საქართველოს მეცნიერებათა ეროვნული აკადემიის მოამბე, 175, №2, 2007
BULLETIN OF THE GEORGIAN NATIONAL ACADEMY OF SCIENCES, 175, №2, 2007

Botany

Peculiarities of Propagation of Species of *Hamamelidaceae* Lindl. Family

Mariam Metreveli*, Mariza Bregvadze*

* *Batumi Botanical Garden*

(Presented by Academy Member V. Papunidze)

ABSTRACT. Peculiarities of propagation by seeds and vegetatively by grafts have been investigated in plants of the *Hamamelidaceae* family introduced in Batumi Botanical Garden. The capacity for propagation of plants of the *Hamamelidaceae* family is very important for wide application of these plants in planting of greenery in the humid subtropical zone of Ajara, ornamental gardening, park construction, afforestation. *© 2007 Bull. Georg. Natl. Acad. Sci.*

Key words: *introduction, adaptation, seed, graft, seedling, rooting.*

Plants of the *Hamamelidaceae* family hold an important position in the richest collection of Batumi Botanical Garden, established several decades ago. The majority of species of the family occupy an important place among introduced plant species and significantly exceed the polyfunctionality of many woody plants spread in Georgia. Despite the above mentioned facts, the potential of these plants is not fully exploited, due to little scientific information on them or low popularization.

In the process of adaptation of introduced plants to new environmental conditions plant resistance to unfavorable environmental factors rises in generations reproduced from seeds. So, permanent renovation of populations by locally reproduced plants seems to be essential for the increase of the resistance of woody plants and their wide establishment. At the same time, when summarizing the results of introduction it is better to consider integrally the possibilities of generative propagation and vegetative renovation [1, 2].

By our observations, out of plants of *Hamamelidaceae* family, growing in Batumi Botanical Garden, the species of the genera *Hamamelis*, *Corylopsis*, *Sycopsis* and *Liquidambar* possess the ability for natural vegetative renovation. *Hamamelis mollis*, *Liquidambar stryfaciflua* and species of the genus *Corylopsis* develop self-sprouts and are capable of self-renovation.

The aim of the present investigation was to evaluate the capacity for propagation by seeds in 17 species of trees and bushes of the *Hamamelidaceae* Lindl. family. In 14 species of the same family the potential for propagation by stem grafts has been estimated. The chosen species seem to be prospective for use in green construction of the Black Sea coast of Ajara, ornamental gardening, especially for constructing winter- and early spring-blooming gardens, afforestation. Life forms of the chosen species and native ranges are listed in Table 1.

Seeds of the species under investigation were collected in October-November and prepared for sowing. Except the species belonging to the genus Liquidambar, seeds of all species were characterized by the combined type of dormancy or combination of exogenic and endogenic types [2]. The dormancy of seeds was broken by means of stratification and scarification. Then the seeds were put into wide clay pots filled with a mixture of sand with soil and allowed to stay outside for the whole period of winter at low ambient temperature. Scarification was performed by damaging the harsh seed coat.

Table 1

Some data on species of the *Hamamelidaceae* family introduced in Batumi Botanical Garden

№	Species	Life form	Native range
1	*Corylopsis platypetala*	deciduous tall bush, flowering in early spring	Central and West China
2	*Corylopsis sinensis*	deciduous tall bush, flowering in early spring	China
3	*Corylopsis spicata*	deciduous tall bush, flowering in early spring	Japan, Sikoku
4	*Corylopsis veitchiana*	deciduous tall bush, flowering in early spring	China
5	*Corylopsis wilmottiae*	deciduous tall bush, flowering in early spring	Central China
6	*Distylium racemosum*	evergreen tall bush or tree	Japan
7	*Fortunearia sinensis*	deciduous tree	China
8	*Hamamelis japonica*	deciduous, winter-flowering bush	Japan
9	*Hamamelis mollis*	deciduous, winter-flowering bush	China
10	*Hamamelis vernalis*	deciduous, winter-flowering bush	North America
11	*Hamamelis virginiana*	deciduous, autumn-flowering bush	North America
12	*Liquidambar formosana*	deciduous, tall tree, with valuable wood	China, Taiwan
13	*Liquidambar styraciflua*	deciduous, tall tree, with valuable wood	North America
14	*Loropetalum chinense*	evergreen tall bush	China
15	*Parrotia persica*	deciduous tree, with valuable wood	Azerbaijan, North Iran
16	*Parrotiopsis jacquemontiana*	deciduous tall bush, flowering in early spring	Hymalaya, Afganistan, Pakistan
17	*Sycopsis sinensis*	evergreen tall bush or tree	China

