-style-type: none"> - Based on the inputs gathered from and research, curate a diverse range of activities. - Ensure activities align with the objectives and target audience's interests. - Consider the practicality of implementing selected activities within the available garden or park infrastructure.
4. Framing the Schedule:	<ul style="list-style-type: none"> - Create a detailed schedule for each activity, considering time slots, duration, and participant flow. - Factor in the time required for setup, breakdown, and any necessary transitions between activities. - Allocate ample time for breaks, refreshments, and relaxation.
5. Resource Management:	<ul style="list-style-type: none"> - Identify the resources required for each activity, such as equipment, materials, and personnel. - Collaborate with relevant departments or vendors to source and manage these resources effectively. - Consider budgetary constraints and explore cost-effective options.
6. Safety and Accessibility:	<ul style="list-style-type: none"> - Prioritize the safety and accessibility of garden and park activities. - Ensure compliance with local regulations and guidelines for public gatherings. - Provide clear instructions, signage, and support to enhance participants' safety and experience.
7. Promotion and Outreach:	<ul style="list-style-type: none"> - Leverage capabilities to develop engaging promotional content. - Utilize social media platforms, local communities, and relevant organizations to reach the target audience. - Empower to answer frequently asked questions and provide event-specific information.
8. Evaluation and Improvements:	<ul style="list-style-type: none"> - Gather feedback from participants through surveys or interactive features. - Analyze the data to identify areas for improvement and success stories.

The history of garden and park art has hundreds of years of development and evolution. It encompasses styles and techniques that are the result of the interaction of different cultures, traditions and aesthetic views of different eras.

The oldest known example of horticultural art is found in Egypt, where the gardens of Ife, which were decorated with temples and water features, existed already around 2800 BC. In Greece and Rome, gardens were also popular, they were decorated with architectural elements and sculptures.

In the Middle Ages, the development of gardens was connected with the introduction of ancient culture in Europe. French gardens, with their symmetrical

avenues and geometric patterns, became popular in the 17th century. In Italy, large Byzantine gardens were created with fountains, sculptures and plants.

During the Baroque era, the gardens became more hidden and natural. An example of this style is the English landscape gardens that appeared in the 18th century. They transformed landscapes by using natural beauty and creating the illusion of vast space.

As technology and architecture developed, it became possible to create innovative garden and park elements. Modern gardens and parks use not only plants, but also sculptures, water effects, lighting and other architectural features.

The history of garden and park art continues to develop and evolve. Today we see a variety of styles and techniques in gardens and parks around the world, from classical forms to ecologically oriented concepts. Work on the improvement of garden and park art keeps pace with the growing demands of society and the development of new technologies.

For more than 22 years of Ukraine's independence, domestic ornamental nurseries have passed the initial stage of modern development, which has its own national features and characteristic patterns. It is time to sum up the first results not only for the generalization of the development experience, but also for the purpose of identifying existing problems, tasks for the future and finding ways to improve it. This determines the relevance of the conducted research, the scientific results of which complement the theory of nursery farming and are of considerable interest for its modern practice and further development. At the same time, it should be remembered that the appearance of Ukraine as a European country depends to a large extent on the state of domestic decorative nurseries and that it has unique conditions, much better than other European countries, for highly efficient production of planting material.

In the history of the country's modern decorative nurseries, there are many achievements and unsolved problems [3, 6,]. The positive aspects of its development include, first of all, the formation of an extensive network of nurseries under private ownership [5, 9, 10], a significant expansion of the assortment of tree cultivars and the assortment of products at state and communal enterprises [5], the mastery of new technologies for propagation and cultivation of planting material, in particular, an increase in the specific weight of container culture [8, 9], the start of production of accompanying materials (universal and specialized substrates, containers, fertilizers, etc.) and, in general, an increase in the specific weight of domestic products on the market of Ukraine and abroad [2].

