УДК 504.064:631.416.9

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TRANSFORMATION OF CHEMICAL COMPOSITION OF WEEDS

In the course of the study there was revealed an anthropogenic transformation of not only species composition of agrophytocenoses vegetation, but also significant changes in chemical composition of weeds. The data was received of concentration functions of weeds with respect to heavy metals. In current conditions it is urgent to estimate participation of priority heavy metals in biogeochemical circle in block "soil-plant" based on the study of transformation of chemical composition of weeds.

➢ ***Keywords****: agrophytocenoses, chemical composition, cultural plants, weeds.*

Introduction

Plant community of higher plants (cultivated and wild) takes the central place in agrophytocenoses. This community places a role of energy provider for consumers and reducents. At that the presence of wild plants in agrophytocenosis is not necessary, however, weed synusia is typical for almost all cultivated plants, as far as plant apophytes fall in the crops of local natural ecosystems and remain in them by adapting to the specific conditions (tillage, crop rotation, use of mineral fertilizers and chemical plant protection). Formation of a wide variety of species of agrophytocenosis weeds is caused by the presence in soil of very high potential stock of seeds and vegetative propagation parts [1].

The problems of transformation of the species composition of agrophytocenosis segetal flora have been reviewed in several studies. The species composition and competitiveness segetal, ruderal and natural communities have been reviewed and possible dynamic tendencies in segetal flora have been identified. [2, 3, 4].

It should be noted that in Belarus phytocenotic diversity of agrophytocenosis segetal vegetation has not been specifically studied that is why it could be reviewed only inderectly taking as a basis quantitative assessment of agrophytocenosis flora.

However, intensive industrial and agricultural production causes not only the transformation of the species composition of agrophytocenosis vegetation but also significant changes in anthropogenic biogeochemical cycle of heavy metals (HM). In recent years, the direction and rate of migration of heavy metals have been transformed, removal and storage areas have been shifted, the list of elements included in the man-made pollution flows has been significantly expanded [5].

Relevance of the identifying of features of anthropogenic transformation of the real (chemical) composition of agrophytocenosis cultural and segetal plants based on biogeochemical analysis of metals and metalloids content in them confirmed by multiple researchers [5; 6].

Thus, in modern conditions a very urgent priority is to estimate the participation of heavy metals in biogeochemical cycling in the block "soil-plant" based on the transformation of the chemical composition of agrophytocenosis cultural and segetal plants [7].

It also should be noted, that in the scientific literature almost no reliable information on the use of concentration functions of wild (segetal) plants for ecological and biogeochemical monitoring of agroecosystems. That is why general features of natural and anthropogenically transformed phytocenoses to date can not be considered fully disclosed, and basic ecological principles of their study to be fully developed [5].

The objective of the present work is to reveal specific features of anthropogenic transformation of chemical composition of agrophytocenosis cultural and segetal plants of conditionally clean territory based on biochemical analysis of metal and metaloid concentration in them.

Materials and methods of the study

Selection of the direct objects and methods is predetermined by research methodology, the essence of which is based on the position: transformation of plants chemical composition is identified by the content of exogenous chemicals in segetal species phytomass as an indicator of pollution of comparable agrophytocenosis.

Field studies were conducted in 2007–2009 in the two-factor stationary experiment in actually existing rotations on the lands of agricultural factory "Kameno", Logoisk region, Minsk area. Proceeding and analysis of the collected material was conducted from 2009 to 2010. Experimental sites allocated within the boundaries of the village council of Kamensky 40 km far from Logoisk and 80 km North-East from Minsk.

Soil cover of experimental plots is characterized mainly by sod-podzolic gley contact-loam soils developed on silty-sandy glaciofluvial sandy loam, underlain at a depth of 30–40 cm by easy moraine loam, often with a layer of sand on track.

Methods of study – Field: natural survey, production and field experiments. Cameral: chemical analyzes.

In each agrophytocenosis a permanent sample plots (PSP) of 100 m^2 was pawned [8, 9]. Geobotanical survey of agrophytocenosis was conducted using route-reconnaissance method. Sampling of plants was carried out in accordance with the STB 1056-98 in dry weather from 8 to 10 o'clock in the morning (June, 2007–2009) on the grounds of 1 m^2 in 10 replicates. Plants were cut flush with the surface of the soil and assorted according to species composition [10].

