

УДК 632.51

4.1.1. Общее земледелие и растениеводство
(биологические науки, сельскохозяйственные
науки)

ОЦЕНКА И ОТБОР ГИБРИДОВ КАРТОФЕЛЯ В УСЛОВИЯХ ПРЕДГОРНОЙ ЗОНЫ ЧЕЧЕНСКОЙ РЕСПУБЛИКИ

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Целью представленного исследования является селекция сортов и гибридов картофеля, устойчивых к жаре, засухе, болезням и вредителям, адаптированных к агроэкологическим условиям вертикальной зональности Северного Кавказа. Работа выполнялась в предгорной зоне Чеченской Республики на лугово-черноземных почвах. Исходный материал включал 86 сортов отечественной и зарубежной селекции. Ключевые результаты показали эффективность отбора на всех этапах. В питомнике первого года сохранность генотипов к уборке составила 24,0% от высеванных семян, с лучшими показателями у комбинаций К-314 (Маяк × Вр-808) и К-322 (20.108/8 × Инноватор). В питомнике второго года отобрано 72,1% растений, подтверждена высокая полевая устойчивость к фитофторозу. В питомнике третьего года сохранность составила 57,1%, при этом максимальная отобранность (73,7%) отмечена у гибрида К-163 (Удача × Романо). На этапе предварительного испытания отобрано 26,4% генотипов. Наиболее перспективные гибриды, превзошедшие стандартные сорта по урожайности, выделены в питомниках основного и конкурсного испытаний. Пять гибридов прошли тестирование на устойчивость к раку и золотистой цистообразующей нематоды, три из них проявили комплексную устойчивость. Гибрид 19.101/34, лидирующий по урожайности и устойчивый к раку, рекомендован для передачи в Государственное сортоиспытание в 2026 году. Таким образом, исследования подтвердили

UDC 632.51

4.1.1. General agriculture and plant growing
(biological sciences, agricultural sciences)

EVALUATION AND SELECTION OF POTATO HYBRIDS IN THE CONDITIONS OF THE FOOTHILL ZONE OF THE CHECHEN REPUBLIC

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The objective of this study is to select potato varieties and hybrids resistant to heat, drought, diseases, and pests, adapted to the agroecological conditions of the vertical zonation of the North Caucasus. The work was conducted in the foothill zone of the Chechen Republic on meadow-chernozem soils. The source material included 86 varieties of domestic and foreign selection. Key results demonstrated the effectiveness of the selection process at all stages. In the first-year nursery, 24.0% of sown seeds survived to harvest, with the best results for the K-314 (Mayak × VR-808) and K-322 (20.108/8 × Innovator) combinations. In the second-year nursery, 72.1% of plants were selected, and high field resistance to late blight was confirmed. In the third-year nursery, 57.1% of plants survived, with the highest selectivity (73.7%) observed for the K-163 (Udacha × Romano) hybrid. 26.4% of genotypes were selected during the preliminary testing stage. The most promising hybrids, which outperformed standard varieties in yield, were selected in the nurseries of the main and competitive trials. Five hybrids were tested for resistance to canker and golden cyst nematode, three of which demonstrated comprehensive resistance. Hybrid 19.101/34, a leading yielder and cancer-resistant variety, is recommended for State Variety Testing in 2026. Thus, the research confirmed the success of the breeding process and made it possible to identify competitive hybrid potato varieties that are promising for cultivation in the North Caucasus region

успешность селекционного процесса и позволили выделить конкурентоспособные гибридные формы картофеля, перспективные для возделывания в регионе Северного Кавказа

Ключевые слова: КАРТОФЕЛЬ, АГРОЦЕНОЗ, СОРТА, ПЕРСПЕКТИВНЫЕ ГИБРИДЫ, ОТОБРАННОСТЬ, УРОЖАЙНОСТЬ

Keywords: POTATOES, AGROCENOSIS, VARIETIES, PROMISING HYBRIDS, SELECTION, PRODUCTIVITY

<http://dx.doi.org/10.21515/1990-4665-216-041>

Introduction. The development of new high-quality potato varieties with stable, economically valuable traits for specific agricultural production regions is a necessity in the current Russian Federation. Given import substitution and sanctions, this issue is becoming increasingly pressing. To achieve this goal, the resulting new varieties and hybrid offspring must be tested in various agroecological zones of the North Caucasus. Potato seed production deserves special attention in potato cultivation. Seed material used in research must meet the highest reproduction standards and according to GOST. This is necessary to meet the needs of the region's producers for high-quality potato seeds [1, 3, 8].

