FRUIT GROWING.*

NO doubt some of you will, after perusing the title of this paper, maintain that the whole business of fruit-growing, together with its marketing problems, is a vital one to us and needs investigation and concerted action to place it on a semblance of a business footing. Apple growers especially, no doubt, feel that, unless something is done to place the marketing of their produce on a better footing, this particular phase of orchard activities will cease to be attractive to them. Whilst I would agree with you in this, it is not my intention to deal with this aspect of the problem; except very briefly, but to take a few facts which, in my opinion, are needful of investigation and attention by fruit-growers as a body, and which apply more to the first operations of establishing an orchard, and to its subsequent management, than to the ultimate disposition of the yields.

I propose to start at the beginning of the life of orchard trees, and to give some facts relating to them whilst still in the nursery, and then to follow them into maturity. It will be readily agreed that the first essential in planting an orchard is to secure the best trees available. No farmer would think of sowing a paddock with seed of which he was not certain with regard to variety and grade, and this being so with regard to a crop which will only occupy the land for a few months, how much more should it apply to the planting of trees which will be looked to provide a yearly income for a long period.

It is the nurseryman's business to provide trees to the best of his ability and right here it becomes apparent that the nurserymen themselves need assistance, and would welcome any attempt to carry into effect some of the suggestions contained in this paper. It is, in a number of instances, very difficult for nurserymen to secure buds or scions for propagation from trees which have a proved record for consistent and heavy bearing of quality fruit. This brings us to the first important matter in connection with which research work is urgently needed in Australia, namely:

BUD SELECTION.

Bud selection is a vital matter and needs investigation even more urgently than is commonly realised. Most of you will be acquainted with the fact that, in orchards comprised of leading varieties of commercial fruits, there are distinct variations in the same variety, some of them even departing from their usual characteristics so far as to become hardly recognisable. To propagate from such a tree would not be a safe procedure, no matter how slight the variation may be, and I now put forward a suggestion on behalf of future orchardists of this State, that in connection with the leading commercial varieties—which, after all, are comparatively few in number—a number of trees should be propagated from the finest proved stock available, planted out, and after having proved themselves to be worthy of being the foundation of future orchards, the scions could be supplied to nurserymen, who would then in a measure be sure of the quality of the trees propagated. I am quite aware that this could not be done by private enterprise, because it is comparatively lengthy, and quite unremunerative procedure, but if undertaken by the Department of Agriculture, I am confident that the small expenditure of maintaining these few score of trees would be warranted, as it would, in a measure, be an insurance against orchards being planted with varieties with a doubtful or very inferior parentage.

* By H. N. Wicks in Bulletin No. 219 of the Department of Agriculture of South Australia.

In support of this claim I would point out two significant features in the position. Firstly, the present day nurseryman has to obtain buds and scions for propagation of his saleable stock in trade, from any source available, which is usually a private gardener adjacent to his nursery. The drawbacks to this practice are too evident after my previous remarks to need further comment. Secondly, in other parts of the world, the importance of this matter has been realised and action is being taken with marked results. In some of the States of America, it has been made illegal for a nurseryman to propagate a certain variety of fruit tree from any parent other than those especially selected for the purpose by the Government. This being so, can a young country like Australia, which must come into direct competition with other countries on the world's markets, afford to take any chances with regard to its future plantings of commercial lines of fruit trees.

By commercial lines I mean such varieties as the Aoorpark Apricot, together with perhaps one or two other varieties of the same class, apples such as Cleopatra, Jonathan, Dunn's Favourite, Granny Smith, and a few others, and in short, those varieties which are planted in large quantities for production of fruit which will ultimately be sold—either dried or fresh—on the world's markets. The establishment of a small block of trees in one or two districts would be sufficient for the purpose, and would not be costly to either establish or maintain, and I am sure, would prove in years to come to be productive of many times the cost of maintenance, in the production of better yields of finer quality fruit, which we must produce if we are to hold a position in the world's markets.