In determining the floristic composition of agrophytocenosis and vascular plant species a number of literary sources was used, the Latin species name were given in accordance with the vascular plants qualifier of S. K. Cherepanova [11].

Plant samples for the study of heavy metal pollution were analyzed in laboratory conditions in 2009–2010 in the International Sakharov Environmental University using X-ray fluorescence method adopted by BelGIM (МВИ.МН 3272-2009), on a spectrometer of X-ray energy in accordance with conventional procedure [10, 12].

Sample preparation consisted of: plants drying the samples in a low-temperature electric laboratory furnace at temperature of 40 °C until constant weight, grinding in a laboratory mill, sieving through a laboratory sieve with mesh size of 0.5 mm, a sample weighing 0,1000±0,0001 and formation of compressed tablet of 10 mm diameter using a hydraulic press from spectrometer kit.

The results of measurements of heavy metals in the samples were statistically processed using algorithms STB ISO 5725 (2,3) – 2002.

Results and discussion

The subjects of the study were agrophytocenoses of conditionally clean area: rapeseed, spring barley sowing with grass-legumes; Lupino-pea mixture, as well as a 3-year fallow cropland, formed due to termination of economic use.

A survey of plant communities found that in each agrophytocenosis applied cultivation technology creates its own specific conditions conducive to the formation of the biological diversity of plant species (table 1).

Table 1

Species composition of agrophytocenosis on conditionally clean soil

Number	Taxons and species	Type of agrophytocenosis			
		Rape	Barley	Lupine	Fallow
Сем. ***Brassicaceae***					
1	*Brassica napus* L.	●			
Сем. ***Violaceae***					
2	*Viola arvensis* Murr.	●			
Сем. ***Polygonaceae***					
3	*Polygonum convolvulus* L.	●			
4	*Rumex confertus* Willd.			●	●
Сем. ***Poaceae***					
5	*Elytrigia repens (*L.*) Nevski*	●			
6	*Hordeum distichon* L.		●		
7	*Phleum pratense* L.		●		●
8	*Dactylis glomerata* L.		●		
Сем. ***Asteraceae***					
9	*Matricaria inodora* L.	●		●	
10	*Centaurea cyanus* L.	●			
11	*Taraxacum officinale* Wigg.		●		●
12	*Artemisia vulgaris* L.		●	●	●
13	*Artemisia absinthum* L.			●	●
14	*Achillea millefolium* L.			●	●
15	*Cirsium arvense (*L.*) Scop.*				●
16	*Leucanthemum vulgare* Lam.				●
Сем. ***Rosaceae***					
17	*Potentilla anserina* L.	●			

Continuation table 1

Number	Taxons and species	Type of agrophy-tocenosis	Number	Taxons and species	Type of agrophy-tocenosis
Сем. ***Fabaceae***					
18	*Vicia cracca* L.		●		
19	*Pisum sativum* L.			●	
20	*Trifolium pratense* L.		●	●	
21	*Trifolium repens* L.			●	●
22	*Lupinus angustifolius* L.			●	
Сем. ***Plantaginaceae***					
23	*Plantago major* L.		●		
Сем. ***Convolvulaceae***					
24	*Convolvulus arvensis* L.			●	
Сем. ***Chenopodiaceae***					
25	*Chenopodium album* L.			●	
Сем. ***Caryophyllaceae***					
26	*Melandrium album (*Mill.*)*			●	
Сем. ***Urticaceae***					
27	*Urtica dioica* L.				●
Сем. ***Ranunculaceae***					
28	*Ranunculus repens* L.		●		
Сем. ***Boraginaceae***					
29	*Myosotis arvensis (*L.*) Hill*	●			
Сем. ***Hypericaceae***					
30	*Hypericum perforatum* L.		●		
Сем. ***Papaveraceae***					
31	*Chelidonium majus* L.				●

This is due to the fact that the ability of plants to absorb minerals varies significantly. It depends on the floristic composition and properties of substances of agrophytocenosis and polluting technology-related crops, including using of different types and doses of mineral fertilizers, as well as highly specialized for each type of plant protection chemicals. On the fallow cropland area due to termination of the economic use of arable land the initial stages of successional vegetation change by newly forming postcultural ecosystem was found which is expressed by a change in species richness of plant communities by perennials. The results of study of the chemical composition and cultural segetal plants indicate that concentration of chemical elements in plants on conditionally clean soil (background) depends essentially on the taxon and plant species, as well as the type of phytocenosis and applied technologies of cultivation (table 2).

