CANADA'S WORK FOR HER FARMERS

BY

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ILLUSTRATED WITH PHOTOGRAPHS

"HERE is the man who has done more for Canada than all the politicians." In these words a distinguished member of the Canadian Government the other day expressed his estimate of the services rendered his country by Dr. William Saunders. This simple and unassuming gentleman was the creator, and has ever since its foundation been the Director, of Canada's system of Experimental Farms. In twenty-three years of untiring work he has scoured the earth for things of service to Canada; he has increased the potential yield of every acre of her farms; he has given the cold north plains fruits for their joy and wheats for their nourishment: and in all this he is making of his work a great educational Extension Service for the training of the intelligence of the Canadian farmer.

Canada's farming problem stretches across the continent. East of Maine lie the Maritime Provinces; north of New England is Quebec, overlapping Ontario as far west as Buffalo; Ontario reaches on north of all the Great Lakes and almost all of Minnesota; Manitoba carries us half across North Dakota; while north and west of her sweep the great provinces of Saskatchewan and Alberta, until we come to British Columbia and the Pacific. The main activity of this immense region is agriculture,— nearly half of the whole Canadian population is agricultural,— and the problems awaiting solution are as full of variety as the country itself. No greater service can be rendered the people of Canada than aid in solving these agricultural problems of theirs.

Canada Attacks Her Agricultural Problems through the Experimental Farm

So Sir John Carling saw when he was chosen Minister of Agriculture in 1885, and to him belongs the honor of setting about a systematic answer. He inaugurated his coming into office by sending Dr. Saunders, then a business man who had long made a hobby of horticulture, on a mission to study what was being done by other nations to help their agricultural life. Returning, Dr. Saunders presented his report to the House of Commons, and within a few months found himself the newly created Director of five Farms not yet in existence. This was in 1886. The following day — the Director wastes no time! — he set out for three months of continuous traveling to determine the placing of his five Farms. In that year he threaded back and forth across the Dominion, and the autumn of 1887 found three Farms established, their heads appointed, and their work begun. The following two years saw the creation of the fourth and fifth.

The Central Farm, where the Director was to live, had to be in the neighborhood of the capital, Ottawa. The first Branch Farm, that for the Maritime Provinces, was set as near as might be to the boundary line between New Brunswick and Nova Scotia, in the latter, at Nappan. The second, for Manitoba, was placed at Brandon, in full view of the passing trains of the Canadian Pacific — a typical bit of country, fertile valley farm-land on the river, sloping up through bluffs slit by wooded ravines to higher lands above. The third, for the Northwest Territories, was set at Indian Head, also in full view of the railroad — more than six hundred acres of bare prairie-land stretching on and on, neither tree nor bush in sight.

The Director's object was to place each Farm where it could be readily seen, readily visited, yet where it would be under no specially favoring circumstance, but would have to solve for itself the average problem of the region it was to serve. The Indian Head problem is that of the open prairie. At the last Farm, at Agassiz, British Columbia, the problem is that of fruit

and nut tree growing in a mild climate, and two thousand kinds of fruits and nuts are now flourishing on its fertile valley land and mountainside.

At the present time a number of small supplementary stations are being established. The most interesting of these is the "farthest north" — Fort Vermilion, on the Peace River, in northern Alberta, six hundred miles above the United States boundary. In the spring of 1907 the first lot of seeds, trees, and plants was sent there for experiment, via Edmonton, from the Central Farm. On the first of May, "as there was no immediate prospect of the breaking up of the rivers"— the usual line of travel — these supplies were driven for seventeen days over four hundred miles, and ferried on a raft three hundred miles farther till they reached Fort Vermilion. By the first of June the seeds were in and the land was fenced. It cannot be said that the Experimental Farms are not squarely facing Canada's problems.

The heart of this system is the Central Farm. Everything that can be done is done here once, and under one head, the Branch Farms being left to deal with regional problems only. Here the distinctively scientific experiments in cross-fertilization, breeding, soil analysis, and the like, are carried on. The staff consists of a Chemist, a Botanist, an Entomologist, and a Cerealist, who make tests and publish bulletins applying to the problems of any of the Branch Farms, or of any farmer who chooses to appeal to them; and of a Horticulturist, an Agriculturist, and a Poultry Manager, whose work is chiefly for eastern Canada.

The Farm itself lies three miles out of Ottawa, spreading its four hundred and fifty sunlit acres for all to see — its arboretum, its belts of forest trees, its lawns and ornamental shrubs and gay flower beds, its hundred specimen hedges, its mile-long border of hardy perennial flowers, its orchards of cross-bred fruits, its test plots of standard, or new, or hybrid grain. The general public flock there from Ottawa and the surrounding country; and from its central offices and chemical laboratory go forth 340,000 letters and reports, and eighty tons of special and priceless seed, every year.

How the Soil is Made to Increase Its Yield

The first object of the Farms is, through improved methods, to increase the yield of every acre of Canadian farm-land. By tests extending over a long series of years, they have shown that it pays to sow plump seed of productive varieties; that there is a loss of more than half the value of barn-yard manure when it is allowed to rot; that plowing in clover with grain increases the grain yield by nearly thirty per cent; that sowing wheat only a week after the right moment means a loss of nearly one third of the crop; and these profits and losses can be gaged with almost mathematical precision. An increase of one bushel only to the acre in the oat crop of the Dominion would put an extra $2,000,000 a year into the pockets of the farmers; a like increase in wheat would add nearly double as much. Arithmetic of this sort no farmer is too dull to follow; and putting its own lessons into practice where all could see the results, the Central Farm, in its first ten years, increased its oats twenty-three, barley twelve, and wheat four bushels to the acre. In a report of five years ago the Director notes that Ontario has increased her yield of oats till she now averages 42 bushels to New York's 37; but he shrewdly adds that the yield on the Central Farm has reached 62 bushels per acre.

One Money Crop the Ruin of the Farmer

But the Farms devote by no means all their attention to grain. With the lesson of our cotton-growing South before him,— five States living and dying by one money crop,— the Director has set himself to preaching the lesson of "mixed farming," and above all of dairying and pork-raising, from end to end of the great grain regions of Canada. By this system the farm-land profits no less than the farmer — it keeps itself fertile automatically. Thus, if we sow grain alone and sell it as raw grain, we must sooner or later convert a portion of our cash into fertilizer for the reënrichment of the soil. In mixed farming the accounts run: grain, hay, and ensilage; these fed to stock give pork and butter; pork and butter give cash. But meanwhile fertility has been restored to the soil by the stock; at no point does cash have to be turned in on the land again for fertilizer.

A still greater advantage in this system is the insurance it secures for the farmer against the seasons when grain fails — and the farmer who raises only grain fails too. The 20th of August, 1900, recorded five degrees of frost at Indian Head. Heavy rains followed, and the grain of all the surrounding country was spoiled. The Superintendent at Indian Head reported the loss, with a plea to the settler almost dramatic in intensity: "Nothing is so agreeable as the raising of wheat, yet nothing is doing so much harm to the country." But Dr. Saunders' comment is characteristically calm: "This visitation will be followed by compensating advantages." It was worth all it cost if the farmer could be made to think, and to calculate his chances and his risks.

