

Genetics and Selection

Rhythm of Growth and Development of Japanese Pieris (*Pieris japonica* (Thunb) D.Don) in the Batumi Botanical Garden

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ABSTRACT. Japanese pieris (*Pieris japonica*) develops and grows well on the Caucasian Black Sea coast, especially in the coastal zone of Ajara. In order to establish future trends of its application in ornamental gardening along the Black Sea coast, the rhythm of seasonal development of vegetative organs, blossoming and fruit-bearing of this plant was studied in Batumi Botanical Garden. © 2010 Bull. Georg. Natl. Acad. Sci.

Key words: *Pieris japonica*.

The Botanical Garden of Batumi boasts plants of highly decorative value; only a single plant of this kind or none at all can be found in entire decorative gardens of coastal Ajara. One of them is Japanese pieris (*Pieris japonica* Thunb/D.Don).

The genus of pieris belongs to the *Ericaceae* family. Eight varieties of pieris occur in North America, East Asia and the Himalayas. In the Botanical Garden of Batumi two varieties of pieris were introduced – Japanese pieris (*Pieris japonica*) and Taiwan pieris (*Pieris taiwanensis*); the latter was brought to the garden in 1960 [1], but it soon died from unknown reasons and is not registered in our collection.

At present in the Botanical Garden there is one variety of pieris – Japanese pieris (*Pieris japonica* (Thunb) D.Don), i.e. *Andromeda japonica* (Thunb). It is an ever-green bush of about 3 meters in height or a small tree 5 to 9 meters high [1]. It has an open crown and branches with smooth bark. Its leaves, oblanceolate or obovate to lanceolate-oblong, 3-8 cm long with short petioles, with straight or serrated edges, pointed, alternate along the stem, or for the most part, become clustered at the stem termini; they have shiny dark green colour on the upper

side and light on bottom side. White roundish flowers of *Pieris japonica* 8 mm in diameter are clustered at the branch tips in thick erect or pendent 6-12 cm long paniculate inflorescence. Sometimes the flowers have light pink shade and delicate fragrance [2]. The fruits are five-sectioned ligneous spherical capsules 5-6 cm long with numerous small brownish seeds (Fig. 1). Japanese pieris is native to South Japan, Taiwan and Eastern China. It is found on sunny hills in the zones of propagation of ever-green oaks, ternstroemias, styraxes, azaleas, etc. [3].

Japanese pieris was introduced in the Batumi Botanical Garden in 1913. Today about 30 specimens are registered in the collection. At the age of 70 they represent bushes about 4 m in height with crowns of spherical form. Pieris blooms and fruits abundantly, it is also characterized as a self-seeding plant [2].

Pieris grows well in partial shade in moist, rich, well-drained, acidic soils. As phenologic observations show, vegetative bud break of pieris begins in the second half of February, and vegetation of shoots begins in mid-March and lasts into late May with the formation of vegetation buds. The first period of vegetation ends and some shoots enter into the period of dormancy. The



Fig. 1

Fig. 2

Fig. 3

buds formed on most of the shoots begin opening in mid-June and the growth period II begins. It lasts to the end of July when new vegetative shoots are produced. Shoots of growing period I exceed those of period II and make up 10-20 cm on the average, while shoots of growing period II make 10-15 cm. Like all evergreens, leaf fall in pieris begins in the spring in May and lasts until the end of the year (Table 1).

During the vegetation period young leaves are greenish-reddish, beautifying the plant. Germination of floral buds begins almost simultaneously with that of vegetative buds, and mass budding takes place in early December. Flowering of pieris begins in the first half of February and lasts until mid-April, sometimes until early May. Mass flowering takes place in February-March; maturation of seeds occurs in September-October, while the bolls open

and seeds fall out only in winter (Table 2).

Fruits persist for a long time, almost to May-June, on the fruiting stalk. Pieris is very beautiful at the beginning of flowering with already formed dark-chestnut-yellowish inflorescences, and during mass flowering, when the plant is covered all over with abundant white flowers (Fig. 2).

In the Batumi Botanical Garden Japanese pieris blossoms abundantly and bears fruit. In order to widely distribute and apply this plant in ornamental horticulture, it is necessary to develop methods for its reproduction. To develop methods for breeding pieris both vegetatively and generatively we have carried out experiments. Seeds of pieris are very small and their germination ability is not high, hence sowing them directly in the ground is not advisable, because seeds may be lost or washed away during irrigation.

Table 1

Rhythm of seasonal development of vegetative organs of Japanese pieris in Batumi Botanical Garden

Vegetative bud-break		Mid-February – End of May
Vegetation period	I growth	End of March –End of May
	II growth	Mid-June –End of July
Length of growth, cm	I growth	10-20
	II growth	10-15
Leaf fall		Mid-May – Early December

Table 2

Rhythm of flowering and fruit-bearing of Japanese pieris in Batumi Botanical Garden

Germination of floral buds	End of June – end of July	
Mass budding	Early December	
Flowering	begin	Mid-February,
	mass	End of February – End of March
	end	First half of April
Seed maturity	begin	Mid-September
	end	Early October

Table 3

Biology of the seed germination of Japanese pieris

№	Individual number of plants	Season to pick fruits	Time of sowing	Duration of germination (days)	Number of seeds	Number of germinations	Percentage of germination
1	2	Early October	First half of October	32	100	85	85
2	4	"	"	35	100	97	97
3	5	"	"	33	100	94	94
4	7	"	"	32	100	95	95
5	9	"	"	35	100	92	92
6	12	"	"	32	100	87	87
7	14	"	"	35	100	95	95
8	15	"	"	30	100	97	97
9	17	"	"	35	100	87	87
10	20	"	"	30	100	93	93

Table 4.