The shortcomings and problems inherent in the Ukrainian segment of the production of decorative planting material include:

- lack of a state strategy and national policy for the development of domestic ornamental nurseries [6, 11];
- imperfection, and in some cases also insufficiency of legislative and regulatory and instructional support, lack of production regulations and requirements for products harmonized with European ones, etc. [8];
- the spontaneity of development due to the lack of effective monitoring of nursery development and production volumes [4] and the possibility, as a result, of forecasting and purposeful, harmonious development of various areas of its activity;

- unequal attention to nurseries of different forms of ownership from the central authorities and rare open lobbying of the interests of state and communal enterprises or, on the contrary, ignoring the proposals and wishes of private ones [5].

In the context of the latter, the results of the assessment of the current state of domestic decorative nurseries and the attitude to its problems and possible ways of development of national producers of planting material for landscaping of various forms of ownership are of particular interest, which was the subject of our research.

The solution to the problem of providing ever-growing domestic needs for high-quality planting material for landscaping, mainly at the expense of imports from European countries, is not only inexpedient due to the need to take into account the national interests and protection of the Ukrainian commodity producer, and unjustified due to certain ecological and biological differences of imported planting material, which significantly affect its viability and decorativeness under local conditions. However, the problem of improving supply concerns not only the increase in the production of decorative planting material, but also the expansion of its range and assortment and a significant increase in its quality.

Analysis of the modern assortment of ornamental woody plants, which grown in nurseries in Europe and actively imported into Ukraine, shows that in Western European nurseries, about 6 thousand species, subspecies, varieties, cultivars (varieties) are grown, while the majority of domestic producers - 25-200 names. Taking into account the fact that "Assortment of trees, bushes and vines for landscaping in Ukraine" (2022) includes 90 taxa of gymnosperms and more than 500 angiosperm woody plants and a significant number of taxa suitable for green construction in the collections of botanical institutions of Ukraine (over 3600).

The achievements and achievements of modern decorative nurseries include see Figure 1.

- formation of a network of manufacturers of decorative products nurseries and, as a result, the relative decrease in import growth rates in the last 2-3 years;
- significant improvement of existing and introduction of European, modern technologies of reproduction and production of new types of planting material of woody plants (with a closed root system, plant regenerants);
- the appearance of powerful, industrially oriented methods of reproduction and cultivation of planting material manufacturers (in Kyiv, Lviv and other cities);
- revival at a new qualitative level of decorative nurseries in state nurseries of various departments;
- introduction of new productions focused on the production of related and auxiliary nursery products (substrate, fertilizers, containers, tools, machines, etc.);
- the adoption of the Laws of Ukraine "On Seeds and Planting Material" and "On Protection of Rights to Plant Varieties", the implementation of which will largely depend on the civilized development of nurseries and its prospects.

The achievements and achievements of modern decorative nurseries

Figure 1. The achievements of modern decorative nurseries.

One of the main problems that inhibits the development of flower and decorative plant nurseries in modern conditions is the diversity of planting material producers, which not only complicates the exchange of best practices between them, but also does not allow, to a sufficient extent, to lobby the interests of entrepreneurs and protect their rights before the central authorities legislative and executive power and more fully provide for the urgent needs of the production of decorative planting material on the part of the state.

From the point of view of a professional forecast regarding the possible volumes of production of decorative planting material in domestic nurseries, an important place belongs to the assessment of the modern base of nurseries.

The segment of state nurseries of Ukraine is mainly represented by permanent forest nurseries, most of which produce a fairly limited range of ornamental plants. The state sector includes nurseries of botanical gardens and arboretums, the assortment of which is much larger, primarily due to the introduction of the most suitable introducers for landscaping needs.

A significant share of planting material of woody ornamental plants for landscaping is produced by communal nurseries - enterprises that are concentrated in green construction farms. The main purpose of their operation is to meet the needs of settlements in decorative seedlings for large-scale landscaping works as much as possible.

Recent years have been characterized by a sharp increase in the number of private nurseries and garden centers, which, along with growing their own, devote a significant amount of time to growing imported planting material.

