Біологічний вісник МДПУ імені Богдана Хмельницького 6 (2), стор. 259–267, 2016
Biological Bulletin of Bogdan Chmelnitskiy Melitopol State Pedagogical University, 6 (2), pp. 259–267, 2016

ARTICLE UDC 574.633.1

TRIBE *TRITICEAE* L. AND THE BIOCENOTIC MECHANISMS OF ADAPTABILITY

T.Z. Moskalets

Bila Tserkva National Agrarian University, Bila Tserkva, Ukraine. Email: shunyascience@ukr.net

The cultural species in the process ontogenesis and phylogenesis to favorable and unfavorable environmental conditions produce a number of biological mechanisms (molecular genetic, physiological, biochemical, morphological, biocenotic), plants identification behind them reflects the degree of their ecological of adaptability, plasticity and stability. Studying the and comparison of morphological parameters and relations with consort-species and representatives of tribe *Triticeae* allowed to find out what plants differently realize their life potential. Which are based on structural and functional features biocenotic mechanisms that manifested in adaptive properties. On example cultural cereal species shows that the basic mechanisms of adaptability are: mechanisms of functional sustainability, morphological tolerance and ontogenetic avoidance. The first group is associated with functional parameters forming and manifestation life potential of plants (accumulation protein, accumulation gluten, duration assimilatory ability flag leaf; erection leaves the upper tier; depth of node tillering; strength of the stem, ie the, low penchant to lodging; total tillering plants; synchronicity growth of main stem; the intensity fading ear after full ripeness. The second group includes mechanisms of morphological tolerance (hairiness of leaves, stems; wax-colored bloom; plaza of leaf; type of bush; density head; beardedness; glossy coating of leaf, culm; glaucous color of leaf, culm; placing spicate of scales near granule; plant height). To mechanisms of ontogenetic avoidance relating such as mismatch of pathogen, phytophage and plant; photoperiodic sensitivity; duration interphase periods in particular florification, ripening; duration of vegetation period; duration of primary dormancy (latent period); multivariation of synontogenesis; photoperiodic sensitivity. Knowing the biocenotic mechanisms formation of adaptability cultural species discloses up new opportunities in clarifying the fundamental bases of adaptation and is of practical importance in the management of vitality and seed productivity.

Key words: *biocenotic mechanisms, drought resistance, adaptability, Triticeae.*

The basis of the fundamental bases adaptation, developing approaches to obtain resistant varieties and plant forms to pathogens, phytophages, especially in the present global warming and arid climate (Parent et al., 2016; Keeley, 2012), underlying of plant response as response to abiotic and biotic prolonged stressors and (Voelckel and Jander, 2014; Tavares et al., 2015; Field, 2014). Question of forming of appliance and sustainability of the crops (Hancock et al., 2015).

Adaptability (from the Latin. «*adapto*» – adapt) as a property of living organisms characterizing adequacy (conformity) plant genotype real conditions of existence for quite a long time to maximum realization of potential opportunities in the environment (Genkel, 1978; Cellular mechanisms of plant adaptation …, 2003; Bita, Gerats, 2013). The conducted analysis of of literature in recent years demonstrates the significance achievements of problems in the study of adaptability and adaptation of plant populations (Hrytsyna, 2011; Ermakova, 1979; Kyyak, 2014; Suley, 1989) and prompts it to further development of analytical approaches, including the comparison of of vital functions occurring between different organisms in biocenosis not only of rare, relict and endemic plants, but also cultural species (Moskalets, Rybalchenko, 2015).

Citation:
Moskalets, T.Z. (2016). Tribe *Triticeae* L. and the biocenotic mechanisms of adaptability. *Biological Bulletin of Bogdan Chmelnitskiy Melitopol State Pedagogical University,* 6 (2), 259–267.

Поступило в редакцию / Submitted: 09.07.2016
Принято к публикации / Accepted: 19.08.2016

crossref **http://dx.doi.org/10.15421/201656**

The sharp aggravation of environmental situation as a result of anthropogenic impact induces to search for new forms of crops and the ways of realization their sustainability (Kolesnichenko, 2012; (Moskalets et al., 2016b). To resist extremal conditions can genotypes highly plastic, tread properties are determined by genetic, morphological, physiological and biochemical and biocoenotic mechanisms (Shpylchyn et al., 2010; Moskalets et al., 2016a). The success of the spread of new species and forms of plants is determined by the presence of reliable criteria of stability and protective mechanisms for competitive (parasitic, trophic) relations (Hancock et al., 2015).

