

PLANT DISEASES.

NEEDS TO COMBAT LOSS.

Geoffrey Samuel, B.Sc. (Plant Pathologist), Waite Research Institute. All who are connected with any form of agriculture are agreed upon the desirability of eliminating, as far as possible, losses from plant disease. There is so much wasted effort involved, as well as indirect loss in crop yield, seed, manure, railway freight, and so on. Dr. Richardson, in 1910, estimated that diseases took an annual toll of 10 per cent. of the wheat crops of South Australia. Even if half this figure is taken as representing the probable loss in Australia as a whole, it is seen that wheat diseases alone must account for a loss of over £2,000,000. Add to this the loss from diseases of oats, barley, stone fruits, apples, potatoes, and so on, and it is unlikely that we escape with an annual plant disease bill of much less than £5,000,000. Indeed, the probabilities are that the figure is larger than that. It is of considerable value, therefore, occasionally to review our position in this matter; to consider what steps we are taking to reduce this huge annual loss of money and effort, and whether these steps are as efficient as they might be. The problem of reducing plant disease losses in Australia can be divided into three distinct sections:—1. Excluding plant diseases of other countries which are not yet established in Australia. 2. Bringing to every farmer the best knowledge on plant disease control which we now possess. 3. Further research work in seeking still better methods of control than those at present in operation.

Exclusion of Foreign Diseases. Australia is still one of the most fortunate countries in the world in being free from many of the worst plant diseases. It would be the height of folly if we did not make every possible effort to prevent the entry of further diseases, for when once established a disease can rarely be eradicated, and takes an annual toll in crop loss, spray material, and so on. Practically all the diseases which we at present have to contend with were brought into Australia with their host plants in the days before plant diseases were understood. As late as 1917, however, a very bad disease of vines (downy mildew) gained entry to the Commonwealth, which would indicate that our quarantine laws were not affording sufficient protection. Hitherto we have been protected by our great distance from other parts of the world, and the difficulty of sending living plants here in any quantity. This has been of the greatest service to us. But with the rapid development of transport facilities, and especially of aerial transport, the danger of the importation of new diseases becomes more real every year. More than any other country in the world therefore, we need to study the problems of how best to exclude foreign diseases. We are fortunate in having the experience of other countries to guide us to some extent. America, when she recently established her Quarantine 37, admitted that it was largely shutting the stable door after the horse had gone; for in the previous 20 years she had suffered from the introduction of a number of the most virulent plant diseases in the world, which have cost her billions of dollars and the loss of magnificent forests. We in Australia must not be apathetic because we do not know these diseases "face to face," so to speak. We can read sufficient about them to give us a permanent abhorrence of them. The list of possible enemies which might be introduced touches every phase of South Australian agriculture. Black wart of potatoes, fire-blight and cankers of apples and pears, the dreaded citrus scab, grape rots, and wheat scab are only a few that need be mentioned. The importance of making our exclusion methods as highly efficient as it is possible is therefore self-evident. It is a gratifying sign that the Federal Government has decided this year to appoint a special technical director of plant quarantine.

Spreading Knowledge of Disease Control. This also is an important phase of the subject, for probably three-quarters of our loss from plant diseases is preventable by known methods of control. For example, the annual loss from stinking smut of wheat must run into tens of thousands of pounds, and yet this disease is 99 per cent. preventable by known processes of picking the seed. The problem of how to get the knowledge of the best methods of practical disease control to the farmer who is in greatest need of it is part of the larger one of imparting the best agricultural practice in general. Indeed, this control of disease is intimately bound up with general agricultural practice. The preparation of the best seedbed for the growth of wheat will of itself tend to eliminate soil diseases, such as take-all, and the use of the best graded seed will go far towards excluding other diseases. In every district there are farmers who through unconscious experimenting of their own, and through readily assimilating new ideas from reading, are far ahead of many of their neighbours. The difference is everywhere manifested by the 30-bushel crop on one side of the fence with a 12-bushel crop on the other. It is manifested again by clean, plump grain in all the bags as against a poor and smutty sample. The man that produces the smutty grain is usually not a good reader, and pages of advice can be printed without it ever reaching him, or being assimilated properly if it does. It has been found in other countries, as well as

in our own, that personal contact is necessary to effect this assimilation of new ideas by the "12-bushel man." The outstanding example is America with her 4,000 county agents carrying new methods from the experiment stations to the farthest corners of the States. It is unquestionable that we need more agricultural instructors to perform a similar work here, and from the point of view of disease control alone, they should be able to save far more to the State than they would cost.

