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ORIGINAL ARTICLE

Population dynamics of the typical meadow species in the conditions of pasture digression in flooded meadows

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The analysis of the vitality structure of the meadow species of *Dactylis glomerata* L., *Festuca pratensis* Huds, *Phleum pratense* L., *Trifolium pratense* L., *Trifolium repens* L., *Lotus corniculatus* L., *Convolvulus arvensis* L. growing on flood meadows of River Sula and River Psel (Sumy region) in the conditions of overgrazing is presented. The study of vitality included the determination of the indices of the population quality (Q) and the index of the vitality population dynamic (IVD) at different levels of the pasture gradient. The analysis was carried out on the basis of the morphometric parameters of genet and ramets. It has been established that the high grazing pressure on meadow phytocenoses is the powerful destructive environmental factor that impact populations of cereals, legumes and grass. It was revealed that in flooded meadows, the response of the population vitality parameters to grazing is determined by its intensity as well as the species characteristics of plants. Adaptation of species to pasture pressure reveals in vitality variability and plasticity. Analysis of the vitality structure of cereals, legumes and grass showed that high grazing pressure are excessive for the most populations of investigated species. Due to the apparent displacement of the population quality from the prosperous to depressive ones on the pasture gradient, the meadow grasses of floodplain meadows are unstable to the intensive regime of exploitation in the Forest-Steppe region of Ukraine. The realization of different vitality tactics and strategies by the species is the powerful factor in the conservation of biodiversity in the vegetation cover in areas that are exposed to significant anthropogenic pressures.
Keywords: Vitality; population; pasture digression; population quality index; vital dynamics index

Introduction

Floodplain meadows are intrazonal ecosystems that formed in the temperate zone of the Northern Hemisphere because of centuries-long human economic activity (Maslov et al., 2017). Nowadays they are powerful suppliers of various ecosystem services (resource, regulatory, cultural and sociological, supporting (Duncan et al., 2003; Paracchini et al., 2008; Farruggia et al., 2012)**.** Preservation of the unique biodiversity of the meadows is a prerequisite for ensuring the sustainable passage of natural cycles, deep population and ecosystem processes at the regional and planetary levels (Tilman & Downing, 1994).

Meadow ecosystems are characterized by significant dynamism of temporal and spatial characteristics, which are determined by their position in the relief, the duration of floods, the depth of groundwater, the time and frequency of mowing, the intensity of grazing and other forms of management (Wellstein et. al., 2007; Kahmen & Poschlod, 2008; Sizykh, 2016). The decrease in productivity and negative transformation of biodiversity was observed nowadays due to the powerful anthropogenic impact on the meadows (Wallies de Vries et al., 2002; Rusev et al., 2007; Panchenkova, 2012). The problem of protection and restoration of meadows biodiversity is considered as global one (Liira et al., 2009; Ternovaya & Rusev, 2012). The number and area of meadows is being used as indicators of sustainability, efficiency and environmental friendliness of agriculture (Piveteau, 1998; MAFF, 2002). Under these conditions, some countries have already developed and started to implement diverse activities aimed at both restoring and protecting meadow ecosystems (Magda et al., 2015).

The efficiency of the measures ensuring sustainable and rational use of nature and the environment considerably increase in case of population analysis using in the study of related problems (Begon et al., 1989; Zhukova, 1995; Zlobin, 2009). Populations are real forms of biological species existence. At the population level all processes and mechanisms related to the response of organisms to various external influences are realized (Zlobin, 1992).

An important part of population research is the estimation of the individuals and populations vitality in general (Zlobin, 1989; Zhilyaev, 2005, Kashin et al., 2017). In botanical studies the estimation can be carried out on the basis of vitality analysis, when the qualitative characteristics of plants and population as a whole are determined on the base of the complex of dimensional characteristics of genet (ramet) represented in its composition (Zlobin, 2018). The use of vitality analysis is quite informative. This is evidenced by the results of research in various regions including plants of different organization levels, life forms, environmental parameters, degree of rarity (Gavrilova, 2008; Kovalenko, 2006; Skliar, 2003; Thazaplizheva et al. 2010; Tikhonova, 2011; Sherstyuk, 2017). A number of scientific developments are devoted to the study of the vitality structure of the of meadow species (Bondarieva & Bjelan, 2010; Zlobin & Kyrylchuk, 2005, Kyrylchuk & Bashtovyi, 2018). In Ukraine, like many regions of the world the cattle grazing is a powerful factor caused the transformation of meadow grasslands (Pekhota & Leshchinskaya, 2016; Kuzemko & Kozyr, 2011). Accordingly, the development of tasks related to the protection of meadow phytodiversity in conditions of grazing pressure is an actual scientific problem for our country. Considering the above, the purpose of this paper is to establish the features and patterns of changes in the vitality parameters of populations of different plant groups involved in the formation of plant communities in floodplain meadows of Northeastern Ukraine on the pasture gradient.

