

amount of seed will be made available in Eastern Ontario this year as a result of the campaign to save the second growth for seed.

A great many farmers saved some timothy for seed, and there should be sufficient for local needs with possibly some surplus for the trade. The Kenora District promises a yield of something like 1,000 bushels of red clover, 2,000 bushels of alsike, and a considerable quantity of mixed seed. The late crops of buckwheat and corn were good in Eastern Ontario so that the silos are well filled, and buckwheat will supply some of the demands for coarse grain.

The pea crop was a variable one, yielding low averages generally, so that fields of only 10 bushels per acre were quite common. However, the supplies of both fancy and mixed peas will be adequate because of the fact that a quantity of old seed is on hand. Not more than sixty per cent. of the normal potato and root crop prevailed, but in some districts such as the Timiskaming, Sudbury and Dryden districts there were some splendid yields. A grower near Dryden is reported to have had at the rate of 1,020 bushels of potatoes on a quarter acre. General opinion lends strength to the statement that production was 25 per cent. less than it would have been had the supply of labor been adequate.

Canada's Need for Plant Pathologists.

By PROF. B. T. DICKSON, MACDONALD COLLEGE, QUE.

It is now becoming somewhat trite to say that we are living in a period of "Post-war Reconstruction". Nevertheless it is true and the Present is already laying the foundation for building the heritage of the Future. It is an unavoidable result of such a war, as has just been brought to a culmination, that the heritage to be passed to succeeding generations is loaded with taxation, since no one generation can hope to pay so formidable a debt. This is not pessimism it is simply facing facts as they are.

Is this load of taxation to be a dead load, disheartening in its effects, or may it possess elements of hope to relieve the burden? Our legislators must visualize the Canada of fifty years hence and in developing vision they will realize that there is urgent need for a greater development along certain lines of technical agriculture.

It is well known to economists, to statisticians, and to those of us who have pursued the study of scientific agriculture in its manifold phases that the Dominion of Canada loses each year millions of dollars through diseases of crop plants. It is not so well known to farmers generally because they, as a rule, are so busy that they can consider only their own troubles or those of their immediate neighbors. They realize individual losses, or county losses, but it is not so easy to visualize Provincial or Dominion losses. Consequently our legislators do not know generally to what extent such crop depreciation may affect the financial status of the crop. Occasionally one hears the voice in the wilderness but it is soon, all too soon, forgotten, and the nation continues losing its millions annually with no concerted effort to prevent this huge loss. I say no concerted effort, but one must not forget the faithful few who are working to alleviate the situation either under the Government or in our colleges. But their numerical strength needs to be trebled or more in order to make a good fight and show sufficiently tangible results.

Let us consider a few diseases and the resultant losses. Their name is legion and therefore it is only necessary to consider some of the most important.

Every grain grower knows that cereal crops suffer from rust and smuts. How many realize that this Dominion in 1916 lost approximately one hundred million bushels of wheat principally because of the Black Stem Rust? Yet this is the case. Suppose we reckon the wheat as being No. 4 and worth, say, \$1.50 per bushel; there is a loss of roughly \$150,000,000, in one year from one crop alone.

In 1910 there was a loss of \$16,000,000, to Canada from smut of cereal crops and in 1911 this financial loss amounted to \$17,000,000. Whilst it may be argued that these were bad years no one will contend for a moment that the loss has been of no account.

In Eastern Canada frequently from 30 per cent to 50 per cent of the potato crop is unsaleable because of the prevalence of the four most important diseases of potatoes. A conservative estimate will place this loss at \$4,250,000 per annum.

The Niagara Peninsula is a great fruit growing district and in 1911 the fruit growers were obliged to take out 60,000 diseased trees thereby losing not only the crop but fruit trees as well.

