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DIVISION OF HORTICULTURE

THE EXPERIMENTAL FARMS

OF THE

DOMINION OF CANADA.



DEPARTMENT OF AGRICULTURE.

OTTAWA:

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THE EXPERIMENTAL FARMS

OF THE

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In Canada agriculture lies at the foundation of the nation's prosperity and involves interests of the greatest magnitude and importance. The vast area of land suitable for agricultural operations within the Dominion, much of it of unsurpassed fertility, will always enable Canada to furnish from her surplus food products of prime quality for the less favoured nations of Europe. But since cheap railway and water conveyance of agricultural productions from distant countries is rapidly affecting the economic aspects of agriculture in all parts of the world, it is of the utmost importance that those who are interested in the cultivation of the soil in Canada should strive to remedy all that is faulty or wasteful in practice, and by the introduction of new products and improved methods endeavour to maintain the position Canada has gained as a producer and exporter of farm produce. It having been demonstrated that agricultural experimental stations are of much service in supplying needed information and stimulating the progress of agriculture wherever they have been established, either in Europe or America, this important subject has engaged the attention of the Government of Canada. A bill was introduced last session by the Honourable the Minister of Agriculture, which was passed almost without opposition by the Parliament of the country, which provides for a system of experimental agriculture which is likely to meet the most pressing present needs of the farming community throughout the Dominion, and by judicious forethought and experiment will, it is hoped, anticipate the requirements of the future. The methods proposed are intended to secure for Canadian agriculture the greatest good at a comparatively small cost.

ORGANIZATION AND MANAGEMENT.

A central experimental farm has been secured near the capital, the dividing line between the important Provinces of Ontario and Quebec, comprising 465 acres of land; which will serve as an experimental station for these Provinces jointly. Here the climate represents the average condition of a large part of the settled portions of Canada, where all the cereals and many other field crops can be successfully grown, and where most of the best varieties of grapes grown in the open air ripen well, and many sorts of apple and other fruits are raised with advantage. At this central point all the different classes of experimental work will be conducted. There will also be established one sub-station for the Provinces of Nova Scotia, New Brunswick and Prince Edward Island jointly, and one each for Manitoba, the North-West Territories, and British Columbia. In the Maritime Provinces and in British Columbia 200 acres will probably be sufficient for the purposes of each station, but in Manitoba and the North-West Territories, where land is abundant and cheap, there will probably not be less than a section of 640 acres belonging to each station, so that there may be land sufficient to carry on experiments in stock raising and forestry on such a scale as the circumstances of the case may require.

With the varying conditions of climate and soil necessarily associated with a stretch of territory covering 4,000 miles, from ocean to ocean, all now accessible by rail, a station on the Atlantic, another on the Pacific, with three intermediate ones, will be constantly required to carry on the work with reasonable efficiency. It is also expedient that the Government reserve, at suitable points in Manitoba and the North-West Territories, from the available and unoccupied Dominion lands, blocks of one, two, or more sections each, for future experimental work in tree planting. The setting apart of these blocks of land for forestry purposes will not in any case be a loss to the country, since if they should be planted only in part, this will increase the value of the remaining portion and also that of all the lands in the neighbourhood. By adding to the value of the adjacent lands these sections would partly pay for themselves, and at the same time prepare the way for extended experimental work if desired, as soon as young forest trees were available for the purpose.

The whole will be under the control of one head, known as Director, whose residence will be at the central station, and whose duty it will be to visit the sub-stations as occasion requires, and, in conference with the managers of such stations, arrange for the course and character of the work to be carried on at each, subject to the approval of the Minister of Agriculture. This arrangement will ensure desirable uniformity in the character of the work performed, and prevent the waste which might result from the unnecessary duplication of experiments.

At the central station there will be required, in addition to the Director, a superintendent of agriculture charged with the care of farm stock and dairy; also with field crops and field experiments.

A superintendent of horticulture, who will conduct experiments in fruit and vegetable growing, in determining the vitality and purity of seeds, and have charge of the nursery and propagating houses.