Materials and methods

The study of the vitality structure of meadow species was carried out in the floodplain meadows of the Sula River and the Psel River (Forest-Steppe zone of the North-Eastern Ukraine. Coordinates region of research: 50°48'07" N, 33°37'14" E; 50°45'18" N 33°31'29" E; 50°40'58" N 33°29'17" E; 50°46'25" N 34°42'14" E; 50°38'18" N 34°34'32" E; 51°01'16" N 35°08'16" E) on a pasture gradient. The study includes populations of species represented all major groups of plants involved in the formation of meadow phytocoenoses: cereals (*Dactylis glomerata* L.*, Festuca pratensis* Huds*, Phleum pratense* L.), legumes (*Trifolium pratense* L.*, Trifolium repens* L.*, Lotus corniculatus* L.) and motley grass (*Convolvulus arvensis* L.).

Plots of meadow grasses with increasing grazing pressure were included in the study. In accordance with the number of cattle per unit area, they formed five degrees of gradient.

Stages of pasture digression (PD):

PD0 - control, where grazing does not occur or it is minimal. Meadow phytocoenoses are distinguished by rather high projective cover of species involved in the study: in cereals it varies from 20 to 50%, in legumes - from 7 to 40%.

PD1 - moderate grazing, the number of high grass and legumes remains high, the role of low grass is increasing. Grazing is carried out according to the scheme adopted in the region: 2-3 heads of cattle per 1 ha.

PD2 -intensive grazing. Cereals, legumes and grass resistant to this impact are predominate. Grazing grasses (*Poa pratensis* L.*, Festuca rubra* L.) begin to dominate; the role of sedges and motley grass, which are eaten poorly, increases. Pasture weeds appear.

PD3 -excessive grazing. Poisonous plants and badly eaten plants predominate. The upper cereals are almost absent, the proportion of legumes is preserved, first of all, at the expense of *Trifolium repens*. Herbage is sparce. Bald and trampled spots and paths appear, and hillock and tussock increase.

PD4 - bad pasture. There are many low-growing species of grass (*Potentilla anserine* L.*, Polygonum aviculare* L., etc.) and plots of naked soil.

In accordance with the algorithm of the vitality analysis (Zlobin, 1989, 2018), the morphometric analysis of the individuals of populations of the species was initially carried out. Depending on the species, they were evaluated by 10 dimensional indicators. The units for accounting were the genet *(D. glomerata, F. pratensis, P. pratense, T. pratense* and *L. corniculatus*) and the ramet (*T. repens* and *C. arvensis).*

Based on the results for the variability level of morphometric parameters, the structure of correlation galaxies and factor load, for each species the set of three key morphometric parameters determining the vitality of plants was established.

For cereals, these parameters were: W - an above-ground green phytomass of the individual (g), A - the area of the leaf surface (cm^2), PT - productive tillering (pcs / pcs • 100). For legumes: W - total above-ground phytomass of the individual (g), A - area of the leaf surface (cm^2) and RE - reproductive effort (%). For grass group they were: W - the above-ground phytomass of the individual (g), A - area of the leaf surface(cm^2), Wg - the mass of generative organs(g).

These parameters were used to establish the vitality population structure. Taking into account their values, the plants of species were included to one of three vitality classes (“A” - high, “B” - intermediate, “C” - low). In accordance with the methodology of the vitality analysis of populations, for the pooled sample, which included full series of the pasture gradient, the average arithmetic value and its standard error for the key features were calculated. This made it possible to define aggregate population quality indices (Q) and include each of them to the certain category in the vitality spectrum (prosperous, balanced, depressive).

The original index of vitality dynamics (IVD) was also calculated for the complex estimation of the change in the vital parameters of populations on the pasture gradient and, accordingly, to find out the peculiarities of the appearance of vital plasticity.

