ASTERACEAE IN BOTANICAL GARDENS OF ASIAN RUSSIA

Ph.D. Anna N. Vorobyeva,[1*]
scientific employee,
1 Laboratory of introduction of plants, Amur Branch of Botanical Garden-Institute,
Far-East Division, Russian Academy of Sciences,
675000, 18, Relochny Line, Blagoveschensk, Amur region, Russia, sparrowaj@yandex.ru

Academician Peter G. Gorovoy,[2]
managing laboratory,
2 Laboratory of plant chemotaxonomy, Pacific Institute of Bioorganic Chemistry,
Far-East Division, Russian Academy of Sciences
690022, 159, 100-letiyaVladivostoky Ave., Vladivostok, Russia.

Abstract
Study and conservation *Asteraceae* in the Asian Russia carry out in botanical gardens of the Russian academy of sciences in a Novosibirsk and Vladivostok. Over 600 taxons of this family are cultivated here. The ornamental species is 70 % of all species of collection and genera *Chrysanthemum* s.l., *Dahlia* Cav., *Callistephus* Cass. predominate. The new boreal cultivars of *Chrysanthemum* (*Dendranthema*) on the basis of *Ch. mongolicum* Ling. are bred. There are about 100 species of medicinal plants and our botanical gardens are territory for multidisciplinary investigations of phytoecdysteroids in species of genera *Rhaponticum* Ludw. (*Stemmacantha* Cass.), *Serratula* L. and for study of the conditions for introduction *Saussurea* spp. Conservation in botanical gardens of very rare species *Saussurea jadrinzevii* Kryl.; *S. sovietica* Kom., *Aster woroschilovii* Zdorovjeva et Schapoval, *Symphyllocarpus exilis* Maxim. will prevent extinction of these taxons.

Key words: *Asteraceae*, Eastern Asia, botanical garden.

The Central Siberian Botanical Garden of the Siberian department of the Russian Academy of Sciences (Novosibirsk) and the Botanical Garden-Institute of Far East department of the Russian Academy of Sciences (Vladivostok) are the largest botanical gardens in the Asian Russia. The botanical garden in Novosibirsk was established in 1946 and included in the Academy of Sciences of the USSR (AS USSR) in 1957 as a scientific division. The botanical garden in Vladivostok was established in 1949 and included in the structure of AS USSR in 1962.

Plants of *Asteraceae* are 5% of all species (665 taxons) in collections of these botanical gardens. Over 70 taxons (38 species of 15 genera) of tropical and subtropical plants of *Asteraceae* are cultivated and studied in greenhouses of gardens. They are grouped by systematic principle and located according to day light illumination & temperature regimen. Genus *Senecio* L. (22 species) is presented in the full. 34 cultivares of *Chrysanthemum indicum* (L.) Des Moul. are being tested in the protected ground now.

The majority of collection's species of *Asteraceae* are presented by plants of the open ground. There are 590 of introduced and natural species of *Asteraceae* in the territory of gardens. The ornamental species are 70% of all collection's species and genera *Chrysanthemum* (*Dendranthema*) s.l., *Dahlia* Cav., *Callistephus* Cass. are predominated.

Selection is being carried out for the expansion of collection's assortment and practical use of genofund. The most of achievements in selection are concerned with the collection of chrysanthemums. The remote and satiating crossings have been carried out with species of Far Eastern and Siberian floraes.

The *Chrysanthemum weyrichii* Maxim. and *Ch. zawadskii* Herbich. are valuable natural species (Fig. 1,2). These species form bushy plants with large lilac flowers at hybridization in culture.

Fig. 1. *Chrysanthemum zawadskii* Herbich.

Fig. 2. *Chrysanthemum weyrichii* Maxim.

The new boreal cultivars of *Chrysanthemum* are got on the basis of *Ch. mongolicum* Ling. About 100 new hybrids are in the process of testing. The 20 cultivares were investigated and 17 of them were zoned, such as "Yaroslavna", "Dalnevostochnitsa" (Fig.3), "Mazurka" (Fig.4), "Kostyor Dersu", "Rossiyanka" (Fig.5), "Utro Rossii" (Fig.6), "Neznakomka", "Rozovy flamingo", "Zvyozdnaya noch" (Fig.7), "Tsaritsa Tamara", "Tayfoon", "Vdohnoveniye", "Sudarushka" (Fig.8), "Volshebnitsa", "Tatyanin den", "Solnechnoe Prymorye" (Nedoluzhko 2004).

Fig. 3. "Dalnevostochnitsa"

Fig. 4. "Mazurka"

Fig. 5. "Rossiyanka"

Fig. 6. "Utro Rossii"

Fig. 7. "Zvyozdnaya noch"

Fig. 8. "Sudarushka"

Researches of features of reproductive biology of chrysanthemums, namely morphology of flower, evolution of female and man's gametophytes are enable to get cultivares with simple, radial, anemonelike and the double form of florets ("Zolotaya dolina", "Sirenevyi tuman", "Lyudmila" and "Penelopa") the selection work on varietal hybridization of chrysanthemums.