In this connection, the **purpose** was to find out biocenotic mechanisms of adaptiveness that are already produced and that shape the representatives tribe *Triticeae* L. the negative impact of pathogens, phytophages, segetal plants for new growth conditions.

MATERIALS AND METHODS

The objects of research were sorts and lines of tribe *Triticeae,* in particular: *Triticum aestivum L.* (common wheat), *Secale cereale L.* (winter rye) and winter triticale (*Triticum trispecies Shulind.)* Nosivska selection and research station of Remeslo Myronivka Institute of Wheat of NAAS of Ukraine (Table 1).

Proceeding from the fact that the origin of the weekend parent forms have a wide habitat of geographical origin important for disclosure biocoenotic of mechanisms adaptability in different areas of their introduction, identify marker adaptive characteristics and properties. Research carried out during the 2008–2015 in central part of Ukrainian northern Right Bank Forest-Steppe zone with periodically erratic humidification (the research field NSRC of Bila Tserkva NAU), soil – chernozem typical deep argillaceous sand; Polissia-Forest-Steppe insufficient moistening zone (Nosivska selection and research station of Remeslo Myronivka Institute of Wheat of NAAS of Ukraine, Chernigiv region), soil – chernozem low humus and easy argillaceous sand and Zhytomyr Polissya the wet zone (Institute of Agriculture Polissia of UAAS (Zhytomyr region, Korestenskyy district, Hrozyne), soil – sandy loam sod-medium podzolic. Characteristics of weather and climate conditions are presented in tables 2,3.

Morphological studies of plants performed by I.G. Serebryakov (Serebryakov, 1964). The number, species composition and strategy functioning of the segetal vegetation – using modified methods A.Ph. Chenkin (Chenkin, 1994), Rabotnov (Rabotnov, 1993). Phytopathogenic assessment of crops was carried out by conventional method (Babayants et al., 1988). Counts entomophages – according to the recommendations Polyakov (Polyakov et al., 1984). For determination of species composition of of arthropods used appropriate auxiliaries used (The determinant of agricultural pests …, 1976). The calculations of pest were carried out according to phenophase of crops. Statistical data processing conducted by B.A. Dospehov (Dospehov, 1985).

RESULTS AND DISCUSSION

According to data the observations we is marked that the structure of trophic and parasitic connections of winter cereal crops a leading place occupy: *Sitobion avenae* F., *Schisaphis graminum* Roind, *Eurygaster integriceps* Put., *Aelia acuminata* L., *Phyllotreta vittula* T. This is the most numerous representatives of phytophages II-IV, IX-XI stages of organogenesis members of the tribe *Triticeae.* According to the literature (Stryhun, 2015) on crops of wheat and other crops in Ukraine there are more than 300 species of phytophagans, including practical importance are 132 species of these insects class includes – 111 species of arachnids – 6.

In autumn in the formation of of increase cone, its intense differentiation of laying nodes, internodes, stems and leaves, stems injury influences these formative processes and to frost-, winter hardiness of plants. Crop during damage weaker accumulate plastic material, much of which is spent on regeneration processes of damaged tissue, and as a consequence the plants lose their resistance to unfavorable abiotic factors. So, as a result of effects of harmful parasite entomofauna on the plant as a whole organism, results in to the manifestation of physiological processes both in the direction of increasing protective mechanisms and in the direction of weakening..

Differentiation of representatives of tribe during the growing season for protective mechanisms to phytophages, enabled to single out a link between the intensity of display entomophytoparasitism and the photoperiodic sensitivity. Established that plants with weak development of the herb of the autumn

