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INTERRELATION OF SOME TRAITS AND THEIR VARIABILITY IN NEW RICE VARIETIES DURING COMPETITIVE TRIAL

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Abstract

Rice is the staple food for many people of the world, since it gives the greatest amount of grain from a unit area. According to the gross grain collection in the world, it stands in one place with wheat, ranking second in the sowing areas. Rice for food purposes is used in the form of cereals, as an admixture to bread or confectionery products, in the production of flakes, puffed grain. Milled rice has high nutritional properties.

Strategic plans of ARRRI's breeding program and international projects include development of productive varieties with high yield potential. Together with yield increase great importance is given to grain quality. It is known that yield and quality are two parameters which are difficult to combine when obtaining agricultural products. Как известно, урожайность и качество – это два параметра, которые трудно сочетать при получении сельскохозяйственной продукции. In most cases, with increasing yields, quality decreases and vice versa. Therefore, the aim of our research is to search

for the optimum in which grain and milled rice quality will not decrease with increasing yields.

This article presents the specific interrelation of agronomic traits as well as variability of this traits by years.

Keywords: rice breeding, new variety, technological indicators of grain quality, competitive variety trial.

Introduction. In scientifically based technological scheme of cultivation of agricultural plants breeding and seed production take leading place as the most powerful, environmentally friendly levers in increasing the yield and quality of crop production [8].

In 2016, the amount of exported crops (135.5 thousand tons) was almost equal to the amount of imported grain (137.6 thousand tons), which is an indicator of the country's almost 100% self-sufficiency and the potential for import substitution program. This indicator was achieved by Russia for the first time in recent years [1].

Mostly the increase in yield and gross collection, as well as improvement of technological indicators of grain and milled rice, is ensured by the introduction of new rice varieties mostly of intensive type, which in turn contributes to the growth of rice-growing efficiency.

ARRRI has developed a wide range of varieties which can be used for cooking dishes for various purposes and can provide import substitution for almost all types of rice products. Rice varieties Rapan, Regul, Diamant, Khazar, Ametist, Favorit, Lider, Anait, Kurazh, etc. are for a long time and deservedly in demand among consumers and connoisseurs.

Exclusive rice varieties developed by domestic breeders also find their consumer: Viola, Violetta, Vita belonging to glutinous and ensphering varieties; Mars and Rubin – red-grained, having colored pericarp of peeled rice grain; Yuzhnaya Noch, Mavr and Gagat with deeper coloring of outer layers from dark violet to graphite. These varieties differ in grain type and refer to different groups with a grain index (l / b) from 1.6 to 3.5.

For the progressive development of rice growing, a scientifically grounded varietal policy is needed, including increasing the assortment of cultivated varieties of different technological energy intensities (varieties of intensive, extensive and intermediate types), taking into account their characteristic features, as well as agro-climatic conditions of cultivation.

Variety change is an important process, success of which depends on joint efforts of scientists and production workers. The trend of recent years - a steady increase in demand for large-grain varieties, could not but affect the

direction of work of breeders. Three from five varieties passed to State Variety Testing in 2017 are large-grain, and in 2018 – two from five [6].

Materials and methods. As a material for research we used varieties from competitive trial. When sowing plots for Competitive Variety Trial the "Wintersteiger Plotseed" seeder was used with a central seeding machine. The plot area is 20 m^2 (length 15.2 m, width 1.2 m) in a four-time repetition with a seeding rate of 7 million viable grains per 1 ha. Disposition – randomized repetitions [8]. Number of rows in the plot – eight, space between rows - 15 cm, space between plots - 0,4 and 0,5 m. As a standard for competitive trial medium-grained, medium ripening variety Flagman was used.

The experiments were laid on experimental plot of ARRRI"s rice irrigated system for the period 2015-2017. Sowing time – first decade of May.

Seed plots were harvested by hand, and the rest - by a compact Korean combine DKS-515 directly.

Technological characteristics of grain and milled rice were determined in accordance with GOST 10843-76, GOST 10987-76 and "Guidelines for evaluating the quality of rice grain" [5].