IVD=(Qn - Qp) / 0.166,

Qn - the value of the quality index of the population at the next degree of the gradient,

Qp - the value of the population quality index on the previous gradient degree,

0,166 is the value of the quality index at the level where the transition of populations from one qualitative type to the next occurs (according to the provisions of the classical vitality analysis with the value of the quality index Q from 0 to 0.166, the population is depressed; for Q from 0.167 to 0.332 - is balanced; for Q from 0.333 to 0.50 - prosperous).

In general, the value of the index of vital dynamics (IVD) is in the range of values from -3.012 to +3.012.

At IVD = 0, there is no change in the quality index Q in the populations by the gradient degree.

If the IVD (modulo) is less than 1, the changes are minor.

If the IVD (modulo) is in the range of 1 to 2 - the change is significant.

If IVD (by module) is more than 2 - changes are considerable.

With values of IVD with a minus - there is a deterioration of the population, with a plus - an improvement. (Skliar, 2013).

Results and discussion

The distribution of plants by vitality classes and the population quality indices along the pasture gradient is given in Table 1. In the control plots, according to the vitality structure, the populations of cereals and legumes belong to the prosperous category with the values of the population quality index (Q) from 0.35 to 0.46. At the same time, the population of the *C. arvensis* species (grass group) in the control plots is balanced, with the population quality index of 0.31. The population of *D. glomerata* had the quality index (Q) of 0.46. Here, vast majority of individuals (more than 70%) belonged to the intermediate class of vitality ("B"). The populations of *F. pratensis* were characterized by the quality index of 0.46. But individuals of the highest class of vitality("A") dominated. Populations of *P. pratense* were characterized by the quality index (Q) of 0.38. All categories of vitality were represented with the predominance of intermediate ones. Analysis of the legumes vitality spectrum showed that the control plots were characterized by the vitality structure of prosperous type with the high population quality index. It indicates to the high adaptability of legumes to growth in meadow grasslands that were not exposed to anthropogenic impact. Thus, in the vitality spectrum of *T. pratense* populations, more than 60% of individuals belonged to the highest class of vitality (A). On control plots, individuals of the middle class ("B") were represented by the smallest number - only 13%. Individuals of "C" class were 27%. The population quality index (Q) was 0.37.

Populations of *L. corniculatus* in the control plots were characterized by relative parity in the population ratio of individuals of different vitality classes. The individuals number of "A", "B", "C" classes was respectively 45%, 25% and 30% and the quality index (Q) was 0.35. The *T. repens* populations in the control plots differed in the even distribution of individuals by vitality classes of "A" and "B" (51% and 44%, respectively) and very small number of "C " class individuals. The population quality index (Q) was 0.48.

The vitality spectra of the *C. arvensis* populations in the control plots differed by the predominance of "A" class individuals (44%) and "C" class individuals (37%). They formed balanced populations with the quality index of 0.31.

In general, the composition of species populations of cereals and legumes showed that their vitality level in the control plots (in the absence of expressed anthropogenic impact) was quite high. These populations could persist for a long time. The analysis of the vitality spectra of grass group plants showed that *C. arvensis* populations were balanced in control with a predominance of cereals and legumes, but had a slight projective covering.

Table 1. The vitality structure and population qualitative types of meadow plant species in the control and transformed meadows.

Gradient degree	PD0	PD1	PD2	PD3	PD4
			Dactylis glomerata		
Class A	0.18	0.08	0.06	0.00	0.00
Class B	0.73	0.42	0.31	0.22	0.17
Class C	0.09	0.50	0.63	0.78	0.83
Population type	prosperous	balanced	balanced	depressive	depressive
			Festuca pratensis		
Class A	0.36	0.63	0.16	0.24	0.16
Class B	0.55	0.19	0.30	0.29	0.34
Class C	0.09	0.18	0.54	0.47	0.50
Population type	prosperous	prosperous	balanced	balanced	balanced
			Phleum pratense		
Class A	0.25	0.30	0.26	0.07	0.02
Class B	0.50	0.23	0.21	0.25	0.23
Class C	0.25	0.47	0.53	0.68	0.75
Population type	prosperous	balanced	balanced	balanced	balanced
			Trifolium pratense		
Class A	0.60	0.57	0.53	0.46	0.00
Clas B	0.13	0.00	0.12	0.08	0.00
Class C	0.27	0.43	0.35	0.46	1.00
Population type	prosperous	balanced	balanced	balanced	depressive
			Lotus corniculatus		
Class A	0.45	0.35	0.15	0.00	0.00
Class B	0.25	0.35	0.45	0.45	0.00
Class C	0.30	0.30	0.40	0.55	1.00
Population type	prosperous	prosperous	balanced	balanced	depressive
			Trifolium repens		
Class A	0.51	0.27	0.33	0.25	0.28
Class B	0.44	0.18	0.17	0.15	0.24
Class C	0.05	0.55	0.50	0.60	0.48