"Made to think"! Does not the greatest ad-

vantage of all lie here — an advantage to the nation beyond even the mighty arithmetic of crop values? Instead of waiting through a season for one crop, harvesting it in bulk, selling it for cash, and then living on the proceeds till the next harvest time, the farmer has here the intellectual stimulus and training of attending to a variety of things, seeing after a profit here, practising a small economy or avoiding a loss there — the same training that turned out from our stony New England farms so many of our ablest men. The calculable results of the system are already impressive. In 1884 Canada exported cheese to the value of $7,000,000. Ten years after the founding of the Farms this had become $17,000,000. In the same period the value of exported butter had doubled. Pork outdid them both with a phenomenal record of an increase of from less than a million dollars in 1884 to $8,000,000 in 1898. The Superintendent at Indian Head reports, with a note of relief: "Only in a few districts is wheat still 'king.'"

Covering the Northwest Prairies with Tree Belts

With the founding of the Central Farm, tree-planting was begun, and the first year saw it laid out into hundreds of seed and nursery beds, bristling with seedling trees. One of its most interesting exhibits is a hundred specimen hedges where the visiting farmer may examine samples of the best thorny protection against cattle, while his wife has her pick between Japanese rose and nodding blue Hungarian lilac.

But tree-planting on Eastern farms is almost a luxury; on the Northwest prairies — miles and miles with neither tree nor shrub, the winds rushing over them sometimes at thirty miles an hour — it becomes a vital necessity. We in the East have no conception of what such conditions mean to the farmer. Every attempt to grow our most hardy fruit was proving utter failure. The Northwest homestead longed for shelter from the choking, dust-laden winds of summer as much as from the winter blizzards at "thirty below."

On his Northwest Farms, accordingly, the Director began to develop tree belts; first, chiefly of the native Manitoba maple and the native ash; when these were established, of evergreens, in their shelter. Under this almost wind-proof protection areas were hedged off in checkerboard pattern with poplar, maple, lilac even; and garden planting was begun within these boxlike squares.

Indian Head started without a tree or a bush. In four years she reported herself as "practically provided with shelter belts, forest clumps, avenues, and hedges." It was apparent soon that the problem of shelter for the Northwest prairie farm had been solved. In the snug squares and garden plots were growing strawberries, raspberries, currants, table vegetables, and flowers in phenomenal luxuriance, and a few young apple trees which had never before been wintered in that region.

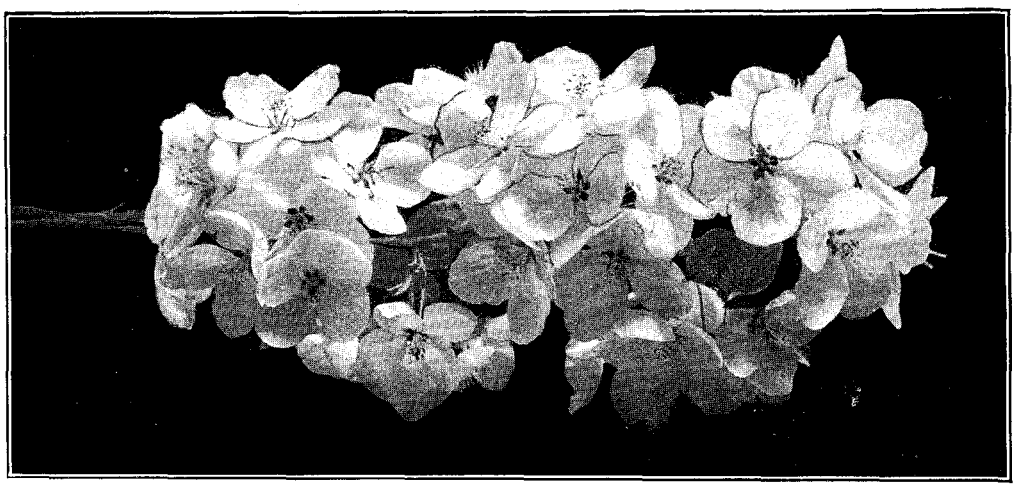
One day in the summer of 1890, on his visit to the Western Farms, Dr. Saunders noticed, as he drove through the wooded country, that the native forest trees were heavy with seed. Owing to frost, trees of that region do not fruit oftener than once in two or three years; but seed ripened in that cold climate develops into trees especially able to resist the cold, and is on that account very desirable. The Director therefore gave orders to the superintendents of the two Prairie Farms to hire a corps of helpers to collect tree seeds by the bushel.

Money was scarce on the prairies, and settlers, Indians, and half-breeds saw their chance for extra earnings. They did not stop at bushels — they got seeds by cart-loads. The result was between two and three tons of seeds. Seven acres were sown at each of the Branch Farms, and a ton and a half of seed was forwarded to Ottawa. From there, one thousand cotton bags, each containing a pound of seed, went out at once to settlers in the Northwest; next year two thousand more. From one pound of seed the most careful growers got from three to five thousand seedlings. Even average care would give eight hundred little trees. In six or seven years the young tree begins to bear seed on its own account, in the favorable seasons. With his interest awakened, there was no limit to what a settler could do.

In the annals of Canadian tree-growing, the red-letter year is 1890, for it saw also the beginnings of the distribution of seedling forest trees. This distribution was advertised through the newspapers of the Northwest. The farmer who made application to the Central Farm presently received through the mails a package done up in manila paper with a layer of oiled paper beneath. Within, rolled in moss still damp, though it had been on the road for possibly fourteen days, were a hundred little forest trees from ten to fifteen inches high, each variety bearing a wooden label with its name upon it. A note of directions for planting and cultivating accompanied them, ending:

"You will be expected to take such notes as will enable you to make a report on the behavior of each variety. Reports will be expected, whether favorable or unfavorable."

One hundred thousand little trees thus went out; the following year twice as many. Ten



CRAB-APPLE BLOSSOMS FROM THE FIRST HARDY CANADIAN FRUIT TREES

years after the starting of the work, the Director reported that seven tons of hardy tree seed had been distributed, that one and a quarter million little seedlings had been sent to "individual lovers of trees," and that there were on homesteads in almost every part of the Northwest plantations of forest trees for shelter and beauty.

For beauty as well as serviceableness is an object with the Farms. Our Director has a way of going about his professional journeys with his pockets stuffed with flower seeds, so that the farmer's wife may have something, as well as her good man. The Central Farm wears to the casual visitor much the air of a pleasure park. The Branch Farms, too, have their arboretums and perennial borders; they publish reports on roses that may be grown with some hope of success a few hundred miles, more or less, north of the Dakotas, and on the geraniums that make the bravest show in the garden before the advent of the early autumn frost. The attempt is being made here, an early report announces proudly, to grow flowers, as well as to raise No. 1 Hard wheat.