STOCK TESTS.

Let up suppose, for the time being, that the conditions outlined above are at present in operation, and that bud selection from pedigreed trees is common practice. We are then immediately faced with another problem of no less importance than the former one. I refer to the matter of stocks for the various trees. In dealing with this matter I intend to discuss only those lines which I consider need attention most urgently at the present time. For those who are not familiar with phrases usually applied in nursery practice, allow me, before going any further, to mention that the word stock generally applies to the seedling or cutting into which the bud or graft of the required variety is placed, the greater portion of same being removed when the bud starts into growth. For the purpose of this talk, and that you may better follow my remarks, I will call these seedlings and cuttings, stock or stocks, and the buds or grafts which are placed in same, scions.

There is an appalling lack of knowledge the world over with regard to the relationship between stock and scion, and the effect one has on the other. That each is affected by the other is quite beyond dispute, but just what effect is produced by combinations is unknown and there is room for a vast amount of investigation. It is a remarkable fact, but very noticeable to any one who has had much experience in propagation, that not only has the stock an effect over the growth and habit of the scion, but *vice versa* also. If we take a stock which has a tendency to go straight down by forming one or two tap roots—such as pear stocks usually do—it will be noticed that if an upright variety such as Kieffer's Hybrid is budded on to it, the root system apparently does not alter. But if we work a scion of widely spreading habit on to the same stock, the root system immediately tends to take on a spreading tendency, thus proving that both stock and scion are affected one with the other.

The root stocks at present in common use in Australia are not altogether satisfactory under all conditions, and in some instances are very unsuccessful. Let us take a few examples. The stock most generally used for plums and

prunes is *Prunus myrabolana,* commonly called Myrobalan, which is a very thriftly, strong grower, and is no doubt eminently suited for quite a number of varieties, but nevertheless has its drawbacks. Those who grow prunes of the d'Agen or Splendor varieties will be fully acquainted with the shoots which persistently appear from below the union of stock and scion in these varieties. These crown shoots are often erroneously called suckers, but in reality are quite different, being shoots from the main stem of the tree, and not from the roots, as in the case with suckers. These shoots are the direct result of the unsuitability of the Myrobalan stock for these particular varieties for the following very simple reason. Both these varieties are not so strong in their growth as the stock itself, and these shoots are the results of a restriction of growth at the union of stock and scion, and are the only means the stock has of getting rid of its surplus growth. If an excessively strong grower, such as some of the Japanese varieties, is budded on to the Myrobalan stock these shoots will very rarely, if ever, appear. Quite a number of the European varieties of plums are not sufficiently robust to occupy the whole energies of the Myrobalan stock which forms its foundation, and in some instances these resultant offsets from the base of the tree are a source of continual annoyance to the orchardist, having to be removed periodically.

Nevertheless, at the present time, there is no stock which will give such good, allround results as the Myrobalan seedling, and, therefore we must put up with the trouble of these off shoots in the meantime, but I think that a stock of slightly dwarfing habits, but with the vigor and hardiness of the Myrobalan, would be more suitable for a majority of the slower growing varieties of European plums.

The majority of apple trees at the present time in Australia are worked on to the Northern Spy stock which is completely blight proof; thus trees on this stock are not affected underground with the American blight, commonly called woolly aphis, but this pest is in this way confined to the top of the trees where it can be attacked and destroyed to a certain extent.

Recently, there has been a controversy in the fruit-growing periodicals of Australia debating the merits and demerits of this stock for apples, and a number of writers maintain that the seedling stock is superior in many ways, and that the blight which attacks the roots never becomes so strong as to eradicate or kill the parent tree. I have no desire to enter into a controversy on this very debatable subject, but will go so far to say that it is claimed by some growers that in some districts of Tasmania the trees fruit more heavily and more consistently on the seedling stock, having good crops every season.