Research on Our Own Diseases. But it is in the field of research that our neglect has been greatest. This is the more regrettable since it is in this sphere that our greatest hopes may be considered to lie. It is especially research on the breeding of disease-resistant varieties of plants which we need. What would it not mean to have a tomato resistant to spotted wilt, a banana resistant to bunchy top, and wheat resistant to take-all, rusts, and smuts? There is no reason to regard the picture drawn as too illusory for a moment's consideration. It is a sober possibility, but a possibility which will never become fact unless much patient research work is done on the problems. In Europe and America rapid progress has been made of recent years in the breeding of varieties of plants resistant to a number of troublesome diseases. There are now potatoes resistant to black wart disease, flax resistant to flax wilt, cotton resistant to cotton wilt, tomatoes resistant to Fusarium wilt, and so on. It is noticeable that the majority of these diseases are soil diseases, and are thus particularly hard to control in any other way than by the use of resistant varieties. Such diseases are often capable of living saprophytically in the soil for many years, so that very long crop rotations have to be adopted in the absence of resistant varieties. In fact, it practically amounts to abandonment of the crop in question. The position can be well illustrated by reference to the disease known as cabbage yellows in America. Cabbages were first grown extensively in the eastern American States, but gradually the yellows disease increased in severity so that losses from 50 per cent. to 95 per cent. on badly sick soil were common. It thus became unprofitable to grow cabbages on this soil, and the centre of intensive cabbage culture moved gradually further westwards on to fresh land. Even here, however, it was not very long before the yellows disease appeared and spread, and in a few years ago many of the cabbage fields of Wisconsin were already badly "sick." About this time Professor L. R. Jones, of the Agricultural Experiment Station of the University of Wisconsin, took up in a systematic manner the breeding of resistant strains from the odd plants which survived in badly diseased fields. Strains were soon secured which showed resistance of 95 per cent. and over on the worst cabbage-sick soil. The work has been continued to the present day, and resistant strains of all the important varieties in commercial use were secured. The breeding was accompanied by research into the casual fungus of the yellows disease, and it was shown that it only infected cabbages at comparatively high soil temperatures. At very high temperatures even resistant strains showed a considerable percentage of infection, so that it was found always advisable to start even these in a non-infected seedbed. This is an excellent example of thorough practical research applied to a problem of the producer. The benefits derived as a result of it are, of course, incalculable, extending to local industry as well as to local agriculture.

Work Needed in Australia. Similar work is much needed in Australia. To take only one example, the take-all disease of wheat is certainly responsible for more loss than any other disease we have. The disease has been recognised here since about 1840 at least, and we still know practically nothing about the details of its behaviour. It is probably influenced much in its development by soil temperature, by soil moisture, by the amount of air in the soil, by the amount of humus in the soil, &c., &c.; but we do not yet know exactly at which temperature, at which moisture percentage, and so on, it is worst; still less have we selected any strains of wheat more resistant than others to the disease. Take-all has been recognised in America since 1919, and already much work has been done upon it. In recent American papers upon the disease, the most favourable soil temperature, moisture, reaction, and so on, have been determined, and it is possible that research workers here are already seeking resistant strains of wheat. They have had the disease for six years, and already know far more about it than we who have it for 66 years. Their country is much older and better equipped, of course, but a start with similar work must soon be made here. The Australian take-all is different in some respects from the American, and the American results will not necessarily apply in Australia. It is our business to investigate these questions.

A Good Omen. The establishment of the Waite Agricultural Research Institute is a good omen in this direction, but for the best results to come of it, the active interest and support of the community will have to be behind it, as it is behind the agricultural experiment stations in America. Already there are good indications that this is the case, and it may be hoped that the

institute will contribute materially towards advancing the third of our needs enumerated above, namely, further research on our own problems. This has been a very brief review of three important needs of our country in the matter of reducing loss from plant diseases, and thus also of eliminating waste of effort. What has been said on each could be supported by many interesting chapters detailing the experiences of other countries. It is desirable, however, that all should recognise these three needs as points to aim and work for, and perhaps the most important of all to us is the first, namely, plant quarantine.

ADV. 24. 7. 26

UNIVERSITY ARTS ASSOCIATION.

THE ANNUAL DINNER.

The fifteenth annual dinner of the University Arts Association was held at Covent Garden Restaurant on Friday night. The president (Mr. A. E. M. Kirwood) occupied the chair. Mr. A. Grenfell Price proposed "The University." He said 50 years ago the University began its teaching with eight matriculated students. The English debaters had praised the present brilliant body of professors, whose work was well known all over the world. The University wanted more land, as it was impossible to carry on under the present cramped conditions. Some of that land was wanted for a Students' Union building, for which £20,000 was required. Progress was bound to follow, but it would only come from within. At present they had an unrivalled opportunity of getting those things. They wanted to make the University noted, not only for its intellectual life, but for its goodfellowship. In response, Professor Darnley Naylor said when he first came to the University there was no such thing as a sports ground. They should not forget what Professor Henderson had done. But for him and a few others there might have been no cricket ground and no boatshed. If they wanted their students' halls they would have put their shoulders to the wheel. They should not always rely upon the benefactions of others. He had no fears for the future of the University. He had opportunities to go elsewhere, but he had been content to remain where he had always been happy. He looked forward to hearing great things of the University. He was pleased to have been associated with the residential college of the University. "The Professors and Lecturers" was proposed by Miss Hope Crampton, who said the influence of the lecturers and professors upon them had a great effect. She paid a tribute to Professor Naylor, but for whom, she said, the League of Nations would have been a mere name to many of the people of Adelaide. He had also done much for education. The professors stood in the forefront of intellectual achievement. Professor Sir Archibald Strong, replying to the toast, said he felt that the union was the thing they needed most in the University, notwithstanding the present lack of room. He would rather go on under the present conditions for another ten years than forego the opportunity of securing a union hall. He caused amusement by his references to conditions existing in medieval universities. A great task fell upon the Australian universities when they got abroad, and they in helping to shape the destinies of the usually failed to adapt themselves in the country. If students and professors saw least. The blatant ones were known as more of one another outside the lecture-rooms it would help to establish more firmly the present good relationships. He eulogised the work of Professor Naylor. "The Arts Association" was proposed by Mr. G. E. Kelly and seconded by Mr. L. Dixon.

