



Fifty years of research on genetics and plant breeding in the Research Institute of Crop Production Prague-Ruzyně

Research Institute of Crop Production in Prague celebrated fifty years of its existence in 2001. The Institute was established in 1951 on the basis of former State Research Agricultural Institutes in Brno and in Prague. Since the beginning the Institute has been engaged in the study and maintenance of plant genetic resources, in studies on genetics, physiology, and quality of products, breeding methods and seed sciences. Practical breeding work was also carried out, often jointly with breeding companies.

As an organizational part of the Institute the Department (later Section/Division) of Genetics and Plant Breeding was established and took over responsibilities for the above-mentioned research fields. Prof. Ladislav Hruška headed this unit of the new institute since 1952 and later this position was taken by Ing. Jan Holienka (1953–1962), Prof. Antonín Kováčik (1962–1966, 1967–1969), Ing. Vladimír Martinek (1966–1967, 1969–1978), Doc. František Vrkoč (1978–1981) and Ing. Jan Valkoun (1981–1988). In the fifties and sixties, research was aimed mainly at the development of theoretical bases and methods for maintenance, evaluation and utilization of genetic resources, breeding methods, including development of hybrid breeding, screening of donors and creation of initial materials for utilization in breeding programmes. Studies in genetics of resistance to diseases, abiotic stresses and quality of products were also carried out as well as some studies on seed quality, its increase and maintenance. Later new techniques, such as in vitro cultures and employment of electrophoreses of proteins, were developed and implemented in research and also in breeding; techniques of molecular genetics were applied since the eighties and especially in the nineties. The National Gene Bank was established in RICP Prague-Ruzyně in 1988 and contributed to the better study, conservation and utilization of plant genetic resources. Similarly, the progress in application of biotechnologies (especially “in vitro” cultures, molecular biology), study of proteins and cryobiology were linked with the completion of new facilities – particularly finalization of a new building for biotechnology in 1990 and subsequent acquisition of necessary laboratory equipment.

During the existence of the Institute, the Division has pursued close collaboration with breeders and many researchers have participated in breeding programmes. In the framework of these activities many valuable materials were developed and further utilized as well as some cultivars were bred. During the sixties, seventies and eighties there were released the spring wheat cvs. Ruzyňská II and Praga, poppy cv. Hybrid HD, fodder pea Vesna and broad bean Pluto. Many valuable cultivars of vegetables were also bred in the Institute, such as cauliflower cvs. Praga, Expres, Brilant, Bolero, Regent, Fontana, Dalibor, Bora and Diplomat. Successful hybrid breeding was carried out in cucumbers where hybrids Triga F1, Lyra F1, Vega F1, Petra F1, Alena F1, Korona F1 and Partena F1 were bred and in kohlrabi (Sparta F1) and tomato (Start F1 and Start S F1). As concerns other vegetables, cultivars of spinach (Besta), lettuce (Pražan), zucchini (Diamant F2), onion (Augusta) and kohlrabi (Luna) were bred in the Institute. In the last decade winter wheat cultivars Šárka (1997), Vlasta (1999) and Rheia (2002), bred in cooperation with SELGEN comp., were released as well as spelt wheat Rubiota (2001).

Specialists from the Institute, especially those dealing with genetics of resistance to diseases, genetic resources and winter hardiness, participated directly or indirectly in the breeding of other cultivars as well, providing breeders with knowledge and materials. Close cooperation with breeders has lately been preferred to own breeding or development of advanced materials. Direct cooperation with agricultural practice has traditionally been ensured by advising cultivar composition, newly also cooperation on enhancement of neglected and alternative crops for growing has developed.

The present orientation of research in the Division of Genetics and Plant Breeding carries on traditional research fields and develops new trends as well. The aim is to contribute to build up theoretical and methodological bases and provide materials for genetic improvement of agricultural crops as well as utilization of their biological potential and genetic diversity to assure specific requirements for the quality of products, effective response to growing conditions and to avoid negative impacts on the environment. Among all measures, genetic improvement

of crops can be considered as the most effective way of increasing plant production and quality without significant increase in costs and negative effects on the environment. In addition, breeding for resistance to pests, diseases and abiotic stresses as well as for effective utilization of nutrients and good response to growing conditions can lead to decreased demands for other inputs. A wider genetic diversity of crops and cultivars also contributes to more stable production and its quality in balanced agro-ecosystems. At present, fast and fundamental progress in molecular and cell biology, tissue techniques as well as applied genetics and breeding methods speeds up further progress in agriculture through new cultivars and technologies. Simultaneously, increasing attention is paid to the conservation and utilization of genetic resources as an irreplaceable source of genes for further genetic improvements of crops. To meet all these requirements intensive research on genetics, breeding techniques, genetic resources and seed technologies is needed. The Division contributes to these efforts through projects of strategic and applied research, in cooperation with local and foreign institutes, universities and companies.

Research programme “Study and utilization of biodiversity, genetic mechanisms, and new methods for crop improvement and for sustainable development in agriculture” is an essential institutional project covering a part of the Division capacity. Another large project coordinated by the Gene Bank is the National programme on plant genetic resources conservation and utilization. Eighteen projects of the National Agency for Agricultural Research (NAZV) aimed at applied research and 5 projects of Grant Agency of the Czech Republic (GACR) were also carried out under the responsibility of the Division in 2001 and our staff cooperated on 8 projects run by other institutes. The Division participated in 3 international projects of EU (Fifth Framework Programme), three COST activities and another 16 smaller projects or activities. The services of labs for GMO identification and protein SDS–PAGE, which serve as reference points, also belong to the responsibilities of the Division.

The last decade can be characterized by fast development of international collaboration, especially in the field of plant genetic resources, biodiversity, molecular genetics, genetics of resistance and other issues. Besides bilateral contacts with partner institutes participation in international programmes and projects (ECP/GR, COST, Fifth Framework Program of EU) has increased as well as cooperation with international organizations (FAO, IPGRI).

RICP Prague-Ruzyně celebrated 50 years of its existence and it was a good reason for hindsight as well as for discussions about future prospects and challenges. Some results were presented to a scientific conference organized by RICP Prague-Ruzyně last October or on other occasions; we would like to present comprehensive information to the professional community at large. Therefore, I highly appreciate this great opportunity to present the history, and mainly recent status and trends of research on genetics and plant breeding in RICP Prague-Ruzyně to the readers of the Czech Journal of Genetics and Plant Breeding.

LADISLAV DOTLAČIL
Head of the Division of Genetics and Plant Breeding
RICP Prague-Ruzyně