One of the greatest factors at present worrying the minds of apple producers in this State is the tendency of some leading varieties to crop on alternate seasons only, and until experiments are carried out under the conditions in which this fruit is grown, who is to say that the matter of stock relationship to the scion—if properly understood—will not overcome this discrepancy? There is no doubt that at present, in this State at any rate, our apple production seems to be, in a great measure, an every-other-year job and the producers would be far better off if a happy medium could be secured. There are numerous theories relating to this matter, but none of them are to my mind anywhere near conclusive. I have old trees under observation standing on the seedling stock, and they are undoubtedly more consistent than those on the Spy, but this may be on account of their age. However, I am sure that investigation in this connection will not be wasted. No doubt some will reply that these tests have already been tried out in other parts of the world. I am quite ready to grant all this, but would

point out the futility of taking these results and applying them to our conditions. The only way to obtain authentic tests is to make them under the conditions in which the trees are ultimately to grow.

Rules of horticulture in regard to propagation and other factors which must be strictly adhered to in other parts of the world can often be entirely eliminated here or altered to a great extent, and it is useless in this class of work to take as final the results obtained in other parts of the world where conditions may be very different to those obtaining here.

With regard to this stock question, I can see very serious trouble ahead for pear growers unless a blight-proof stock is found for these trees, because the stocks at present in use for pear trees are very susceptible to the pear woolly aphis, which is playing havoc in pear plantations all over the Commonwealth, and it is essential that either a sure remedy for this pest be obtained or otherwise we must look to combat the evil by a suitable resistant stock.

Having outlined suggestions whereby planters would be able to secure better trees should these suggestions be put into force, I will now deal with several matters which will apply after the trees are in the orchard and commencing to bear, and which, so far, are not being investigated locally as they should be.

INTER-POLLINATION OR CROSS-FERTILISATION.

Perhaps the foremost matter in this connection would be a closer study of inter-pollination or cross-fertilisation. That great benefits are to be secured by this practice in certain districts and under certain conditions is now an established fact, and evidence is very plentiful on this point, and it is the exception now-a-days for a planter to ignore this factor when planting his orchard, whereas a few years ago this was looked upon to be a fad. My experience in this connection covers a number of years of practical experimenting, and results were not lacking from the beginning. My first trial of any importance was on a block of about three acres of Jonathan apples, which although being light crops, were not doing their duty.

Having tried every method of pruning I could conceive, together with manuring tests, I left them unpruned for a season with even poorer results than before, although they were most profuse in blossoming. The following season I placed a tin or a bottle in a number of the trees filling same with water, and then placed a limb of another variety of apple which was blossoming at the same time as the Jonathan in the water to keep it fresh. This was done at the time when the trees could be classed as in full bloom, and the small limbs containing the foreign blooms kept fresh until the Jonathans had completed their blossoming period. The result of this test was so remarkable that the following season I used every available tin, and scoured the district for blossom, and managed to pollinate several acres by placing the twig of foreign bloom in every tree. The result of this was that the trees carried their first payable crop. So convinced was I of the necessity of this practice, that I lost no time in heading off about 200 trees ranging from 10 to 16 years old, and interspersed throughout the blocks of Jonathans, and grafting varieties on to them which would pollinate the Jonathans. That the same necessity exists in every district I would not venture to suggest, for I believe that in some districts cross-pollination is not as necessary as it is in other areas, but just what causes the difference we do not at present know, or cannot even surmise, but I consider that very probably this could be ascertained by research work. Then again, some varieties are quite self-fertile and pollination is unnecessary, and complete data as to which varieties would be benefitted by this practice is not available, but if a schedule was available of varieties which, under most

