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HUNGARIAN AGRICULTURAL RESEARCH IN THE TEN YEARS SINCE LIBERATION

A Magyar Tudomány Tíz Éve, 1945-1955
Ten Years of Science in Hungary,
1945-1955, 1955, Budapest,
 Pages 135-150

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In the spring of 1945 the Red Army liberated Hungary from centuries of oppression. The new economic and political situation which followed liberation offered completely new possibilities for the development of the field of scientific agricultural research. Liberation also made possible the rapid execution of land reform. As a result of the land reform the previously defrauded agrarian proletariat and small peasants replaced the large capital and land-holding exploiting class as the land owners of the country. The foundations for socialized agriculture were laid with the organization of the state farms, producer cooperative groups, and machine stations. Simultaneously with this reorganization, measures had to be taken for the immediate recommencement of agricultural production which had been devastated during the course of World War II. Under such circumstances it was only natural that agricultural cultivation and the development of agricultural production became one of the most important tasks of the nation. The major problem was how to restore within the shortest possible time the productive capacity of Hungarian soil which had been ruined by the wasteful management practices of the preliberation regime, how to develop within the shortest possible time those new agricultural production techniques which could enable the rapid increase of production levels above the old production levels, and how to supplement the domestic animal stock, which had suffered great losses. The problems of the improvement of poorly yielding sodic soil, the development of modern soil cultivation, fertilization, and crop rotation systems, expansion of the irrigation systems in the regions of the country with little natural precipitation, the development of a method for rapidly increasing the quantity and quality of domestic animals, etc, suddenly and simultaneously became problems of primary importance. It became an urgent task to acclimatize and cultivate certain new types of plants which previously had not been grown in Hungary on an industrial scale, but which are well suited to the favorable cultivation conditions utilizing the achievements of science and technology and modern large scale mechanized socialist agricultural cultivation. In another respect, the commencement of socialist reorganization of agriculture necessitated the solution of an entire series of work organization, labor management, mechanization, and other problems.

The successful solution of the tasks arising from the new situation would have been impossible without adequate aid from the field of scientific research. However the entire agricultural experimental system had to be reorganized, modernized, and expanded in order that the agricultural research could effectively solve the tasks imposed upon it. To those who evaluated the situation realistically there was no doubt that the tasks involved in the development of agricultural production could not be solved under the facilities of the old experimental system. Many new tasks arose in the period immediately following liberation in connection with which experimental work could not even be undertaken under the old experimental system. Adequate scientific investigation of the exceptionally varied and complex tasks of plant cultivation was impossible when only one plant cultivation institute and 4 or 5 experimental stations were available for such research. There was no national central research institute in the fields of animal husbandry, agricultural mechanization, or forestry.

Even in most of the existing institutes, instead of research involving deep concentration, the work of the researchers was limited mainly to routine

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investigations. Another fault which hindered the development of agricultural research in the period preceding liberation was the fact that researchers served the profit-seeking quest of the dominant capitalist groups instead of concerning themselves with the solution of problems of national importance.

The little outstanding research which was produced in individual cases under the conditions prevailing at that time was due primarily to the untiring and selfless devotion of individual Hungarian scientists of international renown. Hungary's most outstanding scientists (Treitz, Sigmond, Hutya, Marek, Cserhati, Szekacs, Baross, Fleischmann) often were forced to jeopardize their international reputations in order to continue their scientific work.

The status of scientific agricultural research and higher education in this field prior to liberation is best indicated by the following data. A total of 215 researchers were active in the field of experimental agriculture at the beginning of World War II in 1939-1940. The total area of experimental farms necessary for the research work of the experimental institutes, including the training farms of universities and farms was 3,400 cadastral yokes. Of the latter, the tilled area of the exclusively experimental farms totaled only 500 cadastral yokes. In the field of higher agricultural education there were only approximately 200 teachers. The number of students graduated in 1940 did not even reach 200 (178).

At that time there was no planned publication of scientific books in this field. The privately owned publishing enterprises published only those types of books which ensured a profitable sale.

There was no adequate state institution for the documentation of foreign technical literature.

In order to provide for the effective solution of the large number of tasks which arose in the field of agricultural research following liberation the material and personnel resources of the agricultural research field had to be built up. The main task in this field was the rapid expansion of the agricultural experimental system through the further development of existing institutes and through the creation of new institutes.

In the personnel aspect of this development, the facilities for the advanced technical and ideological training of research workers had to be created as soon as possible. The task of raising the level of scientific work was perhaps even more important than the former. The solution of the new agricultural production tasks through the application of the old, and in many respects outmoded scientific research methods would have been impossible, and it was absolutely necessary to study and to utilize the leading Soviet agricultural biological research methods. At first the work progressed very slowly and with great difficulty. It was a great disadvantage that none of the Hungarian researchers was well read in Soviet technical literature, nor had a thorough knowledge and was able to properly apply the principles of Michurin biology. Because of this there was no substantial development in this field in the first 2 years following liberation. The expansion of the agricultural experimental network also was neglected during the first years because of the emphasis on other, more important problems. The large scale expansion of the experimental network could not be considered before the land reform was successfully concluded and the necessary measures for the recommencement of agricultural production were at least partially satisfied (seed, tractor power, artificial fertilizer, etc). Therefore in the first years following liberation research work was conducted only in the old institutes, mostly with the application of the old research methods.