The problems of the market of ornamental plants, namely, representatives of nurseries name the following problems that they face in their work

1. Lack of personnel needed for nursery work. Almost all interviewees, representatives of nurseries, faced this problem. This is due to the fact that the borders have opened and a lot of personnel of various levels are moving to other countries, in particular to Poland, where salaries are higher. In addition, agricultural universities do not train agronomists for the cultivation of ornamental plants, the focus is more on agricultural crops.

A separate problem that hinders the development of the ornamental plant market is the insufficient number of gardeners who could take care of the planted plants. The lack of gardeners leads to the fact that due to lack of proper care, planted plants die or get sick, they are planted incorrectly. Clients of nurseries can lose significant funds on planting material, which then dies due to unprofessional care. Because of this, the client then does not buy new plants.

2. The problem of selling grown products: representatives of nurseries admit that it is difficult for them to guess the assortment of plants according to the tastes of buyers, since there are no marketing specialists who can predict changes in demand for certain categories of plants. Often the plants are not sold according to plan.

Municipalities have little interest in urban greening, which significantly reduces the demand for decorative plants.

There is no culture of gardening in the population, there are no legal norms that

would oblige to green the territory adjacent to the house. Low purchasing power of the population, which does not allow spending money on decorative plants, and accordingly reduces the profit of nurseries.

3. Lack of a developed infrastructure that would allow quick and easy access to all consumables needed for growing plants, for example: the pesticide market specifically for nurseries is not developed. Fertilizers and containers are not so easy to find. Finding them at the best price and quality requires more effort, compared to how it happens in the Netherlands, according to Cornelis nursery representatives. The latter, in turn, have experience working in nurseries in the Netherlands, and are currently doing business in Ukraine, that is, they have something to compare with. The main reasons for the low development of infrastructure: a small number of nurseries and, accordingly, a young market, so the related institutions did not have time to develop

4. Difficulties associated with updating the fleet of equipment necessary for nursery maintenance: lack of funds for the purchase of equipment, inflated prices including customs clearance, unfavorable conditions for renting equipment or lack of service for nurseries, lack of assistance from the state.

5. Potential risks when selling plants grown in nurseries, as most of the crops grown there are not included in the State Register of plant varieties suitable for distribution in Ukraine. So far, there have been no cases when plants have been banned from sale, but such an option is potentially possible, and it causes concern among nursery owners.

6. Lack of loans with low interest, banks currently have no offers for nurseries that would take into account their capabilities and an important feature in their work - seasonality of profits. Because of this, nurseries do not have the opportunity to update and buy additional machinery and equipment.

7. The problem of maintenance of specialized equipment: service centers are either difficult to access or do not exist at all. Manufacturers and distributors of equipment are not interested in organizing the service, since the number of nurseries is not large, accordingly, there are not many potential customers. If there are problems with the equipment, nurseries are forced to call specialists from abroad, which is very expensive.

8. Difficulties that arise when crossing the border, especially during customs clearance. Among the difficulties, some representatives of nurseries called the long time for which the products are delayed at customs, difficulties with the processing of documents as a reason for demanding bribes.

9. Difficulties associated with climate and weather conditions that may cause plant losses.

Despite the significant expansion of the assortment of decorative planting material grown in domestic ornamental nurseries over the years of independence, its diversity is significantly inferior to the average similar indicators of most European countries. Therefore, in the process of development and expansion of one's own decorative material, the constant, scientifically based expansion of the assortment of woody plants is important. In recent years, there has been a tendency in Ukraine to increase the demand in the green economy for planting material of ornamental plants

that are unique and unusual for local conditions.

The main ways of expanding the range of ornamental plants in nurseries and landscaping are introduction, own selection and the use of new forms of plants of foreign selection in landscaping. The main material for green construction is trees and shrubs. The species composition, or assortment, of woody and shrubby plants determines the architectural qualities of plantations, their sanitary and hygienic properties, durability and economic efficiency of use on various landscaping objects.

Planting material is divided into basic, additional and limited assortment according to the sum of characteristics (stability and longevity of the species in the given natural conditions and conditions of a specific object) and according to the decorative qualities of the species grown for landscaping [10].

