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Canadian Agriculture as Applied to Wheat Growing.

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ADDRESSING the Canadian Club, Prof. C. A. Zavitz, Professor of Field Husbandry, Agricultural College, Guelph, Ont., said:

Mr. Chairman and Members of the Canadian Club.—According to the last census report of Canada, the agricultural wealth of the Dominion amounted to upwards of two billion dollars. When the next census is taken in 1911, the agricultural wealth will undoubtedly be considerably greater than that of ten years previous. This is certainly a growing time in Canada, and especially is this true in connection with Canadian agriculture.

We, as Canadians, are proud of our great natural resources in the form of the forests, and the mines, and the fisheries. Do we realize, however, that the products of agriculture amount to over four hundred million dollars annually, which is three times as great as the combined values obtained from the forests, the mines, and the fisheries of Canada.

According to the same statistical reports, we learn that the agricultural wealth of the Province of Ontario is greater than that of all the rest of the Dominion combined. The annual value of the field crops which are grown in Ontario is greater than the combined value of the products of the forests, and the mines, and the fisheries, and the wild animals of the whole Dominion. Surely we have a great agricultural country and a great agricultural Province.

We cannot yet realize the great possibilities of our Canadian Northwest along agricultural lines. Farm crops are being grown farther north from year to year. Although we have heard much regarding the great agricultural areas of northwestern Canada, our attention has not been so closely directed to the new areas suitable for agriculture which are being opened up in our own Province. It was my privilege and opportunity in 1905 to travel over a district of nearly one million acres of agricultural lands which lie about 350 miles north of Toronto. The Temiscaming District, although requir-

ing considerable labor to clear the land, possesses an exceedingly rich soil, and will some day form a most valuable agricultural section. The country is very level, and the land is free from stones and can be worked to excellent advantage. Clover, and peas, and oats, and small fruits, and vegetables furnish good yields of excellent quality. I have great hopes for the agriculture of the Temiscaming District. We are told that there are sixteen million acres of clay soil north of the Height of Land in New Ontario which is very similar to that of the Temiscaming District. If this proves to be true, there are opportunities for great development in the northern parts of this Province.

In the older parts of Ontario, we are only beginning to realize a few of the possibilities in agriculture. About twelve years ago, I was in the eastern part of the Province addressing agricultural meetings. At one of these meetings, Mr. D. M. McPherson, who was called the Cheese King of the East, made the statement in an evening address that all the money which had been devoted to agriculture had practically been thrown away, owing to the fact that the average farm of Ontario was not as productive at that time as it had been fifteen years previous. I could not agree with Mr. McPherson in the statement that the money which had been used for the development of agriculture in Ontario had been used to no effect, but we had to face the fact that the average farm in Ontario appeared to be growing less productive. I am pleased to be able to state to you to-day, however, that during the past ten years our principal cereal crops, viz., oats, winter wheat, and barley have produced an average increase in yield of grain per acre of fully eighteen per cent. over the average yields of the ten years previous. This has undoubtedly been brought about by the increase of the live stock industry, by better methods of farming, and by the introduction of improved varieties of farm crops.

Although it is only about one hundred years since the first school of agriculture was established, we now find agricultural schools and colleges in practically all of the countries of the world. We also find that agriculture is being included as a part of the curriculum of the public school instruction in many countries; such as, France, Germany, Great Britain, etc. In France, there are no less than nine agricultural colleges, and in addition to this, agriculture forms a part of the educational system extending from the Primary to the Normal Schools.

In Canada, we have agricultural colleges in Ontario, Quebec, Nova Scotia and Manitoba, and the prospects are that other colleges in the West will be started in a very short time. The Ontario Agricultural College was established at Guelph in 1874. From extensive inquiries made recently, we learn that of all the students who had entered the regular course during the first twenty-five years of the existence of the College over one-half of them were located in the Province of Ontario, and of these, 71 per cent, were actually engaged in practical farming. In recent years, the percentage of the students who remain in Ontario and who follow along agricultural lines is even higher than in the earlier history of the institution. From inquiries made regarding the occupations of the graduates of Yale University, it was ascertained that less than 2 per cent, were in any way connected with agriculture. The advantages of a special education made suitable for the young people of the country seems very evident. I am of the firm opinion that those countries which adopt the education of the country children to rural conditions will do much towards the development of a properly educated rural population. It is of great importance that the people as a whole become well educated for occupying those spheres of usefulness in which they expect to spend the greater part of their lives.

Agricultural Colleges, as they are organized in Canada and the United States, are quite different from most other educational institutions. While it is necessary to have class-rooms and laboratories, museums and libraries, play-grounds and gymnasiums, it is also of great importance to have fields and gardens, stables and greenhouses, living animals and growing plants. Not only does this additional equipment furnish means for a practical education in agriculture and its applied sciences, but it also forms an opportunity for conducting experiments and investigations, the results of which furnish valuable information for those connected with agriculture, and also helps to enrich our knowledge of science itself. At most of these institutions it is difficult to say whether the instruction given to the students or the results of the scientific experiments and investigations exert a greater influence on agriculture as a whole. It may be truly said that an agricultural institution should have ample equipment for each of these lines of work.

A large amount of experimental work is conducted yearly at the Ontario Agricultural College at Guelph along various lines of agriculture. In the experimental grounds in connection with the Department of Field Husbandry, about fifty acres

are divided into more than 2,000 plots on which experiments are conducted with varieties of farm crops, selections of seed, dates of seeding, methods of cultivation, the maintenance of soil fertility, etc.

