

## AGRICULTURAL EDUCATION AND RESEARCH IN BELGIUM.

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Belgium has one of the most complete systems of agricultural education and research in existence to-day. This has been largely developed during the past five or six years. The growth of population, the requirements of intensive farming, and the increasing pressure of foreign competition have profoundly affected the farmer of the Old World. Both people and Government were slow to realize the significance of the changes taking place in agricultural conditions, but now that they are awake to the necessities of the case, they are laboring strenuously to give the farmer information and training which will enable him to overcome the difficulties of his environment and to compete at least on equal terms of knowledge and skill with his rivals in other lands.

### EUROPEAN VERSUS AMERICAN METHOD OF PROMOTING EDUCATION.

It is well that the people of the United States should realize what active efforts are being made in the continental countries of Europe to give the rising generation sound and thorough technical education in agriculture and other arts. Under the political system there prevailing the Government takes the initiative in such matters. When once aroused to the importance of such a thing as technical education in agriculture, it is very likely to proceed with great energy to establish and enforce a complete system as far as this is practicable. It does not have to wait to convince a majority of the people that this is the best thing to do. It looks for its support to the leaders of science and industry and recognizes its duty to bring the people to see that what it attempts in this line is really intended for their good.

In this country, on the other hand, broadly speaking, systems of public education and scientific effort depend on the will of the people expressed through their representatives in local and national legislatures or boards. While here and there private munificence or even advanced public spirit may organize institutions for general or special education, these are not likely to affect the people generally until they are themselves convinced that it will be a good thing to have such institutions for their children. In the long run our plan may produce the best results because our educational institutions are founded on the intelligent choice of the people and have their sympathetic support. It involves, however, a period of agitation, during

which the merits of any particular system must be submitted to more or less critical examination. Prejudice and conservatism must be broken down and the advantages of the new scheme be made sufficiently plain to induce the taxpayers to give their consent to the financial burden involved in carrying it out. This process may be a relatively long one and in the meantime other countries with a more paternal Government may temporarily get ahead of us in this particular. Something like this has happened with respect to education and research, especially in the arts and industries. Thirty or forty years ago our people had made such relatively rapid progress in establishing systems of free public instruction that they received the congratulations of mankind on this account. The belief that we had the best educational system in the world became firmly fixed in the public mind, and we have thus far remained in too great contentment with our lot in this matter. We have thus been blinded to a certain extent to the fact that while we have gone on strengthening and improving our educational system, European countries have made herculean efforts to outstrip each other in educating their people and have in many particulars elaborated more nearly perfect systems than our own. The limits and scope of this article will only permit the calling attention to the broad and fundamental facts which must be taken into account if we are to make a just comparison of European with American educational systems.

In approaching the study of Belgian institutions for education and research in agriculture it is well to bear in mind, first, that the rapid progress made in developing such institutions in that country in recent years has been largely due to the energy displayed by the Government in this work, and, second, that concentration by the Government on this problem has enabled it to perfect the system beyond what has been attempted in this country.

#### GENERAL CHARACTERISTICS OF BELGIAN AGRICULTURE.

Belgium, we should remember, is the most densely populated country in Europe. Within an area smaller than that of Massachusetts and Connecticut is crowded a population as large as that of the State of New York. Of the total area of 7,275,000 acres, less than 600,000 acres are waste land. The subdivision of estates has progressed so far that many of the so-called farms are mere garden patches of from 1 to 2 acres. As in other countries of Europe, the people live in villages, from which they go out to their daily toil on the farms. The smallness of the farms makes it necessary, in many cases, for the family to engage in other industries along with farming. The famous laces of Belgium are largely made by women and children in the time when they are not engaged in agriculture. Here, as elsewhere in Europe, women and girls perform a large amount of labor in the fields. Agricultural machinery is little used. The soil is thoroughly tilled by

hand. Every available foot of ground is worked, rotation is practiced to maintain fertility and to increase the number of crops grown on the same land in a given time, and weeds are carefully kept out. Under the pressure of foreign competition, staple crops of grain are being crowded out. Much attention is given to horticulture, truck farming, seed raising, and dairying. Flax culture is an important industry.