To compare the degree of variability of a number of traits, the coefficient of variation (V) was used. According to Dospekhov B.A. (1979) and Dzyuba V.A. (2007) variability is considered to be insignificant if the coefficient of variation does not exceed 10%; average if V is above 10%, but less than 20%, and significant if the coefficient of variation is more than 20% [3, 4].

Knowledge of the nature of variability of trait can be used to evaluate the lines [9].

The degree of correlation of agronomic traits and technological indicators of grain and milled rice quality was determined [10].

The obtained results were processed by the method of variance analysis [4].

Results of research. Breeding and introduction of new, more productive varieties into production is one of the factors contributing to the growth of rice growing efficiency.

Duration of growing period of most rice varieties depends on agroclimatic conditions (from the average daily temperature in certain stages of growth and development, heat supply of the growing season) and the duration of daylight hours. Even with the same level of agricultural technology, the indicator can vary within 3-5 days, and in some years up to 10 days [7, 9]. But basically it is a stable trait, reliably characterizing the variety.

Since most of the agronomic traits are closely related to growing period, its duration will affect the value of the structural elements of the crop, the yield and the associated estimates (Table 1).

Table – 1 Variability of traits of new rice varieties, Competitive variety trial, 2015-2017.

Variety	Trait	2015	2016	2017	Mean value	V, %
Flagman, (st)	Duration, days.	120	118	110	116	4,6
	Number of spikelets from main panicle, pcs.	166,0	133,4	124,9	141,4	15,3
	Yield, c/ha	83,3	85,9	68,8	79,3	11,7
	Grain content in agrophytocenosis, thous. pcs./m^2	28,8	37,1	26,4	30,7	18,4
	Productivity of vegetation day, kg/day/ha	69,6	72,8	62,5	68,3	7,7
VNIIR 10262 (*Veles*)	Duration, days.	120	128	126	124,7	3,3
	Number of spikelets from main panicle, pcs.	119,6	142,0	134,2	131,9	8,6
	Yield, c/ha	92,1	91,3	73,7	85,7	12,1
	Grain content in agrophytocenosis, thous. pcs./m^2	38,8	34,0	33,8	35,5	8,0
	Productivity of vegetation day, kg/day/ha	76,8	71,3	58,5	68,9	13,6
VNIIR 10244	Duration, days.	128	129	126	128	1,2
	Number of spikelets from main panicle, pcs.	115,2	147,6	172,7	145,2	19,9
	Yield, c/ha	99,9	101,4	72,4	91,2	17,9
	Grain content in agrophytocenosis, thous. pcs./m^2	38,4	41,2	31,6	37,0	10,4
	Productivity of vegetation day, kg/day/ha	78,0	78,6	57,5	71,4	16,8
KP-15-272	Duration, days.	126	129	126	127	1,4
	Number of spikelets from main panicle, pcs.	121,1	133,9	160,1	138,4	14,4
	Yield, c/ha	87,0	84,6	70,8	80,8	10,8
	Grain content in agrophytocenosis, thous. pcs./m^2	31,3	35,4	27,6	31,4	9,0
	Productivity of vegetation day, kg/day/ha	69,1	65,6	56,2	63,6	10,5
KP-15-305	Duration, days.	127	126	126	126	0,5
	Number of spikelets from main panicle, pcs.	173,1	162,8	190,5	175,5	8,0
	Yield, c/ha	87,3	95,1	60,8	81,0	22,2
	Grain content in agrophytocenosis, thous. pcs./m^2	45,9	44,2	29,6	39,9	25,5
	Productivity of vegetation day, kg/day/ha	68,7	75,5	48,3	64,2	22,1
KP-15-270	Duration, days.	125	126	125	125	0,5
	Number of spikelets from main panicle, pcs.	150,0	151,5	164,1	155,2	5,0
	Yield, c/ha	92,9	89,0	76,9	86,2	9,7
	Grain content in agrophytocenosis, thous. pcs./m^2	46,9	40,4	36,3	41,2	22,2
	Productivity of vegetation day, kg/day/ha	74,3	70,6	61,5	68,8	9,6
KP-15-260	Duration, days.	127	129	125	127	1,6
	Number of spikelets from main panicle, pcs.	186,5	218,1	195,3	200,0	8,2
	Yield, c/ha	92,0	101,0	63,3	85,4	23,0
	Grain content in agrophytocenosis, thous. pcs./m^2	47,6	51,3	30,9	43,3	18,8
	Productivity of vegetation day, kg/day/ha	72,4	78,3	50,6	67,1	21,7
Mean value	Duration, days.	124,7	126,4	123,4	124,9	
	Number of spikelets from main panicle, pcs.	147,4	155,6	163,1	155,36	
	Yield, c/ha	90,7	92,6	69,5	84,2	
	Grain content in agrophytocenosis, thous. pcs./m^2	39,7	40,5	30,9	37,01	
	Productivity of vegetation day, kg/day/ha	72,7	73,2	56,4	67,46	
V, %	Duration, days.	2,7	3,1	4,8		
	Number of spikelets from main panicle, pcs.	19,7	18,9	16,2		
	Yield, c/ha	5,9	7,3	8,2		
	Grain content in agrophytocenosis, thous. pcs./m^2	19,1	14,6	11,8		
	Productivity of vegetation day, kg/day/ha	5,2	6,3	9,4		

