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Value of coarse varieties of summer grain crops in Predural.

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ABSTRACT

The Predural don't differ with favorable conditions for cultivation of grain crops therefore value the coarse varieties can run high at increase of size and stability of productivity. Direct dependence on productivity of a spring-sown field and barley on the mass of 1000 grains of a grade in the conditions of adverse for formation of optimum density of crops is revealed. At the high standard of farming there are processes of compensation of decrease in efficiency of crops. The highest level of compensation oats at the expense of potentially more inflorescences and barley grain content as more coarse and bushy culture possess.

Keywords: the spring-sown field, barley, oats, weight is 1000 grains, productivity.

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INTRODUCTION

Contrast of ecological conditions leads to considerable changes of productivity of field cultures in time and space. Modern technologies of their cultivation enough power and resource-intensive therefore lead to ecological disruption in agro ecosystems and agro landscapes.

Important role in giving to agriculture of stability and an ecological orientation allocate for a grade. By calculations of scientists the contribution of a grade to growth of productivity of grain crops reaches now 40% and more [1, 2, 3, 4].

Selection of adaptive grades of grain crops for cultivation in a certain region is an important task. The majority of scientists for an assessment of adaptive properties of a genotype is used by indicators of ecological plasticity (bi, Hom, etc.) and stability (V, λ, etc.). It is established that in favorable ecological conditions at the high standard of farming more plastic grades, with lower level of stability prove better. In process of deterioration of conditions of cultivation the preference should be given to cost average and slightly plastic, but more stable varieties [5, 6, 7, 8, 9].

Probably that indicators of plasticity of a grade are connected with such elements of efficiency of a plant as the tillering and amount of grains in an inflorescence which are more variable, depend on soil and climatic and agro technical conditions and their potential are realized in process of improvement of ecological conditions. The mass of 1000 grains is the least variable element of efficiency of a grade that is a basis of its stability [1, 10].

From the follows that in regions and years with extreme ecological and agro technical conditions for cultivation of grain crops the mass of 1000 grains of a grade becomes the most important element of efficiency providing stability of productivity. In recent years many researchers point to existence of close direct correlation link between the mass of 1000 grains and productivity [1, 11, 12].

The Predurals don't differ favorable conditions for cultivation of grain crops therefore it is possible to assume that value the coarse varieties here can increase in increase of size and stability of productivity. The analysis of data of the state test of grades across Perm region shows that stable direct link between the mass of 1000 grains of grades of grain crops and their productivity is traced only on a spring-sown field, both in space (tab. 1), and in time (tab. 2).

Coarse grain varieties of grain crops, as a rule, provided higher and steady productivity, than small seed, but the straight line steady communication in space between the mass of 1000 grains and productivity, over the last 10 years, is revealed also only on a spring-sown field. The narrowness of communication does not depend on a grain size of the variety (tab. 3).

Table 1: Correlation coefficients between 1000 grain weight and yield varieties of grain crops at competitive strain testing in the Perm region, 2012

Crop	Strain testing station					
	Kudymkar	Nytva	Verkhnemula	Berezovsk	Ordinsk	Kuedinsk
Winter wheat	-	-	0,66	0,36	0,31	0,20
Winter rye	-0,03	-0,15	0,53	0,14	-	-0,30
Spring wheat	0,66	0,64	0,27	0,32	0,34	0,76
Barley	0,32	0,46	0,34	-0,08	0,34	0,24

Table 2: Correlation coefficients between 1000 grain weight and yield varieties of grain crops at competitive strain testing on Kuedinsk testing plots in Perm region

Crop	2008 r.	2009 r.	2010 r.	2011 r.	2012 r.
Winter wheat	0,41	0,63	0,01	-0,45	-0,20
Winter rye	0,01	0,74	-0,55	0,10	-0,30
Spring wheat	0,82	0,36	0,41	0,41	0,76
Barley	0,14	-0,22	-0,26	-,16	0,24
Oat	0,04	-0,54	0,21	0,01	-0,28

Table 3: 1000 grain weight, yield and their correlation in the varieties of spring crops for testing plots in Perm region

