Problems of primary seed production of some rice varieties

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Abstract. Rice is a product that combines high calorie content with dietary and medicinal properties. Its consumption in our country, and throughout the world, is constantly growing. In this connection, the relevance of the need to develop new rice varieties that harmoniously combine high yield and excellent grain and milled rice quality is increasing. The key to obtaining quality rice grain and seed is competent seed production work. This article presents the results of many years of research on the possible causes of the appearance of unusual phenotypes (atypical plants) in the primary seed production nurseries of three new rice varieties, fundamentally different in architectonics - Anait (tall, early ripening and large-grain), Sharm (short, early ripening and long-grain) and Lastochka (medium-grown, medium-ripening, medium-grain). Variety Anahit was found to be of different quality according to grain thickness and the weight of 1000 grains. The range of variation in the grain thickness was 1.2–2.4 mm, and in the weight of 1000 grains – 33.9–44.4 g. Therefore, all plants of this variety were conditionally grouped into two classes and analyzed in detail by family. In the long-grain variety Sharm, an unusual trait appeared - the spinousness of the grain. In the primary seed production nursery in 2016, out of 600 sown plots, 329 plots had different types of spinousness. It is considered that the set of chromosomes according to spinousness trait in the variety Sharm included both recessive and dominant genes (an1, An2*, An3*; An1*, An2*, an3). And in the event of an unfavorable combination of circumstances (abiotic and anthropogenic factors) in 2015, in the phase of heading-flowering in the variety during fertilization, gene unlocking occurred, as a result of which atavistic traits started being observed in the progeny. In variety Lastochka, families significantly differed both among themselves and in the years of cultivation, in resistance to blast and in the mass of 1000 grains. In the process of primary seed production during family-wide selection, families with average resistance to blast and with improved technological milled rice characteristics were identified.

1. Introduction
In a scientifically based technological system for cultivating agricultural plants, breeding and seed production occupy a leading position as the most powerful, environmentally friendly levers in increasing the yield and quality of crop products. Seed production is an essential element in rice growing and includes a set of measures aimed at preserving varietal qualities, growing seeds of high sowing conditions, propagating them in the required quantities, storing and monitoring their quality. Stable production of rice grain largely depends on the level of organization of seed production [1].

Primary seed production after transferring the variety to the State test and before entering it into the State register of breeding achievements is carried out in specialized research institutes by breeders.
After inclusion in the List of varieties eligible for use in the production, professionals in research institutions and in specialized (licensed) farms are engaged in its seed production [2].

An important element of rice growing is seed production - a system of measures to preserve varietal qualities, grow seeds of high sowing conditions, multiply them in the required quantities, store and control their quality [2]. Stable grain production largely depends on the level of organization of seed production. Properly organized seed production becomes an essential condition for obtaining high yields and increasing gross rice harvests. [3].

With constant care for maintaining varietal purity, rice seeds can be used for a long time and not lose their hereditary and yield qualities.

Seed production work is based on continuous improving selection of plants grown for seeds, strict rejection of all atypical, deviating forms and enrichment of the hereditary basis of the variety. For this purpose, conditions of high agricultural technology are created on seed crops to obtain maximum yields and manifest potential of plant productivity [2].

To accelerate the introduction of new promising varieties in state variety testing, research institutes and educational experimental farms of higher educational institutions establish primary nurseries for these varieties so that by the end of the test and till release sufficient seed funds of these varieties would be created [2, 3].

2. Materials and methods of research
The material in the work were rice varieties Anait (early ripening, large-grain), Sharm (early ripening long-grain), Lastochka (medium-ripening, with an amylose content of 21-24%). The studies were carried out for four years: 2015-2018. Varieties were sown in primary seed nurseries according to the methods of All-Russian Rice Research Institute on 0.5 m2 (P-1) and 6.5 m2 (P-2) plots with Wintersteinger “Rowseed” central seeders and the Wintersteinger “Plotseed” cassette version [4]. The sowing rate - 7 million germinating grains per 1 ha at experimental plot of FSBSI ARRRI (Belozerny, Krasnodar). As standard plots, the multiplication crops of the studied varieties (PR) were used.