Note: V – Coefficient of variation, %

From the data obtained, it can be seen that duration was less susceptible to variability in the varieties under study, and its coefficient of variation was within 0.5-4.6% over three years of observations. All varieties in the experiment are almost indistinguishable by this trait, they are represented by the mid-late-ripening group, except for the standard (it is mid-ripening) (Table 1).

The average varietal variability of duration, depending on the year of cultivation, was also insignificant - 2.7-4.8%. This indicates a timely occurrence of stages of growth and development, seedling vigor and the uniformity of cenosis in the plots for repetitions.

Rice varieties VNIIR 10262, VNIIR 10244, KP-15-270 and KP-15-260 on average for three years of studies significantly exceeded standard-check variety Flagman for yield, while the rest showed the result within the least significant difference (LSD05=6,33). The lowest coefficient of variation in yield was in variety KP-15-270 - 9.7%, which indicates its stable ability to form yields in different years of growing according to climatic characteristics.

In KP-15-305 and KP-15-260, the yield was highly variable: V = 22.2 and 23.0%. These varieties show significant variations over the years, from 63 to 101 centner / ha. Although the actual yield is high, but such a strong decline in some years characterizes KP-15-305 and KP-15-260 as unstable in terms of productivity.

The coefficient of variation in yields and associated parameters (productivity of vegetation day and grain content in agrophytocenosis) characterized most varieties with an average degree of variability of traits (V = 10-20%).

The number of spikelets formed on the main panicle varies from 131.9-200.0 in the studied varieties over an average of three years. The variability of the trait was medium in varieties Flagman (st.), VNIIR 10244 and KP-15-272 - 15.3, 19.9 and 14.4%. Constantly low variability of this trait during three years of research was preserved in varieties VNIIR 10262 (Veles), KP-15-305, KP-15-270 and KP-15-260 -5.0-8.6%.

Grain content in agrophytocenosis is an important trait of productivity of rice varieties. Coefficient of its correlation with yield is very high (r=0,91-0,97). Number of grain on sowing area unit is a complex trait determined by number of fertile tillers on this unit and grain content in their panicles. From the disadvantages of this trait, it should be acknowledged that it does not take into account the mass of 1000 grains Nevertheless, it deserves much attention when evaluating breeding samples for productivity [2].

Grain content in agrophytocenosis for three years varied within 30,7-43,3 thousand pieces/m^2. A significant excess of the standard was detected in varieties KP-15-270 and KP-15-260 - 41.2 and 43.3 thousand pieces / m^2, respectively. Strong variability of the trait was in KP-15-305 and KP-15-270 - 25.5 and 22.2%, respectively, VNIIR 10262 and KP-15-272 showed weak variation and 8.0 and 9.0%, and the remaining - the average - 10.4-18.8%.

