

Wild useful herbs of Aktobe Region (Western Kazakhstan)

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Received: 15.09.2019. Accepted: 30.10.2019

The article presents the results of long-term studies of useful plants of Aktobe region, located at the junction of Europe and Asia and therefore of special interest in the botanical-geographical aspect. Seven groups of useful plants were identified: forage, medicinal, food, honey, technical, decorative, and poisonous plants. According to our results, 876 species with certain properties are used by humans, accounting for 59.4% of the total number of flora species in the Aktobe region. We revealed that the following groups represent the largest number of species: medicinal plants-593 species (40.2%), forage plants -428 species (29.0%), ornamental plants -253 species of flora of the region or 17.2% of the total number of species, and the smallest group of poisonous plants -114 species. Some species like *Agropyron cristatum*, *Bromopsis inermis*, *Eremopyrum orientale*, *Festuca valesiaca*, *Phleum phleoides*, and *Poa pratensis*, are the most abundant in the Aktobe region. *Agropyron cristatum* and *Secale sylvestre* should have potential interest for breeding.

Keywords: Flora; Wild useful plants; Aktobe region; Medicinal plants; Ornamental plants; Forage plants

Introduction

The Aktobe region occupies an interesting geographical position at the crossroads of Europe and Asia, the border of which is the southern spurs of the Urals - the small mountains of Mugodzhary. The region is located in the Caspian depression in the west, the Ustyurt plateau in the south, the Turan lowland in the south-east and Mugodzhary in the center from north to south. Most of the region is a plain with heights of 100-200 m, divided by river valleys; in the middle part of the region there are Mugodzhary mountains. The western part of the Aktobe region is occupied by the Poduralsky plateau; in the south-east there are massifs of hilly sands - the Big and Small Badgersucky. The Turgai plateau enters the northeast of the Aktobe region. (The Encyclopedia, 2003). The territory of the Aktobe region is located in the steppe and desert zones. According to the newest physical-geographical zoning, it is located within the limits of seven physical-geographical regions (South Ural, Ural-Turgai, North-Caucasian, Turgai-Central-Kazakhstan, South-Caucasian, Aral-Syr Darya and Mangyshlak-Usturt-Krasnovodskaya, see Geldyeva & Veselova, 1992). The Aktobe region is of particular interest in terms of botany and geography as one of the most significant industrial areas of Kazakhstan, where unique steppe communities, chalky massifs, relict forest and marshlands in need of protection of the flora are preserved (Aipeisova, 2011). The strengthening of the anthropogenic factor on the environment of the region requires the activation of works on the conservation of biodiversity and the creation of a system of monitoring of the plant world, in particular, the inventory and conservation of useful plant populations of flora.

Methods

The work is done on the basis of more than 30-year-old materials collected by the transect method, the analysis of herbal collections of Kazakhstan, and review of literary data on the region. As a part of any flora there are valuable species having economic application, which are perspective for their use in natural conditions and in culture. We selected the groups of useful plants by their economic importance taking into account the research done by N. I. Rubtsov (1934), N. V. Pavlov (1942), I. V. Larin et al. (1956, 1990), I.V. Larin (1956), M.K. Kukenov (1988, 1999), A.L. Budantsev, E.E. Lesiovskaya (2001).

Results and Discussion

On the basis of available information on useful properties of flora species of the region we have defined several groups: stern, medicinal, food, honey, technical, decorative, poisonous. As a result of the analysis, 876 species with certain properties used by humans were identified, which makes up 59.4% of the total number of flora species in the region (Aipeisova, 2007). The medical plants represent the largest number of species - 593 species (40.2% from total number). Feed plants are represented by 428 species or 29.0% of the total number of flora species in the region. The group of ornamental plants consists of 253 species of flora of the region or 17.2% of the total number of species. The group of technical plants includes 208 species (14.1%). Group of honey-bearing plants - 238 species, food plants - 141 species, poisonous plants - 114 species. Many species are of complex importance in their usefulness. Below is a description of plants by utility category.

Fodder plants

All fodder herbs are divided into 4 economic-botanical groups: Cereals, legumes, sedges, and herbaceous plants. The greatest number of forage plants in the flora of the Aktobe region is registered for Poaceae family - 90 species or 21% of the total number of species and for Fabaceae family - 76 species or 17%. *Agropyron cristatum*, *Bromopsis inermis*, *Eremopyrum orientale*, *Festuca*

valesiaca, *Phleum phleoides*, and *Poa pratensis* are the most abundant in the Aktobe region. *Agropyron cristatum* and *Secale sylvestre* have potential interest for culture breeding.

