Scientific Papers. Series B, Horticulture. Vol. LXX, No. 1, 2026
Print ISSN 2285-5653, CD-ROM ISSN 2285-5661, Online ISSN 2286-1580, ISSN-L 2285-5653

INTEGRATED ANALYSIS OF MORPHOLOGICAL, PHYTOCHEMICAL, AND TECHNOLOGICAL CHARACTERISTICS OF TAXONS OF THE GENUS *LAVANDULA* L., WITH REFERENCE TO THE CULTIVAR 'LAVINIE DE GRĂDINĂ'

Maricica COLTUN, Alina BOGDAN

"Alexandru Ciubotaru" National Botanical Garden (Institute) MSU,
18 Padurii Str., Chisinau, Republic of Moldova

Corresponding author emails: maricicacoltun@gmail.com, alinkabog90@gmail.com

Abstract

The article presents the results of a biomorphological, phytochemical, and technological study on the cultivation of Lavandula angustifolia Mill., the cultivar 'Lavinie de Grădină', registered at the Botanical Garden. The research focused on describing the biomorphological characteristics of the cultivar and on assessing the content and composition of its essential oil – a key resource for therapeutic and industrial applications. The plants are characterized by strongly branched stems, opposite linear leaves, and aromatic violet flowers arranged in spike inflorescences. Both generative and vegetative propagation methods were examined, along with primary cultivation practices. Generative propagation can be achieved using stratified seeds or seeds treated according to a specialized protocol, whereas vegetative propagation is performed through cuttings, lignified annual shoots, and layering. The inflorescences constitute the main raw material due to their high essential-oil yield (4.25%), consisting mainly of linalool (50.0%) alongside other aromatic compounds with relevant biological activities. This phytochemical profile provides the cultivar with a broad spectrum of therapeutic properties. The cultivar is early-maturing and exhibits tolerance to drought and overwintering, making it a valuable local source of raw material.

Key words: *lavender, aromatic plants, biomorphology, essential oil, cosmetics.*

INTRODUCTION

In the context of prevailing trends in cosmetology and modern naturopathy, there is an increasing emphasis on the use of plant-based preparations alongside synthetic alternatives. This shift is driven by the growing recognition of the beneficial properties of medicinal plants, which have been rediscovered and reaffirmed through scientific research, as well as by an acknowledgment of their integral role in contemporary human life. The widespread use of phytotherapeutic and natural cosmetic products reflects a high interest in efficient and promising alternatives for promoting health and beauty. Following a period of stagnation, there has been a notable resurgence in the application of natural essential oils and products across various sectors, including phytotherapy, aromatherapy, the fragrance industry, and the food industry. This trend is part of a global movement towards gradually replacing synthetic compounds with natural counterparts. A similar evolution is also evident at the national level, where major companies in the fragrance industry now incorporate natural essential oils in concentrations ranging from 60 to 90% in the production of finished goods. Regarding aromatic and medicinal plants, the quality of raw materials is evaluated based on the content of biologically active compounds, the accumulation of which is influenced by ecological factors, species distribution, cultivation techniques, and the intrinsic biological value of the plant. In this context, the introduction, conservation, enhancement, and valorization of aromatic, medicinal, and spice species housed within the Botanical Garden represents a key area of research for the long-term future (Teleuță A., 2008).

Among the species of particular significance, lavender (*Lavandula angustifolia* Mill.) has been, and continues to be, of considerable interest. It is extensively studied within the Botanical Garden as both an aromatic and medicinal plant, distinguished by its high concentration of biologically active compounds, particularly essential oil, which has diverse

applications in the perfume, cosmetics, and pharmaceutical industries. The collection of "Alexandru Ciubotaru" National Botanical Garden (Institute) also includes other species such as *Lavandula dentata* L., *Lavandula angustifolia* Mill. subsp. *pyrenaica* (DC.) Guinea, and *Lavandula pinnata* Lundmark, in addition to cultivars like *Lavandula angustifolia* Mill. 'K-90' and 'Lavinie de grădină', the latter has officially been registered at the NBGI.