The results of investigation of propagation by seeds of species belonging to the *Hamamelidaceae* family are presented in Table 2. The species *Liquidambar styraciflua* and *Liquidambar formosana*, belonging to the genus Liquidambar, were characterized by fast germination of seeds. Sprouts emerged in 30-45 days after sowing. In some cases the germination period was even shorter.

Seeds of the remaining species of the *Hamamelidacea* family, those belonging to the genera Corylopsis and Hamamelis, in particular *Distylium racemosum*, *Fortunearia sinensis*, *Loropetalum chinense*, *Parrotia persica*, *Parrotiopsis jacquemontiana*, *Sycopsis sinensis* were characterized by a long period of dormancy (1-1.5 year). To break the dormancy the methods of scarification and stratification at low temperature were utilized. Due to this the period of dormancy was reduced from 1-1.5 year to 6-7 months.

Germination of seeds is of aboveground type, sprouts are characterized by rapid growth and development.

Loropetalum chinense, *Parrotia persica* and *Parrotiopsis jacquemontiana* did not develop sprouts. Seeds of Fortunearia sinensis were characterized by low germination capacity (15-20%).

Plants belonging to the genera Sycopsis, Corylopsis, Hamamelis, Liquidambar and Distylium were distinguished for their average or normal germination capacity.

The period of juvenile (virgin) development lasts on the average 3-4 years. During this period seedlings develop branching of second and third order and plants transform into bushes.

The height of three-year seedlings developed from seeds reaches 80-130 cm, except *Fortunearia sinensis*, *Hamamelis japonica* and species of the Liquidambar, whose three-year seedlings are 20-40 cm high.

The seedlings of *Hamamelis virginiana*, *Hamamelis mollis*, *Corylopsis spicata*, *Distylium racemosum* and *Sycopsis sinensis* are distinguished for especially rapid growth.

The root system of developed plants is mainly of taproot type, though annual seedlings of Hamamelis and Corylopsis species reveal the tendency to the development of fibrous type root.

Flower buds emerge on seedlings in May of the third year. On the fourth year flowering of plants starts. Species of the genus Liquidambar form an exception. At the age of 4-5 years they fully resemble the mother plant,

Table 2

Dynamics of germination of seeds and percentage of rooting of grafts in plants of *Hamamelidaceae* family in Batumi Botanical Garden

Species	Weight of 100 seeds, g	Planting date	Germination date		Time needed for germination, days	Germination rate, %	Rooting date	Survival rate, %
			first	last				
Corylopsis platypetala	1.9	5/XI	20.04	15.06	167-223	40	-	-
Corylopsis sinensis	1.8	5/XI	22.04	15.06	169-223	45	27.02	35
Corylopsis spicata	1.7	5/XI	27.04	18.06	174-226	50	27.02	45
Corylopsis veitchiana	1.9	5/XI	22.04	20.06	169-228	40	27.02	35
Corylopsis wilmottiae	1.8	5/XI	22.04	20.06	169-228	45	-	-
Distylium racemosum	2.9	2/XI	25.04	18.06	175-229	44	30.08	55
Fortunearia sinensis	10.5	2/XI	18.04	16.06	168-227	20	25.02	15
Hamamelis japonica	6.6	7/XI	15.04	10.06	160-216	40	-	-
Hamamelis mollis	8.00	7/XI	17.04	10.06	162-216	60	27.02	50
Hamamelis vernalis	8.5	2/XI	18.04	10.06	168-221	40	27.02	20
Hamamelis virginiana	7.2	2/XI	18.04	15.06	168-226	65	27.02	55
Liquidambar formosana	0.38	10/III	10.04	15.05	31-78	75	25.02	9
Liquidambar styraciflua	0.40	10/III	20.04	25.05	41-76	55	25.02	-
Loropetalum chinense	1.7	5/X	-	-	-	-	30.08	-
Parrotia persica	6.9	5/X	-	-	-	-	25.02	30
Parrotiopsis jacquemontiana	1.3	5/X	-	-	-	-	27.02	-
Sycopsis sinensis	3.7	2/XI	20.04	15.06	170-226	36	30.08	45

