

Role of Irrigation for Field Crops Entomocoenoses Stabilization in Irrigated Agricultural Landscapes of the Lower Volga Region

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Abstract — the article presents materials of long-term studies (1988 - 2018) devoted to solving regulation issues of phytosanitary situation in irrigated agrocenoses. The paper outlines the results of studying species abundance and number of insects, patterns of their change under the influence of irrigation in the Lower Volga region. Authors confirmed the formation of mesophytic microclimate parameters under the influence of irrigation, which is one of the leading factors determining the increase in biodiversity of entomocomplexes of irrigated agrocenoses due to the increase in species abundance and number of insects: mesophiles and hygrophilas. The study also shows an increase in species diversity and number of mesophiles and hygrophilas in irrigated agricultural landscapes due to the appearance of additional microhabitats (canals, storage ponds, spillways, etc.). The paper reveals the formation mechanism of polydominant entomological communities in irrigated conditions, which increase the balance of agroecosystem, including optimizing its trophic structure. A changing ecological situation in irrigated agricultural landscapes results in plants cultivation with optimized physiological parameters; in the irrigation conditions, biological features of harmful and beneficial insects development change as well. It is noted that in irrigation conditions, due to a more favorable ratio between pests and beneficial entomofauna, entomocomplexes' self-regulating ability increases. At the same time, the pesticide load on irrigated agricultural landscapes is reduced by 40-50 %.

Keywords: *entomocomplexes, irrigation, microclimate, agrolandscapes, phytophages, entomophages*

I. INTRODUCTION

The importance of plant protection in agricultural systems is determined by significant losses of agricultural products due to phytophages, annually reaching up to 35 % depending on the crop type [1, 2].

Irrigated conditions are the most relevant solution to this problem, which is associated with water and food regimes optimization. This, according to VA. Minoransky [3] and D. M. Mailafiya [4], promotes both growth of field cultures productivity, and increase in harmfulness of phytophages. Significant areas of irrigated land in the South-East of Russia necessitate a comprehensive scientific and practical assessment of the impact of controlled anthropogenic factors, with irrigation as one of the most important among them, on peculiarities of formation of the entomocomplexes' composition and structure, their trophic structure, determining the place and role of harmful insects in it, causing significant damage to the crop, as well as search for means of controlling their numbers in order to reduce harmfulness.

Our research was aimed at solving these issues.

II. MATERIALS AND METHODS (MODEL)

We studied entomocomplexes of field crops in agricultural landscapes with irrigation and without irrigation in 1988-2018. Irrigation influence on entomocomplexes was evaluated in specialized grain-feed crop rotations at the Federal state unitary enterprise "Oroshayemoye", which is a scientific and experimental base of All-Russian Research Institute of Irrigated Agriculture, located 20 km west of Volgograd.

Species composition and population dynamics of phyto level's phytophages and entomophages were determined by mowing with entomological net according to generally accepted methods [5]; soil traps of Barber were used for herpetobium fauna [6]. Estimation was carried out weekly from April to October. Dominance structure was determined by standard criteria: dominants – 5% or more, subdominants – 2-5 %, rare species – less than 2 %.

All evaluations were conducted simultaneously in agroecosystems with and without irrigation.

III. RESULTS AND DISCUSSION

The concept of ecological system of agricultural crops protection involves stabilization of agrobiosphere's own resistance [7, 8, 9]. Ecological protection of plants is aimed not at destruction of harmful species, but at formation of ecologically stable agroecosystems in order to optimize phytosanitary condition of agrobiocenoses. The system includes the following elements – first, timely information on biotic and phytosanitary condition of crops, ecological characteristics of variety, high-performance technology of its cultivation. All these factors greatly affect the formation of entomocoenoses. And as a final indicator – a reasonable and timely use of active products of plant protection.