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The first important achievement in the reorganization of agricultural experimental research occurred in 1948-1949, with the creation by the government of an entire series of new agricultural experimental institutes. The institutes which were formed at that time included the Martonvasar Plant Cultivation and Improvement Institute, the Animal Husbandry Research Institute, the Agricultural Mechanization Institute, the Scientific Institute of Forestry, the Horticultural Research Institute, etc. The creation of these new institutes provided an adequate basis for commencement of the solution of an entire series of research problems.

Simultaneously with the creation of the new institutes, the modern reorganization of the old institutes also was begun. (Institute of Agricultural Biology, Plant Protection Research Institute, Agrochemical Institute)

During this period the supplementation of the institutes with adequate experimental farms also was begun. Instead of the few cadastral yoke experimental farms of the old system, the new experimental farms were large enough to enable large scale modern socialist agricultural operations.

In 1949 the Agricultural Scientific Center was formed for the purpose of providing unified central direction of the constantly increasing agricultural research system. This also provided an organizational center for the direction of agricultural research.

In the same year the old Academy of Science was also reorganized. In the course of this reorganization an independent department was formed for the work of the agricultural sciences, and thus Hungarian agricultural science acquired a place in the newly reorganized Academy of Science which befitting its importance.

After the initial difficulties were overcome, the rate of development increased considerably in 1949-1950. During the year 1949-1950 there was an important qualitative change in the development of industry. This period represented a basic turning point in the field of agricultural research in Hungary.

In the field of the organization of scientific work this qualitative change was represented by the creation of the Agricultural Scientific Center, later called the Agricultural Experimental Center. Qualitative changes also were reflected in the modern expansion of experimental network, the creation of new institutes, the expansion of existing older institutes, the addition of large experimental farms to the experimental institutes, the separation of routine investigations from research work conducted by the individual institutes, and the creation of the department of agricultural sciences, which was formed as a result of the reorganization of the Academy of Sciences.

In the field of the direction of experimental work the Agricultural Experimental Center remained under the direct control of the Minister of Agriculture as a department of the Ministry of Agriculture, and later as the experimental and propaganda division, and functioned in close cooperation with the production departments which control practical applications. The department of agricultural sciences of the Academy of Science, in close cooperation with the Ministry of Agriculture, participates in this work through the investigation of basic theoretical problems which further the development of agricultural sciences, through the direction of the ideological struggle for the dissemination of Michurin biology, and through the organization of scientific congresses and debates.

The first assistance in the field of the study of Soviet agricultural science literature was the beginning of the translation of Soviet technical literature into Hungarian. At that time the Agricultural Publishing House

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assisted in the dissemination of the Michurin biology primarily through the publication of Hungarian language editions of more basic Soviet books. Another great assistance was provided by I. Ye. Glushchenko, Soviet professor of agricultural biology, who gave many lectures on the bases of Michurin biology during the period of his first visit to Hungary. In the discussion periods following the lectures Glushchenko clarified the most important debatable questions in his profound answers to the questions of the Hungarian researchers.

From the beginning of the postwar period the Agricultural Document Center extended great aid in the domestic study of foreign, especially Soviet scientific literature.

The indications of the qualitative changes which had taken place in the experimental field appeared during the first scientific session of the 1950 annual conference of the Academy of Science. The reports presented at the conference had stated the results achieved in the domestic dissemination of Michurin biology. (Kurt Sedlmayr reported on the application of Michurin biology in plant improvement, Karoly Fater reported on the role of the Vilyams system in the development of agriculture, and Arthur Horn reported on the assertion of the principles of Michurin biology in the raising of small animals.) From the reports and from the debates which followed the reports it was evident that Hungarian researchers are beginning to comprehend Michurin biology, they see the superiority of this system over the Morganist-Mendelian view which is founded on an idealist world outlook, and for this reason they are beginning to convert to the application of Soviet agricultural biological methods in their own work. But at the same time this session also showed that most of the researchers still are on the old path. They do not sufficiently understand the essence and the methods of Michurin biology, and for this reason cannot properly apply the latter in their research work. These researchers have not surpassed the mechanical, formal applications of the methods.

From the reports presented at the conference of the Academy of Science it also was apparent that the theoretical scientists, who are occupied in areas of research more or less remote from agricultural research work, show a tendency to undertake investigation of the problems uncovered by agricultural practice.

