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Сорные растения в посевах кукурузы в Белгородской области

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Видовой состав сорных растений в посевах кукурузы, возделываемой в разных регионах Российской Федерации, не идентичен. Это значительно повышает роль регионального фитосанитарного мониторинга посевов, обусловливающего разработку прогноза для принятия решений по выбору конкретных агротехнических и химических мер борьбы с сорными растениями. Выявлен видовой состав сорных растений в посевах кукурузы в Белгородской области и разработан многолетний прогноз их произрастания в данных агрофитоценозах. Материалом для проведения исследования послужили данные фитосанитарного мониторинга состояния посевов кукурузы в Белгородской области в 2020, 2021 гг. Возможность создания регионального прогноза обусловлена масштабом полевых исследований (обследовано 40 полей в разных районах Белгородской области). Достоверность результатов определена использованием апробированной в многолетней практике методики обследования полей. Научное обоснование стабильности произрастания выявленных видов сорных растений на территории Белгородской области обеспечивает разработку регионального прогноза на длительную временную перспективу. Зарегистрировано 32 вида сорных растений, среди которых преобладают малолетние виды (65,63%). Фитосанитарная роль каждого вида выявлена путем определения активности каждого в ценофлоре агрофитоценозов. Группа высокоактивных видов сорных растений включает ежовник обыкновенный, марь белую, щетинник сизый, паслен черный, бодяк седой, гречишку вьюнковую, щирицу назадзапрокинутую. В довольноактивные виды входят вьюнок полевой, осот полевой, спорыш птичий. Группа малоактивных включает 13 видов: полынь обыкновенную, дурнишник обыкновенный, сурепку дуговидную, чистец однолетний, дескурайнию Софии, горошек мышиный, мальву маленькую, сокирки великолепные, циклахену дурнишниколистную, латук компасный, лебеду раскидистую, горец перечный, трехреберник непахучий. Выявлено девять неактивных видов, изредка регистрируемых в посевах кукурузы. Распределение видового состава по группам разного статуса активности будет сохранено в длительной временной перспективе при условии неизменности состояния гидротермических условий, сохранении структуры посевных площадей и соблюдении особенностей региональной технологии возделывания кукурузы и системы защитных мероприятий.

Ключевые слова: мониторинг, активность видов, многолетний региональный прогноз

Weeds in corn crops in the Belgorod region

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The species composition of weeds in corn crops cultivated in different regions of the Russian Federation is not identical. This fact significantly increases the role of regional phytosanitary monitoring of crops, which leads to the development of a forecast for making decisions on the choice of specific agrotechnical and chemical measures to combat weeds. The species composition of weed plants in corn crops in the Belgorod region was identified and a multi-year forecast of their growth in these agrophytocenoses was developed. The data of phytosanitary monitoring of corn crops in the Belgorod

region in 2020, 2021 were used as the material for the study. The possibility of creating a regional forecast is due to the scale of field research (40 fields were surveyed in different areas of the Belgorod region). The reliability of the results is determined by the use of the field examination method tested in long-term practice. The scientific justification of the stability of the growth of the identified species of weeds in the Belgorod region ensures the development of a regional forecast for a long-time perspective. Thirty-two species of weed plants were recorded, among which annual species predominate (65.63%). The phytosanitary role of each species was revealed by determining the activity of each in the cenoflor of agrophytocenoses. A group of highly active weed species include barnyard millet, lamb's-quarters, yellow foxtail, black nightshade, sow thistles, wild buckwheat, redroot. Rather active species include: corn bindweed, milk thistle, black bindweed. The group of little active includes 13 species: sagebrush, common cocklebur, rocket cress, hedge-nettle betony, tansy mustard, bird vetch, mallow, forking larkspur, sumpfweed, prickly lettuce, common arache, water pepper, wild chamomile. Nine inactive species were identified and occasionally recorded in corn crops. The distribution of species composition by groups of different activity status will be preserved in a long time period, provided that the state of hydrothermal conditions is unchanged, the structure of sown areas is preserved, and the peculiarities of regional technology of maize cultivation and the system of protective measures are observed.