The sowing date is May 2, 6, April 26 and May 20 (respectively by year). The predecessor is fallow field in 2015-2016. and soy in 2017-2018.

Mineral fertilizers in the experiment: N42+92P42K42.

The work was carried out in accordance with GOST 15.101.80 - “The order of the research work” and the methods developed in All-Russian Rice Research Institute. The technological characteristics of grain and milled rice were determined in accordance with GOST 55289-2012, GOST 10843-76, GOST 10987-76 and "Methodological guidelines for assessing rice grain quality" [5].

3. Results and discussion
Rice is a self-pollinator, but its cross-pollination is possible from 1% to 7% [2, 6]. The extreme biological resistance of red-grain rice, the rapid propagation and emergence of spontaneous hybrids between it and the cultivar, worsen the breed quality of the seeds during the reproduction process and necessitate their frequent replacement [2; 7].

In all varieties studied in the experiment, in the nursery for testing the first year progeny (P-1), we observed the appearance of such spontaneous hybrids. When replanting these plants, significant splitting occurred. You can fight them only by hand, rejecting plants and removing all the plot from the nurseries.

But besides this, the manifestation of individual changes of a special nature was observed in each variety.

In rice variety Anait in the primary seed production nursery (P-1), a family-wide analysis revealed a different quality according to the linear dimensions of the husked grain, which resulted in a large variability in the mass of 1000 grains. Rice variety Anait is distinguished by large grain, but the range of values by weight of 1000 grains can reach 33.9-44.4 g.
In 2016, 600 plots of variety Anait were sown in the primary seed production nursery (P-1). After the necessary rejections, they noted that, according to morphological characteristics, the remaining plots did not differ from each other. Of these, 25 typical family plots were selected for study. In each family, three (in 2016) and five (in 2017) plants were taken for analysis. Biometric and technological analyzes for a number of traits were conducted (table 1). For this, grain from each plant was divided approximately in half: one part was examined, the other was sown the next year in a field of type P-1.

The different grain quality in the experiment was associated with a significantly different thickness of the grains on one panicle (from 1.2 mm to 2.4 mm) and between families: from 1.8 mm to 2.1 mm.

Since the Anait thickness index of the husked grain has high variability, it was decided for systematizing the data to conditionally divide all plants by the thickness of the grain into two classes, taking into account the fact that 75-85% of grain fall into the interval of often encountered thickness [8, 9].

The first (I) class included ten families of 25 harvested for analysis (No. 1, No. 3, No. 5, No. 6, No. 7, No. 11, No. 14, No. 21, No. 22 and No. 23) with the most thick grains - 2.0-2.2 mm. To the second (II) class - twelve families (No. 9, No. 10, No. 12, No. 13, No. 15, No. 16, No. 17, No. 18, No. 19, No. 20, No. 24 and No. 25) with an average grain thickness 1.9-2.0 mm. Three families (No. 2, No. 4 and No. 8) with a predominant distribution of the grain thickness of 1.7-1.9 mm, took an intermediate position and were assigned to the third class (III). During the measurements, the distribution of grains over the thickness was noted without obvious advantages in any direction. The percentage ratio of 10 to 20% in six gradations.

The accumulation of heterogeneity traits in the process of reproduction destabilizes the variety as a homogeneous system. It is difficult to definitely establish the timing of the physical aging of a variety, i.e. deterioration of its quality compared to the source material. Varietal, sowing and yielding qualities of seeds of crops, including rice, do not depend on reproduction, but are determined by the level of seed production [10].

By different quality, we understand the difference in seeds according to morphological (weight, shape, size, degree of filling), chemical, physiological, genetic characteristics, the ability to germinate and provide a certain productivity of plants in the progeny [6].

There are maternal (matrix) diversity, genetic and environmental. The most attention of seed growers is attracted by maternal quality of seeds, due to the nature of fruit formation in plants and their varietal characteristics. The above forms of different quality are interconnected with each other [11, 12, 13, 14].