The scheme of ecological protection of plants considers all available factors for phytophages number control. It is based on adaptive landscape system of agriculture, with its main elements: structure of acreage, crop rotations, tillage system, varieties, etc.). At the same time, all phytosanitary measures complement the impact of main factors of the system in cases of insufficiently effective suppression of phytophages by agrotechnical or organizational and economic measures. Special pest control measures should be planned and implemented regarding actual and expected environmental situation, which is optimized by technological methods. Thus, it is important to consider carefully each element of technology, to determine its role in plant protection. This is of particular concern in the field crops cultivation under irrigation, as main factors affecting biological characteristics, number and harmfulness of phytophages, availability of moisture and nutrients to plants, temperature and humidity optimization in herbage are regulated in a much larger range than without irrigation. This, of course, increases the resistance of plants.

In general, we may say that the system of agriculture adopted in a particular region, including organizational, economic and agrotechnical measures, irrigation, maintenance of water and food regimes of soil, environmentally safe systems of plant protection from harmful organisms, can have a controlling effect on ecosystems.

In arid conditions of the South-East of Russia complex cultivation of lands based on irrigation is the most important factor for agroecosystems stabilization, as well as biota optimization; they occupy now more than 5 % of the area of plowed lands [10].

The result of studies of meteorological indicators registered by us during the thirty-year period involves data of microclimate parameters in the phyto level of alfalfa agroecosystem at an altitude of up to 1 m. Microclimatic parameters of air temperature and humidity differ significantly for variants with and without irrigation. Thus, air temperature in the surface layer of non-irrigated alfalfa crops exceeds the temperature in irrigated agroecosystem by 7-8^oC within 3-4 days after sprinkling. Temperature difference was gradually smoothed in irrigated and non-irrigated alfalfa herbage in the period before next irrigation, but on average during the growing season (April – October), average daily air temperatures in irrigated agroecosystems decreased by 2-4 ^oC. At the same time, in irrigated areas, we

registered an increase by 20% in relative humidity in alfalfa herbage and a significant decrease in daily temperature amplitude. In general, it can be noted that herbage of irrigated crops forms a microclimate that is more comfortable for insects – the inhabitants of phyto level and herpetobium.

Thereby, in arid areas irrigation can be attributed to the leading factor for optimizing the biota habitat in agroecosystems, and, accordingly, preservation and, to some extent, expansion of its biodiversity due to the increase in species diversity and number of insects: mesophiles and hygrophils. Further, for irrigation conditions, we revealed a differentiated association of species, in particular, nodule weevils to certain microclimatic conditions. In non-irrigated crops, in alfalfa agroecosystems among dominant species of nodule weevils *Sitona crinitus* Hbst. and *S. lineatus* L. xerophilic species *S. crinitus* Hbst. make up 100% of the harvest collected, and in irrigation conditions, part of the ecological niche is occupied by the species *S. lineatus* L.

The emergence of additional microhabitats in agricultural landscapes with irrigation, which include canals, storage ponds, spillways, etc., and resulting increase in the overall diversity of insect habitat conditions lead to the growth of species diversity and number of meso- and hygrophils. Thus, in irrigated agricultural landscapes there are ecologically comfortable conditions favorable for the habitat of these groups: Hygrophils are observed in near-water habitats, xerophiles are concentrated in non-irrigated areas, as a result, there is a significant increase in biological diversity of entomological communities.

Due to many year studies, All-Russian Research Institute of Irrigated Agriculture obtained data showing the increase in balance of agroecosystem, its capacity for self-regulation in context of irrigation, which is associated with increasing the diversity of its constituent elements and formation of grass structure of communities in contrast to oligo- and monodominant communities of non-irrigated (rain-fed) agriculture. According to our research, mainly invertebrates (insects) form total biodiversity of the zoo component of ecosystems. They predominate both in species composition and in numerical abundance (about 80-85 % of the total animal population).