though generative development is not characteristic of them.

As a result of rooting shoot grafts (Table 2) it became clear that rooting was more active in grafts taken in August. In particular, the process of rooting in these grafts started after 30-35 days. Roots started to develop after 50-55 days on grafts taken in February. The root system was better developed on grafts taken in August.

The root system was well developed on shoot grafts of the following species: *Distylium racemosum*, *Sycopsis sinensis*, *Corylopsis sinensis*, *C. veitchiana*, *C. spicata*, *Hamamelis mollis*, *H. virginiana* (30-55%) and they were characterized by rapid growth. Species *Hamamelis vernalis*, *Fortunearia sinensis*, *Liquidambar formosana* were characterized by low rooting capacity (7-20%). The species *Parrotiopsis jacquemontiana*, *Liquidambar styraciflua* and *Loropetalum chinense* failed to propagate by shoot grafts.

ბოტანიკა

Hamamelidaceae Lindl. ოჯახის სახეობების გამრავლების თავისებურებანი ბათუმის ბოტანიკურ ბაღში

მ. მეტრეველი, მ. ბრეგვაძე

ბათუმის ბოტანიკური ბაღი

(წარმოდგენილია აკადემიის წევრის ვ. პაპუნიძის მიერ)

სტატიაში განხილულია ბათუმის ბოტანიკურ ბაღში ინტროდუცირებული *Hamamelidaceae* Lindl. ოჯახის სახეობების თესლით და ღეროს კალმებით გამრავლების შესაძლებლობანი. ამას დიდი მნიშვნელობა აქვს დღემდე გამოუყენებელი სახეობების ფართოდ დანერგვისათვის აჭარის ტენიანი სუბტროპიკული ზონის მწვანე მშენებლობაში, დეკორაციულ მებაღეობაში, განსაკუთრებით ზამთარში და ადრე გაზაფხულზე მოყვავილე ბაღების, სატყეო მშენებლობასა და ხე-ტყის წარმოებაში. გამოვლინდა, რომ *Hamamelidaceae* ოჯახის სახეობებიდან თესლით კარგად მრავლდება *Distylium, Sycopsis, Hamamelis*, Corylopsis და Liquidambar გვარების სახეობები. ღეროს კალმებით ეფექტურად ფესვიანდება სახეობები: *Distylium racemosum, Sycopsis sinensis, Corylopsis sinensis, C. veitchiana, C. spicata, Hamamelis mollis, H. virginiana.*

REFERENCES

1. *P. Raven, R. Evert, S. Eichhern*. (1990), Sovremennaya botanika (Biology of Plants. Translated from English), I, M., 340-345 (Russian).
2. Semennoe razmnozhenie introdutsirovannykh drevesnykh rastenii (1970). Glavnyi botanicheskii sad AN SSSR, M., 320 (Russian).
3. *M. Metreveli*. (2003), J. Batumis botanikuri baghis moambe, 32: 60-65 (Georgian).
4. *M. Metreveli*. (2002), In: Agraruli metsnierebis problemebi, M., XX, 35-38 (Georgian).

Received June, 2006