Table 1. Characteristics of research objects

№	Variety, line of species *Triticeae*	Pedigree of sort, line	Physical geographic origin	The approximate zone regionalization
Triticum aestivum L. (common winter wheat)				
1	Noshpa 100	i.s. of Л 41-95	UA	FS
2	Zoriana Nosivska	♀ (♀Obriy x ♂Maris Yuntsman) x ♂Maris Yuntsman	UA, GB	Pl-FS
3	Yuvivata 60	i.s. of Л 4639/96	UA	Pl
4	КС 1	♀Donska n/k x ♂К-6477/91	RU, CN	FS
5	КС 5	♀ Donska n/k x ♂Zoriana Nosivska	RU, UA	FS
6	КС 7	♀Л 00239 x ♂ Donska n/k	RU	FS
7	КС 14	♀Maris huntsman x ♂ (♀Kyianka x ♂Pony)	CN, UA, US	FS
8	КС 16	♀Kyshynivska intensyvna x ♂ (♀Poliska 87 x ♂ Kyianka)	MD, UA	FS
9	КС 17	♀ (♀Norman x ♂Florida) x ♂Myronivska 61	GB, DE, UA	FS
10	КС 21	♀ Zoriana Nosivska x ♂ Poliska 29	UA	FS
11	КС 22	♀ Zoriana Nosivska x ♂Myronivska 61	UA	FS
12	Л 41-95	(♀Myrleben x ♂ Poliska 92)	UA	Pl-FS
13	Л 59-95	♀ Donska n/k x ♂[♀(♀Maris Madler x ♂Pony) x ♂ Donska n/k]	RU, US, GB	Pl-FS
14	Л 3-85	-//-	-//-	FS
15	Л 4639/96	♀ Poliska 90 x ♂Мирлебен) x ♂ (♀Holger x ♂ППГ 296)	UA, GB, RU	Pl
16	Daushka	♀(♀Donska n/k x ♂Maris Hunstman) x♂ Donska n/k	RU	Pl-FS
17	Zirka Nosivska	♀ Poliska 90 x ♂К 6407	UA, CN	Pl-FS
18	Prydesnyanska n/k	i.s. of Л 59-95	RU, US, GB	Pl-FS
19	Ariivka	i.s. of КС 1	UA	FS
Secale cereale L. (winter rye)				
20	Borotba	♀ Sangaste x ♂ Saratovska 4	EE, RU	Pl-FS-St
21	Olimpiada 80	♀Kustro x ♂Pantserne	DE, PL	Pl -FS
Triticum trispecies Shulind (winter triticale)				
22	Vivate Nosivske	i.s. of Pshenychne	UA	FS
23	ПС_1_12	♀Slavetne x ♂Pshenychne	UA	FS
24	ПС_2_12	♀ Slavetne x ♂Pshenychne	UA	FS
25	УП_1-12	♀Uragan x ♂Pshenychne	UA	FS
26	Д_5_2010	♀ (♀Avgusto x ♂NE 312) x ♂№1364/93	UA, CA	Pl-FS

Note: n/k (napivkarlykovyy) – semi dwarf, i.s. of – individual selection of, Pl – Polissia, FS – Forest-Steppe, St – Steppe.

and early spring of to vegetation significantly less are affected insect pests (mechanism of «ontogenetic avoidance»), than varieties and lines with weak or neutral photoperiodic sensitivity. In 2009, 2010, 2012 increase in populations of *Coleoptera, Scarabaeidae, Hemiptera, Aphidina* significantly impairs the the performance of seed plants, and considerably reduces the yield and impairs grain quality. Our conclusion is supported by the research of other authors (Hancock et al., 2015; Sumarokov, 2001; Voelckel and Jander, 2014) whose data indicate a deterioration of the phytosanitary state and seed productivity.

Important mechanisms that reflect the protective properties of cultural plant to harmful insects are morphological characteristics producers (Strygun, 2015; Sumarokov, 2001; Felman et al., 1997). In particular, resistance to insects caused by dense fit of spicate of scales to fit grains (which prevent colo-

Table 2. The characteristic temperature regime of the research areas, including most extreme

Zone	Indexes									
	a/l t, °C air	the sum of tempera-tures above, °C			the duration of periods with t, above, days			max, t, °C	min, t, °C	the depth of soil freezing, cm
		10	5	0	0°C	5°C	10°C			
FS	7,6	2650	3010	3270	256	215	168	+42	-37	85
Pl-FS	6,9	2540	2980	3130	249	206	157	+38	-34	89
Pl	6,7	2460	2960	3090	245	200	153	+38	-32	44

Note: a/l – the average longstanding.

Table 3. Characteristics of weather-climate conditions of the research areas

Zone	Indexes							
	rainfall		duration, day		HTI	the total radiation kkal /cm^2	the total FAR, temperatures for the period, MJ/m^2	
	a/l	g/s	g/s	f/f p			>5°C	>10°C
FS	538	300-340	200-210	160-170	0,9-1,2	95-107	1600-1750	1460-1470
Pl-FS	575	350-400	200-205	155-165	1,5-1,6	90-95	1610-1640	1370-1480
Pl	614	400-420	190-205	160-165	1,5-1,7	86-94	1635-1650	1410-1435

Note: HTI – hydrothermal coefficient, g/s – growing season, f/f p – frost-free period.

nization colossus phytophages insects, thrips, aphids cereal for wheat Spelta, Turhidum and wheat-rye amphidiploid: ПС_1_12, ПС_2_12, УП_1-12, Д_5_2010, in them genome are genes the aforementioned wheats). It was found that lack ligula in the vagina determines of the leaf lesions plants of *Phyllotreta vittula* T. (mechanism of «morphological tolerance»). Most wheat, in which the presence of liguly and its snug fit to the stem significantly reduced parasitizing development as *Phyllotreta vittula* T. and *Phyllotreta cruciferae* Goeze the autumn and early spring, in peak of puberty.