Highly valuable forage plants of the Poaceae family are *Alopecurus pratensis*, *Festuca pratensis*, and *Elytrigia repens*. The sedge group includes plants from the Suregaceae and Juncaceae families (*Carex diandra*, *Carex riparia*, *Carex vulpina*, *Juncus compressus*). The most valuable source of protein are species from Fabaceae family. They contain about 18.4% of protein in their flowering phase and up to 31.3% in seeds (Pavlov, 1942). The following genera are most abundant in this family: *Astragalus* (29 species), *Trifolium* (8 species), *Lathyrus* (8 species), and *Medicago* (6 species).

The most valuable forage species are *Trifolium pratense*, *Trifolium repens*, *Trifolium hybridum*, *Medicago falcata*, *Lathyrus pratensis*, *Melilotus albus*, *Melilotus dentatus*, and *Melilotus officinalis*. There are large populations of *Melilotus officinalis* in the north-west of the study area (Kargala region), which, in our opinion, are of some interest for culture breeding. Rational use of natural resources is primarily based on the identification and regulation of the stocks of economically useful plants. Despite the species diversity of resources, their regional status has remained poorly studied and requires further resource use.

Medicinal plants

In the flora of Aktobe region some 593 medicinal plant species are registered, 114 of which are used in official medicine (State Pharmacopoeia, 1990; State Catalogue, 2000).

The greatest number of medicinal plants grows in forest outliers and floodplain forests: *Betula pendula*, *Alnus glutinosa*, *Comarum palustre*, *Agrimonia asiatica*, *Crataegus korolkowii*, *Fragaria vesca*, *Fragaria viridis*, *Rosa canina*, *Althaea officinalis*, *Athyrium filix-femina*, *Tussilago farfara*, and *Dryopteris filix-mas*. Slightly fewer species occur in meadows and bogs. These are *Inula helenium*, *Hypericum perforatum*, *Oxycoccus palustris*, *Sanguisorba officinalis*, *Cynoglossum officinale*, *Plantago maxima*, and *Bidens tripartite*. Medicinal plants typical for steppe formations include *Pulsatilla patens*, *Dianthus versicolor*, *Euphorbia subcordata*, and *Carduus crispus*. There are many weed species among the medicinal plants. These are *Capsella bursa-pastoris*, *Xanthium strumarium*, *Taraxacum officinale*, *Urtica dioica*, and *Band erteroa incana*.

Therapeutic medicinal plants can be used for the prevention and treatment of a number of diseases, besides, such species like *Helichrysum arenarium*, *Tanacetum vulgare*, *Artemisia absinthium*, and *Achillea millefolium* have potential resource importance. In this regard, the territory of Aktobe region is of definite interest for conducting the resource studies.

Food plants

Food plants occupy one of the first places among other foodstuffs, being an important source of proteins, carbohydrates, fats, and vitamins. The most valuable species of this group are fruit-berry, vegetable and spicy aromatic wild species. Fruit-berry species are *Rubus saxatilis*, *Rubus caesius*, *Padus avium*, *Rosa canina*, *Rosa laxa*, *Rosa majalis*, *Fragaria vesca*, *Fragaria viridis*, *Viburnum opulus*, *Crataegus sanguinea*, *Crataegus korolkowii*, *Prunus spinosa*, and *Cerasus fruticosa*. Local population harvests fruits of *Padus avium*, *Rubus idaeus* and *Rosa acicularis*. A number of herbaceous plants are used as vegetable species: *Allium angulosum*, *Allium caesium*, *Urtica dioica*, *Taraxacum officinale*, *Cichorium intybus*, *Sanguisorba officinalis*, *Rumex acetosa*, *Rumex confertus*, *Rumex crispus*, *Rumex pseudonatronatus*, and *Stellaria media*. Spicy aromatic plants include *Mentha piperita*, *Carum carvi*, *Daucus carota*, *Thymus marschallianus*, *Filipendula ulmaria*, and *Humulus lupulus*. Local population utilize just a small part of species from this group.

