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Ecology

Bioecological Peculiarities of Introduced Ornamental Plants in Batumi Botanical Garden

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ABSTRACT. The view of green infrastructure of the Black Sea coast in Georgia depends much on ornamental plantations. A lot of evergreens and deciduous ornamental plants were brought to Ajara for decorative greenery of resorts and populated areas. Being situated in the subtropical zone of Georgia - on the Black Sea shore - Ajara has beautiful climatic conditions for most subtropical plants. Nevertheless, natural conditions cause some problems to the introduction of ornamental plants and their adaptation to the environment. The selection, reproduction, implantation and bioecology of ornamental plants were studied. *© 2012 Bull. Georg. Natl. Acad. Sci.*

Key words: *Forsythia viridissima* Lindl., *Gardenia Jasminoides* J.Ellis, *biocological pecularities.*

The main problem of plant introduction is to develop proper environmental conditions for plants. Acclimation transforms inner biological processes in plants in accordance with new environmental conditions. It is also important for a plant to be adapted to the soil which makes the introducing process easier.

A plant has an inner vital force which provides for its adaptation to different ecological conditions. According to S.Sokolov [1] introduction of plants is a complex of means and methods, which help the plant to acclimate.

During the life period a plant reveals sensibility to the environment. Practical importance of introduction is considerable. It permits to study plants under abiotic and new enviromental conditions. Introduction is considered to be a source of reproduction of natural populations. Their biological, ecological, physiological and biochemical characteristics are studied. The reasons of weakening of plants must be determined.

Introduction of plants on the Black Sea coast of Ajara was started in the 1880s by M.Dalfons, P.Tatarinov, A.Krasnov, I.Gordeziani, G.Mkheidze, N.Sharashidze and others [2]. Favorable climate and rich soil at the Black Sea coast of Ajara create favorable conditions for introduction of plants from different subtropical regions.

Purposeful introduction of plants at the Batumi Botanical Garden began in 1912, when the park was established, and it continues to the present day.

The aim of the study. We aimed to study bioecological peculiarities of ornamental shrubs

Fig. 1. Flowering shrub of *Forsythia viridissima* Lindl.

Fig. 2. Flowering *Gardenia Jasminoides* J.Ellis

greenstem Forsythia (*Forsythia viridissima* Lindl) and evergreen Gardenia Jasminoides (*Gardenia Jasminoides* J.Ellis), Practical recomendations to introduce them into the green planting (laying out the parks, etc.) in Ajara were worked out.

Materials and Methods. Phenological observations were made according to the Beidemann method [3]. The following phenophases: swelling and breaking of buds, appearing of flowers, seed ripening, leaf fall, end of vegetation - were included in the programme of phenological observations.

Forsythia (*Forsythia viridissima* Lindl.: *Oleaceae*) is native to Central and East China. It is a deciduous ornamental bush about 4 m high with upright dark green branches (Fig.1).

Leaves are lanceolate-oblong 7-15 cm long, dark green, dentate, acuminated at the tip, wedge-shaped at the butt. Floral buds develop at the end of February-early March (10-14 °C). The flowers are produced in mid-March-mid-April before the leaves. They are large, slightly bell-shaped, sulphureous, 1-3 flowers with erect or bent petiole are clustered, weak fragrance; duration of flowering 25-30 days. Fruit is an egg-shaped small box 1.5 cm in length containing several winged seeds. Forsythia flowers regularly but fruits rarely. The fruit ripens in September-October (Table). The plant was introduced at Batumi Botanical Garden in 1912 [2, 4].

Forsythia viridissima Lindl. grows fast and flowers best in full or partial sun. It grows well in moist soils. Soil should be well drained

The forsythia plant really benefits from pruning. Regular pruning keeps the plants within bounds. Pruning promotes better branching and flowering in future years.

Deciduous Forsythia is distinguished for its ornamentality. Forsythia bushes are attractive singly and in small groups on lawns due to their early and long florescence; they may be used as hedgerow as well. Branchlets cut in January-February and put into water for 8-10 days will make nice bunches with gold flowers which can decorate any interior.

