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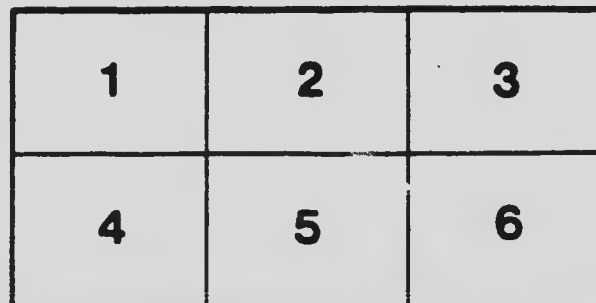
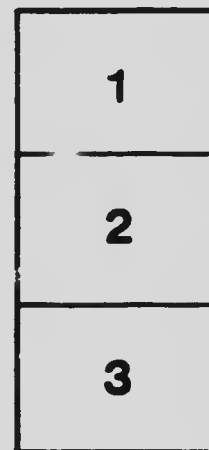
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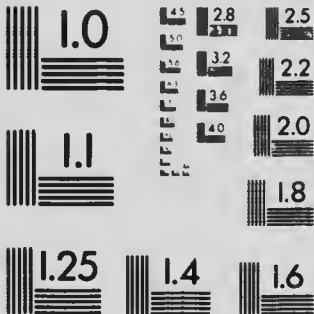
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RESULTS FROM IRRIGATION

EVIDENCE

OF

MR. SAMUEL M. GENEST

DEPARTMENT OF THE INTERIOR.

BEFORE THE

SELECT STANDING COMMITTEE

ON

AGRICULTURE AND COLONIZATION

1904

PRINTED BY ORDER OF PARLIAMENT

As advance sheets of the Committee's Final Report



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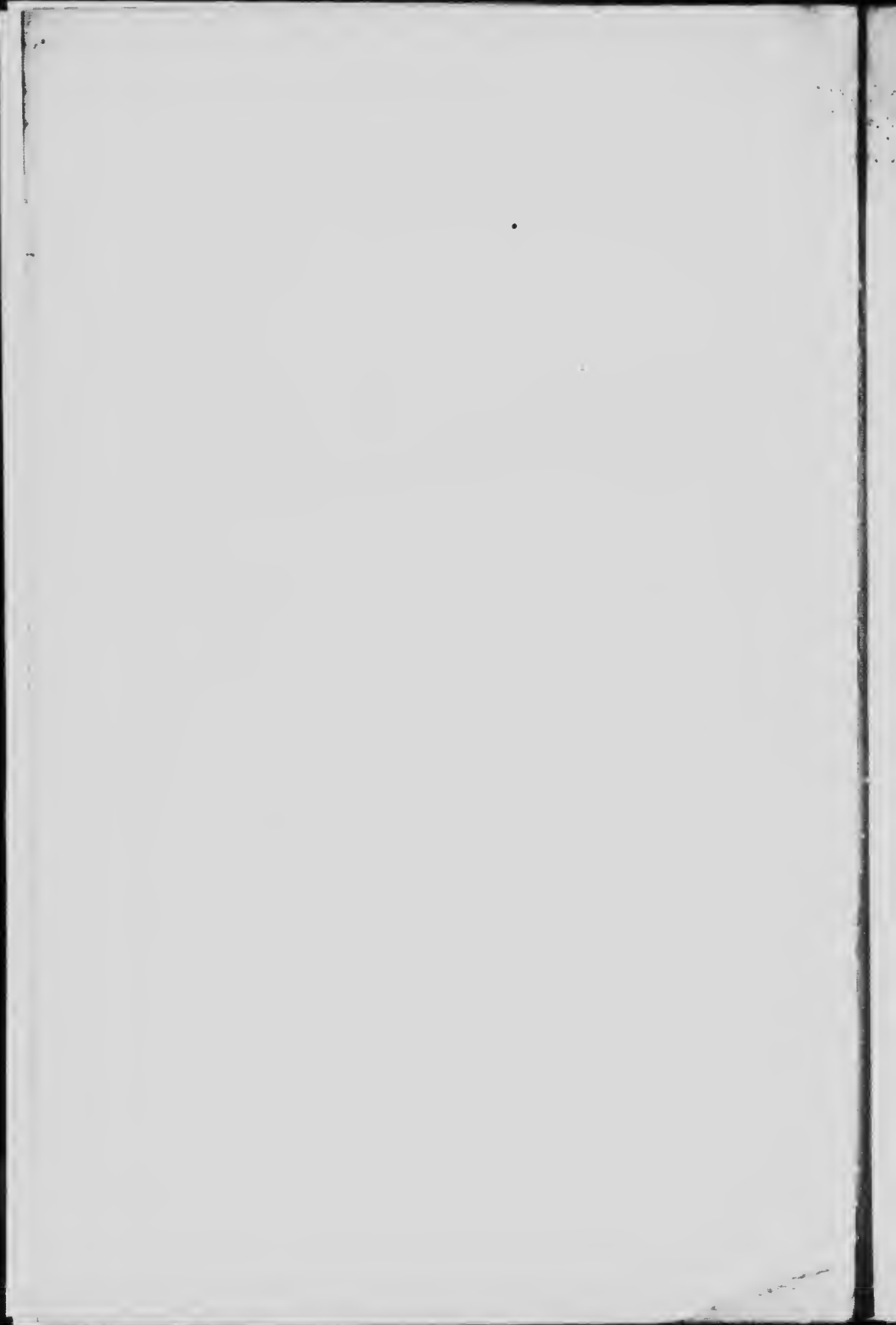
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RESULTS FROM IRRIGATION