#### GENERAL ORGANIZATION OF AGRICULTURAL EDUCATION.

While some institutions for agricultural education and research had existed in Belgium for many years, it was not until 1884 that the Government seriously undertook the task of providing a thorough system of agricultural education. At that time a ministry of agriculture was created "which at once undertook to restore the prosperity of the country by organizing, for the instruction of the farmers in the advanced knowledge given by science, a system of education as complete and thorough as that afforded by any other nation." After a careful study of the systems of agricultural education existing in other countries as related to the conditions and needs of Belgian agriculture, two laws were enacted April 4, 1890, which took the place of all previous legislation on this subject and permitted the establishment of the complete system of education now in operation. This system provides for primary, secondary, and superior schools or courses of agriculture. Primary agricultural courses for adult farmers are conducted under the direction of the ministry of agriculture, while courses of a similar grade for teachers and children are supervised by the ministry of public instruction. The secondary and superior schools of agriculture, as well as other agencies for promoting agricultural education and research, are directed by the ministry of agriculture.

#### THE HIGHER INSTITUTIONS FOR EDUCATION AND RESEARCH.

Scientific and technical training in agriculture is supplied by the Agricultural Institute of Gembloux and the School of Veterinary Medicine of Cureghem, Brussels, which are supported by the Government, and also by the Agricultural Institute of the University of Louvain. This last-named institute is organized as a branch of the scientific faculty of the university and provides instruction of the regular university grade. It possesses no farm and does not attempt to give instruction in the practice of agriculture. It is expected, however, that the students will acquire practical knowledge of farm operations before they are given a degree, and the practical application of the principles and theories taught in the laboratory and lecture room is enforced by numerous and varied excursions to different localities.

The School of Veterinary Medicine of Cureghem, in the vicinity of Brussels, is an institution of high grade. To secure admission to the course which leads to a degree in veterinary medicine, the student must first obtain the same university diploma which is required for admission to courses in human medicine. Special facilities are provided for the study of bacteriology and opportunities for clinics and other practical exercises are afforded in connection with a slaughterhouse and cattle market.

The oldest and most important of the Belgian institutions for higher education in agriculture is the Agricultural Institute of Gembloux. This was founded in 1860 and occupies the buildings and farm of an ancient abbey. It is in the midst of a rich agricultural region and only about 25 miles south of the great city of Brussels. The institution is thoroughly organized with a large and competent staff of professors and other teachers, and possesses ample laboratory equipment and relatively large collections of natural-history specimens and other illustrative materials, as well as a good working library and reading room. A farm of about 160 acres with fields and gardens for experiment and demonstration serves for illustration and practice in agriculture, horticulture, and forestry, while neighboring sugar factories, distilleries, and breweries afford opportunities for the study of agricultural technology in lines deemed of great importance in European countries. The students lodge and board at the institution. The courses of instruction are given in the French language and require three years for their completion. Candidates for admission must be 17 years old and are required to pass oral and written examinations in the French language, arithmetic, algebra, geometry, trigonometry, general and Belgian history, geography, and elementary physics. The course of study in the institute includes algebra, geometry, trigonometry, surveying, mechanics, hydraulics, agricultural engineering, physics, meteorology, chemistry (inorganic, organic, and analytical), agricultural technology, botany (including physiology and pathology of plants), bacteriology, zoology, entomology, mineralogy, geology, agriculture, horticulture, forestry, zootechny (i. e., anatomy, physiology, hygiene, feeding, breeding, and improvement of domestic animals), agricultural and forestry law, constitutional law, agricultural bookkeeping, political economy, rural economy, and microscopic analysis (with special reference to adulterations).