Keywords: monitoring, species activity, multi-year regional forecast

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INTRODUCTION

Corn (*Zea mays* L.) is a widely grown forage crop in many countries around the world, also grown for grain. In the Russian Federation, corn crops for forage occupy 1,261.4 thousand hectares, of which 400.1 thousand hectares are in the Central Federal District (CFD), and 41.2 thousand hectares are in the Belgorod Region, which is part of this district. Fully ripe corn crops for grain occupy much larger areas: 1,845.2 thousand hectares in the Russian Federation, 850.6 thousand hectares in the CFD, and 96.2 thousand hectares in the Belgorod Region[1].

Harmful objects in agricultural crops reduce the yield by more than 35%, with 9.5% of losses due to weeds [1]. The problem of weed infestation of corn crops, like any cultivated crop, is relevant both in Russia and abroad [2–6]. In the Russian Federation, corn crop losses due to

[1]Cultivated areas of the Russian Federation in 2023 // Federal State Statistics Service (Rosstat). https://rosstat.gov.ru/storage/mediabank/posev-4cx_2023.xlsx (date of reference 20 February 2024).

weeds average about 25%[2]. In 2021 and 2022, the area of weed infestation of corn crops in the Russian Federation exceeded 2,000 thousand hectares, in 2023 it decreased to 1,311.3 thousand hectares, but in 2024 it increased again to 1,611.59 thousand hectares[3]. It is indicated that the numerical composition of biological groups of weeds representing the destructive part of agrophytocenoses in corn crops is not the same in different federal districts on the territory of the European part of the Russian Federation (see footnote 3) (see Table 1).

These data are important for tracking the development trends of segetal flora in the regions and the characteristics of the formation of the types of weed infestation that occur when species from different biological groups are combined, but are less suitable for plant protection practice, since the same group in different regions may include different types of weeds that require different herbicide solutions [7].

Analysis of scientific publications shows differences in the composition of commonly encountered weed species in corn crops grown in different regions of the Russian Federation. Such species as lamb's-quarters (*Chenopodium album* L.), barnyard grass (*Echinochloa crus-galli* (L.) Beauv.), green amaranth (*Amaranthus retroflexus* L.), green bristlegrass and yellow foxtail (*Setaria viridis* (L.) Beauv. s. l., *Setaria pumila* (Poir.) Roem. et Schult.) are the dominant weeds in corn crops in the southern regions of the European part of the Russian Federation[4] (see footnote 2) [8, 9], in the irrigated zone of the Volga Delta [10], in the middle part of the Central Federal District [1, 12], in the Lower Volga region [13], in the south of the Non-Black Earth Zone [14]. In the southern regions, the species composition of weeds is replenished with common ragweed (*Ambrosia artemisiifolia* L.), common cocklebur (*Xanthium strumarium* L.) and China jute (*Abutilon theophrastii* Medik.) (see footnote 3) [9], moreover, common ragweed is not indicated for the Volga Delta [9]. In addition to these species, corn crops in Kabardino-Balkaria are contaminated with Johnson

Табл. 1. Преобладающие биологические группы сорных растений в отдельных федеральных округах, шт./м²

Table 1. Predominant biological groups of weed plants in individual federal districts, pcs./m²

Group of weeds	Federal District			
	Central	Southern	North Caucasian	Volga
Spring: early	4,4	2,1	3,6	2,7
late	8,3	3,2	6,7	5,4
Dormant	0,5	0,1	0,7	0,2
Biennial	0,3	–	0,1	–
Taproot plants	0,02	–	0,01	0,05
Rootstock plants	0,3	–	1,6	0,3
Root-sucker plants	1,9	0,2	2,9	1,9

[2]*Nakaev S.M.A., Okazova Z.P.* Dominant weeds and their harmfulness in corn crops // Modern Science Success, 2017, vol. 2, N 12, pp. 199–201.

