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Ecobiomorphology of ruderal plants meeting in Karaganda city environment

This article represents to determine the species of weeds in Central Kazakhstan, especially in Karaganda region, and to give ecobiomorphological description of them. In addition, it was examined how to collect and dry the weeds in dry sections of Central Kazakhstan, to determine the type, the form of life, the period of vegetation of collected plants and to tell about the ecological significance in water and dry regions. By classifying the economic significance of weeds not only harmful effects, but also the benefits were described such as in medicine, in livestock food agriculture, food and in other industries. As a result of our research in the vicinity of the city of Karaganda collected 75 species, and provides systematic information weeds. They are classified into 20 families and 65 genera. Most weeds are members of the following families: Asteraceae, Cruciferae, Fabaceae, Poaceae, Boraginaceae; Chenopodiaceae, Umbelliferae, Labiatae - Solanaceae; Rosaceae; Amaranthaceae, Cuscutaceae, Plantaginaceae; Euphorbiaceae, Caryophyllaceae, Malvaceae, Polygonaceae, Convolvulaceae.

Keywords: ecobiomorphology, period of vegetation, weeds, agrophytocenosis, morphological characters, the generative organs.

Nowadays special attention is paid to the problem of protection of environment and rational use of natural resources. One of the most important tasks in the efficient use of natural resources and the protection of environment contains the ability to read deeply the natural ecological system in order to make recommendations based on scientific research.

The lack of information about the ecomorphological characteristics of weeds in Central Kazakhstan is still one of the most important unresolved issues.

Some authors divided wild plants into two groups: weeds and cultivated plants. The growing of weeds is accompanied with cultural plants which are made by agrophytocenosis of weeds that plays a secondary role in hindering the economic activities of the person [1].

Thousands of species of plants are growing on the earth. The most common type of plants is weeds. They spread in the mountains, forests, ravines and steppe areas, gardens, fields.

The first systematic information about the weeds can be seen in works of the largest systematics in the world such as Kassin (1834), Turchanikov (1856), Dekandol Besser (1928–1949), Ledebur (1844–1946) [2].

Buasse E. (1875), Guker (1882), as well as American botanists Gray (1884), Reydberg (1916), Clement and Xael (1923) has made a great contribution to the systematics of weeds. In order to learn about the types of vegetation not only systematic works, but also the greater importance of regional floristic publications was noted [2, 3].

So far, there is no unique definition of weeds. By Maltseva A.I., weeds are wild or semi-cultivated plants which grow in pasture lands without the participation of the farm, and also with cultural plants. Nikitin V.V. emphasizes that «weeds are the group of grass which would harm the cultural plants». Weeds in farm fields are considered as the group of «not necessary» grasses [4].

Harmfulness of weed plants does not depend on the type of plant, it depends on quick breeding by scattering the seeds.

According to Nikitin V.V., demutation (re-position) of weed plants is closely related to the natural conditions and to the moisture of relief.

In rare cases among intentionally grown grain crops cultural plants are known as weeds. Sometimes the increase of black wheat hinders the growing of wheat area and also alfalfa hinders growing of cotton areas. By Malceva A.I. (1932), the weed plants are very close to all cultural plants which interfere with the fields and other cultivated plants.

Currently, the reasons of the elimination of plants are the mass extinction of plant species, areas that change often and the deterioration of the ecological conditions. Conservation of diversity of plants and recovery of endangered species are one of the most important issues for the science of botany.

Increasing the influence of anthropological factors causes the reduction in the diversity of plants that has become one of the most important measures. For example: due to the direct and indirect impact of lands for rupturing, the urban development, roads and etc. plant species are disappearing which have led to the reduction in biological diversity.

Parasitic weed plants are plants which can take nutrients from foster plant, some weeds take from the stalks of the plants, and some take from the roots of the plant by clinging to the root. For example, skilled tobacco, tomato and others are considered as one of the most common weeds which are growing on sunflower by sticking to them.

In general perennial weeds breed by seeds and also by vegetative organs. Perennial weeds according to the root system are divided into the following groups: taproot, fibrous root, tubers and crown roots, bulb root, stolon root, corm root. Taproot weeds breed by seeds and slightly by vegetative organs [5].

Weeds such as common wormwood, medical dandelions, common plantain, silver bloodroot and others widely spread in orchards, gardens, fields, fallow lands, parks and other places. The example of fibrous root is plantago and banewort.

In essence, the vast majority of weeds grow among the grains and technical crops, also among annual and perennial forage grasses. 31 species of weeds are recorded outside of field.