Comparison of the characteristics of variety Anait when transferred to SVT (2009-2011) and the harvest of 2016-2018 showed that in recent measurements, the range of variation of almost all traits changed. In 2016-2018 an increase in the length of the main panicle, sterility, panicle density, and filminess was noted. A decrease was observed in the linear sizes of the grain (length, width, thickness) and weight of 1000 grains. The grain index was almost unchanged (table 1).

**Table 1.** The range of variation of the studied traits in families of variety Anait, P-1, harvest 2009-2011 and 2016-2018 (minimum-maximum).

| Studied traits                  | 2009-2011          | Class according to thickness of husked |
|---------------------------------|-------------------|----------------------------------------|
|                                |                   | I     | II      | III     |
| Plant height, cm               | 106-109           | 95-116| 97-117  | 101-115|
| Length of main panicle, cm     | 17.7-21.0         | 19.5-22.3| 18.5-23.0| 19.3-23.0|
| Sterility, %                   | 7.6-11.0          | 9.1-21.7| 8.9-33.2| 7.8-22.2|
| Density of main panicle, pcs./cm| 3.6-5.8           | 5.4-7.5| 5.4-8.2 | 6.3-7.5 |
| Filminess, %                   | 16.7-18.0         | 16.6-19.0| 19.0-22.0| 19.0-21.0|
| Vitreousity, %                 | 75-78             | 56-91 | 55-94   | 61-95   |
Technological quality indicators of Anait families in 2016 were significantly better than in 2017-2018: vitreousity was higher (81-91\% versus 54-68\%), and fracture and broken rice content in husked grain was lower (3-11\% against 43-66\%). Growing conditions had a strong influence on milled rice quality in the studied variety. However, several families stand out for their consistent good results. They have head rice content higher than the rest, and for a large-grain variety this is very important.

An analysis of table 1 shows that families conditionally assigned to the first class are most consistent with the characteristics of the original variety (2009-2011). They have a range of variation in mass of 1000 grains of 35.3-42.5 g. The thickness of the grains on average is 1.9-2.2 mm. There is almost complete agreement on the classes of thickness of the grains during the years of study. These families will form the basis of the primary seed production of the variety. And some differences between families in technological quality indicators make it possible to choose the best families before combining seeds. For example, families No. 7, No. 22, No. 11, No. 21, No. 22 and No. 23 in the analysis of grain and milled rice are distinguished by relatively high rates. The same can be said about the head rice content: for the first class it is low (40-78\%), and in the second class it is possible to distinguish families with an indicator of up to 90\%. The total milled rice by variety is not high (63-70\%). But this is also typical of early-ripening large-grained varieties with a powdery spot, the structure of the grain (the head rice content depends on it), which largely depends on the climatic conditions of cultivation [15, 16].

Anait families, conventionally assigned to the mixed class, have a variability of mass of 1000 grains per plant 33-39 g. The thickness of grain is on average from 1.9 to 2.0 mm. There is complete agreement on the classes of thickness of the grains during the study. These families are carriers of different quality according to the linear sizes of the grain. Since the phenomenon of different quality in the thickness of the grains was repeated during reseeding in 2017-2018, we can talk about the heterogeneity of families on this trait. And during the primary seed production, families with a low mass of 1000 grains should be rejected from the population. If desired, they can be re-selected and get a new source material, evaluating the biometric and technological parameters separately for plants.

Families that are conditionally assigned to the second class have a mass of 1000 grains significantly lower than the main characteristics of the variety (33-39 g) (table). The thickness of the grain is on average 1.8-2.0 mm. Such families are also subject to removal from the population, as do not correspond for a number of parameters to the initial characteristics of variety Anait. But when propagated, they can be the basis for developing new rice variety, large-grained, with a mass of 1000 grains of 35-39 g, while it is possible to take into account the technological grain and milled rice quality by family. For example, families No. 9, No. 10, No. 20 and No. 24 are distinguished by the total milled rice and head rice content, and have a low broken rice content in husked grain. It is these families that can be the basis for obtaining the original seeds of a new rice variety.