The great increase in agricultural research and the enormous increase in the rate of development necessitated extensive open debate of the work which had been done previously. This was done at the first national conference of agricultural researchers in December 1950. During several days of debate the conference members discussed the status of scientific research in agriculture, which resulted in great aid to the further development of research work. At this conference the most important tasks in the field of the development of agriculture were defined. In this connection the conference members pointed out that in the interest of rendering plant cultivation more productive the Vilyams grass rotation system should be introduced in Hungary. Agriculture in the dry Trans-Tisza regions should be converted as soon as possible to irrigation farming. Mechanization should be increased to ameliorate the constantly increasing problem of the labor shortage, etc. To effect the realization of the above practical tasks, research was assigned the task of determining the proper types of plants of the grassy clover sections of the individual cultivation areas, the extent of these sections within any single crop rotation, the time when the grass section should be broken up, the best types of plants to be used in crop rotation, in short, clarification of the special tasks accompanying domestic introduction of grassy crop rotation. The large scale expansion of irrigation farming necessitated the development of the proper agricultural engineering methods for irrigated crops (crop rotation, soil cultivation, fertilization, etc). In the interest of speeding

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up the mechanization of agriculture greater study was devoted to the possibility of mechanization of the individual work movements involved in plant cultivation.

The conference of agricultural researchers was the first such conference in Hungary, in which both researchers and practical experts discussed the tasks of science with each other. In this conference most of the scientists presenting reports and those who raised comments fully exercised criticism and self-criticism, and thus showed how development can be speeded up and the work of the researchers can be made more effective through objective constructive criticism.

From the comments of the practical experts who participated in the conference it was apparent that most of the research workers still have not developed adequate contact with practice. Therefore, one of the most urgent tasks in the interest of broad utilization of the results achieved in the field of research is that of establishing greater contact with practice.

The most important results of the first agricultural scientific conference was the establishment of the further tasks of scientific research through exhaustive criticism of previous developments and disclosure of the existing faults in the research work. According to the latter the greatest hindrances to the further development of research are: (a) lack of theoretical and ideological preparation of individual researchers; (b) lack of a close interest of researchers in practical work; (c) disorganized status of the central direction work; (d) confusion of research (multiplicity of research themes) resulting from lack of coordination of research work; and (e) theoretical scientists extend little assistance to researchers in the field of applied agricultural sciences.

The results achieved in the development of agricultural sciences were due in large part to the publication in 1950 of the fundamental books explaining the theoretical questions of Soviet agricultural biology. These books included Agrobiologija [Agricultural Biology] by T. D. Lysenko, A novenyek vegetativ hibridizalasa [Vegetative Hybridization of Plants] by I. E. Glushchenko, Talajtan [Soil Science] by V. R. Vilyams, Novenytermesztes [Plant Cultivation] by Yakushkin, and others.

Various scientific periodicals were founded in rapid succession for the publication of the research results. The department of agricultural sciences of the Academy of Science undertook the publication of several foreign language periodicals, entitled Acta Agronomica, Acta Veterinaria, Acta Botanica, and Acta Zoologica, for the purpose of acquainting foreign scientists with the results of Hungarian agricultural research. The Osztalykozelemenyek [Departmental Publications] inform Hungarian readers of the latest research results. In addition to the latter the following periodicals carry information on the research results of the individual branches of science: Agrokemia es Talajtan [Agricultural Chemistry and Soil Science], Magyar Allatorvosok Lapja [The Hungarian Veterinarian's Journal], Allattenyesztes [Animal Husbandry], Novenytermeles [Plant Cultivation], and Erdeszeti Kutatasok [Forestry Research]. The research results of the academic chairs of higher educational institutions are published in their yearbooks.

A periodical entitled Agrartudomany [Agricultural Science] serves in the popular dissemination of the results of scientific research among practical agricultural workers.

In the field of advanced technical training the 3 provincial agricultural colleges were temporarily inactivated in the interest of improving the quality of educational work and the best teaching staff members were transferred to the Budapest center of the Agricultural Science University.

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With the conclusion of the initial developmental period, marked by the 1950 first annual national agricultural science conference, the pace of the development of agricultural research work increased considerably. The experimental system was further expanded during the First Five-Year Plan, although the development in this period consisted of correction of poor planning of the individual institutes and experimental farms (exaggerated dimensions, poor selection of sites, etc) and improvement of the quality of the research system, instead of the previous developments in the form of the creation of new institutes and expansion of experimental stations and farms.

The academic direction work of the agricultural sciences department of the Academy of Science was considerably increased by the conversion of the Martonvasar Plant Cultivation and Improvement Institute (now the Agricultural Research Institute), the Animal Health Research Institute, the Vacratoti Botanical Research Institute, and the Sopron soil science department into institutes of the Academy of Science.

The Soviet scientists who have visited Hungary since liberation have contributed greatly to a more thorough understanding of Soviet agricultural biology through their lectures, through the organization of debates, and through their technical advice, in the course of which they always gave detailed answers to any debatable questions which might arise. (I. Ye. Glushchenko, P. A. Baranov, K. Ya. Skryabin, and A. Ya. Oparin) Hungarian researchers who had made a study trip to the Soviet Union were able to study the methods and results of Soviet agricultural research and agricultural biology at close range and brought back much valuable experience with them upon their return to Hungary. The committee of agricultural experts which visited the Soviet Union in 1951 was of particularly great assistance to agricultural research. On the basis of the recommendations made by this committee the central direction of agricultural research was reorganized according to the Soviet model, a new method of work planning was introduced (the preparation of detailed research plans), the system of the preparation of final reports on the results of research work was introduced, etc. Also based on the recommendations of this committee, scientific councils were formed within the research institutes and research collectives were organized for the solution of complex research tasks which require greater effort than the usual tasks. The committee members also were able to contribute to the clarification of certain theoretical problems.