Dynamics and biometric characteristics of the seedling growth of Japanese pieris

№	Individual number of plants	Average height of seedlings	Number of leaves	Number of lateral branches	Stem diameter at the root, cm	Crown diameter, cm	Leave sizes, cm
1	2	25.3	3	3	1.1	8.4	7×5
2	4	20.5	5	1	0.8	7.2	7×3
3	5	18.7	2	1	0.5	5.7	5×2
4	7	24.3	5	2	1.0	9.5	6×2
5	9	27.5	7	3	1.2	10.1	7×3
6	12	20.7	5	2	0.9	7.5	7×3
7	14	30.2	7	3	1.3	10.2	8×4
8	15	30.3	6	3	1.3	10.3	8×4
9	17	30.5	6	3	1.3	10.3	8×4
10	20	27.3	7	3	1.2	10.0	7×3

In order to determine the ability of seed germination of pieris we sowed its seeds in Petri dishes and clay pots. Of the options for planting the most effective was seeding in upturned moss in Petri dishes at temperatures 17-18°C. This method protects the seeds from wash-out during irrigation, ensures full aeration and nutrient medium for germs, reduces the time for the first transplantation; precludes frequent transplantations in the future, etc., which allows even a weak germ to develop and easily endure transplantation. In such circumstances, the seed sprouts of pieris reveal good ability of germination.

In early April the emergence of self-seeding of pieris is observed on the soil covered with damp moss; in the first years crops grow very slowly, and after their transplantation into beds develop well (Fig.3).

For vegetative reproduction, in September, semi-hardwood shoots of pieris were grafted on substrate of river

silt under greenhouse conditions. Graftage has not yielded good results yet: only a few cuttings were rooted. Pieris may be also reproduced from the root growth.

Japanese pieris develops well on the Caucasian Black Sea coast from Batumi to Sochi [3], but the best conditions for it are available on the coastal zone of Ajara. In spite of this pieris is used in ornamental gardening in single specimens only, whereas by its decorative qualities it has a great advantage in comparison with other ornamental plants known on the coast. White or pinkish flowers in hanging inflorescence of pieris are very effective in winter when many other plants are in dormant state, and its young pink shoots beautifully contrast with green leaves. Japanese Pieris is a beautiful object for container growth and for bonsai, which is successfully applied in Japan and other countries.

გენეტიკა და სელექცია

იაპონური პიერისის (*Pieris japonica* (Thunb) D.Don) ზრდა-განვითარების რიტმი ბათუმის ბოტანიკურ ბაღში

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ბათუმის ბოტანიკურ ბაღი

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ნაშრომში შესწავლილია ბათუმის ბოტანიკურ ბაღში ინტროდუცირებული იაპონური პიერისის *Pieris japonica* (Thunb) D.Don ვეგეტატიური ორგანოების სეზონური განვითარების რიტმი. დაფიქსირებულია პიერისის სავეგეტაციო კვირტების გაშლის და ვეგეტაციის დაწყების დრო, რომელიც გრძელდება დაახლოებით მაისის ბოლომდე. დადგენილია დამოკიდებულება ყლორტების I და II პერიოდების ნაზარდებს შორის.

შესწავლილ იქნა აგრეთვე იაპონური პიერისის ყვავილობის და ნაყოფმსხმოიარობის რიტმი. დაფიქსირდა პიერისის ყვავილობის პერიოდი - თებერვლის I ნახევრიდან აპრილის შუა რიცხვებამდე, ზოგჯერ მაისის დასაწყისამდე. ნაყოფი რჩება მცენარეზე თითქმის მაის-ივნისამდე. ეფექტური აღმოჩნდა პეტრის ჯამებში ამობრუნებულ ხავსის კორდში დათესვა 17-18° C ტემპერატურის პირობებში.

ზემოაღნიშნული კვლევები იაპონურ პიერისზე ჩატარებულია დეკორატიულ მებაღეობაში მისი ფართო გამოყენების მიზნით, რადგან ის კარგად ხარობს კავკასიის შავი ზღვის სანაპიროზე.

REFERENCES

1. M. Tkavadze, I. Kiladze (1990), Dekoratiuli dendrologia [Ornamental Dendrology]. Sokhumi (in Georgian).
2. V. Papunidze (Ed.) (2007), Derev'ya i kustarniki Batumskogo botanicheskogo sada (pokrytosemnyye), ch.2. Batumi (in Russian).
3. V.S. Khalyavko, D.A. Globa-Mikhailenko (1976), Tsennye drevesnye porody Chernomorskogo poberezh'ya Kavkaza. M. (in Russian).

Received September, 2009