

Agricultural Bureau of South Australia.

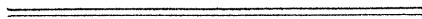


Farm & Orchard Pests.

LECTURE

BY REV. E. H. THOMPSON,

DELIVERED IN ADELAIDE, MARCH 10, 1892.



Fruit Culture.

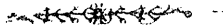
ABSTRACT OF LECTURES

DELIVERED BY

MR. D. A. CRICHTON,

VICTORIAN HORTICULTURAL INSTRUCTOR,

MARCH 2ND AND 3RD, 1892.



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FARM & ORCHARD PESTS.



Taking advantage of the presence in Adelaide of the Rev. E. H. Thompson, who has been for some time Consulting Entomologist and Vegetable Pathologist to the Government of Tasmania, and has lately been induced by his bishop and the Government of Tasmania unitedly to devote his attention for a time exclusively to the above subjects, the General Secretary of the Agricultural Bureau placed himself in communication with that gentleman, who at once consented to deliver free lectures upon "Orchard and Farm Pests" wherever possible. Accordingly, he communicated with Messrs. E. Salter, J.P., and S. Smith, both of Angaston, and arranged for a lecture by the rev. gentleman in the Institute at Angaston, on Monday, March 7. On his return to Adelaide he was kind enough to deliver a similar lecture in the Concert-hall of the Jubilee Exhibition Building, on Thursday evening, March 10, under the joint auspices of the Chamber of Manufactures and the Agricultural Bureau, of which the following is an abstract :—

Mr. T. HARDY presided, and in introducing the lecturer, said the matter which was to be brought before them was a very important one for South Australia, as the colony was to be a fruit-growing country. It appeared to him that the climate would always be in favor of fruit-growing rather than of cereals. They had a good indication during the present season, which was one of the driest ever experienced in South Australia, that there would be a fairly abundant crop of fruit all round, and the grape crop would be very good. One of the great drawbacks of the past—and probably it would be greater in the future—was the insect and fungus pests they had to contend against. In travelling through the other colonies he had been struck with the great importance of preventing the growth of these pests. There were gentlemen who from the love of research and of entomology, devoted their time to the study of these insect and fungus pests, and they should receive every encouragement from the Government and private people. He had

great pleasure in introducing one of those gentlemen who had taken that important subject up for the love of the thing.

The Rev. E. H. THOMPSON said he had always taken the greatest interest in entomology, and at the earnest request of the Tasmanian Government, backed up by the advice of his Bishop and his congregation, he had consented to take the position of Consulting Entomologist for Tasmania. In his own little island the fruit pests existed to a very large extent, and 12,000 people would be ruined there next year if some means were not found to stay their ravages. He had wished to come to South Australia during the time of the late Mr. F. S. Crawford, who had done more to assist orchardists to combat diseases than any man in Australia, and it was with the deepest regret that he heard of that gentleman's death.

TWO CLASSES OF PESTS.

Broadly speaking, there were two classes of pests—insect and fungus—and only two practicable methods of dealing with either, viz., preventive and remedial. In nine cases out of ten the preventive was the best. Numerous as the pests were, they might be expected to make still further increase, not perhaps in variety but in number and intensity. Whenever they brought animals or plants to high culture, they opened the door for many disorders or troubles which in a ruder state of existence they were strangers to.

By modern methods of interchange between various countries foreign pests were introduced, or the balance of nature was disturbed by the destruction of various species of birds or insects. The absence of one insect might be the cause of another becoming a pest. Then, again, the improvement being carried on in methods of cultivation renders plants more delicate, and at the same time makes them more tempting as food, so that insects have been known to leave their natural food, and prey and increase upon cultivated crops.

Among preventative measures the first in importance was a

THOROUGH SYSTEM OF QUARANTINE.