The so-called corn heterosis collective (members: researchers Endre Pap, Laszlo Berszenyi-Janosits, and Ferenc Beke), which was formed for the development of hybrid corn species, is cited as an example of the beneficial effects of the above organizational changes and of the new methods aimed at the improvement of research work. This research team took as its task the development of hybrid (heterosis) corn species which are suited to conditions prevailing in Hungary. During a period of 3 years a hybrid species was produced from the experimental crossing of the large variety of species which were being investigated when this work was begun and from the utilization of the results of the previously independent plant improvement work of the members of the collective, which has a 20-30% greater average yield than the best corn species previously grown in Hungary (Martonvasari M.5 Hybrid). In addition to the latter several other promising species were developed, of which 3 new hybrid types will be ready for comparative experimentation in 1955. In the course of selection of the new combination types 70 species were selected which in the opinion of the collective members are good basic material for further plant improvement.

Since 1950 the achievements of the increased development began to appear more frequently in all fields of agricultural research. Since that time increasing numbers of reports dealing with theoretical and practical problems of Michurin biology have been presented at the lecture meetings of

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the department of agricultural sciences of the Academy of Science. The increasing interest in Michurin biology is even more apparent at the debate meetings of the agricultural department. The outstanding debates were those on the subjects of the purposeful control of plant growth, the process of pollination, the production of intra and extraspecies hybrids and the improvement of plant resistance. Most of the researchers participating in the debates offered their own experimental data in support of the general validity of Michurin biology.

The developmental achievements which have been attained are best illustrated by the results attained in practical work. The outstanding work in this field is the work of academician Kurt Sedlmayr on the improvement of beets. The "Beta" K 91 new sugarbeet developed by Sedlmayr yields approximately 3 quintals of sugar more per cadastral yoke than the best previously cultivated domestic and foreign species. One great advantage of the new species is that it is not sensitive to the *Cercospora beticola* beet disease. The domestic light red fodder beet is one of the outstanding international developments in the field of fodder beet improvement. During recent years this fodder beet placed first in the national species comparison tests. The many-year average yield of this species was 25% greater than the best previously cultivated fodder beet species. The new types of beets developed in Hungary have attained excellent results abroad also, and they are being planted in constantly increasing areas. During the past year the production of the seed of the best types of beets had been increased to the extent that the seed of these types of beets are now entirely domestically produced.

Significant results have been achieved in the improvement of other plants as well. For example the types of spring malt barley developed by the Martonvasari Agricultural Research Institute (FB early and FB 102) are much better than the older types.

In the field of corn improvement, the hybrid corn developed by the corn improvement collective mentioned above will contribute to the development of considerably better species of corn than has been previously cultivated in Hungary.

Erno Kurnik, director of the Iregszemcse Experimental Agricultural Institute, has produced outstanding results in the improvement of sunflower. The types of sunflower developed by Kurnik have greater oil content and develop more rapidly than the older types.

Several valuable new species have been developed by horticulturists also. Outstanding in this field has been the development of a blackberry-raspberry species hybrid which combines the most valuable attributes of both plants. The juice of this hybrid is superior in all respects to the juice of either blackberry or raspberry. The new K 363 canning tomato and K 42 and Kecskemeti dwarf early season tomatoes developed by Gyula Meszoly are valuable supplements to the presently cultivated types of tomatoes. Lambert Angeli, lecturer at a horticultural college, succeeded in developing a new type of sweet red pepper from the Cecei regional species.

The results of the work of the National Variety Certification Council up to the present gives a good survey of the development of the entire field of plant improvement. Since its founding in 1951 the council has examined 474 species, of which 10 species were recognized in the national species registry, 64 were recognized as definite varieties, the cultivation of 305 varieties was authorized, and the cultivation of 95 varieties was ordered discontinued. The significance of these results becomes apparent when compared with the fact that in a prewar 3-year period, from 1936 to 1939, the variety certifying agency in existence at that time examined only 98 plant varieties.

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Important achievements have been attained in the field of genetics also, which is of vital importance to the work of plant improvement. Outstanding in this field is the work of Barna Gyorffy, director of the Genetics Research Institute, and Gyorgy Redei, a graduate student, who succeeded in developing a type of spring wheat from the Bankuti 1201 winter wheat.

During the past few years the genetics department of the Martonvasari Agricultural Research Institute has developed data on wheat species and family hybrids which are of international prominence. This work has greatly increased the variability of species and family hybrids, which improves the basis for wheat improvement work.

In the field of plant acclimatization, the most outstanding results have been obtained with the acclimatization of various types of rice. At the Szeged Plant Cultivation Research Institute a group headed by corresponding member of the Academy of Science Erno Obermayer, director Ferenc Somorjai, and soil scientist Sandor Herke succeeded in further improving the so-called "Szeged bearded" variety of rice, which had been developed from the Dunghan Shali and Arpa Shali rice types, and which has been the most successfully cultivated rice type in Hungary. The new hybrids are especially resistant to the very potent bruzone rice disease. The above group also has developed a method for the cultivation of rice in the alkali soils along the Danube.