The Earth Scoured for Things of Service to Canada

One great division of the work of the Farms is the testing of new things from elsewhere, to ascertain their serviceableness for Canada. If they stand the test, they are promptly introduced to the farmer. An illustration of the immediate usefulness of some of these importations is the awnless brome-grass (*Bromus inermis*). This hardy Russian grass has so exuberant a vitality that in favorable soils it soon rejoices as a weed. Where, however, other pasture can scarcely be grown, or where its season is discouragingly short, brome-grass is proving a godsend. It thrives on drought and bitter cold. It offers pasture on its young green shoots two weeks earlier than the native grasses, and bears a heavier aftermath, holding its head up several inches, persistently green, through the first snows. Additional weeks of succulent food mean additional weeks of rich milk, and brome-grass is preparing the way for the onward march of the cattle trade, and of the butter and cheese industries.

Another important function of the Farms is the seed distribution. This began in the first year of their work with the sending out of a number of small bags of an early-ripening wheat just imported from Russia to test its behavior in Canada. For the first object of the distribution is to gain information by supplementing the experience of the Farms with that of other districts throughout the Dominion. The other object is to increase the quality and yield of the farmer's crops by introducing to him varieties better or more productive than his own. A farmer who wishes a free sample must make application for it himself direct to the Farm. He then receives enough grain to sow one twentieth of an acre. He is expected to grow it in a plot by itself; to thresh it separately by hand; and to use the product as seed the next year. Meanwhile, he is to send a report of it, "favorable or unfavorable," to the Farm.

At first about two thousand bags of samples supplied the demand. The fourth year, when the Farm had become known, fifteen thousand farmers suddenly applied, and got seed. Within a year or so, some of the grains sent as samples, carefully harvested, propagated, and reharvested, were becoming leading varieties throughout the Dominion. One report may serve as a specimen of hundreds that come in:

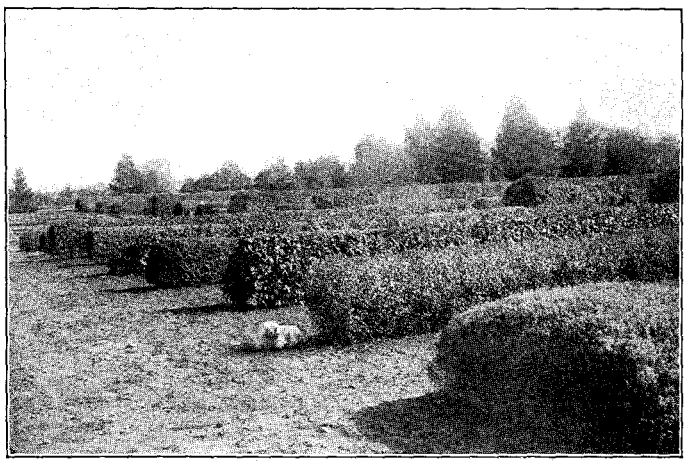
DR. WILLIAM SAUNDERS
DIRECTOR OF THE CANADIAN EXPERIMENTAL FARMS

"We got a sample of oats from you six years ago. The people about here think very highly of them and there are thousands of bushels of them grown. The farmers are coming here for seed from twenty miles around."

Each year the interest has steadily grown, and now the number of co-workers in these tests is over 45,000, and the seed sent them — often of varieties that money could not buy — amounts to eighty tons. The reports that come in bear witness to the recipients' good faith, ardor, and appreciation.

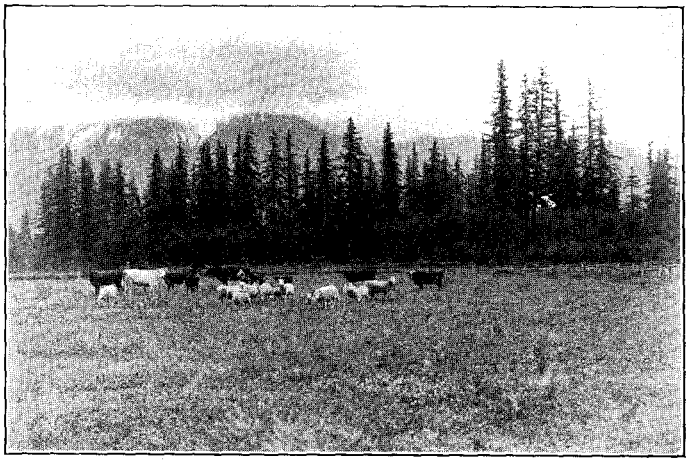
"I didn't have good results with my plot this year," one recently writes; "my dog killed a ground-hog in the middle of it."

Lamentations that "my horse ate the heads off my wheat plot," or "the chickens scratched up my seeds," only go to prove that the fault with many is over-care. Really, the plot would do better if set down in the middle of the grain-field. Still, Dr. Saunders has full right to allude to the farmers as his "army of co-experimenters," and to boast that no such gigantic and practical coöperative work for the improvement of the more important farm crops has ever been undertaken and successfully carried out before.



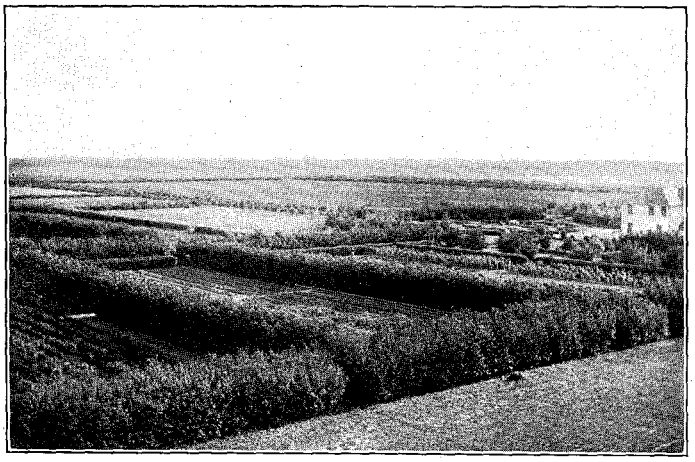
ROWS OF SPECIMEN HEDGES, AT THE CENTRAL FARM IN OTTAWA

We come now to the work of the Experimental Farms, which is the most romantic of all in the appeal it makes to the imagination, and to the possible future development of the continent — the creation of things altogether new, fruits that will survive the long winters of the Northwest and grains that will ripen during its brief summers.

