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Full Length Research Article

Growth—development and Biochemical Peculiarities of some plants introduced at Batumi Botanical Garden

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ARTICLE INFORMATION

ABSTRACT

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The study of ecophysiological and biochemistry peculiarities and features of introduced plants of various geographical origins is still continuing at the Botanical Garden, as well as one of the theoretical basics of plant introduction in order to reveal new plant resources and implement them in different types of farming economy. For the purpose, we conducted thorough phenological observations on the experimental plants. Interrelation between the flowering and fruit bearing was estimated in connection with internal and external factors. Plant development phases and air temperature, drought- resistance, seed quality (germination capacity) and other indices were evaluated. Under the conditions of the Botanical Garden the majority of the studied plants are characterized by adequate growth and development. They flower and bear fruits, are drought and frost resistant. For the purpose of determining the content of essential oils we have conducted experimental research in the regional chromatographic center of western Georgia. For the isolation of essential oils the methods of hydrodistillation, high pressure super-fluid extraction (with inert gases) and titration have been applied. It was determined that the content of essential oils in the *Doryphora sassafras* leaves is $0,124\% \pm 0,02\%$, *Illicium floridanum* fruits $0,0497 \pm 0,003\%$, *Illicium verum* fruits $0,0657 \pm 0,006\%$, *Leptospermum scoparium* leaves $0,065 \pm 0,008\%$, *Lindera communis* fruits $0,5474 \pm 0,06\%$, *Magnolia figo* flowers $1,078 \pm 0,03\%$, genera *Leptospermum scoparium* var. *chapmanii* leaves $0,1533 \pm 0,005\%$, *Leptospermum scoparium* v. *niichollsii* leaves $0,065 \pm 0,007\%$. For the isolation of essential oils the methods of high pressure super-fluid extraction (with inert gases) Major components of the oil in the leaves of *Leptospermum scoparium* are Terpenen e, Cis-b-Ocimene, Pentadecanone),

Introduction

Plant introduction and preservation of diversity has always been a significant priority of botanical gardens generally. Introduction activities in the Batumi Botanical Garden are connected with the foundation of the Garden. The initiators of this job were I. Veru, M. D'Alphonse, E. Tatarinov, A. Solovtsev, G. Olinski, B. Stoyanov and others. Palibin is considered as the founder of the research activities in the Garden. He was the director of the Garden from 1916. He supervised the study of growth-development peculiarities of the introduced plants. It was observed in our conditions how useful it might be to spread certain plants or use them in agriculture, decorative gardening and other fields of national economy [1]. The study of ecophysiological and biochemistry peculiarities and features of introduced plants of various geographical origins is still

continuing at the Botanical Garden, as well as one of the theoretical basics of plant introduction in order to reveal new plant resources and implement them in different types of farming economy [2]. Plants scientific study requires a complex integrated approach: understanding of their close relations with the natural environment in the conditions of interrelations between morphological, phylogenetic and bioecological factors along with the knowledge of chemical composition. Aromatic plants are particularly rich in roses, myrrh, laurel, cypress [3].

Objects of our study were the exotics: *Doryphora sassafras* Endl. *Leptospermum scoparium* Forst; *Doryphora sassafras* Endl., *Illicium verum* Hook.F., *Illicium floridanum* Ellis., *Lindera communis* Thunb., *Magnolia figo* Lour, genera *Leptospermum scoparium* var. *chapmanii* Dorian. Smith Carr.

Bureau, *Leptospermum scoparium* var. *nichollsii* Turill[4,5]. Study of the growth and developmentalities of the researchers has been established that they are consistent with all phases of vegetative and generational development, which is a successful acclimatization rate. The goal of our studies was to reveal the results of the adaptation of the plants, to study their bio-ecological and biochemical peculiarities and estimate regularities of development under the cultivation.

Materials and methods

For the purpose, we conducted thorough phenological observations on the experimental plants. Interrelation between the flowering and fruit bearing was estimated in connection with internal and external factors. Plant development phases and air temperature, drought- resistance, seed quality (germination capacity) and other indices were evaluated.