Lavandula angustifolia (lavender) is a species native to North Africa and the mountainous regions of the Mediterranean basin. The earliest documented use of lavender dates back to Ancient Egypt, where it was utilized in both religious rituals and personal care practices. Subsequently, in Persia, Greece, and Ancient Rome, lavender became a significant component in cosmetic formulations and hygiene practices, revered for its claimed ability to purify both the body and the mind. The flowers were used to fragrance and disinfect public baths, as well as to scent indoor spaces (Rasch A., 2010). Currently, lavender is cultivated extensively, primarily for use in the cosmetic industry. Over time, the plant has been utilized as a natural remedy for a range of conditions, including anxiety, insomnia, depression, acne, nausea, skin irritations, and headaches, as well as in the prevention of hair loss. Lavender essential oil is widely used in aromatherapy due to its beneficial effects on overall well-being (Pârvu C., 2006; Gladstar R., 2015). It possesses therapeutic properties and is recommended for the treatment of wounds, burns, varicose ulcers, and eczema. Recent studies have demonstrated the antibacterial activity of lavender oil against microorganisms such as *Escherichia coli*, *Bacillus subtilis,* and *Staphylococcus aureus*, as well as its antifungal efficacy against *Candida albicans* (Ștefănescu R., 2018; Hajhaschemi V., 2003).

The pedoclimatic conditions of the Republic of Moldova are particularly beneficial to lavender cultivation, facilitating high yields of both flowers and essential oil. In the context of growing concerns about the sustainable use of natural resources, there is an increasing need for the development and implementation of effective strategies for utilizing plant resources, both in the economic sector and in medical practice, to positively impact public health (Goncearuc M., 2008; Musteață Gh., 2007).

Numerous studies confirm the influence of environmental factors and cultivation conditions on the production and quality of the essential oil derived from *Lavandula angustifolia* Mill. during the flowering period. Factors such as high temperatures and light intensity are crucial in determining both the yield and the chemical composition of the essential oil. The literature suggests that the optimal harvest time for obtaining high-quality lavender oil occurs when approximately 60% of the flowers are in bloom, with air temperatures exceeding 26°C and no precipitation in the ten days before harvest (Păun E., 1995; Hassiotis C., 2014).

Quantitatively, the European Pharmacopoeia identifies the primary components responsible for the characteristic scent of lavender essential oil as linalool (20-45%) and linalyl acetate (25-47%). Other compounds present in smaller quantities include eucalyptol (≤2.5%) and camphor (≤1.2%), with the latter being considered a factor that may degrade the quality of the oil. Lavandulol (≥0.1%) and lavandulyl acetate (≥0.2%) are recognized as specific markers of lavender oil, contributing to its distinct aromatic profile (Ceaușescu et al., 1988; Lis-Balchin, 2002; Herraiz-Peñalver et al., 2013).

Differences in the composition of essential oil derived from lavender cultivated in Syria compared with that cultivated in Romania underscore the significant influence of pedoclimatic conditions, genetic factors, and extraction technologies on the phytochemical profile. Syrian lavender is characterized by elevated concentrations of linalool (34.70%), camphor (12.77%) and eucalyptol (11.50%), indicating the plant's adaptation to a more arid climate and higher temperatures, which favor the biosynthesis of oxidized monoterpenes (Gassan al Wassouf, 2018).

In contrast, the essential oils obtained from lavender cultivated in Romania exhibit a more balanced profile, with linalool (20.60-35.99%) and linalyl acetate (12.58-19.65%) predominating, along with notable concentrations of lavandulyl acetate (3.74-10.48%) and other aromatic compounds, including *t*-p-3-ocimene, α-terpineol and nerol. These compounds contribute to a more refined fragrance, which is highly valued in the perfume industry (Robu S., 2011). These regional

variations further substantiate the statement that the chemical profile of lavender essential oil serves as a sensitive indicator of ecological conditions and cultivation practices. The selection of cultivation areas and the optimization of agricultural techniques are therefore crucial in guiding production toward specific cosmetic or therapeutic applications.