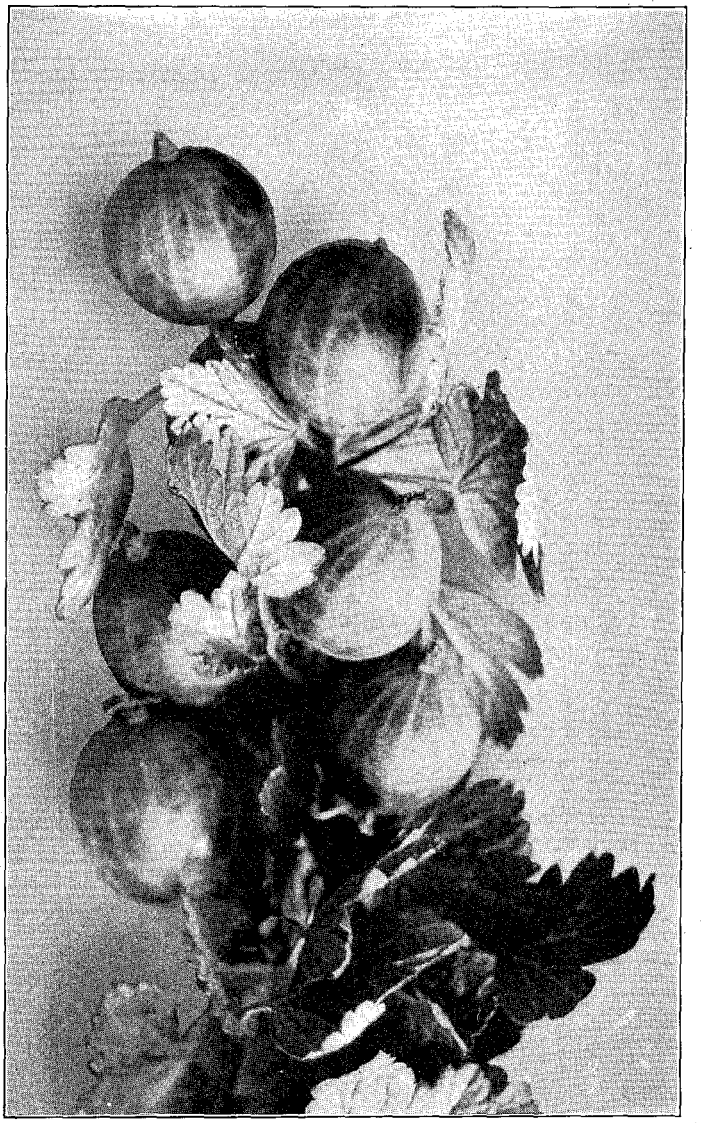


A FERTILE VALLEY OF THE LAST FARM AT AGASSIZ, BRITISH COLUMBIA

Long before Dr. Saunders began his public work he had a garden of his own in which he had cross-fertilized and experimented for years; and, coming to the Central Farm, he brought with him from his little trial ground at London, Ontario, over eight hundred seedlings, raspberries, gooseberries, and currants, the results of his own crosses. To receive these he laid out on the great new Farm a small private garden with a strong fence about it, a hedge, now ten feet high, and a padlocked gate. Within this he stowed his precious collection. It included many sorts that are



SHELTER BELTS OF TREES FOR PROTECTING GARDEN PLOTS FROM THE STRONG WINDS OF THE PRAIRIES



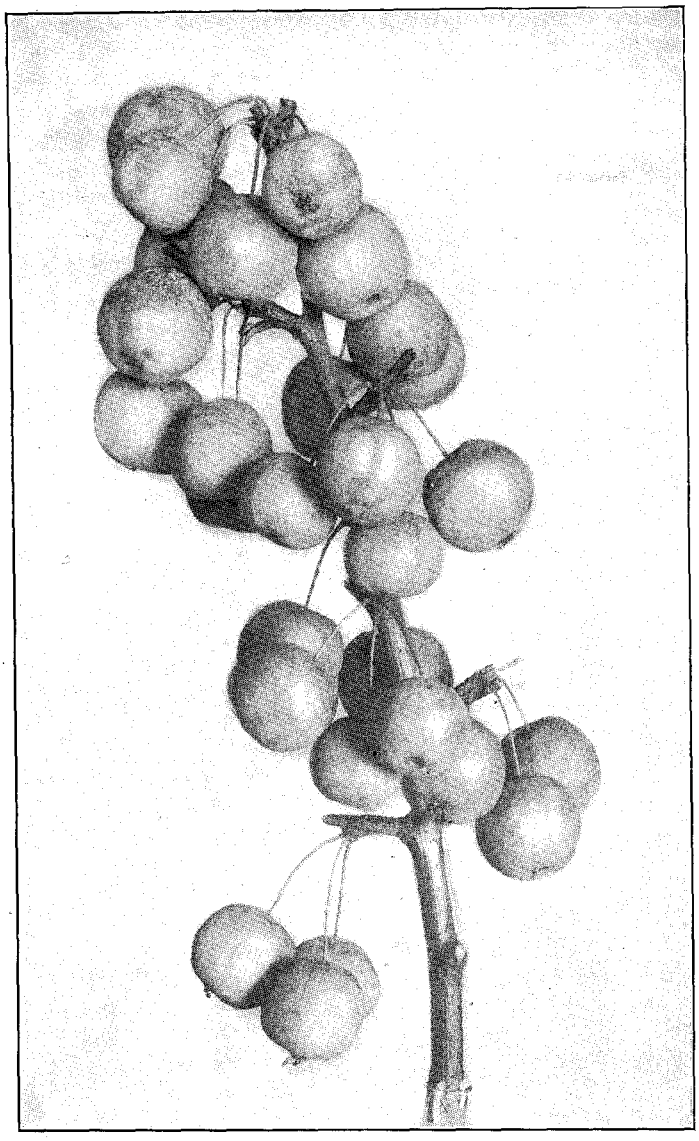
ACTUAL SIZE OF GOOSEBERRIES GROWN ON THE CANADIAN FARMS

of value in the climate of Ontario, but they were not available for the Northwest Provinces, where scarcely any fruits were hardy enough to survive, except the native Manitoba plum and a few wild berries like the sand-cherry. Of these fruits as table delicacies the less said the better — even so hardened an optimist as the Superintendent of a Northwest Farm can claim no more for them than that they are "excellent for canning." Yet the people of the Northwest were no less fruit-hungry than other people.

The fruit a farmer most wants is the apple, and in the Northwest Provinces the apple would not grow. Apples were tried by the hundreds — hardy apples from other parts of Canada; apples from Russia; seedlings raised from Russian seed in Ottawa; crabs of the toughest sort; apples grown as bushes when the trunks killed back, and trees wrapped in canvas and tar-paper *till May* — all were tried, and all failed.