On productivity of vegetation day, there were no significant differences between the samples. The value of the trait, in physical terms, varied within 63.6-71.4 kg / day / ha on average over three years. The strong variability of this trait, as well as the yield, corresponds to KP-15-305 and KP-15-260 to 22.1 and 21.7%, respectively. A slight (weak) variability was noted in varieties Flagman (st.) and KP-15-270 - 7.7 and 9.6%, and the rest were characterized by average variability. This feature is also calculated, and its magnitude depends on the duration of the growing season and yield.

Simultaneously with the increase in yield, great importance in breeding programs is given to grain and milled rice quality in new varieties. Yield and quality are two parameters that are difficult to combine when obtaining agricultural products. In most cases, with increasing yields, quality decreases and vice versa. Therefore, the aim of our research and of many domestic breeders is to search for the "golden mean", in which the quality of grain milled will not decrease with increasing yields.

The low coefficient of variation of the main technological indicators of grain and milled rice quality, with a significant increase in yield, indicates their genetic nature, a constant manifestation, despite the influence of environmental factors (Table 2).

The main technological indicators of grain and milled rice quality are mass of 1000 grain, filminess, vitreousity and head rice content.

The mass of 1000 grains is a weakly varying trait of grain, which reliably characterizes the variety. A slight variation of this trait indicates sufficient homozygosity of new varieties. Mean values for this trait over the three years of research were within the range of 26.1-31.1 g, and the coefficient of variation was 1.0-3.6%. It should be noted that the maximum mean value by weight of 1000 grains was registered in 2015 - 28.4 grams, and in subsequent years there is a steady tendency to its decrease, which is the reaction of varieties to the changing growing conditions. The highest values for this trait corresponded to VNIIR 10262 (Veles) during the entire study period at 31.8; 30.7; 30.7 g, respectively, and 31.1 g, on average over three years.

The variation coefficient between varieties according to the season of vegetation on the basis of the mass of 1000 grains was also insignificant - V =

7.6-9.0%. But the mass of 1000 grains in the experiment shows significant differences between the varieties: VNIIR 10262 and KP-15-272 refer to large-grain (31.1 and 30.5 g), the rest to medium-grained (25-29 g).

Filminess by years varied insignificantly - V = 1.1-4.3%. Mean values of the indicator for the period of research in physical terms were within the limits of 17.1-19.3%. The lowest values are observed in VNIIR 10262 (Veles) and KP-15-260 (17.1% and 17.2%, respectively). Almost all of the varieties under study reliably differ from the Flagman standard. Indicators of KP-15-305 and KP-15-270 are at the level of the standard (18.9-19.3%). The filminess also varied slightly in varieties, depending on the growing season (V = 4.6-5.8%).

Table 2 – Variability of technological indicators of grain and milled rice quality, Competitive variety trial 2015-2017

Variety	Trait	2015	2016	2017	Mean value	V, %
Flagman, (st)	Mass of 1000 grain, g	26.8	27.2	26.7	26.9	1.0
	Filminess, %	19.3	19.2	18.9	19.1	1.1
	Vitreousity, %	96	94	96	95.3	1.2
	Head rice content, %	98.5	82.5	77.3	86.1	12.8
VNIIR 10262 (*Veles*)	Mass of 1000 grain, g	31.8	30.7	30.7	31.1	2.0
	Filminess, %	16.6	17.7	17.1	17.1	3.2
	Vitreousity, %	96	97	98	97.0	1.0
	Head rice content, %	86.4	74.1	85.5	82.0	8.4
VNIIR 10244	Mass of 1000 grain, g	30.2	28.3	28.5	29.0	3.6
	Filminess, %	17.5	18.1	17.4	17.7	2.1
	Vitreousity, %	78	94	92	88.0	9.9
	Head rice content, %	78.3	81.7	85.7	81.9	4.5
KP-15-272	Mass of 1000 grain, g	30.7	31.0	29.7	30.5	2.2
	Filminess, %	17.9	18.5	17.9	18.1	1.9
	Vitreousity, %	96	94	97	95.7	1.6
	Head rice content, %	79.8	82.5	78.8	80.4	2.4
KP-15-305	Mass of 1000 grain, g	24.9	25.3	24.0	24.7	2.7
	Filminess, %	18.7	19.8	18.2	18.9	4.3
	Vitreousity, %	95	92	97	94.7	2.7
	Head rice content, %	72.5	68.1	78.4	73.0	7.1
KP-15-270	Mass of 1000 grain, g	28.1	28.3	27.4	27.9	1.7
	Filminess, %	19.1	19.2	19.6	19.3	1.4
	Vitreousity, %	98	98	98	98.0	0.0
	Head rice content, %	89.8	92.6	88.9	90.4	2.1
KP-15-260	Mass of 1000 grain, g	26.3	26.3	25.8	26.1	1.1
	Filminess, %	17.0	17.5	17.1	17.2	1.5
	Vitreousity, %	96	88	94	92.7	4.5
	Head rice content, %	89.6	88.7	92.4	90.2	2.1
Mean value	Mass of 1000 grain, g	28.4	28.2	27.5	28.03	
	Filminess, %	18.0	18.6	18.0	18.20	
	Vitreousity, %	93.6	93.9	96.0	94.48	
	Head rice content, %	85.0	81.5	83.9	83.43	
V, %	Mass of 1000 grain, g	9.0	7.6	8.4		
	Filminess, %	5.8	4.6	5.3		
	Vitreousity, %	7.4	3.5	2.3		
	Head rice content, %	10.3	10.2	6.9		