The theoretical questions and practical methods of Michurin biology must be studied further in the interest of the further perfection of plant improvement work. All Hungarian plant improvement scientists must learn the practical significance and the methods of practical application of controlled growth, selective pollinization, and vegetative hybridization and approximation. The broadening of the scientific bases of plant improvement is especially important because it will become increasingly necessary to resort to interfamilial hybridization for the development of new varieties in the future which may lead to success in this field. The new varieties of grain developed by the Soviet academician Tsitsin (wheat-grass species hybrids) are excellent examples of the enormous possibilities which are offered by Michurin methods.

The work of plant improvement however cannot end with the development of new varieties. The plant improvement scientists, together with the farmers, should do all within their power to ensure the rapid modernization of domestic seed production, and that within a short time the old species cultivated on the farms can be replaced by the newly developed varieties.

In the field of plant cultivation research the most outstanding results have been achieved in crop rotation research. After several decades of work Vilmos Vetsik, head of the Nyiregyhaza Experimental Sand Farm and Kossuth Prize winner, perfected a modern crop rotation method for the sandy soil of the Nyirseg region. In the course of his crop rotation experiments he proved that with the use of proper green fertilization (lupine) and proper crop rotation the average yield of rye, which is the principal grain crop of these sandy regions, can be increased 2-3 times that obtained by the old peasant crop rotation methods.

Erno Kemenezy and his associates have done work on clarification of the main problems of the crop rotation, soil cultivation, and fertilization systems of the marshland in the Lake Balaton vicinity. The methods developed by this group are being applied in practice, and have resulted in greater yields in this area, which comprises 40,000 cadastral yokes.

Great strides have been made in the field of exploitation of the poor soil of the Danube-Tisza Intervale and of humus-lacking sandy soils in general through application of the sand improvement method developed by researcher

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Sandor Egerszegi. Through the increasing addition of organic matter to sandy soils improved by this method plants with very exacting soil requirements may be grown in this soil for the first time. According to the experimental results the crop yield may be increased from 3 to 5-fold through the use of the above method.

Lajos Kreybig, Kossuth Prize winning academician, has obtained important results in the improvement of soil fertilization methods which greatly influence the effectiveness of agricultural plant cultivation. The method which he developed involves the biological recovery of raw phosphate (Kola phosphates, etc) through the mixture of the latter with manure.

In the field of the cultivation of fodder plants corresponding member of the Academy of Science Janos Suranyi has enabled considerable broadening of the previous bases of Hungary's fodder crop cultivation. Certain types of fodder sorghum which he subjected to experimentation may be successfully cultivated under dry conditions and thus may serve not only as a primary crop but also as a secondary crop in a 2-crop system.

In comparison of the tasks which lie before plant cultivation research with the results which have been achieved up to the present time it is apparent that research has been of great assistance in the solution of major tasks of the people's economy. In practice however it must be admitted that in many cases scientific research still is not sufficiently in advance of practice. One of the reasons for this is that in some regions there is no group of research personnel which would be able to solve within an allotted time the tasks assigned to it. Another reason is that there is still insufficient channelling of research results into practical fields, which also prevents the beneficial effect of existing new achievements from being noticeable in practice.

The successful solution of public economy tasks which appear in this field necessitates further improvement of the scientific level of plant cultivation research through greater application of modern evaluation methods in the further improvement of the previously used research methods.

The importance of the results achieved in individual fields of agricultural research is substantiated by the international congresses which were organized by the department of agricultural sciences of the Academy of Science. The most outstanding of the latter were the veterinary, animal husbandry, feeding, and meteorological congresses.

The development of research in the fields of animal husbandry and veterinary science is best illustrated by the debate sessions organized by the department of agricultural sciences. Thus the debate entitled "The Importance of Nervism in the Fields of Veterinary Science and Animal Husbandry" greatly contributed to the ideological and technical development of researchers and practical experts in the fields of animal husbandry and animal health. The above debate session was of further service to scientific research in that the practical experts who participated in the meeting called the attention of the researchers to the most important tasks encountered in practice.

Outstanding among the results achieved in the field of animal husbandry research in the period which has elapsed since liberation are the results of the investigations of Zoltan Csukas, corresponding member of the Academy of Science, carried on at the Herceghalmi experimental farm of the Animal Husbandry Research Institute. The principal aim of these investigations was the development of a long-lived, high milk yielding type of cow with high butterfat content milk, from the Hungarian pied horned cattle. A lasting high output is the most dependable indicator of good organization.

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Therefore the selection of individual cows with the above characteristics provides a breed improvement stock with which the value of the Hungarian horned cattle may be greatly increased. Another project initiated by Zoltan Csukas was the offspring control examination for the purpose of investigating the capability of bulls to transmit hereditary characteristics.

