PROSPECTS FOR THE USE OF *HEMEROCALLIS* X *HYBRIDA* IN PHYTODESIGN AND LANDSCAPE ARCHITECTURE TECHNOLOGICAL ASPECTS OF CULTIVATION

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Introduction. Under the modern conditions of globalization and intensive urbanization, the role of urban green infrastructure is transforming from purely aesthetic to functional and ecological. Modern landscape architecture requires plants that are capable not only of creating a visual effect but also of withstanding significant anthropogenic pressures: temperature inversions, moisture deficiency, soil salinity, and high concentrations of heavy metals in the air [1, 2].

Today, the hybrid daylily (*Hemerocallis × hybrida*) is one of the most versatile and promising crops. The history of daylily breeding has progressed from species forms to complex tetraploid hybrids, with over 80,000 registered cultivars. This creates an unprecedented resource for phytodesign: ranging from miniature forms (up to 20 cm) for rock gardens to giant spiders (exceeding 120 cm) [3-7].

An analysis of global experience reveals a transition from traditional flower beds to complex sustainable phytocenoses. The daylily fits perfectly into the concept of low-maintenance landscapes. Due to their robust root system, they serve as excellent groundcover plants that prevent erosion, while their dense leaf rosettes suppress weed growth [4, 8, 9].

Advanced techniques, particularly *in vitro* micropropagation, facilitate the swift introduction of emerging cultivars into the commercial market. The implementation of drip irrigation systems and precision fertilization transforms daylily cultivation into a high-tech sector of the nursery industry [10-15].

Integrating daylily displays into urban parks enhances the recreational appeal of these spaces and supports the psychological well-being of residents. Economically, this serves as a sustainable long-term investment, given that daylilies maintain their aesthetic quality for 10 to 15 years without requiring relocation [16-21].

Problem statement. Although the genus *Hemerocallis* has been extensively researched, a significant gap remains between its theoretical potential and its practical application in landscape design. There is a marked disconnect between the vast diversity of global cultivars and the limited selection found in local nurseries. Consequently, most landscaping projects rely on a narrow range of varieties, hindering the implementation of contemporary phytodesign strategies – such as monochrome gardens or landscapes designed for prolonged flowering cycles [22-25].

A pressing issue is the adaptation of modern tetraploid hybrids of foreign breeding to the specific climatic conditions of Ukraine, particularly to sharp temperature fluctuations during the winter and extreme summer droughts.

The lack of site-specific cultivation protocols results in significant mortality rates during the initial years of plant establishment [26-30]. Within the realms of interior phytodesign and container gardening, there is a notable absence of scientifically substantiated guidelines for utilizing daylilies as containerized crops. Questions concerning substrates, lighting regimes, and growth regulation within limited soil volumes remain open [31-34].

Consequently, there is a pressing need for a comprehensive study that integrates an assessment of the ornamental traits of the latest *Hemerocallis × hybrida* cultivars with the establishment of optimized cultivation techniques tailored for modern urban environments.

The aim of this study is to conduct a comparative analysis of modern *Hemerocallis* × *hybrida* cultivars within landscape architecture and phytodesign systems based on key morphological indicators. Furthermore, it seeks to perform a comprehensive assessment of their decorative qualities using container cultivation technology at the TOV SP «Demetra» nursery to optimize the assortment available for phytodesign and landscape architecture.

The nursery operates as an independent enterprise, specializing in container-grown planting material. The production cycle integrates mechanized technological processes with advanced fertilization and plant protection protocols.

The nursery is structured into two primary zones: the production area and the auxiliary area. The production sector is dedicated to the cultivation of ornamental, fruit, and berry nursery stock. Complementing this, the auxiliary section provides essential support, encompassing organizational, administrative, and protective functions

Research Methods. To obtain scientific data regarding the introduction and aesthetic evaluation of *Hemerocallis* cultivars, diverse methods for the collection and analysis of morphological and ornamental traits are utilized. Field observations are systematically conducted within experimental plots to monitor these characteristics. These plots were selected to reflect the typical conditions of the forest-steppe zone, facilitating an accurate assessment of plant adaptation to the regional climate and soil.

The primary methodology for assessing ornamental traits involves a comparative analysis of specific plant components, including scape height, flower diameter and morphology, foliage dimensions, and clump density. This approach facilitates the creation of a technical profile for each cultivar, providing an exhaustive description of individual characteristics. Moreover, it identifies the specific cultivation technologies that most effectively enhance the plants' aesthetic qualities [35, 36, 37].

The research methodology focuses on evaluating the ornamental traits of specific daylily cultivars grown using container cultivation technology. The assessment is based on several key indicators: flower color and morphology, the duration and intensity of the blooming period, flower and leaf dimensions, plant and scape height, and clump density [38, 39]. The resulting data are subsequently processed using statistical analysis [40].

In addition to morphological analysis, the plants' adaptive traits to local growing conditions are thoroughly evaluated. These parameters encompass heat and drought tolerance, natural propagation capacity, and resistance to pests and diseases. Based on the study's findings, cultivars that exhibit superior ornamental qualities under container cultivation and demonstrate suitability for the regional climate are selected [41]

Consequently, a holistic methodology – integrating comprehensive data collection, morphological assessment, and systematic observation – юensures objective and scientifically substantiated findings. These results provide a robust basis for determining the suitability of *Hemerocallis* cultivars for landscaping both urban environments and private estates within the specific conditions of Ukraine's Forest-Steppe zone.