MATERIALS AND METHODS

The investigations were conducted between 2014 and 2025, with the experiments carried out in the aromatic plant collection at the NBGI. The study encompassed the following species: *Lavandula dentata* L., *Lavandula angustifolia* Mill. ssp. *pyrenaica* (DC.) Guinea, *Lavandula pinnata* Lundmark, and *Lavandula angustifolia* Mill., cultivar 'Lavinie de grădină'. The primary focus of the research was on the 'Lavinie de grădină' lavender cultivar, with emphasis on evaluating the plants' resistance of the plants to climatic conditions, determining optimal propagation methods, analyzing essential oil content and its chemical composition, and developing specific cultivation guidelines for the registered cultivar 'Lavinie de grădină'. Various propagation methods, seasonal growth rates, and biological potential were tested. Key factors such as vegetation phases, relevant organs for raw material accumulation, plant age, and the seasonal dynamics of essential oil accumulation were assessed, leading to the identification of the optimal harvest period. The plants were cultivated in open fields under ecologically balanced conditions and on a uniform agrotechnical background. Phenological observations and biomorphological studies were performed every three days throughout the entire growing season (Sparks, 2009). Essential oil was extracted via steam distillation using a Clevenger-type hydrodistillation apparatus (Clevenger, 1928), with direct heating and rigorous monitoring. The chemical composition of the essential oil was determined by gas chromatography coupled with mass spectrometry (GC-MS), using an Agilent Technologies 6890N gas chromatograph connected to the 5975 Inert XL Mass Selective Detector (Adams, R., 2017). Phytochemical analyses were conducted at the Biological Research Center "Stejarul", Piatra Neamț, Romania.

RESULTS AND DISCUSSIONS

Among the lavender species monitored and evaluated within the collection of the "Alexandru Ciubotaru" National Botanical Garden (Institute) (NBGI) is *Lavandula dentata* L., a species introduced via international seed exchange from France. Native to the Mediterranean basin, Eritrea, Ethiopia, and the Arabian Peninsula, *L. dentata* thrives under local pedoclimatic conditions, achieving an average height of approximately 60 cm. The plant is characterized by gray-green leaves that form a delicate, velvety background with a characteristic silver sheen. The ornamental value of *L. dentata* is notable, with large flowers of intense violet color that harmonize with the leaves, which feature slightly serrated edges and are arranged in false whorls, forming spike inflorescences. The shoots extend radially from the base, displaying a curved structure and lateral divergence toward the apex. The plant emits a strong, typical lavender fragrance, attributed to its high content of linalool (45.06%), followed by camphor (15.62%) and borneol (8.28%). Under the pedoclimatic conditions of the Republic of Moldova, *L. dentata* has demonstrated resistance to low temperatures of up to –10°C, in particularly cold winters, it was necessary to transfer the plants to protected environments. Its drought tolerance was assessed as moderate. In traditional medicine, *L. dentata* is used to treat gastrointestinal disorders and is recognized as an effective antidepressant (Figure 1.1).

Another species evaluated in this study is *Lavandula angustifolia* Mill. ssp. *pyrenaica* (DC.) Guinea, named after the Pyrenees Mountains, where it predominantly occurs on the Spanish side, with a limited distribution in France. This subspecies closely resembles *L. angustifolia* ssp. *angustifolia*, which is found further east in France and Italy. In the collection of NBGI, it was introduced through international seed exchange from Germany and has demonstrated good adaptation to local pedoclimatic conditions. The plants require a southern exposure and full sunlight, reaching the peak flowering phase approximately two weeks earlier than *L. angustifolia* Mill. Introduction studies highlight its high resistance to drought, frost, diseases, and pests. Morphologically, it is

an evergreen shrub with gray-pubescent stems, growing to heights ranging from 30 to 60 cm, and occasionally reaching up to 100 cm, characterized by an intense fragrance. The root system is taproot-like, woody, and branched at the apex. The lower, woody branches are intensely branched and ascending, bearing numerous young shoots. The flowering shoots are tetrahedral, with elongated upper internodes and typically numbering between 100 and 120. The leaves are opposite, sessile, oblong-linear, with curved edges, measuring 2-6 cm in length, pubescent and green or gray-green in color. The flowers are grouped in false whorls, forming spike inflorescences; the corolla, approximately 1 cm long, is typically blue-violet and pubescent. The fruit consists of four nutlets enclosed in a persistent calyx (Figure 1.2)