In terms of entomofauna study in agricultural landscapes with irrigation for the Lower Volga region, we recorded 1,712 species, of which 1,432 species are indicated for agroecosystems of field crops cultivated under irrigation conditions: 1,579 species are recorded in adjacent zonal and intrazonal habitats. In non-irrigated agroecosystems, species composition of insects is much poorer – 982 species. Entomocomplexes of irrigated maize crops are represented by 771 species, while without irrigation, 514 species of insects are recorded on them, there are 809 and 743 species in potato fields, respectively, and 870 and 732 species – within grain crops. Crops of perennial legumes and grasses accumulate the maximum number of species. 1,249 species have been recorded here under irrigation, and 920 – in non-irrigated areas.

In addition to diversity, their structural organization is an important factor affecting stability of communities, primarily, it is diversity of groups of high rank-abundance species (dominant ones). It is noted that stability of entomocomplexes increases significantly with the transition

from mono- to polydominant structure [11, 12, 13]. The most diverse composition of dominant groups in the region is characterized by entomocomplexes formed on irrigated multicomponent mixtures planting; here they include up to 76 species, abundance of which exceeds the 5% barrier. In non-irrigated agrocenoses, the number of dominant species is much lower (45), indicating greater lability of such communities. Based on this criterion, the least stable communities are formed on row crops planting, in particular, maize, where the main core of entomocomplex under irrigation includes 27 species, and in non-irrigated agrocenoses – only 14.

A polydominant complex is the main core of entomocomplex of perennial legumes consisting of 50 dominant species, the number of which in the collected harvest exceeded 5 %: *Aphis crassivora* Koch., *Acyrtosiphon pisum* Harris., *Nabis ferus* L., *Orius niger* Wolff., *Polymerus cognatus* Fieb., *P. vulneratus* Pz., *Lygus pratensis* L., *Adelphocoris lineolatus* Gz., *Dolycoris baccarum* L., *Aeolothrips intermedius* Bagn., *Kakothrips robustus* Uz., *Thrips tabaci* Lind., *Poecilus puncticollis* Dej., *Harpalus rufipes* De Geer., *Silpha obscura* L., *Margarinotus bipustulatus* Schrank., *Amphimallon solstitialis* L., *Agriotes gurgistanus* Fald., *A. medvedevi* Dol., *Malachius aeneus* L., *Adonia variegata* Gz., *Coccinella septempunctata* L., *Plagionotus floralis* Pall., *Apion apricans* Hbst., *Stenoptera pumilio* Kby., *Sitona callosus* Gyll., *S. crinitus* Hbst., *S. lineatus* L., *Phytonomus variabilis* Hbst., *Tychius flavus* Beck., *Pyrausta sticticalis* L., *Heliothis virescens* Hfn., *Chrysopa carnea* Steph., *Bathyplectes curculionis* Thoms., *Pimpla instigator* F., *Andrena figurata* Latr., *Melitturga clavicornis* Latr., *Halictus petellatus* F., *H. robicundus* Christ., *Rhopitoides canus* Ev., *Eucera clypeata* Erichs., *Habrocytus microgasteris* Kurd., *Bruchophagus roddi* Guss., *Tetrastichus bruchophagii* Ash., *Telenomus strelzowi* Vassil., *Contarinia medicaginis* Kff., *Dasyneura ignorata* Wachtl., *Jaapiella medicaginis* Rubs., *Syrphus ribesii* L., *Metasyrphus corollae* F., *Tachina fera* L.

