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ITEMS FROM THE UKRAINE

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The impact of larvae of Eurygaster integriceps Put. on winter wheat grain.

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Winter wheat suffers from harmful organisms to a considerable extent. Among these pests, cereal insects are especially harmful not only on yield but also on grain quality of winter wheat. At present, with the reduction in the use of chemical protection, agronomical means of protection are important. Our aim is the search for zonal agnonomic methods that reduce the harmful impact of the cereal insect on the qualitative indices in winter wheat grain. We have made studies on a cultivar, forecrop, and fertilizer bases.

Material and Methods. Field experiments were at the Plant Breeding Laboratory of the Plant Production Institute NA. V.Ya. Yuriev of the UAAS (Eastern Forest-Steppe of Ukraine) in a fixed 9-course, fallow-crop rotation. The common, heavy chernozem soil has medium humus and is characterized by the following indices in the arable layer: humus, 5.25–5.38 %; pH of salt extract, 6.0–6.5; nitrogen content, 16.8–17.5, labile phosphorus, 11.2–14.8; and exchange potassium, 11.1–13.3 mg/100 g soil.

Table 1. Grain quality in winter wheat depending on cultivation conditions and seed damage by *Eurygaster integriceps* Put. (average over 2001–05, factor A).

Number of damaged seeds					Test weight (g/l)	Crude gluten content in flour (%)	Gluten IDG units	Quality group	Grain protein content, (%)	Flour strength alveograph units (w)	Bread volume/ 100-g flour (ml)	Total bread-making value	Grain glass	Grain yield (t/ha)
total	1	2	3	4										
Forecrop – black fallow (organic-mineral fertilizer background), factor B.														
5.4	0.2	4.3	0.8	0.1	773	30.9	74	II	13.31	290	573	4.2	2	6.49
Forecrop – peas for grain (organic-mineral fertilizer background), factor B.														
8.9	0.6	7.5	0.3	0.6	780	28.8	74	II	12.76	250	550	3.6	3	5.90
LSD_{05} for factors:														
A – 1.04														0.16
B – 0.74						0.64			0.73	42.19	88.35	1.33		0.12
AB – interaction – 1.47														0.30
Cultivar Donetskaya 48 (organic-mineral fertilizer background, forecrop – black fallow), factor B.														
3.9	0.2	3.0	0.8	0.0	783	34.1	83	II	14.10	241	555	3.8	2	5.64
Cultivar Kharus (organic-mineral fertilizer background, forecrop – black fallow), factor B.														
5.3	0.3	4.2	0.5	0.3	773	29.9	70	II	12.74	278	583	4.3	3	6.89
LSD_{05} for factors:														
A – 1.17														0.12
B – 0.83						1.49			1.41	67.55	122.75	1.44		0.15
AB – interaction –1,65														0.27
Fertilizer omitted in background, factor B.														
5.9	0.3	4.3	0.8	0.5	779	28.1	76	II	12.53	254	548	4.0	3	6,01
Organic fertilizer background – manure 30 t/ha, factor B.														
6.0	0.3	4.9	0.7	0.2	779	29.4	83	II	12.86	252	525	3.7	3	6.22
Organic-mineral fertilizer background – manure 30 t/ha + $(NPK)_{60}$, factor B.														
5.6	0.6	4.2	0.6	0.2	775	31.4	75	II	13.41	275	553	4.1	2	6.44
LSD_{05} for factors:														
A – 0.84														0.10
B – 0.73						1.15			0.65	36.70	30.75	0.80		0.16
AB – interaction – 1.45														0.23

The 4-year average for the different fertilizer backgrounds indicated that the least total grain damage by cereal bug larvae was in the block with organic-mineral fertilizer, 5.6 %. Damage in the blocks without fertilizer and with only organic fertilizer was 5.9 and 6.0 %, respectively. Total damage was 4.2–4.9 % in seed with a score of 2, which corresponded to 75–83 units of gluten quality (IDG, 2nd group). A reduction in grain damage, from 6.0 to 5.6 %, contributed to a reliable increase in crude gluten content in flour between 29.4 and 31.4 (LSD_{05} = 1.15 %), and protein content in the grain from 12.86 to 13.41 %, bread volume/100-g flour from 525 to 553 ml, and total bread-making estimate from 3.7 to 4.1 score. These analyses showed a negative correlation between the indices of grain quality and damage by the cereal bug (r = -0.8). However, higher gluten quality was found in grain from the organic fertilizer treatment, 83 alveograph units compared to 76 units for the block without fertilizer and 75 units for the block with organic-mineral fertilizer. Winter wheat grain grown without fertilizer and with organic fertilizers corresponded to the third class and that in the block with organic-mineral fertilizer to the 2nd class. On average, during 2001–05, the maximum grain yield was obtained in the organic-mineral fertilizer treatments, 6,44 t/ha, out-yielding the treatment without fertilizer by 0.43 t/ha (at LSD_{05} = 0.23 t/ha).

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Callus initiation and morphogenesis in in vitro culture of isogenic on gene type and rate of development in winter wheat lines.

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Methods of cultivating isolated cells, tissues, and organs for studying fundamental, plant physiology problems have found wide application in the development of unconventional approaches to various biological research areas and have a very wide spectrum of practical application (receiving of biologically active substances, transgeneration, selection, microcloning reproduction, and cryopreservation). The efficiency of cellular technology depends on many factors including the composition of nutrient medium, type of explant, age of a plant, and genotype (Machii et al. 1998; Stelmakh 1998; Tyankova and Zagorska 2001; Wang and Wei 2004). The search for genotypes with a high potential for callus formation and regeneration potential for the production of high-quality, fertile plant regenerants is a problem that depends on biotechnology (Tyankova and Zagorska 2001).

Systems of genetic monitoring of type (vernalization) and rates (photoperiod) developments determine a number of physiologico-biochemical processes of ability to vital activity of plants of wheat (Stelmakh 1998). These genetic systems also probably participate in the control of processes of callus initiation and morphogenesis *in vitro*.

Materials and Methods. Seven genotypes of soft winter wheat NILs for genes that control vernalization (*VRN1–VRN3*) and photoperiod *PPD1–PPD3*) were grown. The check cultivar Mironovskay 808 is completely recessive for all of these genes. Isogenic lines were produced by backcrossing with Mironovskay 808 by Stelmah (1998).

For production of callus and quality explants, we used the mature germ and apical meristems of aseptic roots. Seeds were sterilized in a 3% NaOCl solution for 15 min, washed for 5 min with sterile distilled water, and isolated germs transferred to a Petri dish with Murashige and Skoog medium (MS) with a full set of macro- and microsalts and containing 2,4 D (2 mg/l) as a growth regulator (Tyankova and Zagorska 2001). Explants were cultivated in the thermostat at 26°C in the dark. For apical root meristems, explants were grown for 4–5 days in on MS medium without phytohormone in the dark at 22°C. Isolated apical roots 1–1.5-cm long were transferred to MS medium with 2,4 D at 2 mg/l and cultivated in the dark at 26°C. At 14–21 days, explants isolated from apical meristems were sterilized with 3 % NaOCl solution for 15 min, washed 5 times in sterile distilled water, and placed on MS medium without phytohormone. Cultivation was at 22°C, with 3–4 lux of illumination and a 16-hour photoperiod at 70% humidity. For mature germ, seeds were sterilized and isolated germs were cultivated under the same conditions. The frequency callus induction and the efficiency of morphogenesis (%) was defined as the number of explants formed per callus or the number of plant regenerants to the initial number of explants. Results were from three independent experiments from not less than four Petri dishes or flasks (5–7 explants).