conditions are known to be self-fertile, it would be of great benefit to planters generally. Just what makes blossoms infertile is somewhat of a problem and research work would be valuable in this connection, and it is quite possible that some chemical action could be discovered which could be manipulated by growers to enable fruit buds to be stimulated into fruit production. As far back as 1914, the United States Journal of Agricultural Research reported on experiments with a Nitrate of Soda Spray with this end in view. A solution was concocted with the following ingredients:— Nitrate of Soda 50 lb. Caustic Soda 6 lb. and Water 50 gallons, and this was thoroughly sprayed on to the trees at a period of the year corresponding to about August 1st, in Australia. The report on the experiment states:— "It is evident that at least under certain conditions some varieties of apples and pears that are more or less self-sterile may have their crop production materially increased by dormant spraying with solutions of Nitrate of Soda plus Caustic Soda. The combination of Nitrate of Soda and Lime Sulphur is apparently capable of bringing about the same results. Aside from the effect on crop production there has also been a very noticeable improvement in the colour, abundance, and vigor of the foliage, and it seems possible that Nitrate spraying of dormant trees may be a valuable supplement to the ordinary fertiliser practices in obtaining quick results in orchards suffering from lack of Nitrogen. The writers will make no attempt at present to explain the peculiar effect of Nitrate of Soda in increasing the production of more or less self-sterile varieties of fruits, or in improving foliage growth."

From the foregoing extract it will be seen that the matter of assisting infertile blooms to become fertile and produce fruit by chemical process and human agency is not only feasible, but has actually been carried into effect.

This being so, it seems quite reasonable that in this age of science the time will come when we may actually be able to prevent the alternate cropping of so many of our fruits by chemical application, and thus give us more staple and even production.

At present an extremely heavy blooming does not necessarily mean a heavy crop of fruit, this fact pointing to a lack of something in the blooms themselves. Tests of this character would not be difficult to arrange, and might bring to light much that might help us.

SPRAYING.

This all-important part of fruit culture has, through recent years, been forced to the foremost of all orchard operations by reason of the rapid increase in the pests we have to fight. The hordes of attacking parasites which continually beset the present-day orchardist are sufficient to break the heart of any but the hardiest and most optimistic in the ranks of the producers, and the sprayer is now a vital factor in the production of good fruit. This is fully realised by all who have to earn their living by fruit production, and yet there is an immense amount of laxity and even carelessness in applying the different formulas and more uniformity is essential in this connection. Such spray mixtures as Bordeaux are often spoiled before application by erroneous methods of mixing and application. Accuracy in preparing such sprays as Arsenate of Lead is essential if we are to avoid excessive arsenic content in the fruit when marketed, carelessness in weighing the ingredients being one of the chief faults in this connection. The Lime Sulphur solution has now taken a permanent place in a number of orchards instead of Bordeaux mixture, but this material is not safe to use when the temperature of the atmosphere is over a certain limit, and information regarding just what this limit is would be valuable. Further, some of our leading varieties of apples and pears will not stand this solution at the

same strength as will others, causing damage at times to fruit buds, and information in regard to this would be well worth while.

No doubt you will consider that a fairly comprehensive programme has been outlined, but in defence of the matters brought forward, I will conclude with a brief statement of the value of the fruit industry to us, and I am sure you will agree that it is of sufficient magnitude to warrant investigation and assistance wherever possible.

Taking the last 10 years into consideration and studying the following figures, which have been courteously supplied by the Department of Agriculture, we notice a very steady rise in the approximate annual value of fruit yields of South Australia, the approximate values being as follows :—

1917-1918	...	...	£411,577
1926-1927	...	...	£732,586

This rise of nearly a third of a million pounds has been very consistently distributed throughout the period under review, and in no instance has a season since the 1917-1918 period shown a return as low as that year.

Of course, one or two seasons stand out pre-eminently, the highest figures being for the season 1923-1924, when the value was approximately £820,000. I am sure that you will agree that an industry of this magnitude is worthy of all we can do to place it on a footing which will enable its products to compete successfully on the world's markets.

In briefly touching upon the marketing problem at present before us, I consider that urgent attention should be paid to the matter of finding new outlets for our exportable surplus, India and the East both being worthy of investigation in this connection.