Weeds which breed in vegetative way by root offspring and which dive deep into the roots are classified into root offspring species. The examples of root offspring are field sow thistle, filed ivy, reddish sow thistle, ragwort, yellow sow thistle, arable sow thistle, fiber sinadenium, creeping wheatgrass, creeping oxtongue, simple agrimony, inclination thistle, reddish cornflower and et al.

In general, effective struggle with weeds depends on the activities carried out in time and quality in connection with variable technology for the production of agricultural crops.

Root offspring weeds can produce new plants from their roots. Their roots can collect large amounts of nutrients and new shoots can appear from their root buds. Therefore, the fight against them is held mainly in the areas where stream measures aimed and where roots can seduce.

In the fight against perennial weeds it is important to do plowing in early autumn. The root offspring can be weakened and the two years hibernating weeds can be removed by shearing the neck of roots. This fight against weeds can be done by cultivators which are left in stream lands, then it is carried out by ripping a depth of 20–22 cm [6, 7].

The fight against annual weeds can be very effective in spring time. Unfortunately, it is not possible to eliminate the weeds by using agricultural activities. In this regard, we would like to introduce the benefit of using chemical method.

Currently in the field of plant protection and uniqueness of high biological productivity the impact of chemical method is considered to be the most effective one. Therefore, there has been a clear use of pesticides in agriculture. That is why it is allowed only to use the pesticides which are fixed by the Ministry of Agriculture of the Republic of Kazakhstan [8].

Many scientists believe that underestimation of ecological adverse effects of agriculture leads to a significant deterioration in the quality of soil, the 20–30% reduction in the amount of humus, agrochemical and agrophysical deterioration, the deterioration of the compaction of the sand erosion, as well as the damage of areas of the soil and the most important led to the pollution of fields of weeds.

The goal of this work is to determine the types of plants and give the ecobiomorphological description of weeds in Central Kazakhstan, including the city of Karaganda. In addition, another purpose is to collect and dry weeds and plants in the arid steppes of Central Kazakhstan. Moreover, it was mentioned how to determine the type, the form of life, the period of vegetation of collected plants and to tell about the ecological significance in water and dry regions.

Ephemers and ephemeroïdes are long-developing types of plants that bloom later were chosen as the object of the study which passes the period of the vegetation and species composition in the early spring. Harvesting was held in the spring and summer of 2014–2015.

Collection of weeds was held by routing method 23–25 km south-east of the city, near the highway along the Spassky near the slide Bai-Daulet, the right and the left bank of the river Buqpa and all regions of the Orbita № 1 were covered. In addition, the left and the right bank of the river Sokyr was considered. The weeds of Karaganda near ash and middens were studied. The accumulated plants were identified by their differences in type, by general (family and relatives) morphological features and by generative organs. The collected plants are identified by illustrated flora of Kazakhstan. Drying and processing of herbarium

were made by methods of Uranov A.A., Skvortsov A.K., Anapiev I.M., Abdrakhmanov O.A., Akhmetzhanova A.I., Auelbekova A.K., AVerchenko A., Sechin D. [9, 10] et al.

As a result of the research, there are 850 different species of flowering plants in meadow areas of Central Kazakhstan. There are weeds among them. As a result of our study 75 different kinds of weeds were collected in the city of Karagandy region.

20 families, 65 related plant species were classified. The majority of weeds are considered to be a relative of the family *Asteracea* — 17 family, 20 species, *Cruciferae* — 9 family, 9 species, *Fabaceae* — 7 family, 9 species, *Poaceae* — 8 family, 8 species. Some species are *Boraginaceae* *Iridaceae* family, 5 family and 5 species which often grow in gardens; *Chenopodiaceae*, *Umbelliferae*, *Labiatae* and 2 family, 2 species of *Solanaceae*; 1 family and 3 species of *Rosaceae*; *Amaranthaceae*, *Cuscutaceae* and 2 species of *Plantaginaceae*.

A few species are related to Euphorbiaceae, Caryophyllaceae, Malvaceae, Polygonaceae and Convolvulaceae.

By life forms weed plants are divided into perennial which is 48% and into one-year, two-year grass like plants which is 38.7% (Fig. 1).

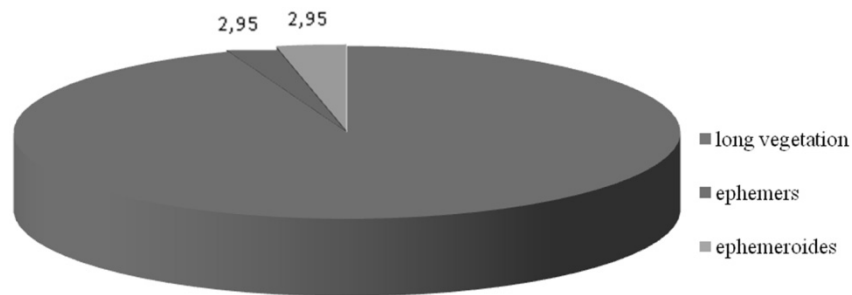


Figure 1. The percentage ratio (%) of short and long cycle development of the weed species

The vast majority of the weed plants are mesophytes which are 50.7%. It has long vegetation period, that is 94.1%.