Another morphological feature – as element the protective mechanism of individual groups of phytophages, in particular, to *Sch. graminum*, *E. integriceps*, *A. acuminata*, *P. cruciferae* are: density head (ear), beardedness, their location along the length ear, which is typical for Noshpa 100, Л 41-95, Prydesnyanska napivkarlykova, Л 59-95, Ariivka, КС 1. Not less an essential morphological feature that provides resistance to insects of leaf beetles (*Chrysomelidae*) are medium and strong hairiness of stems under ear and floral scales (that is inherent to Vivate Nosivske, ПС_1_12, ПС_2_12, УП_1-12, Д_5_2010). Plant height and strength of the stem are also a leading elements of plant resistance to the undesirable phenomena (including lodging), which is a precedent for intensive development of unwanted entomofauna and the decline in productivity and quality of seed seed. These varieties and lines are КС 5 КС 1, L 59-95, Ariivka, Nosshpa 100 that belong to short stemmed. Insect resistance is also associated with following characteristics plants as the beginning and duration earing. It is established that triticale lines ПС_1_12, ПС_2_12 the early occurrence of and short term earing and in its turn reduces the early occurrence of ripening crops reduces on crops the number of adults and grain beetle of injury seed.

The ability of of plants to rapid regeneration from damage by insects inherent to wide-deciduous varieties and lines such as Nosshpa 100 Yuvivata 60 and others. Thus, in research S.O Triebel is shown that high level of resistance to wheat stem sawflies provides biotypes with high resistance to lodging and to grain beetles – with resistance to shedding (Triebel, 1999).

Stability varieties and lines cereal crops to phytophages O.O. Strygun (Strygun, 2015) considered by the several mechanisms: antibiosis (suppression of pests); antixenosis (unpleasantness plants for egg-laying adults); tolerance (recovery of lost plants without decrease of plant productivity); evasion (development harmful stage of phytophage in invulnerable time phenophase of plants); antibiosis and evasion; antixenosis and evasion; antixenosis, antibiosis and evasion. In the critical period of plant forming - ripening grain (X-XII stages) in agrocenoses wheat number more than ten main types of phytophages of the most

dangerous of bedbugs (6 species) and wheat thrips that damages grains. On IV–XII stages organogenesis of cereals manifested action of a number of defense reactions and mechanisms of plants that suppress the development and reproduction sucking phytophages.

To such mechanisms relating wax-colored bloomon leaves and ears, thickness spikelet scales, their thickness spikelet scales, ear density, flow velocity shaping processes etc. However completely avoid the harmfulness of of the complex sucking phytophages not possible, since each species has adapted to food on organs of places of plants and where the protective mechanisms are weakened. But the compensation for damage in the existing action entomocomplex КС 1, КС 22, Ariivka is prolonged assimilation ability leaf apparat. To *Eurygaster integriceps* plants confront due to such mechanisms as the stability of precocity, inability seeds to germinate in the ear, the accumulation high protein content and gluten.

Group leaf beetles are the least the numerical. These include смугаста *Phyllotreta vittula* and *Oulema* (*melanopus, lichenis*). Damage to IV-VII of organogenesis stages (early output in tube – of earing) when completed intensely shaping processes generative organs occurring and intense vegetative growth processes of plants. During its damage of puff apparatus of is disturbed photosynthesis, which adversely affects the crop capacity and grain quality. Against these phytophages mechanism of resistance varieties were identified in the 30 years of XX century V.A. Megalov, which is opushenist leaves trichomes. *Oulema* avoided tall varieties with high bushiness and narrow leaf plates and dense nervates. Yet the layers of wax-colored bloom on the leaves promotes the development of larvae *Oulema.* It is this feature and widely leaves are a fairly common in modern varieties, providing plant drought resistance and high yield, but contributes to reproduction and harmfulness of phytophages. Therefore problems with *Oulema*, as with *Phyllotreta vittula*, palpable exacerbated in the last decade (Hancock et al., 2015; Strygun, 2015; Sumarokov, 2001; Moskalets, 2015).