Population type	prosperous	balanced	balanced	balanced	balanced
		Convolvulus arvensis			
Class A	0.44	0.60	0.21	0.09	0.07
Class B	0.19	0.24	0.29	0.23	0.19
Class C	0.37	0.16	0.50	0.68	0.74
Population type	balanced	prosperous	balanced	depressive	depressive

As for vitality structure of cereals , legumes, and grass species the main patterns in the response of them to the grazing pressure were revealed (Table 1, Figure 1). In *D. glomerata,* in the gradient of pasture digression, the population quality index was reduced from 0.46 to 0.09. At the last stages of the pasture gradient the population of *D. glomerata* was represented mainly by individuals of the lower category of vitality "C "(80%). Thus, this species appears to be unstable to uncontrolled grazing.

F. pratensis changes the composition of populations from prosperous to balanced ones with a corresponding decrease in the quality population index (Q) from 0.46 to 0.25. This indicates its rather high resistance to the impact like this. Relatively high resistance to grazing pressure was determined in *P. pratense* spesies. At the gradient, the vitality population structure of this species varied from prosperous to balanced with the decrease in the Q index population to 0.12 in the pastures. The comparative stability of *P. pratense* to the grazing is indicated that even for the degree of PD4 in the populations, up to 2% of class "A" individuals and more than 20% of class "B" individuals are preserved.

Along pasture gradient, the quality index of *T. pratense* population is reduced from 0.37 (PD0) to 0.00 (PD4) and populations are classified as depressed. At the same time there is a gradually decrease in the proportion of individuals of the highest vitality class, which is 0% at PD4 and significant increase of "C" class individuals - up to 100% at the gradient stage of PD4. This demonstrates the resistance of the *T. pratense* population to overgrazing. The populations of *L. corniculatus* are transformed according to the ratio of individuals of the three classes of vitality along the pasture gradient and are transferred from the category of prosperous (in control plots and PD1 plots) to depressive at the last stage of digression (PD4).

At PD2 and PD3 stages populations are balanced. Staying populations of this species in the prosperous category in PD1 degree indicates to their resistance to moderate grazing. The *T. repens* populations are characterized by relatively high resistance to pasture pressure. On the control plots the quality index of *T. repens* population is 0.48. A noticeable decrease in the population quality index (0.26) is observed only in the transition from control plots to PD4. In this case, the populations of *T. repens* are converted from the prosperous to balanced category and do not change their quality even at the last stage of the digression (PD4).

In *C. arvensis* species on the pasture gradient, the population quality index is reduced from 0.42 (for PD0) to 0.1 (for PD4). In the PD1 plots with moderate grazing the individuals of "A" class (number at level 60%) and "B" class (number at level 16%) dominate in populations. These two classes form the prosperous population with a quality index of 0.42. In the plots of PD2 with intensive grazing, balanced populations with a quality index of 0.23 form. Individuals of "C" class represent of 50% , individuals of "B" class - 29% and "A" class individuals - 21%. In plots with excessive grazing, depressive populations of *C. arvensis* form, with predominance of "C" class individuals. They occupy 68% of the PD3 plots, and 74% of the PD4 ones. Quality indices are respectively 0.16 and 0.1. It should be noted that on the pasture gradient, in *C. arvensis* plants the decrease of total phytomass and leaf area are fixed with a slight fluctuation in the mass of reproductive organs, which promote growth of reproductive effort with the increase in the grazing intensity. The species adapts to the conditions of excessive pasture pressure due to morphological plasticity. If the pasture pressure increases, the individuals become smaller, but do not drop out of the grass stand.