Ephemerals and ephemeroids belong to the short vegetation period plants which grow in early spring and they bloom until summer. They use maximum spring rain water and then dry up where the amount of water is 5.6%.

Mesophytes share 2.7%, while xeromesophytes are 12% and xerophytes are 8%. Moreover, hydromesophytes share 1.6% in the city.

Among the variety of weed plants, weeds that belong to segetal groups are 49.3%. It is due to the prevalence of anthropogenic impacts on the plants. Ruderal-segetal and segetal-ruderal plants share 28% and 12% respectively and only ruderal group contains 10.7% (Fig. 2).

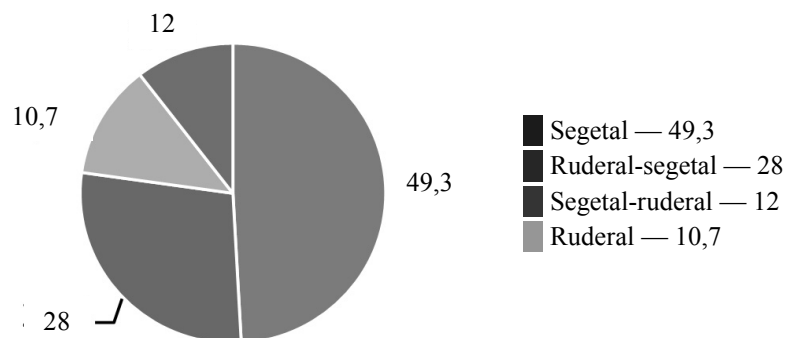


Figure 2. The percentage ratio of the life forms of weeds in Karaganda region, %

Among annual weeds, the spring one-year weeds are 38.7% and 93.3% of them are autumn.

The classification of weeds in Karaganda region by its economic significance showed the following results: animal-feed plants came as a representative of the majority of cereals, 19 species, and the percentage was 20.2%.

Most of the medical plants came as a representative of *Labiatae* and *Asteraceae*, 18 species, and the percentage was 19.1%.

Most of the plants which give the honey are a representative of the harvest *Labiatae* and plantain. It had 11 species and the percentage was 11.6%. 9 species are used as food and 9 species are poisonous, which takes 9.6% of the weeds from the total, essential napkins are 7 species, which range from 8.2%, while oil is 4 species and 5.3%, 3 species of insecticides, which is 4.6% of the total weed.

Thus, not only harmful aspects were identified in their classification but also other important benefits such as medicine, agriculture, livestock feed, food, etc. were discussed (Fig. 3).

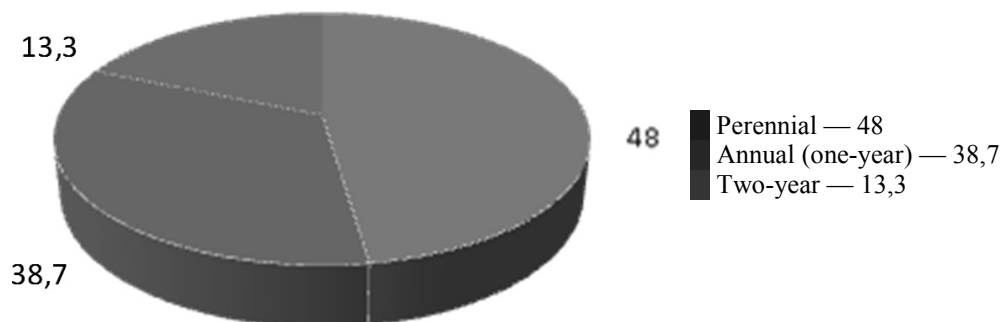


Figure 3. The percentage ratio of the types of weeds in Karaganda region, %

The fight with weed through a biological method is used to prevent environmental problems in the region or to avoid environmental pollution by various chemical products, also which is used to improve the environment.

In addition, the adaptation for the breeding of weeds depends on the high ability to spread seeds quickly around power line which is 43%, and 24% of high growth and sprouting seeds irregularly, 18% of preserving the seeds in the soil for a long time and 15% of the weeds reproduce not only by seeds, but as well as by rhizome, root offspring, tubers and by vegetative way.