As can be seen from the data presented, the range of thickness variation by class for individual measurements is approximately the same: 1.2-2.4 mm. But the average thickness of the grains, which was calculated as a result of dividing the sum of the thickness of all grains on the panicle by their number, has differences in classes. And these differences as a result determined the mass of 1000 grains.

It is believed that the different quality of grain is a manifestation of modification (non-hereditary) variability [6, 9]. However, in our experiment, the following trend is observed: families with a large

| Broken rice content in the husked grain, % | 24.0-29.5 | 2.9-37.6 | 1.1-20.5 | 3.5-14.3 |
| Length of the husked grain, mm            | 7.3-7.6   | 7.0-7.7  | 6.9-7.6  | 7.0-7.5  |
| Width of the husked grain, mm             | 3.2-3.3   | 3.04-3.3 | 2.95-3.2 | 3.05-3.2 |
| Average thickness of husked grain., mm    | 2.3       | 1.9-2.2  | 1.8-2.0  | 1.88-2.0 |
| Grain index (l/b)                         | 2.2-2.4   | 2.3-2.4  | 2.3-2.4  | 2.3-2.35 |
| Mass of 1000 grains, g                    | 42.2-43.3 | 35.3-42.5 | 33.0-39.5 | 33.0-39.1 |
| Total milled rice, %                      | 65-70     | 63.0-70.4 | 61.0-69.0 | 62.0-69.0 |
| Head rice content, %                      | 50-56     | 40.2-78.0 | 40.0-90.3 | 34.0-92.0 |
grain (1st class) have a large amount of broken in husked grain (up to 10-20%), if the weight of the grain is reduced, then grain crushing during processing will decrease (up to 5-12%).

This means that in the primary seed production system, with careful study of the families in P-1 and P-2, this type of variety can be maintained unchanged. And rejected but appreciated families should be used as source material.

Long-grain rice variety Sharm was released in 2014. Until that time, it was studied for 8 years in various breeding and seed production nurseries. No significant phenotypic or modification changes were observed during this period of time.

In the primary seed production nurseries in 2015, in some families of this variety a phenotypic trait unusual for it was observed - spinousness of the grain. Of the 600 families sown in the experiment (each progeny of one panicle), 329 had spinousness of different nature. Plots with awnless plants, plots with rudiments of awns along the entire profile of the panicle and with rudiments of awns in the upper part of the panicle were simultaneously observed. After reseeding for three years, its hereditary nature was established, which indicates the genetic nature of the phenomenon. Morphologically studied families did not differ in appearance.

During prolonged cultivation of varieties under the influence of external conditions (high temperatures, solar activity, various heat supply, etc.), phenotypic traits unusual for the variety may appear in the progeny. This fact underlines the relevance of the issue under study and the need for a more in-depth study of the causes of genotype-environment interactions. [6].

It is assumed that the set of chromosomes according to the trait of spinousness in the variety Sharm included both recessive and dominant genes (an1, An2*, An3*; An1*, An2*, an3) [6]. During the entire breeding process in variety Sharm dominant genes were blocked. Only recessive genes showed themselves, as a result of which the variety was characterized as awnless. But in 2014, the heading-flowering phase occurred during the period of simultaneous action of a number of external conditions. Probably, all three factors considered in the experiment acted - high air temperature, heat supply and solar activity. Each of them individually was not catastrophically extreme. But with the combined effect during the period of fertilization and the formation of the embryo, they could have had a sufficient effect for the I-An gene to unblock, and we observed the consequence in P-1 in 2015 (table 2).