The main assortment includes species of trees and shrubs that have been grown in urban plantations for a long time and do not lose their decorative qualities. To include them in the main assortment, it is necessary to have reliable queens for harvesting seeds or cuttings. These species are mainly of local origin. They usually make up the bulk of the plantations, but their diversity is relatively small.

The additional assortment includes species that are characterized by high decorative qualities, but are less biologically durable or stable under these environmental conditions. Most often these are introduced breeds, but there may also be aboriginal species. The additional assortment is much more diverse than the main one and includes most decorative species, which are often difficult to reproduce by seed [3].

The range of limited use is intended mainly for collector landings. The limited assortment includes breeds that require additional care and protection from adverse conditions.

The formation of an assortment of plants in a garden and park object is not always based on the durability, stability and decorativeness of plants. Quite often, the composition of tree species depends on the available planting material in local nurseries, where mainly the most technologically convenient species are grown. The consequence of such work is the impoverishment of landscape compositions, as well as the irrational ratio of breeds of the main and additional assortment.

The choice of high-quality planting material is one of the most important conditions for creating long-lasting plantations. Many production problems that may arise in the future are directly related to the use of plants that were grown with a violation of technology, affected by diseases and pests.

Planting material sold on the Ukrainian market is classified into two categories according to the state of the root system: with an open and closed root system. Plants that have a closed root system are characterized by a higher level of survival after transplantation, are less sick and more resistant to adverse weather conditions.

Seedlings grown in containers should have a symmetrical, well-developed healthy crown, characteristic of this botanical species, a straight trunk, and a root system formed in the volume of the container. There should be no mechanical damage on the seedlings, as well as external signs of damage by pests and diseases.

Certified planting material is grown from virus-indexed mother material of the

basic and initial categories. For planting material, a full package of accompanying documents is provided, in particular:

Certificate certifying the varietal quality of the planting material

A certificate certifying the marketable quality of planting material

The planting material meets the requirements of the Technical Conditions of TC U 01.3-40375245-001:2018, which were developed by the "Ukrsadprom" Association

These Technical Conditions apply to seedlings (planting material) of berry crops, which are intended for the establishment of commercial plantations for the purpose of growing fruit and berry products, as well as for sale to the public for the purposes of amateur gardening.

TC were developed and are the object of intellectual property rights of the UKRSADPROM Association (40375245). The right holder grants permission to use this document without restrictions to any subjects of economic activity.

Planting material, like seeds, is characterized by certain quality indicators that determine its grade or category. The category of seeds and planting material is the belonging of seeds and planting material to a certain stage of reproduction of the variety and phytosanitary status.

The initial planting material of perennial plants is virus-free plants or plant parts of varieties, clones, created as a result of selection work for further propagation. The basic planting material of perennial plants is virus-free plants or plant parts of varieties, clones, obtained from the successive reproduction of the original planting material and intended for the creation of mother plants.

Certified planting material of perennial plants - virus-free plants of varieties, clones, obtained from the propagation of basic planting material and intended for planting industrial plantations.

Varietal qualities of seeds and planting material are a set of morphological features that determine whether the plant belongs to the corresponding variety. Commercial qualities of planting material - a set of biometric indicators of planting material, established by regulatory documents, according to which the sorting and determination of economic suitability of planting material is carried out. Planting material marking is a label indicating the details of the producer, culture, variety, rootstock, age, category and product quality of the plants. Perennial plants are plants whose development takes place over two growing seasons. Ornamental plants - flowers, lawn grasses, bulbs, bulbs, seedlings and saplings, cuttings, micro-cuttings and regenerating plants used for decorative purposes.

State management in the field of nursery production is carried out by the Cabinet of Ministers of Ukraine, the central body of executive power that ensures the formation and implementation of state agrarian policy, the central body of executive power that implements state policy in the field of state supervision (control) in the field of seed production and nursery production

One of the main elements of this industry is state control in the field of seed and nursery production - the activity of authorized state supervision (control) bodies within their powers to detect and prevent violations of legislation.