According to the results of research work in the city of Karaganda, 20 families, 65 genus and 75 species of weeds were identified. The most common types of them are tent hawkweed, climbing buttercup, bloodroot, prickly thistle, terry burdock, blue cornflower, latch thistle, ivy. Weeds which belong to rhizome are creeping wheatgrass, Tatar buckwheat, gladiolus, white pigweed, ivy elymus, simple cane, sorghum, field equisetum.

48% of the weeds in the territory of the Karaganda in the form of life are perennial herbs plants, where 27% of them are ephemeroides and 25% are ephemerers. In addition, 94.1% of weeds belong to long growing plants.

Among the weeds collected from water 30.7% are mesophytes and 26.7% are mesoxerophytes. The vast majority of xerophytes that is defined due to the climatic and soil conditions are 53.6%.

According to the result of the classification of weeds by growth condition, the most common lands are steppe and grasslands.

Weeds found in the territory of Karaganda were divided into following groups by economic significance: 19 for animal feed; 18 for medicines; 12 for honey; 9 for food and 9 as toxic; 7 types of essential fat.

Thus, the protection of natural resources, care, efficient use of today's scientific and technological progress is one of the most actual problems in the developed countries. By following this rules which were discussed above the plants can be preserved and it will help to improve environmental protection. Therefore, we have to make the contribution together as a team in order to preserve our natural resources. It is our civic obligation.

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Қарағанды аймақтарында кездесетін арамшөптердің экобиоморфологиясы

Мақалада Орталық Қазақстанда, оның ішінде Қарағанды қаласының ландшафтарындағы арамшөпті өсімдіктерінің түрлерін анықтау және оларға экобиоморфологиялық сипаттама беру қарастырылған. Орталық Қазақстанның құрғақ далалық аймағындағы арамшөпті өсімдіктерді кептіріп жинау, жиналған өсімдіктердің түрін, өмір сүру формаларын, вегетациялық дәуірінің ұзақтығын анықтау және суға байланысты экологиялық топтарын, өсімдіктердің құрғақ далалық жағдайдағы экологиялық шаруашылық маңызы туралы айтылған. Қарағанды қаласы мен оның аумағындағы арамшөптердің шаруашылық маңызы бойынша жіктеудің барысында олардың зиянды жақтары ғана емес, маңызы, пайдалы тұстары да анықталды, яғни, медицинада дәрілік, ауыл шаруашылығында мал-азықтық, тағамдық және т.б. өндіріс салаларында қолданылатыны, пайдасы жөнінде. Сондай-ақ арамшөптер жайлы систематикалық мағлұматтар келтірілген. Біздің зерттеулеріміздің нәтижесінде Қарағанды қаласы аймақтарынан 75 түрлі арамшөптердің түрлері белгілі болды. Олар 20 тұқымдасқа, 65 туысқа жататын өсімдіктердің түрлеріне жіктелген. Арамшөптердің басым көпшілігі: *Asteraceae, Cruciferae, Fabaceae, Poaceae, Boraginaceae; Chenopodiaceae, Umbelliferae, Labiatae - Solanaceae; Rosaceae; Amaranthaceae, Cuscutaceae, Plantaginaceae; Euphorbiaceae, Caryophyllaceae, Malvaceae, Polygonaceae, Convolvulaceae* тұқымдастарына жатады.

Кілт сөздер: экобиоморфология, вегетациялық дәуір, арамшөптер, агрофитоценоз, морфологиялық белгілер, генеративті мүшелер.

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Экобиоморфология сорных растений, встречающихся в окрестности г. Караганды

В статье рассмотрены виды сорных растений Центрального Казахстана, в том числе ландшафта г. Караганды, а также их экобиоморфологическая характеристика. Представлены данные о сборке и сушке сорных растений, об определении их видовой принадлежности, жизненных форм, длительности вегетационного периода, об экологических группах по отношению к влажности, экологическом хозяйственном значении в аридных условиях. На основе классификации по хозяйственному значению определены как отрицательное влияние сорных растений г. Караганды и его окрестностей, так и их полезные свойства: использование как лекарственного средства в медицине, в качестве корма в сельском хозяйстве, в пищевой отрасли и т.д. В результате исследований в окрестностях города Караганды собрано 75 видов сорных растений, а также приведены систематические сведения о них. Сорные растения классифицированы к 20 семействам и 65 родам. Большинство из них являются представителями следующих семейств: *Asteraceae, Cruciferae, Fabaceae, Poaceae, Boraginaceae; Chenopodiaceae, Umbelliferae, Labiatae - Solanaceae; Rosaceae; Amaranthaceae, Cuscutaceae, Plantaginaceae; Euphorbiaceae, Caryophyllaceae, Malvaceae, Polygonaceae, Convolvulaceae.*

Ключевые слова: экобиоморфология, вегетационный период, сорняки, агрофитоценоз, морфологические особенности, генеративные органы.

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