HOUSE OF COMMONS,
COMMITTEE ROOM 34.

TUESDAY, June 7, 1904.

The Select Standing Committee on Agriculture and Colonization met here this day at 10 o'clock a.m., Mr. Douglas, chairman, presiding.

The CHAIRMAN.—I may say to the Committee that we tried to secure the presence of one of the members of the Department of the Interior to speak to us with reference to immigration. Mr. Scott, who was expected to come, has been in Winnipeg I think for two weeks, and it is not yet known when he can come here, so that instead of immigration we had to fall back this morning on irrigation.

Mr. Samuel M. Genest, from the Department of the Interior, is here, and will be able to give us some information with reference to the work of irrigation in the North-west. It is the first time this matter has come before the committee, but there is a good deal of money being spent in connection with irrigation works, and it is well that the committee should hear of it and learn what is being done.

Mr. GENEST.—Mr. Chairman and Gentlemen, as irrigation in the North-west is comparatively a new proposition and may be quite unknown to the majority of members here, I have prepared a synopsis of its history—how it was established in the North-west and what have been the results.

IRRIGATION IN SOUTHERN ALBERTA.

Prior to the year 1890, the greater portion of Southern Alberta was thought to be only suitable for grazing purposes, and was, therefore, mostly taken up by ranchers who obtained leases of certain tracts ranging in area from 5,000 to 10,000 acres, upon which cattle and horses were bred. This industry was a great attraction to settlers in that portion of the country, who, besides being paid wages to look after the ranchers' interests, were also desirous of making a home for themselves by securing a homestead and opening up the same, the wages alone affording them a comfortable livelihood.

These small settlers were in reality the means of bringing to the Government's attention the necessity of distributing the limited supply of water in the North-west of Alberta and South-western Assiniboia to the best advantage. For instance, the thing that these settlers did in choosing a piece of land was to ascertain if water was available on the same, and therefore, they were sure in every case to try and secure a quarter section upon which a spring, creek or a good approach to a river was located; and it was with great difficulty that the government protected the interests of those already established in the country by setting aside such pieces of land as water might become the water supply of vast areas surrounding the streams, creeks or approaches.

THE NORTH-WEST IRRIGATION ACT.

In the year 1893, after having sent out circulars to some of the best known and most experienced settlers of the North-west Territories, it was decided that it would be well to regulate the disposal of the available water in those districts by an Act of Parliament, and consequently the North-west Irrigation Act was passed and assented to on July 23, 1894. This Act was subsequently amended on July 22, 1895, and again on June 13, 1898.

It was probably not without a certain amount of hesitation that the Government decided to lay such a bill before Parliament, for some parties who knew the North west well were pessimistic as to the results which would be obtained from irrigation, and fear was expressed that such an Act might stop intending immigrants from settling in that portion of Canada, as the Act might be the means of leading them to believe that Southern Alberta and Western Assiniboia were too arid to be farmed and tilled to advantage; in fact, it was even feared that the settlement of the province of Manitoba might be materially retarded if such an impression was implanted abroad. This fear was not without a certain excuse, for even corporations with big interests in that part of the country were doubtful as to its agricultural resources, and such an important company as the Alberta Railway Company, which held thousands of acres in Southern Alberta, disposed of large blocks of the same at the rate of \$1 and \$1.25 per acre, thinking at that time that they were getting good value for their land.