The Evolution of the First Apple of the Northwest

The Western Farm Reports took on an unusual, apologetic tone. "I regret," and "Unfortunately," became the opening phrases of the sections on APPLES. The casualties were dreadful: "died this spring," or "killed, root and branch," occur with deplorable persistency. In more cheerful moments a "List of Survivors" was penned. Even garden roses were easier to



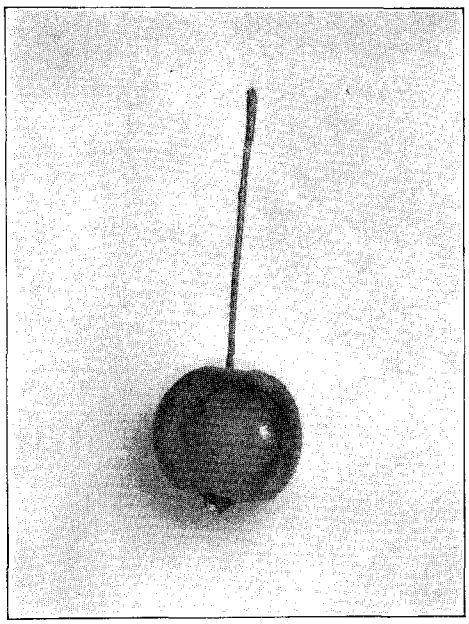
ACTUAL SIZE OF A FRUITING BRANCH OF CROSS-BRED CRAB-APPLE

raise. Brandon succeeded in growing one Transcendent crab — by casing up its stem and filling it about with earth each winter — which had reports all to itself for several years under the heading, "Standard Crab-apple"! But this as a promise for the future of apple-growing in the Northwest left something to be desired.

In 1887 there had come to the Farm from the Imperial Botanic Gardens at St. Petersburg, among other packets of seeds of hardy shrubs and trees for trial, a packet of the seed of the hardy crab-apple of Siberia, *Pyrus baccata*, the berried crab. Seedlings raised from this on the Farm bore tiny fruits the size of a cranberry, and very astringent; but when they were sent to the Northwest Farms to be tested, they were reported in due time as "perfectly hardy."

The excitement they created is tragi-comic. The Farms could scarcely believe that an apple tree had wintered in the open and stood hardy to the tips. But not till 1898 could Indian Head — the testing ground for the Northwest — triumphantly report: "The first crab-apples ever produced on this Farm were grown this year." Ten trees, it seems, were covered with blossoms, till a late May frost culled all but a few, which ultimately developed into six crabs! "They were not large," says the report complacently, "but nevertheless they were perfect apples." (The largest was the size of a pie-cherry!)

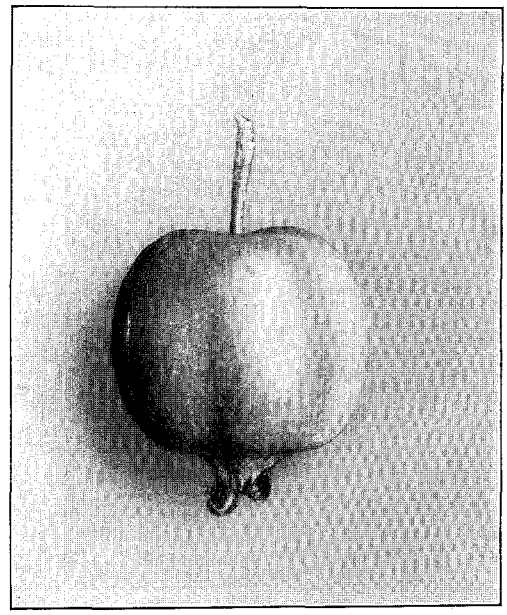
Three years later, the trees were so heavy with



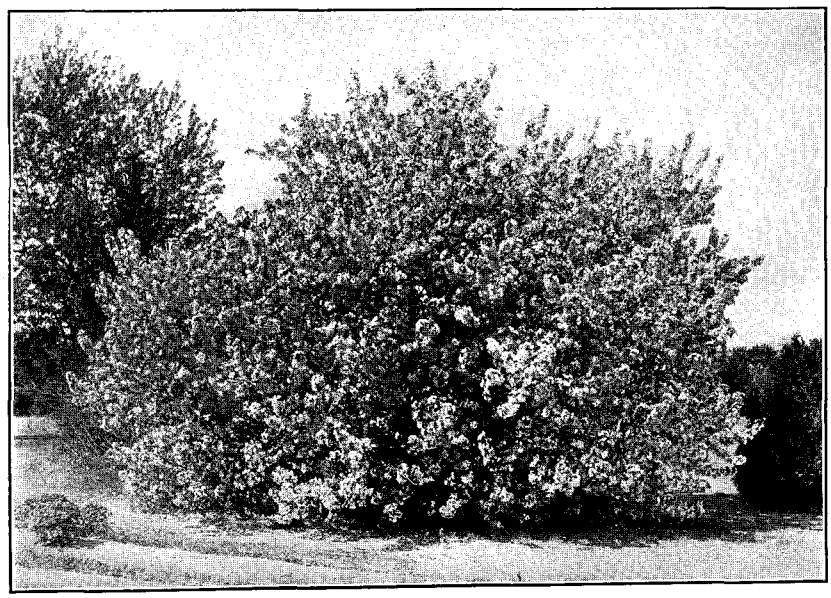
NATURAL-SIZED SPECIMEN OF THE PYRUS BACCATA, A HARDY SIBERIAN CRAB, WHICH WAS THE FIRST APPLE TO WEATHER A CANADIAN WINTER IN THE NORTHWEST

fruit that they had to be propped to keep them from breaking. The Farm then busied itself with making up samples of jelly and pickles — "for either of these commodities nothing better could be desired."

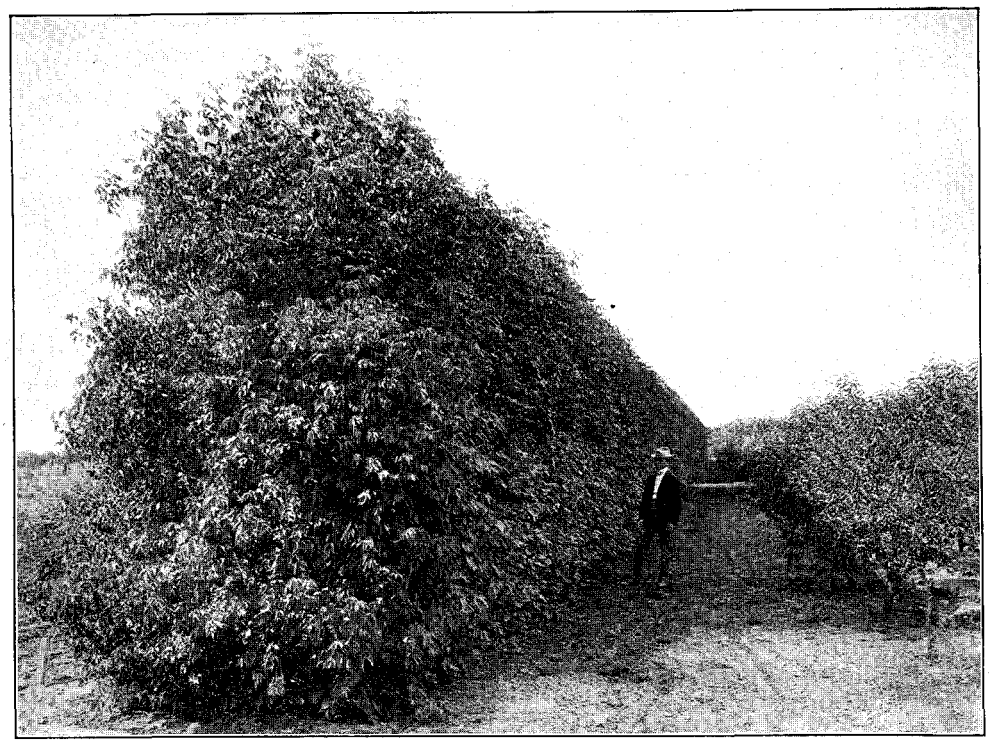
But far more important than the jelly these tiny fruits could produce was the promise they contained in their hardy sap of a possible apple for the Northwest plains. The Director took immediate advantage of it. He crossed the berried crab, and also its cousin, *Pyrus prunifolia*, a fruit a little larger and equally hardy, with a few good eating apples that were absolutely hardy at Ottawa. Four years after the first seed was planted, these prompt little cross-breds began to bear. Their fruit was several times larger and many times more palatable than that



