

## AGROPHYSICAL RESEARCH IN CZECHOSLOVAKIA

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Let me, first of all, express my gratitude and appreciation to the workers of the Institute of Agrophysics of the Polish Academy of Sciences for organizing this Conference. The research in the physical properties of agricultural materials is being carried out in many countries and this Conference is to facilitate the personal contacts of researchers and mutual information in their fields of work; it may also be expected that broader co-ordination of effort and of the application of the results will be encouraged for instance through the establishment of a commission, co-operating with FAO or GIGR and working under the auspices of the Agrophysical Institute of the P.A.S., for collecting information on agrophysical research from all over the world and for issuing a Bulletin once or twice a year containing a survey of published papers and further information in this field.

However, my task is to say some words on agrophysical research in Czechoslovakia. When B. Szot informed me that I was entrusted with this task I was surprised at having to talk on behalf of the whole Czechoslovak delegation. I thought that such a task is usually given to the doyen of the delegation. I did not notice that time quickly passes and that mine was the role of the doyen. *Irreparabile fugit tempus*. And as time runs quickly on, so runs the development of agrophysical research in Czechoslovakia. The first efforts taken 20 years ago were sporadic, as necessitated by the call for solving some problems associated with the construction of new machines or with the development of new technologies. No great importance was attached to systematic basic research at the beginning. The reason was that there was a justified need for orientation to the solution of important problems arising directly in agricultural production and, in addition, that research was led by workers who were not familiar with physics, with the research in the physical properties and in physical effects on plants, seeds, products, etc. Some of them even excluded any involvement of physics in agricultural

research. It was impossible at that time to discuss, for instance, the effect of the electric field on plants at a necessary scientific level. Sophisms could have been used to counter these views, for instance: Denying any effect of the electric field on the plants? Look at a forest through which electric mains are led. High trees never grow under the wires. It might also be possible to exaggerate slightly the chances of agrophysics. There is an electric voltage between different parts of roots of plants. Oscillation of this voltage can be evoked by means of biological agents, we could argue. Let us use this as an electric power source. Such a source may be attractive nowadays in the period of energy crisis.

However, later on, some 10 years ago, agrophysical research won support and was given chances for systematic research under various research assignments, particularly in relation with the vast advance of mechanization and automation in our agriculture. In this sense, decisive support was rendered to agrophysical research by Academician Professor Klečka, former Chairman of the Czechoslovak Academy of Agricultural Sciences. Still in this period, agrophysical studies were concerned mainly in the research in physical properties usable directly in agricultural mechanization and automation. However, grounds were laid for the systematic study of the agrophysical properties of agricultural material irrespective of the possibility of immediate application. The main institutions where agrophysical research planning started to develop were the Research Institute of Farm Engineering in Prague-Řepy, Universities of Agriculture in Nitra and in Prague (particularly their Faculties of Mechanization), and the Slovak Branch of the Research Institute of Agricultural Engineering at Rovinka u Bratislavy (now working as a separate institute). A broad spectrum of physical effects and characteristics has been studied at these institutions, including the mechanical, thermal, electric, magnetic, optical effects as well as problems belonging to the field of ionizing radiation. It must be noted in this respect that a number of the problems to be reported here by participants from other countries have been, or are, treated in our country. This fact only supports the mentioned proposal for an improvement of mutual information on agrophysical research. In addition, I would like to note that apart from plant materials, physical properties of animal products are also studied. For instance, my department (Department of Physics of the University of Agriculture in Prague) has been studying for several years the physical characteristics of milk including viscosity, surface tension, density, electric conductivity, optical absorption and the effect of temperature, intensity of electric and magnetic field, the effect of pressure or negative pressure in relation with time, etc. Nowadays in our country, there is a broad complex of research tasks controlled by the state at the Czecho-

slovak Agricultural Academy where a special committee is dealing with research concerning agrophysics.

Now I shall proceed to a brief characterization of the reports to be presented by the Members of the Czechoslovak delegation.

The first report to be mentioned is that by J. Fiala and A. Jelínek of the Research Institute of Agricultural Mechanization. The title of the report is "Agrophysical properties of compressed fodder".

A further report should be delivered by V. Novák of the Agronomical Faculty of the University of Agriculture in Prague. The title of this paper is "Anatomical build-up and its changes measured in various parts of internodium of winter wheat".

Five additional reports are the result of the co-operation of the workers of the Department of Physics of the Faculty of Mechanization of the University of Agriculture in Prague. The authors are Dr. Ing. Blahovec, Grad. Biologist Patočka, Ing. Kadrmas, MSc. Amin Mahmoud, and I.

As to the reports by researchers from this department, I would like to mention that the subject-matters have been chosen so as to reflect the three main fields of agrophysical study:

1. To contribute new results to the knowledge of the characteristics of plants (generally agricultural materials).
2. To take efforts for rendering these results applicable both in variety breeding and classification and in the field of the mechanization and automation of agricultural technologies.
3. To introduce so-called agrophysical quantities for an objective and quantitative definition of the characteristics of plant material which are still determined subjectively and qualitatively. This also involves the designing of necessary apparatuses and elaboration of measuring methods.

The first report to be delivered by the workers of the dept. of Physics of the Agricultural University in Prague is my paper for the Poster Session concerning the "Experimental examination of bond strength and energy of grain in ear". Mr. Patočka will follow the line, delivering our report on the "Results of measurements of bond strength and energy of grain in ear". This paper contains an elaboration of the results obtained by means of the direct method.

Another report of mine bears the title "Method for determination of the cracking resistance of rape pods". Dr. Blahovec will present our report under the heading "Contribution to study of rheological properties of tomatoes". Finally, our report under the title "Contribution to the measurement of texture profile of fruits and vegetables" will be delivered by Dr. Blahovec.

This is, I hope, enough as brief information on the reports to be delivered by the Czechoslovak delegation. After having fulfilled my task,

let me express a wish. I wish that the conference will be successful, that we may have a good time delivering our lectures, hearing, and talking, that we may feel pleased by having established new bonds of friendship. I wish that we may gain new inspiration for our professional work and for our personal life.

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