The level of resistance grain varieties to *E. integriceps* caused by high protein and gluten (≥14 і 28 %) (mechanism of «functional sustainability»). Occupancy the stairs in the autumn significantly depends on the shape of the bush and wax-colored bloom (mechanism of «morphological tolerance»). Varieties with half upright and upright bush form and strong waxy bloom in 1,9–2,3 times less settled by than the the flies that are spreading form of the bush (Moskalets, Rybalchenko, 2016; Hof et al., 2011).

Yet another factor decrease, and the loss of vitality cultural cereals are epiphytotics – fungal disease, that take into account interaction mechanisms plant and pathogen in the system «plant – pathogen – environment». Tolerant form of plants (species, subspecies, varieties, lines, cultivar, etc.) have a number of adaptiveappliances, which determine the long preservation stability properties of their growing in different soil-climatic zones. Identification of these features allows to predict future areas of distribution of certain plant varieties.

Among a number of consort-types of cereals are very common pathogen mealy dew – fungus *Blumeria gramimis f.sp. tritici* (DC.) Speer. Infection of plants pass the temperature 0–20°C and relative air humidity 50–100 %. High air temperature (over 30 °C) retards the development of mealy dew. Incubation period – 3–11 days (on average 4–5). Pathogen of mealy dew on susceptible varieties and lines of winter grain crops appears and develops in the early phase of tillering.

Under the conditions of Forest-Steppe and Polissia ecotypes maximum manifestation the pathogen (about 28–34 %) noted that lesions mealy dew, leaf all tiers, including Nosshpy 100, Л 41-95, Borotba, Olimpiada, which is characterized by high bushiness (intensive formation stems) and not erective flag leaf. In the phase of seed wax ripeness symptoms of the disease marked in on the leaves and stems of plants.. It is known that resistance varieties of of cereals to powdery mildew, created by hybridization is effective for 7 years. At 2008 – 2014 pp. established that varieties wheat common КС 1; КС 5, КС 14, Prydesnyanska napivkarlykova, КС 17, Yuvivata 60 і winter triticale ПС_1_12, ПС_2_12, Д_5_2010 are resistant to pathogen mealy dew that is, these biotypes are unlikely ecological niche (tab. 4). The mechanism of resistance short stemmed plants (КС 1; КС 5, КС 14, Prydesnyanska n/k) is not high stem (to 85 cm) and early ripeness. Mechanism of stability Yuvivata 60 and Л 4639/96 are characteristic for the high photoperiodic sensitivity, resulting in plants of these biotypes not outgrow the autumn and early spring.

It is clear that this differentiation is not absolutely perfect from phytopathogenic point of view, but graduation genotypes cultural species of ecological and biological point of view is important because it allows synecology reflect the peculiarities of biodiversity in environmental and landscape terms. This

Table 4. Research of varieties and lines in probability to be ecological niche for *Blumeria graminis*

Epiphyte-parasite	Resistance against the pathogen, marks	The property to be ecological niche	Ecotope		
			Forest-Steppe	Polissia–Forest-Steppe	Polissia
2	*3*	*4*	*5*	*6*	*7*
Blumeria graminis (DC.) f. sp. tritici Speer	9–8	unlikely	*Common winter wheat*		
			КС 1; КС 5	КС 1; КС 5	КС 1
	7–6	probable	КС 14; Prydesnyanska n/k,	КС 14, Prydesnyanska n/k; КС 17; Yuvivata 60; Л 4639/96	Prydesnyanska n/k; КС 17; КС 14; Yuvivata 60; Л 4639/96
	5–4	medium-probable	КС 1, КС 5, КС 21, КС 22, Ariivka	Zoriana Nosivska, КС 1, КС 5, Ariivka, КС 21, КС 22	Zoriana Nosivska; Noshpa 100; Л 41-95, КС 1, КС 5, КС 21, КС 22
	3–2	intense-probable	Noshpa 100; Л 41-95	Noshpa 100; Л 41-95	Noshpa 100; Л 41-95, Ariivka
	9–8	unlikely	*Winter triticale, Winter rye*		
			ПС_1-12; ПС_2-12; Д_5-2010	ПС_1-12; ПС_2-12; Д_5-2010	ПС_1-12; ПС_2-12; Д_5-2010
	7–6	probable	Olimpiada 80 Borotba	Olimpiada 80, Borotba	Olimpiada 80, Borotba

system-ecological approach discloses ecology-biological potential new genotypes for the important criteria for a particular spatiotemporal period of growth and development of crops.