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In California powers were given to certain officers to declare and enforce certain rules and regulations in the nature of quarantine, and until similar precaution was taken here, they would never be safe, but always liable to the attacks of insects and fungi imported from elsewhere. The Minister of Agriculture in Victoria stated the other day that out of sixty-four varieties of insects specially injurious to fruit-trees, no less than twenty-seven had been introduced from other countries, and included amongst them some of the very worst. This

year specimens of beans badly affected with a weevil (*Bruchus obsoletus*) were sent to him by a firm of seed merchants who had imported them from America. The pear or cherry slug (*Selandria cerasi*) was introduced into Tasmania simultaneously in the north and south of the island among some imported fruit-trees from New Zealand. This was about four years ago, and it had now spread over a very large area. There was a far greater likelihood of pests being introduced from the other colonies into South Australia than into Tasmania, which was an island, and great precaution should be observed. In view of the great importance of this question, there could be no objection to the strict examination and disinfection if necessary of all trees, shrubs, plants, &c., brought here from other places. He did not at present attempt to indicate the precise form this examination or quarantine should take, but strongly urged the importance of this point on all who were interested in our agricultural and fruit-growing industries.

In order that intelligent measures might be adopted, it was necessary that people must be

TRAINED TO USE THEIR EYES.

The lack of correct information on the part of the general public was only equalled by their inability to make exact observations. It was highly important that people should be educated to seek for information, and that means should be provided for giving exact knowledge in popular form. To this end

ENTOMOLOGY SHOULD BE TAUGHT

to all children having a taste for it. Insects differed so much at different periods of their lives that the unobservant considered them different creatures.

Clean cultivation was necessary to effectually deal with any of these pests, and amongst other precautionary measures a regular system of correspondence with the Entomological and Pathological Departments of England, America, the colonies, and other parts of the world should be maintained, so that the latest information might be obtained, and the habits, seasons, &c., of the various pests might be accurately known, in order that, should they make their appearance here, we might be at once prepared to deal with them. In fact, before all the life history of some of these pests could be properly understood, they might require to be carefully observed and their habits noted for many years. In America the observations with regard to what was known as the Seventeen-year Cicada had been carried on since the year 1859, and had not been concluded yet. He had received from the American Government the other day no less than 60 volumes of books of information.

It was necessary not only to know the appearance of the insects, but also to know their habits. It was of the greatest importance to know the time when the insects were defenceless, and every one was defenceless at some time or other. Then they should take steps to

PROTECT ALL INSECT-EATING BIRDS.

He had formed a Branch of the Dicky Bird Society, and had induced 1,680 children in Tasmania to pledge themselves not to destroy their native feathered friends. Insects preferred fruit-trees to other trees, and his object was to show how they could be eradicated, not not only thoroughly, but as cheaply as possible. Before going on with insects, however, he would refer to the species of fungi commonly known as the

BLACK SPOT OR APPLE SCAB.

[The lecturer showed that the terms apple and pear "scab" are objectionable, and stated that the late Mr. Crawford used the term black spot for *Fusicladium dendriticum*.] In Tasmania that pest threatened to destroy some of the great apple orchards there, and in fact some fruit-growing districts altogether. A month ago he visited an apple orchard in Tasmania, and the fruit, which was all clean, was estimated at 4,000 bushels. A fortnight afterwards he again visited the orchard, and the black spot had got into it, and 2,000 bushels were entirely destroyed. Since arriving in Adelaide he had visited Angaston, and inspected the district thoroughly. If the trees were badly attacked in that district, then he did not know how to describe the bad condition of some orchards in his own district. When the fruit was attacked, it was a waste of time to try and save it. The proper thing to do was to prevent the spread of the disease. He believed that the black spot had two phases of existence, each of which produced distinct forms of fungi, with differing spores or seeds, one of which was ripe in the summer, and the other in the winter months. He had cultivated the black spot, and found that it grew from an invisible spore to the size of a pin's head in four days. He was now trying to find the winter or resting spore.

NOW ABOUT THE INSECTS.

An insect consists of five parts—head, thorax (carries the first pair of legs), mesothorax (carries the second pair of legs and first pair of wings), metathorax, or "body" (carries the third pair of legs and second pair of wings), and abdomen.

Insects are classified according to the metamorphoses or changes they undergo during life. The lecturer strongly urged all to study these changes, so that they would know, when they saw an insect in its early

stages, what it would be like later on. Some insects go through the whole set of changes, while others do not. Such a study as he indicated would show, for example, that a grub which would turn into a beetle has only six legs, while a caterpillar which would change into a butterfly has three pairs of true legs near the head and ten false legs or suckers.