Long-term research by scientific institutions confirms that well-established potato seed production and specific technological methods can further increase yields and gross harvests by 20-25%. When developing new potato varieties and hybrids, attention must be paid to methods for accelerating hybridization processes, adaptability, and competitiveness [5, 6, 9].

Objective of the work. To develop potato varieties and hybrids adapted to the various agroecological conditions of the vertical zonality of the North Caucasus, with high resistance to heat and drought, pests and diseases, as well as abiotic and biotic conditions of the agricultural landscape.

Scientific novelty lies in breeding hybrid offspring with good yield, marketability, resistance to heat and drought, diseases, pests, and adapted to agro-ecological conditions.

Research methodology. Research to develop new high-yielding potato varieties and hybrids was conducted in the forest-steppe zone III (Foothill) of

<http://ej.kubagro.ru/2026/02/pdf/41.pdf>

the Chechen Republic. The soils of the experimental plot are slightly leached meadow-chernozem soils. The bulk density of the arable soil layer in the experimental plot ranges from 1.2 to 1.35 g/cm³. The soil is characterized by a percolative soil water regime.

The void ratio throughout the soil profile (except for the upper layers) is quite uniform and, on average, close to 50%. The water resistance in the upper soil layers approaches 45%. The percentage of structural aggregates is close to 80%.

The soil solution reaction is slightly acidic, close to neutral, with a pH of 6.9. The humus content in the arable (0-30 cm) layer is 4.6%. Total potassium is abundant in the upper horizons. Total phosphorus and nitrogen contents are moderate. The total absorbed bases in the arable horizon are 42-44 mg/eq per 100 g of soil.

In terms of fertility, the soil of the experimental plot is optimal for cultivating the main agricultural crops zoned for this region.

The climatic conditions during the experiment were ambiguous; data on temperature and precipitation varied from year to year, but no significant changes were detected from the average long-term indicators [2, 4].

The experiment was carried out according to the methodology of the All-Russian Research Institute of Potato Crops (1994), in all nurseries according to the potato breeding process.

The records and observations in the experiments were carried out in accordance with the methodological guidelines for the selection process developed at the All-Russian Research Institute of Crops, VIR, VIZR and the Federal State Budgetary Educational Institution of Higher Education Gorsky State Agrarian University (1980, 1994; 2023).

Research results. In 2022, as part of a mutual scientific collaboration, 86 potato varieties were transferred from the Gorsky State Agricultural University to the A.A. Kadyrov Chechen State University to the Department of Agricultural

Technology for the establishment of a collection nursery, along with samples for further work in the breeding nurseries.

In 2023, collection and parent nurseries with 86 potato varieties of Russian and foreign selection were established. That same year, tubers previously obtained at the Gorsky State Agrarian University were planted in the first- and second-year nurseries, the preliminary and main testing nursery, and the first, second, and third years of competitive testing [7, 10].

During the 2024 replanting, 10 varieties were rejected from the collection nursery for various reasons. Seventy-six accessions were selected for further work and continued with the experiments. In the first-year nursery, 98.8% of the 1,800 seeds sown in six combinations germinated. After two weeks, we transplanted and potted 93.5% of the germinated plants (Table 1).

Table 1. Survival of plants in the nursery in the first year, in 2025.

Combination	Origin	Number of seeds sprouted according to combinations	Pricked out into pots	Survived at the time of harvesting	% survival from seeds/from picking
K-312	Mayak x Innovator	300	268	68	22.7/25.4
K-314	Lighthouse x Vr-808	290	270	76	26.2/28.1
K-315	Alaska x VR-808	297	273	70	23.6/25.6
K-317	Gorsky x Innovator	295	289	69	23.4/23.9
K-318	Gorsky x Krepysh	299	280	66	22.1/23.6
K-322	20.108/8 x Innovator	298	283	78	26.2/27.6
Total		1779	1663	427	24.0/25.7

Based on the results of the experiments in the first-year nursery, 24.0% of the genotypes were selected for further study. The maximum percentage of selection from the sown seeds was established for the combinations K-314, K-322, which amounted to 26.2%. For the remaining combinations, the percentage

of selection varied from 22.1 to 23.6%. Thus, in the first-year nursery, the maximum number of genotypes was selected for the combination K-322 (20.108/8 x Innovator) - 78 pcs. or 27.6% and K-314 (Mayak x VR-808) - 76 pcs. or 28.1%.