According to our data, complex of dominant species on grain crops in the Lower Volga region includes 42 species: *Macrosteles laevis* Rib., *Psammotettix striatus* L., *Sitobion avenae* F., *Schizaphis graminum* Rond., *Nabis ferus* L., *Orius niger* Wolff., *Eurygaster integriceps* Put., *Aelia acuminata* L., *A. rostrata* Boh., *Aeolothrips intermedius* Bagn., *Haplothrips tritici* Kurd., *Poecilus cupreus* L., *P. puncticollis* Dej., *Harpalus rufipes* De Geer., *H. distinguendus* Duft., *Anisoplia austriaca* Hbst., *A. segetum* Hbst., *Agriotes gurgistanus* Fald., *A. medvedevi* Dol., *Adonia variegata* Gz., *Coccinella septempunctata* L., *Lema melanopus* L., *Phyllotreta vittula* Redt., *Chaetocnema aridula* Gyll., *Agrotis segetum* Schiff., *Apamea anceps* Schiff., *A. sordens* Hfn., *Chrysopa carnea* Steph., *Cephus pygmaeus* L., *Lissonota nitida* Grav., *Rogas dimidiatus* Spin., *Trissolcus grandis* Thoms., *T. vassilievi* Mayr., *Mayetiola destructor* Say., *Oscinella frit* L., *O. pusilla* Mg., *Syrphus ribesii* L., *Metasyrphus corollae* F., *Clytiomyia helleo* F., *Tachina orientalis* Zim., *Isomera cinerascens* Rond.

Entomocomplex of perennial legumes and grasses combines to a certain extent dominant species complexes on perennial legumes and grain crops. Polydominance of plant community on multicomponent mixtures, which include

wheatgrass, orchard grass, foxtail grass, alfalfa, clover, etc., in different percentages brings agrobiocenosis of mixtures nearer to biocenoses formed on zonal types of landscape. The largest number of species (1,249) among entomocomplexes of agrocenoses was registered on perennial legumes and grasses. Polydominance of the main core of entomocomplex reflects significant biodiversity of this community, represented by 76 species, which exceeded the 5% barrier in our records: *Macrosteles laevis* Rib., *Psammotettix striatus* L., *Aphis crassivora* Koch., *Sitobion avenae* F., *Schizaphis graminum* Rond., *Acyrtosiphon pisum* Harris., *Nabis ferus* L., *Orius niger* Wolff., *Polymerus cognatus* Fieb., *P. vulneratus* Pz., *Lygus pratensis* L., *Adelphocoris lineolatus* Gz., *Dolycoris baccarum* L., *Eurygaster integriceps* Put., *Aelia acuminata* L., *A. rostrata* Boh., *Aeolothrips intermedius* Bagn., *Kakothrips robustus* Uz., *Thrips tabaci* Lind., *Haplothrips tritici* Kurd., *Poecilus puncticollis* Dej., *Harpalus rufipes* De Geer., *H. distinguendus* Duftschmid, *Silpha obscura* L., *Margarinotus bipustulatus* Schrank., *Anisoplia austriaca* Hbst., *A. segetum* Hbst., *Agriotes gurgistanus* Fald., *A. medvedevi* Dol., *Malachius aeneus* L., *Adonia variegata* Gz., *Coccinella septempunctata* L., *Plagionotus floralis* Pall., *Lema melanopus* L., *Phyllotreta vittula* Redt., *Chaetocnema aridula* Gyll., *Apion apricans* Hbst., *Stenoptera pumilio* Kby., *Sitona callosus* Gyll., *S. crinitus* Hbst., *S. lineatus* L., *Phytonomus variabilis* Hbst., *Tychius flavus* Beck., *Pyrausta sticticalis* L., *Agrotis segetum* Schiff., *Heliothis virescens* Hfn., *Apamea anceps* Schiff., *A. sordens* Hfn., *Chrysopa carnea* Steph., *Pachynematus clytellatus* Lep., *Bathyplectes curculionis* Thoms., *Pimpla instigator* F., *Lissonota nitida* Grav., *Rogas dimidiatus* Spin., *Andrena figurata* Latr., *Melitturga clavicornis* Latr., *Halictus petellatus* F., *H. robicundus* Christ., *Rhopitoides canus* Ev., *Eucera clypeata* Erichs., *Bruchophagus roddi* Guss., *Tetrastichus bruchophagii* Ash., *Trissolcus grandis* Thoms., *T. vassilievi* Mayr., *Telenomus strelzowi* Vassil., *Mayetiola destructor* Say., *Contarinia medicaginis* Kff., *Dasyneura ignorata* Wachtl., *Oscinella frit* L., *O. pusilla* Mg., *Syrphus ribesii* L., *Metasyrphus corollae* F., *Clytiomyia helleo* F., *Tachina fera* L., *T. orientalis* Zim., *Isomera cinerascens* Rond.