The research material consisted of *Hemerocallis* × *hybrida* cultivars grown on the premises of the Demetra ornamental nursery.

Specifics of daylily cultivation technologies. To date, five main methods of daylily cultivation are recognized. The first approach is traditional open-field cultivation, which remains the most prevalent method for growing daylilies. Its primary advantages include providing natural conditions for root system development, lower capital expenditures for equipment, and the scalability to manage large plant populations. Conversely, the method entails several drawbacks, such as vulnerability to weather fluctuations, an increased risk of pest and disease pressure, seasonal flowering constraints, and the difficulty of maintaining precise control over soil moisture and nutrient levels across expansive areas.

Daylilies cultivated in open fields develop extensive root systems and demonstrate superior frost resistance relative to other production methods. Ideal cultivation sites are open, sunny locations with adequate air circulation. Systematic irrigation is critical, especially during stages of vigorous growth; such applications must be substantial enough to ensure soil moisture penetrates to a depth of 50 cm [42].

The second method involves container cultivation using individual pots of varying capacities. Key advantages include plant mobility – allowing for seasonal relocation – and precise control over substrate quality, irrigation, and fertilization. This method is particularly suitable for confined spaces and reduces the prevalence of soil-borne pathogens. However, drawbacks include the need for intensive maintenance, the risk of root zone hyperthermia in dark containers, and higher operational costs. Recommended container volumes

range from 5 to 15 liters, contingent on cultivar height, and must feature drainage holes to prevent waterlogging. Ideal materials include ceramics, plastic, or geotextile bags. The substrate should be a lightweight, aerated blend of soil, humus, peat, and sand (2:1:1:1 ratio), potentially augmented with vermiculite or perlite. Because moisture evaporates and nutrients leach more rapidly in containers, more frequent irrigation and fertilization are required compared to in-ground cultivation [43, 44].

The third method employs protected-ground cultivation within greenhouses and hotbeds under controlled environmental conditions. This approach offers the advantage of regulating temperature, humidity, and lighting, which allows for manipulated flowering schedules and protection from adverse weather, pests, and pathogens. Integrating modern technologies like drip irrigation and automated climate control enhances efficiency and reduces labor. However, these benefits are offset by high capital expenditures for infrastructure, significant energy requirements for microclimate maintenance, and the need for manual pollination in seed production. Optimal growth occurs between 18°C and 25°C; sharp temperature fluctuations must be avoided to prevent stunted development or diminished ornamental value. As light-demanding crops, daylilies require supplemental lighting (grow lights) during winter. Furthermore, maintaining relative humidity between 60% and 70% is essential for physiological health and the mitigation of fungal diseases [45].

The substrate must be nutrient-dense while maintaining high air and water permeability. An optimal composition consists of a 2:1:1:1 ratio of soil, humus, peat, and sand, which provides the necessary moisture retention and aeration levels for robust root system development [46].

The fourth method is hydroponic cultivation, which involves growing plants in a soil-less medium where nutrients are delivered directly to the roots via an aqueous solution. Common configurations include drip irrigation, Nutrient Film Technique (NFT), and Deep Water Culture (DWC). This approach offers several advantages: precise nutritional management, efficient water and fertilizer conservation, accelerated growth rates, and a diminished risk of soil-borne pathogens. Conversely, its drawbacks include significant capital investment for equipment, the need for specialized technical expertise, and a total reliance on electricity for system operations. Consequently, hydroponics is not standard for commercial daylily production; it is primarily utilized in scientific research or for the cultivation of high-value cultivars [47].

The fifth method is *in vitro* cultivation, or micropropagation – a laboratory-based technique for regenerating plants from small cell or tissue samples within sterile nutrient media. This approach facilitates the rapid production of vast quantities of genetically identical clones [11]. A primary benefit is the elimination of viral pathogens, as plants are sanitized during the process. Additionally, this method is entirely independent of seasonal or climatic fluctuations. However, it requires stringent sterility protocols, highly qualified personnel, and substantial capital investment in laboratory infrastructure. Furthermore, microclones require a critical acclimatization phase before they can transition to open-field conditions. It is most commonly employed for the commercial propagation of rare and high-value cultivars [38].

Research Results. The Impact of Containerized Growth Systems on the Phenological Phases of Hemerocallis. Our research was conducted at the facilities of TOV SP «Demetra», situated within the Forest-Steppe zone of Ukraine. This enterprise specializes in the containerized production of daylilies. For this study, plants were initially grown in 10-liter black containers and subsequently transplanted into 15-liter vessels as they matured.

To prevent waterlogging and subsequent root rot, all containers are equipped with basal drainage holes. While daylilies are adaptable to various soil types, they perform optimally in well-drained, fertile substrates with a neutral to slightly acidic pH (approximately 6,0-7,0). The potting medium utilized for this study consisted of 50% high-quality garden soil for structural integrity and mineral content, 30% humus to provide organic matter and slow-release nutrients, and 20% aerating components. This latter portion included 5% perlite, 5% vermiculite, and 10% coarse sand to enhance drainage and oxygenation. Notably, the inclusion of coarse sand increased container ballast, providing necessary stability for larger specimens.

