

TEACHING OF SOIL MECHANICS KNOWLEDGE ON THE FACULTY OF FARM MECHANIZATION AT THE UNIVERSITY OF AGRICULTURAL SCIENCES AT GÖDÖLLÖ

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The task of the University of Agricultural Sciences is to educate, on the one hand, the engineers directing immediately animal and crop husbandry and, on the other, the technical service of agriculture. These two special branches cannot be separated sharply from each other, and the close cooperation necessitates a thorough knowledge of a large relatively sphere of scientific activities.

The soil constituting the surface layers of earth's crust appears as a part of the growing space of the cultivated crops, as a nutritive source of raw materials and as a leaning medium for the agricultural engineer. As for the agricultural mechanical engineer, it represents partly a weight-burdened, partly a getting-to-be-worked structural substance that has to bear buildings on itself, on which a traffic has to be kept up, and that has to be transformed into a medium with a construction most suitable to the requirements of agrotechnics. Both the aspects and duties demand getting acquainted with the properties of soil.

The research of surface layers from the view-point of agronomy goes back to a past of more than 150 years in Hungary as well. The investigation on the chemical composition, physical structure, water balance and decomposition of organic matter in the cultivated soil surface, similarly on their effects on the crop vegetation has been going on, especially since the beginning of our century with a great effort and organization. The problems of economic production required to get acquainted with the necessary knowledge, and nobody has challenged the necessity of such studies, the acquainted-making of results and their utilization in practice. Such researches with an aspect basically agronomic and with an aim of immediate or long-range service of the agronomy are going on at our

University on the Faculty of Agricultural Sciences, first of all, on the Chair of Soil Science lead by Dr. Pál Stefanovits, Professor of University, but some detail studies have taken place on other chairs, and at other universities and research institutes of our country as well.

The soil mechanics researches, started in Hungary in the 1920th years on the base of Karl Terzaghi's activity, served to the stability of engineering establishments, buildings, constructive works, dams, roads etc., rendering an important help for the more reliable planning. The centre of research work was at the University of Polytechnics in Budapest where the results of pioneering investigations, directed by Professor Dr. Józef Jáky and, later, Prof. Dr. Árpád Kézdy became applied shortly by the plan-making practice, and the polytechnical engineering students had the possibility of getting familiar with the most important elements of the practical soil mechanics. In our days this Institute lead by Prof. Dr. Árpád Kézdy is one of the centres of the inland theoretical investigations on soil mechanics.

After the Liberation of Hungary (1945), following the experiences of the soil mechanics laboratory of the Polytechnical University a number of well-equipped relatively laboratories of soil mechanics were established which yielded data to the work of a planning or a constructing institution. These laboratories are also running in our days, their special fitting-up increases more and more.

As for the University of Agricultural Sciences at Gödöllő, it is the Chair of Geodesy and Soil Amelioration, belonging to the Faculty of Agricultural Sciences and lead firstly by Prof. Dr. István Oroszlány and, later, by Prof. Dr. István Petrasovits where a soil investigation of engineering aspect and such education in accordance with the situation of the Chair are going on.

A centre of the studies on mechanics of deeply situated soils, with a mining aspect, has been formed at the Polytechnical University of Heavy Industry in Miskolc, but there exist some mining enterprises, too, which sustain an important research work. Appointing the mechanical conditions of an economic gangway making, assuring and exploitation promises considerable returns. The studies on rock mechanics are going on under the leadership of Prof. Dr. Richárd Richter.

At our University the research work about the effects of the mechanical properties of soil surface on forming the road-vehicle structures is taking place under the leadership of Professor Dr. György Komándi on the Chair of Tractors and Automobiles. The results of researches have been built in the curriculum of students. A part of such investigations consists of getting acquainted with the influence of characteristic parameters of soil on the traction qualities of vehicles and vehicle construc-

tions. The relation statable between the characteristic curves of the vehicular traction and the shearing of soil made possible to determine the region of perimetric power between the 0 and 100% slip of the given-size blown pneu-tyre, and to trace out the region of tractive power of the tractor.

The Institute of Agricultural Mechanics directed by Prof. Dr. László Lehoczky deals with the working instruments of soil. Its well-equipped laboratory makes possible to determine the powers and moments exerting an influence on several working machines of agriculture under circumstances of both the field-growing and the laboratory. This Institute considers — according to its task — the soil properties from the side of engineering constructions; its measurings can be applied for controlling the theoretical work. Notwithstanding to this, some knowledge of soil mechanics is provided for the students in this way, too.

The afore-said aspects of vehicles and working machines in the studies on soil mechanics are getting across in the studies lead by Prof. Dr. György Sitkei, Academic Doctor of the Technical Sciences, at the University of Polytechnics in Budapest and, in the other side, in the frame of the Experiment Institute of Agricultural Machines at Gödöllő.

The Chair of Mechanics deals with the so-called soil mechanics, more distinctly, with the mechanical qualities of the soil surface as a substance. The work going on here wishes to generalize the other results of empirical character, and to make them general suitable for counting because of their having a theoretical base as well.

As for teaching the soil mechanics in relation to teaching the general mechanics it is necessary to remark that the education of mechanical engineers does not exceed, for the time being, the instruction in mechanical Knowledge, basing on the hypothesis of Hooke and founded on the steel. We remark, of course, that Hooke's correlation ($\sigma = E\varepsilon$) cannot be applied in the case of a number of building materials and we also mention the soil as an example, but the small number of compulsory lessons does not allow much more than this, for the present time. We want to arouse the interest, only.