To illustrate simply the work under progress along one line of one department at the College, I wish to draw your attention to what is being done in plant breeding. Within the past twenty years, fully 2,000 varieties of farm crops have been carefully tested on the experimental grounds at the College. The various characteristics have been watched from year to year until very valuable information has been obtained regarding the suitability for Ontario of many of the leading farm crops of the world. We have thus been enabled to obtain some importations which have been worth millions of dollars to the agriculture of Ontario and to the Dominion of Canada.

After experiments have shown which are the most suitable varieties for growing in Ontario, some of these varieties have been improved by continuous and systematic selection of the best individual plants. For that purpose, no less than 60,000 seeds of leading varieties of farm crops have been planted separately in a single year, and new strains have been started from those plants which furnished the most satisfactory results.

With the object of combining the good qualities and of eliminating the undesirable characteristics, work in hybridization was started in 1902 and has been continued each year since that date. Some of our principal farm crops, such as wheat, oats, barley, and peas are naturally self-fertilized. If we artificially cross-fertilize the varieties of any of these classes of grain, we break up the characteristics of the individual varieties and get a great many different combinations. By careful study and selection, new varieties can be obtained which come true to type and which are different from each of the parents. As this work deals with the very principles of heredity, it requires a deep study on the part of those engaged in the work, and it also furnishes some most valuable information in giving us a greater and a better knowledge of the principles of heredity, as it effects life in its various forms.

It was my privilege to visit Mr. Luther Burbank in California, in 1906. Mr. Burbank has certainly done much to lead the way in the line of plant breeding. He has, however, worked almost entirely with plants which are increased by vegetative propagation, and does not require to plant the seeds of his hybrids. After obtaining his ideal plants, he can

easily re-produce the same by means of runners, cuttings, scions, buds, tubers or bulbs, as the case may be. In breeding many of our cereals, however, we cannot increase our plants in this way, but are required to secure the seed and to continue the selection of the individual plants until they become perfectly fixed in all characteristics. I take the liberty of explaining the work of plant-breeding more fully by drawing your attention to the specimens which I here present.

No. 1 specimen represents the Dawson's Golden Chaff variety of winter wheat which is very stiff in the straw and a heavy yielder of white grain. This variety, however, is rather soft in the grain, is more subject to the attacks of smut than most varieties and sprouts readily in a wet harvest.

No. 2 specimen represents the Tasmania Red variety of winter wheat which is one of the very best wheats for bread production of all of the two hundred and fifty kinds which have been grown at the Ontario Agricultural College. It is, however, weak in the straw and a comparatively light yielder of grain.

No. 3 specimen represents a selected strain of the Dawson's Golden Chaff variety which was started from an individual plant six years ago. Of all the new strains which were thus started from the best individuals selected from many thousand plants, this one has made the best record. In the average tests of the past three years the grain has been of better quality and the yield has surpassed the original Dawson's Golden Chaff by 10.4 bushels per acre.

No. 4 specimen represents a new variety which we have originated by crossing the Dawson's Golden Chaff and the Tasmania Red. It has the beardless character of the Dawson's Golden Chaff, and the red grain of the Tasmania Red. If, when entirely fixed it will also possess the strength of straw and the yielding properties of the Dawson's Golden Chaff and the quality of the grain of the Tasmania Red, we will have a new variety of wheat for Ontario which would be superior to any of the old varieties which are now in cultivation.

In 1908 we grew upwards of 40,000 hybrid plants, resulting from twenty-five distinct crosses made within the past seven years between leading varieties of winter wheat, spring wheat, oats, barley and peas. The results from this work are very promising.

The Ontario Experimental Union is an organization whose members are, or have been at some time, connected with the

Ontario Agricultural College at Guelph. Through the medium of this organization a system of co-operative work is conducted throughout Ontario in connection with the Departments of Agriculture, Horticulture, Forestry, Poultry Raising, etc. In 1908 co-operative experiments were conducted on about 8,000 farms throughout Ontario. In Agriculture alone experimental work was conducted on measured plots on no less than 4,420 farms. It is through this medium that the best material which is produced at the College is brought to the homes of the farmers throughout the country. A large number of the principal farm crops which are now grown in Ontario, and to a considerable extent in some of the other Provinces of the Dominion, were introduced at the College, tested on the experimental grounds, and distributed through the medium of the Experimental Union. This work has undoubtedly had a marked influence in actually doubling the output of the Ontario farms within the past fifteen years.

When visiting the Old Country I have been greatly pleased and much impressed with the deep interest which the nobility take in agriculture. The possession of land, and flocks, and herds adds to the social standing and to the evident enjoyment of the people of the Old Land. The Late Queen Victoria visited her farms frequently and took a deep interest in raising the pure bred animals which she not only kept on her farm but also exhibited at the various Agricultural Shows and competed for the prizes that were offered. His Majesty King Edward also takes a deep interest in his farm, his dairy, and his live stock. I believe the time is coming when Canadian Agriculture will be placed on a higher social status than it has been in the past, and that not only will the people in the country be proud of their occupation and happy in its pursuits, but many of the business men of the city will have country homes where they can enjoy the invigorating atmosphere and the quiet rural life and where their children will enjoy, as thousands of the country children now enjoy, gathering the eggs in the barn, picking the strawberries in the garden, eating the apples in the orchard, running after the butterflies in the fields and gathering the wild flowers in the woodlots.

I am glad I was born in Canada, the brightest star in the British Empire; in Ontario, the banner province of this great Dominion; and in a country home surrounded by the beauties of nature fresh from the hands of God.

I have been asked by the Governments of different countries to join their forces in the advancement of agriculture, but I have felt like saying that,

I have visited many countries,
Away beyond the sea,
But this great and prosperous Canada,
Is good enough for me.
