

Wartime activities of the Vavilov Institute

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**Деятельность ВИР им. Н.И. Вавилова
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Among the chronicles relating the heroism of the besieged Leningrad, there are pages dedicated to the deeds performed by the staff the world-famous All-Union Research Institute of Plant Industry (VIR, now the N.I. Vavilov All-Russian Institute of Plant Genetic Resources). With the beginning of the war, even before the city was surrounded by the Nazi troops, the government decided to evacuate a number of factories and institutes from Leningrad, including VIR, but the plan failed. Only in winter did the Institute start partial evacuation, although preparations had been going on for a long time. The largest and most important part of the collection was left behind in the besieged city. The remaining employees were forced to work under the hardest conditions of the siege, in unheated premises. In the harsh reality of the winter in 1941–1942, the daily bread rationing was cut down, and hunger raged in the city, killing tens of thousands of city residents, including VIR employees who kept the stored seeds and tubers untouched. The most difficult part was preserving the potato collection. In the spring of 1942, preparations were made for sowing to restore the viability of seeds and tubers in the fields of Leningrad's suburban area under the fire from the enemy artillery. Only the heroic efforts of VIR's staff helped to save the collection from destruction and loss of germination. This heroism cost more than 20 experts and scientists their lives. So, the most dangerous period for the Institute was overcome at such price. Immediately after the siege was lifted, a group of experts was sent to Leningrad from Krasnoufimsk to help with selecting seed accessions for urgent reproduction. Working under extreme physical exhaustion in frozen premises, without water or electricity, under continuous shelling, they saved, many at the cost of their own lives, the collection of cultivated plants and their wild relatives, the herbarium, and the scientific library for future generations.

Key words: collection, VIR, siege, hunger, exhaustion, shelling, preservation, evacuation.

В летописи подвига блокадного Ленинграда мы не должны забывать о подвиге сотрудников известного на весь мир Всесоюзного НИИ растениеводства (ВИР, ныне Федеральный исследовательский центр Всероссийский институт генетических ресурсов растений имени Н.И. Вавилова). С началом войны, еще до окружения города немецкими войсками, правительство приняло решение об эвакуации из Ленинграда ряда заводов и институтов, среди которых был и ВИР, но осуществить этот план не удалось. Только зимой институт начал частичную эвакуацию, хотя подготовка к ней велась в течение долгого времени. Самая большая и наиболее важная часть коллекции была оставлена в осажденном городе. Оставшиеся сотрудники были вынуждены работать в тяжелейших условиях блокады, в неотапливаемых помещениях. В жестоких условиях блокадной зимы 1941–1942 гг. дневная норма выдачи хлеба по карточкам была сокращена, в городе свирепствовал голод, убивая десятки тысяч жителей города, в том числе сотрудников ВИР, хранивших нетронутыми коллекционные семена и клубни. Самым тяжелым было сохранение коллекции картофеля. С весны 1942 г. стали готовиться к посевной с целью возобновления жизнеспособности семян и клубней в хозяйствах пригородной зоны Ленинграда под обстрелом немецкой артиллерии. Только благодаря героическим усилиям персонала ВИР коллекция была сохранена от уничтожения и потери всхожести. Этот героизм стоил жизни более 20 специалистам и ученым. Благодаря этому наиболее опасный для института период был преодолен. Сразу же после снятия блокады в Ленинград из Красноуфимска были командированы сотрудники в помощь ленинградской группе для отбора образцов коллекции для срочного пересева. Работая при крайнем физическом истощении в промерзших помещениях института, без воды, электричества, под непрерывным артобстрелом, они сохранили, многие ценой собственной жизни, для будущих поколений мировую коллекцию культурных растений и их диких родичей, гербарий, научную библиотеку.

Ключевые слова: коллекция, ВИР, блокада, голод, истощение, обстрелы, сохранение, эвакуация.

From the beginning of the Nazi invasion on June 22, 1941, the work of the All-Union Institute of Plant Industry (VIR) was focused on strengthening direct aid to the national food production through increasing food resources and stocks of agricultural raw materials in the country. Many employees were drafted into the ranks of the Red Army, but a significant part of the staff of the Institute and its branches were sent to

collective and state farms with the mission of agronomic assistance in sowing and harvesting operations (Loskutov, 2009).

In the following studies and practical utilization of the global crop genetic resources collections, the main attention was paid to the seed production of the best zoned or promising cultivars, bred or isolated by the Institute from its hold-

ings, as well as such elite varieties whose cultivation was committed to the Institute by the USSR People's Commissariat for Agriculture.

The course of military events dramatically changed the work of the Institute's headquarters and its experimental fields in Leningrad Province, as the latter in September 1941 found themselves in the zone of direct hostilities. Beginning from July, the overwhelming majority of physically capable employees of the Institute were directly involved in the construction of defense structures on the approaches to Leningrad and in the city itself, while some of the staff members switched to the research work that had straight significance for defense (Scientific report..., 1945).

Already on July 7, 1941, the Institute issued Order No. 182 (Fig. 1), obliging everyone to go to work for the needs of the city; for failure to appear or being late for work, the guilty were brought to justice under the wartime law. From July 10, orders started to be issued to regulate the redundancy and dismissal of employees – due to the reduction in the volume of works and topics irrelevant for wartime, evacuation, and transition to defense enterprises. Besides, in July, not only employees, including typists with typewriters, but also cars, horses, carts, etc. were mobilized into the Workers' and Peasants' Red Army (RKKA). Beginning from July 15, orders concerning reinforcement of the Institute's security system were adopted (the front entrance was blocked, 24-hour guarding posts were organized, and strict access control was introduced) (VIR Archives..., 1962; Orders and directives..., 1945).

While some scientists and technical support workers were sent to the front, most of the Institute's staff labored in the defense works around Leningrad. A small number of employees out of those who remained at VIR started preparing the collection for evacuation to Krasnoufinsk in the Urals (Krasnoufinsk Experiment Station, not far from the city of Sverdlovsk, now Yekaterinburg).

In August 1940, Acad. Johan Gansovich Eichfeld, the Institute's director, who held this position after N. I. Vavilov's arrest, wrote in his report to the Lenin All-Russian Academy of Agricultural Sciences (VASKhNIL): "The work at the Institute never came to a halt, even in the hardest months of the siege, when water supply and electricity were blocked, and the temperature in the laboratories dropped to -15 – -20°C . It was at that time that a lot of work was done to prepare the most valuable part of the global collection for shipment to the rear, and the remaining part for long-term storage." (VIR Archives..., 1962, unpagged)

Beginning from the earliest August, VIR issued a number of orders, regulating the Institute's activities in wartime conditions: Order No. 215 on recruiting a firefighting group for the building (at 42 Herzen Street), providing the Forest Aviation Trust with a room for permanent stationing of their fire team, completing the blackout of windows, and removing combustible materials (archives, herbarium, reagents, etc.) from the premises; Order No. 216 on recruiting a firefighting team for the building (at 44 Herzen Street); Order No. 230 about the transfer of A. G. Gael, Y. F. Katz and P. F. Medvedev, the staff members who worked with rubber plants, to VIR's experiment stations due to the curtailed scope of work; and Order No. 256 (Fig. 2), appointing Ya. Ya. Virs as the manager of the Leningrad and Pushkin units, and the Krasny Pakhar facilities (Orders and directives..., 1945).

When the Government decreed evacuation of the Institute's staff (100 employees with their families), the Oktyabrskaya Railway allocated two standard cars and one open freight car for the collection of seeds. The plan was to evacuate the Institute's collection in two batches. The first consign-

ment was assigned to the hand luggage of the staff members evacuated to Krasnoufinsk (Sverdlovsk Province) and included about 20,000 accessions from the collection: 100 grains for a cereal crop accession, and from 50 to 200 seeds for each of the other crops. They were packed in 100 soft parcels, 2 kg each. The second consignment consisted of over 100,000 accessions, 20–50 g each; they were packed in 300 double-wall containers with a total weight of 5 metric tons. Valuable equipment, the library, and scientific publications were also packed. The cargo prepared for evacuation was to be handed over to the shipment unit under the charge of the Institute's superintendent M. S. Belyaeva and senior researcher O. A. Voskresenskaya (Orders and directives..., 1945).

