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PERSPECTIVE RANGE OF WOODY PLANTS FOR SCHOOL TERRITORIES LANDSCAPING

Developed criteria for the selection of woody plants range for use on school grounds. Criteria include plant safety in terms of toxicity, diversity of woody plants, the use of the main plant of the first category of landscape and environmental significance, highest integrated plant resistance, selection of exotic plants, taking into account the location of the site in one of the five boroughs of introduction in the territory of Belarus, expressive decorative quality, availability of planting material of trees and shrubs in the country, and others. The list of conifers that are recommended for landscaping schools of the Republic of Belarus, consists of 39 items, including 23 cultivars belong to the first group by the criterion of safety for students. Among the recommended cultivars of deciduous trees and shrubs 60 names, 59 also belong to the first group by the criterion of safety for students.

Key words: landscaping, range perspective, trees, shrubs, school, school territory, the criteria for selection, safety, toxic plants.

Introduction. When forming the range of woody plants for gardening of school territories the attention should be paid to the selection of species and cultivars combining ruggedness, stability and durability in species with high decorative qualities remaining in winter season. It is necessary to take into account the experience woody plants introduction and in general the possibility of their growing and use in the Republic of Belarus.

Main part. The main criteria for the selection of the assortment of trees and shrubs for landscaping purposes of school territory are as follows:

- safety of plants in terms of toxicity of the substances contained in them as well as individual plant parts contacting with the skin, mucous membrane, gastrointestinal tract, even in small amounts;
- a variety of woody plants of local and introduced flora according to systematic position, life forms (trees, shrubs, lianas), appearance, decorative and economic-useful features that allow you to create various kinds of vegetable compositions on their basis;
- use of local species as a major assortment species of woody plants being the first category in terms of environmental and landscaping value as well as the most stable exotic plants in the conditions of the Republic of Belarus [1, 2];
- selection of additional species range, especially exotic ones, taking into account the location of school territory in one of the five introduction areas in the territory of the Republic of Belarus [1];
- high rate of integrated plant resistance to a range of abiotic and biotic factors in the Republic of Belarus [1, 2];
- high winter hardiness of conifers and deciduous species, as one of the main factors ensuring the longevity and stability of decorative plants under the influence of a complex unfavorable weather conditions in winter period [1, 3, 4];

- introduction of various plants in the range, not only species of decorative woody plants and their cultivars resulting in individualization of school territory appearance [3–5];

- expressive decorative qualities of crown, leaves (needles) and the plant as a whole, including the period of flowering and fruiting, as well as in winter period [4];

- use of beautifully-flowering woody plants with different flowering periods dominating species flowering in spring-summer and summer-autumn periods, taking into account the most intense operation of schoolyards in these seasons [4];
- introduction of fruited species – fruit and berry species;

- availability of planting trees and shrubs in nurseries and garden centers on the territory of the Republic of Belarus, they are relatively cheap.

According to safety criteria for woody plants being used in gardening on school territories, conifers and deciduous species can be combined into three groups.

1. Secure types of plant species having no contraindications for growing on school yard which is actively being used by children; the plants have no thorns or spines, toxic substances and being attractive for children having their bright cones or decorative fruits; these plants can be widely used in gardening on school territories.

2. Relatively safe types of plant species having rigid, barbed needles or being dangerous contacting with plants for a long time; they may be of limited use in gardening on school territories.

3. Prohibited types of plant species having spines, thorns; poisonous plants; plants, polluting the territory and subjected to hidden necrotic timber diseases forming a large number of dry branches; these types of plants cannot be used in gardening on school territories.

Note that plant toxicity may vary depending on the type of situation in the geographical area, the climatic conditions of the year, the stages of ontogeny and phenophase; toxicity may depend on a number of other reasons, such as the soil composition, its temperature and humidity.

The list of conifers that are recommended for landscaping territories of Belarusian schools, includes 39 items, including 23 cultivars belonging to the first group of the safety criteria for pupils.

Conifers of the first group of safety criteria for pupils: *Picea abies* 'Echiniformis', *P. abies* 'Nidiformis', *P. abies* 'Frohburg', *P. glauca* 'Alberta Globe', *P. glauca* 'Conica', *P. pungens* 'Glauc Globosa', *P. pungens* 'Hoopsii', *Larix decidua* 'Repens', *Abies balsamea* 'Piccolo', *A. concolor* 'Glauc', *A. concolor* 'Argentea', *A. concolor* 'Violacea', *A. koreana* 'Aurea', *A. koreana* 'Green Carpet', *A. koreana* 'Silberlocke', *Pinus mugo* 'Ophir', *P. mugo* 'Gnom', *P. mugo* var. *mughus*, *P. mugo* var. *pumilio*, *P. mugo* 'Mops', *P. sylvestris* 'Watereri', *P. nigra* 'Pyramidalis', *Tsuga canadensis* 'Eddeloh'.