On the site of 3-year fallow decreased concentration of microelements and heavy metals in plants was found due to higher adaptive capacity of segetal plants for priority pollutants compared to cultivated species, as well as the fact that the fertilizers are not applied to fallow.

The experiment found that the content of gross heavy metal compounds in cultivated plants and segetal agrophytocenosis do not exceed background levels for the area, at the same time in the experiments selective ability of individual plant species to accumulate certain heavy metals was found [13]. At that there was revealed that the following elements were accumulated by the plants more rapidly: **Cu** – *Artemisia vulgaris* L., *Artemisia absinthus* L., *Melandrium album* (Mill.*), Lupinus angustifolius* L., *Taraxacum officinale* Wigg., *Centaurea cyanus* L. и *Urtica dioica* L.*;* **Mn** – *Rumex confertus* Willd., *Lupinus angustifolius* L., *Ranunculus repens* L., *Brassica napus* L. и *Convolvulus arvensis* L.; **Mn и Sr** – *Lupinus angustifolius* L.*;* **Fe, Sr и Co** – *Convolvulus arvensis* L.*;* **Sr** – *Chenopodium album* L. ; **Fe, Pb и Cr** – *Melandrium album (*Mill.*)*; **Fe** – *Vicia cracca* L.; **Cu, Co и Ni** – *Artemisia absinthum* L.; **Cu, Zn, Ba и Cr** – *Lupinus angustifolius* L.; **Fe и Cr** – *Pisum sativum* L.; **Mn, Cu и Zn** – *Matricaria inodora* L.; **Co и Pb** – *Polygonum convolvulus* L.; **Zn** – *Lupinus angustifolius* L., *Artemisia absinthus* L., *Achillea millefolium* L., *Leucanthemum vulgare* Lam. и *Cirsium arvense (*L.*) Scop.*; **Mn, Fe, Ba, Co, Pb, Cr и Ni** – *Hordeum distichon* L.; **Fe, Ba, Pb и Cr** – *Brassica napus* L.

The study revealed species-specific features of individual accumulation of heavy metals by plants of lupine agrophytocenosis on conditionally clean soil (table 3).

Thus, in the course of experiments there was found anthropogenic transformation of not only species composition of vegetation, but also significant changes in microelemental (material) composition of cultural and segetal species of agrophytocenosis. It should be noted that the cultivated plants *Lupinus angustifolius* L., *Pisum sativum* L. as the main coating dominant culture, have an extremely high coefficient of bioaccumulation of heavy metals Cu, Zn, Sr and Cr, what to consider when planning their placement in conditions of technogenic pollution.

Obtained information about the concentration functions of wild (segetal) plants with respect to heavy metals allow to use them for ecological and biogeochemical monitoring of agroecosystems.

Table 2

Background concentration of chemical elements in plants of agrophytocenosis on conditionally clean soil, mg / kg