Here, as elsewhere in the European institutions for higher education in agriculture, more and more stress is being laid on thorough scientific training. The student is expected to be familiar with farm practice before he comes to the institute or to acquire this familiarity during vacation or in some other way before passing his final examinations for a degree. Experience seems to have demonstrated that in such institutions the farm and garden can be best utilized for purposes of illustration or as an agricultural laboratory. Trained

brains, rather than simply skilled hands, are required for the performance of the higher services demanded by agricultural science and practice to-day. The institute at Gembloux is not regarded as a school for teaching the operations of the farm; it is rather the training place for the future leaders in agricultural progress in Belgium. While the candidates for a degree are required to pursue a set course and submit to rigid examinations, students who desire to pursue special courses are admitted on liberal terms without examination. This is in accordance with the policy generally pursued at the institutions for higher education in Europe. There are thousands of students attending lectures at the universities in different European countries who have no expectation of taking a degree. It is believed that this freedom of admission to higher courses, on the whole, contributes to raise the general level of intelligence in the community and gives very many persons an opportunity to secure useful knowledge on special subjects which they would otherwise be deprived of. Of course, a considerable number of these special students abuse their privileges. Idlers and profligates are found wherever young men congregate. Nevertheless, this feature of the European educational system deserves more consideration than it has hitherto received from the colleges and universities in this country. In too many of our institutions the college grade of instruction is kept too low, with a view to getting more students in the regular college classes. We need to bring the requirements for degrees to a greater uniformity, without excluding from our colleges those students who might profit from special or partial courses.

#### THE SECONDARY SCHOOLS.

Having provided, as we have seen, for thorough training in the higher lines of agricultural education and having thus secured a considerable number of men fitted to be investigators and teachers of agricultural science and practice, the Government of Belgium has devoted itself to the maintenance of schools and courses of agriculture of a distinctly lower grade than those previously mentioned.

Three of the secondary schools are regularly organized under the general laws governing agricultural education. The school at Huy is devoted entirely to agriculture, while those at Ghent and Vilvorde give instruction in both agriculture and horticulture. The school at Ghent is the oldest of these institutions, having been founded in 1855. It has extensive buildings and grounds, and is thoroughly equipped with facilities for theoretical and practical instruction. Candidates for admission must ordinarily be at least 16 years old, and pass an examination in the French or Flemish language, national history, geography, and arithmetic. They must also give satisfactory proof that they are physically able to regularly carry on the practical work required in connection with their studies. The regular course occupies

three years, and includes instruction in the French, Flemish, German, and English languages, arithmetic, bookkeeping, geometry, geography, botany, elementary physics and chemistry, drawing, agricultural engineering, animal physiology and production, and the theory and practice of agriculture and horticulture. Especial attention is given to floriculture, which is a very important industry in Ghent, as well as elsewhere in Belgium. The minister of agriculture may admit pupils who desire to pursue special courses. These students are not required to take an entrance examination, and they may be relieved of practical work. For students in the regular course tuition is free, and some financial assistance is given to especially meritorious students who need it. In schools of this grade the effort is made to train young men for the practical pursuit of agriculture or horticulture on a relatively large scale. It is expected that they will become managers of estates or foremen in horticultural establishments.

Secondary instruction in agriculture and horticulture is also provided for in a number of private schools which are organized with reference to instruction in these lines in return for small subsidies. "As these schools are of different kinds, the Government has arranged three different courses of instruction from which a choice can be made according to the requirements of the individual school. These courses resemble the typical courses of the State schools of practical agriculture, but as the system of indoor discipline in most private schools does not permit sufficient time to be given to the practice of agriculture, the Government contents itself with requiring appropriate theoretical instruction." It is, however, insisted that object teaching and laboratory practice shall be made prominent in the courses in agriculture in these schools. Twenty of these private schools of agriculture are now in operation in Belgium and are so located as to meet the needs of the different agricultural regions.

Provision is also made by the Government for short courses in agriculture in public and private secondary schools for general education. These courses consist of at least one lesson a week during the school year, which must be given in accordance with the plan laid down by the Government. Thirty schools in Belgium are at present giving such courses. This plan has the advantage of providing at least an outline of the theory and practice of agriculture at small expense to a considerable number of students who are at the same time acquiring an ordinary high-school education. Such a course awakens their interest in the more scientific and advanced ideas regarding agriculture and prepares them to read with intelligence the reports of agricultural investigations. It also tends to make them more contented with rural life. It is believed that some such plan might easily be adopted in the rural high schools in many places in the United States.