Bee plants

This group is represented by 238 plant species, most of which belong to the Rosaceae and Fabaceae families, such as *Cerasus fruticosa*, *Comarum palustre*, *Cotoneaster melanocarpus*, *Padus avium*, *Chamaecytisus ruthenicus*, *Melilotus albus*, *Melilotus dentatus*, *Melampyrum cristatum* and *Salix hastata*. Bee plants, in a broad sense, include plants that provide not only nectar but also pollen or bee bread. Usually bee plants are divided into three flowering groups: Spring, summer, late summer/autumn.

- **Spring mellifers:** Genera *Betula*, *Ulmus*, *Salix*, *Taraxacum*, *Viburnum*, *Populus*, *Padus* and *Amygdalus*.
- **Summer mellifers:** *Chamerion angustifolium*, *Echium vulgare*, *Filipendula ulmaria*, *Medicago falcata*, *Melilotus albus*, *Melilotus officinalis*, *Rubus idaeus*, *Vicia cracca*, *Vicia tenuifolia*, *Trifolium hybridum*, *Trifolium medium*, *Trifolium pratense*, *Trifolium repens*, and *Rosa majalis*.
- **Late summer and autumn mellifers:** *Achillea millefolium*, *Berteroa incana*, *Origanum vulgare*, *Bidens tripartita*, and *Odontites vulgaris*.

Technical plants

It is a group of plants, some parts of which are used as raw materials in various industries. In regional flora there are 208 technical plant species (14.1%). They can be divided into the following subgroups: dyeing plants, essential oil plants, fibrous plants, and tannin plants. The art of dyeing is one of the oldest. As soon as a human learns how to make fabrics, leather, yarns, roll felt, and weave carpets, it became necessary to dye them. The ability to dye fabrics and make leather depended on the development of civilization, which was determined by historical time and natural conditions (Korolyuk, 2003). Dyeing plants of our flora include: *Betula pendula*, *Betula pubescens*, *Atraphaxis frutescens*, *Rumex confertus*, *Chelidonium majus*, *Isatis tinctoria*, *Genista tinctoria*, and *Impatiens noli-tangere*.

Tannins

This name belong to the plants containing in the cells special, so-called tannins, used in the currying and equipped the leather with number of valuable technical properties, such as softness, strength, waterproof, and coloring. Tannins are organic compounds by their chemical composition and they have typical selective signs. Thus, they should dissolve in water, have astringent tart taste, are precipitated by the action of glue, alcohol and after exposure to oxygen they oxidized and polymerized into red or brown. Tannery plants include such species as *Rheum tataricum*, *Limonium gmelinii*, *Geranium pratense*, and *Elaeagnus angustifolia*. Essential oil plants are represented by *Mentha longifolia*, *Nepeta cataria*, *Origanum vulgare*, *Chelidonium majus*, and *Prunella vulgaris*. Fibrous plants are represented by *Linum uralense*, *Linum corymbulosum*, *Linum perenne*, and *Trachomitum lancifolium*. Other sub-groups include *Humulus lupulus*, *Dipsacus gmelinii*, *Anabasis aphylla*, *Salix caprea*, and *Salix alba*.

Poisonous plants

Poisonous plants include *Hyoscyamus niger*, *Datura stramonium*, *Ephedra distachya*, *Aconitum anthora*, *Conium maculatum*, *Hypericum perforatum*, *Equisetum arvense*, *Frangula alnus*, and *Ranunculus flammula*. Poisonous plants are used as insecticides and rodenticides. In our region we have *Cynoglossum officinale*, *Lepidium perfoliatum*, and *Chelidonium majus*.

Ornamental plants

The flora of our region contains a large number of species with high potential culture importance. This group is represented in our flora by 253 plant species (17.2%). Nevertheless, the local population uses a small part of such wild plants on garden plots and front gardens. These are *Ulmus grabra*, *Betula pendula*, *Hesperis sibirica*, and *Rosa majalis*. Blossoming regional plants that are promising crops are *Anemone sylvestris*, *Dianthus borbasi*, *Calystegia sepium*, *Pulsatilla patens*, *Filipendula ulmaria*, *Gladiolus imbricatus*, and *Ixiolirion tataricum*.

Conclusion


Rational use of natural resources is primarily based on the identification and regulation of economically useful plants. Despite the high species diversity and abundance their status in the Aktobe region requires further resource research.

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Citation:

Aipeisova, S.A., Utarbayeva, N.A., Kazkeev, E.T., Maui, A.A. (2019). Wild useful herbs of Aktobe Region (Western Kazakhstan) *Ukrainian Journal of Ecology*, 9(3), 329-331.

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