After the Irrigation Act was assented to, it was necessary to find out who were the parties who had irrigation works constructed, in order that they might be notified to come under the provisions of the same; that is to say, secure a license from the Crown for the water required by them within a certain period, which was to lapse on July 1, 1896, and which period was subsequently extended to July 1, 1898.

After investigation it was found that at the time the Irrigation Act came into force, there were about 119 irrigation schemes constructed, or in course of construction. These schemes came under the three classes defined in clause 2 of section 3 of the Act, as follows:—

Twenty-eight came under the heading of domestic purposes, and comprised the diversion of water for railway purposes, the supply to mills worked by steam, and the watering of stock.

Seventy-eight came under the heading of 'irrigation' and were found to have been constructed since 1890, or were in course of construction at the time the Act was enacted, all of them on a small scale, irrigating at the most from 25 to 200 acres, which goes to show that irrigation was in its infancy at that time and the results from the same were only problematical.

The remaining three schemes came under the heading of 'other purposes,' one of them for the purpose of operating mills by water pressure, the other two constructed, or in course of construction, by the Calgary Water Power Company, and the Calgary Irrigation Company which held a Dominion charter prior to the passage of the North-west Irrigation Act of 1894.

IRRIGATION COMPANIES FORMED.

With the exception of the Calgary Irrigation Company and the Spring Bank Irrigation Company, which had made application for water to be diverted from the Elbow river and Jumping Pond creek, the former to irrigate 45,000 acres, and the latter 21,000 acres, no company had yet taken up irrigation on a large scale, till the Canadian North-west Irrigation Company applied in the year 1897 to be given the water reserved from the St. Mary river for the purpose of irrigating 500,000 acres of land, which after survey, were considered to be susceptible of being irrigated from that source. After having secured the necessary authorization the company began the construction of these works at an estimated cost of \$400,000, but which expendi-

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ture has now reached about \$650,000. The company are now supplying water to about 200 settlers, the majority of whom are experienced agriculturists.

In view of the increased area embraced by this scheme and by experiments made by this company, at their suggestion it was thought advisable to change the ratio of water from one cubic foot per second to the 100 acres, to one cubic foot per second to the 150 acres, economizing thereby a great quantity of water which may at a future date be used in irrigating land susceptible thereto.

This company may be said to be the pioneer of irrigation on a large scale in the North-west, for it was certainly not without a certain amount of risk that they undertook the task of carrying out a proposition of such magnitude, as it was thought that on account of the temperature in those parts being rather low although enhanced by irrigation, the growth of cereals and crops might be ruined by frosts before they could mature, and that, therefore, the aim and advantage which the construction of the works was meant to attain would thereby be nullified. Fortunately, however, since these works have begun to be operated, the fears expressed above have proved to be without foundation, and in consequence the Canadian North-west Irrigation Company have asked and received the necessary authorization to extend their works, so that now they are about to expend over \$1,000,000 to bring under irrigation at least 1,000,000 acres.

THE BOW RIVER IRRIGATION CANAL.

The success of this company has, to a great extent, been the means of deciding the Canadian Pacific Railway Company to undertake the construction of the Bow river irrigation canal, the practicability of which was proved by surveys made under the jurisdiction of the Dominion government, under the able supervision of Chief Engineer J. S. Dennis, whose valuable services have since been secured by the Canadian Pacific Railway Company to carry out the construction of these extensive works which will bring under irrigation at least 2,500,000 acres within the 3,000,000 acre tract. The cost of constructing these works is estimated by the company's engineer at \$4,000,000, and the amount of water granted from the Bow 13,000 cubic feet at high water stages, and 3,000 cubic feet per second at flood stages, 13,000 cubic feet at high water stages, and 3,000 cubic feet at low water. It is estimated that although only a little over 2,500,000 acres are susceptible to irrigation in this tract, the balance of the 3,000,000 acres will be so benefited by the distribution of water in that locality as to make the same suitable for settlement.

The plans filed by the company show that to carry out these works the construction of about 480 miles of canal and laterals will be necessary, and that to store the water granted at flood and high water stages, at least 15 reservoirs will have to be created.

By Mr. Ross (Ontario):

Q. Is there sufficient water to supply the irrigation there?

A. Yes, plenty, the companies having secured by the authorization above referred to, the full duty required to irrigate the same.

The authorization given to the company in connection with this scheme provides that the whole of these works shall be completed within 15 years from March 14, 1904, that is, by March 14, 1919.

SYSTEM OF DISPOSING OF WATER SUPPLY TO SETTLERS.