Quite recently the Government has perceived "that it is important

for the agricultural prosperity of the country to train competent farm women as well as farm men." This would seem to be especially true in European countries where women perform numerous duties on the farm which in the United States are usually performed by men. A school for the theoretical and practical instruction of young women in agriculture, including dairying, kitchen gardening, domestic economy, etc., has been established in each of the provinces of Belgium.

#### LECTURE COURSES FOR ADULT FARMERS.

To meet the needs of adult farmers who can not attend schools, numerous lecture courses on agricultural topics have been organized. Each year some 250 courses of 15 lectures each on questions of general interest to farmers are given in the different rural districts of Belgium by graduates of the higher agricultural schools or other persons who are thoroughly competent for this kind of work. In an article on agricultural education in Belgium published in 1893, M. De Vuyst, an officer of the Belgian Government whose duty it was to supervise these courses, thus writes regarding them:

To secure practice in this exceedingly difficult kind of teaching, the persons to give these courses meet together twice a year in each district. At these meetings one of their number presents a typical lecture and the others discuss it. The best lessons in the different courses are printed and distributed. At these meetings the improvements which are most urgently needed by the farmers of the region are also studied.

This method of organized courses of instruction in agriculture for adults is, we believe, peculiar to Belgium. The results which it has produced during four years are quite important. There are in the Kingdom about 2,500 rural communes. Within a few years no locality will have reason to complain that it has not enjoyed the advantages of this institution. The courses are attended each year by more than 10,000 farmers. The expense of conducting them amounts to only about \$1 per hearer.

Besides these general courses in agriculture, special courses in orchard management, market gardening, dairying, animal husbandry, horseshoeing, apiculture, etc., are also given, and farmers' meetings of one or two days' duration, corresponding somewhat to our farmers' institutes, are held in different places under the supervision of Government officials. In each of the provinces there is a State agriculturist and an assistant agriculturist, whose business it is to hold farmers' meetings, deliver lectures, establish fields of demonstration in which the results of agricultural investigations may be shown on a practical scale, aid the agricultural societies in their work, collect agricultural statistics, and prepare reports on the agricultural condition of the country.

#### PRIMARY EDUCATION.

Thus far we have described the system of agricultural education organized under the ministry of agriculture, but the attempt is also being made in Belgium to teach the elements of agricultural theory

and practice in the primary schools. This work is under the direction of the minister of public instruction. To provide competent teachers for this purpose, the course of study in the normal schools has been reorganized so as to give regular attention to agriculture, and in order that the teachers already in the primary schools may be fitted to conduct the newly established courses of agriculture, special normal courses on this subject are provided during the vacation season. Agricultural instruction in the primary schools consists of two lessons a week which are given in accordance with the plan outlined by the Government. Financial or other encouragement is given to those teachers who excel in such instruction. It is clearly recognized that the success of this scheme depends almost wholly on the enthusiasm and efficiency of the teachers. Thus far there has been considerable difficulty in securing teachers having the right equipment of knowledge and teaching ability for this kind of work. For this reason the success of these primary courses of agricultural instruction has been quite varied in different places, and the matter can hardly be said to have passed beyond the experimental stage.

During the past summer the writer visited a primary school in Belgium which is fortunate in possessing a well-equipped teacher thoroughly interested in agricultural instruction. This school is located at a small village in one of the most populous districts of Belgium. At the time of the visit the teacher gave a lesson on the properties and uses of milk to a class of boys and girls about 12 years old. Samples of milk and cream, together with other illustrative material relating to the composition and uses of milk, were brought into the presence of the pupils, and by means of simple chemical experiments and skillful questioning, the teacher gave to the pupils a simple but clear explanation of such matters relating to the properties and uses of milk as they could reasonably be expected to understand at that early age. The summing up of the lesson by different members of the class showed that they had been well taught, and there is no doubt that from that time forth the horizon of their knowledge regarding milk will be considerably wider than if the lesson had not been given. The teacher of this class was a man, as it is not customary to employ women as teachers in the public schools in Belgium. He had evidently made good use of the very limited means at his disposal for providing illustrative material for his classes. The walls of the schoolroom were hung with charts, on many of which were pictures of agricultural implements, different varieties of plants, etc., which had been cut from advertising posters. Adjoining the school was a small garden in which a considerable number of different kinds of plants were grown and different methods of culture were tried for the information of the pupils. Close by were the rooms of the agricultural society of the village, which contained collections of seeds, grains, etc., as well as charts giving the composition of