Studying the the main dominant competitive associations of weeds and their differentiation by type of population strategies discussed in detail in a previous publication (Moskalets, 2016) made it possible to find out the features of formation mechanisms of adaptability members of tribe Triticeae on the structure and the competitive relationships with segetal groups, provided an opportunity discover that tall varieties and lines of wheat soft, rye and triticale winter are the most competitive. Under the conditions of Forest-Steppe and Polissia these are: Yuvivata 60, Л 4639/96, Borotba, Olimpiada 80, Д_5_2010, that have the ability highly competitive compared to other medium grew and semi dwarf varieties. As protective mechanisms that limiting spread of associative weeds is the height of culture, a high overall tillering, size of leaf plates, the duration of accumulation of organic matter, synchronicity of growth of the main stem, the intensity sinking ear after full ripeness, strength stems, stretched maturate period, high associative ability of microorganisms - antagonists of weeds.

Studying the and comparison of morphological parameters and relations with consort-species and representatives of tribe *Triticeae* allowed to find out what plants produces structural and functional features biocenotic mechanisms that manifested in adaptive properties. On example cultural cereal species shows that the basic mechanisms of adaptability are: mechanisms of functional sustainability, morphological tolerance and ontogenetic avoidance (Fig. 1).

CONCLUSIONS

Studying the and comparison of morphological parameters and relations with consort-species and representatives of tribe *Triticeae* allowed to find out what plants differently realize their life potential. Which are based on structural and functional features biocenotic mechanisms that manifested in adaptive properties. On example cultural cereal species shows that the basic mechanisms of adaptability are: mechanisms of functional sustainability, morphological tolerance and ontogenetic avoidance. The first group is associated with functional parameters forming and manifestation life potential of plants (accumulation

Table 5. Research of varieties and lines in probability to be ecological niche for *Fusarium graminearum*

Epiphyte-parasite	Resistance against the pathogen, marks	The property to be ecological niche	Ecotope		
			Forest-Steppe	Polissia–Forest-Steppe	Polissia
2	*3*	*4*	*5*	*6*	*7*
Fusarium graminearum var. caricis (Oudem.) Wollenw.	8–7	unlikely	*Common winter wheat*		
			КС 1; КС 14, КС 22, Л 4639/96, Л 59-95, Zoriana Nosivska	КС 1; Noshpa 100, Ariivka	Yuvivata 60, Ariivka
	6–5	probable	Л 41/94; Zirka Nosivska, КС 5, Noshpa 100, Ariivka	Л 4639/96, Prydesnyanska n/k; Zoriana Nosivska	Л 4639/96, Prydesnyanska n/k; Zoriana Nosivska
	4–3	intense-probable	КС 17	-	-
	8–7	unlikely	*Winter triticale*		
			ПС_1_12, ПС_2_12, Vivate Nosivske	ПС_1_12, ПС_2_12, Vivate Nosivske	Д-5_2010
	6–5	probable	УП 1-12	-	Vivate Nosivske
	Winter rye				
	6–5	probable	Borotba, Olimpiada 80	-	Borotba
	5–4	intense-probable		Borotba, Olimpiada 80	Olimpiada 80