To facilitate drainage, a 2-3 cm layer of expanded clay was placed at the base of each container. The experimental cultivars were planted in early September 2023; the residual summer warmth in the soil stimulated root development, allowing the plants to become well-established before the first frosts and ensuring successful overwintering. In late October 2023, the daylilies were transferred to a cool, frost-free environment maintained at 5-10°C. A subsequent temperature increase to 10-15°C in early March 2024 triggered the onset of the growing season by late March, evidenced by the emergence of basal shoots, bud enlargement, and the unfurling of young foliage.

Table 1 details the results of our phenological observations regarding daylily growth and development. For the eight studied cultivars, the initial vegetative phase spanned from mid-March to early April. The Stella de Oro variety, classified within the early maturity group, served as the experimental control. Prairie Blue Eyes was the first to initiate vegetation on March 17, while Purple de Oro followed on April 5. This stage was characterized by the activation of dormant rhizome buds, the emergence of narrow young foliage, and the onset of root system development. Additionally, the resumption of photosynthesis facilitated the accumulation of vegetative biomass necessary for subsequent flowering.

The active vegetative growth phase commenced in late April (specifically on April 27, 2024, for the Prairie Blue Eyes cultivar), spanning from the emergence of initial foliage to the onset of scape initiation. This period was characterized by rapid leaf proliferation and the development of a dense basal rosette alongside further root expansion. During this stage, the plants accumulated the essential nutrients required for flower spike formation and prolific blooming. By late May and early summer, the daylilies transitioned into the scape development phase. The first signs of flower stalks emerging from the center of the leaf rosette became apparent, followed by intensive vertical growth and the formation of buds at the apices and in the leaf axils.

The flowering phase commences in late June and early July with the opening of the initial buds, continuing until the final blooms on the clump have expired. Prairie Blue Eyes was the first to initiate flowering, maintaining a duration of 56 days. It was followed by Happy Returns, which began blooming on June 10, 2024, and lasted for 51 days. The varieties Stella de Oro and Chicago Apache tied for third place, each exhibiting a 50-day flowering span. Fourth place was shared by Anna Warner and Apricot Beauty, both with a duration of 45 days. Purple de Oro followed on June 25 with a 36-day blooming period, while Catherine Woodbury was the final cultivar to bloom, starting on July 15, 2024, for 35 days. Our findings suggest a correlation between later blooming onset dates and a reduction in the total flowering duration.

During the anthesis phase, blossoms open sequentially along each scape, with individual flowers typically remaining open for only a single day. The total duration of flowering is contingent upon the cultivar, plant maturity, and prevailing environmental conditions. This stage encompasses pollination and subsequent seed set. Fruit development initiates almost immediately following floral senescence, progressing rapidly within several days.

Table 1. Results of phenological observations on the development of *Hemerocallis* × *hybrida* varieties under the conditions of TOV SP «Demetra», 2024.

Variety	Onset of vegetation	Active vegetative growth phase	Flower stalk formation and growth phase	Blooming phase			Beginning of seed maturation phase	Preparation for dormancy phase	Dormancy phase
				Onset	Termination	Flowering duration			
H. x h. 'Prairie Blue Eyes'	17.03.2024	27.04.2024	24.05.2024	05.06.2024	31.07.2024	56	31.07.2024	01.10.2024	10.11.2024
H. x h. 'Stella De Oro	25.03.2024	05.05.2025	1.06.2024	15.06.2024	05.08.2024	50	05.08.2024	05.10.2024	15.11.2024
H. x h. 'Happy Returns'	20.03.2024	30.04.2024	27.05.2024	10.06.2024	31.07.2024	51	31.07.2024	01.10.2024	10.11.2024
H. x h. 'Chicago Apache'	25.03.2024	05.05.2025	1.06.2024	15.06.2024	05.08.2024	50	05.08.2024	05.10.2024	15.11.2024
H. x h. 'Purple de Oro	05.04.2024	15.05.2024	10.06.2024	25.06.2024	31.07.2024	36	31.07.2024	01.10.2024	10.11.2024
H. x h. 'Catherine Woodbury'	25.03.2024	05.05.2025	1.06.2024	15.07.2024	20.08.2024	35	20.08.2024	20.10.2024	20.11.2024
H. x h. 'Anna Warner'	30.03.2024	10.05.2025	5.06.2024	20.06.2024	05.08.2024	45	05.08.2024	05.10.2024	15.11.2024
H. x h. 'Apricot Beauty'	30.03.2024	10.05.2025	5.06.2024	20.06.2024	05.08.2024	45	05.08.2024	05.10.2024	15.11.2024

Seed maturation occurs over an eight-week period, with ripening dates ranging from July 31, 2024, for Prairie Blue Eyes to August 20, 2024, for Catherine Woodbury. This timeline reinforces a consistent trend in maturation phenology. This phase facilitates sexual reproduction and the accumulation of storage reserves within the rhizome for winter dormancy, which is triggered by declining mean temperatures and photoperiod.