An entomologist, whose duty it will be to investigate the habits of insects destructive to farm and garden crops, fruit, &c, as well as those affecting animals, with the view of testing such remedies as may be available for their destruction. He will also prepare such collections for the museum at the central station as will illustrate the insects injurious and beneficial to vegetation, and duplicate collections of a similar character as early as practicable for each of the sub-stations.

A botanist, to whom will be entrusted the special duty of investigating the injury done to field and garden crops, fruit and forest trees, by the lower forms of vegetable life, such as fungi, rusts, moulds, &c.; to study the character and modes of growth of the noxious weeds prevailing in all parts of the Dominion, with the object of devising means for their subjugation or destruction. He will also take charge of the botanic garden or arboretum, and of that portion of the central museum illustrating vegetable products.

A chemist, to whom will be referred all questions relating to agricultural chemistry, such as analyses of fertilizers, the determination of the chemical constituents of any substances which it may be desirable to use in experimental work in feeding or for other purposes; to make analyses of milk in connection with experiments in dairying, of wheats, to determine their relative quality for milling; and to have charge of all other subjects requiring special chemical investigation in connection with the work being carried on at any of the stations.

SUB-STATIONS.

The officers required at each of the sub-stations will be a superintendent of agriculture and a superintendent of horticulture. The superintendent of agriculture to be the chief officer of the station, subordinate only to the Director, and responsible to him for the proper government of the farm, and for the due performance of all work directed to be undertaken. The superintendent of horticulture and all other employees will be subordinate to the superintendent of agriculture, and under his direction.

REPORTS.

The outlying stations will report to the Director as often as required, and the reports of the officers of all the stations will be presented through the Director to the Minister of Agriculture.

NURSERIES AND PROPAGATING HOUSES.

At each station there will be established a nursery for the propagation of such varieties of plants, fruit, forest trees, &c., as may be desirable for the purpose of distribution, so as to rapidly extend the area of experimental work. Each station will also be provided with a propagating house to facilitate these objects and for the purpose of testing the vitality and purity of seeds for farmers and others.

MUSEUM.

A general museum will be established in connection with the central station, where samples of all the varieties of produce raised from year to year will, as far as possible, be kept for reference and comparison, as well as for the instruction of visiting farmers. Specimens of injurious insects and their work, of injurious and beneficial birds, and other subjects of interest, will also find a place here.

OTHER DUTIES OF OFFICERS.

In addition to the special duties referred to, the officers of the several stations will be expected to visit, whenever practicable, the public meetings of the farmers and fruit growers in different parts of the Dominion, for the purpose of conferring with them, and aiding in the discussion of the many problems connected with agricultural and horticultural pursuits which may be discussed.

DISPOSAL OF PRODUCE.

In the management of the stations all the products will be sold, and a strict account kept of the returns. No officer or employee will receive any portion of the produce without paying fair value for the same.

GRAIN CROPS.

All cultivated cereals manifest, sooner or later, a tendency to deteriorate or run out; some much earlier than others. New varieties freshly introduced into a country often show great vigour and a high average of productiveness. Hence the importance of introducing new or untried sorts, and of the exchange of seed between localities having different conditions as to climate. Spring wheat has been for some years past a comparative failure in Ontario, producing, it is said of late, an average of 12 bushels, as against a former yield of nearly 20 bushels. This is attributed to various causes, such as climate changes, exhaustion of soil and insect pests. All these have some part in the result, yet it is likely that deterioration is an important element in the case. More knowledge as to the proper rotation of crops, more thorough tillage and thorough drainage, would materially aid in advancing productiveness.

When we consider that a single grain of wheat carefully grown as a separate plant will yield an average of about three hundredfold, and how small compared with this is the ordinary yield in field culture, it is evident that there is abundant room for experiment and improvement as to methods of cultivation and treatment. The results of some researches are of such a nature, that after definite conclusions have once been reached and published, there is no special need of their being repeated. Not so with the growth of agricultural products; the circumstances of climate and soil are so variable, and changes in the character of plants so frequent, that experiments may be constantly conducted with profit.