The evacuation of the Institute's staff and collections was scheduled for August 25, 1941. Already on August 26, 1941 the last passenger train set off from Leningrad to the east, and on August 27 the Nazi cut off the last railroad and Leningrad was isolated from the country. On September 5 the ring of the siege was tightened and fortified by the enemy, and on September 8, 1941, the ring was completely closed, so on September 8, 1941, the staff of the Institute with their families returned to the city. The open freight car, where the Institute's seed collection had been loaded for evacuation, remained on a sidetrack of the railway (Orders and directives..., 1945).

In this difficult time for the country, VASKhNIL sent to Leningrad a special commissioner to act as the curator of agricultural institutes, including VIR – Isai Izraelevich Prezent, who was expected to organize and monitor the evacuation of employees and equipment, but he left Leningrad at the first opportunity. He did not take any part in saving the seeds of VIR's invaluable collection.

After the failed evacuation, the returned containers with the collection were divided into 2 lots and kept in different parts of the Institute's building (44 Herzen Street) to avoid destruction during bombing. A team of 10–12 people daily removed up to 3,000–4,000 boxes from the racks, tying them together into 400–500 packs. The packs were stacked tightly between the shelves whereon the collection was previously stored. Wheat accessions were the first to be handled – over 20,000 boxes, followed by rye, oat and barley; then it was the turn of maize, millet, sorghum, buckwheat, peas and other legumes. All in all, up to 100,000 boxes with seeds of those crops were tied together. The last to be tied up were the boxes with vegetable, industrial and forage crop seeds. The unhandled containers with seeds were sorted, and the seeds were packed into 2,500 empty boxes. Over 3,000 boxes from 40 rooms in the entire building were moved to 16 rooms on the second floor, away from cold and burglars. The collections of maize (306 boxes), flax (1,334) and legumes (1,582) were also brought there. When the relocation was completed, an inventory was made and a layout of the new storage premises was drawn (Orders and directives..., 1945).

The collections maintained in Pavlovsk and Pushkin were urgently evacuated under fire to Leningrad in the end of August; among them there were collections of potato, rye and other crops. The rye expert V. F. Antropova moved the precious rye seed collection from Pushkin to Leningrad; the collection of cucurbits was also evacuated. The pea and lupine collections were transported by N. R. Ivanov. The agricultural meteorologist V. K. Omelchenko continued his work at the Meteorological Station (Orders and directives..., 1945).

The evacuation of potato accessions faced many problems. In 1941, most of them (6,000) were planted in the fields of Pavlovsk Experiment Station of VIR, 30 km from Leningrad. The period of their ripening coincided with the outbreak of hostilities near Pavlovsk. The town was all in flames from nu-

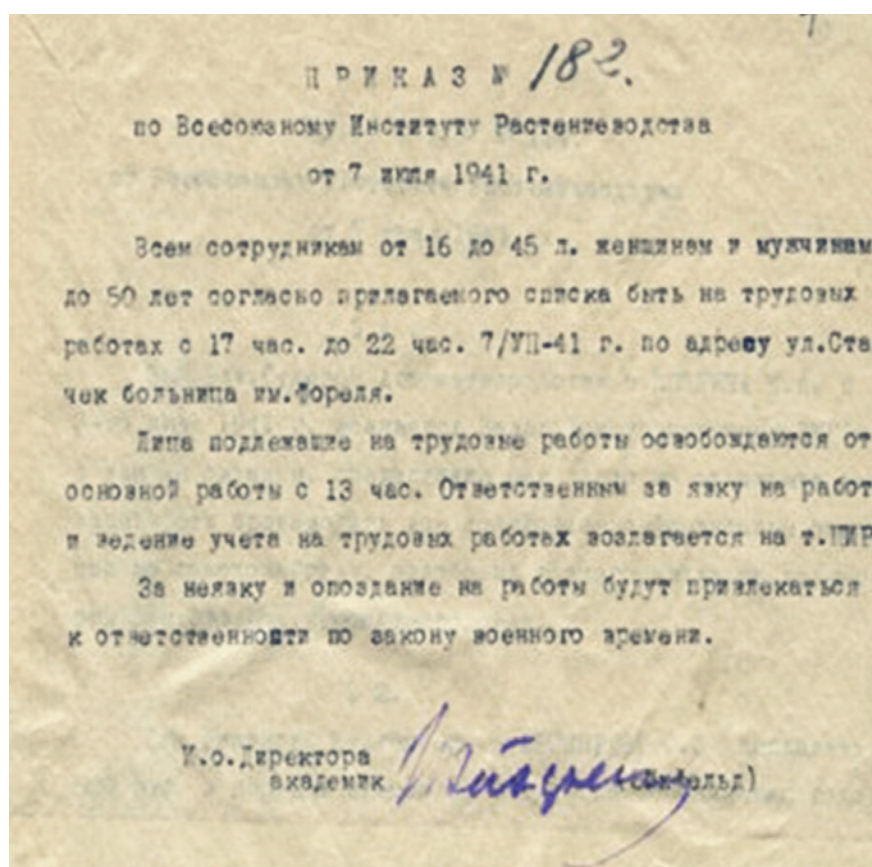


Fig. 1. Order No. 182 for the All-Russian Institute of Plant Industry, dated July 7, 1941 (VIR Archives)

Рис. 1. Приказ № 182 по Всесоюзному Институту Растениеводства от 7 июля 1941 г. (Архив ВИР)

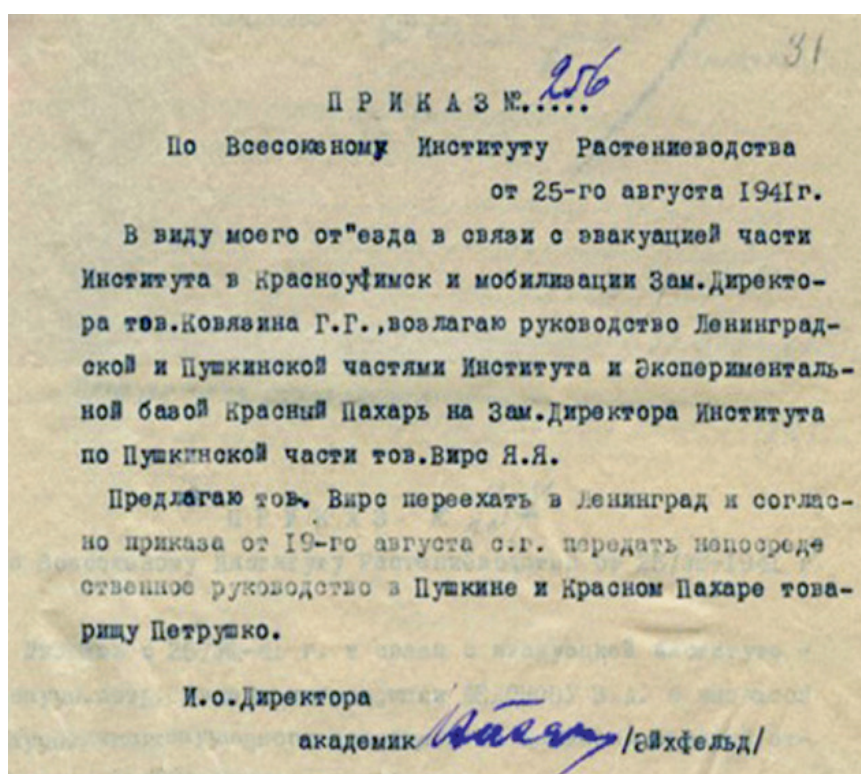


Fig. 2. Order No. 256 for the All-Russian Institute of Plant Industry, dated August 25, 1941 (VIR Archives)

Рис. 2. Приказ № 256 по Всесоюзному Институту Растениеводства от 25 августа 1941 г. (Архив ВИР)

merous bombings by the Nazi aircraft, and the potato fields were constantly under fire from the enemy's artillery. It was clear that under such conditions the potatoes would have to be harvested unripe. The Institute's researchers A. Ya. Kameraz and O. A. Voskresenskaya organized potato harvesting in as short time as possible, so that each accession was harvested separately. They managed to collect 1–2 bushes of each accession out of 6,000 planted ones; in addition, one bush per each of 500 promising hybrids was dug out, along with nearly a hundred accessions from the unique South American collection gathered in the pre-war period – those that yielded tubers (N.R. Ivanov's documents, 1945).