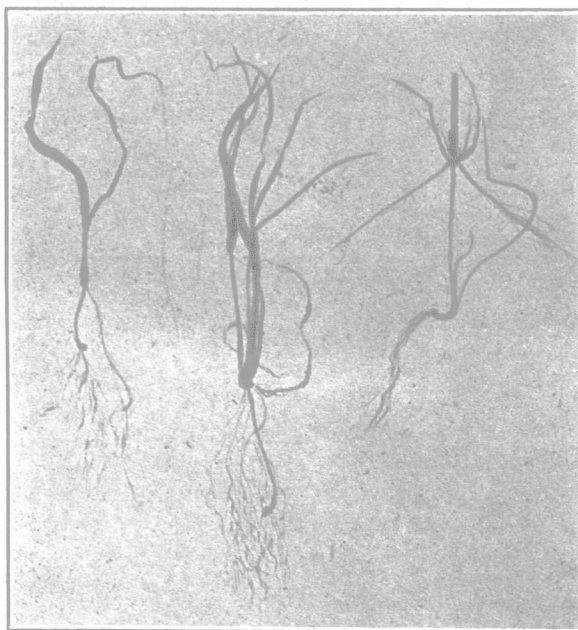
It is easy to count up thirty fruit and fruit-tree diseases and yet how many experts are there available to supervise these diseases in Ontario? There is one laboratory at St. Catharines with an expert in charge. He has one or two junior assistants. Is it possible adequately to supervise the crops of Ontario and at the same time to do research work regarding these diseases with so limited a staff? Overworked and underpaid college professors do their share to help out for the good of the country, but many more experts putting in full time are needed.

To watch potato diseases in the Dominion there are two experts again helped by one or two others. To work on rust and smuts there is one expert aided by one or two assistants. Is this situation just to the Dominion and to its greatest industry? Would such a state be tolerated for a year in a great industrial concern?

Consider for a space what the losses above quoted would pay for in the way of expert investigation. Take the loss of one year, the year 1916 from the rust of wheat. Put it at half its actual total and that would give \$75,000,000. Equip ten laboratories at \$5,000 each; pay ten expert investigators \$4,000 per annum for thirty years and after all that the Government would have spent only one-sixtieth of the amount.

This loss has been continuing for generations with greater or lesser intensity, totalling an amount impossible to conceive. In this respect Canada is far behind the United States and we are in the position of the poor man at the rich man's table. But it is not necessary here to make contrasts, it is definitely our job in our country and we have to face our own problems in our own climate. If this country is to do its share of investigation in plant diseases many more experts are needed and the young men in our agricultural colleges are the ones to whom the country must look for its future experts. That brings into the light of day the fact that, whilst there are many enthusiastic and well-trained students who would be willing to enter the profession of Plant Pathology, they do not so enter. Why is this? Simply because as a carpenter, plumber, or roadmender they could make more money.

Let us consider the requirements of a trained plant pathologist. I do not pretend that this is a complete list of subjects, nor, do I on the other hand mean to imply that a plant pathologist must know everything there is to know about each. First and foremost he must possess a good general education and he must be blessed by nature with sound commonsense and with the personality necessary to mix with men. Then properly to discharge his duties he must be trained in the following subjects: General agriculture, botany, plant physiology, histology, cytology both normal and abnormal, plant breeding for resistance, bacteriology, entomology, general chemistry, soil chemistry, biochemistry, general physics, soil physics, and last but not least mycology and plant pathology. In addition to this extensive list he must be able to keep in touch with all the latest work being done in other lands and for this he must possess a reading knowledge of French and German. Even then all this would not benefit the farmer were he not able to disseminate his knowledge. That he may be able to give out the results



Infested Fall-Wheat Plants.

The small black spots at the base of each plant represent the "flax seed" stage of the insect.

of his work he must certainly be able to write and edit to a certain extent, and to speak in public.

It is obvious that such a training would require from six to seven years in college. Put it at six and every father with a son at college will be able to reckon out his expenses.

Suppose it cost \$4,000, there is also to be considered a further \$8,000 which would have been earned by that student had he not attended college. This makes a total of \$12,000. Now what salary is offered him in order to induce him to give his services for his country's good? As a rule it is around \$1,500. At such a salary he would be working eight years before being able to recoup himself of the original expense and after all he would not be receiving anything like the salary commensurate with his training. He would be far better off as an engineer, or lawyer or doctor. Is it any wonder that the plant pathologist is a "rare bird?"

Let me in the conclusion urge two points of fundamental importance. First: That there is crying need for a greater number of expert investigators to study methods of control of plant diseases in this great country. The farmer should demand them, they become in part an insurance. Think of the future—what is to be the total financial loss in 75 years, and is no strong concerted effort to be made to redeem this loss? It will not mean immediate increased income but it will most assuredly mean future greater prosperity for agriculture. And second, that it is very necessary that the experts who are working for the benefit of their country and for man-kind should be adequately remunerated. A salary commensurate with their technical qualifications would enable men to face their work with hope and high ambition rather than with dogged patience in face of discouragement and financial disability.