The studying results of the vitality structure populations on the pasture gradient show that their adaptation to this type of economic use is accompanied by the active realization of vitality variability. The variability is manifested in the fact that, the proportion of plants of various classes to vitality (A, B, C) varies significantly according to the degree of the gradient.

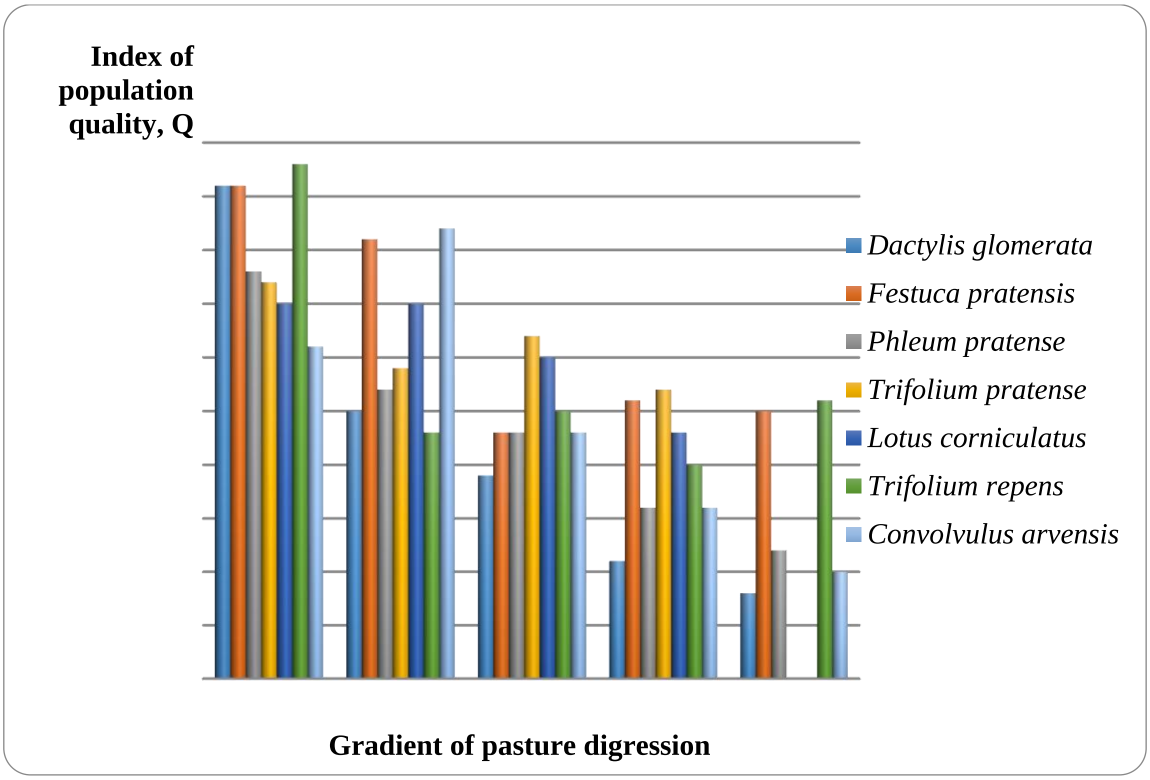

Figure 1 Quality indexes of species populations at different degrees of transformed meadows.