[3]Review of the phytosanitary condition of agricultural crops in the Russian Federation in 2023 and a forecast for the development of harmful objects in 2024. Moscow, 2024. 1281 p.

[4]*Mysnik E.N., Zakota T.Yu.* The structure of the species composition of weeds in corn crops in the steppe zone of the Krasnodar Territory // Bulletin of Plant Protection. 2018. N 4 (98). pp. 50–53.

grass (*Sorghum halepense* (L.) Pers.), couch grass (*Cynodon dactylon* (L.) Pers.), arched winter cress (*Barbarea arcuata* (Opiz ex J. et C Presl) Reichb.) and common horsetail (*Equisetum arvense* L.) [8]. Black nightshade is often found in corn crops in the Volga Delta (*Solanum nigrum* L.), trailing hollyhock (*Hibiscus trionum* L.), mountain bluet (*Acroptilon repens* (L.) DC.), corn bindweed (*Convolvulus arvensis* L.) and couch grass (*Elytrigia repens* (L.) Nevski) [10]. In the middle part of the Central Federal District, in addition to species that contaminate corn crops in all regions of its cultivation in the European part of the Russian Federation, there are species such as common spurrey (*Spergula arvensis* L.), corn gromwell (*Lithospermum arvense* L.), shepherd's purse (*Capsella bursa-pastoris* (L.) Medik.), German camomile (*Tripleurospermum inodorum* (L.) Sch. Bip.), field pansy (*Viola arvensis* Murray) [11], as well as cleavers (*Galium aparine* L.), common fumitory (*Fumaria officinalis* L.), field pennycress (*Thlaspi arvense* L.) [12]. Corn bindweed and field milk thistle are also registered here (*Sonchus arvensis* L.), grey thistle (*Cirsium incanum* (S.G. Gmel.) Fisch.) [12] is also often found in corn crops in the Lower Volga region and in the south of the Non-Black Earth Zone [12–14].

In the south of the Non-Chernozem zone, common horsetail and pinweed are often found. (*Erodium cicutarium* (L.) L'Herit.), Canada fleabane (*Erigeron canadensis* L.), types of hemp-nettles (*Galeopsis* spp.), clown's woundwort (*Stachys palustris* L.) [14]. A similar picture, showing differences in the species composition of weeds that are problematic in crops of one crop grown in different regions, also characterizes winter wheat crops [15], which determines the relevance of regional studies.

In plant protection practice, the development of a set of protective measures in a separate agroecosystem is based on the results of monitoring the species composition and number of weeds in individual fields within its boundaries, and is therefore suitable for the fields of a given agroecosystem [16]. Conducting phytosanitary monitoring simultaneously in several farms in one region allows us to draw a conclusion about the contamination of all or individual crops in this region [17]. To characterize the phytosanitary situation of crops in a region or area, large-scale phytosanitary monitoring covering a large number of fields is necessary. An objective assessment of the phytosanitary situation in agrocenoses determines the forecast of the further presence of harmful objects in them. A phytosanitary forecast is a "probabilistic scientifically substantiated judgment on the dynamics of populations of harmful objects in the future, based on the patterns identified in the past" [18]. The subject of the forecast is the dynamics of not only the number, but also the species composition of the destructive part of agrophytocenoses, and the reliability of the forecast depends on the reliability and scale of the monitoring results. The regional forecast scientifically predicts the presence, at least in the next field season, of a complex of weeds identified in the current season. It is possible to give a forecast of the presence in the agrophytocenoses of the region for a period of a number of years only for those species of weeds whose stable growth in this region is scientifically substantiated.