Another important distinction to be noticed about insects was the manner in which they got their food. It would be noticed that they could be divided into two classes:—(a) Mandibulate, or those provided with jaws which curiously work horizontally, and not up and down. Beetles belong to this class. (b) Haustellate or suctorial. These had no mouth in the ordinary sense, but were provided with a sucking tube. Scale insects and aphids belong to this class. This distinction was most important, for it was perfectly useless using a poison like Paris green for an insect which drew its food through a sucking tube.

Insects did not breathe through their mouths, but through little holes (spiracles) in the sides of their bodies, and a spraying with a soapy substance would choke them. That was an important fact which should be known.

The lecturer then passed on to a description of various pests, the codlin moth, the apple bark scale, American blight, pear slug, cherry borer, curculio or weevil, apple-borer, and peach aphid. In several cases he gave the life history of the insects, and pointed out their various forms at the various stages of their existence by means of a number of well-illustrated diagrams. He dwelt at length on the codlin moth. He had very grave doubts whether the whole of the damage done by the so-called codlin moth was wholly the work of the true codlin moth. The real codlin moth nearly always laid its eggs inside the apex of an apple. When the grub hatched it came out and worked its way round to the stalk, and from there ate its way to the core, generally coming out of the side of the fruit. The cacæcia moth, which was confounded with the codlin moth, always went into the apple from the cheek and came out of the same entrance. He considered the best remedy for most insect pests was kerosine emulsion, which was fatal to all scale insects. When he said kerosine emulsion, he did not mean the stuff which some people made and called it emulsion. Kerosine should be used in double the quantity of the emulsifying liquid; milk was a good emulsifier, but they could not all get milk. A very good thing was soap. Half a pound of soap to a gallon of water; boil it, and when boiling add double the quantity (two gallons) of kerosene, and churn it

until the oil was completely broken down and became of a creamy consistency, and then dilute to nine or ten times the quantity of water, thus making about 30 gallons of emulsion. The lecturer drew attention to

THE VALUE OF INSECT FRIENDS, referring especially to the "ladybirds." A study of these useful little beetles illustrated the importance of studying all stages of an insect's life. The larva was a soft hairy grub, so unlike the pretty ladybird, that he had known people carefully pick off all their friends and kill them. Another useful class of insects was the ichneumon flies, which laid their eggs in the bodies of other insects, and so destroyed countless numbers. He asked that any persons who heard or read his lectures should take notice of the work of insects, and keep grubs under observation to see how they changed their state. He was convinced they had many friends in the enemies of the moths and grubs if they only knew them. He had a caterpillar sent to him last year out of which he had obtained 64 ichneumon flies, and several of the eggs were not hatched yet. The fly in depositing its eggs was very careful not to injure any vital part, but allowed the grub to live on until it wanted to change into the chrysalis stage, when it found it could not do so. He wanted every one to take a few grubs whenever they saw them, so that they could watch whether they lived, and if not there was some chance of finding out what killed them. The ladybirds were among our greatest insect friends. They were of great benefit while in the larvæ stage, and he had been told by a gentleman who had observed the occurrence that the larva of a ladybird had destroyed five aphis within one minute. The lecturer asked them to be particularly careful to preserve all ladybirds. Another great friend was a green fly called the tiger aphis ("Lacewing fly"). As showing how pests spread he instanced the American queen aphis, which when five days old began to produce other queens, which in their turn produced more, so that in one month as many as 940,000,000 were produced. One great principle to be observed was to preserve their friends in the insect world that might prove serviceable to them. The most certain way to destroy boring insects was to mix one part of carbolic acid with two parts tar, dip a match or some soft wood into the mixture, and plug the hole in the tree with it. To kill the pear slug simple dust, or ashes, or dry lime thrown amongst the branches would be sufficient if done before the larva (or slug) had moulted the fourth time. He thanked them very heartily for the patient hearing they had

given him, and he intimated that he would be willing to give any information which was desired if he could do so.

Messrs. Hardy, Grasby, Molineux, and others took part in a short discussion on points raised by the lecture, special reference being made to ladybirds and the relative merits of resin wash and kerosine emulsion.

Mr. HARDY thought the best way to prevent diseases from entering the colony was to quarantine every plant coming within its borders.