Plant species	Lev-el	**Chemical element**										
		Mn	**Fe**	**Cu**	**Zn**	**Ba**	**Sr**	**Co**	**Pb**	**Cr**	**Ni**	**Sn**
Trifolium pratense L.	min	13,2±1,1	29,9±1,6	1,9±0,3	17,7±0,8	Traces	9,9±0,6	Traces	Traces	Traces	Traces	0,5±0,1
	max	32,6±1,7	35,3±1,7	3,2±0,4	45,5±1,3	38,7±7,3	17,5±0,8	1,1±0,2	4,6±0,5	0,5±0,3	0,2±0,1	0,7±0,1
Artemisia vulgaris L.	min	8,6±0,8	39,8±1,6	0,9±0,1	15,3±0,6	2,9±1,9	9,6±0,5	Traces	Traces	0,6±0,3	Traces	0,4±0,1
	max	32,4±1,7	53,6±2,0	15,3±0,8	43,3±1,3	14,1±4,0	10,3±0,5	Traces	0,3±0,1	1,0±0,3	0,7±0,2	0,8±0,1
Trifolium repens L.	min	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces
	max	16,3±1,2	60,6±2,3	2,4±0,3	25,4±1,0	19,5±5,5	17,8±0,8	Traces	Traces	0,7±0,3	Traces	0,6±0,1
Rumex confertus L.	min	13,1±1,0	58,9±2,1	1,3±0,2	9,7±0,5	26,8±5,6	4,4±0,3	0,4±0,1	Traces	Traces	Traces	0,4±0,1
	max	46,0±1,8	63,2±2,0	3,9±0,3	20,1±0,7	37,7±7,1	40,8±1,2	0,5±0,1	0,2±0,1	0,4±0,2	0,7±0,1	0,5±0,1
Achillea millefolium L.	min	8,9±0,8	54,7±2,1	3,8±0,4	21,2±0,9	12,4±4,1	4,5±0,4	Traces	Traces	Traces	0,3±0,1	Traces
	max	9,7±0,9	67,0±2,2	4,0±0,4	23,6±0,9	16,0±4,8	8,6±0,5	0,5±0,1	0,5±0,1	0,6±0,3	0,5±0,1	0,7±0,1
Convolvulus arvensis L.	min	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces
	max	18,4±1,3	108,0±3,0	1,8±0,3	13,4±0,7	28,8±6,5	48,3±1,3	2,1±0,3	0,5±0,1	0,3±0,2	0,2±0,1	0,9±0,1
Chenopodium album L.	min	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces
	max	12,1±1,1	49,4±2,0	2,1±0,3	15,5±0,8	8,8±3,7	62,4±1,6	Traces	0,2±0,1	0,7±0,3	Traces	0,9±0,1
Melandrium album (Mill.)	min	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces
	max	11,7±0,8	139,0±2,8	5,1±0,4	15,4±0,6	34,8±6,0	7,5±0,4	Traces	1,3±0,2	2,7±0,5	0,9±0,1	0,4±0,1
Ranunculus repens L.	min	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces
	max	34,9±2,0	29,3±1,8	5,2±0,5	29,4±1,2	21,1±6,4	17,9±0,9	0,3±0,1	0,7±0,2	0,4±0,3	0,3±0,1	0,6±0,1
Vicia cracca L.	min	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces
	max	12,6±1,0	105,0±2,7	1,9±0,2	16,3±0,7	27,0±5,8	23,7±0,9	0,6±0,1	0,3±0,1	Traces	Traces	0,7±0,1
Artemisia absinthus L.	min	9,4±0,9	25,2±1,4	5,0±0,4	23,0±0,8	Traces	0,7±0,1	Traces	0,2±0,1	Traces	Traces	0,4±0,1
	max	14,8±1,0	73,5±2,2	7,4±0,5	33,8±1,1	46,9±8,1	2,1±0,2	1,3±0,2	0,3±0,1	0,7±0,2	1,2±0,2	0,5±0,1
Plantago major L.	min	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces
	max	9,0±0,1	43,5±1,9	1,5±0,2	16,3±0,8	36,3±7,3	21,5±0,9	0,5±0,1	Traces	Traces	Traces	0,7±0,1
Lupinus angustifolius L.	min	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces
	max	Traces	12,4±1,5	22,9±1,5	157,0±3,6	97,6±17,8	7,9±0,8	0,3±0,1	Traces	1,1±0,6	Traces	0,6±0,1
Pisum sativum L.	min	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces
	max	15,3±1,2	127±3,3	3,0±0,3	15,5±0,7	16,7±5,0	35,3±1,2	Traces	0,3±0,1	1,3±0,4	0,4±0,1	0,3±0,1
Matricaria inodora L.	min	4,7±0,6	40,7±1,7	5,8±0,5	14,0±0,6	18,6±5,6	10,4±0,6	Traces	Traces	Traces	Traces	0,3±0,1
	max	81,8±3,0	56,5±2,3	7,1±0,5	123,0±2,3	31,7±6,3	31,8±1,2	0,3±0,1	0,7±0,2	0,3±0,2	0,2±0,1	0,4±0,1
Phleum pratense L.	min	7,5±0,8	20,6±1,2	2,1±0,3	20,0±0,9	12,5±4,1	3,0±0,3	Traces	Traces	0,5±0,2	Traces	0,2±0,1
	max	15,8±1,1	50,8±2,1	2,2±0,3	25,1±0,9	34,2±7,4	8,9±0,6	0,5±0,1	1,2±0,3	1,1±0,4	0,4±0,1	0,6±0,1