Weeds are wild plants of secondary habitats [19], therefore the ranges of species, as well as regional species complexes, are formed in accordance with the level of heat and moisture supply of the territory and the level of requirements of each individual species for heat and moisture factors[5]. On this basis, an ecological-geographical analysis is carried out, which is used in studying the distribution of weeds[6]. Using this analysis, a complex of weeds was previously identified for which the territory of the Belgorod region is optimally suited in terms

[5]*Alekhine V.V., Kudryashov L.V., Govorukhin V.S.* Plant geography with the basics of botany. Moscow: Uchpedgiz, 1961, 532 p.

[6]*Gillham J.H., Hild A., Johnson J.H., Hunt E.R. Jr., Whitson T.D.* Weed invasion susceptibility prediction (WISP) model for use with geographic information systems. Arid land research and management. 2004. Vol. 18. Is. 1. P. 1–12. DOI: 10.1080/15324980490244933.

of heat and moisture supply[7]. The complex of weeds that forms agrophytocenoses in the crops of a separate crop represents cenoflora as a division of segetal flora and, like all weed flora, can be predicted for the territory of the Belgorod region in a significant time perspective [15, 19].

The purpose of the study is to identify the species composition of weeds in corn crops in the Belgorod region and to develop a long-term forecast of their growth in these agrophytocenoses.

The research objectives are:

– to monitor corn crops;

– to systematize the data, establish the species composition of weeds;

– to determine the degree of activity of species in crops.

MATERIAL AND METHODS

The object of the study is the species composition of weeds in agrophytocenoses of corn crops in the Belgorod region. The material for the study was the data of phytosanitary monitoring of the state of corn crops in the Belgorod region in 2020, 2021. Monitoring (40 fields were surveyed) was carried out in accordance with the methodology of geobotanical survey of crops in relation to weeds[8].

The materials are systematized using a specialized database "Weeds of the fields of the Russian Federation"[9]. The taxonomic structure of the species composition was established by the method of floristic analysis[10]. The names of taxa are given in accordance with the floristic summary compiled for plant protection practitioners[11].

The phytosanitary role of weed species in corn crops was revealed by determining their activity in agrophytocenoses using the method of T.A. Palkina[12]. According to the methodology, the activity of a species in the formation of agrocenoses in crops of one culture (partial) was determined taking into account two indicators: the constancy of the occurrence of this species in the crops of a given culture and the average projective cover in the cenoflora.

Six classes of occurrence constancy were identified: 1st class: the species was found in less than 10% of fields, 2nd – in 10–20, 3rd – in 21–40, 4th – in 41–60, 5th – in 61–80, 6th – in 81–100% of fields.

Abundance classes were identified based on the projective cover of the species in the communities: 1st class – single plants, 2nd – abundance less than 0.5%; 3rd – abundance 0.5–1.0, 4th – abundance 1.1–2.0, 5th – abundance 2.1–5.0, 6th – abundance more than 5%. Based on the combination of these indicators, weed species were divided into 6 categories (1 – particularly active, 2 – highly active, 3 – moderately active, 4 – fairly active, 5 – slightly active, 6 – inactive) in accordance with the scale given in Table 2.

RESULTS AND DISCUSSION

Low foxtail and unidentified foxtail species have been recorded in corn crops. In the plant protection system, closely related species that require the same control measures are often grouped together, such as "vetch species", "hemp nettle species" or "foxtail *Setaria* L." Therefore, these species were combined for analysis into a group of "foxtail species" and

[7]*Luneva N.N., Fedorova Yu.A.* Ecological and geographical substantiation of the formation of a species complex of weeds in the Belgorod region // Biological species in the structural and functional hierarchy of the biosphere: Proc. XV int. scientific and practical. ecological conf. (Belgorod, October 8-12, 2018). Belgorod: National Research University "BelSU", 2018, pp. 104-108.

[8]*Luneva N.N.* Technological methods of accounting and monitoring of weeds in agroecosystems // High-performance and high-precision technologies and methods of phytosanitary monitoring. St. Petersburg: All-Russian Research Institute of Plant Protection, 2009, pp. 39–56.