Mr. THOMPSON did not attach so much importance to the codlin moth as to the fusicladium, because the codlin moth could easily be stamped out. If Paris green were used as a spray, they would have to be very careful with it.

Mr. MOLINEUX moved a hearty vote of thanks to the lecturer. As Secretary of the Agricultural Bureau he had arranged with Mr. Thompson to give a number of lectures, and he had already visited Angaston. The people there agreed that he was the best lecturer they had ever heard, and he thought the audience would be of the same opinion. (Cheers.) The lecturer had been most explicit, and even those who did not take a very great interest in the subject could understand it thoroughly. He asked the company to give Mr. Thompson a real South Australian vote of thanks. This was heartily complied with.

Mr. THOMPSON, in reply, said that he had had a liking for entomology since his boyhood. His father was a great entomologist, and he (the speaker) had always found it a real pleasure to do anything of that kind. He proposed a vote of thanks to the Chairman for presiding. This was carried, and the meeting terminated. Afterwards specimens which Mr. Thompson had on view were inspected by some of the company.

On March 12 Mr. Thompson kindly repeated his lecture, which was illustrated with a great many diagrams, at the Institute, Riverton, to a large audience, presided over by Dr. F. Allwork. The notice given was very short—about five hours—but the residents gathered in force, and greatly appreciated the instruction given. The lecture was quite free from technicalities. Mr. Felix Gray, Chairman of the local Branch of the Bureau, moved a vote of thanks to the lecturer, which was carried with enthusiasm.

FRUIT CULTURE.



On Wednesday and Thursday evenings, March 2nd and 3rd, Mr. D. A. Crichton, Horticultural Lecturer for Victoria, delivered lectures on the above subject at Riverton and Clare, of which the following is an abstract:—

Mr. CRICHTON said he was exceedingly pleased with what he had seen of the settlers and the soil in South Australia, and advocated the giving of more attention to the cultivation of fruit. Some might be sceptical as to how the fruit, when grown, was to be disposed of, but they need have no fear on that score. The more fruit that was grown in this and the neighboring colonies, the greater the demand would be. Of course, they could not depend on the local market altogether, and must turn their attention to the export trade, which was the safety-valve for local production. While they had that at their command they need not fear anything in this respect. The United Kingdom would be the market, and the imports there of fruit amounted to nearly £7,000,000 annually. He was quite sure that Australia would be able, in time, to get a good share of that trade, as there was nothing in the way to prevent it. Something had been done in Victoria and Tasmania in the way of sending fresh fruit to the United Kingdom. Apples and pears had been sent from both colonies with good success, satisfactory prices having been realised. The quantity of apples imported into the United Kingdom amounted to about six million bushels, and there was about half that quantity of pears, and it would be strange indeed, if Australia could not get a fair slice of that trade. Australia had peculiar advantages, owing to the difference of the season, and we would be able to put fruit on the London market at a time when the supplies of Europe and America were practically exhausted, thus getting almost a monopoly of the London market during that period. We would also command that market when the highest prices would be obtained, which of course, would be a great advantage. The London market was really the best in the world, and no matter at what price, there were always people ready to pay for fruit, if the commodities were out of the season, and choice. He had been trained to agriculture and horticulture from his youth up, and had had considerable practice

in various parts of the world, and he had cultivated in England, Scotland, New South Wales, Victoria, and Queensland, so that his experience was a varied one. He had taken fruit into Convent Garden, and obtained as high as 25s. per lb. for grapes, 18s. to 21s. per dozen for peaches and apricots, and strawberries 2s. 6d. to 3s. 6d. per oz. He mentioned these figures to show that there was a class of people ready to pay any price for luxuries. The people of Australia would not, however, pay such fancy prices. They would admire anything out of season or superior, but would wait till it got cheaper. As Australian fruits would get to England when other fruits were out of season, they would fetch good prices. He thought they would be able to develop a profitable trade in grapes, and South Australia being somewhat nearer and earlier than the other colonies would have the advantage, and the period of transit would be a day or two shorter. He could recollect grapes being brought to England from Spain and Portugal in large quantities by sailing vessels, and it was often six or seven weeks from the time they were packed till they reached the consumer. He had seen them turned out in excellent condition, and he was quite sure that there was nothing to prevent us packing thick-skinned grapes up and sending them home in this way. In this direction they might find a large and profitable trade. Then there was the canning and drying of fruit, which was at present only in its infancy. We should be able to send that produce home in large quantities, and always find a ready market. Some of the farmers in Victoria had sent canned fruit home during the last few years, and though there was some difficulty in obtaining a footing in the British market, it had become sure. The managers of the factories told him that the trade would develop, in the course of a year or two, to ten times its present proportions, and there was nothing to prevent South Australia getting a good share of that trade, as the climate was well adapted for the raising of currants and raisins, and also for peaches, apricots, figs, apples, and pears, which were all fruits that could be dried. An unlimited amount of produce could be disposed of in this way in the United Kingdom, while there would be a larger local consumption when the housewives were able to get a good dried fruit. As regards the home consumption of fresh fruit, people were becoming more fully alive to the advantages of fruit for dietary purposes. It would be much better for us if we consumed more fruit and less animal food. If we followed the example of the southern nations of Europe in this respect, it would be to our advantage, and more especially during the warm months

