

THE IMPORTANCE OF ORNAMENTAL BEAUTIFICATION AND FLOWER GARDENING OF TRANSBAIKAL KNOTWEED (*ACONOGONON DIVARICATUM* (L.) Nakai)

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Abstract

Beautification and flower gardening are currently developing in Northern Kazakhstan. The choice is made on the long-term Polygonaceae family. For the purpose of beautification and flower gardening Transbaikal knotweed can be planted around residential buildings and on lawns, flowerbeds, ponds. According to the developed ornamental beautification and flower gardening methods during the seeding period, such as date, rate, depth, and care, the plants grow with excellent results. The bushes have a wide form, flowers for more than a month, with a wonderful honey aroma. This plant in the second to fourth years of life can grow more than 1 meter in height, and more than 50 cm in width. The plant will please the eye for 6-8 years in such a beautiful form. In the light places, the Transbaikal knotweed can be combined with peach-leaved bellflower (*Campanula persicifolia* L.), beaumont's-root (*Veronicastrum virginicum*), marsh milkweed (*Eupatorium purpureum* L. Farw), meal-monger (*Filipendula x purpurea* Maxim). Selection has brought great changes in the development of decorative beautification. Thus, by the method of hybridization, *A. alpinum x fennicum* was obtained, which is successfully arranged in single and group plantings in Finland.

Keywords: agrotechnology, flower arrangement, Transbaikal knotweed.

1. INTRODUCTION

Transbaikal knotweed (*Aconogonon divaricatum* (L.) Nakai) is also called as alpine fleecflower, which belongs to Dicotyledoneae, Caryophyllales order, Polygonaceae family, Polygonoideae subfamily, Aconogonon genus.

Transbaikal Knotweed is a perennial tall grass loosely-bunched spring plant. The average life expectancy of the plant is 10 - 14 years. The plant has an appearance of a very large, well-leaved bush.

Transbaikal knotweed develops a straight stem, which is lignescent in the lower part and slightly colored with anthocyanin. In the middle of the bush the stems are located vertically, slightly elevated at the edges.

In the first year of life, the plant forms one sprout. In the second and subsequent years, sprouts develop from buds, which are formed on the hypocotylous part of the root. Their number increases with age. Due to the stem structure, the plant has a spreading-branching shape; it forms large, almost spherical bushes, with a height of up to 120 - 150 cm. Beginning with the second year of life, Transbaikal knotweed has the layerage of the leaves along the stem length (Kuznetsov, 1957). Larger leaves are located in the lower layer. The flowers of Transbaikal knotweed are androgynous, collected in large paniced inflorescences. The number of flowers depends on the conditions of moisture supply. More flowers are observed in the upper inflorescences (85 - 110 pieces) in comparison with the lower ones, the number of which varies from 25 to 35 on one plant. Inflorescences have yellow-white color and regular shape. It is androgynous and monochlamydeous with acyclic type. The simple perianth consists of five tepals, about 3 mm in length. There are 5-8 external stamens. Stamen's anthers are turned inward alternating with the perianth lobes. Three internal stamens are turned with their anthers outward and located opposite the edges of the ovary, that is surrounded at the base by a ring-shaped thickening (rudimentary nectary).

Upper ovary consists of one lobe. The style is trifid at the top and has a short base. The stigmas are capitate and at the end of the flowering phase they acquire rusty brown color. The flowers are adapted for cross-pollination and have a dichogamic, though weak, character.

The general inflorescence is noticeably prominent over the vegetative part of the stem. The duration of flowering for one flower is 4 - 6 days, and the entire inflorescence is 14 - 21 days. This phenomenon is associated with prolongation of the flowering period (Kostikov and Malitskaya, 2017).

2. MATERIALS AND METHODS

In the conditions of the moderately arid steppe of Northern Kazakhstan, the technology of ornamental beautification and flower gardening using the Transbaikal knotweed was studied and developed. In Akmola Oblast, Transbaikal knotweed was seeded all around the facade of the residential house. It was seeded to form a favorable view for a person.

Annual precipitation in this agricultural zone was 300 mm, the annual air temperature was - 2°C. Wind direction was south-west.

The seeding of Transbaikal knotweed was carried out in 2013 on the 1st to 10th of May with seeds of local variety Chaglinsky. Transbaikal knotweed was seeded near the walls of a residential house on an earthy - stony soil. 12 seeds were manually seeded at 1 meter of length, which means a single planting along the elements of the load bearing constructions of the residential house. The seeding depth was 2 - 4 cm. The following care activities in the first year of plant life include: weeding and soil loosening in a row. Irrigation was carried out as the soil dries. During the flowering period, the plants were fertilized with ammonium nitrate ($(\text{NH}_4)(\text{NO}_3)$) in a dose of 30 kg/ha by the active ingredient. In the second and subsequent years of life, harrowing was carried out in the spring to preserve moisture, destroy soil crust and release buds from brown leaves. Loosening, watering were carried out as necessary, fertilization with ammonium nitrate ($(\text{NH}_4)(\text{NO}_3)$) in a dose of 30 kg/ha by the active substance was carried out in the period of mass flowering. In the autumn, the seeds were removed; the dry residues of plants were half removed and some of it were left to accumulate moisture.