[9]*Mysnik E.N., Luneva N.N., Sokolova T.D., Nadtochiy I.N.* Weeds of the fields of the Russian Federation. Database registration certificate No. 2021522847 dated 09.12. 2021.

[10]*Tolmachev A.I.* Methods of comparative floristics and problems of florogenesis. Novosibirsk: Nauka, 1986, 195 p.

[11]*Luneva N.N., Mysnik E.N.* Modern botanical nomenclature of weed species of the Russian Federation // Supplements to the journal " Plant Protection News", 2018. Vol. 26. 80 p. DOI: 10.5281/zenodo.1241599.

[12]*Palkina T.A.* Structure of segetal flora of Ryazan region // Herald of Ryazan state agrotechnological university named after P. A. Kostychev, 2015, N 27 (3), pp. 26–32.

Табл. 2. Баллы парциальной активности видов растений сегетальной флоры в агрофитоценозах культуры (см. сноску 12)

Table 2. Partial activity scores of plant species of segetal flora in agrophytocenoses of the culture (see footnote 12)

Abundance score	Projective cover, %	Activity score in the persistency class					
		VI	V	IV	III	II	I
		81–100	61–80	41–60	21–40	10–20	< 10
6	> 5	1	1	2	3	4	5
5	2,1–5,0	2	2	3	4	4	5
4	1,1–2,0	2	2	3	4	4	5
3	0,5–1,0	3	3	4	5	5	5
2	< 0,5	4	4	4	5	5	6
1	Sporadically	5	5	5	5	6	6

considered as one species.

As a result of processing the data obtained during the survey of corn fields in the Belgorod region, 32 species of weeds from 30 genera and 17 families were identified, which is indicated in Table 3.

The presented systematic spectrum, the leading families of which are Compositae, Cruciferae, Polygonaceae, Gramineae and Chenopodiaceae, differs from the composition of the leading families of the taxonomic spectrum of agrophytocenoses of winter wheat crops in the Belgorod region by the presence of the Chenopodiaceae family instead of the Leguminosae family [15]. This indicates both the unity of the segetal flora of the Belgorod region and the differences between its constituent coenofloras. The majority (70.59%) of the families are represented by one genus and one species. Taxonomic diversity is expressed by the following average indicators: the number of species in a family is 1.88, the number of genera in one family is 1.76, the number of species in one genus is 1,07.

Phytocenotic activity, showing the phytosanitary role of each type of weed in agrophytocenoses of corn crops, is presented in Table 4.

Analysis of the identified species by lifespan showed that annual weed species predominate (65.63% are annual and biennial species). The

Табл. 3. Структура сорного компонента в агрофитоценозах посевов кукурузы в Белгородской области (2020, 2021 гг.)

Table 3. Structure of weed component in agrophytocenoses of corn crops (Belgorod region, 2020, 2021)

Weed plant family	Number in the family	
	types	genera
Composite plants (Compositae Giseke)	11	8
Cruciferous plants (Cruciferae Juss.)	4	4
Buckwheat plants (Polygonaceae Juss.)	3	3
Gramineous plants (Gramineae Juss.)	2	2
Goosefoot family (Chenopodiaceae Vent.)	2	2
Bindweed family (Convolvulaceae Juss.)	1	1
Legumes (Leguminosae Juss.)	1	1
Amaranthaceous (Amaranthaceae Juss.)	1	1
Poppy family (Papaveraceae Juss. (incl. Fumariaceae DC.))	1	1
Parsley family (Umbelliferae Juss.)	1	1
Heliotrope family (Boraginaceae Juss. (incl. Hydrophyllaceae R. Br.))	1	1
Equisetaceous plants (Equisetaceae Michx. ex DC.)	1	1
Mallow family (Malvaceae Juss.)	1	1
Labiate family (Labiatae Juss.)	1	1
Figwort family (Scrophulariaceae Juss. s. l. (incl. Orobanchaceae Vent.))	1	1
Nightshade family (Solanaceae Juss.)	1	1
Crowfoot family (Ranunculaceae Juss.)	1	1

perennial group includes 10 species: corn bindweed, milk thistle, sagebrush, gray sow thistle, field falcaria, common wormwood, arched winter cress, common horsetail, bird vetch, common toadflax, small mallow.