Lavandula pinnata Lundmark, commonly known as fern-leaf lavender, is another species present and monitored within the collection. It is characterized by its pinnate, fleshy leaves, which confer a distinct morphological appearance compared with other lavender species. The flowers, which are of an intense violet-blue color, are arranged in short, spike-like inflorescences on slender stems, spirally opening around the floral axis. The flowering period is extended, spanning from early spring to early summer. The plants exhibited rapid growth under fertile soil conditions but also demonstrated the ability to tolerate poor, stony soils. Being native to India and surrounding regions, *L. pinnata* has shown greater tolerance to high temperatures and increased humidity compared with other lavender species, making it particularly suited for warmer climates. However, *L. pinnata* is sensitive to low temperatures and cannot withstand freezing conditions. Thus, under local pedoclimatic conditions, it is cultivated as an annual, with specimens transferred to protected spaces during the cold season to preserve the biological material (Figure 1.3).



Figure 1. General appearance of lavender species: 1. *Lavandula dentata* L.; 2. *Lavandula angustifolia* subsp. *pyrenaica* (DC.) Guinea; 3. *Lavandula pinnata* Lundmark

Lavandula angustifolia Mill. cv. 'Lavinie de grădină' was developed and certified at the "Alexandru Ciubotaru" National Botanical Garden and is officially registered in the Plant Cultivar Catalogue. It was created through individual selection and is characterized by an average harvest period and a plant height of approximately 65 cm. The cultivar can be propagated both generatively and vegetatively. Plants derived from generative seedlings exhibit heterogeneity, displaying variation in size, flower corolla color, and a shorter lifespan. In contrast, plants propagated vegetatively typically produce between 450 and 500 flowering stems per plant on average.

An experimental plantation of 0.40 ha was established for systematic phenological observations. The research aimed to assess plant resistance to local climatic conditions, determine optimal propagation methods, analyze essential oil content and composition, and develop cultivation guidelines for the

certified cultivar 'Lavinie de grădină'. Various propagation methods were tested, and the plants' seasonal growth patterns and biological potential were evaluated. Key factors, including vegetative phases, organs crucial for raw material accumulation, optimal plant age, and the dynamics of essential oil biosynthesis, were examined to identify the optimal harvest period. The research results indicate that the cultivar 'Lavinie de grădină'. is a perennial semi-shrub with a globular shape, developing a thick, deep lignified root system that ensures strong root anchorage and tolerance to variable pedoclimatic conditions. The stem is highly branched, brown, and features exfoliating bark, reaching heights of 50–70 cm. The young branches are square, pubescent, and gray. From the second year onward, the plants typically produce 450–500 flowering stems per plant. The leaves are opposite, linear, entire, sessile, and acute; the lower leaves are gray and hairy, while the upper leaves are gray-green and less pubescent. The flowers are labiated, intensely aromatic, blue-violet in color, pubescent, and glandular, grouped in spike-like inflorescences typical of the species (Figures 2.1, 2.2).



Figure 2. The cultivar *Lavandula angustifolia* Mill. 'Lavinie de grădină':
1. peak the flowering stage; 2. the end of the flowering stage