Continuation table 2

Plant species	Lev-el	Chemical element										
		Mn	**Fe**	**Cu**	**Zn**	**Ba**	**Sr**	**Co**	**Pb**	**Cr**	**Ni**	**Sn**
Dactylis glomerata L.	min	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces
	max	18,6±1,3	33,4±1,7	2,1±0,3	18,5±0,8	16,3±4,9	9,0±0,6	0,3±0,1	0,7±0,2	0,3±0,2	0,5±0,1	0,5±0,1
Taraxacum officinale Wigg.	min	5,7±0,7	18,8±1,2	3,3±0,3	11,0±0,6	17,4±4,9	3,6±0,3	Traces	Traces	Traces	Traces	0,6±0,1
	max	15,7±1,1	32,4±1,6	5,7±0,5	26,2±0,9	18,0±5,1	12,8±0,6	0,3±0,1	0,2±0,1	0,5±0,2	Traces	0,7±0,1
Viola arvensis L.	min	13,5±1,0	28,6±1,4	1,6±0,2	15,8±0,7	22,0±5,4	7,9±0,5	Traces	Traces	Traces	Traces	0,6±0,1
	max	20,3±1,3	60,0±2,1	1,9±0,2	24,6±0,9	23,8±5,8	25,0±0,9	0,2±0,1	0,2±0,1	0,3±0,2	Traces	0,7±0,1
Polygonum convolvu-lus L.	min	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces
	max	10,2±0,9	80,7±2,5	3,7±0,4	22,2±0,9	10,7±3,9	16,0±0,7	1,2±0,2	1,6±0,3	1,0±0,4	0,9±0,2	0,5±0,1
Myosotis arvensis (L.)	min	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces
	max	14,8±1,1	66,3±2,3	3,5±0,4	23,1±0,9	13,4±4,4	8,8±0,5	Traces	0,4±0,1	0,5±0,2	Traces	0,4±0,1
Elytrigia repens (L.) *Nevski*	min	7,1±0,7	26,4±1,4	1,9±0,2	17,2±0,7	14,2±4,3	5,9±0,4	Traces	Traces	Traces	Traces	0,4±0,1
	max	8,7±0,8	36,9±1,6	2,5±0,3	17,7±0,7	17,4±4,6	10,5±0,6	Traces	0,2±0,1	4,5±0,8	0,6±0,1	0,5±0,1
Centaurea cyanus L.	min	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces
	max	27,8±1,6	59,6±2,2	7,1±0,5	41,6±1,2	26,9±6,4	14,3±0,7	Traces	0,7±0,2	0,7±0,3	Traces	0,6±0,1
Cirsium arvense (L.) *Scop.*	min	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces
	max	15,4±1,1	14,7±1,0	3,1±0,3	56,7±1,3	Traces	17,1±0,7	Traces	Traces	0,6±0,2	Traces	0,6±0,1
Urtica dioica L.	min	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces
	max	17,6±1,2	24,0±1,3	4,0±0,4	24,2±0,9	16,9±4,7	35,7±1,1	0,3±0,1	0,7±0,2	0,4±0,2	Traces	0,8±0,1
Hordeum distichon L.	min	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces
	max	48,6±2,5	1150± 11	1,2±0,3	3,4±0,4	123± 16	27,1±1,2	5,3±0,6	5,7±0,7	32± 3	2,0±0,4	0,4±0,1
Brassica napus L.	min	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces
	max	10,1±1,0	487,0±7,0	0,7±0,2	1,1±0,2	68,9±11,0	21,8±1,0	0,4±0,1	3,4±0,5	2,9±0,7	Traces	0,6±0,1