Note: V – Coefficient of variation, %

Vitreousity is an important indicator of rice grain quality. With its increase, the technological and cooking characteristics of rice increase: polishing produces less crushed grain, the porridge retains a friable consistency, has a good appearance and high nutritional value. Vitreousity in our experiment varied within the range of 88.0-98%. This trait was distinguished by its constancy in varieties and by years, had an insignificant coefficient of variation - 0.0-9.9%. KP-15-270, VNIIR 10262 and Flagman (V = 0.0-1.2%) especially distinguished by a stable manifestation of the trait .

Head rice content is one of the main technological indicators of milled rice quality, which characterizes the economic effectiveness of rice varieties during processing. High values for this feature indicate the ability of new varieties to form a full-fledged, high-quality and filled grain, despite weather fluctuations.

The value of the indicator on average for three years varied within the limits of 73.0-90.4%. The maximum head rice content is observed in KP-15-270 and KP-15-260 (90.4 and 90.2%, respectively) with insignificant variation by years (V = 2.1%). The minimum is in KP-15-305 (73%). The low coefficient of variation in this trait indicates its genetic nature. The average degree of variability o was in the Flagman standard (V = 12.8%).

In VNIIR 10262 (Veles), head rice content is 82.0% on average over three years with a coefficient of variation of V = 8.4%. There were no significant differences in this trait between varieties in comparison with the standard (LSD05 = 10.22) (except KP-15-305).

The genetic diversity of the material under study is ensured by the diversity and different degree (narrowness) of the interrelations of traits characterizing the variety.

To determine the interaction of genetic systems of the studied rice varieties in competitive variety testing, expressed by quantitative characteristics, we performed a correlation analysis (Table 3).

Analysis of the correlation between the traits of the varieties studied in competitive trial shows the diversity of the genetic systems under study, since the nature of the bonds is not homogeneous.

For example, the yield of Flagman (st) is closely related to such traits as the mass of 1000 grains and the filminess (r = 0.76 and 0.93).

Table 3 – Correlation (r) of agronomic traits and technological indicators of grain and milled rice of varieties in competitive trial, 2015-2017