'Lavinie de grădină' flowers during June and July and is classified as a relatively late-blooming cultivar. The flowering phase typically lasts between 25 and 30 days. The fruits are ovoid nutlets, shiny and brown, arranged at the base of the persistent calyx. This cultivar is valued for its high productivity of raw plant material, good resistance to winter conditions, and the longevity of the plantation. For small areas, where harvesting can be done quickly, the optimal harvesting period is the 75% flowering phase. However, in cases where the harvesting period is extended (due to large areas or limited processing capacity), it is recommended to begin harvesting at the 50% flowering phase and complete it by the 100% flowering phase. The harvested inflorescences are immediately transported to the distillation units. Over several years of testing, the inflorescence yield ranged from 9.2 to 10.8 t/ha, with essential oil content varying between 1.390% and 1.484% (f. m.) and 4.251% (d. m.). Under these conditions, essential oil production ranged from 105.4 to 145.3 kg/ha. Under favorable climatic conditions, the cultivar can exhibit a secondary flowering period in October. However, during this period, the essential oil content is significantly lower, and the flower stems are much shorter. Flowers produced at this time are primarily suitable for decorative purposes in floral arrangements. According to phenological observations over a 10-year period, the plants showed no signs of damage from low temperatures, drought, diseases, or pests, underscoring the biological stability and high adaptability of the cultivar to local pedoclimatic conditions. In the fifth year of growth, when the bushes reached full vigor, methods for propagating planting material through cuttings and rooted layers were evaluated. These vegetative propagation methods proved effective in producing uniform plantations with higher yields of raw material and essential oil.

Vegetative propagation through rooting lignified cuttings begins with the collection of

planting material, typically performed during autumn (September-October) or spring (March-April) when the plants are in their vegetative rest phase. The cuttings are sourced from healthy, well-developed mother plants aged between 3 and 5 years, exhibiting phenotypic traits that align with cultivar standards. Using a sharp knife or blade, the cuttings are sectioned to minimize tissue damage, ensuring a clean cut just below a vegetative bud. Leaves are carefully removed to prevent injury to the buds. At the base of each cutting, a single slanted wedge-shaped incision is made just beneath the bud to promote callus formation and initiate the rooting process.

The cuttings, typically 5-6 cm in length, should be planted within 1-2 hours of collection. If planting is delayed (but not exceeding 24 hours), the cuttings are placed in containers with clean water to prevent dehydration. The soil designated for the rooting beds must be free of weeds and preferably located near a reliable water source. It is leveled, broken up, and lightly compacted to ensure a stable substrate. Frames are then placed with a 40-50 cm distance between them to facilitate proper access and ventilation. Within the frames, a layer of well-sieved sand (8-10 cm thick) is spread and thoroughly watered after leveling.

Following watering, rows are marked using specialized markers to guide planting. The cuttings are manually inserted into the substrate, spaced 5-10 cm apart, depending on the vigor of the planting material. They are gently pressed into the substrate to prevent damage to the apical leaves. Moreover, the cuttings are watered abundantly, and the frames are covered with whitewashed glass panes and mats to maintain optimal humidity and protect the cuttings until the first roots emerge (Figure 3).



Figure 3. Obtaining rooted cuttings of *Lavandula angustifolia* Mill. cultivar 'Lavinie de grădină'

Once the rooting process is initiated, the cuttings are gradually hardened off by opening the frames for a few hours each day, preferably during the cooler parts of the day, such as morning or evening. When flower stems emerge, they are pruned to approximately half their length to promote branching and ensure balanced growth of the young plants. The rooting success rate typically ranges from 80% to 85%. Following rooting, the cuttings are transplanted into open ground for the establishment of industrial plantations, where field success rates are generally very high, ranging from 90% to 95%.

Horizontal layering (also known as rooted layers) is a simple and cost-effective propagation method that offers significant economic advantages. This technique ensures the production of genetically pure material, resulting in plants that exhibit the desired characteristics of the cultivar, particularly in terms of both productivity and essential oil quality. Horizontal layering involves rooting the basal portions of lignified stems and branches without severing them.

The process begins by slightly heeling the selected lavender bushes, adding soil from between the rows to form a 4-5 cm mound beneath the lateral shoots. The bush is then carefully opened from the center outward, and the stems are bent radially toward the soil. Additional soil is placed in the center and compacted to form a 10-12 cm layer, ensuring good contact between the bent stems and the substrate. The leaf tips of the bent stems, which extend approximately 8-10 cm, remain above the soil. Soil covering for rooting is typically

carried out in early spring or late autumn, during the vegetative rest periods of plants.
Mulching between rows significantly accelerates the rooting process and increases the number of layers produced from each plant. A single bush can yield 100-120 rooted layers. This method also ensures the production of uniform, vigorous layers with well-developed root systems, resulting in high-quality planting material (Figure 4).