Mandatory are the Register of Plant Varieties of Ukraine (Register of Varieties)

– the State Register of Plant Varieties Suitable for Distribution in Ukraine and the State Register of Seed and Planting Material Producers – the list of seed and nursery entities that are granted the right to produce and sell seeds or planting material .

The procedure for seed and planting material certification has been improved in accordance with EU requirements.

By Resolution No. 1274 dated November 11, the Cabinet of Ministers of Ukraine amended the Procedure for Certification, Issuance and Cancellation of Certificates for Seeds and/or Planting Material [7-8].

These changes were implemented within the framework defined by the Action Plan for the Implementation of the Association Agreement between Ukraine, on the one hand, and the European Union, the European Atomic Energy Community and their member states, on the other, and relate to trade in planting material of perennial fruit, berry, and nut trees , rare and grape varieties and ensuring the improvement of the efficiency of nursery management of fruit, berry, nut-bearing crops and grapes, the output of domestic producers of planting material to the modern level in terms of quality and phytosanitary status.

The document establishes: the procedure for determining the varietal qualities of planting material by means of field evaluation of plantings to check for the presence of regulated harmful organisms, establishing the compliance of the variety with the morphological features determined during its state registration, and, if necessary, laboratory varietal control by molecular and genetic methods; deadlines for submitting an application for determining the varietal qualities of planting material; the validity period of the certificate certifying the marketable quality of the planting material; the mechanism of re-certification of imported planting material or during growing, re-skilling in the new growing season (season); the grounds for cancellation of certificates certifying the sowing and commercial qualities of seeds and planting material, in particular based on the results of the arbitration (expert) determination of seed sowing qualities and the commercial qualities of planting material and/or violation of the requirements of their certification procedure.

We expect that the improvement of the Order will have a positive effect on increasing the efficiency of fruit, berry, nut and grape nursery operations and improving the quality of domestic planting material in terms of quality and phytosanitary status, and at the same time will contribute to meeting export demand and opening new markets.

The set of control measures at all stages of seed and planting material reproduction, aimed at determining their varietal and sowing qualities, is called seed and planting material certification. It is carried out in accordance with a separate procedure according to the legislation. The form and content of the certificate for seeds or planting material are approved by the Cabinet of Ministers of Ukraine. Only certified planting material is put into circulation.

Planting material is considered certified if it: meets the requirements of normative legal acts in terms of varietal purity and seed quality; belongs to the variety entered in the Register of Plant Varieties of Ukraine or the Register of Plant Varieties of the Organization for Economic Cooperation and Development.

To create highly decorative green plantings in settlements, it is recommended to expand the existing species range of woody plants. In order to improve the greening of populated areas, it is recommended to optimize the species composition of green spaces based on the introduction of new fast-growing, decorative, tolerant to anthropogenic influences species and cultivars of tree plants, taking into account the correspondence of their biological and ecological properties to the specific conditions of local growth.

Taking into account the practical experience and the generalization of scientific data, the dominance of the negative impact on plants of atmospheric pollution over soil pollution has been proven, it is recommended to give preference to smoke- and gas-resistant taxa in the selection of plants for landscaping urban landscapes. The resistance of plants to adverse environmental factors is increased by observing the necessary agrotechnical measures during planting and plant care. This will greatly improve the condition and decorativeness of green spaces in the future.

When creating urban green spaces, it is worth using high-quality planting material with a formed and intact root system, which is a guarantee of good plant survival.

The taxa most adapted to the specific climatic conditions in a specific geographical area are characterized by higher resistance to air pollution. It is advisable to give preference to planting material of local reproduction (grown in nurseries near the place of planned plantings). This will ensure the maximum degree of adaptation of the plant to the new place of growth, and therefore - minimize the amount of losses.

To strengthen the phytomelioration role of street greenery, it is advisable to plant more bushes, especially in the lane between the sidewalk and the roadway. Green street plantings of the city require regular sanitary and health measures, improvement of agricultural techniques for the creation of plantings and their care, taking into account the peculiarities of the conditions of local growth on the streets of the city. Simultaneously with the implementation of measures to expand the diversity of ornamental plants in green areas, it is recommended to foresee measures to monitor the species composition in the urbanized environment.