Crop	Breed	Weight of 1000 grains		Prolificness		Correlation coefficient
		gm	spread, %	ton/ha	spread, %	
Kudymarsky State Testing Plot						
Spring wheat	Irgina	36,9	28	3,45	38	0,56
	Krasnoufimsk 100	41,1	27	3,84	34	0,27
Barley	Ecologist	46,9	21	3,69	33	-0,08
	Gonar	49,1	18	3,90	26	0,14
Oat	Ulov	33,9	31	3,45	56	0,07
	Dens	34,8	30	3,72	52	0,29
Kuedinsky State Testing Plot						
Spring wheat	Irgina	34,6	34	2,70	69	0,78
	Krasnoufimsk 100	38,6	32	3,55	62	0,82
Barley	Ecologist	48,1	27	3,36	73	0,40
	Gonar	50,3	17	3,42	65	0,62
Oat	Улов	30,6	24	3,13	76	0,34
	Dens	34,9	17	3,11	61	0,13

In the southern agro climatic zone of edge (Kuyedinsk STP) productivity of summer grain crops decreases in comparison with more damp northern zone (Kudymkarsk STP) by 0,29 – 0,75 t/hectare, and its stability by years twice on wheat and barley and to a lesser extent on oats. Scope of productivity reaches 62 – 76%. Value of mass of 1000 grains increases in these conditions. Its communication with productivity on grades of wheat becomes close ($r=0,78 - 0,82$), on barley grades average ($r=0,40 - 0,62$), on oats remains weak. The mass of 1000 grains in the southern zone decreases only at wheat grades, its variability is 2 - 3 times lower, than change of their productivity.

Thus, the analysis of data of a sort tests shows a certain dependence of a size of grain for increase of size and stability of productivity of summer grain crops in the Preurals.

METHODS OF RESEARCH

For deeper studying of the matter in 2008 - 2010 on a skilled field of the Permian AgAc the field experiment by which purpose was made studying of features of formation of productivity of grades of summer grain crops was. Research problems included supervision over changes of indicators of structure of productivity. Scheme of two-factorial experience: factor And – culture: A1 – a spring-sown field, A2 – barley, A3 – oats; factor In – a grade: B1 – Irgin's wheat, B2 – wheat Krasnoufimsk 100, B1 – barley the Ecologist, B2 – barley Gonar, B1 – oats of Dens, B2 – oats the Fakir. Frequency in experience the quadruple. The registration area of an allotment is 40 sq.m. placement of options the systematic.

The soil of skilled sites sod slightly podsollic, hard loamy so-so cultivated had the following agrochemical indicators: humus of 2,1 - 2,2%, mobile phosphorus of 93 - 130 mg/kg, exchange potassium of 146 - 153 mg/kg, the sum of the absorbed bases of 20,3 - 22,2 mg-ekv/100 of, pH_{col} 5,2 – 5,6.

Agro technology in experience standard for summer grain crops in Perm region. Norm of seeding of seeds: wheat – 7 million, barley – 5 million, oats of 6 million seeds on 1 hectare.

Weather conditions in the years of researches were various. For development of cultures 2008 was optimum (the State Customs Committee = 1,5), 2009 and 2010 goals were droughty (the State Customs Committee = 1,1 and 1,0).

Stability in productivity and other indicators determined by scope in time ($P = \left(\frac{n_{\max} - n_{\min}}{n_{\max}} \right) * 100$).

RESULTS OF RESEARCHES

As a result of researches it is established that in years contrast under the terms moisture and heat provision grain crops had low stability of productivity (tab. 4).

Table 4: Size and stability of productivity and mass of 1000 grains of grades of summer grain crops (2008 - 2010)

Crop(A)	Breed (B)	Prolificness		Weight of 1000 grains		Correlation coefficient
		т/га	размах, %	г	размах, %	
Spring wheat	Irgina	2,53	56	34,6	10	0,99
	Krasnoufimsk 100	3,06	48	37,5	1	0,44
Average for A₁		2,80	52	36,1	6	0,72
Barley	Ecologist	3,17	53	47,9	6	0,46
	Gonar	3,36	48	51,2	6	0,83
Average for A₂		3,27	50	49,5	6	0,64
Oat	Dens	3,61	40	30,4	17	-0,74
	Fakir	3,95	39	29,8	13	-0,83
Average for A₃		3,78	40	30,1	15	-0,78
NSR ₀₅	Chap. ef.	0,12		0,3		
	frequently. dec.	0,19		0,4		

The least fruitful and unstable culture on efficiency is the spring-sown field. Its productivity averaged 2,8 t/hectare, and scope of productivity of 52%. Barley was 0,47 t/hectare more fruitful at its similar stability.