of the summer, and for the younger portion of the community. There was another class of fruit he would direct attention to, and that was the citrus family, and more particularly oranges and lemons. At present the South Australian production of this fruit was limited, and large quantities were imported from the other colonies; but there was nothing to prevent South Australians growing all they wanted for their own consumption, and this would utilise a large area of country. He spoke from experience on this matter, because he had cultivated oranges for many years, and very successfully too. He could assure them that with proper attention no fruits were more profitable. None would bear more regularly, or give heavier returns to the growers. The fruit was in demand by everybody. It was used by the sick and those who were hale, and it would keep for weeks after it was gathered. It had the advantage over deciduous fruits in this respect. Then there was a peculiar pungent odour in the rind which made it objectionable to small birds. If any future production were too much for home requirements, they could always send the surplus to the United Kingdom, which imported over 7,000,000 bushels of oranges every year. The supplies, too, would get there when the supplies from the Mediterranean and Azores were exhausted.

He did not think it was possible for them to go wrong in the planting of wine grapes, and they would find for wines of a suitable class a market in the United Kingdom. The quantity of wine imported there was in round figures valued at £6,000,000, and good natural wines would readily find a sale. There might be some little difficulty at first in getting a market, but as soon as the wines were known they were bound to be appreciated, and there would be a good and steady demand. South Australians could produce good wines, but they should not attempt to produce every class of wine in the same vineyard. Let them be guided by the experience of Europe. Certain wines were produced in certain localities. Perfect sherry, port, and French clarets were only obtained in particular places. Some of the early planters in the colony had made a serious mistake in planting a number of kinds, and thought that because they had planted the sorts that formed the basis of certain well-known wines that they were bound to succeed in producing those wines. Although certain varieties were used in the production of certain wines, the results might be materially affected by local conditions, such as soil, climate, degree of ripeness of the fruit, the character of the season, and the way the grapes were treated. Let them confine their production to a few classes of wine. They would

find it greatly to their advantage. He would advise them not to name their wines blindly after those used in Europe. He had found that colonial vigneronns were making "port" and "sherry," but it would be far better to discard these names, as they would never make the port and sherry produced in Europe. Let them identify their names with the districts. If they did that they would be more likely to meet with success. By sending port and sherry to the English market the people there would not know what to think of it. Send it in the way he suggested, and if it were good it would earn and maintain a reputation. To develop a large wine trade in the colonies it would be necessary to have the work done in factories. Although some of the larger winegrowers had their own cellars and works, yet, generally speaking, they had not the necessary means and material to develop the work properly. In Victoria if a dozen settlers were growing the same kind of grapes they would make twelve different wines in the same district. That would not do. They must have character wines of the same quality, and of which they could supply 5,000 or 10,000 gallons. The factory system would be better for the growers, because the raising of the grape and its conversion into wine required different kinds of skill. Extensive plant and capital were necessary for winemaking, and moreover the ordinary settler usually wanted to realise his profits as soon as the grapes were out, and he could not do this if he made his own wine. He was pleased to say that the system he advocated had been followed in the Angaston district, and he believed it would be the only sound system of manufacturing and disposing of our wines. There was an unlimited market for them in Europe, and they might also find a considerable trade in India, as the Europeans there would be almost sure to appreciate light colonial wines of the claret and hock classes.