Table 3

Rows of bioaccumulation of heavy metals by plants in decreasing order

Mn	*Lupinus angustifolius* L. > *Convolvulus arvensis* L. > *Trifolium repens* L. > *Pisum sativum* L. > *Artemisia absinthum* L. > *Trifolium pratense* L. > *Rumex confertus* L. > *Chenopodium album* L. > *Melandrium album (*Mill.*)* > *Achillea millefolium* L. > *Artemisia vulgaris* L. > *Matricaria inodora* L.
Cu	*Lupinus angustifolius* L. > *Matricaria inodora* L. > *Melandrium album (*Mill.*)* > *Artemisia absinthum* L. > *Artemisia vulgaris* L. > *Achillea millefolium* L. > *Pisum sativum* L. > *Trifolium repens* L. > *Chenopodium album* L. > *Trifolium pratense* L. > *Convolvulus arvensis* L. > *Rumex confertus* L.
Zn	*Lupinus angustifolius* L. > *Trifolium repens* L. > *Achillea millefolium* L. > *Artemisia absinthum* L. > *Artemisia vulgaris* L. > *Trifolium pratense* L. > *Chenopodium album* L. > *Pisum sativum* L. > *Melandrium album (*Mill.*)* > *Matricaria inodora* L. > *Convolvulus arvensis* L. > *Rumex confertus* L.
Zr	*Lupinus angustifolius* L. > *Chenopodium album* L. > *Convolvulus arvensis* L. > *Rumex confertus* L. > *Pisum sativum* L. > *Trifolium pratense* L. > *Achillea millefolium* L. > *Artemisia vulgaris* L. > *Matricaria inodora* L. > *Melandrium album (*Mill.*)* > *Artemisia absinthum* L.
Pb	*Melandrium album (*Mill.*)* > *Convolvulus arvensis* L. > *Artemisia absinthum* L , *Pisum sativum* L. > *Artemisia vulgaris* L. > *Lupinus angustifolius* L. > *Chenopodium album* L. > *Rumex confertus* L. >*Trifolium repens* L. > *Trifolium pratense* L. > *Achillea millefolium* L.
Co	*Convolvulus arvensis* L. > *Artemisia absinthum* L. > *Rumex confertus* L. > *Lupinus angustifolius* L. > *Matricaria inodora* L.
Cr	*Melandrium album (*Mill.*)* > *Pisum sativum* L. > *Lupinus angustifolius* L. > *Trifolium repens* L., *Chenopodium album* L. > *Artemisia absinthum* L., > *Achillea millefolium* L. > *Artemisia vulgaris* L. > *Trifolium pratense* L. > *Convolvulus arvensis* L. > *Matricaria inodora* L. > *Rumex confertus* L.
Ni	*Melandrium album (*Mill.*)* > *Pisum sativum* L. > *Achillea millefolium* L. > *Artemisia absinthum* L. > *Lupinus angustifolius* L. > *Trifolium pratense* L. > *Convolvulus arvensis* L. > *Rumex confertus* L. > *Artemisia vulgaris* L. > *Trifolium repens* L. > *Matricaria inodora* L.
Sn	*Convolvulus arvensis* L. > *Chenopodium album* L. > *Achillea millefolium* L. > *Trifolium pratense* L. > *Trifolium repens* L. > *Lupinus angustifolius* L. > *Artemisia absinthum* L. > *Melandrium album (*Mill.*)* > *Matricaria inodora* L. > *Rumex confertus* L. >*Artemisia vulgaris* L. > *Pisum sativum* L.

Summary

1. In each agrophytocenosis applied cultivation technology creates its own specific conditions leading to the formation of cultural and biological diversity of segetal plant species. On the fallow cropland area due to termination of the economic use of arable land the initial stages of successional vegetation change by newly forming postcultural ecosystem was found which is expressed by a change in species richness of plant communities by perennials.

2. Concentration of chemical elements in plants on conditionally clean soil (background) depends essentially on the taxon and plant species, as well as the type of phytocenosis and applied technologies of cultivation. In general it does not exceed background levels, at the same time in the experiments selective ability of individual plant species to accumulate certain heavy metals was found. Segetal plants demonstrated low content of microelements and heavy metals, which can be explained by their higher adaptive capacity compared to the cultivated species.

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ТРАНСФОРМАЦИЯ ХИМИЧЕСКОГО СОСТАВА СОРНЯКОВ

В ходе проведенных исследований установлено, что применяемые технологии возделывания сельскохозяйственных культур создают специфические условия, способствующие формированию биологического разнообразия сорных растений. Показано, что содержание химических элементов в сорняках существенно зависит от таксона и вида растений, а также от типа агрофитоценоза и применяемых технологий. В целом, оно не превышает фоновых значений, в то же время в опытах отмечена избирательная способность некоторых видов растений к накоплению тяжелых металлов.