Generally, in populations with the pasture pressure growing there is tendency for increasing the total part of "B" and "C" class plants, with the decrease of "A" class individuals, sometimes to their complete disappearance. A detailed study of cereals, legumes and grass populations makes it possible to distinguish three main variants of the vitality variability. The first group is formed by the species of *D. glomerata, T. pratense* and *L. corniculatus*, where there is a significant increase in the total fraction of individuals of "B" and "C" classes: *D. glomerata* - 0.82 (PD0), 0.91 (PD1), 0.94 (PD2), 1.00 (PD3) and 1.00 (PD4); in *T. pratense* - 0.40 (PD0), 0.43 (PD1), 0.47 (PD2), 0.54 (PD3) and 1.00 (PD4); in *L. corniculatus* - 0,55 (PD0), 0,65 (PD1), 0,85 (PD2), 1,00 (PD3) and 1,00 (PD4). It should be noted that in the first two species, this increase is mainly due to the growth in the number of "C" class individuals (Table 1). In *L. corniculatus* populations this tendency is associated with a simultaneous increase in "B" class individuals. In populations of *D. glomerata* and *L. corniculatus*, "A" class individuals disappear already on the PD3 gradient degree (Table 1). In populations of *T. pratense*, the proportion of individuals of "A" class remains enough high even on the PD3 gradient degree (Table 1). Although at last stage of digression (PD4) in populations of *T. pratense* there are no individuals of "A" and "B" classe., The second group is represented by the populations of *P. pratense* and *C. arvensis*, where at the gradient degree of PD1, the decrease in the total fraction of individuals of "B" and "C" classes from 0.75 (PD0) to 0.70 (PD1) (P. pratense) and from 0.56 (PD0) to 0.40 (PD1) (C. arvensis) is observed. It indicates to the improvement in conditions for the growth and development of these species with minor pasture pressure. Then, following the gradient the natural increase in the total percentage of individuals of "B" and "C" classes (mostly due to individuals of "C" class) was observed: PD2 - 0.74, PD3 - 0.93, PD4 - 0.98 *(P. pratense*) and PD2 - 0.79 , on PD3 - 0,91, PD4 - 0,93 (*C. arvensis*). "A" class individuals are presented in populations of these species, even at the last gradient stages (Table 1).
The species of *F. pratensis* and *T. repens* form the third variant of vitality variability, which means that along the gradient in their populations there is a sharp single increase in the total percentage of "B" and "C" classes of individuals to the level that remains relatively stable until the last degrees of the gradient (in F. pratensis, starting from degree PD2, in *T. repens* - already from degree PD1. This tendency has the following form: in *F. pratensis* - 0.84 (PD2), 0.76 (PD3) and 0.84 (PD4); in *T. repens* - 0.73 (PD1), 0.67 (PD2), 0.75 (PD3), 0.72 (PD4). However, in populations of *F. pratensis* there is a decrease in the total percentage of individuals of "B: and "C" classes on the degree of PD 1 (from 0.64 - PD0 to 0.37 - PD1), which shows their similarity with the second group of species. In the populations of both species there are also individuals of class "A" up to the last degree of the gradient (Table 1).
The response of cereals, legumes and grass populations to grazing is accompanied by the realization of not only vitality variability but vitality plasticity as well: the change in gradient degrees of the quality index (Q) values. The peculiarities of the manifestation of vitality changeability were analyzed on the basis of the vital dynamic index (IVD) and based on accounting for changes in the gradient of the qualitative type of populations (Table 2).

Table 2. Values of the vitality dynamic index (IVD) and the change of the qualitative type of populations in the transformed meadows.

Parameters of vitality	**Transition by gradient degree**			
	PD0 → PD1	**PD1 → PD2**	**PD2 → PD3**	**PD3 → PD4**
	Dactylis glomerata			
IVD value	-1,2650	-0,3614	-0,4819	-0,1807

Change of population type	P → B	B-B	B → D	D-D
		Festuca pratensis		
IVD value	-0,3012	-1,0843	0,1807	-0,0602
Change of population type	P-P	P → B	B-B	B-B
		Phleum pratense		
IVD value	-0,6627	-0,2410	-0,4217	-0,2410
Change of population type	P → B	B-B	B-B	B-B
		Trifolium pratense		
IVD value	-0,4819	0,1807	-0,1807	-1,6265
Change of population type	P → B	B-B	B-B	B → D
		Lotus corniculatus		
IVD value	0	-0,3012	-0,4217	-1,3855
Change of population type	P-P	P → B	B-B	B → D
		Trifolium repens		
IVD value	-1,5060	0,12048	-0,3012	0,3614
Change of population type	P → B	B-B	B-B	B-B
		Convolvulus arvensis		
IVD value	0,6627	-1,1446	-0,4217	-0,3614
Change of population type	B → P	P → B	B → D	D-D

We separated three groups of species depending on the values of the vitality dynamic index (IVD). The first group includes: *P. pratense*, *D. glomerata* and *L. corniculatus*. In general, there is a gradual decrease in the quality index Q in these species populations, but some specific features are characteristic of each ones. Thus, regular minor insignificant changes in the vitality structure with a transformation of the qualitative type are characteristic of *P. pratense* populations: from prosperous type through balanced to depressive one at the last stage of gradient. There is no sharp change in the vitality structure.