To transfer the boxes with harvested potatoes from the field to the Institute, A. Ya. Kameraz resorted to the support of the military. Under such difficult circumstances, the Red Army men, realizing the importance of the Institute's mission, allocated transport to send the potato collection to the Institute's headquarters on St. Isaac's Square. This work was completed a few days before the complete occupation of Pavlovsk (Alexanyan, Krivchenko, 1991; Loskutov, 1999).

The first massive air raid on Leningrad befell on September 8, 1941. Over 6,000 incendiary bombs were dropped on the city, and fires started. During the first months of the war, several dozens of firebombs were thrown down from the Institute's roof; all of them were rendered harmless in the courtyard. A number of new orders were issued. Order No. 283 regulated the process of putting and keeping the Institute's buildings, laboratories, storage rooms and bomb shelters in order. By Order No. 287, D. S. Ivanov was appointed chief of staff, N. N. Likhvonen was put at the head of the self-defense group, and Ya. Ya. Virs became the chief officer of the facility. Order No. 289 established the following units within the self-defense group: the observation and communication unit, medical and sanitary unit, firefighting unit, degassing unit, revolutionary order maintenance unit, bomb shelter unit, and repair and reconstruction team (Orders and directives..., 1945).

A special room was arranged for the Institute's on-duty overseer; it was on the second floor of 44 Herzen Street (at present, it is part of the Department of Oat, Rye and Barley Genetic Resources, room No. 12). In the duty room there was a cast-iron stove, a table, a loudspeaker, and a city telephone (in the post-war period it was turned into the Institute's switchboard). Behind a screen there were two folding beds, a sofa, and ten chairs. The person on duty kept a record on the state of 16 rooms where the collection was locked under a wax seal. The log contained records of the time of alarm and all-clear signals, close hits of high-explosive bombs, and bursts of shells. The on-duty overseer deployed 5–8 employees and workers to the places of operational work and regulated the rather complicated life of the collection curators (N. R. Ivanov's documents, 1945; Orders and directives..., 1945).

A separate order regulated the access to the collections. The rooms where the accessions were stored were sealed. Groups of 3–4 people were allowed to enter and work there. The keys were kept in a safe by the superintendent K. A. Panteleyeva. A 24-hour watch was established, and an additional post was organized in the basement, near the potato storage vault. Once a week, on-duty overseers, in the presence of the chief keeper R. Ya. Kordon, opened the doors of the rooms and the basement and checked the condition of the boxes.

The leaders appointed for the Leningrad group of the Institute's employees, who were responsible for preserving the collection of VIR and its property, were R. Ya. Kordon, K. A. Panteleyeva and G. N. Reiter.

Rudolf Yanovich Kordon graduated in 1926 from Leningrad State University, where he had been majoring in botany, and from September 1926 worked at the Institute. During the siege, he was deputy head of the Leningrad group, senior curator of the seed collections of all crops. He was the author of the apple cultivar 'Kordonovka' and a number of publications. In the post-war years, he was one of the active participants in the project aimed at creating a ring of fruit and berry plantations around Leningrad on the Pulkovo–Gatchina highway (VIR Archives..., 1962; Personal files..., 1942).

Klavdiya Afanasyevna Panteleyeva graduated from Leningrad Agricultural Institute in 1925 with a degree in agronomy and plant breeding. She worked at VIR as the head of special themes from October 1940 to February 1942, then as the head of the Leningrad part of the Institute until May 1945. During all 900 days of the siege, under the pressure of terrible circumstances, she organized preservation of the global crop seed collections, scientific materials, and equipment (VIR Archives..., 1962; Personal files..., 1942).

Georgy Nikolaevich Reiter from 1919 to 1939 served in the border troops of the State Political Directorate (OGPU) under the People's Commissariat for Internal Affairs (NKVD). Beginning from July 1939, he worked at the Institute as the head of the Human Resources Department and Special Unit. In the harsh years of the 900-day siege, he was the secretary of the Communist Party organization in the Institute's Leningrad group and, as such, was responsible for the safety of the seed collections, equipment and property of the Institute (Fig. 3). He was directly involved in the implementation of urgent measures in Oktyabrsky District of Leningrad, supervised the evacuation of people from Leningrad, and was in charge of the organization of subsidiary farms in the difficult years of the siege (VIR Archives..., 1962; Personal files..., 1942).

In October 1941, two more orders were adopted: No. 327 on inventorying the assets in Pushkin and the Krasny Pakhar facilities (Fig. 4), and No. 334 on inventorying the property and real assets of the Institute as of November 1, 1941 (Fig. 5) (Orders and directives..., 1945).

Despite the difficulties, scientific activities at the Institute did not stop. In the fall of 1941, the employees worked out a thematic plan of scientific research for 1942. It included, in addition to the theoretical trends of studying the accessions, purely practical developments. The Institute's staff developed measures to move the production of staple crops to the Urals and Siberia. Seven memoranda were drawn up on that topic for various groups of crops, and all documents were submitted to the Government of the USSR. The Institute regularly held meetings of VIR's Scientific Council, but most often, due to shelling, they took place in the basement (bomb shelter). Some of the departments and laboratories of VIR were involved in research work of direct defense significance (Loskutov, 2020; Scientific report..., 1945).

The chemical laboratory of the Institute developed methods for obtaining pharmaceutical tannin from extracts and leaves of smoke tree, which found wide application in the treatment of wounds in military hospitals. At one of the factories in Leningrad, where five employees of the Institute were constantly working, the production of medical tannin was organized for the first time in the USSR, and its production was brought to a scale that fully met the needs of the Leningrad Front. Following a special assignment from the military department, the laboratory developed methods for dyeing fabrics in the khaki color with local plant dyes, which were introduced into industrial production and found widespread use already in 1941. Since the besieged city was facing difficulties

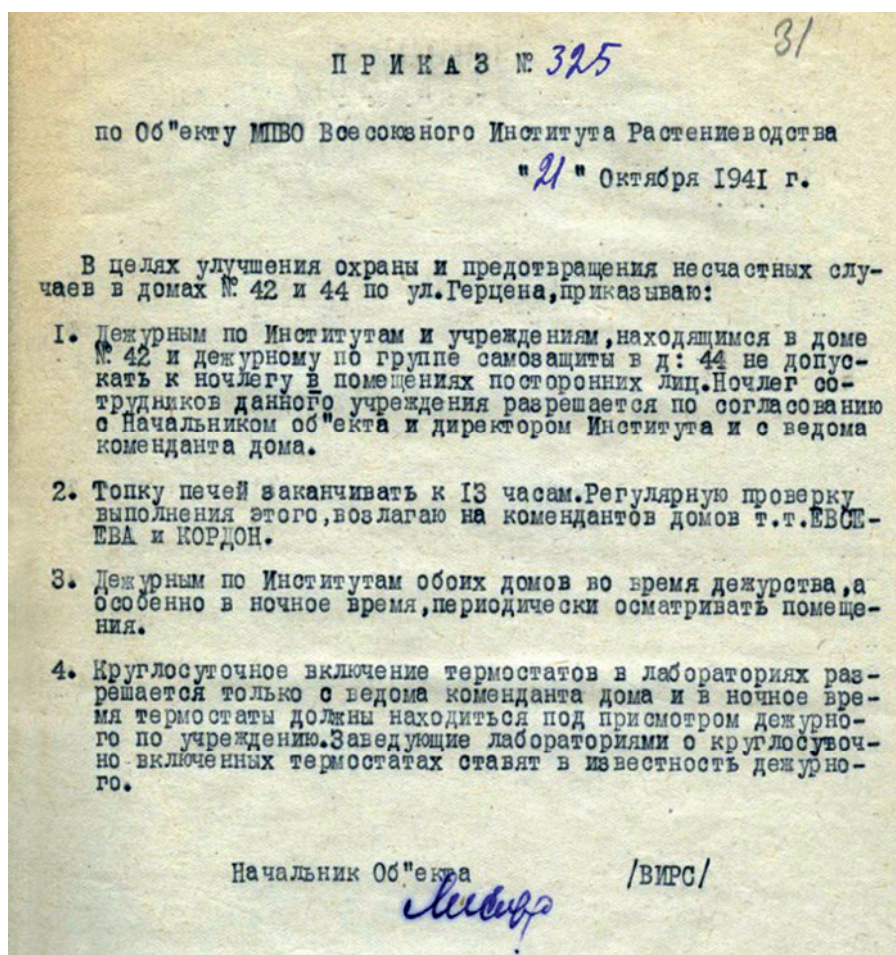


Fig. 3. Order No. 325 for the Local Air Defense Force Object the All-Russian Institute of Plant Industry, dated October 21, 1941 (VIR Archives)