The minimum number of species among agrocenoses (771) was observed on maize. Also, dominant complex, is depleted in comparison with other field crops, it is represented by 26 species of insects: *Gryllus desertus* L., *Calliptamus italicus* L., *Oedipoda miniata* Pall., *O. coerulea* L., *Rhopalosiphum maidis* Fitch., *Schizaphis graminum* Rond., *Rungia maydis* Pass., *Nabis ferus* L., *Aelia acuminata* L., *Aeolothrips intermedius* Bagn., *Thrips tabaci* Lind., *Calathus halensis* Shall., *Harpalus rufipes* De Geer., *Pentodon idiota* Hbst., *Selatosomus latus* F., *Agriotes medvedevi* Dol., *Adonia variegata* Gz., *Tentyria nomas* Pall., *Pedinus femoralis* L., *Opatrum sabulosum* L., *Ostrinia nubilalis* Hbn., *Agrotis segetum* Schiff., *Spodoptera exiqua* Hbn., *Chrysopa carnea* Steph., *Syrphus ribesii* L., *Metasyrphus corollae* F.

Entomofauna of other row crops (soybeans, beets, potatoes) is represented almost by the same complex of dominant species: *Gryllus desertus* L., *Calliptamus italicus* L., *Aphis* sp., *Nabis ferus* L., *Polymerus cognatus* Fieb., *P. vulneratus* Pz., *Dolycoris baccarum* L., *Aeolothrips intermedius* Bagn., *Thrips tabaci* Lind., *Bembidion properans* Steph., *Poecilus puncticollis* Dej., *Harpalus*

rufipes De Geer., *H. distinguendus* Duftschmid, *Pentodon idiota* Hbst., *Amphimallon solstitialis* L., *Selatosomus latus* F., *Agriotes gurgistanus* Fald., *A. medvedevi* Dol., *Adonia variegata* Gz., *Tentyria nomas* Pall., *Pedinus femoralis* L., *Opatrum sabulosum* L., *Pimelia subglobosa* Pall., *Phyllotreta vittula* Redt., *Ostrinia nubialis* Hbn., *Pyrausta sticticalis* L., *Agrotis segetum* Schiff., *Chrysopa carnea* Steph., *Syrphus ribesii* L., *Metasyrphus corollae* F., *Tachina vernalis* R.-D.

Additionally, the structure of potato dominant complex includes *Leptinotarsa decemlineata* Say., beetroot – *Pachnophorus tessellatus* Duft., *Chaetocnema tibialis* Ill., *Cassida nebulosa* L., *Tanymericus palliatus* F., *Bothynoderes foveicollis* Gebl., *B. punctiventris* Germ., *Spodoptera exiqua* Hbn.

Soybeans entomocenosis, additionally, as a part of dominant species includes *Etiella zincenella* Tr. and *Helicoverpa armigera* Hbn.

Changing in agricultural landscapes with irrigation ecological situation primarily determines growth and development of plants with optimized physiological parameters in cell structure, on the other hand, irrigation conditions change biological characteristics of harmful and beneficial insects, as well as their numbers. All this directly affects the relationship between phytophages and plants, as well as other parameters of biological development of insects: fertility, survival, duration of periods of individual phases of development.