Corresponding member of the Academy of Science Jozsef Schandl investigated 3 exploitable characteristics of sheep raising (wool, meat, and milk), and established that sheep raising can be made much more profitable if, contrary to the general foreign practice of emphasizing only 2 exploitable characteristics (wool and meat), the milk production of sheep is emphasized as well. The further development of Hungary's sheep raising will occur according to the sheep raising methods developed under the direction of Schandl.

Laszlo Kallai and his associates succeeded in producing a vitamin B 12 preparation from domestic raw materials which are available in unlimited amounts. The effective substance content of this preparation is greater than that of similar foreign preparations. This preparation makes possible the utilization of the full value of the protein content of hog and fowl feed, which usually consists exclusively of plant protein. This method increases the degree of feed utilization by 5%.

Professor Artur [sic] Horn and his associates developed a method of offspring control which is very suitable to the raising of hogs in herds. This method enables investigation of the best feed utilization methods. The quality of Hungary's swine stock may be rapidly improved through the use of this method.

A method based on theoretical computations has been developed by academician Rezzo Maucha, director of the Fish Breeding Research Institute, and his associates for determination of the degree to which any body of water is suited to the breeding of fish.

Corresponding member of the Academy of Science Ferenc Erel initiated and directed valuable research on economics and work organization for the reorganization of producer cooperatives into modern large scale farms.

In the early 1950's the organizational changes which had resulted in great centralization of higher education in agricultural sciences necessitated a change in the content of this training. The old educational system did not assure the training of leading specialists adequate to the demands of large scale socialized agricultural production.

The Soviet example was followed mostly in the formation of the new academic system of the University of Agricultural Sciences and its veterinary science, horticultural, and forestry faculties. In the formation of the new academic system especial attention was devoted to assuring more profound instruction in basic natural science as well as to instruction in the special technical fields. Much more adequate facilities than were previously available have been provided to assure better training in practical matters, which has been inadequate in the past. For the purpose of proper coordination of theoretical and practical training, farming exercises have been added to the previous so-called academic chair exercises. These farm exercises enable students to observe farm life and work methods at first hand. Soviet professor A. P. Soboljev extended great aid in the reorganization of the academic system, and also set an outstanding example in the development of the research work of academic chairs through initiation of experiments leading to the development of suitable domestic methods utilizing the Vilyams agricultural engineering complex. Kravchenko and Soviet professor Krivtsov were of assistance to Hungarian agriculture through their work in furthering the development of research and instruction in the fields of animal husbandry

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and the organization of agricultural work, respectively. Soviet professor Potapov did pioneering work in the field of biological instruction.

Simultaneously with the expansion of the new academic system, the structure of higher technical training in agriculture also was further developed. With the increase in the younger teaching personnel it later became possible to reorganize the academic chairs of veterinary science, forestry and horticulture, and viticulture into independent colleges. Special faculties were formed within the University of Agricultural Sciences for the purpose of meeting the demand felt in agricultural production for specialists in the fields of plant cultivation, animal husbandry, work organization, and mechanization.

The development of higher education in the field of agriculture in the light of 1953 data is as follows. The total number of instructors at the University of Agricultural Sciences and at the various agricultural colleges (veterinary science, horticulture and viticulture, forestry, etc) was 644. The great degree of development is apparent when this is compared with the fact that in 1939-1940 the number of instructors in the field of higher agricultural science totaled 212. The great development also is apparent from examination of the increase in the number of students enrolled in this field. A total of 671 students finished their courses in higher agricultural sciences in 1953, compared to 178 in 1940. Thus since liberation there has been a 3-fold increase in the number of instructors, and a 3.5-fold increase in the number of graduates.

The introduction in 1951 of the aspirant system based on the Soviet example signalled a qualitative change in the field of graduate training. This type of graduate training of research workers enables the best trained young researchers to absorb the basic methods of scientific research work under the guidance of the most outstanding experts in their field. To give an illustration of the proportions of the field of aspirant training it may be mentioned that in the fall of 1954 there were 100 Hungarian agricultural science aspirants studying in Hungary and 20 in the Soviet Union.

Following the reclassification of the old academic degrees according to the example of the Soviet Union, increasing numbers of Hungarian researchers are qualifying for the new academic degrees. Aside from members of the Academy of Science at present there are 30 degrees of doctor of agricultural sciences or veterinary science and more than 100 candidate's degrees outstanding.

In addition to their instructional duties the professors, docents, and other instructors in the field of higher agricultural training also have done important research work. The importance of the research work being conducted at university and college academic chairs is illustrated, for example, by the new immunization method against swine erysipelas developed by Kossuth Prize winning academician and professor of the College of Veterinary Science, Rezsó Manninger, which method is outstanding even on an international scale. Academician Manninger succeeded in the isolation of certain strains of swine erysipelas which had lost their virulence but had retained their immunizing ability. Through the use of these strains Manninger developed an adsorbed vaccine which is completely safe and provides greater protection than the previously used vaccines.

Kossuth Prize winning academician Janos Mocsy has achieved outstanding results in the treatment of sheep mange. On the basis of his research on the endogenous cycle of coccidium bacteria, Sandor Kotlan, member of the Academy of Science and winner of the Kossuth Prize, created an entirely new basis for protection measures against coccidiosis. Important research work is being conducted at individual academic chairs of the College of Horticulture and

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Viticulture (the vegetable, fruit, and decorative plant cultivation chairs) and at the College of Forestry.