No particularly active weed species were identified in corn crops. The group of highly active species in corn crops consisted of seven weed species. Barnyard grass, lamb's-quarters and foxtail species had high (95.00–100.00%) rates of occurrence and projective cover (3.81–4.69%) in the surveyed fields. Black nightshade, grey sow thistle, wild buckwheat and pigweed had slightly lower incidence and projective cover rates: 65.00–80.00 and 1.32–3.44%, respectively. Moderately active weed species were

Табл. 4. Виды сорных растений и статус их активности в посевах кукурузы в Белгородской области (2020, 2021 гг.)
Table 4. Weed plant species and their activity status in corn crops (Belgorod region, 2020, 2021)

Type of weed plants	Occurrence, %	Occurrence constancy class	Projective cover	Abundance class	Activity category	Activity status
Foxtail types (*Setaria* spp.)	100,00	VI	4,69	5	2	HA
Lamb's quarters (*Chenopodium album* L.)	97,50	VI	3,81	5	2	HA
Barnyard grass (*Echinochloa crusgalli* (L.) Beauv.)	95,00	VI	3,84	5	2	HA
Green amaranth (*Amaranthus retroflexus* L.)	80,00	V	3,44	5	2	HA
Black bindweed (*Fallopia convolvulus* (L.) A. Löve)	75,00	V	1,32	4	2	HA
White-felted thistle (*Cirsium incanum* (S.G. Gmel.) Fisch.)	67,50	V	1,22	4	2	HA
Black nightshade (*Solanum nigrum* L.)	65,00	V	3,14	5	2	HA
Hedge-nettle betony (*Stachys annua* (L.) L.)	35,00	III	0,22	2	5	LA
Tansy mustard (*Descurainia sophia* (L.) Webb ex Prantl)	35,00	III	0,10	2	5	LA
Corn bindweed (*Convolvulus arvensis* L.)	32,50	III	1,49	4	4	QA
Arched winter cress (*Barbarea arcuata* (Opiz ex J. et C Presl) Reichb.)	30,00	III	0,78	3	5	LA
Common cocklebur (*Xanthium strumarium* L.)	30,00	III	0,73	3	5	LA
Sagebrush (*Artemisia vulgaris* L.)	30,00	III	0,10	2	5	LA
Sumpfweed (*Cyclachaena xanthiifolia* (Nutt.) Fresen.)	17,50	II	1,07	3	5	LA
Forking larkspur (*Consolida regalis* S.F. Gray)	17,50	II	0,10	2	5	LA
Field milk thistle (*Sonchus arvensis* L.)	15,00	II	1,20	4	4	QA
Little mallow (*Malva pusilla* Smith.)	15,00	II	0,10	2	5	LA
Knotgrass (*Polygonum aviculare* L. s. str.)	10,59	II	9,20	6	4	QA
bird vetch (*Vicia cracca* L.)	10,00	II	0,06	2	5	LA
German camomile (*Tripleurospermum inodorum* (L.) Sch. Bip.)	7,50	I	1,50	4	5	LA
Field falcaria (*Falcaria vulgaris* Bernh.)	7,50	I	0,10	2	6	NA
Water pepper (*Persicaria hydropiper* (L.) Delarbre)	5,00	I	7,80	6	5	LA
Common orache (*Atriplex patula* Bouscher ex DC.)	5,00	I	0,98	3	5	LA
Prickly lettuce (*Lactuca serriola* L.)	5,00	I	0,50	3	5	LA
Spiny annual sow thistle (*Sonchus asper* (L.) Hill.)	5,00	I	0,12	2	6	NA
Common fumitory (*Fumaria officinalis* L.)	5,00	I	0,10	2	6	NA
Common horsetail (*Equisetum arvense* L.)	5,00	I	0,01	2	6	NA
Field pennycress (*Thlaspi arvense* L.)	2,50	I	0,10	2	6	NA
Common wormwood (*Artemisia absinthium* L.)	2,50	I	0,10	2	6	NA
Shepherd's purse (*Capsella bursa-pastoris* (L.) Medik.)	2,50	I	0,10	2	6	NA
Field scorpion grass (*Myosotis arvensis* (L.) Hill)	2,50	I	0,10	2	6	NA
Common toadflax (*Linaria vulgaris* Mill.)	2,50	I	0,10	2	6	NA