Under the conditions of the Botanical Garden the majority of the studied plants are characterized by adequate growth and development. They flower and bear fruits, are drought and frost resistant. In the objects of our study for the purpose of determining the content of essential oils we have conducted experimental research in the regional chromatographic center of western Georgia. For the isolation of essential oils the methods

of hydrodistillation, high pressure super-fluid extraction (with inert gases) and titration have been applied[6,7].

Results

Results of studying the growth and developmental characteristics of the species under study, it has been concluded that they go through all phases of vegetative and generative development, indicating a successful adaptation. Seed productivity studies established that the coefficient of seed emergence is quite high. As a result of hydro distillation of *Leptospermum scoparium* leaves, *Leptospermum scoparium* var. *chapmanii* leaves, *Leptospermum scoparium* var. *nichollsii* leaves, *Lindera communis* seeds, *Illicium verum* leaves, *Illicium floridanum* leaves we obtained distillates with peculiar aroma. The research enabled to conform the presence of essential oils in this species. Through the titration method (hydrolysis of essential oil glycoside link in leaves and fruit was conducted with hydrogen chloride action; the free essential oil was titrated with bromine). It was *Doriphora sassafras* leaves 0,124% ± 0,02 %, *Illicium verum* leaves is 0,0657 ± 0,006%, *Illicium floridanum* fruit 0,0497± 0,003, *Leptospermum scoparium* var. *chapmanii* leaves 0,1533 ± 0, 005 %, *Leptospermum scoparium* leaves 0,065 ± 0.008 % *Leptospermum scoparium* v. *niichollsii* leaves 0,065 ± 0,007 %, *Lindera communis* fruits 0,5474 ± 0, 06 %, *Magnolia figo* flowers 1, 078 ± 0,03%.

Table 1. The content of essential oils in the species studied by the titration method

Plant name	Total essential oils %		
	Leaves	Fruits	Flowers
<i>Doriphora sassafras</i>	0,124 ± 0,02		
<i>Illicium verum</i>		0,0657 ± 0,006	
<i>Illicium floridanum</i>		0,0497 ± 0,003	
<i>Leptospermum scoparium</i> v. <i>chapmanii</i>	0,1537±0,005		
<i>Leptospermum scoparium</i>	0,065 ± 0,008		
<i>Leptospermum scoparium</i> v. <i>nicholssii</i>	0,065 ± 0,007		
<i>Lindera communis</i>		0, 5474 ± 0,06	
<i>Magnolia figo</i>			1.078 ± 0,03

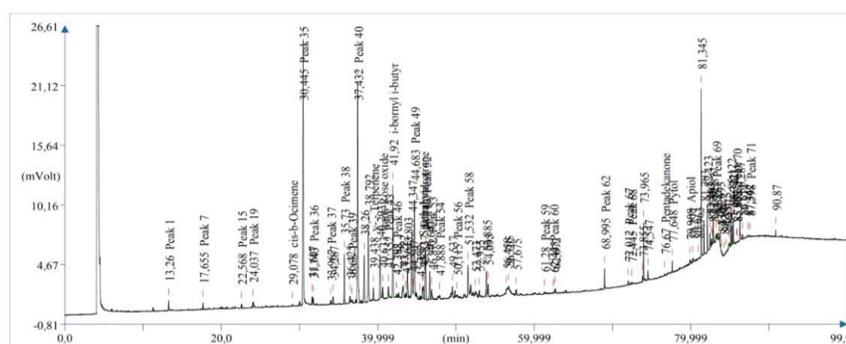


Fig. 1. Cromatograms of *Leptospermum scoparium* Forst. Essential oil from leaves bloomed plant.

For the isolation of essential oils the methods of high pressure super-fluid extraction (with inert gases) Major components of the oil in the leavs of *Leptospermum scoparium* are Terpenene, Cis-b-Ocimene, Pentadecanone).

Conclusion

The some aromatic and medicinal plant species introduced at Batumi Botanical Garden take a significant place in terms of their application in medicine and *International Journal of Environmental Sciences*

widely be implemented in modern pharmacology. According to the adaptation degree, the studied plants can be recommended for the reasonable application in the Ajara coastline.

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