Referring to the establishment of orchards, he did not think any one need hesitate in planting vines or any other fruit-trees, and he hoped that the Riverton district would be turned into full account and made more thrifty by enterprise in this direction. In detailing the practical work to be gone through in the planting of fruit-trees, he impressed upon them the necessity of knowing beforehand what they were really going to plant. They must understand definitely what kinds and varieties were best adapted for the district, and for what purpose they wanted the fruit. Let them pay special attention to the sorts of fruit which throve best in the district, and select those varieties likely to return the most profits. If they

were going in for raising fruit for export, apples and pears (in which he believed a large trade would be done in the future) should be selected, preference being given to long-keeping varieties. Early or mid-season kinds would be perfectly useless. They should also select kinds which had a pleasing appearance, as good-looking fruit affected a buyer to a considerable extent. If they intended going in for canning and drying, they must also get the best sorts. For instance, in peaches, such varieties as the Royal George and the Noblesse were perfectly useless for this purpose. The peaches required for canning and drying were those with a firm flesh and tough fibre. But whatever fruit they planted, whether for drying or canning, they should not plant too many varieties, a mistake which many of the early cultivators made. When they sent to the market, they must do so in quantity.

As to the cultivation of the soil, there was a good deal of difference of opinion. He advised them as a rule to prepare the ground thoroughly in planting. They would find it the most economical and the best in the long run. Although it might cost a little more at the start, it would be far cheaper in the end, and the extra expenditure would be money well spent. A good foundation for an orchard or a vineyard was as necessary as in building a house; and the firmer basis they had, the more likely they were to have thrifty and long-lived trees. If they had soil of a retentive character, he would strongly advise them to break through it and stir it to a depth of 15 inches. This could easily be done by double ploughing—first going over the land in the ordinary way, and then a second time without the mouldboards. In light, open soils the ordinary ploughing would be sufficient. Cultivators should remember that a deeply-worked soil would hold more moisture, and retain it better than another; and, moreover, the moisture would be retained at a time of the year when it would prove very beneficial. Then they must provide for effective drainage. When the water collected about on stiff clayey land it was very detrimental, and the extra expenditure in this direction would be well invested.

In buying from nurserymen, they must insist on getting good young plants, with straight stems, good heads, and a fair proportion of roots, and they should see that they were on good and suitable stocks. As a general rule the closer the affinity between the stock and the plant worked upon it the better—at any rate that was his experience. Of course there were some exceptions, but he preferred an apricot on an apricot, a peach on a peach, or a plum on a plum. Sometimes an apricot or a plum throve in wet heavy land, and

the almond might be a useful stock for the peach under certain conditions, but on the whole there was not so much durability as with trees which were on stocks of closer affinity. He regretted that horticultural science was backward in respect to stocks. Experiments had been tried in America and Europe as to the influence of different stocks, and some curious results had been the consequence. A pear on a quince stock was dwarfed, and many were much altered in character. The different horticultural societies should make investigations in this respect.

He would advise planters to take a little more care with trees before putting them into the ground. Thousands of trees in each of the colonies died every year from neglect in this direction. They were taken from the ground and left lying about, perhaps for days without being covered. Then they were often imperfectly packed, and sent on long journeys, with the consequence that the roots were materially injured, and this, of course, must be of detriment to the plant. Although deciduous trees would stand a good deal, care should be taken of them. They should be protected from the harsh winds which so often prevailed at the planting season.

Many thousands of cuttings also died when planted, not so much owing to the effects of the climate, but because before they were put into the ground they had been neglected, and were little more than so many sticks. Frequently in vineyards the vines were pruned, and the prunings left on the ground before they were made cuttings. Harsh winds prevailed at the time, and often before the cuttings were made, they were injured, the result being that very few could possibly grow. They must insist on having the cuttings fresh, and the sooner they were made after the pruning the better. As soon as the planters received them they should be placed in the ground as soon as possible, and the results he had referred to prevented.