**Table 2.** The splitting of rice variety Sharm in the experiment P-1, yield of 2015.

| Plots       | Description                                      | Number, pcs. | Number, % |
|-------------|--------------------------------------------------|--------------|-----------|
| Awnless     | No awns                                          | 271          | 45,0      |
| Awned       | Awn rudiments on all grains in panicle            | 252          | 42,0      |
|             | Awn rudiments on the grains in the upper part of  |              |           |
|             | the main panicle and on the lateral panicles     | 77           | 13,0      |
| Total       |                                                  | 600          | 100,0     |

**Set of genes**

| Literature | Results of experiment |
|------------|-----------------------|
| an1, an2, an3 | an1, An2, An3; An1, An2, an3 |
| an1, An2, An3* | an1, An2*, An1* |
| an1, an2, an3 | an1, An2*, an3 |
| an1, an2, An3* | an1, An2*, An1* |
| an1, An2, An3* | an1, An2*, an3 |

* – unlocked genes.

The manifestation of atavistic traits, the genes of which are blocked in the reserve block of the genotype, involves the re-unlocking of genes, which explains the loss of some primitive traits by rice, including spinous, pigmentation, etc. This relocation can explain some genetic processes in the rice population, including the manifestation of atavisms. For example, the I-An gene inhibits the formation
of awns. At the plant level, blocked genes constitute a reserve block of the genotype of this rice form. The genes responsible for atavistic traits that usually do not appear during ontogenesis are concentrated in it. [6]. As a result, plots with awnless plants were selected for further propagation and obtaining pure seeds of variety Sharm in P-1.

After studying the awnless families for three years on technological quality traits of grain and milled rice, significant differences between them were noted.

The mass of 1000 grains according to rice-growing researchers belongs to a slightly varying trait. [10]. Being one of the main characteristics of the variety, in our experiment it had significant differences. According to the results of the analysis, for the mass of 1000 grains over the three years of study, families No. 2 (with a mass of 1000 grains 26.8 g) and No. 7 (28.4 g) were rejected as significantly different from the average varieties.

Vitreousity, total milled rice and head rice content in awnless families are high and do not differ significantly. Length-to-width ratio (l/b) also applies to the main varietal characteristics [17]. And in our experiment with variety Sharm, we observed significant differences between families: the range of variation from 3.1 to 3.6 with LSD05 = 0.09. A significant influence of the growing year on the size of the grain is noted. A longer and thinner grain was formed during the growing season of 2015 for all families of the variety.

When analyzing grain index of variety Sharm family by family, it can be seen that families No. 6 (l / b = 3.08) and No. 7 (l / b = 3.49) fall out of the aggregate, i.e., are subject to rejection.

When analyzing head rice content of the studied families of variety Sharm, a strong influence of the growing year is observed. In 2017, the highest values of the trait were recorded during the research period - 79.4-83.4% (families No. 3, No. 5, No. 7), and the lowest - 46, 2% (family No. 1). According to the average value of the trait, head rice content was assigned to the five best families: No. 3, No. 4, No. 5, No. 6 and No. 7.

Head rice content allowed to reject family No. 1; length-to-width ratio - No. 6 and No. 7; the mass of 1000 grains made it possible to isolate families No. 2 and No. 7 with atypical characteristics for the variety and remove them from the totality.

Taking into account the rejection according to three indicators (head rice content, l / b and the mass of 1000 grains) families No. 3, 4 and 5 remain to the unification.

The remaining families can be used for seed production and obtaining original seeds. The external manifestation of the trait (rudiments of awns on the part of the grains) did not change the other morphological and technological characteristics of variety Sharm.

Analysis of traits of variety Sharm in the time range of 2007-2009. (when transferring the variety to the State test) and 2015-2017. (when combining the best typical families) shows that the total milled rice, vitreousity and the grain index have not changed; the weight of 1000 grains became 0.5 g more, and head rice content was 6.9% more (table 3). Wherein fracture decreased by 11.8%.

### Table 3. Characteristic of variety Sharm in the process of growing; 2007-2009 and 2015-2017.

| Traits                      | 2007-2009 | 2015-2017 | Change, (+;-) |
|-----------------------------|-----------|-----------|---------------|
| Mass of 1000 grains, g      | 27.0      | 27.5      | +0.5          |
| Length to width ratio (l/b) | 3.2-3.4   | 3.26      | 0             |
| Fracture, %                 | 21        | 9.2       | -11.8         |
| Total milled rice, %        | 65-67     | 66.8      | 0             |
| Head rice content, %        | 52-57     | 63.9      | +6.9          |

It was previously noted that fracture is highly variable depending on the variety and cultivation zone. [15, 16]. Fracture rejects did not give the desired result, since it (in our experiment) did not have a significant effect on head rice content and total milled rice.
When rejecting families of variety Sharm in P-1 and P-2, it is recommended to use, in addition to morphological characteristics, the following traits: head rice content, the mass of 1000 grains and the grain index (l / b).