Thus, in plants that receive enough moisture, there is an optimization of concentration of cell juice and sucking power of the leaves, which creates favorable conditions for feeding insect species with a piercing-sucking mouth apparatus. Thereby, according to the results of our studies, in the herbage of perennial legumes under irrigation numerical abundance of alfalfa bug (*Adelphocoris lineolatus* Goeze.) increased 4.4 times, aphids (*Aphis* spp. a) – 3.3 times. Also, during irrigation, abundance of mesophilic species increases. Thus, in the agroecocenosis of irrigated alfalfa, there is an increase in the number of alfalfa seed chalcid (*Bruchophagus roddi* Guss.) 2.6 times in comparison with not irrigated crops, and increase in damage of seeds by larvae – 2.3 times, and total losses from seed eaters increased 2.4 times.

Moreover, formation of microclimatic conditions favorable for growth and development of plants in irrigated agroecocenoses positively influenced morphological, organ-forming, physiological and biochemical processes, thereby contributing to a significant increase in plant yields. At the same time, there is a more intensive formation of generative organs, which along with an increase in compensatory properties of plants, as well as in a number of stems leads to productivity growth. According to our research, despite the increase in harmfulness of seed eaters, in irrigated conditions, the yield of seed alfalfa increased 3.5 times.

Air temperature and humidity parameters change in phyto level and in the upper layer of soil also causes a change in the phenology of both phytophages and their forage plants. As a rule, under irrigation conditions, the duration of phases of plants and insects increases. Thus, the period from the beginning of aftergrowing to the ripening phase of alfalfa beans under irrigation increases by 18-20 days in comparison with areas without irrigation. At the

same time, phenological cycle of phytophagous development on irrigated crops planting keeps its synchronization with the phenology of forage plant, increasing also, on average, from 10 to 20-25 days. Feeding period lengthening for phytonomous larvae, as well as larvae and imago of alfalfa bug in conditions of elongation due to irrigation of phases of alfalfa development, leads to an increase in harmfulness by 30-40% of both leaf and seeds pests in comparison with non-irrigated crops.

Irrigated areas also attract entomophages to a greater extent, which significantly reduce the number of harmful insects, performing the role of biological protection of crops [14, 15]. Due to the expansion of ecological valency parameters, increasing diversity of habitats in irrigated agricultural landscapes, there is the growth of useful entomofauna number, and largely active predators of ground beetles (Coleoptera: Carabidae), living in the soil surface layer of agroecocenoses of all field crops (figure 1).

Representatives of the family of ground beetles (Coleoptera: Carabidae), according to our studies, dominated in harvest collected with soil traps Barber (up to 82.1-85.02 % of herpetobia fauna). The results of our studies show that in irrigated agroecocenoses comparative number of ground beetles is 2.5-12.4 times higher than in crops without irrigation. It should be noted that in irrigated agroecocenoses increasing number of ground beetles was due to growth of abundance of species with a mixed type of food, primarily such species include *Poecilus cupreus* L., *Pseudoophonus rufipes* De Geer, *Bembidion properans* Steph., *Clivina fossor* L., *Poecilus nitens* Chaud., *Harpalus distinguendus* Duftschmid. These species, according to many authors, actively predate, significantly reducing the number of phytophages in agroecocenoses [16, 17, 18].

Increase in biological diversity and abundance of beneficial entomofauna in agricultural landscapes with irrigation, as already noted, is associated primarily with a significant change of microclimatic parameters on soil and in phyto level of plants that leads to increased mesophyte and, consequently, to increased number of ecological niches. This is of particular interest for arid conditions of the Lower Volga region, since it leads to growth of species diversity of mesophilic and hygrophilous entomophages and parasites. At the same time, the total amount of biota, which is food base for entomophages and parasites, is growing significantly in agroecocenoses with irrigation [19, 20].