Care must be taken not to plant trees too deep. As a rule they should not put the tree deeper into the ground than was the case in the nursery bed. Put the crown of the roots below the surface, and cut out the mutilated roots, which were almost sure to be found after the plants were taken from the nursery bed. If the injured roots were not taken away, they would only interfere with the others. He was glad that South Australian planters generally gave plenty of room between the trees, as this was an important thing. Trees which attained a great size, and lived for a long time, should not be planted less than 24 feet apart. The apple-tree attained an age of 150 years, the pear from 200 to 250 years, and the orange from

300 to 400 years, and if these trees, for instance, were crowded, it stood to reason that they would not stand the same chance as if given plenty of room.

He commended the practice of planting vines 10 ft. apart, as he noticed had been done in the district. They would get more grapes by adopting this custom than if they planted them five times as thickly.

Orchard trees should be trained with low heads, but still sufficiently high to allow cultural operations to be got through. A low head sheltered the stem, and this was advantageous in a hot country. Young trees especially often suffered severely from the heat of the sun. The effect of the sun could be prevented by enclosing the stems in bark, which might be obtained from young saplings. As soon, however, as the sun lost its power this bark covering should be taken off, as it was very necessary that the wood should properly ripen. He objected to the practice of thinning out the centres of the trees. This might be all very well in Europe and North America, where the ripening period for fruits was late and the cultivator had to assist in this respect, but that was not required here, as the sun was quite powerful enough. They should rather exclude than get the sun into the trees. Vines should not be topped near the bunches. The art of pruning was a most important one to the horticulturists, and yet it was one which was least understood. There was really but a small proportion of cultivators who thoroughly understood the art and theory of pruning. The theory of pruning was to prompt development in certain directions by checking it in others. This could be effected by cutting the branches, which promoted the growth of the wood, and by reducing the action of the roots by root-pruning. By practising these two methods the cultivator had great power over his trees. With young trees the object was to get a good growth, and this could be obtained by concentrating the strength of the plant in two or three channels. When the trees arrived at the fruitgrowing stage many which had been properly attended to in their youth would not require so much attention. The symmetry of the trees should be preserved, but over-pruning should be avoided, as many by injudicious cutting did more harm than good. Some trees, such as the pear, were prone to make a lot of wood, and the common practice was to cut them back severely. That was just what should not be done, because the plant would naturally make a strong effort to restore the balance which had been removed. The proper way was to reduce the growth by root-pruning. By taking some of the roots away there was less vigor left in the plant, not

so much propensity to the production of wood, and more to the formation of fruit. The common, economical, and fairly effective way of root-pruning was to make a semi-circular trench one year and to sever all the roots outside, and then next year to make a similar trench the other side of the tree, and perform a similar operation. The better plan was to bar the roots all round, and cut off some of the fibres.

Peach and apricot-trees required pruning, no matter what the age. The big shoots should be shortened off to two or three fruit-buds. If they were allowed to grow out, the shoot would get thin; and although they might bear a large amount of fruit, it would be small in size and inferior in quality. Although after pruning the fruit might not be so numerous, it would be of better quality; and in the end the return would be the same, if not better. The remarks which applied to peaches also applied to nectarines, as nectarines were raised from peaches, and peaches from nectarines. He would like to mention that plants grown from the kernel thrived better if they were allowed to grow where originally planted than if transplanted, and they were not so prone to disease.

He was glad to see that South Australian growers saw the value of clean cultivation. They should keep the ground as clean as possible, but he wished to caution them against the barbarous practice which was often adopted of ploughing among the roots of fruit-trees. By so doing the surface fibres, which were the mouths and feeders of the trees, were mutilated.

They must not expect, too, to be able to pick crop after crop of fruit without returning something to the soil. Fruit crops were more exhausting to the soil than other crops, because they were always taking precisely the same materials from the soil; whereas with cereals, &c, the crops could be varied each year. The land often became exhausted of minerals. In this colony there was no fear of lime being wanted, but they might require potash. The trees must be fed in accordance with what was taken from the land. If they used manure, they should not give it too heavy a dressing. Light dressings were much preferable. He strongly advocated mulching the land and covering the surface with litter and straw. This checked evaporation, and the retention of the moisture in the ground in summer made a great difference with the crop. It might be said that this would not be applicable to a large area, but what was beneficial for a small area should be applied to a large one. He was convinced that this was one of the greatest aids the cultivator had in a warm climate. The ground should not be allowed to harden before the dressing was applied.

