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NatGenCrop – scientific project with enormous potential for agriculture

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The yields and nutritional properties of vegetable crops are affected by adverse environmental conditions such as drought, salinity, extreme temperatures and pollutants. The ERA Chairs NatGenCrop project was established to improve the stress tolerance of major vegetable crops (tomato, pepper, legumes and lettuce) and to develop new strategies for maintaining higher yields and food quality even under unfavorable climatic conditions. The project is of exceptional importance not only for the Center of Plant Systems Biology and Biotechnology (CPSBB), but also for the development of Bulgarian science in the field of plant systems biology. It will run until 2028 and provides an opportunity to create in Bulgaria an international team with high expertise, which will conduct large-scale fundamental and applied research.

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Interview with Dr. Veselin Petrov, Head of the “Funding” Department at CPSBB.

What is the main objective of the NatGenCrop project?

The project has two main objectives – one is socio-economic, and the other is purely scientific.

“We are proud that NatGenCrop is among the first Bulgarian research projects approved for funding under the EC ERA Chairs programme.”

NatGenCrop is one of the first three Bulgarian projects under the ERA Chairs programme, whose main task is to support and encourage universities and research organizations in attracting scientists with high expertise who will lead research projects in the respective organization and act as a catalyst for structural changes aimed at achieving high scientific excellence.

CPSBB attracted a renowned specialist in plant metabolomics, Dr. Saleh Alseekh, who headed a new scientific department within the structure of CPSBB – “Quantitative Genetics of Crop Species”. It already employs young and ambitious researchers who will increase CPSBB’s scientific productivity in this field, which is of both fundamental and great practical importance.

From a scientific perspective, the NatGenCrop team will mainly rely on the study of the natural genetic variation of hundreds of vegetable lines (tomato and pepper) with diverse characteristics. The ultimate goal is to improve their nutritional properties and stress tolerance, and to this end a set of mutually complementary scientific approaches and activities will be used, which make the project truly large-scale – both in scope and in its potential for agricultural development.

What will the scientists study within the project and what is their expertise?

The scientists working on the project have expertise in various fields of biology, such as systems biology, molecular biology, bioinformatics, agronomy, biochemistry and plant physiology. This will allow the application of a multidisciplinary approach in the research.

On the one hand, new genes related to characteristics of the selected vegetable crops that are important for agriculture and human health – higher yield, accumulation of beneficial compounds and metabolites, improved organoleptic properties, increased tolerance to various types of stress, etc. – will be identified, studied and validated.

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In addition, comprehensive metabolic profiling of the chemical composition of the fruits will be carried out, focusing on compounds related to taste qualities and healthy nutrition. This will be done both under normal growing conditions and under stress, in order to determine the impact of stress factors on fruit quality.

Why is the project important for the scientific activities at CPSBB?

The project is of exceptional importance not only for CPSBB, but also for the development of Bulgarian science in the field of plant systems biology. It will run until 2028 and provides an opportunity to create in Bulgaria an international team with high expertise, which will conduct large-scale fundamental and applied research. It will expand the portfolio of scientific areas in which CPSBB is active and will significantly enrich the professional expertise of the scientists at the Center. Furthermore, new opportunities for collaboration with organizations from Bulgaria and abroad will be created.

An important contribution is also the fact that new PhD students in plant systems biology and biotechnology will be recruited and trained. They will have the opportunity to start and develop a scientific career in an extremely dynamic and expert research environment, to be trained with next-generation technologies and to benefit from the expertise of established researchers.

What has been done so far under the project and what is planned for the next year?

In the first year of the project, the most important task was to establish the new department of “Quantitative Genetics of Crop Species” and to form the research team. In addition to Dr. Saleh Alseekh, six more people were recruited to the department – a highly qualified agronomist and a laboratory manager/technician, three postdoctoral researchers (two molecular biologists and one bioinformatician), and one student.

The established NatGenCrop research team started work on a large-scale experiment to characterize a large set of tomato and pepper lines under field and greenhouse conditions with normal irrigation or water deficit. Hundreds of samples were collected for additional molecular analyses, which will continue over the next year. The main experiment will also be repeated.

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Dr. Veselin Petrov is Head of the “Funding” Department at CPSBB and a lecturer in Biochemistry at the Agricultural University, Plovdiv. His scientific work is in the field of molecular biology and plant physiology, with his main interests related to the impact of abiotic stress on growth and development and the mechanisms by which plants acquire tolerance. At CPSBB his main tasks are to participate in the development of new project proposals, the management of ongoing projects, including NatGenCrop, the establishment of partnerships with representatives of the academic community and business, and others.