For populations of *D. glomerata*, substantial changes in vitality are associated with the deterioration of its population even when it passes to the first degree of the PD1 gradient, where species drastically changes the qualitative type. Further, along the gradual changes are fixed in the vitality and the transition of populations from prosperous to depressed to the degree of PD4. In *L. corniculatus* populations, there is also a logical gradual decrease of the quality index (Q) in the following transition: PD1 → PD2 → PD2 → PD3. Although the populations status of the species does not change in the transition to the degree of PD1, and even at the last gradient degree. However, at the last degree of the gradient there are significant changes in the vitality with deterioration of the populations of this species. For the second group represented by *C. arvensis*, *F. pratensis* and *T. pratense*, the following tendency is typical: general decrease in vitality, there are some positive flashes at different transitions according to grazing degree.

Thus, in *C. arvensis* populations, this flash is observed at the transition of PD0 → PD1, indicating to the improvement in the vitality status of populations (the category varies from balanced to prosperous). In the populations of *F. pratensis* and *T. pratense* this phenomenon is characteristic for PD2 → PD3, PD1 → PD2 transitions, respectively. It should be noted that the status of the populations of these two species during transitions does not change and they remain balanced ones. The balanced population status to the last stage of the gradient is retained only by *F. pratensis*. For two other types of this group, the change in the status of populations to the depressive type in the last stages of the gradient is characteristic.

The third group with an indefinite type of response with a general decrease in vitality from the first to the last degree of the gradient is represented by the populations of *T. repens.* They are characterized by sharp negative changes in the vitality composition observed during the transition of the PD0 → PD1 (the qualitative status of the populations is dramatically changing from prosperous to balanced) and minor negative changes in the vitality of populations in which there is no change of qualitative type (transition of PD2 → PD3). At the same time, there are positive changes in the values of the population quality index in the intermediate transition PD1 → PD2 and PD3 → PD4. In fact, the zigzag curve is formed, which reflects the strategy of this species in the conditions of different pasture pressure.

Summarizing the obtained data on the indices of vitality dynamics (IVD) and changes in the qualitative type of populations of the meadow species in the grazing gradient, it should be noted that there is significant advantage of indices with the sign «-» (78.6% of the total number of indices) which indicates an obvious deterioration of the population under the influence of grazing pressure. 17.8% are indexes with the sign "+" and 3.6% of the indexes are 0.

Most of the indexes of vitality dynamics (75%) are less than 1. According to the accepted gradation, they correspond to slight changes in the vitality structure of the populations. 21.4% are indexes with significant changes in the vitality population structure. 3.6% of the indexes is 0, indicating absence of changes. The analysis of the changes in the type of population shows that the vitality type of populations does not change in 57.1% of cases. Variations in the population type is observed in 42.9% cases along the gradient. Type of P-P change is significantly higher (42.8%). Variation of P → R type makes 25% , P → D changes - 14.4%. The variations of type P-P, D-D, and R → P are rare, representing 7.1%, 7.1% and 3.6%, respectively.

Conclusion

Grazing pressure on the meadows are the powerful factor of economic impact, resulting in the decrease of the plant vitality and negative transformation of the vitality structure of the dominate species which form cenoses and belong to cereals, legumes and grass. The response and adaptation of plants and their populations to this type of anthropogenic pressure is accompanied by emergence of vitality variability and plasticity. In seven species of plants in the study, three main variants of vitality range and vitality plasticity were identified. The specific composition of the selected groups concerning of vitality variability and plasticity is not completely identical. So each of the investigated species according to the grazing gradient degrees shows its specific features regarding to the ratio of plants of different vitality classes, the values of the Q quality index, certain vitality types, the dynamics of these characteristics in the population. In *D. glomerata, P. pratense* and *T. repens* species, the highest negative variations in vitality characteristics are fixed at the transitional stage of PD0 → PD1, in *F. pratensis* and *C. arvensis* - in PD1 → PD2, in *L. corniculatus* and *T. pratense* in PD3 → PD4. The species of *T. repens,* in view of the complex of vitality features, is the most resistant to grazing. On the research result basic it is proved that on the meadows the response of the population vitality parameters of dominant species to the grazing is determined not only by the volume and intensity of this impact, but also by the specific plant features, in particular: the nature of individuals structural components, reproduction characteristics, balanced development of the vegetative and generative spheres, the protection of buds renewal.

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