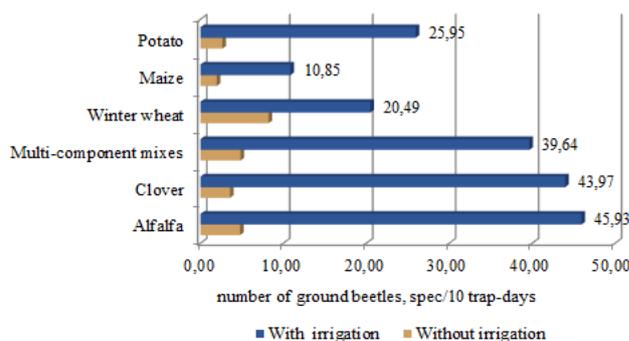


Fig. 1. Irrigation influence on the number of ground beetles on major agricultural crops planting (FSUE "Oroshayemoye", Volgograd, 1988-2018)

We can say that positive impact of microclimate, as well as enough food base, determine the increase in abundance of useful species of entomocomplex in irrigated conditions.

Along with the increase in biological diversity of entomofauna, a significant change in trophic structure of entomocomplexes was also registered in agricultural landscapes with irrigation. Average long-term data obtained in comparative records of entomofauna show a significant excess (7 times) of the abundance of useful species (entomophages and parasites) on irrigated crops in comparison with non-irrigated ones. In irrigation conditions, the ratio of the total number of useful species and pests is 1:1.9, and in non-irrigated areas, it is reduced, and is 1:6.1. If we consider specifically on the main groups of insects, the ratio of coccinellids (Coccinellidae) and leaf alfalfa weevil (*Hypera postica* Gyll.), which is 1:0.1 in irrigated areas, provides complete pest destruction. There is the optimal ratio in irrigated conditions between abundance of entomophages living in alfalfa phytoto level (predatory bedbugs *Nabis* spp. and *Orius* spp, larvae of Syrphidae, *Chrysopa* spp.) and herbivorous bugs (Miridae) – 1:9. According to literature, the optimal ratio between predators and herbivorous bedbugs is 1:13 [21]. Consequently, on irrigated crops, the population of horseflies is suppressed by entomophages. Considering ratio of predators (*Nabis* spp. and *Orius* spp, larvae of Syrphidae, *Chrysopa* spp.) and nodule weevils (*Sitona* spp.), we may note that in irrigated conditions it did not exceed 1: 0.5. As stated in the work by A. T. Demchuk, N. P. Dyadechko and M. B. Ruban [21], this ratio fully suppresses the number of nodule weevils. As to the analysis of predatory insects number ratio (Coccinellidae), green lacewings (*Chrysopa* spp.) and syrphid flies (Syrphidae), predatory bugs (*Nabis* spp. and *Orius* spp.) and aphids (Aphidiidae), we found that it varies from 1:4.2 to 1:6.6; with this ratio, predatory insects reduce the number of aphids to an economically imperceptible level.

Parallel records of entomofauna on non-irrigated crops showed a significant deterioration in the ratio between entomophages and phytophages (for leaf alfalfa weevil – 1:1.9; herbivorous bugs – 1:19.7; aphidiids – 1:16.6; sitons – 1:7). There is no natural regulation of the number of pests in rainfed variants, economic thresholds of harmfulness of phytophages are often exceeded; respectively, it is necessary to use pesticides to protect crops from harmful insects.

IV. CONCLUSION

Long-term research shows the increase in entomocomplexes stabilization in irrigated agricultural landscapes and balance of agroecosystems in general. Under irrigated conditions, ability of entomofauna communities to self-regulate grows. Formation of stability and stability of biota in agroecosystems is conditioned, firstly, by creation of polydominant entomocomplexes possessing significant biological diversity, and, secondly, by optimization of trophic structure of communities. At the same time, the number of pests and beneficial insects has increased in irrigation. However, irrigated agricultural landscapes form entomocomplexes with a more favorable ratio between entomophages and phytophages. All this provides the conditions promoting an increase in self-regulation of entomocomplexes at the expense of polydominant structure of communities and strengthening activity of predators and

parasites. Irrigation creates real conditions to preserve the crop and reduce the pesticide load in agroecosystems by 40-50 %.

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