The system of disposing of the water by these companies to the settlers, is by agreements entered into on forms approved by the Commissioner of Public Works at Regina, and confirmed by the Minister of the Interior at Ottawa, copies of which have to be filed at Regina and in the Department of the Interior at Ottawa. The

rate at present charged is \$150 per cubic foot per second per annum, which is equivalent to \$1 per acre, provided the purchaser of land demands the full duty of one cubic foot per second for each 150 acres. From the contracts filed in the department I find that in a very great number of instances, the settlers having 150 acres of land susceptible to irrigation only contract for one quarter of a cubic foot which costs annually \$37.50, developing a charge of about 25 cents per acre per annum.

If, later on, when the country is more developed, it were found that the rates charged for water were excessive, section 51 of the North-west Irrigation Act empowers the Minister of the Interior to regulate such rates when the interests of the country require it.

However, the tax of \$1 per acre per year for the full duty is not, from statistics gathered both in the department and the United States, a heavy charge, as water is looked upon as an insurance on producing a certain crop, the quantity of which largely depends upon the skill of the user.

By Mr. Ross (Ontario) :

Q. Do you know anything about the charges for water, say, in California?

A. Yes. In California, for instance, certain parties will form themselves into a municipality. Twenty farmers who have got lands adjoining will get together, or perhaps only sixteen of them, and they will get a surveyor. They submit their plans to the government of the United States, and if their scheme is feasible the government will grant them what they call a water right, conditional on their carrying out these works to a successful issue. Well, if these sixteen farmers take water from that ditch the cost of the works is ascertained and their lands are assessed proportionately at say \$5 per acre, or \$10 per acre, or even more according to the cost of the construction of the works. Beyond this, outside of the cost of the water itself, there is no charge except for the maintaining of the works, repairs and administration. Then, if later on others want to go into the scheme of these people, they go to the parties that amalgamated together and say, 'we want to get some water, what will you charge us?' They say, 'That is all very well, but you have got to get your water right first.' Well, this water right is simply paying their proportion of the cost of construction.

WATER SUPPLY—HOW DISTRIBUTED.

As to the distribution of the water, it is worked in this way: say there are ten farmers served by one ditch, who require an aggregate of 10 cubic feet. The foreman notifies them that on a certain day he will turn on the water for a sufficient number of hours to irrigate the whole ten farms. The first farmer requires only half a cubic foot and, therefore, as soon as the water has run on his farm long enough to give him his ratio, the inlet is closed, and the water is run on to the second farm. Now, the second farmer's requirements may be $1\frac{1}{2}$ cubic feet, and therefore the water is run on to his farm until he has secured his ratio; and so on till the whole ten farms have got their aggregate of ten cubic feet. This process is gone through as often as once a month during a season, if required.

By Mr. Stephens :

Q. Can a farmer get that water in the dry season?

A. Yes, that is exactly what he secures the right for.

Q. Do they have to take it in the wet season?

A. Not necessarily, for they do not require it then, although they have the right to take it in any season, wet or dry, but to take water in the wet season when the farm does not require it would be manifestly detrimental to the crop and a waste which is, moreover, provided against by the Act.

In the North-west Territories, that is, in Southern Alberta, instead of using the water for irrigation purposes in the wet season, this is generally the time when provision is made for storing by dams and in reservoirs constructed for that purpose all the water in excess of the low water stage, as licenses to irrigate land in many in-

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stances are granted for the use of the water during the flood and high level water stages only of the streams; so that when the dry season comes the water necessary to irrigate the areas requiring the same is available in sufficient quantity to give the full duty, without interfering with the requirements of the domestic rights of farmers whose properties are crossed by or border on the streams affected.

By Mr. Wright :

Q. Is the farmer allowed to use it for domestic purposes ?

A. Certainly. The man who has got, for instance, an application for domestic purposes, that is, for stock or working mills by steam, has a prior right over the man who has an application for irrigation, because it is more important to secure a supply of water for the cattle, and to keep them alive than to take water merely for the purpose of rendering the land fit for cultivation.

But once the license conveying these rights is issued, it takes precedence in rotation in accordance with the number it bears irrespective of the purpose for which it is issued. It should be stated, however, that the use of water for sanitary and household purposes, and the watering of domestic stock (not, of course, including large herds of cattle), is fully protected by clause 9 of the Irrigation Act, under which no license can be granted which would infringe on such rights.

By Mr. Ross (Ontario) :

Q. Do they bring it into the houses, too ?

A. Oh, yes, this is provided for by the Act.

COMPARATIVE YIELDS OF FIELD CROPS.