After harvesting and inspecting the obtained material that had undergone the treatment period, we selected 380 single-tubers from the remaining 427 plants in combinations for testing in 2026 in the 2nd year nursery.

Second year seedlings are the first tuberous offspring. The material that was in the first-year nursery in 2024 was transferred to the second-year nursery in 2025. As a result of the conducted surveys and observations, it was established that the hybrid offspring of the combinations K-291; K-293; K-294; K-297; K-298; K-302 in the amount of 551 pieces yielded 100% seedlings.

Table 2. Evaluation of 2nd year seedlings – first tuber offspring in the conditions of the foothill zone of the Czech Republic, in 2025.

Combination	Origin	Tubers planted, pcs.	Late blight resistance of tops before harvesting, points	Culling due to diseases during cleaning, pcs.				Survived for harvesting, pcs.
				viral	mushroom	bacterial	undeveloped	
K-291	Labadiya x Gala	30	7	6	-	-	5	19
K-293	Nalchik x VR-808	52	5	3	3	-	9	37
K-294	Sanibel x Labadiya	240	6	32	-	-	29	179
K-297	Saturn x Labadiya	77	8	8	-	-	13	56
K-298	Gulliver x Gala	100	5	20	2	-	11	67
K-302	Saturna x Innovator	52	7	11	-	-	2	39
Total		551		80	5	-	69	397

As shown in Table 2, all hybrid progenies retained high resistance to late blight, reducing the scores for the combinations by only 1 point. Due to viral diseases, 80 bushes were rejected during the latent and overt tests. Fungal diseases affected only five bushes, with three bushes in the K-293 (Nalchiksky x VR-808) and two in the K-298 (Gulliver x Gala) combinations. There were 69

underdeveloped bushes. The overall selection rate in this nursery was high, amounting to 397 bushes, or 72.1%.

A total of 711 genotypes from 10 combinations were transferred from the second-year nursery to the third-year nursery from 2024 to 2025. Following visual phytocleaning and PCR testing for latent forms of viral infection, 406, or 57.1%, of the 711 genotypes remained at harvest (Table 3).

The number of surviving hybrid offspring in the 3rd year nursery was quite high. However, as in previous years, some small combinations showed the highest percentage of survival, for example, K-142 (Reserve) × Nakra) 52 hybrid offspring were planted, of which 35 survived and the percentage of selection was 66.7%. While 201 hybrid offspring were planted for the K-141 (Agouti x Bars) combination, 100 were preserved, where the percentage of selection from the planted genotypes was 49.8%, and from the germination rate 50.5%. In terms of the number of selected genotypes, the K-141 (Agouti x Bars) combination exceeded the K-142 (Reserve) combination × Nakra) into 80 genotypes. The maximum number of genotypes was selected for the combination K – 158 (Luck) × Mirage) - 117 pieces, where the selection rate was 65%. By combination K - 163 (Luck) × Romano) 19 genotypes were planted, 14 of which were selected, and the selection rate was 77.8%.

Table 3. Percentage of selection of 3rd year seedlings in the nursery in the foothill zone of the Czech Republic, in 2025.

Combination	Origin	Tubers planted, pcs.	Number of sprouted tubers, pcs.	Selected during genotype harvesting		Genotypes rejected after the treatment period, pcs.		Overall rating for tops, points	Selected genotypes from the total number of planted ones, %.
				quantity, pcs.	%	diseases	morphological characteristics		
K-140	Vladikavkaz x Lugovskoy	32	30	20	66.7	3	9	6	62.5
K-141	Agouti x Bars	201	198	100	50.5	52	49	6	49.8
K-142	Reserve x Nakra	52	51	35	68.6	12	5	5	67.3
K-144	Brook x Libana	31	29	15	51.7	10	6	5	48.4
K-148	Ilyinsky x Nikita	9	9	6	66.7	1	2	6	66.7
K-150	Kuznetsk x Luck	89	88	49	55.7	19	21	7	55.1
K-151	Garth x Latona	73	72	35	48.6	20	18	9	47.9
K-158	Luck x Mirage	182	180	117	65.0	36	24	7	64.2
K-162	Vitesse x Kolobok	23	21	15	71.4	3	5	6	65.2
K-163	Good luck x Romano	19	18	14	77.8	3	2	8	73.7
		711	696	406	58.3	159	141		57.1

Research showed that the third-year nursery achieved a high selection rate of 57.1% on average across all combinations. Viral disease rejection rates were -17.3%, fungal diseases -3%, and underdeveloped diseases -19.8%. Blight resistance was high across all combinations.