Recent researches in Russia, lately published in St. Petersburg, demonstrate the fact that wheat grown in the northern provinces of that empire ripens in less time than that grown in the southern, the difference being about sixteen days. How much of this difference is due to variety has not been determined, but there is no question that if we succeed in obtaining for our vast wheat fields in the North-West earlier ripening varieties of good quality, the area of wheat culture will be extended, and the benefits resulting difficult to overestimate. Other field crops can, in all probability, in like manner be improved and made more profitable to the growers.

STOCK, HORSES, &c.

It is proposed to carry on a series of experiments with small herds of cattle, selecting such breeds as are likely to prove the most gene-

rally useful to the farmers residing in the provinces in which the several farms will be located. Experiments will be conducted for the purpose of ascertaining the value of different foods for fattening cattle, and for the production of milk, cheese, and butter. It is also intended to test the value of different breeds of horses, sheep, and pigs.

DAIRY PRODUCTS.

Since the general introduction of the factory system, cheese made in Canada has acquired an excellent reputation, owing to the uniformity of its character, and meets with a ready sale at fair prices; at the same time, the quantity exported has increased to a remarkable degree, but the exports of butter have not been so large, partly, it is said, owing to inferiority, being in most localities the product of individual and unskilled labour. Since Canada is one of the best countries in the world for dairying, butter should rank equal in quality and in demand with cheese. Evidence is not wanting to show that wherever creameries have been established the price of this product has been enhanced, in consequence of its uniformly good quality.

Experiments in this department would no doubt help to advance the butter interest.

POULTRY AND EGGS.

By reference to the statistics given of the exports of poultry and eggs, it will be seen that the egg trade has increased enormously, and will, on account of the constant and general use of eggs, admit of almost unlimited expansion. The results of experiments with different breeds of fowls, for the purpose of ascertaining their relative merits as egg layers and flesh producers, would be of great use to the agricultural community everywhere.

FRUITS.

There is no question that most of our best varieties of small fruits will succeed in many of the northern townships of our older provinces, where they are, as yet, but little grown, and equally well in many localities in the North-West. From the experience gained regarding the growth of hardy Russian fruits in Iowa, it is highly probable that many of these could be successfully grown in the northern sections of the Dominion, not only apples, but pears, plums and cherries also. The early introduction of these fruits would be highly appreciated.

In the more favoured sections of the Dominion the variability of the existing climate should be considered and some efforts made to prepare for changes which will probably occur, sooner or later, from the deforestation of the country.

The fruit trade of Canada is rapidly increasing. It is tenfold greater than it was a few years ago, and with a proper selection of late keeping sorts, and the more general introduction of fruit evaporators, the trade might be almost indefinitely extended.

FORESTRY.

The work to be undertaken in this department will include experiments in reclothing denuded land, testing the comparative value of our native trees, also of those from all other parts of the world, where similarity of climate or other circumstances render it probable that they will prove useful. It would also include the propagation of trees of economic value for general distribution.

FERTILIZERS.

The establishment of a chemical station in connection with the central experimental farm will provide the means of thoroughly testing and establishing the value as a fertilizer of Canadian mineral phosphates, and undoubtedly aid in developing this important industry. Ashes are shipped in large quantities from Canada to the United States, where they are sold as a fertilizer, at a cost of from 25 to 33 cents a bushel, while Canadian farmers hesitate to pay 10 cents per bushel. If the actual manurial value of ashes on farm and garden crops was demonstrated to our farmers, it is altogether probable that this useful article would be consumed at home.

The character of the work involved in the complete analysis of fertilizers is such as to require special forms of apparatus which are complex and expensive. Appliances of this character would be needed in the laboratory at the central station for the special work to be undertaken there; and when that department was properly equipped, all the work of this nature required for the Dominion could be efficiently and economically done there.

INJURIOUS INSECTS.

Deficiencies in crops often arise from the depredations of insects. The yearly loss in Canada from this cause is very large, almost every farmer suffering to some extent. Such losses cannot be entirely prevented, but might be greatly lessened by the diffusion of

more general information on the subject. Were a skilled entomologist appointed, whose duty it would be to visit districts where insect plagues occur, and give all the information obtainable as to the best preventive and remedial measures to adopt, the annual losses might be greatly reduced.

BOTANIC GARDEN.