Примечание. ОА – особоактивные виды, ВА – высокоактивные, СА – среднеактивные, ДА – довольноактивные, МА – малоактивные, НА – неактивные виды.

not identified in corn crops. The group of fairly active species consisted of three species: corn bindweed, field sow thistle and bird's knotweed. Corn bindweed has a higher occurrence rate (32.50%), and bird's knotweed has a projective cover (9,20%).

The group of low-active species in corn crops consisted of 13 species of weeds. Common wormwood, common cocklebur, arched winter cress, hedge-nettle betony and Sofia tansy mustard had a frequency of occurrence in the surveyed fields of 30.00–35.00% with a projective cover of 0,10–0,78%. Bird vetch, small mallow, forking larkspur, sumpfweed had a lower occurrence (10.00–17.50%) with a projective cover of 0.06–1.07%. Prickly lettuce, common orache, water pepper and wild chamomile were found in an even smaller number of fields (5.00–7.50%) with a projective cover of 0,50–7,80%.

The group of inactive species in corn crops consisted of nine weed species: field falcaria, rough sow thistle, common fumitory, common horsetail, field pennycress, common wormwood, shepherd's purse, field forget-me-not and common toadflax. In the surveyed fields, they had low rates of occurrence and projective cover: 2.50–7.50 and 0.01–0.12%, respectively.

For 29 out of 32 weed species infesting corn crops in the Belgorod Region, this territory is suitable for growth in terms of heat and moisture supply (see footnote 7). It is not possible to prove the suitability of the survey territory for the growth of three more weed species identified in corn crops (common wormwood, common orach, small mallow) using the method of eco-geographical analysis due to the lack of electronic maps of their distribution. However, the regular occurrence of these species during monitoring allows them to be included in the composition of the cenoflora of corn crops in the Belgorod Region. Not all of the identified species have high phytosanitary significance; the most widespread and abundant in the agrophytocenoses of this crop are the seven highly active and three fairly active species named above.

CONCLUSION

1. The identified composition of the cenoflora of agrophytocenoses of corn crops in the Belgorod region is stable and predictable in the long term (long-term regional forecast). The species composition and distribution of species by groups of different activity status will be preserved if the state of hydrothermal conditions in the region does not change and the structure of crop areas is preserved, and regional agrotechnology for corn cultivation and a system of protective measures are applied.

2. The results were obtained based on the survey of a large number of fields; therefore, they are of an average nature, i.e. not all identified species are present and will continue to grow in all fields under corn crops. This significantly increases the role of phytosanitary monitoring at the level of individual agroecosystems to identify which of the species predicted in agrophytocenoses of corn crops grow in a given farm, and to promptly track the introduction of species from other regions.

3. The obtained results are important for developing a long-term regional forecast of the growth of the identified complex of weeds in corn crops in the Belgorod region, on the basis of which it is possible to adjust the regional system of protective measures in this crop. Knowledge of the species composition of high phytosanitary significance is important for planning the purchase of means of protecting corn crops from weeds on a regional scale. Knowledge of the species composition of the entire complex of weeds in corn crops is important for tracking the changes that may occur when the structure of crop areas and the melioration system are disrupted.

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