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Center of Plant Systems Biology and Biotechnology in Bulgaria – World-Class Science

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Assoc. Prof. Tsanko Gechev, PhD, Director of CPSBB: "We are proud to be implementing the largest Bulgarian project in the field of plant systems biology and biotechnology, funded by the European Commission and the Operational Programme "Science and Education for Smart Growth"

Assoc. Prof. Gechev, when was CPSBB established?

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CPSBB was established in Plovdiv in 2015 with the support of the PlantaSYST project, under the „Teaming“ financial instrument of the EU Horizon 2020 programme. The project consortium consists of six research organizations from Bulgaria and Germany – Maritsa Vegetable Crops Research Institute (MVCRI “Maritsa“), Stephan Angeloff Institute of Microbiology (Metabolomics Laboratory), University of Potsdam, Max Planck Institute of Molecular Plant Physiology, Institute of Molecular Biology and Biotechnology. CPSBB is the coordinating institution.

The project also received funding from the Operational Programme “Science and Education for Smart Growth” for the construction and technological equipment of the new CPSBB building on land provided by the Municipality of Plovdiv.

We are proud that we have succeeded in implementing the largest project in the field of plant systems biology in Bulgaria. CPSBB is a research centre analogous to the prestigious John Innes Centre (JIC) in the United Kingdom and the Max Planck Institutes in Germany.

What is the scientific activity of CPSBB?

The main areas of our research activity are related to plant development, molecular stress physiology, plant cell biotechnology, metabolomics, bioinformatics and breeding of vegetable crops.

We have also set ourselves the goal of training young researchers (PhD students, postdoctoral researchers) in the field of biotechnology, as well as serving as a link between universities, research institutes and private companies.

The applied research at CPSBB includes: development of technologies to improve plant growth and development and their resistance to oxidative stress; biotechnological production of valuable metabolites for the cosmetic and pharmaceutical industries; creation of new vegetable crop varieties with improved nutritional value, resistance to diseases and abiotic stress.

We intend, in the near future, to offer services in the field of bioinformatics and metabolomic analysis. It is a priority for us to establish cooperation between science and business. In this regard, our team has built partnerships with Bulgarian and foreign universities, research institutes and private companies.

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What innovative methods are applied in the scientific activities of CPSBB?

State-of-the-art technologies are used in all scientific departments of CPSBB. Our researchers have high scientific expertise in various fields of systems biology and biotechnology, and we already have scientific discoveries with potential applications in the pharmaceutical, cosmetic and food industries.

Our Department of Breeding and Vegetable Crops is a good example. Together with MVCRI “Maritsa” we study and analyse the genomes of traditional Bulgarian tomato and pepper varieties with the aim of improving their resistance and nutritional qualities. Breeding lines, F1 hybrids, as well as new varieties with improved traits are being developed, based on conventional and molecular-biological methods.

Another example is our Department of Molecular Stress Physiology. The scientists in it identify and characterize various plant genes involved in modulating responses to oxidative stress and programmed cell death induced by reactive oxygen species (ROS). We have already succeeded in identifying a new plant-specific gene that regulates tolerance to oxidative and abiotic stress. Since this gene is homologous in cultivated plants, its discovery may influence the management of stress tolerance in cultivated species, increasing their productivity under adverse environmental conditions.

In cooperation with the Irish company BioAtlantis, the CPSBB team is developing an effective and environmentally friendly technology based on a biostimulant from brown algae. Researchers from CPSBB and BioAtlantis have established that the product induces the expression of certain plant genes and metabolites with protective function. The result of this innovative approach is increased plant tolerance to abiotic stress.

Last but not least, the work of our colleagues from the „Plant Cell Biotechnology“ Department also involves innovative approaches. They use in vitro technologies to isolate and produce plant metabolites. Together with the other departments at CPSBB, they are developing innovative methods for sustainable bioproduction of plant molecules. Thanks to the professional experience of our colleagues, we have already achieved numerous scientific breakthroughs, which are to be announced and patented.

What else has been achieved since the establishment of CPSBB?

To date, CPSBB has produced scientific output including over 200 scientific articles in peer-reviewed journals with medium and high impact factor, 70 of which were published in the past year alone. In parallel, we are working on several new research projects.

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In 2021 we received accreditation for training PhD students in the field of “Biotechnology”, which makes the Centre more attractive for young scientists and contributes to its long-term sustainability.

Together with our partner MVCRI “Maritsa”, in 2021 we organized an international conference on plant systems biology and biotechnology, which was attended by over 150 scientists from 25 countries and representatives of 66 organizations (universities, research institutes and biotechnology companies).

CPSBB has cooperation agreements with universities, research institutes, as well as with Bulgarian and foreign biotechnology companies. Cooperation with companies is a priority for CPSBB because it enables the rapid transfer of applied research to end users, providing them with high-quality products in the fields of the pharmaceutical, cosmetic and food industries.

What lies ahead?

We plan to implement research projects in cooperation with our partners. We also want to attract experienced scientists from Bulgaria and abroad to our team. Another goal is to create products that would find application in agriculture and the biotechnology industry.

More on this topic

A new Bulgarian centre of excellence has been launched