The collection of dahlia includes about 100 cultivares of *Dahlia variabilis* Desf. The valuable cultivares *Dahlia* ("Amurskiy zaliv", "Prymorskaya osen", "Anyuta", "Tishina") have been bred. The recommended cultivares for gardening are: ornamental ("Bogdan Khmelnitskiy", "Kolombina", "Obuhova"); cactus-ornamental ("Vals tzvetov", "Ilya Muromets", "Morskaya tzarevna"); cactuslike ("Apollon", "Zhar-ptitza", "Kupava"); chrysanthemumlike ("Doctor

Faust", "Mephistophel", "Oziris"); nimphealike ("Barcarola", "Zolotaya zhemchuzhina", "Yazminuks"); pompon ("Gertzoginya Fler") (Gutnik, Proshina 1970; Vascular plants… 2001).

Monotypes natural genus of *Callistephus* grow only in Primorye province of Russia and in the Northeast China (provinces Jilin and Heilongjiang). The search of ornamental forms in northeast of these areas will let us get cold-tolerant cultivares for the boreale territory of Asia.

The species of genus *Achillea* L., *Aster* L., *Bellis* L., *Coreopsis* L., *Echinacea* L., *Solidago* L., *Tanacetum* L. are perspective for selection.

There are about 100 species of medicinal *Compositae* plants in the botanical gardens. 12 species are included into the pharmacopoeia of Russia, such as *Achillea millefolium* L., *Artemisia absinthium* L., *Bidens tripartita* L., *Calendula officinalis* L., *Centaurea cyanus* L., *Gnaphalium uliginosum* L., *Helychrysum arenarium* (L.) Moench., *Inula helenium* L., *Matricaria recutita* L., *Tanacetum vulgare* L., *Taraxacum officinale* Wigg., *Tussilago farfara* L. (State register… 2000).

The larger half of the collection of medicinal *Asteraceae* is presented by vicarian species of genera, such as *Gnaphalium* L., *Bidens* L., *Artemisia* L., *Senecio* L, *Atractylodes* DC. Their medical activity is known from folk medicine. Fragmentary data about the chemical compound of these plants are known. Specifical activity of products from these plants and large resource of raw materials should draw attention of scientists.

Botanical gardens of the Asian Russia are the territory for multidisciplinary investigations of plants containing bioactive substances. Natural conditions of these regions allow to create productive plantations and develop original ways of intensive technology of cultivation of valuable species.

Species of genera *Stemmacantha* Cass. and *Serratula* L. are perspective for introduction studying. Unique biological activity of plants of those genera are concerned with phytoecdysteroids. These substances possess adaptogenic, toning up and anabolic properties. Products from underground organs of endemic Siberian species *Stemmacantha carthamoides* (Willd.) M. Dittrich. (Fig.9) are put into the State register of medical products of Russia (1995). Siberian and Far Easten species *S. uniflora* (L.) M. Dittrich. (Fig.10) is included into the pharmacopoeia of China (2000). The species *Serratula coronata* L. (Fig.11) is recommended as a perspective source of ecdysteroids as the second one after *Stemmacantha carthamoides*. The East Asian species of *Saussurea* DC. are perspective for producing medicine against cancer activity.

Fig. 9. *Stemmacantha carthamoides* (Willd.) M. Dittrich.

Fig. 10. *Stemmacantha uniflora* (L.) M. Dittrich.

Fig. 11. *Serratula coronata* L.

The special attention is given to gathering and cultivation of rare and disappearing species of the Asian Russia in botanical gardens. At present 10 rare species of *Asteraceae* are being tested in the culture. Five of them (*Brachanthemum baranovii* (Krasch. P. Poljakov) Krasch.; *Dendranthema sinuatum* (Ledeb.) Tzvel.; *Tridactylina kirilowii* (Turcz.) Sch. Bip. (Fig.12); *Saussurea jadrinzevii* Kryl.; *S. sovietica* Kom. (Fig.13)) are included into the list of endangered species of Russia (http://www.sevin.ru/redbook/index_pl.html). Conservation in botanical

gardens of such very rare species as *Aster woroschilovii* Zdorovjeva et Schapoval and *Symphyllocarpus exilis* Maxim. will prevent extinction of these taxons.

Fig. 12. *Tridactylina kirilowii* (Turcz.) Sch. Bip.

Fig. 13. *Saussurea sovietica* Kom.

Seeds' lists (100 taxons) of the *Asteraceae* exchange fund (delectus) of Siberia and the Far East are published annually.

References:

1. The state register of medical products, 1995, Moscow.
2. The state register of medical products, 2000, Moscow.
3. Gutnik, A.V., Protrunk, A.S. 1970, Dahlias for gardening of the Southern Primorsky Province. Trees, bushes and herbs for gardening the south of the Far East. Vladivostok.
4. The list of endangered plants of Russia / http://www.sevin.ru/redbook/index_pl.html.
5. Nedoluzhko, A.I. 2004, Crysanthemums for Primorsky Province. Vladivostok.
6. Nedoluzhko, V.A. et all. 2001, Vascular plants of Botanical Garden-Institute of FEB RAS: the catalogue. Vladivostok.
7. The pharmacopoeia of China, 2000, Bejgin.