Now, I am going to give you a comparison showing the beneficial results of irrigation, based on statistics I have gathered from United States reports. Let us take as an example the State of Montana, which adjoins Alberta, and take some of the other States which are reputed to great producers where irrigation is not used, and I want to prove by these statistics that where they used irrigation the crops were so much enhanced as to produce about an average of 11 bushels of wheat to the acre, more than the non-irrigated land. These statistics are for the years 1891 to 1900 inclusive, and are taken from the year book of the United States Department of Agriculture for 1900.

In Montana at the present time with irrigation for the last ten years the average production of wheat per acre has been 25.3 bushels, whereas Wisconsin, one of the largest producers of the non-irrigated states of the Union, only gives 14.5 bushels to the acre. Oats are in the same proportion, barley is in the same proportion, potatoes are in the same proportion. For instance, in Montana they got an average of 123 bushels of potatoes to the acre; whereas, in North Dakota, another of the non-irrigating states and said to be one of the greatest producing potato countries of the Union, they only got 90 bushels to the acre. The table of my statistics is as follows :—

State.	Wheat.	Oats.	Barley.	Potatoes.	—
	Bush.	Bush.	Bush.	Bush.	
Montana.....	25.3	38.4	31.3	123	With irrigation.
North Dakota.....	12.7	25.6	21.7	90	Without irrigation.
South Dakota.....	10.4	23.7	21.0	71	"
Minnesota.....	14.2	30.9	26.2	89	"
Wisconsin.....	14.5	32.9	27.4	87	"
Michigan.....	14.1	29.7	22.0	89	"
Illinois.....	13.2	31.5	24.1	72	"
Iowa.....	14.7	31.7	24.3	76	"
Nebraska.....	12.2	24.8	20.8	66	"

By Mr. Ross (Ontario) :

Q. They don't pretend to grow grain on arid sections without irrigation ?

A. In some places it is impossible to do so ; in other places it may be done, but without a certainty of success.

Q. You were talking of the arid sections that need it ?

A. Yes.

In Southern Alberta grain can be grown successfully in a wet season without irrigation, but should a dry season overtake a crop, then if the farmer has not availed himself of the advantages of irrigation his crop is certain to be a failure, as he must rely upon a supply of water to ensure to a certainty the growth of cereals. The last two years have been sufficiently wet ones to obviate the necessity of a very extended use of irrigation.

By Mr. Clancy :

Q. You have given statistics as between the different states rather than the statistics between the arid lands that have to be irrigated and those which have not been irrigated in the same state ?

A. I beg your pardon, perhaps I did not make myself quite clear. The State of Montana is under irrigation, whereas the others enumerated are not.

Q. The whole of it ?

A. The greater portion of the cultivated areas is.

Q. What I was endeavouring to get at was, we are making a comparison probably on the same conditions ?

A. Exactly.

Q. Therefore, the comparison should not be made between Wisconsin and Montana, but rather between the arid lands that are irrigated in Montana and those that do not require irrigation. That is a fair test, under the same conditions, as latitude and so on.

A. I am coming to that. I simply gave these statistics to show what was grown in the irrigated country, and what was grown in some of the non-irrigated country. I am coming to the other.

In addition to the above schedule, here is one of the many instances in which the benefits derived from irrigation are irrefutably proved. The Fairfield farm, near Lehighbridge, produced under irrigation, 91 bushels of oats to the acre, whereas the neighbouring farm, without irrigation, only produced an average of about 18 bushels to the acre, and the grain produced from the non-irrigated farm was inferior in quality to that produced on the Fairfield farm. You will see among the photographs I have here of the grain grown on the Fairfield farm. (Photographs exhibited and shown to members of the committee.)

By Mr. Gilmour :

Q. What year was that ?

A. This last year. The Fairfield farm above referred to was watered from a supply of the Canadian North-west Irrigation Company's system.

I must here speak of an industry of no mean importance which owes its existence in the North-west to the inauguration of cultivation by irrigation ; that is, the beet sugar industry. The same capitalists who are at the head of the Canadian North-west Irrigation Company—

By Mr. Ross (Ontario) :

Q. Just wait a minute before you go on with that. I am told by a friend of mine that it costs as high as \$30 an acre in Southern California for a water supply from irrigation ; would that be right ?