As the senescence phase begins, the foliage loses its chlorophyll, turns yellow, and gradually withers. While above-ground vegetative growth decelerates, the plants actively sequester reserve nutrients within the rhizome in preparation for winter dormancy. This dormancy period commences with the onset of consistent low temperatures and persists until the spring thaw. During this stage, the aerial components – leaves and scapes – die back, and the plants enter a state of physiological dormancy characterized by a significant reduction in metabolic rates. Biological activity is primarily restricted to the rhizome and dormant buds, where essential resources are stored to sustain future development and flowering. In 2024, the transition into dormancy for the various daylily cultivars was recorded between November 10 and November 20.

To derive scientific insights into the introduction and aesthetic evaluation of *Hemerocallis* cultivars, diverse methodologies for the collection and analysis of morphological and ornamental traits are utilized. Systematic field observations are carried out within experimental plots to monitor phenotypic characteristics and decorative performance. These sites are selected to represent the typical environmental conditions of the forest-steppe zone, facilitating a comprehensive assessment of the plants' adaptation to local pedoclimatic factors.

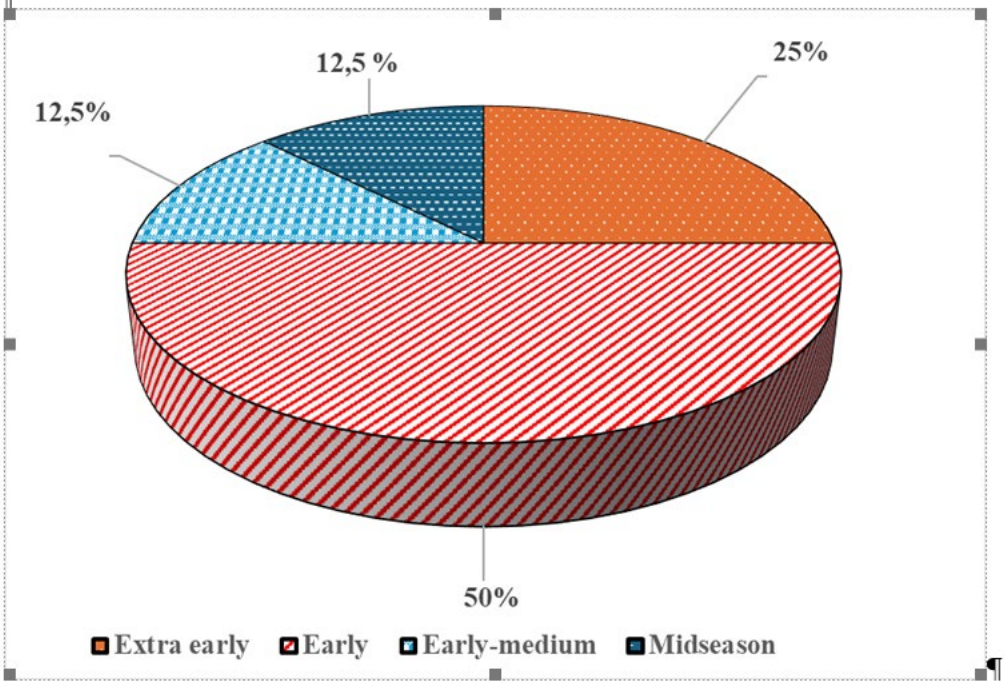

Figure 1. Distribution of Hemerocallis × hybrida varieties by maturity groups

Due to the limited nutrient reserves within a containerized environment, the daylilies required a consistent fertilization regimen. At the onset of the growing season in spring, a urea solution was applied via root drenching at a concentration of 15-20 g per 10 L of water to promote vegetative growth. Prior to anthesis, the plants were treated with potassium sulfate (10-15 g per 10 L of water). This macro-nutrient is essential for optimizing bud initiation, enhancing flowering intensity, and supporting the overall physiological health of the cultivars.

Specific maintenance protocols were implemented throughout the 2024 growing season. To maintain consistent substrate moisture in the containers, irrigation was administered biennially (every other day) during peak summer temperatures. In the spring and autumn, irrigation frequency was reduced to once every 2-3 days in response to declining temperatures and lower evapotranspiration demands. While daylilies exhibit a degree of shade tolerance, optimal floral performance is achieved in full sun; consequently, the plants were positioned to receive a minimum of six hours of direct solar radiation daily to facilitate prolific blooming.

Due to the restricted nutrient volume inherent in containerized systems, the daylilies required a consistent fertilization regimen. At the onset of the spring growing season, a urea solution was administered

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Morphological characterization and aesthetic evaluation of *Hemerocallis* × *hybrida* cultivars within the experimental environment. Variety 1: Stella de Oro (Fig. 2).

Figure 2. General view of H. x h. 'Hemerocallis Stella De Oro'

Eight cultivars were selected for a comprehensive analysis of their morphological characteristics and ornamental traits. These varieties are cultivated using containerized production methods (closed root system), utilizing a standardized substrate and maintained under uniform environmental conditions.

This low-growing cultivar reaches a height of up to 40 cm. The blossoms are compact, measuring up to 7 cm in diameter, and exhibit a vibrant yellow hue with smooth-textured petals. The variety possesses high ornamental value, largely due to its extended flowering period of 45-50 days. Its linear, dark green foliage is primarily concentrated in a basal arrangement. Furthermore, this cultivar is characterized by robust resistance to both drought and common pathogens. The striking yellow flowers provide significant visual appeal, while its compact habit makes it an ideal candidate for small-scale landscapes or containerized urban cultivation (Fig. 3).