Рис. 3. Приказ № 325 по Объекту МПВО Всесоюзного Института Растениеводства от 21 октября 1941 г. (Архив ВИР)

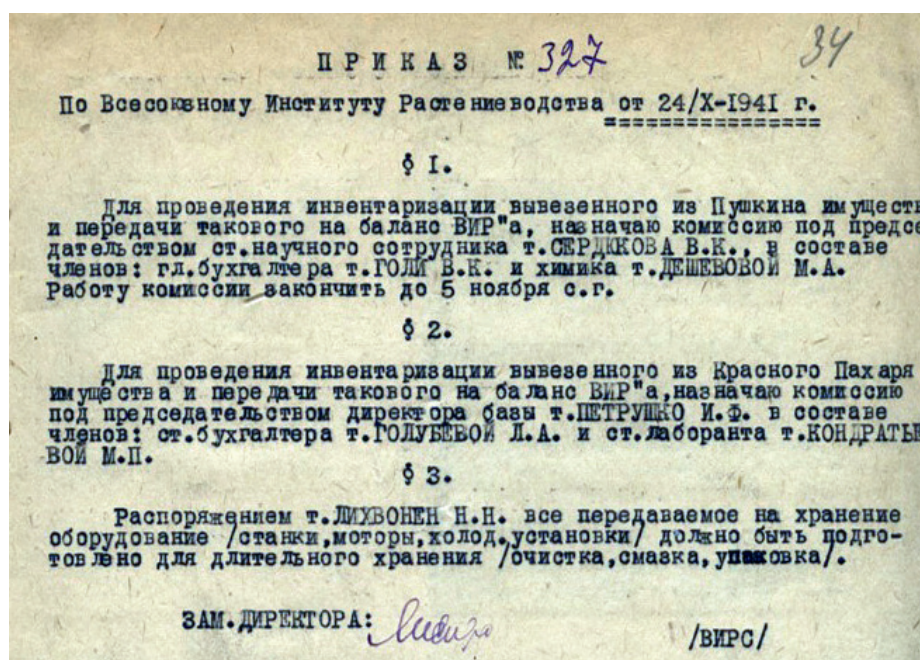


Fig. 4. Order No. 327 for the All-Russian Institute of Plant Industry, dated October 24, 1941 (VIR Archives)

Рис. 4. Приказ № 327 по Всесоюзному Институту Растениеводства от 24 октября 1941 г. (Архив ВИР)

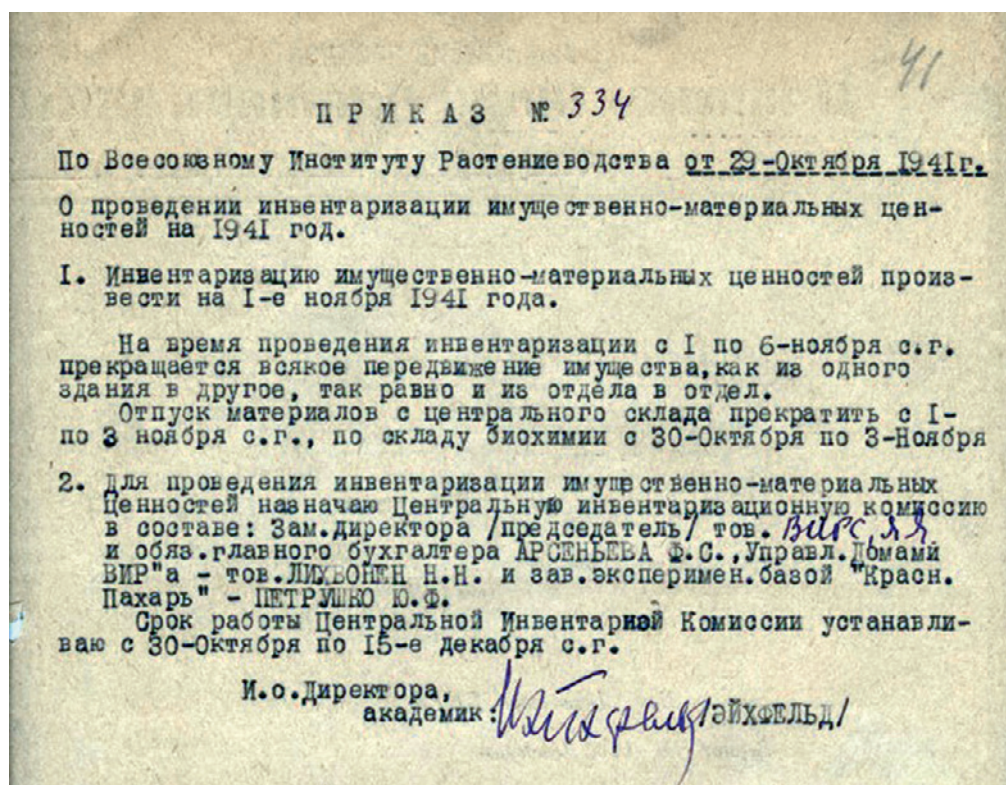


Fig. 5. Order No. 334 for the All-Russian Institute of Plant Industry, dated October 29, 1941 (VIR Archives)

Рис. 5. Приказ № 334 по Всесоюзному Институту Растениеводства от 29 октября 1941 г. (Архив ВИР)

with food supplies, M. I. Knyaginichev with the staff of the technological assessment laboratory carried out research on the content of nutrients valuable for the human organism in some food and industry waste products and developed methods for their extraction. Following the instructions of military organizations, the employees of the Agrometeorology Department of VIR made a number of proposals directly related to the conduct of hostilities and the operation of transport under various weather and soil conditions. G. T. Selyaninov contributed to the clarification of agroclimatic possibilities for expanding the areas under main industrial and food plants in the Asian part of the USSR and participated in the development of other materials (Scientific report..., 1945).

In November 1941, Grigory Ilyich Golenishchev, the Institute's janitor, became the first victim of the unceasing shelling of the city. He was one of the active fighters of the self-defense group; at one time he was the chief of the so-called revolutionary order guards and took part in the elimination of hot spots that arose from thermite bombs on the Institute's buildings. In November, the famine started in the city, and its first victims were VIR's employees. On November 11, 1941, Pavel Pavlovich Gusev, an adviser at VIR and former personal secretary of N. I. Vavilov, died of exhaustion. He had been a good editor and an irreplaceable assistant to Vavilov. Everyone who had met him at work remembered him with a kind word. The Institute's scientific library was not spared either. Maria Parfinievna Dmitrichева, a bibliographer and a qualified librarian, who had been deputy superintendent of the gas shelter in the self-defense group within the Local Air Defense Force (LADF), died of emaciation on November 11, 1941. Later, on November 23, the same cause took the life of Elizaveta Nikolaevna Voyko, deputy head of the VIR Library, who had been responsible for the storage of book funds and participated in the firefighting unit (VIR Archives..., 1962; Personal files..., 1942).

In November, S. M. Bukasov, Doctor of Agricultural and Biological Sciences, was sent to Sverdlovsk and Krasnoufimsk to prepare the deployment of the Institute and organize research work of VIR during its evacuation. On November 5, 1941, he was evacuated by plane with a part of the potato collection to Krasnoufimsk. Besides, V. A. Koroleva-Pavlova was able to relocate with a load of *Taraxacum kok-saghyz* seeds in the same direction (Orders and directives..., 1945).