Tuber progenies from the third-year nursery were transferred to the preliminary testing nursery from 2024 to 2025. A total of 336 genotypes were planted there, of which 229, or 68.2%, germinated, and 87, or 26.4%, were selected (Table 4). In the preliminary testing nursery, across seven combinations of all planted genotypes, the highest selection rate was achieved by the K-125 (Nevsky x Udacha) progenies, accounting for 47.4% of the germinated plants.

Table 4. Data from the preliminary testing nursery in the foothills of the Czech Republic, in 2025.

Combination	Origin	Tubers planted, pcs.	Number of sprouted tubers, pcs.	Selected during genotype harvesting		Genotypes rejected after the treatment period, pcs.		Overall rating for tops, points	Selected genotypes from the total number of planted ones, %.
				quantity, pcs.	%	diseases	morphological characteristics		
K-126	87.759-3 x Reserve	72	72	-	-	21	51	-	-
K-129	Nevsky x Early Rosa	132	130	49	37.7	32	49	9	37.1
K-130	Foothill x Libana	22	20	8	40.0	5	7	8	36.4
K-134	Innovator x Gulliver	43	40	9	22.5	15	16	7	20.9
K-135	Innovator x Premier	31	31	6	19.4	14	11	6	19.4
K-137	Grand x Kuznechanka	17	17	6	35.3	5	6	7	35.3
K-125	Nevsky x Luck	19	19	9	47.4	2	8	7	47.4
Average by indicators		336	329	87	26.4	114	186		25.9

The same high selection was provided by the K-130 hybrids (Foothill × Libana) - 40.0% of the sprouted tubers, and the selection from the planted tubers for this genotype was 36.4%. The data in Table 4 show that, according to the overall assessment (visual and ELISA analysis) of resistance to various diseases, the maximum score (9) was awarded to the selected 49 genotypes of the progeny of the K-129 combination (Nevsky × Early Rosa). From the remaining combinations, 6 to 9 genotypes were selected, which were rated for resistance to various diseases from 6 to 8 points.

As a result of the work carried out, 87 plants were obtained for further breeding work in the preliminary testing nursery hybrids, which after storage will be sorted, assessed for safety and planted in the nursery for the main trial in 2026.

In 2025 in the nursery Eleven hybrid progenies from three combinations were planted in the main trial. The first combination (Roko × Romano) included six hybrid progenies, the second (Vladikavkazsky × Andra) included three, and

the third (Vladikavkazsky × Andra) included four hybrid progenies, which demonstrated high yields and tuber quality. All 11 hybrid progenies yielded higher yields than the regionalized varieties Volzhanin and Osetinsky, which were used as standards. However, those hybrid progenies that demonstrated competitiveness across the remaining 52 parameters will be selected for further research.

In the year under study, the first year of competitive testing in the nursery Four hybrid progenies were planted (21.112/139; 21.112/458; 21.114/128; 21.114/688), which yielded over 28.9 t/ha of high-quality yield. A total of seven hybrid progenies were planted in the second and third years of competitive testing, of which the leading positions were taken by (20.106/130; 20.108/120; 19.101/34), which were sent for cancer and nematode resistance testing.

During the study, it was established that 5 hybrids with numbers 18.98/86; 18.106/156; 18.106/168; 18.108/256; 18.109/112; 19.101/34 passed tests for resistance to cancer and golden cyst-forming blight.nematode. Of these, three hybrids (18.98/86; 18.106/156; 18.106/168) demonstrated high resistance to potato cancer and nematode, while the other two were resistant only to potato cancer. Hybrid number 19.101/34 did not demonstrate resistance to golden cyst nematode, but took the lead in yield and many other positive traits.

In 2026, this hybrid is planned to be propagated and presented to state variety testing sites in the North Caucasus.

Conclusions. Based on the results of the work carried out in the collection nursery, a primary culling of 86 potato varieties was carried out by 2024, and 76 variety samples were selected for further work, which were planted in 2025.

