LAMMC
LITHUANIAN RESEARCH CENTRE FOR AGRICULTURE AND FORESTRY
PLANT BREEDING 1922–2022

A century of plant breeding in Lithuania. Past and Present.

Plant breeding: a success story that gives humanity a chance. Although plant breeding has been practiced by humankind since the beginning of agriculture, modern scientific breeding has existed for just over 100 years.

Plant breeding began from the domestication of the first agricultural crops with the advent of sedentary farming. It is estimated that this practice began 9,000-11,000 years ago. Early farmers initially selected food plants with desirable traits and used them as a seed source for later generations, so they accumulated the desired traits over time. The second stage of scientific breeding began in 1900 with the rediscovery of Gregor Mendel's laws. Gregor Mendel's experiments based on plant hybridization became well known in the early twentieth century and formed the basis of new genetic science. At the same time, a period of conscious hybridization in selection started.

With the development of molecular biology, breeding entered its third stage of development in the late 1970s. The third stage of plant breeding is related with application of new molecular technologies. A wide range of molecular markers has made it easier to identify sources of variation and selection. Many new possibilities have emerged with the development of a new generation of sequencing methods that allow the sequencing of whole plant genomes or transcripts in a short time. In addition to basic molecular technologies (i.e., cloning, nucleotide sequencing, and recombinant DNA analysis), the modern era of plant biotechnology in the early twentieth century has been associated with the ability to grow plant cells and tissues *in vitro*, regenerate and clone new plant forms. The most recent fourth stage of plants breeding is related to the development of genome editing methods. It promises new perspectives in terms of both plant breeding results and rates.

The beginning of scientific plant breeding in Lithuania is associated with the establishment of the Dotnuva Breeding Station in 1922. The first leader of the Dotnuva breeding station, Prof. Dionizas Rudzinskas. He stood out because of his professional knowledge and practical experience. He was the first who developed breeding varieties of winter wheat and other plants in Russia. In 1910, he established (and, until 1922, managed) the breeding station of the Moscow Agricultural Institute, where the specialists in plant genetics and breeding were trained, such as Nikolai Vavilov (1887–1943). Professor organized the first scientific expeditions to collect plants genetic resources. Arriving in Dotnuva, D. Rudzinskas brought genetic collections collected since 1903, the breeding lines and varieties which he created till 1922. This breeding material later became the basis of the first Lithuanian varieties.

Prof. Dionizas Rudzinskas The first plant breeding collections are being set up at 1922

D. Rudzinskas attended the plant breeding course of Prof. Kurt von Rumker at the University of Breslau (now Wroclaw) in Germany at the time. He worked in the Breslau test field and visited many seed companies, including the Svalof Breeding Station. In 1911 got acquainted with the most famous agronomic stations in the USA and visited Luther Burbank, the creator of famous varieties. The breeding of vegetable plants in Lithuania started in 1924. The beginnings of orchard plant breeding work can be found in the works of Adomas Hrebnickis and Vincent Montvila. The pioneer of systematic breeding of orchard plants is Ipolitas Štaras, who started his work on his private plot in Birutė village, Kaunas suburb in 1941. After starting work at the Vytėnai Horticultural Experiment Station, he continued his work by breeding apples, pears, plums, cherries, black currants, and strawberries.

International collaboration is essential for plant breeding. The scientist from Dotnuva breeding station actively cooperated with breeders in neighbouring countries and exchanged plant genetic resources. The work of the breeding station was significantly advanced by the internships of the station staff in the breeding institutions of Sweden, Denmark, Czechoslovakia, Scotland, Sweden, and Germany in the 1930s.

331 agricultural plants varieties and 220 varieties of orchard and vegetable plants have been developed in Lithuania from 1922 till 2021. 29 cereals, four potatoes, one flax, 21 legumes, 38 forage grasses, 19 vegetables, and 13 orchard plant varieties developed at the Lithuanian Research Centre for Agriculture and Forestry were included in the National List of Plant Varieties in 2021. The International Conference on TRADITIONAL AND NOVEL TASKS FOR PLANT BREEDING, dedicated to the 100th-anniversary of PLANT BREEDING (1922–2022) will be held on June 8-9, 2022, at the Institute of Agriculture of LRCAF (Akademija, Kėdainiai distr., Lithuania https://www.lammc.lt/lt).

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