A. Yes, in some instances the cost fully reaches that figure.

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By Mr. Wright :

Q. Annually ?

A. Yes.

By Mr. Ross (Ontario) :

Q. As against \$1 for ours ?

A. \$1 for the full duty.

Q. But they raise fruits there which they don't raise in Alberta ?

A. Yes, and this is what permits the Californians to pay such a high figure for the water, for a grain crop could not carry this heavy charge. In Alberta they have been experimenting on the fruit-growing capacity of the country, and the results so far obtained have been most promising for ultimate success in raising fruits in paying quantities. This, however, is entirely due to the inauguration of irrigation, without which fruit-growing would have been an impossibility.

A CUBIC FOOT OF WATER AS APPLIED TO IRRIGATION.

I might explain here what is meant by a cubic foot of water to the second. A cubic foot of water to the second would be the volume of water running through a sluice one foot wide and one foot deep, having a slant which would permit a chip placed on the surface of the water being carried for the distance of one foot in one second.

By Mr. Wilson :

Q. How far would it carry ?

A. That would depend on the slant, but a sufficient slant must be given to carry it one foot in one second.

Q. I think you can give us an idea of the quantity of water ?

A. Certainly, what I have first explained is a practical illustration.

By Mr. Ross (Ontario) :

Q. You must have instruments to measure ?

A. We have, and I may further state that water is also measured by the **acre foot**, which is equal to 43,560 cubic feet to the acre.

By Mr. Wright :

Q. Do they use 30 times as much water in California as we get for one dollar ?

A. No, you are entitled in the North-west to get the same quantity of water for \$1 that the Californians are entitled to get for \$30.

By Mr. Wilson :

Q. How do you explain the difference ?

A. In California cultivation must be carried on entirely with the use of irrigation, otherwise no crop of any kind can be raised, the country being a totally arid one, where the rain falls in such small quantity that it is not of any material help to the vegetation. This almost total absence of natural water supply renders the artificial supply all the more expensive. Further, as already explained, the crops raised in California are mostly fruits, and can stand a heavier taxation than a grain crop could carry. On the other hand, in the semi-arid region of the North-west, even in a dry season, the grass attains such a growth in the early spring that when the hot weather comes, and dries it up, it still retains so much of its nutritious quality, that cattle grazing on it can be marketed off the range, and compete in quality with any other cattle in the Dominion. That is one reason why Southern Alberta was regarded as one of the best ranching countries in the world.

The principal difficulty with which the ranchers had to cope was not so much the scarcity of water from lack of sufficient rainfall, as the fact that squatters coming into the region located near all the springs and available water approaches, and by fencing in these springs and approaches prevented their being used by the cattle, thus practically locking up tracts in some instances as extensive in area as 25,000 or 30,000 acres. The department, however, took the necessary measures to obviate this difficulty as far as possible by the creation of stock-watering reserves, on which no settlement is allowed, thus leaving the water supply accessible to every one.

By Mr. Clancy :

Q. You say they have received as much in the North-west for one dollar as in California ?

A. Of water ? Yes, they are entitled to as much if they wish to use it.

Q. Does it mean that they pay thirty times as much for a cubic foot in one of the United States, as against \$1 in the other, or that it serves the same purpose. It is a fact which most people know that they are obliged to use more water in California for the reasons stated than in Alberta ?

A. In the North-west they don't have to use the water continuously. They only use it perhaps once or twice in the season. In California they have to use it mostly at all times, say once or twice a month, and consequently although our people have the right to the same quantity of water as they have in California they don't actually need it or use it.

Q. If they did, they would pay more ?

A. They would pay no more.

By Mr. Kidd :

Q. I suppose there are two months that they don't use it at all ?

A. Yes; in California they do not use the water for about two months, December and January.

In Alberta irrigation is more of an insurance on good crops. It is the same as a man who owns a vessel and is putting to sea with a valuable cargo. He places thereon an insurance securing the value of the same, so that in case the vessel and cargo are lost, he is protected against loss by the insurance. The farmer, in a like manner, insures his crop against failure by drought by securing the right to the use of a water supply from the irrigation, in case of need; so that if the natural water supply should fail him and his crop be endangered, he is amply protected, and has no cause for anxiety, having a certainty of a successful crop. So that irrigation is in fact an insurance on a sure return for his labours.

PRODUCTION OF SUGAR BEET BY AID OF IRRIGATION.

I will again refer to this matter in connection with an industry of no mean importance, which owes its existence in the west to the inauguration of cultivation by irrigation; that is, the beet sugar industry. I have here some photographs by way of illustration.

The same capitalists who were at the head of the Canadian North-west Irrigation Company, have constructed a beet sugar factory at an estimated cost of about \$50,000, and in connection with the same have begun the cultivation of sugar beets upon a tract covering 3,000 acres.