Figure 4. Obtaining rooted layers of *Lavandula angustifolia* Mill. cultivar 'Lavinie de grădină'

The layers are detached with relative ease, resulting in minimal loss or damage to the mother plant. The rootstocks are planted in small holes, positioned at the intersection of the marker. Prior to planting, the rootstocks, having been properly selected and stored, have their roots pruned back to 15-20 cm and are subsequently soaked in a clay solution. The rootstocks are then placed in the soil 5-6 cm below the root collar ring, ensuring that the lower branches are adequately covered. During planting, the roots are carefully arranged, covered with soil, watered, and topped with an additional layer of soil, which is not compacted. Before winter, the seedlings are mounded with a 3-5 cm layer of soil for protection.
To assess the quality of the essential oil obtained from *Lavandula angustifolia* Mill., cv. 'Lavinie de grădină', its chemical composition was analyzed, and a total of 24 chemical components were identified. The analysis was performed on two essential oil samples: one collected during the peak flowering phase and the other during the end of the flowering phase, in order to examine the phytochemical dynamics across different phenological stages. The chemical composition was determined using gas chromatography-mass spectrometry (GC-MS). Compound identification was based on retention times, retention indices, and the comparison of mass spectra with reference data from the literature (Figure 5).
According to the chromatographic analysis, the main constituents of the essential oil include linalool, which accounts for 48.8% to 50.0% of the composition, with the highest concentration recorded during the mass flowering phase, and linalyl acetate, which ranged from 6.7% to 12.1%. Additionally, α-terpineol was present in amounts ranging from 0.6% to 6.9%, showing a notable decrease toward the end of the blooming period. Lavandulyl acetate was identified in concentrations between 4.0% and 11.3%, with the highest levels recorded at the end of the flowering phase. Eucalyptol (1,8-cineole) was present at 3.6% to 3.9%, exhibiting an increasing trend toward the end of flowering. Geranyl acetate varied from 1.3% to 2.3%, with the highest abundance during the peak flowering phase. Other identified compounds include trans-linalool oxide, cis-β-ocimene, and additional monoterpenes, all of which contribute to the complex aromatic profile of the essential oil.
These findings highlight the significant influence of the phenological phase on the chemical composition of the essential oil produced by *Lavandula angustifolia* Mill. cv. 'Lavinie de grădină'. This is particularly important for determining the optimal harvest time based on the intended therapeutic or cosmetic use of the oil. The chemical composition of the essential oil underscores that adherence to the appropriate harvest timing for this cultivar is essential, as it not only affects the total essential oil yield but also the chemical profile.

RT (min)	Compounds	Area %		Farmacopeea Eur vol. 8.0
		Peak flowering phase	*End of flowering phase*	
5.85	α-Pinene	0.1	-	
7.19	3-Octanone	0.2	0.3	0.1-2.5%
7.39	β-Myrcene	1.1	1.0	
8.05	Hexyl acetate	0.2	0.2	
8.49	p-Cymene	-	0.3	
8.66	Limonene	0.4	0.3	<1.0%
8.74	Eucalyptol/1,8-Cineole	3.6	3.9	<2.5%
8.91	trans-β-Ocimene	2.9	2.2	
9.32	cis-β-Ocimene	1.5	1.2	
10.19	cis-Linalool oxide	0.8	1.7	
10.78	trans-Linalool oxide	1.1	1.8	
11.25	Linalool	50.0	48.8	20-45%
11.68	1-Octenyl acetate	0.3	1.1	
12.98	Camphor	0.3	0.5	<1.2%
13.90	Lavandulol	1.1	0.2	>0.1%
14.36	4-Terpineol	0.7	0.8	0.1-6.0%
14.90	α-Terpineol	6.9	0.6	<2.0%
17.69	Linalyl acetate	12.1	6.7	25-46%
19.16	Lavandulyl acetate	4.0	11.3	>0.2%
22.24	Neryl acetate	1.4	4.0	
23.03	Geranyl acetate	2.5	1.3	
24.57	β-Caryophyllene	1.5	2.4	
26.06	cis-β-Farnesene	0.6	1.1	
30.95	Caryophyllene oxide	1.4	0.4	
Other compounds		*5.6*	*5.6*	