In the very first fall of the siege, the Institute lost more than 30 researchers: some died from bombing, some from dystrophy, or perished at the front. Throughout the autumn and until deep winter, VIR's employees, mostly women, prepared the collection for evacuation. Only at the onset of the winter did the Institute begin a partial evacuation, although preparations for it had been going on for a long time. The Institute continued its work, despite the harsh conditions of the early severe winter of 1941/42. January and February were the most difficult months of the winter under the siege, when temperatures dropped to record levels – 36–40°C (In the besieged Leningrad..., 1969).

In the hardest winter of 1941/42, the daily ration (for dependents and employees) per card reached only 125 g of bread mixed in half with bran. In the dark, in the frozen building of the Institute, the remaining employees were strenuously preparing the collection for preservation under the siege. While they were dividing the collection into separate batches to preserve it in different parts of the Institute, bombs and shells fell around, damaging the nearby St. Isaac's Cathedral. Fortunately, the main building of VIR was not damaged by the bombing, since it was located opposite the building of the German Embassy (41 Herzen Street) and across the square from the Astoria Hotel (39 Herzen Street), where Hitler, according to unconfirmed reports, planned to celebrate the occupation of Leningrad, therefore these two buildings were not bombed.

On December 21, 1941, during an artillery bombardment of the city, Professor Evgenii Vladimirovich Wulff, head of the Herbarium Department, a prominent botanist and expert in essential oil crops, died from a shell fragment in full bloom of his creative energy (Nikolai Ivanovich..., 2017).

In the winter of 1942, hordes of mice and rats gathered in the Institute's building at 44 Herzen Street. All protective measures against rodents did not save the day. Rats began to enter the premises, throw off the metal boxes with seed accessions from the shelves, and eat the grain and seeds. In this grave situation, the weakened employees decided to remove the remaining boxes from the shelves, tie them into bundles and install the bundles between the shelves. The work on tying the boxes and stacking the packs proceeded in the frozen rooms of the Institute under the scanty light of kerosene lamps, since the windows were boarded up with plywood instead of glass broken by shelling, which additionally served for greater safety of the collection. All rooms were sealed, and the staff checked the seals daily, opened each room every month and examined its internal state. Three to five employees were on duty 24 hours every day. In the spring of 1942, there were several thefts of seeds. Thieves broke into the rooms through the boarded windows, but the losses were insignificant. The windows were immediately sealed, and the seed material moved to a more secure location (In the besieged Leningrad..., 1969).

"The daily passage of the commission registered the integrity of the seals and the locked entrance doors. On damp frosty days, the columns of St. Isaac's Cathedral gleamed beautifully from hoarfrost; on those days the metal boxes were covered with frost, giving light to the rooms in which the collection was kept. Such a picture could be observed on cold and humid days during the three winters of the siege of Leningrad. The germination of seeds in the collection reduced from dampness...

The Institute's headquarters faced a strategic route with one side of its façade (44 Herzen Street). It meant the liability to carry out a very thorough cleaning of this street and part of St. Isaac's Square. Snow or any other garbage could not be left here for long, meltwater had to be absorbed by wells, which required daily cleaning, and it was necessary to throw off the snow from the roof of the building weekly, so that it could not fall in the icy form on the traffic area and pedestrian part of the street. Piles of snow had to be transported by hand sledges or carts to the Moika River. It was a very difficult task for dystrophic people, especially chopping ice in the street and the square and throwing snow from the roof." (N. R. Ivanov's documents, 1945, unpagged)

Hunger raged in the besieged city, killing tens of thousands of residents, and among them the Institute's employees.

On December 27, 1941, Aleksandr Gavrilovich Shchukin, an associate researcher of the collection of industrial and forage crops, a peanut expert, died of emaciation at his writing desk. Until 1938, he had worked in the State Variety Trials, and he was the author of several publications. He was a personification of the wonderful concept of a hard worker. He is remembered as an efficient, honest, polite man, demanding of himself and others. During the siege, he took part in the work of the LADF (VIR Archives..., 1962; Personal files..., 1942).

In the winter of 1942, starvation and cold did not spare the staff of the Institute. On January 5, Nikolai Petrovich Leontievsky, PhD (Agric. Sci.), a senior researcher at the Agrometeorology Department, died of emaciation. His work had been connected with defense issues. He was a fighter of the LADF firefighting group at 42 Herzen Street and was responsible for

storing materials of the Agrometeorology Department (VIR Archives..., 1962; Personal files..., 1942).

On January 9, 1942, Dmitry Sergeyevich Ivanov, a senior researcher and the head of the rice section, died of exhaustion in his office. He had worked at VIR since 1938. He proved himself to be a conscientious worker who knew his job well, and a capable organizer of scientific research. In the past, he had been a warrant officer in the engineering troops of the Russian Army. During the Civil War, he served in the Red Army as a divisional engineer. For his engineering qualifications, forcing the Berezina River in July 1919 and assistance in the development of the offensive, D. S. Ivanov was awarded the Order of the Red Banner by the Revolutionary Military Council of the Republic. In 1941, in the first months of the war, he was one of the leading on-duty overseers at the Institute, chief of staff in the LADF for 44 Herzen Street. Under his leadership, fires in the attics caused by thermite bombs were eliminated. He was also a military instructor for the LADF units. After his death, an inventory was made in his office, and several thousand packages with rice seeds were found – dying from starvation, he had saved them at the cost of his own life (VIR Archives..., 1962; Personal files..., 1942).

On January 12, 1942, Georgy Karlovich Kreyer, PhD (Agric. Sci.), died from hunger in his office. The head of the section of medicinal plants, he had been a famous botanist, had published more than 48 publications on medicinal plants, and had been a fighter of the firefighting team (Personal files..., 1942; Nikolai Ivanovich..., 2017).

On the same day, Aleksandr Yakovlevich Moliboga, a biologist and agronomist, senior researcher at the Agrometeorology Department, died of exhaustion. In the 1930s, he had become a victim of repressions, but after rehabilitation he had retained his usual optimism and great working capacity. He was the author of more than 30 publications, and a member of the firefighting team (VIR Archives..., 1962; Personal files..., 1942).

On January 16, 1942, Georgy Viktorovich Heintz, head of the VIR Library, died of hunger. He was one of the founders and originators of the library. He had developed and introduced into practice a subject catalogue at the Institute, which later began to be used in other libraries of the country. In the self-defense group of the LADF he was the permanent superintendent of the bomb shelter (Personal files..., 1942; Nikolai Ivanovich..., 2017).

In January, Lydia Mikhailovna Rodina, an associate researcher and keeper of the oat collection, died of hunger in the room where the oat collection was stored (In the besieged Leningrad..., 1969).

At the beginning of 1942, Georgy Vladimirovich Kovalovsky, PhD (Agric. Sci.), the Institute's oldest expert, who worked on the agricultural development of highlands, died of exhaustion. A talented researcher, he studied the history and geography of cultivated plants, and was the author of over 50 publications. In the first months of the war, he had been transferred to the Agrometeorology Department to work on special topics (VIR Archives..., 1962; Personal files..., 1942).

Around the same time, Nikolai Nikolaevich Likhvonen, a member of the Communist Party since 1928, died of hunger. He had participated in the civil war in Ukraine. At the Institute he worked as a procurement agent. During the siege, he acted as the head of the supply division and took an active part in the work of the LADF self-defense groups at 44 Herzen Street (VIR Archives..., 1962; Personal files..., 1942).

At the beginning of 1942, Anisiya Ivanovna Malgina, a member of the Communist Party since 1927, died of exhaustion. She had been the head of the Institute's archives. A par-

ticipant of the Civil War, she had worked in evacuation and field hospitals. During her work at the Institute, she had repeatedly won awards “for good performance in production work”. In the first months of the war, she had been responsible for preserving the archives of the Institute and had been a fighter in the LADF firefighting team (VIR Archives..., 1962; Personal files..., 1942).