At the chair of plant cultivation of the University of Agricultural Sciences Imre Mathe, Kossuth Prize winner and corresponding member of the Academy of Science, and his associates contributed to the knowledge of various ecological and grass association questions in the course of their geobotanical investigation of pastures and meadows. Their work on the mapping of plant societies and plant associations forms the basis of Hungary's contemporary meadow and pasture registry.

Among the fields of theoretical science closely related to agricultural research the field of botany has undergone especially great development since liberation. Although prior to liberation most botanical research was of an independent and isolated nature, after liberation domestic botanists showed an increasing trend toward the treatment of practical problems. It may be safely stated that at the present time the majority of Hungarian botanists are engaged in research which is directly connected with practical problems. Properly coordinated research collectives constantly are being formed, and these groups undertake the solution of the great tasks which are encountered in the field of practical agriculture.

Especially outstanding in the field of applied botany is the research work conducted at the chair of plant biology of the Eotvos Lorand University by professor N. G. Potapov and his associates. As a result of the educational and research work of professor N. G. Potapov a new school of plant biology has been formed in Hungary. The work and activity of N. G. Potapov may be held as an example to Hungarian researchers in the field of theoretical sciences. The fact that Potapov as a biological researcher undertook the investigation of problems which further the solution of agricultural problems of major importance, serves as an example of how theoretical biologists can be of effective assistance to everyday practice. The results obtained by Kossuth Prize winning academician Rezső Sós and O. Borsos in their experiments on *Achillea*, *Rorippa*, *Puccinellia*, and other genera are outstanding among experiments undertaken for the investigation of the problem of the modifiability of morphological characteristics in the field of experimental ecology. The significance of the above experiments is greatly enhanced by the fact that they offer new domestic proof of the basic tenet of Michurin biology of the interrelationship between the plant and its environment, from the point of view of morphological changes.

The forestry and plant geography maps which are being prepared through the coordinated efforts of soil scientists, meteorologists and practical foresters under the direction of Balint Zolyomi, Kossuth Prize winner and corresponding member of the Academy of Science, are very helpful in the planning of afforestation and in the cultivation of trees.

In the field of soil biology research the thorough investigation of microbiological relationships of sandy and alkali soils was begun under the direction of the recently deceased corresponding member of the Academy of Science Daniel Feher. This investigation is of great assistance to both botanical and plant and soil cultivation and fertilization research.

In the field of zoology, a group headed by corresponding member of the Academy of Science Endre Dudich and Janos Balogh, doctor of biology, is investigating the process of decomposition of forest ground cover and the formation of humus in the course of their basic research in zoocenology. In addition to the latter the fauna of cultural areas also is being systematically described. These research projects are of manifold assistance to agricultural practice in the solution of problems which are encountered in plant cultivation, fertilization, soil cultivation, and other fields.

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Among the most important achievements in plant health research is the determination of the biology of the American White Bombyx (*Hyphantria cunea*). The domestic parasites, and the bacterial and virus diseases of this moth also have been identified. Thorough knowledge of the life pattern of this pest enabled the development of a modern system of protection against this species, consisting of a complex of mechanical, chemical, and biological methods. This complex system now is in practical use. Hungarian knowledge and experience in the field of the life pattern of this pest and pertaining to the effective protective measures developed by Hungarian scientists have been adopted by foreign professional circles.

The large scale development of agricultural research work also is indicated by the increase in books published. During the past 5 years 34 important books have been published under the sponsorship of the department of agricultural sciences of the Academy of Science. The majority of these books were written by Hungarian authors, and the rest are translations, mostly of Soviet works. In addition, 598 works were published by the Agricultural Publishing House, totaling 1.5 million copies (528 by Hungarian authors and 70 translations).

Several of these books brought international acclaim for the Hungarian agricultural authors. Kossuth Prize winning academician Lajos Kreybig, in his book entitled Az agrotechnika tenyezoi es iranyelvei [The Principles and Factors of Agricultural Engineering], develops his own experimental data and conclusions on the maintenance of soil strength in the light of the advanced Soviet agricultural biology. Another great value of the book is the fact that it gives the first detailed description of the principal agricultural regions of Hungary, including evaluation of the soil, climate, and plant cultivation factors.

The large handbook prepared by the late corresponding member of the Academy Daniel Feher, entitled Talajbiologia [Soil Biology] which recently was published and which is the first large summarizing work in the field of soil biology, has aroused lively international interest.

In the field of botanical publications A magyar novenyvilag kezikonyve [Handbook of Hungarian Plant Life] by Rezzo Soo and Sandor Javorka gives an over-all synthesis of Hungarian botanical research, and not only contains extremely valuable data for domestic practical operations, but is an important work in an international sense, as well.

Allatorvosi belgyogyaszat [Veterinary Internal Medicine] by Manninger and Mocsy now has appeared in its tenth German edition.