Conifers of the second group of safety criteria for pupils: *Juniperus chinensis* 'Obelisk', *J. chinensis* 'Stricta', *J. communis* 'Arnold', *J. communis* 'Depressa Aurea', *J. communis* 'Hibernica', *J. communis* 'Horstmann', *J. media* 'Gold Star', *J. media* 'Pfitzeriana Aurea', *J. scopulorum* 'Blue Arrow', *J. scopulorum* 'Skyrocket', *J. squamata* 'Meyeri', *Thuja occidentalis* 'Brabant', *T. occidentalis* 'Danica', *T. occidentalis* 'Globosa', *T. occidentalis* 'Smaragd', *T. occidentalis* 'Rheingold'.

Among the recommended cultivars of deciduous trees and decorative deciduous shrubs (23 items), 22 also belong to the first group of the safety criteria for pupils. The plants assortment does not include lianas, as those potentially suitable for winter hardiness, decorative and other criteria (maiden grapes, birthwort, moonseed, clematis and others) being to some extent poisonous ones.

Deciduous species of the first group of safety criteria for pupils: *Betula pendula* 'Yongii', *B. pendula* 'Purpurea', *B. pendula* 'Crispa', *Fagus sylvatica* 'Dawyc Gold', *F. sylvatica* 'Purpurea Dawyc', *Ulmus scabra* 'Pendula', *Cornus alba* 'Spaethii', *C. alba* 'Elegantissima', *Salix purpurea* 'Nana', *S. caprea* 'Kilmarnock', *S. integra* 'Hakuro-Nishiki', *S. 'Erythroflexuosa'*, *Acer platanoides* 'Faasen's Black', *A. platanoides* 'Drummondii', *A. platanoides* 'Globosum', *Aesculus hippocastanum* 'Luteo-variegata', *Corylus avellana* 'Aurea', *C. avellana* 'Atropurpurea', *C. avellana* 'Contorta', *Physocarpus opulifolius* 'Diabolo', *P. opulifolius* 'Luteus', *Philadelphus coronarius* 'Aureus'.

Deciduous species of the second group of safety criteria for pupils: *Quercus robur* 'Fastigiata'.

Perspective plants for use in landscaping schools of the republic are flowering shrubs of spring-summer and summer-autumn flowering periods being the safest types of plants: *Weigela hybrida* 'Bristol Ruby', *W. hybrida* 'Candida', *W. florida*, *W. florida* 'Purpurea', *W. florida* 'Nana Purpurea', *Syringa vulgaris*, *S. amurensis*, *S. josikaea*, *Spiraea arguta*, *S. vanhouttei*, *S. nipponica*, *S. cinerea*, *Forsythia europaea*, *F. ovata*, *Forsythia intermedia*, *Philadelphus coronarius*, *Hydrangea bretschneideri*, *H. arborescens*, *H. paniculata*, *Hydrangea paniculata* 'Grandiflora', *H. paniculata* 'Kyushu', *H. paniculata* 'Limelight', *H. paniculata* 'Pink Diamond', *H. paniculata* 'Tardiva', *H. paniculata* 'Vanille Fraise', *H. paniculata* 'Pinky Winky', *Potentilla fruticosa* 'Yellow Giant', *P. fruticosa* 'Primrose Beauty', *P. fruticosa* 'Day Dawn', *P. fruticosa* 'Abbotswood', *P. fruticosa* 'Orange', *P. fruticosa* 'Red Ace', *P. fruticosa* 'Red Robin', *P. fruticosa* 'Pink Beauty', *Spiraea douglasii*, *S. bumaldii*.

For gardening of school territories of particular importance is the severity of the decorative features of woody plants in winter. During this period, the most beautiful trees are firs having correct conical crown and dark green needles and pines having natural free-form and long bluish-green tufts of needles. In greenery plantings in winter and there have been of decorative value various cultivars of fir and cedar which is very popular right now. Beauty of conifers in winter is undeniable. Deciduous trees and shrubs are very decorative in summer: lushly green and shadow forming massifs. At the same time, many deciduous species have specific qualities in the winter. Often, it is deciduous woody plants constitute the natural basis of school territory and characterize the landscape.