Too much dressing should not be applied. Four inches was ample, and it should extend as far as the roots went.

Water should be used with great judgment in fruit-culture. He was afraid that there would be serious trouble in the irrigation colonies from the injudicious use of water. Water would be injurious to deciduous trees after the fruit had attained its full size. It would be better to keep them rather dry then. While the fruit was expanding it might be useful, but to give an excess of water when not required would deteriorate the quality of the fruit. Water was not required in winter, but in a dry spring when they were starting it might advantageously be used. Trees in blossom should not be watered, or serious results would accrue. It was also rather dangerous to water peaches and apricots when stoning. When the fruit was about two-thirds grown water might be applied. Oranges might be given a liberal supply, and it might be even necessary to water them in winter. Another ill effect of over-watering was that a prolonged growth was caused which was not desirable.

Sometimes trees flowered profusely, but the blossoms dropped off, and there was no fruit. That might be caused by a deficiency in the soil, want of potash, for instance, but sometimes it was due to an excess of sap at the flowering period, which affected the fertilizing part of the flowers, and prevented proper fructification. He had experience of this, and found that the best plan to adopt was to make a ring around the tree into the wood, in order to check the flow of sap, just before the flowers open. After doing that he found he always got good crops. Of course, they must not think they were ringing gum-trees—only a narrow slit with a knife, about one-eighth of an inch deep, would be sufficient, a cut which would heal. The following season clean cultivation prevented disease to a great extent. In conclusion, he hoped that horticulture and viticulture would be taken up in the district, as he felt sure that success would result.

Mr. MOLINEUX moved a vote of thanks to Mr. Crichton for the lecture. He mentioned that the world's product in wine was 2,566,380,000 gallons, of which Australia produced 2,200,000 gallons, which was like a drop in a bucket. If growers went in for one sort they would always be able to find a reliable market for desiccated fruits, supplies of which were required for the armies and navies, for instance. Mr. Crichton was a thoroughly practical man, and they would do well to profit by his remarks.

The motion was carried with acclamation.

AT CLARE.

On Wednesday, March 3, we went on to Clare, viâ Saddleworth and Auburn. On the road we passed a good many orchards and vineyards, including the vineyard belonging to Mr. Sobels. In every case the trees and vines showed the greatest luxuriance, and we noted no signs of disease. The crops of fruit have been much diminished through the frost on the 14th October last. On arrival at Clare we were met by Mr. W. Kimber (Hon. Sec.), Mr. John Christison, and other members of the Clare Branch, who took us for a drive around the district. Kimber Bros.' raisin and currant vineyard will give about three tons of fresh fruit per acre, notwithstanding the frost before-mentioned. The area under fruit-trees and vines in this district has largely increased lately, and enquiries are constantly being made for land by strangers desirous of entering upon the industry. Several young men from Angaston have secured lots in the vicinity.

In the evening Mr. D. A. Crichton lectured in the Town Hall, Clare, extemporaneously, the subject matter being practically the same as that of the Riverton address. In reply to questions, Mr. Crichton said the best apples to grow for export were the Cleopatra, Reinette de Canada, Lamb Abbe Pearmain, Adams Pearmain, Five Crown Pippin, Sturmer Pippin, Rome Beauty, Rymer, Nickajack, Jonathan, and Herefordshire Pearmain. The most suitable pears were Vicar of Winkfield (a regular cropper which always bore well), Beurre de Cappiaumont, Beurre du Bosc, Josephine Malines, Glou Morceau, and L'Inconnue; and for canning the best, perhaps, were the Duchess (known as the Bartlett), Beurre Bretonau, and Josephine de Malines. Apricots—Moorpark (early and late), Oullin's Early Peach, Kaisha, and Pennant Hills Oval. Peaches—Crawford's Early and Late, Selway. Evaporating—Plums—Fellemborg, Prune de Argen, and Ickworth's Imperatrice. Figs—Ischia, White Provence, White Marseilles, and Brown Turkey. At the conclusion of the lecture Mr. Crichton was besieged with questions from cultivators, and he dispensed no end of information. A hearty vote of thanks was accorded him for his trouble. The party returned to Adelaide on Friday, March 4.

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