Forsythia is resistant to pests. At bacteriosis eradication is recommended. Due to ornamental features Forsythia is used widely in laying out parks on the Black Sea coast of Ajara.

Gardenia Jasminoides (*Gardenia Jasminoides* J.Ellis: *Rubiaceae*) is native to China, Japan. Gardenia Jasminoides is a bush of 2 m high with branched stem (Fig.2).

Leaves are large, wide lanceolate, leather-like, shiny dark green with entire edges, pointed at tip and narrowed at the basis. Flowers are highly fragrant, large, 10 cm in diameter, single or bunches (3-5 flowers), located at the branch top or at the leaf pocket. Flowers start with white, becoming yellowish later. Gardenia flowers in summer. The fruit is berry [4,5].

Gardenia likes warm, light and sunny climate, grows well at open sunny sites. Sudden change of temperature causes flower fall. The ground must be

Table. Phenophases of *Forsythia viridissima* Lindl. and *Gardenia Jasminoides* J.Ellis under conditions of the Batumi Botanical Garden

Species / Phenophases		Forsythia	Gardenia Jasminoides
Time of bud break		2nd half of February	Early June
Flowering	Beginning	Mid-March	Early July
	Ending	Mid-April	End of August
Fruit maturity		September-October	Mid-October
Growth of sprouts	Beginning	Early May	2nd half of June
	Ending	1st half of September	Early September
Length of 1-year growth, cm		14-17	7-10

acidic, permanently humid, needs moderate irrigation with lukewarm and soft water. Cold water causes leaf yellowing. During budding from spring till the end of summer it needs regular feeding with chemical fertilizer 20 g / l water. Feeding is not needed in autumn-winter. Budding begins at 16-18 °C; vegetation sprouts begin to grow intensively at 20-24 °C and floral buds develop.

The best time in Ajara to transplant gardenia is spring. Gardenia bush is fluffy, regulation of sprout length is necessary. Usually it is done after the end of flowering or when transplanting. One third of annual growth length must be cut. By pruning a Gardenia bush can be given any form. Rooting of cuttings goes fast in spring, transplantation needs acidic soil. During flowering the soil must be moderately moist.

Forsythia is easily reproduced by green or hardwood cuttings and by layering. Gardenia is reproduced by top sprouts, semi-wood cuttings and seeds. In order to study the conditions under which these plants are well reproduced we took green cuttings of Forsythia in June and semi-green cuttings of Gardenia in September (each 100 samples). The Forsythia cuttings were planted in the moist sand at 15-20 °C and the Gardenia cutttings - in the sand mixed with peat at 20-25 °C. In order to speed up rooting a solution of the growth stimulator "Kornevin" was used. Index of their germination was 100%.

Results. The study and observations allow to conclude that under conditions of Batumi Botanical Garden Forsythia and Gardenia have high adaptation ability, fast growth rhythm, regular flowering and fruit bearing, high productivity, which allows to use them in ornamental greenery of the sea coast of Ajara singly and in small groups.

ეკოლოგია

ინტროდუცირებულ დეკორატიულ მცენარეთა ბიოეკოლოგიური თავისებურებანი ბათუმის ბოტანიკური ბაღის პირობებში

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საქართველოს შავიზღვისპირეთის დეკორატიული ინფრასტრუქტურის იერსახე ბევრადაა დამოკიდებული ინტროდუცირებულ დეკორატიულ მცენარეთა ნარგაობაზე. ქალაქების, საკურორტო პარკების და დასახლებული ადგილების გასამწვანებლად წარმატებით გამოიყენება როგორც მარადმწვანე, ისე ფოთოლმცვენი დეკორატიული მცენარეები. ინტროდუცირებულ დეკორატიულ მცენარეთა მრავალმხრივი მნიშვნელობიდან გამომდინარე, ობიექტურად ისახება მისი ბუნებრივი გავრცელების პირობებიდან შეცვლილ გარემო პირობებში კომპლექსურად გამოყენების ამოცანა, რომლის დროსაც ყურადღება ეთმობა დეკორატიულ მცენარეთა ბიოეკოლოგიური საკითხების შესწავლას, შერჩევას, გამრავლებას და დანერგვას.

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