Variety Lastochka was studied by families for five years. In previous years of the study (2014-2017), eight families of variety Lastochka were distinguished by blast resistance when assessed against an artificial background, showing a result from resistant to medium resistant.

Carrying out a technological analysis of grain and milled rice quality allowed to study the families thoroughly. By mass of 1000 grains families vary significantly both among themselves and by years of cultivation. Stand out No. 3, No. 4 and No. 8 with a relatively low mass of 1000 grains of 26.4; 27.2 and 27.4 g. For this trait, they were rejected from the aggregate. Approximately the same weight of 1000 grains in the other five families was 28.1-28.8 g.

Significantly better milled rice quality was noted in 2017: fracturing from 3-4% (No. 3; No. 6 and No. 7) to 17.9% for No. 1; total milled rice - 71-72.6%. Head rice content reaches 92-98%. In 2016, there were low values of the total milled rice (68-69%) and head rice content (55-70%). In other years, milled rice quality was at the level of the characteristics of the variety.

Families No. 1 and No. 5 showed a high value of fracture during the study period (43-64%), which led to low rates of total milled rice and head rice content (70.4% and 72%, respectively).

In 2018, the families of variety Lastochka are marked by a larger mass of 1000 grains, a low vitreosity, but a high total milled rice. Head rice content in families No. 4, No. 6 and No. 7 is high, the same trend is observed in the combined plots of the three best families No. 2 + 6+ 7 (from 84 to 91%) (table 4).

**Table 4.** Comparison of the characteristics of variety Lastochka according to the results of the rejection in the primary seed production by families (2014-2018) and when transferred to the SVT (2007-2012).

| Year          | Grain index(l/b) | Blast resistance | Mass of 1000 grains, g | Filminess, % | Vitreosity, % | Fracture, % | Total milled rice, % | Head rice content, % |
|---------------|------------------|------------------|------------------------|--------------|---------------|-------------|----------------------|---------------------|
| 2007-2012 (SVT) | 2,1-2,2          | MR 42.2          | 27.4-29.3              | 17.9-18.6    | 89-93         | 20.0        | 69-72.8              | 77-93               |
| 2014-2018**   | 2,1-2,2          | MR 38.4          | 28.6                   | 19.1         | 81.0          | 33.3        | 71.3                 | 79.5                |
| 2017-2018**   | 2,1-2,2          | MR 41.4          | 28.5-30.0              | 18.9         | 85.6          | 35.8        | 70.7                 | 77.7                |
| PR-1, control | 2,1              | NR 51.1          | 28.2                   | 19.0         | 85.3          | 62.0        | 71.6                 | 64.3                |
| LSD0.05       |                  |                  | 1.13                   | 0.71         | 5.55          | 11.8        | 0.7                  | 8.38                |

*Note:*  
* – mean value by all families;  
** – mean value by combined families (№ 2+6+7).

Thus, as a result of experiment in studying variety Lastochka by families for technological indicators and resistance to blast for five years, three families (No. 2, No. 6 and No. 7) with average resistance to blast (38-42%), improved technological milled rice quality, with a mass of 1000 grains (28.1 and 28.8 g) were identified.

The main task in studying variety Lastochka by families was to increase its resistance to blast through the primary seed production system. According to the results of five years of evaluating the variety by families under the conditions of a provocative background, it can be seen that the disease is highly dependent on the year of vegetation and the methods of assessment (specialist qualification).
2016 stands out especially. During this growing season, all studied families were non-resistant to the disease. In other years, families of varieties show estimates from resistant (17-23% of the spread of the disease in 2014) to medium-resistant (27-44% of IDD in 2017-2018). However, the average result for five years of study characterizes all families as medium-resistant with an intensity of the development of the disease from 40% (No. 7) to 45.6% (No. 4).