Figure 3. General view of H. x h. 'Happy Returns'

This cultivar attains a height of up to 50 cm and is distinguished by vibrant yellow blossoms with orange undertones, reaching 9 cm in diameter. The flowering duration spans 40-45 days. Its broad foliage results in a dense, robust habit. Notably, the variety exhibits significant resilience to fluctuating temperature conditions. Its striking yellow-orange floral hues provide exceptional visual impact, allowing it to integrate seamlessly into landscape designs where the rich color contrasts effectively against green foliage or turfgrassVariety 3 ′Chicago Apache′ (Fig. 4).

Figure 4. General view of H. x h. 'Chicago Apache'

This cultivar reaches a height of 60-70 cm and is distinguished by large, scarlet-red blossoms with golden margins, measuring up to 12 cm in diameter. The flowers exhibit a pronounced petal structure, complemented by slightly recurved (curving) foliage. Notably, the variety demonstrates strong resistance to chlorosis and the ability to bloom under low-temperature conditions – a significant advantage for cultivation within the forest-steppe zone.

This variety is characterized by large, uniquely shaped blooms. Its vibrant red-and-gold palette creates a stunning contrast, particularly against lush green foliage. Beyond its visual appeal, this plant is remarkably resilient to environmental stressors. Variety 4 ′Purple de Oro′ (Fig. 5) – Typically reaching a height of 50 cm, this variety boasts a blooming season of 30 to 35 days.

Figure 5. General view of H. x h. 'Purple de Oro'

Variety 5: Catherine Woodbury (Fig. 6).

Figure 6. General view of H. x h. 'Catherine Woodbury'

Reaching a height of 55 cm, this variety offers a prolonged flowering window of 40-45 days. It is distinguished by its pale pink blooms with contrasting white centers, measuring up to 10 cm in diameter. The flowers are elegantly formed, featuring delicate, ruffled petal edges. Complemented by dark green, textured foliage, this plant maintains a medium level of disease resistance [36].

Ideally suited for classic landscape designs, this variety excels where soft tones and a sophisticated aesthetic are paramount. Variety 6: 'Anna Warner' (Fig. 7). Standing at a height of 65-70 cm, this cultivar produces large, vibrant apricot-orange blooms with elegantly ruffled petal margins. The flowers reach a diameter of 12-13 cm, set against a dense clump of broad, dark green foliage. With a generous flowering period of 40-50 days, this variety is characterized by high disease resistance and an ability to withstand brief periods of drought.

Figure 7. General view of H. x h. 'Anna Warner'

This variety is an excellent choice for creating vivid accents within flower beds and mixed borders. Its robust disease resistance and reblooming capacity ensure a lasting decorative impact, making it a prized asset in landscape design. Variety 7: ′Prairie Blue Eyes′ (Fig. 8). Reaching a height of 60-65 cm, this cultivar is noted for its delicate lilac blooms featuring a bright yellow center. The flowers, approximately 10-11 cm in diameter, are framed by narrow, dark green foliage of medium density. With a flowering window of 35-40 days, it is exceptionally winter-hardy and adapts seamlessly to fluctuating climatic conditions.

Figure 8. General view of H. x h. 'Prairie Blue Eyes '

Infusing the garden with a sense of romance and elegance, this variety harmonizes beautifully with white, yellow, and blue blooms. Its versatility makes it ideal for both expansive landscape designs and intimate flower beds. Renowned for its exceptional winter hardiness and pest resistance, it remains a favorite among gardeners. Cultivar 8: ′Apricot Beauty′ (Fig. 9). Reaching a height of 55-60 cm, this plant produces stunning apricot-pink flowers measuring 9-10 cm in diameter. Its elongated, light green leaves feature a prominent texture. The flowering window spans 30-35 days, with the potential for a second bloom in milder climates. It exhibits moderate disease resistance and performs well even in partial shade.

Figure 9. General view of H. x h. 'Apricot Beauty'

The light coloration of the flowers allows for the creation of calm, harmonious floral compositions that look excellent in both landscape and formal styles. Table 2 presents the morphological characteristics of the studied varieties.

Table 2. Morphological characteristics of *Hemerocallis* × *hybrida* varieties

Characteristics	*H.* x *h.* 'Stella De Oro'	*H.* x *h.* 'Happy Returns'	*H.* x *h.* 'Chicago Apache'	*H.* x *h.* 'Purple de Oro'	*H.* x *h.* 'Catherine Woodbury'	*H.* x *h.* 'Anna Warner'	*H.* x *h.* 'Prairie Blue Eyes'	*H.* x *h.* 'Apricot Beauty'
Plant height, cm	up to 40	up to 50	up to 60	up to 45	up to 50	up to 70	up to 60	55-60
Bush density	Low, compact	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Number of stems, pcs	up to 3	4-5	up to 34	2-3	up to 33	3-4	2-3	2-3
Leaf length, cm	50-60	50-60	65-70	40-50	50-60	60-70	40-50	60-70
Environmental resistance	Highly adaptable to various conditions	Highly resistant to weather changes	Highly resistant to hot climates	Highly adaptable to partial shade	Highly adaptable to various conditions	Highly resistant to wind and rain	Highly adaptable to partial shade	Highly disease-resistant

The provided data offer a comparative assessment of eight *Hemerocallis* (daylily) cultivars: 'Stella De Oro,' 'Happy Returns', 'Chicago Apache', 'Purple de Oro', 'Catherine Woodbury', 'Anna Warner', 'Prairie Blue Eyes', and 'Apricot Beauty'. Height analysis reveals that the majority of these varieties are medium-sized. Anna Warner is the tallest at 70 cm, whereas 'Stella De Oro' is the most diminutive, staying under 40 cm. Both 'Chicago Apache' and 'Prairie Blue Eyes' maintain a consistent height of approximately 60 cm.