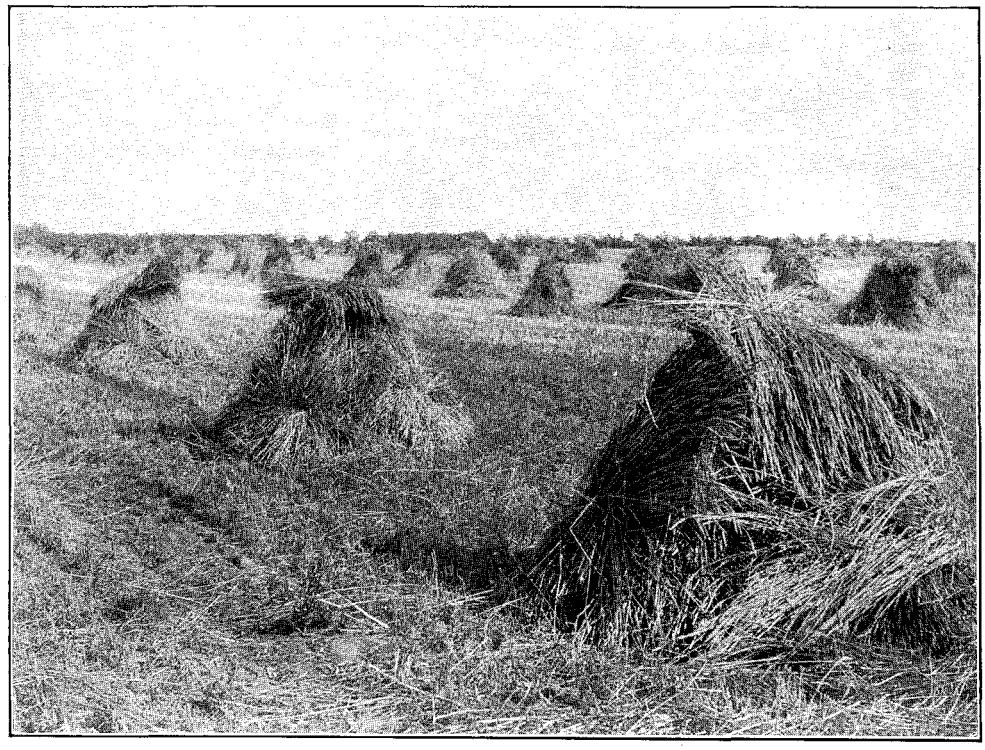
THE RESULT OF CROSS-BREEDING AN EASTERN TABLE APPLE ON THE SIBERIAN CRAB SHOWN IN THE FOREGOING PICTURE



ONE OF THE CRAB-APPLE TREES ON WHICH THE CROSS-BREEDING WAS DONE



A SHELTERING HEDGE OF THE NATIVE MANITOBA MAPLE AT BRANDON



A FIELD OF THE FAMOUS RED FIFE—THE LARGEST YIELDING WHEAT IN CANADA

DISTRIBUTION OF SEEDS FROM THE CENTRAL FARM

of their sour little mother. It was less astringent, sweeter, and juicier, ranking very fairly with our standard crab-apples. They were at once grafted on to the stock of their tough parent, the berried crab, and were distributed, as fast as Nature would permit, to the Northwest Farms.

Some Experiments in Grafting

Meanwhile, these Farms had been trying their own experiments. They were grafting on young trees of the berried crab such table apples and crabs as had proved most nearly hardy through the long winters. And they were raising seedlings from them, too, in the hope that such as survived might prove stronger than the parent tree. Each of these ventures turned out successfully. Apples not hardy on their own roots proved to be so on the wood of the tough crab tree. Seedlings of crabs that had succumbed came up and themselves lived. Best of all, snugly hedged within the little plots that had been made ready for their reception, the new cross-breds began to bear. Each of the Northwest Farms could boast an "orchard."

The Director was not satisfied yet. As his new crosses fruited, he continued to work. Of some he saved the seed as it stood — there was likelihood that it might "sport" still farther from the original tiny grandmother crab, and, while retaining her hardiness, show nearer approach to the size of the other grandparent. This hope has just been realized. Last September the first of these seedlings of seedlings to show an increase in size over its parent crosses fruited in the "cross-bred orchard." From one tree I plucked several, larger around than a good-sized egg, a handsome, dark red fruit, slightly astringent still, but making a close approach to a good dessert apple. There is a very promising group of "second crosses" — crosses with good Eastern table apples on the first hardy cross — which are just beginning to show fruit. The fruit is larger in almost every case than that of the first cross. Whether the race will be sufficiently hardy can be determined only by the ordeal of the winters at Indian Head.

Still another venture has been made. In the early years of the Farm there was placed in the arboretum a specimen tree of the wild European apple, *Pyrus Malus*, bearing a tough, scarcely edible fruit, but hardy, and at least larger than the berried crab. The Director bethought him of a cross on this too. The crosses

were made when blooming season came, and a ten-foot fence was erected in the arboretum around the little tree. But the arboretum is a popular resort for the dear public, and, despite the ten-foot fence, the fruits were stolen before they were ripe. The Northwest had therefore to wait for its crosses on *Pyrus Malus* until a tree could be grown to bearing size behind a boy-proof hedge in the Director's own little padlocked garden. There it now stands, but its crosses have not yet borne fruit.

Of recent years a new enemy to the precious cross-breds has appeared — the twig blight. *Pyrus baccata* and its crosses are specially subject to this disease. The trees begin to die at the tips of their branches, and nothing yet discovered stays the progress of the mischief. A very large number of the crosses, established after so many years of effort, have succumbed at Brandon and are completely dead. But some of the best still stand, and our courageous hybridizers are now turning to the blight-resisting sorts as the basis of a new strain that shall both bear good fruit and withstand the blight. One day the Northwest shall have its apple, hardy, blight-proof, and good to eat.