By Mr. Ross (Ontario) :

Q. Where ?

A. Near Cardston.

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Mr. CLANCY.—At Raymond ?

A. At Raymond.

Experience has proved that to cultivate sugar beet with success the same cannot very well be cultivated on newly broken land, and in fact it takes at least three breakings before the land is ploughed deep and is mellow enough to render the growth of sugar beets successful. This will be easily understood when one takes into consideration the depth to which the sugar beet reaches. The first year's ploughing only disturbs the ground to the extent of about three or four inches, and as in this case, is generally sowed with oats; in the fall this ground was again ploughed up and the next spring, after the land had been copiously irrigated, it was sowed with beet sugar seeds. Here I must say that the company experienced a difficulty which was most unfortunate for them, but which again shows the power of that country for grain raising. Although the ground had been well ploughed before seeding with beet sugar, the waste oats of the previous season started to grow in such abundance, that of the 3,000 acres the company had sowed with beet sugar seed, they had to abandon 1,800 acres and restrict their efforts to the cultivation of the remaining 1,200 acres, and although the beets were almost choked by the growth of the oats, which in some instances had reached a height of about eight to ten inches, the results of that crop were about eight tons to the acre, which, under the circumstances, was considered very satisfactory.

Q. I had information that I believe to be reliable in character that it did not reach six, in fact that it was somewhere about five tons.

A. Of course I do not question your information, but my authority for the statement is a person who is thoroughly reliable and who had personally seen the result of the crop.

By Mr. Smith (Wentworth) :

Q. I would be surprised if they got five tons, after what they had done.

A. The 1,800 acres which were abandoned gave a growth of from 20 to 23 inches of oats; that is, of straw, which, I was informed, was used green for fodder.

It took the factory three weeks to reduce this crop to sugar, and the gross product of the same was about three quarters of a million pounds of sugar.

I, have been informed that to permit this company to reap fair profits on their outlay, say 10 per cent per annum, the cultivation of 3,000 acres is necessary, and the average yield per acre must be about ten tons, being equal to 60,000 pounds of beet, yielding on an average ten per cent of sugar, leaving after expenses are deducted about one cent per pound of a profit, paying, therefore, a dividend of from 10 to 12 per cent on the outlay.

By Mr. Clancy :

Q. Well, that man did not know much about beets, or he would not write that.

A. Well, I have read that in England at the present time some assays have been made to ascertain the percentage of sugar in beets, and that in some instances the results were as high as 15 and 18 per cent. Of course, there is some loss in manufacturing sugar from the beet, but to offset this I only give ten per cent. I think that what has been done in the North-west shows that this industry is a success, and will be a great help to settlement in that district.

In addition to the above, let us see to what extent the cultivation of sugar beet may be a factor in helping financially the parents of a large family of young children. The price paid to farmers by the above mentioned company for sugar beet having a fair percentage of sugar is \$4.75 per ton on board the cars; this would be at the rate

of \$47.50 per acre, which shows that the beet sugar will be a great factor in the development of the west.

Q. What does it cost to produce per acre ?

A. I suppose the cost would be about from one to two-thirds of the receipts, according to circumstances, covering expenses for weeding, ploughing, seeding and taking up, leaving a fair margin of profit.

Q. Well, you have no figures for that ?

A. I have actually no statistics on the cost of producing, and therefore cannot speak on the point with certainty.

Q. That is very important, you know.

A. I recognize that it is. The greatest portion of the labour required to make the growing of beet sugar a success is weeding, so that a settler who is the happy father of children who are not yet old enough to undertake the more arduous work required on the farm, can profitably employ them in weeding the beet field, a work which would not be detrimental to the health of the children so employed, and which would be financially most beneficial to the parents, as it would reduce the expense of cultivating this crop to a minimum.

To be able to do that is illustrated above, irrigation is simply indispensable, for sugar beet requires plenty of water and the risks of having a season's work lost through drought must be ensured against, and the only assurance possible in this case is to have at one's back a certainty of a water supply by irrigation.

CONDITIONS ADOPTED TO FOSTER IRRIGATION.

To foster irrigation in the North-west Territories the government have sold land to settlers under the following conditions :—

The price of the land to be the current regulation price of \$3 per acre, 25 per cent of the acreage so bought to be brought under irrigation, the cost of constructing the works to be credited as part payment to the maximum of \$2 per acre, so that in every instance the cash price of the land so sold will not be less than \$1 per acre. Before the lands thus sold under these regulations are patented, the chief engineer, or an engineer under his supervision, has to inspect the works constructed, verify the expenditure incurred in the construction of the same and then send in a certificate to the Department of the Interior, that all the conditions attached to such a sale have been carried out; and upon the receipt of such certificate and a fee of \$10, the Crown issues the patent for the land so purchased, and also the license conveying the water necessary to irrigate the same.