In terms of clump architecture, 'Stella De Oro' is notably compact with low density, while the remaining varieties exhibit moderate density. Stem counts range from 2 to 5 per plant; 'Happy Returns' shows the most prolific stem development (4-5 units), while 'Purple de Oro', 'Prairie Blue Eyes', and 'Apricot Beauty' produce the fewest (2-3 units). Leaf length generally spans 40-70 cm, with the maximal values observed in 'Chicago Apache' and 'Anna Warner' and the minimal lengths recorded for 'Purple de Oro' and 'Prairie Blue Eyes' (40-50 cm).

We also investigated the adaptive properties of the plants. The 'Stella De Oro' and 'Catherine Woodbury' varieties were identified as highly adaptable to various growing conditions. The 'Happy Returns' variety demonstrates high resistance to weather changes, 'Chicago Apache' is the most heat-tolerant, and 'Anna Warner' stands out for its resistance to mechanical damage from wind and rain. The 'Purple de Oro' and 'Prairie Blue Eyes' varieties are the most suitable for cultivation in partial shade conditions. The 'Apricot Beauty' variety was noted as being highly disease-resistant. Based on the tabular data, it can be concluded that each variety possesses a unique combination of ornamental and biological traits. 'Stella De Oro' is the best choice for border plantings due to its compactness, while it is advisable to use 'Anna Warner' and 'Chicago Apache' as tall accent elements in the landscape due to their high resistance to unfavorable weather conditions. Overall, all studied varieties of *Hemerocallis* × *hybrida* possess high ornamental value. A comparative description of the flower's ornamental qualities is provided in Table 3.

Table 3. Comparative characteristics of the flower's ornamental properties of *Hemerocallis* × *hybrida* varieties.

Characteristics	*H.* x *h.* 'Stella De Oro'	*H.* x *h.* 'Happy Returns'	*H.* x *h.* 'Chicago Apache'	*H.* x *h.* 'Purple de Oro'	*H.* x *h.* 'Catherine Woodbury'	*H.* x *h.* 'Anna Warner'	*H.* x *h.* 'Prairie Blue Eyes'	*H.* x *h.* 'Apricot Beauty'
Flower size, cm	5-6	8-9	up to 12	up to 8	up to 10	up to 13	9-10	up to 12
Flower shape	Round	Round with ruffled petals	Round with wavy petals	Semi-round with rounded petals	Round with wavy petals	Semi-round with wavy petals	Star-shaped with wavy edges	Star-shaped with ruffled petals
Flower color	Bright yellow	Lemon-orange	Red with a golden center	Lavender-purple	Light pink with a white center	Bright orange with a golden tint	Lilac with a yellow center	Orange-pink, with a yellow gradient towards the center

The diverse color palette of these daylilies allows for precise selection tailored to specific landscape requirements. With blooming periods exceeding one month, these varieties guarantee a sustained ornamental impact. Furthermore, the variation in floral and foliage morphology gives each cultivar a distinct identity, while the range of heights facilitates the creation of multi-dimensional, dynamic compositions.

Among the studied group, ′Anna Warner′ produces the largest blooms (up to 13 cm), establishing it as a natural focal point. In contrast, ′Stella De Oro′ features the most petite flowers (5-6 cm), which are approximately half the size of the larger-flowered varieties such as ′Chicago Apache′ and ′Apricot Beauty′ (up to 12 cm).

While most of the evaluated cultivars feature round or semi-round bases, they exhibit significant variation in edge texture. Notably, ′Happy Returns′ and ′Apricot Beauty′ are distinguished by pronounced ruffling, which enhances floral volume. Conversely, ′Prairie Blue Eyes′ and ′Apricot Beauty′ possess a unique star-shaped morphology, providing a sharp contrast to the conventional rounded forms of other varieties. The color palette is primarily composed of warm, solar tones such as yellow and orange, though contrasting hues are also represented. ′Chicago Apache displays the highest saturation with its deep red tones, while ′Catherine Woodbury′ offers a delicate pale pink. The cool end of the spectrum is represented by the lilac and lavender hues of ′Prairie Blue Eyes′ and ′Purple de Oro′, respectively.

In contrast to the monochromatic palette of ′Stella De Oro′, most of the other cultivars exhibit complex color structures. ′Apricot Beauty′ is particularly noteworthy for its seamless yellow gradient, while varieties with contrasting centers – such as ′Chicago Apache′, ′Catherine Woodbury′, and ′Prairie Blue Eyes′ – offer a sense of visual depth.