In the future, particular emphasis must be attributed to the publication of scientific books in the fields of plant cultivation, soil cultivation, and fertilization. Practical agriculture in Hungary suffers greatly from a lack of books in this field based on adequate modern scientific principles.

The Hungarian government gives every support to the study of foreign technical literature. During recent years the Agricultural Documentation Center, which was created for the documentation of foreign language technical literature, has undergone great development. The latter organization has been merged with the National Agricultural Library and the Agricultural Translation Office, and continues its operations under the title of the National Agricultural Library. The proportions of the work of this library are indicated by the following brief data.

In 1954 the number of periodicals dealing with agriculture which were contained in the library increased to more than 1,000. During the past year

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the number of foreign books acquired by the library increased by 8,000. In the field of literary research during the past year the library processed 30,000 books and published works in the course of reference or title translation work. The library also did a considerable amount of work in the field of the development of bibliographies. During the period in mention the library prepared more than 200 (221) technical bibliographies. In the field of technical translation the library placed 95,000 standard pages of foreign technical material at the disposal of Hungarian research and technical experts.

The party and governmental decree dealing with the development of agriculture proved to be a great aid to agricultural research. This decree, in the preparation of which 150 outstanding agricultural researchers and scientists participated, was an important milestone on the road which Hungarian agricultural research has traveled since liberation. With scientific analysis the decree effectively exposes all the errors which have been committed in the field of agricultural development since liberation. After the decree was completed the mistakes which had been committed in previous work became completely clear. As a result of the emphasis within the decree on the importance of local production it became clear that the local characteristics should be given great importance in the solution of the scientific and practical problems which are encountered in the modern development of agricultural production. When this fact was acknowledged it also became apparent that the particular natural features of regional and local production areas had not been sufficiently taken into account in previous agricultural work. In most cases, attempts were made at the domestic application of leading Soviet agricultural methods without previous evaluation of these methods, the unfavorable effects of which recently have appeared in an increasing number of localities. The instances in which Hungarian researchers devoted attention to the special features of local agricultural production areas in the introduction of certain new agricultural methods were quite rare. Nevertheless, internationally acclaimed results were attained in several fields, including the soil cultivation methods developed by Sandor Cserhati and Jozsef Gyarfás, the alkali soil improvement methods of Peter Treitz and Elek Sigmond, and the animal hygiene research results obtained by Ferenc Hutyra and Jozsef Marek. The damaging effects of the mechanical transferral of foreign achievements to domestic conditions were especially noted in the field of plant acclimatization. The failure of the attempts at the acclimatization of cotton and the lemon are outstanding examples of the above. Satisfactory results still have not been achieved in the introduction of grass crop rotation because of the same reasons.

The Academy of Science, the agencies which direct agricultural research, and to a certain extent the researchers themselves are responsible for the situation which resulted in the reflection of leading Soviet agricultural biology in an unfavorable light through the mechanical transferral of the leading Soviet methods to domestic conditions. In the final analysis this situation retarded the development of all agricultural research. The error of the Academy of Science and of the ministerial agencies which direct the research lay in the fact that they did not recognize in time the danger which resulted from the method of mechanically modelling Hungarian agriculture on the Soviet example. The error of the researchers lay in the fact that those who long had realized the disadvantages of recreating stereotypes of Soviet methods did not call attention to these disadvantages at an early date. One of the worst mistakes committed along this line occurred at the session on deep cultivation which was organized by the Academy of Science. At this session the soil cultivation systems developed by Hungarian researchers for the peculiarities of individual agricultural regions were ignored, and thus the researchers were made to appear as advocates of the shallow cultivation system, the aim of which is to prevent heavy crop yields. This grave error

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is somewhat ameliorated by the fact that at this session an extensive debate was begun, which in the last analysis will lead to the development of soil cultivation systems which are suitable to conditions found in Hungary.

In the light of the party and government decree it became apparent that greater efforts must be made for increasing soil productivity (crop rotation, soil cultivation, fertilization) and that methods must be developed for soil improvement and erosion prevention in connection with the latter.

In the interest of improving the effectiveness of research work, the work plans in certain fields must be prepared with greater care and more thorough scientific analysis. The flow of research results to the field of practical application still is not satisfactory. The main reason for the latter lies in the work of the organs charged with the extensive dissemination of research results. Another reason is the fact that some researchers do not pay sufficient attention to the successful dissemination of the methods they have worked out or the new species they have developed.

Glancing back over the 10 years which have elapsed since liberation, it may be stated that during this period Hungary's agricultural experimental network and agricultural research work have undergone great development. Without exaggeration it may be said that Hungarian agricultural research has been completely born anew. At present more than 1,000 researchers are working in approximately 50 modernly constructed research institutes and experimental farms on the solution of problems which serve the development of agriculture. The government extends liberal aid to all aspects of research work. Hungarian scientists enjoy the esteem of the Hungarian people. Many scientists have been awarded the Kossuth Prize or have received other high governmental awards.

The results which have been achieved in agricultural research up to the present time are a sure indication that Hungarian researchers in the future will continue to solve all the tasks which await solution in the course of the development of agriculture.

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