AREAS COVERED BY APPLICATIONS GRANTED UNDER THE ACT.

The number of individuals and companies who have availed themselves of the privileges given under these regulations is 27, the acreage aggregating approximately 503,609 acres. Since the passing of the North-west Irrigation Act in 1894, 84 licenses conveying 144'53 cubic feet per second of water to irrigate about 21,686'51 acres have been issued, and there are still in course of construction 159 schemes, embracing a total area of 4,150,700 acres which will involve the distribution of 27,650 cubic feet per second of water, showing thereby that as the country opens up, the importance of irrigation is being realized more and more every day. In addition to the above, 41 licenses, conveying water for 'domestic' and 'other purposes' have been issued, and about 123 applications for water for similar purposes are now being dealt with.

In summing up my remarks on irrigation in Southern Alberta and Western Assiniboia, I must not overlook the importance of irrigation on the forestation of that portion of the North-west Territory. As proved by observation and experience in

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other countries, the growth of trees has been the means of arresting the run off of freshets, spring and rain water from the ground, thereby keeping the moisture in the earth sufficiently long to permit the vegetation to sprout out with sufficient strength to enable the same to stand the heat of the more advanced season without much more need of water. By referring to the Canadian Forestry Association's report for 1901, pages 22 and 23, I find two very interesting reports made therein by Mrs. Zina Y. Card, and by Mr. Wm. Pearce, which show what an important factor irrigation has been in the successful effort in tree growing in that country.

GOVERNMENT EXPLORATORY IRRIGATION SURVEYS.

I may state that in addition the government have carried on extensive exploratory irrigation surveys covering important portions of that part of the North-west, so as to ascertain from the general contour of the country where the most eligible locations were situated for the construction in the future of different irrigation works. The effect of these surveys, moreover, has been to prevent the possibility of the launching of wild-cat schemes by speculative promoters not possessed of the requisite data to give assurance that their schemes were feasible, and who, by inducing the investment of large amounts of capital in works which could not be carried out, might cause the investors serious financial loss, which would, of course, be greatly detrimental to the good name of the country.

Another valuable result of these exploratory irrigation surveys has been to furnish the department with complete records, for office use, of the water supply at different stages of all the rivers and streams, so that to-day when an application is filed in connection with a district where such surveys have been made, the department is able at once to judge pretty closely from its records whether the stream affected carries a sufficient body of water to justify the granting of the application. These surveys cover large tracts of the country, such, for instance, as the St. Mary and Bow rivers basins. What is known as a basin in irrigation is the land surrounding the main stream and tributaries, which is capable of being irrigated by the same. So, to get at that basin and to ascertain what proportion of the area can be irrigated in the same, the government—

By Mr. Gilmour :

Q. You mean the Dominion government ?

A. Yes, the government are making surveys to that end. The result of these surveys has fully justified the expenditure for, as I have already stated, by the construction of the works carried out by the Canadian North-west Irrigation Company, for which the company were enabled to partly utilize the government surveys, large tracts which were only suitable for grazing purposes have been rendered most valuable for cultivation, and large tracts which were thought to be useless for any purpose whatever have been made very valuable for grazing purposes, and these latter mentioned lands are now being disposed of by the company at from \$3 to \$4 per acre, although in some cases the water does not actually touch them. The explanation of this is that before irrigation was introduced the large herds of cattle would bunch round a spot where they could be near the natural water supply, and, with herds numbering from 6,000 to 10,000 head, the grass was soon eaten entirely off, as the cattle would not go far away to the more arid portions where they could not have ready access to water. Then, the areas near water where grass was good were not large enough to give subsistence to these herds sufficient to bring them into good condition for marketing direct off the range.

I have here some photographs showing where cattle can now graze, and where, previous to the year 1890, before irrigation was started there, they could not feed, as there was not sufficient grass, and because they would have to go too far for water.

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The construction of the Bow river irrigation canal, which was also proved by the government's surveys to be feasible, will bring as valuable results as those attained by the Canadian North-west Irrigation Company's scheme; and the climatic conditions of the country, joined to the results attained through irrigation, I am satisfied justify me in predicting that Southern Alberta and South-western Assiniboia will in a very short time become the Garden of Eden of Canada.

Having read over the preceding transcript of my evidence, I find it correct.

SAMUEL M. GENEST.

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