The Test of a Wheat's Market Value

Dear as a good eating apple would be to the settler in the Northwest, his real need is for a wheat. His ideal wheat must be of the very highest market value, in order to outweigh the cost of transportation to the far distant Atlantic seaboard. Roughly speaking, it is hardness of kernel and flour strength that determine a wheat's market value. After a new wheat has been bred, therefore, its flour strength must at once be put to the test. By the "strength" of a flour is meant its ability to take up a large quantity of water when mixed to a dough, and to produce a high loaf of even crust and firm texture. It can be finally determined only by an actual baking trial. But from a few kernels of a new wheat an expert like the Cerealist of the Central Farm can get an idea of the value by the "chewing test." This consists in chewing the kernels for four or five minutes and then examining the gluten thus obtained. The gluten most elastic when squeezed between the fingers marks the wheat that will make the strongest flour. The work requires patience, the Cerealist observes, and a fairly good set of teeth — both essential to all breeders of wheat!

After a certain amount of a wheat has been grown, it is subjected to an actual baking test. Something over a pound of it is passed through the two pairs of rollers and the twelve sieves of the experimental mill. The flour is kept for a month or so, and then baked in tiny pans one inch high by three inches across — a compromise between the American bread baked in the high-sided baking-tin and the English cottage loaf baked with no support. For the flour is being tested for use in both England and America. The resulting loaf looks like a very tempting "raised breakfast biscuit." Minute observations on it are recorded, one of the most important facts to the baker being the amount of water taken up by the flour (a large amount gives a dough easier to work) and the amount of water retained during baking (a large amount of water sells profitably at several cents a pound). Nutritive value and flavor are not important enough to record. A commercial flour is for the commercial baker, the consumer, here as elsewhere, takes his chance.

The strongest flour, therefore, does not inevitably make the best bread; but it is in demand throughout the world's markets for mixing with other sorts too low in strength, and the supply of it is limited. The No. 1 Hard wheat that produces it, therefore, always commands the highest price.

How an Accident Produced Canada's Finest Wheat

For Canada, the chief source of No. 1 Hard wheat is the famous "Red Fife," introduced as long ago as 1842 by a Scotchman, David Fife, then living in "Canada West," now Ontario. The *Canadian Agriculturist* of 1861 gives this account of its origin: A Glasgow friend sent Mr. Fife, early one spring, a quantity of wheat that he had got from a cargo straight from Dantzic. Mr. Fife sowed it in the spring, but it proved to be a winter wheat that should have been kept till the autumn to be put in. None of it ripened save three ears, sprung, apparently, from a single plant — a plant that was to prove a veritable Jack's bean-stalk in its growth for Canada. Mr. Fife wanted a wheat for spring sowing, and saved the seed from his three precocious ears, planting it the following spring. He sowed it too late and in a shady place,— so this fairy tale of wheat-growing tells us,— yet at the harvest it stood free from rust when all the wheat in the neighborhood had rusted. Mr. Fife carefully preserved the seed again, and from it sprang the wheat that will perpetuate his name forever in Canada. The search-light of modern criticism has recently been turned on this charming story. A few years ago the Cerealist of the Central Farm discovered that one of his imported wheats from Galicia (three hundred miles from Dantzic) was completely identical with Red Fife: Canada's greatest wheat came to her as a chance grain or so in the wrong bundle!

Red Fife, with its variety White Fife, is so high in quality and so large in yield that it serves as a standard throughout the Dominion. Carried by settlers from Ontario to Manitoba and the Northwest Territories, it seemed only to improve; and, where it can be grown, it takes the lead among Canadian wheats. Many millers are unwilling to buy any other kind.

But Red Fife is slow to ripen. Up to a certain latitude it can be depended upon to produce the much-desired No. 1 Hard. Beyond this, farther north in the plains, or up in the higher altitudes with their shorter summers, the settler was brought up short every year with the question as to whether he could harvest his crop as No. 1 Hard before the dreaded August frost, or should have to dispose of it, after freezing, as "Grade 5," for cattle feed. Farther north still, he realized that, despite the richness of the untouched soil, the question was taking the form, Can I raise wheat at all?

Pushing the Wheat Line Northward

The Story of Wheat is one of the romances of humanity. If Canada was to grow, she must grow northward; and there her need was for a wheat of the highest grade, but, above all, of the earliest ripening. Millions of fertile acres waited to yield up their holdings to him who had in his hand a wheat that could mature in that short summer. Every day that could be saved by early ripening would push the wheat line one step farther northward. This was the challenge of the North to man. How was it to be met?

Letters from a Moravian missionary "laboring in the higher altitudes of the Himalayas" had fallen under the eye of Dr. Saunders, and he was quick to notice the significance of references in them to native wheats, ripening in the brief season of those mountain-sides. Lord Dufferin, then Viceroy of India, had been Governor-General of Canada. His interest was readily enlisted, and through his coöperation several bushels of different wheats "collected by the Government of India for the benefit of Canada," some of them from an altitude of eleven thousand feet, came over to try a new climate. The Himalayan wheats ripened, the earliest of them, in ninety days. Red Fife takes one hundred and five days. But they yielded only three and a half to ten bushels an acre, where Red Fife yielded twenty-five. It was obvious that they were not worth considering.

However, early-ripening wheats may be found in high latitudes as well as at high altitudes. Russia is a great wheat country, so it was natural to turn next in the search to her northern regions. Upon application, Goegginger, the noted seed dealer of Riga, recommended to the Farms a wheat from Lake Ladoga north of St. Petersburg — a latitude six hundred miles farther north than the city of Winnipeg. This Ladoga wheat was imported in quantity, part of the shipment being distributed to farmers throughout the Northwest. It did better than the Himalayan. It ripened ten days before Red Fife and gave a large yield; but it produced a yellowish flour, and though it has already proved a boon to the settler of the far Northwest for his own use, its quality is not high enough for an export wheat.

But if these imported wheats are not in themselves valuable, why might they not be made the basis of a new stock? Why should it not be possible, by cross-breeding them with Red Fife, to produce a wheat that should combine the earliness of the foreign parent with the yield and quality of the home-bred? Work to this end was begun in 1888 by the Director, with the able assistance of Mr. W. T. Macoun, Horticulturist of the Central Farm.