Ecological design of horticulture - Ecological design of horticulture involves the use of sustainable and environmentally friendly practices in growing and caring for plants. It is aimed at minimizing the negative impact on the environment while maximizing productivity, that is, it is an approach to the organization of space taking into account the ecological principles of nature conservation and creating a favorable environment for plants, animals and people.

It is appropriate to highlight the basic principles of ecological design in horticulture:

1. Biodiversity - modern horticultural practices should promote and enhance biodiversity by creating diverse ecosystems, this can be achieved by combining different plant species, conserving native plant varieties and creating habitats for beneficial insects and wildlife.

2. Organic and regenerative methods, namely avoiding the use of synthetic pesticides, herbicides and fertilizers, are important in ecological gardening. Instead, organic practices such as composting, crop rotation and biological pest control should

be used, and regenerative practices such as the use of organic mulches and cover crops to improve soil health and fertility should also be considered.

3. Saving water, that is, gardening should be aimed at minimizing water use. Water-efficient irrigation systems should be implemented, such as drip irrigation, rainwater harvesting and wastewater treatment can also be used to reduce dependence on fresh water sources.

4. Soil health: Maintaining healthy soil is critical to sustainable gardening. Practices such as composting, vermiculture (using worms to break down organic matter) and avoiding over-tilling help improve soil structure, nutrient availability and retention. water

5. Integrated pest management involves the use of a combination of cultural, biological and chemical methods of pest and disease control, this approach minimizes the use of synthetic pesticides and instead focuses on prevention, monitoring and targeted intervention.

6. Energy efficiency requires efforts to reduce energy consumption in horticulture, which may include using renewable energy sources to heat and cool greenhouses, implementing energy-efficient technologies, and maximizing the use of natural light for plant growth.

7. Habitat preservation, i.e. creating habitats for pollinators and beneficial insects, is an integral part of ecological gardening. This includes providing flowering plants, shelter and water sources to support the ecosystem.

Implementing these principles, ecological design in horticulture aims to create sustainable agricultural systems that are ecologically clean, conserve resources and support biodiversity and contribute to the preservation of human health and well-being.

Therefore, the prospects of garden and park ecological design are important nowadays, as ecological sustainability involves ecologically clean design from the creation of gardens and parks that harmonize with nature and minimize the negative impact on the environment, as they will be designed taking into account ecological principles that benefit both people and the environment. These include improved air quality, reduced soil erosion, water filtration, climate regulation, and enhanced pollination and pest control by beneficial insects. They have benefits for health, physical and mental well-being as visiting nature is associated with reduced stress, improved mood, increased physical activity and stabilized cognitive functions, meaning these spaces can also provide opportunities for community engagement, socialization and education. In fact, by imitating natural landscapes and using a diverse plant palette, these spaces can create a visually pleasing and culturally meaningful environment that increases their value and appeal to visitors. By using plants that are adapted to local climate conditions, implementing water management strategies and implementing elements of green infrastructure, these spaces can better withstand extreme weather events such as heat waves and heavy rainfall. Gardens and parks designed with ecological principles in mind can serve as outdoor classrooms, providing hands-on learning experiences for people of all ages. They can be used to teach about environmental conservation, sustainable development, gardening techniques and the importance of biodiversity.

Overall, the prospects for sustainable garden and park design are promising as they offer a balance between human needs and environmental conservation, leading to sustainable and vibrant open spaces that benefit both people and the environment.

In the conditions of growing urbanization, it is becoming extremely important to implement technologies in the landscaping of urban spaces that contribute to the creation of ecologically clean and cozy areas for the urban population. One of the key innovations is the use of green technologies to strengthen the shores of water bodies.

Fortification of shores. The use of modern technologies of shore fortification allows not only to ensure the resistance of coastal areas to erosion, but also to create aesthetically pleasing and functional areas for recreation. Green fortification systems, which include the use of vegetation and geotextiles, help conserve water resources and balance the ecosystem.