Variety	Q	Mean value	Dispersion	1	2	3	4	5	6	7	8
Flagman, (st)	1	116,0	5,29								
	2	141,4	21,70	0,790							
	3	79,3	9,21	0,945	0,547						
	4	30,8	5,61	0,522	-0,111	0,771					
	5	68,3	5,27	0,878	0,401	0,986	0,866				
	6	26,9	0,26	0,500	-0,136	0,755	0,999	0,853			
	7	19,1	0,21	0,999	0,821	0,927	0,476	0,852	0,454		
	8	95,3	1,15	-0,327	0,321	-0,617	-0,977	-0,739	-0,982	-0,277	
	9	86,1	11,05	0,814	0,999	0,581	-0,071	0,437	-0,096	0,843	0,282
VNIIR 10262 (*Veles*)	1	124,7	4,16								
	2	131,9	11,37	0,994							
	3	85,7	10,40	-0,314	-0,210						
	4	35,5	2,83	-0,962	-0,927	0,562					
	5	68,9	9,39	-0,547	-0,454	0,967	0,755				
	6	31,1	0,64	-0,971	-0,939	0,533	0,999	0,732			
	7	17,1	0,55	0,945	0,975	0,014	-0,819	-0,242	-0,839		
	8	97,0	1,00	0,721	0,642	-0,885	-0,883	-0,974	-0,866	0,454	
	9	82,0	6,86	-0,739	-0,807	-0,407	0,526	-0,160	0,556	-0,919	-0,066
VNIIR 10244	1	127,7	1,53								
	2	145,2	28,83	-0,598							
	3	91,2	16,33	0,959	-0,800						
	4	37,1	4,94	0,999	-0,634	0,971					
	5	71,4	12,01	0,953	-0,813	0,999	0,966				
	6	29,0	1,04	0,094	-0,854	0,373	0,140	0,392			
	7	17,7	0,38	0,836	-0,059	0,646	0,810	0,630	-0,468		
	8	88,0	8,72	-0,075	0,844	-0,355	-0,121	-0,374	-0,999	0,485	
	9	81,9	3,70	-0,689	0,993	-0,866	-0,722	-0,877	-0,786	-0,178	0,774
KP-15-272	1	127,0	1,73								
	2	138,4	19,88	-0,195							
	3	80,8	8,74	0,376	-0,982						
	4	31,4	3,90	0,880	-0,636	0,771					
	5	63,6	6,67	0,255	-0,998	0,992	0,683				
	6	30,5	0,68	0,679	-0,853	0,936	0,946	0,883			
	7	18,1	0,35	0,999	-0,195	0,376	0,880	0,255	0,679		
	8	95,7	1,53	-0,945	0,505	-0,659	-0,987	-0,558	-0,882	-0,945	
	9	80,4	1,91	0,965	-0,444	0,605	0,974	0,499	0,847	0,965	-0,998
KP-15-305	1	126,3	0,58								
	2	175,5	14,00	-0,146							
	3	81,1	17,98	0,300	-0,988						
	4	39,9	8,96	0,580	-0,891	0,951					
	5	64,2	14,16	0,277	-0,991	0,999	0,944				
	6	24,7	0,67	0,217	-0,997	0,996	0,921	0,998			
	7	18,9	0,82	-0,212	-0,936	0,869	0,674	0,880	0,908		
	8	94,7	2,52	0,115	0,966	-0,913	-0,743	-0,923	-0,945	-0,995	
	9	73,0	5,17	-0,084	0,998	-0,976	-0,860	-0,981	-0,991	-0,956	0,980
KP-15-270	1	125,3	0,58								
	2	155,2	7,74	-0,414							
	3	86,3	8,34	0,284	-0,990						
	4	41,2	5,35	-0,130	-0,849	0,914					
	5	68,8	6,59	0,237	-0,982	0,999	0,933				
	6	27,9	0,47	0,672	-0,952	0,901	0,647	0,879			
	7	19,3	0,26	-0,327	0,996	-0,999	-0,895	-0,996	-0,920		
	8	98,0	0,00	-	-	-	-	-	-	-	
	9	90,4	1,93	0,972	-0,615	0,500	0,105	0,457	0,826	-0,539	-
KP-15-260	1	127,0	2,00								
	2	200,0	16,31	0,699							
	3	85,4	19,69	0,957	0,463						
	4	43,3	10,87	0,938	0,409	0,998					
	5	67,1	14,59	0,949	0,439	0,999	0,999				
	6	26,1	0,29	0,866	0,248	0,974	0,985	0,979			
	7	17,2	0,26	0,756	0,997	0,535	0,483	0,512	0,327		
	8	92,7	4,16	-0,721	-0,999	-0,490	-0,437	-0,466	-0,277	-0,999	
	9	90,2	1,93	-0,959	-0,467	-0,999	-0,998	-0,999	-0,972	-0,539	0,494

Note: Q – trait under study:

1 – duration, days;
2 – number of filled grains from main panicle, pcs.;
3 – yield, c/ha;
4 – grain content in agrophytocenosis, thous.pcs./m^2;
5 – productivity of vegetation day, kg/days/ha;
6 – mass of 1000 grain, g;
7 – filminess, %;
8 – vitreousity, %;
9 – head rice content, %.