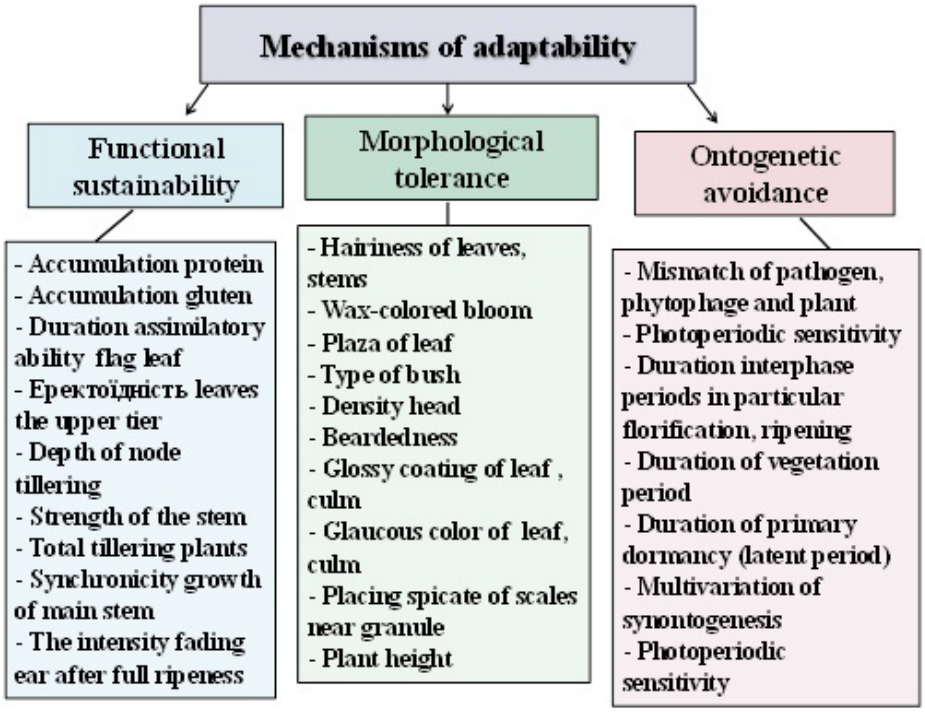

Figure 1. Biocenotical mechanisms of formation and manifestation adaptive properties of representatives tribe *Triticeae.*

protein, accumulation gluten, duration assimilatory ability flag leaf; erection leaves the upper tier; depth of node tillering; strength of the stem, ie the, low penchant to lodging; total tillering plants; synchronicity growth of main stem; the intensity fading ear after full ripeness.

The second group includes mechanisms of morphological tolerance (hairiness of leaves, stems; wax-colored bloom; plaza of leaf; type of bush; density head; beardedness; glossy coating of leaf, culm; glaucous color of leaf, culm; placing spicate of scales near granule; plant height). To mechanisms of ontogenetic avoidance relating such as mismatch of pathogen, phytophage and plant; photoperiodic sensitivity; duration interphase periods in particular florification, ripening; duration of vegetation period; duration of primary dormancy (latent period); multivariation of synontogenesis; photoperiodic sensitivity.

Knowing the biocenotic mechanisms formation of adaptability cultural species discloses up new opportunities in clarifying the fundamental bases of adaptation and is of practical importance in the management of vitality and seed productivity.

REFERENCES

Ahremovich, M.B., Batiashvili, I.D., Bay-Bienko, G.Y. (1976). *The determinant of agricultural pests on crop damage*. Leningrad: Kolos. (in Russian).

Babayants, L., Meshterhazy, A., Waechter, F., (1988). *Methods of selective breeding and stability wheat and barley for the disease in developing countries SEV states.* Praga: Koordynatsyonnyy tsenter, 321. (in Russian).

Bita, C., Gerats, T. (2013). Plant tolerance to high temperature in a changing environment: scientific fundamentals and production of heat stress-tolerant crops. *Front. Plant Sci. 4*, 134–135.

Cellular mechanisms of plant adaptation to adverse environmental factors vozdeystuviyam in vivo. (2003). E.L. Kordyum (Ed.). Kiev: Naukova Dumka, 277 (in Ukrainian).

Chenkin, A.F. (1994). *Phytosanitary diagnostics*. Moscow: Kolos, 1994. (in Russian).

Dospehov, B.A. (1985). *Metodika polievogo opyta [Methods of field experience]*. Moscow: Agropromizdat. (in Russian).

Ermakova, I.M. (1976). *Vitality of poplutaions and method of determining. Cenopopulations of plants*. Moscow. (in Russian).

Field, C.B., Barros, V.R., Dokken, D.J., Mach, K.J., Mastrandrea, M.D., Mastrandrea, P.R., White, L.L., 2014. *Intergovernmental Panel on Climate Change. Climate Change 2014: Impacts, Adaptation, and Vulnerability.* Cambridge: Cambridge University Press.

Genkel, P.A. (1978). The adaptation of plants to extreme environmental conditions. *Plant Physiology, 25*(5), 889-902.

Hancock, R.D., Hogenhout, S., Foyer, C.H. (2015). Mechanisms of plant–insect interaction. *Journal of Experimental Botany, 66*(2), 421-424.

Hrytsyna, M. (2011). Feature of ontogenesis of individuals of *Verbascum densiflorum* Bertol. caused by on the level of vitality in the population. *Visnyk of the Lviv University. Series Biology, 57*, 77–83

Hof, C., Araújo, M., Jetz W., Rahbeck C. (2011). Additive threats from pathogens, climate and land-use change for global amphibian diversity. *Nature, 480*, 516–519.

Keeley, J.E. (2012). Ecology and evolution of pine life histories. *Annals of Forest Science, 69*, 445–453.

Kolesnichenko, O.V., Grygoryuk, I.P., Grysyuk, S.M. (2012). *Biology and ecological systems sustainability and adaptation of plants Castanea sativa Mill.: monograph*. Kiev: Komprynt. (in Ukrainian).

Kumar, S., Sharma, V., Chaudhary, S. (2012). Genetics of flowering time in bread wheat *Triticum aestivum*: complementary interaction between vernalization-insensitive and photoperiod-insensitive mutations imparts very early flowering habit to spring wheat. *Genetics, 91*(1), 33–47.