fertilizers, results of experiments, and other things which would be of interest in connection with the discussions of the society, and which were doubtless available for use in the school. The teacher of the school acted as secretary of the society, aiding the farmers in the purchase of fertilizers and in other ways. Rooms were being fitted up for a cooperative dairy for the benefit of the villagers, which was to be supplied with the most improved appliances for the creamery business. It seems quite clear that children trained in a school under such circumstances would have a much broader outlook regarding agricultural affairs and be much more inclined to avail themselves of the results of advanced experience and experimentation in agriculture than their fathers had been.

#### AGRICULTURAL SOCIETIES.

The agricultural societies, to which reference has already been made, are also to a considerable extent under the direction of the Government. Numerous local societies are organized, and these are confederated in each province through the provincial society, whose affairs are managed by a representative assembly of delegates chosen by the local societies. These societies act as intermediaries between the Government and the farmers in disseminating information regarding agricultural progress and in helping to carry out any measures which may have been devised for improving the condition of the agricultural population. The societies receive subsidies from the Government, which enable them to conduct fairs, hold farmers' meetings, establish experimental fields, etc.

#### EXPERIMENT STATION AT GEMBOUX.

Agricultural research is directly promoted in Belgium by the experiment station at Gembloux. This is well manned and equipped for research in the chemistry and physiology of plants and animals and in meteorology. Thorough and scientific work is done at this station. Analyses of foods and feeding stuffs, fertilizers, and other agricultural materials and the testing of seeds are carried on in laboratories organized for this purpose in seven different localities.

Reports of the investigations conducted at Gembloux and elsewhere in Belgium as well as information regarding the different institutions for agricultural education are given in a periodical bulletin published by the ministry of agriculture.

#### COMPARATIVE VIEW OF AGRICULTURAL EDUCATION IN THE UNITED STATES.

To gain a just idea of the comprehensiveness and thoroughness of the Belgian organization for agricultural education and research, the reader would do well to compare it with the system prevailing in his

own locality. In the United States we have thus far provided agricultural colleges, experiment stations, and farmers' institutes. For the general information of the farmer regarding the results of agricultural investigations and improved methods of agriculture we rely very largely on the publications of the experiment stations, the Department of Agriculture, State boards of agriculture, and the agricultural press. Regular primary instruction in agriculture is entirely lacking, and there is at present only one regularly organized secondary school of agriculture (in Minnesota), though the regular or short courses in agriculture in a number of our colleges are really if not nominally of the secondary grade. In view of the strenuous efforts which European countries are making to give regular instruction in agriculture to large numbers of their rural population, it is well that our farmers should seriously consider their needs in this direction and the best ways in which these needs may be supplied. It is certain that the colleges of agriculture need to be strengthened and developed in order that the leaders in agricultural education, research, and progress in this country may be as thoroughly trained as they are in the Old World. The grade of instruction in these colleges needs to be raised rather than lowered, and it is not to be expected that these institutions will send back to the farms any considerable body of practical farmers. Their graduates will for the most part be needed as teachers, investigators, editors, officials, and managers of those agricultural industries in which scientific attainments are indispensable to success. If any considerable number of the farmers of the coming generations are to have definite instruction in agriculture, it must be in schools and courses specially devised to meet the needs of those who for any reason are unable to take the long and expensive college course. This article will have served its purpose if it contributes in any measure to an intelligent examination of the problems involved in providing a suitable system of agricultural education in this country.