Duration plays an important role in the formation of such traits as filminess and vitreousity in VNIIR 10262 (Veles) - r = 0.94 and 0.72. The mass of 1000 grains in it is closely connected with grain content in the cenosis (r = 0.99) and slightly less with the productivity ofvegetation day (r = 0.73). A positive correlation of filminess was found with head rice content (average), the number of grain in the panicle (strong) and vitreous (medium) (r = 0.56, r = 0.98 and r = 0.64, respectively). Yield and vitreousity in the variety are related strongly negative, r = -0.88.

It should be noted that a positive average correlation between the yield and head rice content was noted only in varieties: Flagman (st), KP-15-272 and KP-15-270 (r = 0.58, r = 0.60 and r = 0.50, respectively). In the other varieties, the correlation of these traits is characterized by a negative correlation, which indicates a decrease in head rice content with an increase in yield.

Most of the varieties studied in the competitive trial showed good results throughout the entire study period. They were characterized by an insignificant (V <10%) or medium (V = 10-20%) variability of traits (by the coefficient of variation), which indicates their potential to form a high yield with good grain and milled rice quality, regardless of the natural anomalies of the growing season.

The results of the correlation analysis indicated the diversity and degree (ration) of the connection of examined traits, which indicates the specificity of each variety expressed by one or another set of genes.

The result of a comprehensive assessment of varieties in competitive trial over a period of three years was the allocation of medium-late ripening large-grain variety VNIIR 10262 (Veles) and its transfer to the State varietal

trial. The variety significantly exceeded the Flagman (st) in yield and other characteristics, while showing a slight variability of agronomic traits.

Conclusions. Seven rice varieties were evaluated in competitive trial for the period 2015-2017.

Coefficients of variation in agronomic traits and technological indicators of milled rice quality were determined.

The varieties with the least variability of traits were identified, indicating their potential to form high yields with excellent milled rice quality under constantly changing cultivation conditions: KP-15-260, KP-15-270 and VNIIR 10262.

A positive average correlation between the yield and head rice content was noted in varieties: Flagman (st), KP-15-272 and KP-15-270 ($r = 0.58$, $r = 0.60$ and $r = 0.50$ respectively). In the other varieties, the correlation of these traits is characterized by a negative correlation, which indicates a decrease in head rice content with an increase in yield.

According to the results of correlation analysis, there is a variety of interrelations of traits characterizing one or another genotype. The study of different genotypes for several years allowed to evaluate all the material and to allocate the best variety for cultivation in this agroclimatic zone.

The result of a comprehensive evaluation of varieties in competitive trial over a period of three years was the allocation of medium-late ripening large-grain variety VNIIR 10262 (Veles) and its transfer to the State varietal trial. The variety significantly exceeded Flagman (st) in yield and other characteristics, while showing a slight variability of agronomic traits.

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ECONOMICS

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INFLUENCE OF DIGITALIZATION OF ECONOMY ON THE DEVELOPMENT OF REMOTE EMPLOYMENT

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Abstract
The article explores various aspects of teleworking - a new phenomenon in the labor market. The authors have revealed which forms of telework have now been found in Russia; in which sectors of the economy and for which professional groups the telework is used. The advantages and disadvantages of distance employment for employees of Russian enterprises are formulated.
Keywords: non-standard employment; telework; telecommuting, information technologies, vacancies, intellectual work

В течение последних десятилетий цифровизация экономики оказывает существенное влияние на рынок труда и сферу занятости. Данной теме посвящен ряд публикаций отечественных и зарубежных авторов. Но она остается явлением, требующим дальнейшего изучения, поскольку трансформация занятости под влиянием цифровизации и