Around the same time, Prof. Samuil Abramovich Egiz, Doctor of Biological Sciences, head of the tobacco and tea group, author of more than 50 publications on genetics and tobacco breeding, died of hunger (VIR Archives..., 1962; Personal files..., 1942).

Exhaustion was the cause of the death of Andrey Ivanovich Baikov, the Institute's driver and mechanic. He had been a constant companion to N. I. Vavilov in his expeditions to Transcaucasia and other republics of the USSR in 1935, 1936, and 1937. In the besieged Leningrad, he had been a fighter in the repair and reconstruction unit of the LADF at 44 Herzen Street (VIR Archives..., 1962; Personal files..., 1942).

Many other employees (M. Shcheglov, A. Korzun and others) also starved to death at their workplaces. They were slowly dying of starvation, but did not use the grain and seeds of rice, pea, maize and wheat accessions to mitigate their hunger. They chose torment and death, aspiring to preserve Vavilov's invaluable collection for the wellbeing of people (Alexanyan, Krivchenko, 1991; Loskutov, 1999).

The evacuation of the Institute's staff and collections was scheduled for February 17, 1942. Nadya Katkova, a laboratory assistant at the Department of Cereals, visited all the Institute's employees and announced the departure. In total, 300 people were evacuated from the institutes of the VASKhNIL system, including the employees of VIR. The evacuees traveled for three days by railway in frozen carriages to Lake Ladoga, getting to Borisova Griva Railway Station, walked 7 km to Osinovets, and then moved by trucks along the Road of Life to Kabona and to Voybokalo Railway Station, where their long and difficult journey to Krasnoufimsk began in heated goods vans, called teplushki. The rescued people were very weak, and three VIR's employees died on the way, having in their meager luggage packages with seeds from the invaluable collection, which they had taken out to the “mainland”. Vavilov's associate, wheat expert M. M. Yakubtsiner, was removed from the train for a suspected lethal condition, but he recovered and continued on his way to the east with a small bag of unique wheat accessions from the VIR collection saved on his chest (N. R. Ivanov's documents, 1945).

During the evacuation, on April 14, 1942, Grigory Aleksandrovich Rubtsov, senior researcher of the Department of Fruit Crops, died of hunger and exhaustion on his way to the “mainland”. On his chest a small bag was found: it contained seeds carefully carried through the hungry and cold days of the siege period. Rubtsov had graduated from two universities. An erudite botanist and agronomist, a tireless traveler, he described several new species of fruit plants in Central Asia. He was a prominent expert in the genus *Pyrus* L. (pear). From the beginning of the war until February 1942, he was a firefighter (VIR Archives..., 1962; Personal files..., 1942; Nikolai Ivanovich..., 2017).

For more than six months the open freight car loaded with the Institute's collection was driven from place to place along the railway sidings due to the intensified bombing of the tracks. After that, when sending the car from the besieged city had become a completely hopeless venture, the management of the Oktyabrskaya Railway demanded that the Institute take 300 containers back. By that time, the Institute had already been evacuated. The employees and workers who remained

to protect the collection and property were not able to transport 5 tons of cargo to the Institute on their own, so a military unit helped them in this. The containers were delivered to VIR's building at 44 Herzen Street. People were unable to lift such a load above the first floor, and for four years it was left in the entrance hall of the Institute (N. R. Ivanov's documents, 1945).

But the hardest part was preserving the collection of potatoes. V. S. Lekhnovich, curator of the potato collection under the siege, in the book *In the Besieged Leningrad* (In the besieged Leningrad..., 1969) recalled: “The task turned out to be very difficult. We had to protect the tubers from rats, frosts, and starving people. For greater safety, I began to seal the basement and close it with three different locks. I bound the door with iron. However, petty thefts could not be avoided... Twice a day, despite severe exhaustion, I made my way from my home on Nekrasova Street, where I lived, to St. Isaac's Square, where the collection was kept, and each one-way trip took about an hour and a half...”

The winter of 1941/42 was distinguished for its exceptional severity. Frost penetrated from everywhere to the basement with the potato collection. We had to heat the stove every day. I got firewood wherever I could. Once a week, the superintendent of VIR, M. S. Belyaeva, supplied me with a bundle of firewood. Sometimes the hospital soldiers who warmed themselves in the courtyard by the fire gave me a drawer from some table or sideboard. In any case, the temperature in the premises never dropped below zero.” (In the besieged Leningrad..., 1969, p. 133-134)

In spring, the time came to plant potatoes. The preserved potato collection was planted in the fields of a suburban state farm; throughout the summer and autumn, it was protected from robbers. This was repeated in each of the three years of the siege. Thus, the collection was saved and partially reproduced. Resowing and reproduction of cereal crops began in the still besieged city in 1942. N. R. Ivanov recalls it: “The work was carried out at the Predportovoy State Farm, under the gunfire of the Germans. About 200 varieties were sown on the area of 250 m².” (In the besieged Leningrad..., 1969, p. 132)

Under the hardest conditions of the siege, VIR's employees preserved the unique collection of 6,000 potato accessions, which weighed about 2 metric tons. Only one cultivar, “Tesma”, was lost. Storing the collection in two places within the same basement gave good results, although not without losses. Some accessions from subtropical countries and highland areas lost their germination, but generally the collection remained viable. Several immature Chilean varieties with late tuberization were lost, along with several accessions of wild potato species, which were later revived in the Urals upon requesting them from other stations of the Institute and by sowing seeds from the fully preserved seed repository of VIR (N. R. Ivanov's documents, 1945).

In 1942, a lot of work was done to preserve the Institute's library: the books were dried and placed in separate cabinets with appropriate labels. Fire prevention and rat extermination measures were taken in the library.

In March 1942, one more attempt was made to evacuate the collection by plane. With extreme urgency, about 40,000 seed packages, weighing half a ton, and a full duplicate set of potato accessions were selected. This valuable cargo was taken to Krasnoufimsk by Yan Yanovich Virs, who departed from Leningrad a few weeks after the evacuation of scientific researchers. Preparation of the shipment went on ceaselessly, almost on a 24-hour schedule, under the feeble light of cold-blast kerosene lanterns. Around two dozens of them

were in the storehouse, with about 300 liters of kerosene kept in a special depot (N. R. Ivanov's documents, 1945).

J. G. Eichfeld, director of VIR, wrote in a telegram sent from Krasnoufimsk to K. A. Panteleyeva and G. N. Reiter: "Spare nothing to support people." (N. R. Ivanov's documents..., 1945)

After the departure of the main personnel, the Institute turned into a "minor" institution. Its local labor union committee was elected in March. For about 1000 days N. R. Ivanov served as its chairman, and O. A. Voskresenskaya was his assistant. In addition to other responsibilities, the chairman of the committee was charged with the duty to monitor the health of the employees and the task of death prevention. Any death was regarded as an emergency event.

The life of the employees who remained in the besieged city was difficult. In order not to get sick with scurvy, every day the researchers and workers received "vitamin-containing" pea sprouts. For that purpose, about 40 kg of seeds was set aside from the reproductions of several pea varieties. Pea seeds were germinated on metal trays taken from the seed control laboratory in calcined sand, and on the 5th–8th day the seedlings were ready for consumption. The only warm area was room No. 12 of the on-duty overseer, located on the second floor of the Institute's building at 44 Herzen Street. A "potbelly" stove, fed with random wood, was smoking there for 24 hours, and the only working telephone switch was available in the room. The temperature there was from +10 to +16°C, which proved quite enough for pea germination. The daily consumption was 30 sprouted peas per person (N. R. Ivanov's documents, 1945).

Nevertheless, hunger did not release the emaciated employees from its grip. On March 15, 1942, the Institute's accountant E. I. Dmitrieva died; on March 22, the researcher M. N. Lavrova; on April 14, the associate researcher Serafima Arsenyevna Shchavinskaya (N. R. Ivanov's documents, 1945).

In the spring of 1942, the researchers and other staff were divided into three groups. The most difficult job was to replant potato accessions. Potato tubers required annual reproductions, so two sites were chosen to ensure safety duplication of the reproduction procedure: Lesnoye State Farm, where all the work was carried out by V. S. Lekhnovich, and the state farm of the Greenery Trust on the Vyborg Side, where O. A. Voskresenskaya was responsible for the work, with organizational support from the agronomist K. Lavua. Potato accessions were planted on those sites for three seasons (N. R. Ivanov's documents, 1945).