For the students who showed interest in this problematics we organized a series of facultative lectures later, 2 hours per week where the introduction into soil mechanics takes place. This course is running through two terms, then the students displaying an extra interest will get a self-sufficient task of laboratory. Under the necessary special leadership they elaborate some detail tasks of the Chair's research work and, as much as possible, they prepare a written paper as well. This work takes place in the frame of the Scientific Study Circle, already.

The participants in the Scientific Study Circles make self-sufficient

part-researches under the suitable special direction, by means of the Chair's laboratories. In such work a big enough proportion of the students takes part but the students are divided among several institutions of the University. This means that only a few students deal with soil mechanics, namely those who took part earlier on the facultative lectures, and in the exercises of laboratory and measurings.

The tasks are composed in the way that their solution should be possible for students who desire to get familiar with the details of the soil mechanics beyond the compulsory scholl-matter of the University. With the aid of the Chair's educators, these students can obtain the required knowledge by means of a self-sufficient work in libraries and of tutorial consultations; in this way they also plan and perform their measurements and, in addition, they elaborate the results by using computers as well if necessary. The essays prepared in this way take part on the Conferences of Scientific Study Circles, affording a chance for their authors to be in the limelight as well. These works are also stimulated be, partly, a support for the research and scientific study circle works, the good competition works may by the parts of the students' diploma works as well.

From among the essays of the Scientific Study Circle of Soil Mechanics I lay particular stress on the paper of Sándor Nagy, our graduating colleague about the rheological properties of the soil samples. This essay was presented on this conference, too.

The laboratory chances of the Chair of Mechanics in connection with the soil mechanics are limited at the present, only, but we endeavour to establish a soil mechanics laboratory of full and well-usable equippedness, for both researching and educating aims. This laboratory will be a complement of the mechanic laboratory existing already, and it will be, partly, a support for the research and scientific study circle works, revealing the mechanical qualities of the agricultural materials, granulous masses. The pace of the started already development work is, for the moment, braced by the financial and acquisitional possibilities and, similarly, the small size of the workshop capacity, too. In spite of this the equippedness is constantly growing, even if some of our contrivances may be called provisional and utilizable in a limited way, only. We also draw some students into the work of development, thus we afford them a certain orientation and practical knowledge in this field as well.

The Faculty of Farm Mechanization of the University of Agricultural Sciences at Gödöllő is not given for the task of educating specialists of soil mechanics. Because, however, the agricultural mechanical engineer

also meets soil mechanical problems which appear in a metastatic way — very often — they should have a certain proficiency in this field of speciality, too. The lectures of mechanics as a ground subject can only touch the problems, and the special subjects connected with the conveyance and soil cultivation machines make only the applicable immediately knowledge acquainted, in the measure strictly required by them.

The part of students which is interested in soil mechanics beyond the compulsory curriculum can attend some facultative lessons in the time assured officially for this subject. I would remark that, often the chairs of other specialities direct the students to listen to lectures from this subject as a preliminary study for their work in their Scientific Study Circles, in the field of vehicles or soilcultivating machines. A part of the students listened already to the facultative lessons, utilizing the possibilities of the Scientific Study Tours, can perform their work in the Chair's laboratory, and thus they can amplify their knowledge. The less skilled beginners also get sustained by the senior students acting in the Study Circle.

The curriculum which gets delivered to the students does not seem to be accomplished yet; it is strongly influenced by the Chair's work and the intensity of the students' interests.

The possibilities of the undergraduates are also impacted by the small size of the premises and the occupiedness of the instruments. Therefore the friendly observations related to the suitable selection, the series of questions „what, how and in which way” will always be appreciated, — here on this conference as well — with grateful thanks by us.

Z. Balássy

NAUCZANIE MECHANIKI GLEB NA WYDZIALE MASZYN ROLNICZYCH
UNIwersytetu Nauk Rolniczych w GÖDÖLLÖ

Streszczenie

Praca przedstawia stan badań w zakresie mechaniki gleb na Węgrzech. Węgierskie laboratoria mechaniki gruntu zostały utworzone przy resortowych instytutach badawczych i przy wyższych uczelniach. Największym ośrodkiem tych badań jest Instytut Geotechniki prof. Kezdi'ego na Politechnice Budapesztańskiej. Niektóre instytuty badają fizyczne właściwości gruntu pod kątem gleboznawstwa rolniczego, badając zjawiska między powierzchnią gleby, a pojazdami oraz narzędziami uprawowymi.

З. Балашь

ОБУЧЕНИЕ ПРЕДМЕТА МЕХАНИКИ ПОЧВ В МЕХАНИЧЕСКОМ
ФАКУЛЬТЕТЕ СЕЛЬСКОХОЗЯЙСТВЕННОЙ АКАДЕМИИ В ГЕДЕЛЛЕ

Резюме

В труде рассматривается состояние проводимых в Венгрии исследовательских работ в области механики почв. Венгерские лаборатории механики грунтов имеются при институтах высших учебных заведений в области сельского хозяйства. Крупнейшим центром сосредоточивающим эти исследования является Геотехнический институт Будапоштского политехникума (проф. Кезди). В некоторых институтах исследуются физические свойства почв с точки зрения агропочвоведения, с учетом явлений между поверхностью почвы и средствами тяги и обработки.