Digging a trench for the foundation. Another innovative technology in the landscaping of urban spaces is the use of methods of digging trenches under the foundation to create optimal conditions for plant growth. This approach allows you to develop green spaces from the very roots, providing them with convenient access to water and nutrients.

Greening of urban spaces is becoming an increasingly important component of sustainable urban development. The variety of technologies in the landscaping of urban spaces reflects the enormous progress in this direction. Here are some types of technology used in urban landscaping: Automated irrigation systems: Modern sensor-controlled automatic irrigation systems are used that adapt to plant needs depending on soil moisture and weather conditions.

Hydroponics and aeroponics: techniques for growing plants without the use of soil, instead using aqueous solutions of nutrients or air to deliver nutrients to plant roots. **Smart management systems:** use of the Internet of Things (IoT) and sensors to monitor the condition of plants, soil and atmospheric conditions, allowing automatic adjustment of parameters for optimal plant growth. **Vertical gardening:** the use of vertical gardens and horizontal planters on the walls of buildings to make efficient use of urban space and improve air quality. **Water management technologies:** rainwater collection and use systems for irrigation and the development of drainage systems that help avoid flooding and water pollution. **The use of ecological materials:** the introduction of biodegradable materials for the arrangement of lawns and alleys, which allows to reduce the environmental impact and preserve natural resources. **Solar Power Systems:** Using solar panels to power lighting and other systems in city parks and squares, providing an environmentally friendly source of energy. **Green walls and roofs:** using technologies to create living walls and roofs that improve the energy efficiency of buildings and improve air quality.

All these technologies are aimed at creating a healthier and ecologically clean urban environment, ensuring a balance between development and environmental protection measures.

Conclusions. To the problems of the formation of the latest floral and decorative nurseries in Ukraine should also be attributed to the lack of consulting and design institutions in the country that could provide producers of planting material with the

necessary consulting services and develop scientifically based projects of organizational and economic plans decorative nurseries, marketing of their products and special management. Such institutions would certainly contribute to increasing the profitability of production and would save individual entrepreneurs from making mistakes when making professional decisions on certain problems. In this list, it is necessary to single out modern problems related to the production of planting material with a closed root system, the main of which are: search for modern, environmentally friendly, reusable containers for plant containers; improvement of the quality and specialization of the substrate for the container house cultures of individual types and stages of production; development of new ways and methods of optimizing the mineral level plant nutrition in container culture; improvement of water quality and development of new, more rational ones ways of irrigating container culture.

The problems caused by implementation become especially acute provisions of the aforementioned Laws of Ukraine "On Seeds and Planting Material" and "On Protection of Rights to Plant Varieties". This is also the preparation of by-laws, the necessary normative and regulatory materials, which would be state-based in essence and would maximally take into account the interests of all producers and users of nursery products of various forms of ownership.

In the future, taking into account existing production trends and market of nursery products in the country, it is necessary to be ready for problems arising as a result of intensifying competition, both between domestic producers and related to competition with foreign firms. In this regard, with great probability, it is possible to predict the specialization of nurseries already in the near future. From the experience of foreign countries, we should expect the emergence of nurseries with the following specializations: nurseries for growing planting material of certain breeds (lilac, roses, rhododendrons, other species) with a wide range of varieties and forms plants; nurseries with an emphasis on certain types of activities: reproduction and production of small-sized planting material, growing planting material with a closed root system, enterprises for growing and forming large-sized trees, hedges, certain forms of trees and shrubs, etc.; expert - breeding; the Internet - nurseries and a number of others.

We cannot ignore the problems associated with the certification of producers of nursery products and the use of plant varieties by individual producers, the solution of which should contribute to the formation of civilized relations between the state and nursery subjects. In connection with the latter, again based on the experience of foreign countries, it is not difficult to predict the future intensification of work on expanding the assortment of cultivated breeds, especially at the expense of own selection, with the subsequent entry of them into the state register and obtaining the right to their reproduction and use.

It is extremely important for the successful development of the domestic flower and decorative nursery industry to find and develop its own ways of its formation and improvement, which would maximally take into account the soil and climatic features of Ukraine, its supply of natural and energy resources, national historical traditions, and spiritual values and the mentality of the Ukrainian people.