Kyyak, V.H. (2014). Vitality as an integral indicator of plant population state. *Studia Biologica, 8*(3–4), 273–284. (in Ukrainian).

Minden, V., Andratschke, S., Spalke, J. (2012). Plant–trait environment relationships in salt marshes: deviations from predictions by ecological concepts Perspectives in Plant Ecology. *Evolution and Systematics, 14*, 183–192.

Moskalets, T.Z. (2015). Vplyv mozajichnoho rozmishennja sortiv ozymoji pshenyci na ahroriznomanittja [Effect of plantitng pattern of winter wheat on agrodiversity]. *Biological Bulletin of Bogdan Chmelnitskiy Melitopol State Pedagogical University, 5*(2), 31–43 (in Ukrainian).

Moskalets, T.Z. (2016). Osoblyvosti vplyvu sortiv tryby Triticeae na strukturu i konkurentospromozhnist sehetalнnoho uhrupuvannia [Impact of tribe Triticeae varieties on structure and competitiveness of segetal group]. *Biological Bulletin of Bogdan Chmelnitskiy Melitopol State Pedagogical University, 6*(1), 63–79 (in Ukrainian).

Moskalets, T.Z., Vasylkivskyi, S.P., Rybalchenko, V.K. (2016a). Adaptive potential performance of representatives of the tribe Triticeae L. *Biotechnologia Acta, 9*(2): 61–69 (in Ukrainian).

Moskalets, T.Z., Vasylkivskyi, S.P., Rybalchenko, V.K., Morgun, B.V., Moskalets, V.I., Moskalets V.V. (2016b). New genotypes and technological indicators of winter Triticale. *Biotechnologia Acta, 9*(1): 79–86 (in Ukrainian).

Moskalets, T.Z., Rybalchenko, V.K. (2016). Conceptual model of management the vital state plant ecomorphs by the criteria of adaptation mechanisms. *Vìsn. Dnìpropetr. Unìv. Ser. Bìol. Ekol., 24*(1), 211-221. (in Ukrainian).

Moskalets, T.Z., Rybalchenko, V.K. (2015). Morpho-phisiologichni ta moleculiarno-genetychni oznaky kseromorphnosti *Triticum aestivum* L. [Morpho-physiological and molecular genetics features of xeromorphity *Triticum aestivum* L.]. *J. Scientific Herald of Chernivtsi University. Biology (Biological Systems), 7*(1),49–56 (in Ukrainian).

Parent, B., Vile, D., Violle, C., Tardieu, F. (2016). Towards parsimonious ecophysiological models that bridge ecology and agronomy. *New Phytologist, 25*, 143–145.

Polyakov, I.J., Persians, M.P., Smirnov, V.A. (1984). *Forecast of development of pests and diseases of crops*. Leningrad: Kolos. (in Russian).

Rabotnov T.A. (1993). Experience in the use of ecological scales to study patientnosti plants. Ecology,1, 11-18 (in Russian).

Serebryakov, I.G. (1964). Zhiznennyie formy vysshix rasteniy i ix izucheniie [Life forms of higher plants and their study] Polevaya geobotanika. M., 3, 146–157 (in Russian).

Shpylchyn, V., Antonyuk, M., Ternovska, T. (2010). Phenotypic polymorphism in glaucousness trait among *Triticinae* subtribe members. *Scientific notes. Biology and Ecology, 106*, 3-8. (in Ukrainian).

Strygun, O.O., Tribel, S.A., Gamayunova, O.H. (2015). Diptera (Diptera) pests of cereal crops and redundant system protection. *Agriculture and Plant Protection, 2*, 51-54. (in Belarus).

Suley, M. (1989). *Viable population: environmental aspects*. Moscow: Mir. (in Russian).

Sumarokov, O.M. (2001). Coleopteropterofauna winter wheat crops in the northern steppe of Ukraine. *Bulletin Institute of Grain Production, 15-16*, 49–56. (in Ukrainian).

Tavares, L., Carvalho, C., Bassoi, M. (2015). Adaptability and stability as selection criterion for wheat cultivars in Paraná State. *Ciências Agrárias, Londrina, 36*(5), 2933–2942.

Triebel, S.O. (1999). *Forecast of pests, diseases and weeds, pest status assessment agrocenoses Handbook of Plant Protection*. Kiev: Urozhay. (in Ukrainian).

Voelckel, C., Jander, G. (2014). *Insect-Plant Interactions*. John Wiley & Sons, Ltd.