Of the over 1,800 seeds sown in the first-year nursery, 98.8% germinated, and the survival rate after transplantation was 93.5%. At harvest, the overall survival rate was 24.0% of the sown seeds. A total of 380 single-tuber plants were selected for transfer to the second-year nursery. The best results were

demonstrated by the combinations K-314 (Mayak × VR-808) and K-322 (20.108/8 × Innovator).

In the second year of the nursery, 100% of the tubers planted (551 pcs.) germinated. High resistance to late blight was noted. The overall selection rate in this nursery was high – 72.1% (397 out of 551 clumps).

Of the 711 genotypes planted in the third-year nursery, 57.1% (406 units) were retained. The culling rate was 17.3% for viral diseases, 3% for fungal diseases, and 19.8% for underdeveloped varieties. Resistance to late blight remained high. The highest selection rate was observed for the K-163 (Udacha × Romano) combination—73.7%.

Preliminary testing nursery: 26.4% of genotypes (87 of 336 planted) were selected. The best results were achieved by the combinations K-125 (Nevsky × Udacha) with 47.4% and K-130 (Predgorny × Libana) with 40.0% of germinated seeds.

In the main trial nursery, all 11 hybrid progenies tested outperformed standard varieties (Volzhanin and Osetinsky) in yield. Final selection for further breeding will be conducted using a set of 52 parameters in subsequent nurseries.

In the competitive testing nurseries, four hybrids demonstrated yields exceeding 28.9 t/ha in the first year. In the second and third years, three hybrids with leading values for a range of economically valuable traits (20.106/130; 20.108/120; 19.101/34) were sent for cancer and nematode testing.

Hybrid 19.101/34 (resistant only to cancer, but a leader in yield) is planned to be submitted to State Variety Testing in 2026.

Bibliography

1. Adaev N.L., Okazova Z.P., Amaeva A.G., Magomadov A.S., Daulakova A.Sh. Register of weeds in row crops of the Chechen Republic. Database registration certificate 2024621030, 05.03.2024. Application No. 2024620167 dated 22.01.2024.

2. Bakunov, A. L. Comprehensive assessment of potato varieties when grown in dry conditions / A. L. Bakunov, S. L. Rubtsov, A. V. Milekhin // Bulletin of KrasSAU. - 2022. - No.10(187). – P. 57-64.

3. Gazdanova, I. O. Evaluation of domestic potato varieties by biochemical indicators in the conditions of North Ossetia / I. O. Gazdanova, F. T. Gerieva // Proceedings of the Kuban State Agrarian University. - 2023. - No. 103. - P. 96-100.

4. Gerieva, F. T. Evaluation and selection of heat- and drought-resistant potato forms for the soil and climatic conditions of the North Caucasus / F. T. Gerieva, I. A. Lekova, B. V. Bekmurzov // Bulletin of KrasSAU. - 2022. -No.9(186). – P. 41-46.

5. Gerieva, F.T. Agroecological testing of promising potato varieties of domestic selection in the conditions of the North Caucasus region / F. T. Gerieva, T. A. Morgoev, H. T. Dzedayev, B. V. Bekmurzov // Agrarian scientific journal. - 2023. - No. 2. - P. 11-17.

6. Gerieva, F.T. Evaluation of potato varieties for productivity and adaptability in the conditions of the North Caucasus region / F. T. Gerieva, Z. I. Revazova // Agrarian scientific journal. - 2024. -No.2. – P. 10-17.

7. Magomadov, A. S. Influence of growth regulators based on natural humic substances on the competitiveness of plants of different potato varieties in the forest-steppe zone of the Chechen Republic / A. S. Magomadov, Z. P. Okazova, L. A. Titova // International Agricultural Journal. - 2025. - No. 6 (408). - P. 811-815.

8. Morgoev, T. A. Phytopathological assessment of domestic potato varieties in the conditions of the North Caucasus / T. A. Morgoev, I. O. Gazdanova, N. N. Doguzova // Agrarian scientific journal. - 2023. -No.7. – P. 33-38.

9. Sereda, G. M. Immunological evaluation of potato hybrids of Belarusian selection for cancer and nematode resistance / G. M. Sereda, M. V. Konopatskaya, V. I. Khalaeva // Plant Protection. - 2019. -No.43. – P. 203-209.

10. Shorin P.M., Okazov P.N., Shcherbinin A.N., Okazova Z.P., Shalygina A.A. Method of pre-planting treatment of potato tubers // Patent for invention RU 2195098 C2, 27.02.2002. Application No. 2001108512/13 dated 30.03.2001