Analysis of the traits of variety Lastochka in the time range 2007-2012 (when transferring the variety to the State test) and 2014-2018 (when combining the best families No. 2, No. 6 and No. 7) shows that the grain index and the mass of 1000 grains are within the LSD. At the same time, blast resistance (by 3.8 points), filminess (by 0.9%), and total milled rice (by 2.1%) increased; fracture (by 5.2%); vitreousity (by 8.7%) and head rice content (by 7.6%) decreased.

Of these traits, a positive trend is observed in blast resistance and total milled rice. The growth of resistance to the disease is small and, as you know, is highly dependent on many factors: the duration of cultivation of the variety, the emergence of new aggressive strains and pathogen races, which easily adapt to environmental conditions [17].

The technological indicators of grain and milled rice, which characterize the families we have identified as the best, for the most part depend on the agro-ecological conditions of cultivation. It was noted that the quality indicators of grain and milled rice of the vast majority of varieties and accessions of ARRIRI breeding decreased in 2016 due to adverse conditions during the period of filling and ripening of grain [13, 15, 18].

Thus, the result of work with variety Lastochka should be recognized as an increase: blast resistance, total milled rice, as well as stable results on other qualitative characteristics of grain and milled rice.

Technological indicators of grain and milled rice quality of variety Lastochka, on the example of the studied families, differ significantly from each other. But when studying them in primary seed production nurseries for a certain time, conducting assessments and rejections, it is possible to stabilize quality indicators and increase resistance to diseases.

As can be seen from the data presented, climatic conditions and constant reseeding of the variety leads to the appearance of neoplasms - new forms (families) of rice that differ from the main variety in anatomical and morphological traits and technological indicators of grain and milled rice quality.

When conducting primary seed production of new rice varieties, special attention should be paid to the selection of original plants, thorough rejections in the nursery for testing offspring of the first and second years, taking into account their assessments for resistance to pyriculariosis and technological analysis of the quality of grain and cereals.

As a result of a further study of variety Lastochka by families for three years, there are three families (No. 2, No. 6, No. 7) with medium blast resistance 36.1-42.2%), productivity (88-98 kg/ha), with a mass of 1000 grains of 28.5-29.2 g, with improved technological characteristics of milled rice (table 3).

When analyzing the technological traits of variety Lastochka in the time range of 2007-2012 (when transferring the variety to the State test) and 2015-2018 (after rejecting according to the results of the study in P-1 for the best families) it is clear that the grain index has not changed. At the same time, there was an improvement in the characteristics of the variety: blast resistance (by 3.8 points) and a mass of 1000 grains (by 0.7-1.2 g) increased.

4. Conclusion

In the plots of primary seed production of rice varieties, the appearance of spontaneous hybrids that occurred during cross-pollination was observed. It is recommended that such plots be completely removed in order to preserve varietal characters.

In the large-grain variety Anait, there is a different quality in the grain thickness for families from 1.8 to 2.1 mm. The mass of 1000 grains is directly dependent on their thickness. For this variety, the thickness of the grain and the mass of 1000 grains are important indicators for the rejection of families in primary seed production.
In the primary links of seed production of variety Sharm, the appearance of the rudiments of the awns was observed, caused by the unlocking of I-An gene. It is established that this is hereditary. It is recommended to leave awnless families for breeding.

When rejecting families of variety Sharm in P-1 and P-2, it is recommended to use, in addition to morphological characteristics, quality traits: head rice content, the mass of 1000 grains and the grain index (l / b).

In the families of variety Lastochka, in the process of primary seed production, an increase in blast resistance was observed, therefore, it is recommended to conduct a family-based assessment of resistance to disease against a provocative background and take into account qualitative indicators: head rice content and the mass of 1000 grains.

In the process of primary seed production with an individual approach to each variety, a number of indicators can be improved and the variety can be grown for a long time without a significant change in characteristics.

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