ADV. 24. 7. 26

Mr. E. W. Holden, who was elected president of the Graduates Association of the University at the annual meeting of that body last night, is managing-director of Holden's Motor Body Builders, Limited. Mr. Holden, who was on a visit to England when his father died, returned to South Australia a few months ago, to assume control of the business. He had a distinguished career at the Adelaide University, where he graduated in science. While still at the University he was engaged in his father's business, where he received the training that fitted him for the position he now holds. Mr. Holden takes an interest in sport, and he hopes to see the playing grounds of the University greatly improved in the near future.

ADV. 24. 7. 26

Professor W. Mitchell (Vice-Chancellor of the Adelaide University), who went to Scotland to deliver Gifford lectures at the University of Aberdeen, reached Sydney by the Aorangi yesterday. In Canada he visited the McGill and Montreal Universities, and Hart House, at Toronto, which he described as the finest club for children in the world.

THE GRADUATES' ASSOCIATION.

ANNUAL MEETING.

The annual meeting of the Graduates' Association was held at the Prince of Wales Theatre at the University last night. The vice-president (Mr. C. T. Madigan) presented the annual report and balance-sheet, which showed that the committee had met regularly throughout the year. Much consideration had been given to the question of the proposed Students' Union, and War Memorial Building. They had every reason to expect that during the present session of Parliament, the legal transfer of the building and other property formerly occupied by the Royal Agricultural Society would take place. It was pleasing to be able to report that the University Council had sanctioned the election of a committee with power to assume responsibility to proceed with the Union and the War Memorial project. It would for the first time be in the hands of a definite and permanent body authorised to take steps towards the realisation of the union. The committee would consist of three members of the council, three members of the staff, the University Registrar, two members each from the Students' Annual Sports Association, and the Graduates' Association, and one each from the Women's Union and the Women Graduates' Association. The activities of the Graduates' Association during the year had naturally been unobtrusive, but particular attention had been paid to the social aspects of university life. Professor T. Braithford Robertson, a former president, had been one of those instrumental in forming the University Club and the association had done all that was possible in order to help with the establishment of St. Mark's College. Help had been given in the matter of the Appointments Board, and the University Magazine. With new ideas, new members, and new blood on the committee, a successful year was looked for. There were 27 financial members, and the assets were £500.

The report and balance-sheet were adopted, and the following officers elected:—Patron, Sir George Murray; president, Mr. E. W. Holden; vice-president, Mr. C. T. Madigan; treasurer, Mr. A. G. Price; committee, Dr. Helen Mayo, Mrs. J. C. McKail, Mr. F. W. Eardley, Professor A. L. Campbell, Professor J. McKellar Stewart, Mr. E. M. Barnes, and Mr. Talbot Smith. Messrs. A. Grenfell Price and Mr. C. T. Madigan were appointed as representatives of the committee empowered to deal actively with the project of the Students' Union and War Memorial Building.

Mr. E. W. Holden, in assuming office as president, said there was plenty of work for them to do. He hoped they would see the University grounds transformed into something of what they should resemble as a setting for their buildings and as playing grounds.

At the conclusion of the formal business Professor W. G. Hancock delivered a breezy address on "National Characteristics." Professor Hancock's address was most informal, and was illustrated with many amusing stories. He has a nonchalant manner, and his easy satire evidently pleased his listeners, though very often the joke was against them. He said that at Oxford and Florence there was ample opportunity to meet all the types of the world in the street. Tourists, as a rule, were the worst advertisements of a country, for they were out of their element when they got abroad, and they usually failed to adapt themselves in the country. The blatant ones were known as more of one another outside the lecture-rooms it would help to establish more firmly the present good relationships. He eulogised the work of Professor Naylor. The American tourists appeared to divide quite naturally into classes which might be labelled Philistines, boosters, collectors, and yearners, the last-named fairly oozing false sentiment. The most pleasing news that had come out of France for some time was that the French were beginning to throw things at the English Philistines, who raced round the country in charabancs. One of the salient features of the Englishman was his ungodly self-control. Englishmen were prone to be over-sensitive where the American was over-sentimental. The Englishman preserved his individuality, where the American lost his in the crowd. The governing class of England came mainly from Oxford, which was a curious mixture of aristocracy and democracy, and was a much more democratic place fundamentally than Adelaide. The greatest trait of the Englishman was his love of liberty. English integrity was known everywhere, and it was a national characteristic which caused the country to be true to her financial traditions. Australian characteristics were a mixture of those of the Englishman and the American.