The small second group, headed by K. A. Panteleyeva and the researcher R. Ya. Kordon, remained in Leningrad. The task of this group was to protect the part of the collection that remained in the Institute's headquarters from looting. Great help in this matter was provided by the superintendent of the building, M. S. Belyaeva, who for many days in a row was on duty at night under the gates in the unheated entrance.

The third group, led by Vasily Vasilyevich Ivanov and Nikolai Rodionovich Ivanov, was sent to Peri Railway Station to assist the subsidiary farms of Oktyabrsky District and individual household plots of Leningraders with advice and practical aid (N. R. Ivanov's documents, 1945).

The director of the Lesnoye State Farm, A. T. Vorobyev, made arrangements for VIR's employees to eat in the farm's canteen. Here, without any cards, they received linseed cake porridge and stewed saltbush. The chief agronomist V. M. Kalinin earmarked cabbage seedlings and turnip seeds, the harvest of which was used to enhance the nutrition of the Institute's staff. The farm helped to transport the planting material to the field. Together with V. S. Lekhnovich, the potato collec-

tion was planted in the field of the Lesnoye State Farm by K. T. Chernyanskaya, G. A. Lebedeva, and the worker A. I. Ivanov. The State Farm's blacksmith built a marker for planting potato accessions. The plot was plowed for a whole week. The entire collection, except for A. Ya. Kameraz's hybrids, was planted in two parallel series. The planting of potatoes was finished only on June 22, but the tubers sprouted well. Saltbush sprouted concurrently with the tubers. The employees let it grow a little, harvested, and handed over to the state suppliers, thus earning 800 rubles. In the fall, the issue of protecting the field arose. In September and October, V. S. Lekhnovich was on duty at the site for 38 nights. Fortunately, everything turned out well. The collected harvest was transported to the State Farm's cellars (N. R. Ivanov's documents, 1945).

Andrey Fedorovich Nikitin, director of Vyborgsky Flower Enterprise, could not believe for a long time that potatoes had been stored in the besieged Leningrad all winter: "And you didn't touch it, didn't eat it, did you?" He allocated the best field for the collection. Olga Aleksandrovna Voskresenskaya, Praskovya Nikolaevna Petrova, the janitor Anna Pavlovna Andreyeva, and Nikolai Rodionovich Ivanov worked there. That area was better fertilized, so the harvest was more generous. A. F. Nikitin set aside a small greenhouse for the most valuable South American varieties. But in August, a German shell broke the glass roof, so not all the plants managed to produce tubers (N. R. Ivanov's documents, 1945).

In addition to rescuing the collection, the Institute's staff worked according to the thematic research plan adopted in the fall of 1941. Johan Karlovich Murri, Senior Researcher, PhD (Chem. Sci.), carried out the work on the biochemical characterization of crop species and varietal diversity, mainly in the context of vitamin content, and on studying the effect of growing, storage and processing patterns on vitamin accumulation and preservation in plant raw materials. He developed a technique to produce highly active anticorben vitamin concentrates from fruit and berry juices for the vitamin industry as well as a fluorometric method for determining vitamin B and a rapid and simple method for colorimetric determination of provitamin A for the food industry (Scientific report..., 1945).

At the same time, the Institute's team developed materials and plans for moving eastwards and expanding the crops of *Taraxacum kok-saghyz*, fiber flax, potato, medicinal plants, vegetables for canning, cucurbits and grain legumes, whose main areas of cultivation were in the lands by that time captured by the enemy. The materials on the movement of food and industrial crops to the east were submitted for further use to the Central Committee of the Communist Party, the State Planning Committee, and the People's Commissariat for Agriculture as early as in December 1941. The work on the implementation of the proposals was carried out in summer in Sverdlovsk Province and at the Central Asian Experiment Station. The hostilities in the extreme northwest of the USSR, the movement of industry to the east, and the congestion of transport arteries with military traffic were the factors that prioritized the issues of developing own food and feed production bases in the Far North and in the arid and desert regions of Kazakhstan and Turkmenistan. The personnel of the Polar, Maikop, Kuban, Aral and Turkmen Experiment Stations, and Derbent Substation worked to resolve all those issues (Scientific report..., 1945).

Since the spring of 1942, VIR's employees evacuated from Leningrad had been working in the Urals at Krasnoufimsk Experiment Station, Sverdlovsk Province. During the war, following the recommendations of the Institute's staff, the areas

under many crops were significantly expanded in the Urals, because since the beginning of the war the population and the need for agricultural products in the region had increased sharply as a result of the enhancement of local industry and the transfer of a large number of factories to the Urals from other regions. In view of this, the basic work of the Ural group from VIR under wartime conditions included scientific development of measures for rapid expansion of crop areas and raising the yield of potatoes and vegetables in the Urals; development of vegetable seed production and increasing the yield of red clover seeds and hay; and studying the conditions for the development of fruit and berry farming in Sverdlovsk Province. This work was carried out by the staff of the Institute in cooperation with the Commission of the USSR Academy of Sciences for mobilizing the resources of the Urals for defense needs, and with local experimental institutions (Loskutov, 2020; Scientific report..., 1945).

The Institute's agricultural meteorologists, led by Prof. G. T. Selyaninov, worked on extensive materials to make a description of the climate resources in the Urals and built an agroclimatic map of the region. Surveying by expeditions helped to find solutions to such problems as the development of heat-loving vegetable cultivation in the Middle Urals in the context of microclimate features in individual areas, and the supply of vegetable crops with moisture. The Institute's plant scientists studied in detail the conditions for the cultivation of vegetables and potatoes in the southwestern areas of the Cis-Urals, verifying the recommended basic techniques and measures to increase yields in collective farms. Research itineraries covered the central mining areas. At the end of 1942, a memorandum was drawn up on the main measures for the development of crop areas and an increase in the yield of vegetables and potatoes in the mining zone of the Middle Urals in wartime. In 1942, in order to facilitate rapid restoration of vegetable seed production disturbed by the war in Leningrad Province, adjacent regions and republics, VIR's staff started multiplying vegetable crop cultivars bred at VIR and Leningrad Zonal Vegetable Experiment Station; the work was done in Krasnoufimsk District, Sverdlovsk Province. In the fall, the Institute deposited for storage 61,750 seeds of cabbage, rutabaga, carrot, beet and other crops (Scientific report..., 1945).

Materials were prepared for the development of horticulture in Sverdlovsk Province; they were used by regional agencies in special decrees that envisaged planning and scientific guidance for setting up a ring of berry plantations around Sverdlovsk. Scientists of the Ural group developed measures for preservation and accelerated reproduction of canker-resistant potato cultivars, reproduction of T. kok-saghyz cultivars developed at VIR, and a search for new sources of tannin in plant raw materials. Materials were submitted to the USSR People's Commissariat for Agriculture, proposing measures for preservation and multiplication of canker-resistant potato cultivars needed for restoring the barrier along the western border of the USSR. A search was made for the presence of canker-resistant potato varieties in the regions and republics of the USSR, and measures were developed for their accelerated reproduction (Dr. S. M. Bukasov). VIR's employees performed forced multiplication of a set of the most valuable cultivars at the Polar Experiment Station, in Sverdlovsk Province, and in the suburban state farms of Leningrad (Scientific report..., 1945).

The Institute's biochemistry laboratory developed methods for simultaneous quantitative and qualitative assessment of rubber in the roots of T. kok-saghyz and for ex-

tracting rubber from their roots. Studies of wild vegetation in the Urals were carried out to identify new sources of tannins. VIR's scientists identified a whole set of plants that contained significant tannin amounts. Of greatest practical interest were the rhizomes of knotweed, from the Polygonaceae family. Methods were developed for upgrading knotweed rhizomes, conditions were calculated for preparing tan liquors from them, and half-way trials were started to verify the use of tanning extracts in the tannery industry (Scientific report..., 1945).