3. RESULTS AND DISCUSSIONS

During the period of flowering, the dimensions of Transbaikal knotweed plants varied in dynamics by age. In terms of plant height, in the second year of life the indicator was 101 cm, in the fourth

year - 112 cm, the height varied 1.1 times in dynamics. The bush width also varied by year of Transbaikian knotweed life, respectively from 30 to 50 cm or in 1.6 times.

The volume of plants can be estimated by the presence of leaves, inflorescences and stems. In one plant, the weight of leaves and inflorescences in relation to the stems from the second 47.1 to 52.9% over the fourth 44 to 58% years of life. The amount varied by years, respectively, from 1.07 to 0.9 times (figure 1).

Plants beautifying the walls of the residential house are protected from winds, unpretentious to moisture, so leafy bushes and flowering for 30 - 40 days were observed. Therefore, the plants looked very beautiful near the walls of residential house, and the plants emit honey aroma.



Figure 1. Flowering Transbaikian knotweed, growing at the walls of a house

Transbaikian knotweed can be intensively used in beautification for 6 - 8 years. At this age, the intensity of bush color with anthocyanin is drawing the eye to the plants.

About 200 species of knotweed are grown in the European part of the continent. Recently, new, previously unfamiliar varieties from the Far East, China and Japan joined this list. Transbaikian knotweed (*Aconogonon divaricatum* (L.) Nakai) among them is unpretentious and grows even in semi-arid conditions, which corresponds to the climate of its natural distribution area. Transbaikian knotweed has multifunctional usage in flower gardening application. It looks good in bouquets, including dried flowers, as well as in flower arrangements. Since the bush does not fall apart, it can be used as a soloist (Lehmuskallio and Lehmuskallio, 2016), for example, on a lawn (figure 2).

It is also indispensable for masking farm buildings. At the same time the open form of the bush does not create a deep shadow and does not interfere with sunlight.



Figure 2. Landscape gardening with *Aconogonon divaricatum* L. (Lehmuskallio, 2016)

The color combination gives it a special decorative effect, so it is well suited for large mixed borders, like a filling or background plant. According to many practicing florists it is perfectly combined with decorative deciduous plants of almost any color. In addition, the Transbaikian knotweed is distinguished by its mildness in flower phytocenosis.

In Baltic countries, especially in Finland and Latvia, it is used mainly for group, as well as for single planting on lawns, near various structures and hard landscaping pieces.

In group, the knotweed can be planted in the foreground of flowerbed and on the edge of the pond (Malitskaya, 2010). It is combined only with well-growing plants: *Campanula persicifolia*, *Eupatorium purpureum* L., *Filipendula x purpurea* Maxim, *Veronica virginicum* (figure 3).



Figure 3. Plants combined with Transbaikian knotweed on the flowerbed and on the edge of the pond

Upper left - *Campanula persicifolia* L.
Bottom left - *Veronicastrum virginicum* (L.) Farw
Upper right - *Eupatorium purpureum* L.
Bottom right - *Filipendula x purpurea* Maxim

In the Eastern Baltic countries the flowering of Transbaikian knotweed continues from the end of June to the end of August. However, in comparison with Weirich knotweed (*Aconogonon weyrichii*) it has larger and bright inflorescences. The combination of these important in flower gardening qualities was obtained by crossing (Jonsell, 1999).

The hybrid, which is produced by crossing Transbaikian knotweed and Weirich knotweed, is known as *A. alpinum x fennicum* (figure 4).



Figure 4. Fragment of the Finnish arrangement. Inflorescence of *A.x fennicum* (Arkio, 2005)

In this form the plants are very popular as arranging specimens (Arkkio, 2005) for making beautiful bouquets and as a decoration when dry. These plants can be recommended for gardens and parks with limited care and minimal manual labor, as the plant can grow long enough in the same place without transplantation. Knotweed is an attractive combination of open white inflorescences appearing from July to August, reddish stems and narrow green leaves.

4. CONCLUSIONS

Knotweed (*Aconogonon divaricatum* (L.) Nakai) can be used for beautification and flower gardening, seeding local varieties and hybrids in Northern Kazakhstan, Russia (Eastern Siberia, the Far East) and Asian countries (China, Japan).

In conditions of moderately arid steppe of Northern Kazakhstan ornamental beautification and flower gardening technology of Transbaikal knotweed is developed. It is recommended to grow Transbaikal knotweed as single plantations for the beautification of the fronts of residential houses. Transbaikal knotweed should be seeded in well lit places, in the front row of the flowerbed and on the edge of the pond with such plants as *Campanula persicifolia* L., *Veronicastrum virginicum* (L.) Farw., *Eupatorium purpureum* L., *Filipendula x purpurea* Maxim.

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