Hessian Fly in Western Ontario.

The Hessian fly is one of the most destructive insects known to attack wheat. It is some years since we have had such an extensive and serious outbreak in Western Ontario as was the case in 1919. From recent observations made in Essex and Middlesex Counties, it would appear that the wisest recommendation that can be made is to plow badly-infested wheat fields as early next spring as possible, the plowing to be at least five inches deep, the ground firmly rolled, and the land planted to some other crop, such as potatoes or corn. The object of the deep plowing is to bury the immature fly and prevent its escape.

In the interest of the farmer himself every effort should be made to make a careful survey of his wheat fields, and all badly-infested wheat fields should be deeply plowed at the earliest opportunity and afterwards firmly rolled.

If infested plants are examined they will be found to be entirely dead or the central shoot will be killed or aborted. Infested plants, too, are of a light green color and the finding of "flax-seed" at or near the base of the plant is a sure indication of the presence of the insect. The drawing made from infested plants in Essex County shows the exact position of the "flax-seed" stage at this time of year.

Nothing can be done when once a plant is infested. A dressing of artificial fertilizer or barnyard manure may help to stimulate the plant and thus slightly increase the yield, but where a field is badly infested this measure is not recommended.

Unless badly-infested fields are plowed under deeply early in the spring and the ground firmly rolled, the late-planted fields which are free from "fly" this year will be seriously injured in the spring by the flies emerging from the early-planted fields. The spirit of co-operation is imperative. Unless a farmer plows under his badly-infested fields, he is not only helping to increase the spread of the insect, but is thus a direct menace to his neighbor.

Through the medium of this paper late fall planting was strongly urged last year. Where this was followed and wheat sowing delayed until the 20th of September in Middlesex County such fields appeared to be free from the fly, but this condition does not obtain in Essex County where fields planted on September 19 were, in some cases, completely ruined.

In our experimental wheat plots at Strathroy, wheat sown between September 25 and the 30th were the most promising. Although it did not make the same amount of growth as that sown early it was nevertheless free from the fly which is not the case with the earlier-planted plots. Furthermore, the late-planted wheat is a much darker green and more vigorous looking; it has been the frequent comment of farmers that the late-planted wheat is the best. This coincides with our observations in the field. In the vicinity of the plots are two wheat fields planted between September 1st and the 10th, both of these are generally infested but possibly not to the extent of recommending the plowing under of the crop.

The situation is thus a comparatively simple one. If the recommendations made, are carefully followed we confidently believe the pest can be largely controlled. Co-operation amongst farmers is of vital importance. We unhesitatingly recommend the deep plowing under of badly-infested fields; we know of no other remedy, and unless these precautions are followed we feel that wheat growing in Western Ontario is very likely to be very uncertain. The Entomological Branch of the Dominion Department of Agriculture is desirous of rendering every possible assistance to farmers in the present situation, and those who have any doubt as to the condition of their wheat fields are requested to communicate with the undersigned.

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Agriculture in New York State.

EDITOR "THE FARMER'S ADVOCATE":

The part of New York State in which I had the pleasure of spending a couple of weeks lately, visiting relatives and school-boy acquaintances, is what has come to be known as "The Finger Lakes" District. The four principal lakes of this part of the State, 40 to 60 miles southeast of Rochester, resemble the fingers of the hand in that they lie parallel to each other, and are long and narrow. The smallest and the first one counting from the west is Canandaigua Lake, nine miles long and averaging one and a half miles in width. Seneca Lake, the third in order, is the largest, being forty miles in length and about three miles wide. Lying between these two but projecting farther south is Keuka Lake, in shape something like the letter Y, the peninsula which lies between the two northern arms being known as Bluff Point. The easternmost of the four is Cayuga Lake, at whose southern end is the town of Ithaca, and on the heights above the town the famous Cornell University. The average distance between lakes is about eight miles.

The ends of these lakes seem to have been chosen as the sites of towns. Canandaigua is at the foot or northern end of the lake of the same name. Geneva, where the New York Experiment Station is situated, is at the north end of Seneca Lake, and the town which occupies a similar position in relation to Keuka Lake is Penn Yan, the peculiar name said to be an abbreviation of Pennsylvania Yankee.

These four mentioned lakes are not at all the only ones in the district. The range of parallel lakes, all with outlets to the north and emptying into Lake Ontario, continues eastward, but the lakes are much