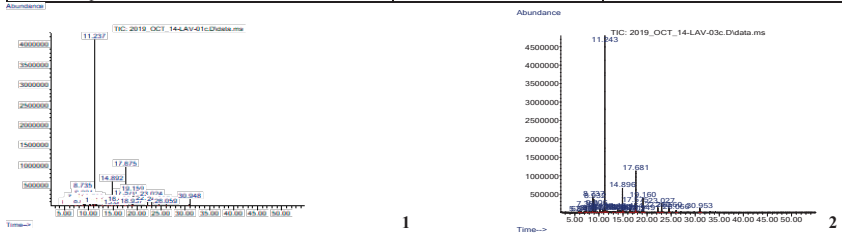

Figure 5: The chemical composition of the essential oil of *Lavandula angustifolia* Mill. cultivar 'Lavinie de grădină' by GC-MS: 1. Chromatogram - peak flowering phase; 2. Chromatogram - end of flowering phase

For plantations established with vegetatively propagated material, where plants exhibit uniform flowering, determining the harvest time becomes relatively simple. The flowering period of this cultivar lasts between 35 and 45 days and can be divided into four distinct phases: bud formation (when the floral buds first appear); early flowering (when approximately 25% of the flowers are open); peak flowering (when 50% of the flowers are open); and end of flowering (when 90% of the flowers have withered). For smaller areas, harvesting can be performed when 70–80% of the flowers are open. For large plantations, harvesting should span 11 to 13 days, beginning when about 55% of the flowers are open and concluding at 95% open flowers.

It is important to avoid harvesting during rainy weather, high humidity, or strong winds, as these conditions can negatively affect the quality of the essential oil. Harvesting is best done in the morning hours, between 9:00 and 11:00 AM, when the concentration of essential oil is at its peak. After 2:00 PM, the essential oil content decreases significantly, making later harvesting less efficient.

CONCLUSIONS

Lavandula angustifolia Mill. cv. 'Lavinie de grădină' is characterized by early technical maturity, high flower yield, and a rich content of essential oils.

This cultivar exhibits a range of specific quantitative and qualitative traits, including plant size, bush shape, inflorescence length, corolla color, inflorescence (spike) length, flower stalk length, and the number of flower stalks.

It is capable of being propagated both generatively and vegetatively, through the use of cuttings and rooted rootstocks, methods which

facilitate the establishment of uniform and productive plantations.

During the peak flowering phase, the essential oil content reaches its highest values, with a maximum of 4.251% (d. m.). The primary compounds identified in the essential oil include linalool (48.8-50.0%), linalyl acetate (6.7-12.1%), α-terpineol (0.6-6.9%), lavandulyl acetate (4.0-11.3%), eucalyptol (1,8-cineole) (3.6-3.9%), geranyl acetate (1.3-2.3%), and other secondary compounds. The productivity of this cultivar is influenced by prevailing pedoclimatic conditions, with yields ranging from 9.2 to 10.8 t/ha for raw material and 105 to 145.3 kg/ha for essential oil.

The primary application of the cultivar 'Lavinie de grădină' is for the extraction of essential oil, which is utilized in a variety of industries, including perfumery, aromatherapy, food production, pharmaceuticals, beekeeping, and ornamental purposes. Furthermore, the cultivar exhibits remarkable resistance to frost, drought, disease, and pests, rendering it a highly resilient crop. Given these traits, it represents a viable and promising alternative crop with substantial potential for exploitation, particularly in the context of ongoing climate change.