The diversity of floral forms, ranging from simple rounded shapes to sophisticated star-like profiles, combined with an extensive color spectrum, enables the design of dynamic garden arrangements with varied heights and textures. The findings indicate that all studied *Hemerocallis* × *hybrida* varieties possess significant ornamental potential for diverse landscape applications, though the choice of a specific cultivar should be guided by site-specific requirements and environmental conditions

The role of *Hemerocallis* × *hybrida* in ornamental gardening. Selecting *Hemerocallis* × *hybrida* cultivars is a fundamental element in the design of ornamental landscapes. These plants are prized for their aesthetic appeal, extended flowering duration, and diversity in morphology and color. To maximize their effectiveness, it is crucial to account for their morphological traits, environmental requirements, and synergistic potential with companion plants [35]. Accurate variety selection necessitates a thorough understanding of specific flowering windows, as these timelines vary across cultivars. Consequently, this factor is a vital consideration in site planning. The flowering intensity of these daylilies is detailed in Table 4.

Table 4. Comparison of blooming intensity among *Hemerocallis* × *hybrida* varieties

Observation date	*H.* x *h.* ′Stella De Oro′; %	*H.* x *h.* ′Happy Returns′; %	*H.* x *h.* ′Chicago Apache′; %	*H.* x *h.* ′Purple de Oro′; %	*H.* x *h.* ′Catherine Woodbury′; %	*H.* x *h.* ′Anna Warner′; %	*H.* x *h.* ′Prairie Blue Eyes′; %	*H.* x *h.* ′Apricot Beauty′; %
15.06	5	10	5	0	0	0	15	0
01.07	30	40	30	15	0	20	55	0
15.07	55	50	50	40	5	50	30	20
31.07	10	0	15	45	25	30	0	60
15.08	0	0	0	0	70	0	0	20

When planning a daylily planting site, consider the existing seasonal interest. If your garden already features spring, late summer, or early autumn blooms, varieties like ′Happy Returns′ and ′Prairie Blue Eyes′ are ideal for filling the early summer gap. ′Prairie Blue Eyes′, for instance, begins flowering in early June and remains decorative until late July, reaching its peak intensity around July 1st.

Conversely, if the site lacks mid-summer color, ′Anna Warner′, ′Chicago Apache′, ′Stella De Oro′, and ′Purple de Oro′ are the most suitable choices. These varieties peak around July 15th with a blooming intensity of 50-55%, lasting through the end of the month. Meanwhile, ′Catherine Woodbury′ and ′Apricot Beauty′ provide their most vibrant displays in the latter half of summer, though their flowering windows are notably brief.

The significance of *Hemerocallis* × *hybrida* in ornamental horticulture stems from its versatile application in various planting schemes, including mixed borders, flower ribbons (rabatki), traditional beds, specimen plantings (solitaires), and edging. This utility is enhanced by a vast diversity in floral morphology, color, and size, enabling the creation of bespoke garden compositions. Beyond their aesthetic appeal, these hybrids are noted for their robust resistance to environmental stressors, pathogens, and pests. They are notably drought-tolerant and winter-hardy; furthermore, their resilience to air pollution makes them an excellent choice for urban landscaping.

In practice, daylilies serve multiple roles. For border applications, 'Stella De Oro' and 'Purple de Oro' are particularly effective due to their compact growth habit and extended flowering seasons. These varieties pair harmoniously with low-growing annuals like verbena or petunia (Fig. 10) [35].

Figure 10. Use of Hemerocallis × hybrida in border plantings

For specimen (solitary) plantings, the Prairie Blue Eyes, Anna Warner, and Chicago Apache varieties can be used, as they draw focus through their vibrant floral coloring (Fig. 11).

Figure 11. Use of Hemerocallis × hybrida in specimen (solitary) plantings

In mixed borders (mixborders), varieties such as ′Apricot Beauty′, ′Chicago Apache′, ′Happy Returns′, and ′Catherine Woodbury′ can be used, as they pair well with other perennials, annuals, and ornamental grasses (Fig. 12).

Figure 12. Use of Hemerocallis × hybrida in mixed borders

In group plantings, the ′Stella De Oro′, ′Happy Returns′, ′Anna Warner′, ′Prairie Blue Eyes′, and ′Catherine Woodbury′ varieties pair effectively with coniferous shrubs, creating a striking accent against their deep green foliage. They also combine beautifully with other perennials that have similar flower colors to create a delicate and harmonious composition (Fig. 13).

Figure 13. Use of Hemerocallis × hybrida in group plantings

Varieties such as 'Stella De Oro' and 'Purple de Oro' are used for container planting and are placed on patios, balconies, or terraces. Their height does not exceed 45 cm, so they do not require much space on the site (Fig. 14).

Figure 14. Use of Hemerocallis × hybrida in container plantings

Daylilies offer a highly naturalistic aesthetic when positioned near water features, enhancing the organic feel of a landscape. For ponds and streams, varieties that tolerate higher moisture levels – such as ′Stella De Oro′, ′Purple de Oro′, and ′Prairie Blue Eyes′ – are ideal choices (Fig. 15). Whether used as standalone specimens, in mass groupings, or as border plantings, they help stabilize shorelines and seamlessly integrate artificial water bodies into the broader garden concept. These varieties harmonize beautifully with moisture-loving companions like ferns, hostas, and reeds [48].