There are representatives among the deciduous trees that can be recognized at a sufficient distance, especially due to exceptional architectonic crown. In this regard, European larch, Siberian larch, Japanese larch etc., are of particular interest as well as and their cultivars – European larch 'Repens' and 'Horstmann Recurved', Japanese larch 'Diana'. The latter is characterized by winding twisted shoots. There are identical cultivars for deciduous trees such as hazel and willow (*Salix babylonica* 'Tortuosa', common hazel 'Contorta').

Regular spherical crowns of Norway maple 'Globosum' and willow brittle 'Bullata' do not lose their appearance and in the leafless state. If there is a significant area for open space there can be grown beech wood and black poplar, as well as its strict decorative form – 'Pyramidalis', widely used since the Soviet times. A special place in this list takes English oak. Perseverance, longevity and strength are specific features of this giant. Such a plant can be recommended for use as a family tree.

Recently, the most popular plants with distinctive branching pattern are Juneberry and plum. Naturally interwoven trunks of these middle bushes give the effect of a small arboretum. This fact can be important in selection of plant assortment for landscaping of small areas.

In winter season the plants of white turf is easy to see – the shrub stands out well from the almost monochrome landscape of bright red straight shoots. With a regard to its height (about 2–3 m) and a group arrangement, in winter this plant can be of primary importance, as opposed to the summer season. The cultivar of turf proliferous 'Flaviramea' is also of decorative value, it is characterized by bright straw-light green shoots. These plants can be effectively used in a joint plantation. The value of native species of the genus birch (*Betula*) in winter season passes into the background: in summer time, they enliven the territory, while maintaining good illumination and solemnity in the stand, in winter the colure of bark is often identical to the color of surrounding landscape.

Particularly rare in landscaping there is a shrub species blooming in late autumn or under the first snow called witch hazel. Most acclimatized to our conditions Virginian Hamamelis blooms yellow flowers followed by reddening in the form of spiders in October – November, more heat-loving cultivars of Witch hazel that of Hamamelis medium and Hamamelis soft can bloom at the end of winter.

Conclusion. Thus, there have been developed the criteria for the selection of woody plants assortment for use on school grounds, including the safety of the plant in terms of toxicity, a high integral stability of plants, expressive decorative qualities, availability of planting material of woody plants in the country, and others. The list of conifers that are recommended for gardening Belarusian schools territories includes 39 items, including 23 cultivars belonging to the first group of safety criteria for pupils. There are 60 items among the recommended cultivars of deciduous trees and shrubs, 59 of them also belong to the first group in terms of safety criteria for pupils.

References

1. Sidorovich E. A., Garanovich I. M., Chakhovsky A. I. *Assortiment dekorativnykh derev'yev i kustarnikov dlya zelenogo stroitel'stva Belarusi i rekomendatsii po optimizatsii usloviy vyrashchivaniya seyantssev* [The range of ornamental trees and shrubs for green building in Belarus and recommendations for optimizing the growth conditions of seedlings]. Edited by E. A. Sidorovich. Minsk, Technology Publ., 1997. 62 p.
2. *Assortiment aborigennykh i introdutsirovannykh derev'ev i kustarnikov, rekomenduemykh dlya ozeleneniya promyshlenno-gorodskikh territoriy, avtomagistralei, v zonakh zagryazneniya vozdukha gazoobraznymi soedineniyami azota, formal'degidom, benz(a)perinom, khloristym vodorodom* [The range of native and introduced trees and shrubs are recommended for planting industrial and urban areas, highways, in the areas of air pollution with gaseous nitrogen compounds, of formaldehyde, benzo(a)-pyrene, hydrogen chloride]. Comp. S. A. Sergeichik [et al.], edited by E. A. Sidorovich. Minsk, Edit BB Publ., 2005. 48 p.
3. *Katalog rasteniy. Derev'ya, kustarniki, mnogoletniki, rekomendovannye soyuzom pol'skikh pitomnikov* [Catalogue of plants. Trees, shrubs, perennials, recommended by the Polish kennels]. Warsaw, Agency of Promotion of greenery Publ., 2011. 392 p.
4. Antipov V. G. *Dekorativnaya dendrologia: uchebnik* [Decorative Dendrology: textbook]. Minsk, BGTU Publ., 2004. 78 p.
5. Torchik V. I. *Dekorativnye sadovye formy khvoynnykh rasteniy* [Garden forms of conifers]. Minsk, Edit BB Publ., 2007. 151 p.

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