ACKNOWLEDGEMENTS

The research was carried out with the support of Research Subprogram No. 010101 "*Ex situ* and *in situ* research and conservation of plant diversity in the Republic of Moldova".

REFERENCES

Adams, R. (2017). *Identification of Essential Oil Components by Gas Chromatography/Mass Spectrometry*, 4.1 edition. Allured Publishing.

Ceauşescu, V.E., Rădoiaş, G., Cădariu, T. (1988). *Odorante şi Aromatizante. Chimie, Tehnologie, Aplicaţii*. Ed. Tehnică, Bucureşti.

Clevenger, J. F. (1928). Apparatus for Volatile Oil Determination: Description of a New Type. *The Journal of the American Pharmaceutical Association*, 17, 345–349.

European Pharmacopoeia (8th Edition). EDQM, Council of Europe.

Gassan al-Wassouf (2018). Chemical Composition of the Essential Oil of *Lavandula angustifolia* from Syria. *Chemistry and Materials Research*, 10(1), 1–6.

Gladstar, R., trad. Frunză, L. (2015). *Plante medicinale. Ghid esențial*. Editura Litera, București.

Goncearіuc, M. (2008). Plante medicinale și aromatice cultivate. CE UASM, Chișinău.

Hajhashemi, V., Ghannadi, A., Sharif, B. (2003). Anti-inflammatory and analgesic properties of the leaf extracts and essential oil of *Lavandula angustifolia* Mill. *Journal of Ethnopharmacology*, 89(1), 67–71.

Hassiotis, C.N., Ntana, F., Lazari, D.M., Poulios, D.M., Vlachonasios, K.E. (2014). Environmental and developmental factors affect essential oil production and quality of *Lavandula angustifolia* during the flowering period. *Industrial Crops and Products*, 62, 359.
https://doi.org/10.1016/j.indcrop.2014.09.017

Herraiz-Peñalver, D., Cases, M.Á., Varela, F., Navarrete, P., Sánchez-Vioque, R., Usano-Alemany, J. (2013). Chemical characterization of Lavandula latifolia Medik. essential oil from Spanish wild populations. *Biochemical Systematics and Ecology*, 46, 59–68.
https://doi.org/10.1016/j.bse.2012.09.018

Lis-Balchin, M. (2002). Chemical composition of essential oils from different species, hybrids and cultivars of *Lavandula*. In *Lavender*. Taylor & Francis.
https://www.taylorfrancis.com/chapters/edit/10.1201/9780203216521-29/chemical-composition-essential-oils-different-species-hybrids-cultivars-lavandula

Musteață, G. (2007). *Subarbuști medicinali şi aromatici cultivați*. *Lavanda* (*Lavandula angustifolia* Mill.). Chișinău.

Păun, E. (1995). *Sănătatea Carpaților. Lavanda* (*Lavandula angustifolia* Mill.). București.

Pârvu, C. (2006). *Universul plantelor*. Editura ASAB, București.

Rausch, A., Lotz, B. (2010). *Plante aromatice. Cultivare, Gastronomie, Cosmetică, Efecte terapeutice*. Editura ALLFA, București.

Robu, S., Aprotosoaie, A.C., Cioancă, O., Hancianu, M., Stănescu, U. (2011). Cercetări privind compoziția chimică a uleiurilor volatile extrase din flori de levănțică. *Rev. Med. Chir. Soc. Med. Nat*., Iași, 115(2), 584–589.

Smigielski, K., Raj, A., Krosowiak, K., Gruska, R. (2009). Chemical composition of the essential oil of Lavandula angustifolia cultivated in Poland. *Journal of Essential Oil-Bearing Plants*, 12(3), 338–347.

Sparks, T. (2009). European cooperation in plant phenology.
https://www.researchgate.net/publication/242676714_European_cooperation_in_plant_phenolog

Ștefănescu, E., R., Eșianu, S. (2018). *Uleiuri volatile utilizate în practica farmaceutică și în parfumerie*. Editura University Press, Târgu Mureș.

Teleuță, A., Colțun, M., ș.al. (2008). *Plante medicinale*. Editura Litera, Chișinău.