Figure 15. Use of Hemerocallis × hybrida in plantings near water bodies

In conclusion, *Hemerocallis* × *hybrida* cultivars represent a highly valuable asset to ornamental horticulture, primarily due to their extended flowering duration. By strategically selecting specific varieties, a continuous succession of blooms can be maintained throughout the entire summer season. Their diverse range of plant heights and floral palettes allows for the creation of multifaceted combinations – from mixed borders and edging to specimen and group plantings, and even container gardening. This adaptability makes them exceptionally versatile for both urban greening and private landscape projects.

The application of *Hemerocallis* × *hybrida* in contemporary floristry and interior phytodesign

Recent shifts in floral art reflect a departure from standardized industrial crops in favor of garden-style flowers, with hybrid daylilies (*Hemerocallis* × *hybrida*) occupying a prominent role. Their extensive color palette – spanning from pastel creams to deep purples and near-black hues – enables the creation of sophisticated monochromatic and high-contrast compositions that align with contemporary aesthetic trends [49]. A defining characteristic of the daylily is its ephemerality; while the short lifespan of individual blooms was once seen as a commercial drawback, modern floral studios now embrace it as a symbol of 'fleeting beauty' and ecological authenticity. Research indicates that daylilies are particularly effective in bridal bouquets and event decor, as they maintain turgor for 12-18 hours without supplemental hydration – a vital trait for short-term festivities [50].

In commercial floristry, prioritizing cultivars with multi-flowered scapes is essential. Modern tetraploid hybrids can sequentially open their buds on a single cut stem over 5-7 days, provided stable temperatures are maintained and professional floral preservatives are utilized [35]. The specialized preparation techniques implemented at ensure the production of premium-grade cut flowers, where each TOV SP «Demetra» subsequent bud retains high ornamental value.

Another promising application is the use of flowering daylilies in containers as components of interior phytodesign and terrace styling. Container-based cultivation enables the seamless integration of daylilies into vertical gardens and modular living walls.

Figure 16. Photo of a blooming daylily in a container for interior phytodesign

Recent shifts in floral art reflect a departure from standardized industrial crops in favor of garden-style flowers, with hybrid daylilies (*Hemerocallis* × *hybrida*) occupying a prominent role. Their extensive color palette – spanning from pastel creams to deep purples and near-black hues – enables the creation of sophisticated monochromatic and high-contrast compositions that align with contemporary aesthetic trends [49]. A defining characteristic of the daylily is its ephemerality; while the short lifespan of individual blooms was once seen as a commercial drawback, modern floral studios now embrace it as a symbol of fleeting beauty and ecological authenticity. Research indicates that daylilies are particularly effective in bridal bouquets and event decor, as they maintain turgor for 12-18 hours without supplemental hydration – a vital trait for short-term festivities [35, 49, 50].

For floristry, the strength of the scape and the resistance of the petals to mechanical damage are critical indicators. Varieties with a high wax content in the petal epidermis are most suitable for transportation and use in complex floral structures [35, 50].

Thus, *Hemerocallis* × *hybrida* is a versatile material for modern floristry, enabling the implementation of both short-term decorative tasks (cut flowers, boutonnieres) and long-term projects within interior phytodesign systems. Further study of the cultivar assortment at TOV SP «Demetra» will allow for the identification of a group of varieties most adapted for floristic use, based on indicators of flower lifespan and scape strength.

Conclusions and recommendations for production

1.Based on original phenological observations, it has been established that the container cultivation technology of *Hemerocallis* × *hybrida* in the conditions of the Forest-Steppe zone of Ukraine promotes an early start of the growing season; specifically, for the 'Prairie Blue Eyes' variety, this begins on March 17.

2.As a result of comparing 8 varieties based on their decorative properties, 4 can be identified as suitable for continuous summer blooming: ′Prairie Blue Eyes′, ′Happy Returns′, ′Chicago Apache′, and 'Stella De Oro′.

3.Phenological observations have confirmed that varieties with an earlier start to their growing season possess a longer flowering period compared to those in which the growing season begins later.

4.Based on the results of categorizing varieties by the onset of specific phenological phases, the plants have been classified into the following groups: very early, early, mid-early, and mid-season.

5.It has been proven that the ′Stella De Oro′, ′Happy Returns′, and ′Chicago Apache′ varieties performed best under container cultivation. With this cultivation technology, these varieties demonstrate high decorative value, vibrant blooming, and resilience to climatic changes.

6.When landscaping a specific site, it is necessary to consider the plant dimensions, the type of plant composition, and its functional purpose. Therefore, for ribbon beds (*rabatkas*) and borders, I recommend using the ′Stella De Oro′ and ′Happy Returns′ varieties, while ′Anna Warner′ and ′Chicago Apache′ are better suited as specimen plants.

7.In the conditions of the Forest-Steppe zone of Ukraine (eastern part of the Kyiv region), the most promising varieties for container cultivation technology are: ′Prairie Blue Eyes′, ′Happy Returns′, and ′Stella De Oro′.

8.To ensure continuous blooming on a site, the following varieties can be planted: Happy Returns and Prairie Blue Eyes (early flowering period), Anna Warner and Purple de Oro (mid-season flowering period), and Catherine Woodbury (mid-season flowering period).

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