The highest and steady productivity was provided by oats of 3,78 t/hectare and 40%. The mass of 1000 grains of cultures changed by years to a lesser extent (scope of 1 - 17%). This indicator was the least stable at oats.

On wheat and barley average and close direct link between the mass of 1000 grains and productivity ($r = 0,44 - 0,99$) is revealed, and on oats communication was the return. Coarse varieties of wheat (Krasnoufimsk 100) and barley (Gonar) provided higher and stable productivity, than small seed varieties, at oats on the contrary. Nevertheless, not always at a coarse varieties communication of productivity weighing 1000 grains I was closer.

Why at wheat and barley direct dependence of productivity on the mass of 1000 grains and coarse varieties is traced are more fruitful, and at oats isn't present? Possibly, it is connected with different compensatory abilities of this or that culture, a grade. Researches show that in adverse year's crops of summer grain crops strongly thin out. The general survival of plants to cleaning on wheat and barley made 40%, and on oats is 11% higher (tab. 5). Coarse varieties differ the best survival, than small seed varieties at the expense of increase in field viability of seeds at 3 - 4%.

Table 5: Indicators of structure of productivity of grades of summer grain crops (2008 - 2010)

Crop(A)	Breed (B)	Overall survival,%	Quantity product. plants before harvest, piece/sq.m	Productive tillering	Quantity product. stalks before harvest, piece/sq.m	Quantity of grains in an inflorescence, piece.	Quantity of grains on 1 sq.m, piece.
Spring wheat	Irgina	45	320	1,1	352	22,9	8061
	Krasnoufimsk 100	48	351	1,1	386	24,5	9457
Average for A₁		46	336	1,1	369	23,7	8759
Barley	Ecologist	44	224	2,0	447	17,3	7733
	Gonar	49	251	1,7	426	17,7	7540
Average for A₂		46	243	1,8	437	17,5	7636
Oat	Dens	58	352	1,2	423	35,1	14424
	Fakir	56	350	1,1	385	40,9	15746
Average for A₃		57	351	1,2	404	38,0	15085
NSR ₀₅	Chap. ef.	3	16	0,1	23	1,0	934
	frequently. dec.	5	25	0,3	32	1,5	1316

The greatest compensatory ability at density restoration of stalks of barley at which the coefficient of a productive tillering averaged 1,8 differs, and at a grade Gonar it is reliable 0,3 below, than at a grade the Ecologist. Stalks of wheat and oats are restored poorly as the coefficient of a tillering doesn't exceed 1,2, distinctions on grades it isn't revealed.

The average density for the three years of productive stalks close to the optimum level for the Perm region (500 per m²), only barley was 426 - 447 per m², crops of wheat (369 per m²) and oats (404 pcs ./m²) were more sparse.

Thus, indicators of efficiency of an inflorescence are important for achievement of high efficiency of grain crops in the Predurals. The amount of grains in an ear of barley averaged 17,5 pieces, at wheat of 23,7 pieces that it is obvious not enough for high-capacity formation of absorption assimilates. At barley the amount of grains on 1 sq.m made 7636 pieces and didn't depend on a grade, at Irgin's wheat of 8061 pieces, at wheat Krasnoufimsk 100 is 1396 pieces more. In these situation genotypes with higher weight of 1000 grains, namely grade barley Gonar and wheat Krasnoufimsk 100 have advantage, as predetermined more their high productivity.

At oats inflorescence whisk more grain content, than ear. The amount of grains at a grade of Dens reached 35,1 pieces, and at a grade the Fakir is 5,8 pieces more. It provided sufficient for developing level of production process capacity for inflow of carbohydrates of 15085 pieces/sq.m of grains, and at a small seed varieties the Fakir it was 1322 pieces/sq.m more, than at a grade of Dens. In these conditions the mass of 1000 grains wasn't of great importance for formation of level of productivity therefore communication of these indicators is absent.

CONCLUSIONS

Thus, in the Predural on cespitose and podsolic the middlecultured soils in the conditions of insufficient moisture security strong processes of a thinning of crops of grain crops are observed. At the high standard of farming there are processes of compensation of decrease in efficiency of crops. The highest level of compensation oats at the expense of potentially more grain content inflorescence and barley as more coarse varieties and bushy culture that provides more their high productivity, than at wheat possess. Large size grades of barley (Gonar) and especially wheat (Krasnoufimsk 100) in these conditions provides a reliable increase of productivity of grain of 0,19 - 0,53 t/hectare in comparison with more small seed varieties.

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