It has long been a reflection on Canadian taste and progress that we have no botanic garden in the Dominion. In Australia and India there are several such gardens supported by the Government. Botanic gardens have also been long established in Ceylon, the Mauritius, Jamaica, and several other of the West India Islands. Canada is, indeed, the only important British colony where such an instructive institution is wanting. In such gardens, trees are tested as to their hardiness, for the production of timber, for their bark for economic purposes, and for their fruit, and all sorts of medicinal and other flowering plants are grown. Such a garden it is proposed to establish in connection with the Central Experimental Farm, where all the native trees, shrubs and flowers of the Dominion can be brought together as far as conditions of climate will permit, and new and useful species introduced and propagated. This garden will be a very instructive feature in connection with the work and can be carried on there at a relatively small cost.

GENERAL USEFULNESS.

The agricultural experimental farms, properly conducted, will soon become bureaus of information for all who are concerned with agriculture or horticulture, which the farmer and fruit grower will be encouraged to visit, and inspect the work going on, and where it is hoped they will feel free to report regarding such difficulties as they may experience in the course of their work, and seek information from the officers in charge.

GENERAL SUMMARY.

The following is a general summary of the work, which, it is proposed under the act, should be undertaken :

- (a.) Conduct researches and verify experiments designed to test the relative value, for all purposes, of different breeds of stock, and their adaptability to the varying climatic or other conditions which prevail in the several provinces and in the North-West Territories ;
- (b.) Examine into scientific and economic questions involved in the production of butter and cheese ;

(c.) Test the merits, hardiness and adaptability of new or untried varieties of wheat or other cereals, and of field crops, grasses and forage plants, fruits, vegetables, plants and trees, and disseminate among persons engaged in farming, gardening or fruit growing, upon such conditions as are prescribed by the Minister of Agriculture, samples of such surplus products as are considered to be specially worthy of introduction ;

(d.) Analyze fertilizers, whether natural or artificial, and conduct experiments with such fertilizers, in order to test their comparative value as applied to crops of different kinds ;

(e.) Examine into the composition and digestibility of foods for domestic animals ;

(f.) Conduct experiments in the planting of trees for timber and for shelter ;

(g.) Examine into the diseases to which cultivated plants and trees are subject, and also into the ravages of destructive insects, and ascertain and test the most useful preventives and remedies to be used in each case ;

(h.) Investigate the diseases to which domestic animals are subject ;

(i.) Ascertain the vitality and purity of agricultural seeds ; and

(j.) Conduct any other experiments and researches bearing upon the agricultural industry of Canada, which may be approved by the Minister of Agriculture.

WM. SAUNDERS,

Director.

(1) The first of the following methods of determining the
vitality of a seed is the method of the microscope. This
method is the most accurate and the most reliable. It
is based on the fact that a living seed will show a
certain amount of protoplasmic streaming in the
cytoplasm of the cells. This streaming is usually
observed in the form of small, clear, granular
particles which move about in the cytoplasm.

(2) Another method of determining the vitality of a
seed is the method of the microscope. This method
is based on the fact that a living seed will show a
certain amount of protoplasmic streaming in the
cytoplasm of the cells. This streaming is usually
observed in the form of small, clear, granular
particles which move about in the cytoplasm.

(3) A third method of determining the vitality of a
seed is the method of the microscope. This method
is based on the fact that a living seed will show a
certain amount of protoplasmic streaming in the
cytoplasm of the cells. This streaming is usually
observed in the form of small, clear, granular
particles which move about in the cytoplasm.

(4) A fourth method of determining the vitality of a
seed is the method of the microscope. This method
is based on the fact that a living seed will show a
certain amount of protoplasmic streaming in the
cytoplasm of the cells. This streaming is usually
observed in the form of small, clear, granular
particles which move about in the cytoplasm.

(5) A fifth method of determining the vitality of a
seed is the method of the microscope. This method
is based on the fact that a living seed will show a
certain amount of protoplasmic streaming in the
cytoplasm of the cells. This streaming is usually
observed in the form of small, clear, granular
particles which move about in the cytoplasm.

W. W. BENTLEY
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