The Institute's employees rendered agronomic services to five districts of Sverdlovsk Province, mainly in the cultivation of vegetable crops and potatoes and in the organization of seed production. Besides, training courses and workshops for agronomists, foremen and workteam leaders were organized in Sverdlovsk Province to improve the qualifications of agronomic personnel and collective farm workers. In addition, the Institute's staff took part in briefings held by regional and district agencies. They prepared for publication a number of guidelines on seed production, agricultural practices, and plant protection against pests (Scientific report..., 1945).

The hardest periods in the siege of Leningrad were the winters of 1941/42 and 1942/43. When the last one was over, with the onset of warmth in the spring of 1943, the Institute's staff lived with a sole concern – the sowing campaign. The storage life of the seeds of many vegetables, cereals, legumes and other crops expired, since the aging process of seeds that had endured cold and especially high humidity went on quicker. It was necessary to update the reproductions of the collection. For the regeneration of cereal, vegetable and other crop accessions, an area of about 3.5 hectares was allotted in Pargolovo District, 3 km from Peri Railway Station, and a plot of 250 m² in the Predportovy State Farm. Field operations started on May 17. In the absence of draft power, the employees had to cultivate the entire land with shovels. Under gunfire, they started replanting 200 early-ripening varieties of various crops from the collection. The work was supervised by Nikolai Rodionovich Ivanov and the associate researcher P. N. Petrova (N. R. Ivanov's documents, 1945).

The Leningrad group of the Institute's employees carried out a great deal of work to preserve the collections of the world's cultivated plants under the difficult conditions of the frontline city and to provide agronomic services to suburban farms. All the collections of the Institute were in a satisfactory condition, while the potato collection and a set of canker-resistant varieties were planted by VIR's staff on an area of about 2 hectares in two suburban farms of Leningrad and to a large extent reproduced. Following a suggestion of Leningrad agencies, the Institute organized an agricultural plot in the suburban area as a base for rendering agronomic services to the production enterprise where about 400,000 seedlings were grown for subsidiary farms. The Institute's staff arranged courses and workshops for foremen of vegetable-growing teams and classes for directors of subsidiary farms. Certain farms were assigned under the care of VIR's scientists and profited from the Institute's systematic agronomic assistance. For their achievements, Leningrad City Council awarded some of those farms with Certificates of Merit and the Challenge Red Banner (Scientific report..., 1945).

When the siege was broken, before the Institute's staff arrived, R. Ya. Kordon was the first to beat a path in the snow that led to the Krasny Pakhar experimental base, and the work began. Afterwards, he wrote: "All work was car-

ried out under the slogan of preserving the collection. The rest of the issues were considered secondary." (N. R. Ivanov's documents..., 1945)

In February 1944, the first group of the Institute's employees arrived from Krasnoufimsk to Leningrad. They came to the Institute in order to prepare the first batches of seeds for shipment to VIR's stations for reproduction, because every year the accessions in need of fresh seeds had been increasing in number. And so, little by little, the activities of the Institute began to revive. In 1946, immediately after the war, the Institute's staff thoroughly checked the state of the collection and made a plan for emergency regeneration for the accessions with critically low viability. All the Institute's experiment stations and breeding centers of the country were involved in this work. That program of reproduction and preservation of Vavilov's global collection was implemented to the fullest (N. R. Ivanov's documents, 1945).

During the siege of Leningrad (1942–1944), the employees of VIR who worked at Krasnoufimsk Experiment Station exerted themselves in saving the most valuable part of the global crop collection, evacuated from the besieged city in the amount of over 100,000 accessions. Together with the Institute's director J. G. Eichfeld, this painstaking work was done by S. M. Bukasov, V. A. Koroleva-Pavlova, E. F. Palmova, T. V. Lizgunova, M. A. Shebolina, L. V. Bek, V. T. Krasochkin, T. L. Krasochkina, A. Kustushina, N. L. Boronova, K. M. Mal'tseva, I. A. Babichev, A. M. Sofinsky, J. K. Murri, E. I. Yakusheva, A. V. Koyanovich, V. F. Antropova, A. M. Evert, A. F. Evert, M. Mukhmatullina, M. V. Alpatieva, A. M. Alpatiev, M. P. Shevchikova, N. G. Khoroshailov, and others. All of them left a notable mark on the development of plant breeding and, more widely, agricultural science in the Middle Urals (N. R. Ivanov's documents, 1945).

In the tragic times of the Great Patriotic War (1941–1945) of the Soviet Union against the German Nazi invaders, the All-Union Institute of Plant Industry significantly intensified its work aimed at providing practical assistance to the country's agriculture, and expanded the base of this work by including new regions and setting new tasks (Scientific report..., 1945).

D. V. Pavlov, the authorized commissioner of the State Defense Committee for food supplies to the troops of the Leningrad Front and the population of Leningrad, wrote: "In the whirlpool of unexpected events, when death soared all around, houses collapsed, material values perished, the Institute of Plant Industry (and not only it) was lost in the commotion of the wartime days. At that time, the authorities were not up to it. The employees of the Institute were aware of that, so they could have disposed of the collection at their own discretion, and no one would have made them responsible if the seed accessions had died, since the authorities knew the situation. But the Institute's staff, although many employees were missing in their ranks, continued to work with due regard to specific circumstances." (Pavlov, 1967, p. 153)

Summing up the results of wartime losses according to the data of the Extraordinary State Commission, the Institute lost about 40,000 accessions of the collection. The buildings, property, archive, and herbarium of VIR were seriously damaged. The total losses of VIR in Leningrad alone amounted to 14.4 million rubles. The retreating Nazi troops captured the main collections at Detskoye Selo (Pushkin): 10,000 accessions of wheat, barley, oat, vegetable crops, T. kok-saghyz, lupine, etc., as well as scientific equipment, the library, and the priceless collection of 66,000 flower

plants were carried off. In Pavlovsk, the collection of apple trees was half lost, and the collection of creeping southern varieties was lost completely. The pear collection and the valuable collection of original stone-fruit hybrids were also lost. In addition, the losses included half of the worldwide gooseberry collection, the entire collections of strawberries, raspberries, and perennial ornamental plants. There is no information in the archival documents whether those collections were destroyed or taken away by the Nazi, but the total damage was estimated at 4.5 million rubles. (N. R. Ivanov's documents, 1945).

During the war, some stations of VIR were occupied by the enemy troops and the collections maintained there were requisitioned. Such a situation was faced by Pushkin Laboratories and Pavlovsk Experiment Station of VIR, near Leningrad, and Kuban Experiment Station of VIR, Krasnodar Territory. As evidenced by E. I. Nikolaenko, an employee of Pushkin Laboratories, the collections were moved from Leningrad to the Baltic States (Nikolai Ivanovich..., 2017). Even if other collections had been carried away to Germany, their traces were lost. This is confirmed by numerous investigations carried out by German researchers in Germany itself and also in the USSR. Searches for the material were also undertaken in the late 1940s at the German Genebank in Gatersleben which had been organized by that time. Part of the wartime evidence collected by German researchers was submitted to VIR for studying, but no traces of the VIR collection were found there. Most likely, all the seized seed collections were irrevocably lost, since the plant material (seeds) under improper storage conditions (with changing temperature and humidity patterns) would have quickly lost its viability. On the other hand, collection material without well-documented detailed passport information about its composition would lose its uniqueness and value.

After its re-evacuation from the Urals, the Institute, due to the lack of specialists, stopped working with essential oils, medicinal plants, tobacco, tea, and novel crops. The collections of the above-listed groups of cultivated plants consisted of about 30,000 accessions. Those collections were handed over to other sectoral institutes, but lacking the skills to restore and preserve the collections, they quickly lost the original stock.

Thus, the heroic efforts of the scientific and technical personnel of VIR saved the Institute's unique collection from destruction and loss of viability. The price of such heroism was the lives of many employees, and the suffering and deprivation of those who survived under those dreadful conditions. Nevertheless, that terrible period in the Institute's history was overcome.

The staff of VIR, showing incredible perseverance, sometimes at the cost of their own lives and health, preserved the unique global collection of cultivated plants and their wild relatives, collected by N. I. Vavilov and his associates, and continued their work in the postwar period.

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