The Long Search for an Early-Ripening Wheat

The wheat flower is one of those in which both the stamens and the pistil are found in the same bloom, so that, left alone, each flower fertilizes itself, the pollen falling from the anthers upon the pistil. To cross-fertilize, the covering chaff must be separated from one of the tiny wheat flowers that has not yet reached maturity. With a pair of small forceps the anthers are removed. This flower is now ready to be fertilized with pollen brought from the matured flower of another variety. An anther from such a flower is brushed gently over the pistil to be fertilized, till the latter is covered with pollen. The flower case is then closed as before. When the operation is completed, the head is tied up in a little paper bag to protect it from foreign wind-borne pollen, and attached to a bamboo cane to hold it upright, and so left till harvest time. Each kernel, when sown the following season, forms the starting-point of a new variety. With all the skill trained hands can bring to the work, the ripened kernels are always few. After six years of experiment, Dr. Saunders reports seven hundred kernels produced — half a teacupful — the result of five thousand flowers carefully worked.

From these first crosses have sprung several wheats now widely grown in the Northwest. The best three are of one parentage — Red or White Fife crossed with Ladoga — and are named Preston and Stanley and Huron. They were sent, as early as possible in their existence, to the Northwest Farms, and from the first made

a brave showing on the test plots there, side by side with Red Fife, sometimes outranking it in productiveness, and always maturing earlier. They ripened, in favorable seasons, from four to six days earlier than Red Fife; in a cold and backward year, when the ripening was slow and there was need for speed, they seemed to outdo themselves, their advantage in earliness being then ten or twelve days. In some instances Preston won by as much as two weeks. As to their quality, they were pronounced by experts to be practically on a par with Red Fife, both for bread-making and for general selling. The farmers reported hundreds of acres planted with the new sorts, particularly Preston, and many millers paid the same price for it as for Red Fife.

Records Made by the New Wheats

The new wheats have kept every promise they made on the test grounds. They not only ripen from four to twelve days earlier than Red Fife, but they often give a better yield, even in a good season; and always, when frost has to be endured. They have done wonders for wheat-growing in the colder districts in the past few years. Unfortunately, their flour is of a deeper yellowish color than that from Red Fife, and, a more serious defect, it does not possess the same extraordinary baking strength. Dr. Charles Saunders, now Cerealist at the Farm, by the utmost care in re-selection, breeding in each case from one particularly promising plant, has already improved these strains. His new Stanley now produces flour of a color identical with that from Red Fife.

A still more precious single plant he spied one day six years ago when walking through the trial plots. It is such moments as these that lend dramatic touches to the life of the hybridist. In a plot of Red Fife, one plant stood ripe four days before the rest of the plot was ready for harvest. The seed sprung from that plant now amounts to several bushels — absolutely priceless. Only a Red Fife a few days early; but a "few days" in this campaign to the northward means hundreds of miles and millions of bushels.

One other wheat promises better still — the best of all, so far. It has been named the "Marquis," and was distributed for the first time last year. Here is a wheat that ripens with Preston and Stanley and Huron, ten to twelve days before Red Fife. Better still, in color and flour strength, the few bushels thus far grown actually surpassed Red Fife of the same year. Marquis sounds too good to be true; a position above Red Fife is not finally assured by the records of only one season. But there is little question that this variety is the greatest achievement in wheat-raising at the Farms. By this year's returns, which have just come in, Marquis still holds its lead; Brandon, where a high yield for Red Fife is forty-five bushels, reports for Marquis in 1909 a yield of fifty bushels to the acre.

Hundreds of new wheats, sprung from his crosses in the past few years, are now being propagated by the Cerealist, and other hundreds are coming forward. "The work," he says, "is just now reaching the period of greatest interest, during which the most rapid advances may be expected" — and this after twenty years! Of these wheats only a few will be wanted in the end. The task of crossing, propagating, fixing, testing, and finally of deciding between them and throwing out the less worthy, is long and hard. New strains are not established overnight. It is very easy to "create" a large and miscellaneous collection of hybrid plants; but the perfect fixing of a type is often the labor of years. The "sensations" of horticulture look better on paper than they do in the field. The real progress is slow and incredibly silent-footed.

Dr. Saunders and his assistants have been very careful not as yet to recommend any of their new varieties to displace Red Fife as a main crop, where early autumn frosts are not feared. Even in such districts, however, the early wheats give the settler a chance to make the best use of his always limited "help." Where a wide crop is ripe and ready within a few days, he must cut some of his wheat still unripe in order to get the rest cut before it shells; with the same acreage ripening by relays, the harvesting is spread over several weeks, and the entire crop may be cut when at its best.

Millions of Acres Opened to Settlement by the New Wheats

But the real achievement of the new wheats is their march north, across the parallels. Offering their harvest a week, and in the more unfavorable seasons even two weeks, earlier than the old sorts; making a better pace, too, as the days lengthen to seventeen or eighteen hours of sunlight; they are conquering for wheat-growing slowly, surely, millions of acres of virgin land lying north of the present wheat-fields. Dr. Saunders, says a witty observer, has made the Canadian summer ten days longer.

And the great national result of all this? The land is of the richest; its price is enticingly low; the new wheats are ready to grow on it. Canada offers land and wheat, and bids the new settler welcome by every means in her power. As a result, there are pouring across her borders and over her great plains every year, now, tens of thousands of the best of our farmers from the

Dakotas, Minnesota, Iowa — the best in experience, in initiative, in equipment of implements and money — an exodus comparable only to the New England exodus of half a century ago which built up our own great West. The last fiscal year saw the largest emigration on record — sixty thousand American citizens, and wealth estimated at sixty million dollars, gravitating, almost the whole of it, to the great Canadian wheat-lands. Canada is solving her immigration problem in a way of which she may well be proud — at the expense of the United States.

If, of the lands available for wheat-growing, but still unoccupied, one quarter were under wheat at the average yield, Dr. Saunders estimates that the wheat crop of Canada would be over 850,000,000 bushels annually, and Canada would be the largest wheat-producing country in the world. And if these figures seem overlarge, too full of the buoyant hope of the man whose life has been spent to help them come true, at least they do not stand alone. Set beside them the utterance this past summer of a countryman of our own, Mr. W. C. Tiffany, one of the editors of the *Northwestern Miller*. He is speaking of the Province of Saskatchewan alone: "Ten years ago, Saskatchewan produced less than 5,000,000 bushels of wheat; last year she produced over 43,000,000. In ten years more she promises completely to change the conditions of the wheat markets of the world."

Saskatchewan's wheat crop for the present year, estimated at 84,000,000 bushels, shows that this great prophecy is already on the way to fulfilment. In helping it come true the Experimental Farms will have contributed their impressive share.

SEA-LAVENDER

BY

MILDRED McNEAL-SWEENEY

HERE lay the perilous gray sea,
And there the anxious-minded land,
And still the gale at the pebbles and the sand
Was tugging manfully.

And if the fields were green, not we,
Here trudging to the wind, could know;
And deemed far-wandering Spring too wise to sow
Her flowers against the sea.

It seemed a mist the storm had blown
About our feet — so pale it grew.
It glanced and turned; and briefly it was blue,
Then gray as every stone.

Fast rooted where the boulders were,
And breasting out the August gale,
We found our only flower. It was the pale,
The brave sea-lavender.