REFERENCES

1. Elisavenko, Yu. A., Smashnyuk, L. V., & Vasylevsky, O. G. (2018). Parks-monuments of garden and park art of Eastern Podillya as biocenters of the regional ecological network. *Bulletin of NUVGP of Ukraine*, 1 (81), 142–149 [in Ukrainian].
2. Kuziovich, V. S., Bidolakh, D. I., Pidkhovna, S. M., Timanska, O. B., & Grinyuk, Yu. G. (2021). Analysis of the state of plantations in the forest park zone in the city of Halych and prospects for its development. *Scientific Bulletin of NLTU of Ukraine*, 31 (2), 9–15 [in Ukrainian]. <https://doi.org/10.36930/40310201>
3. Lakida, P. I., Bidolakh, D. I., & Kuzyovych, V. S. (2020). Spatial database of urban landscapes on the example of greenery in the city of Brzezany. *Scientific Bulletin of NLTU of Ukraine*, 30 (4), 51–56 [in Ukrainian]. <https://doi.org/10.36930/40300409>
4. Oleksiyenko, N. O., & Pidhovna, S. M. (2019). Retrospective analysis of the parks-monuments formation of Ternopil region horticultures. *Scientific Bulletin of NLTU of Ukraine*, 29 (5), 17–21 [in Ukrainian]. <https://doi.org/10.15421/40290503>
5. Stoyanets Nataliya Current challenges of agricultural transformations in Ukraine: biodiesel production Modern Challenges of Agrarian Transformations in Ukraine: Agriculture, Forestry and Horticulture / Edited by T. I. Melnyk. – Warsaw: RS Global Sp. Z O. O., 2022. – 96 p. DOI: <https://doi.org/10.31435/rsglobal/048-8>
6. Stoyanets N. Planning of forestry activities in Ukraine XIX International scientific and practical conference "*Innovative approaches to solving scientific problems*", May 16-19, 2023, Tokyo, Japan. pp. 83-86.
7. Stoyanets Nataliya, Yuanyuan Xia PECULIARITIES OF TERRITORY PLANNING FOR RURAL DEVELOPMENT Planning and use of territories within the context of inclusive development: *International Scientific and Practical Conference Proceeding*, May 17-18, 2023 / Edited by Valerii Mykhailov, Iryna Koshkalda, Serhii Vynohradenko / State Biotechnological University (Ukraine). – Publishing house: "Stylish typography", Kharkiv, Ukraine, 2023. 291 p. 168-171.
8. On the introduction of changes to some laws of Ukraine on bringing the legislation of Ukraine in the field of protection of rights to plant varieties and seed production and nurseries into compliance with the provisions of the legislation of the European Union: Law of Ukraine dated 11/16/2022 No. 2763-IX. Official Gazette of Ukraine. 2022. No. 99. Art. 6164.
9. On the introduction of changes to some laws of Ukraine regarding bringing the legislation of Ukraine in the field of seed production and nurseries into compliance with European and international norms and standards: Law of Ukraine dated 08.12.2015 No. 864-VIII. Details of Verkhov. Council of Ukraine. 2016. No. 4 Art. 39.
10. Hejun Zhao, Stoyanets Nataliya, Guohou Li APPLICATION OF BIG DATA ANALYSIS IN PATH PLANNING OF INTELLIGENT PICKING ROBOT *INMATEH - Agricultural Engineering* Volume 65 / No. 3 / 2021 P. 476-484 <https://doi.org/10.35633/inmateh-65-49>.
11. Tokman, V. S., & Stoyanets, N. V. (2023). FORMATION OF PLANTING MATERIAL SALIX MATSUDANA KOIDZ. FOR THE CREATION AND PLANNING OF FOREST PLANTATION PLANTS. *Bulletin of Sumy National Agrarian University. The Series: Agronomy and Biology*, 52(2), 99-104. <https://doi.org/10.32782/agrobio.2023.2.13>.