AGRONOMY AND THE COCONUT INDUSTRY

Address given By Mr. T. B. PALTRIDGE,

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Since I am the first Agronomist to be appointed to the Coconut Research Institute, some of you may be wondering just what is an Agronomist and what he is supposed to do.

According to one dictionary ' Agronomy ' is ' Scientific Agriculture ' another describes it as merely ' The study of grasses '. This for a start is rather confusing, and yet both definitions are correct, because the grasses include a great many crop plants such as wheat, rice, sorghum, maize, etc. In reality the science of Agronomy is not restricted to grasses, and there are agronomists who study nearly all crop plants : either collectively or in some instances as specialists in a particular crop, e.g. coconuts.

Another group of Agronomists usually called ' Agrostologists ' have specialised in the study of grasses that are used in pastures and for feeding animals, and in Australia I was mainly a pasture agronomist. I am therefore specially interested in your scheme for sowing pastures that will carry cattle and so produce milk and meat on coconut estates. This is a very interesting project which may be of great economic value, and one that will demand study on the effect of pasture, and the animal on coconut trees. Conversely it will require study on the effect of shade on a pasture.

A good pasture is not made up entirely of grasses, and any agrostologist must also study legumes. Legumes are important because they provide additional protein for stock and still more important because they have root nodules in which there are bacteria with power to absorb or ' fix ' atmospheric nitrogen. This nitrogen is then added to the soils either by ploughing, or by decay, or through the animal ; and this leads directly, to another and still more important aspect of agronomy which is to study the rise and fall, and the maintenance of soil fertility.

If we go back a very long way in the World's History, to a time when there was no vegetation and no soil, but only rock and water, we can imagine a gradual break-down of the rock material, followed by erosion and an equally gradual accumulation of debris on the plains and in valleys. This purely inorganic material would then form something that we might call a ' soil '. This ' soil ' would then be comprised simply of rubble, sand, silt, and clay. It would contain all the minerals and chemical elements of the original rock, but it might be a very infertile soil.

In course of time, however, some plants would grow : their roots would decay and there would be a slow accumulation of vegetable debris (fallen leaves, stems, etc.) forming a vegetable mulch upon the surface of the ' soil '.

In this mulch bacteria and other minute forms of life would feed and multiply: gradually converting it into what we call ' humus '. This in turn would seep into the mineral sands and form an ' A ' horizon, or top soil and in this way truly fertile land would be developed. There would of course be losses from oxidation and from leaching but this process could go on continually, were it not for the activity of animals and of mankind.

Man in particular is likely to upset things because he clears the land and digs or ploughs the soil to grow crops that are removed and used for food or other purposes. This, not only prevents any further build up but it can, and often does lead to an actual loss of soil fertility.

While the cultivation of land for crops has this effect, there are fortunately, some types of agriculture—notably the growth of forests or pasture that will again reverse this process of deterioration and so lead once more to increasing fertility. Thus agriculture involves not only the production of economic crops but it also requires the restoration of soil fertility. Soil fertility is the capital on which we depend for our very existence. It is far more valuable than all the accumulated treasure in the world.

If under the force of circumstances (drought, war or over-population) or if through ignorance we use up some of this capital; then we must start off again, at a lower level to build up and restore the fertility that has been lost.

Up to this point I have been discussing soil fertility in very general terms. It is in fact a complex of a great many things, viz. :—

- (*a*) essential minerals and elements (plant foods)
- (*b*) particles of various sizes (gravel, sand, silt and clay)
- (*c*) soil aggregates (particles that are held together as a spongy mass)
- (*d*) organic matter (humus and organic debris)
- (*e*) bacteria and other soil organisms, worms, etc.
- (*f*) water (both free and unavailable)

but it is essential to remember that a shortage of any one component is a matter of the greatest importance, since it is like that one weak link in a chain without which all others are of limited use or value.

For example a soil should contain all of the essential major nutrients, N.P.K., Ca and Mg. and in addition a whole series of minor, or ' trace elements ' (iron, manganese, copper, zinc, boron and molybdenum) all of which are required for plant growth. Moreover, all of these must be present, and available in sufficient quantity whatever that may be, i.e. whether it be cwt. per acre as with potash; lb. per acre—as with manganese or copper, or ounces per acre—as with molybdenum: All are equally important.

If any one of these nutrients is in short supply then some crops will not grow at all, and others will give reduced yields. Let me illustrate this by showing you some photographs.

The nutrient status of a soil is often a very difficult thing to measure, because an element may be present in the soil in quite large amounts and yet not available to plants. In such cases chemical analysis would be misleading, and it is now standard practice to grow test plants in pots in order to determine and measure these deficiencies.

The ideal test plant is, of course, the crop we wish to grow, but in some cases, and espe with coconuts, or other trees, this involves practical difficulty and it takes a very long tim get results. In that case, however, we can and do use other plants, i.e. grasses and legu that can be grown in small pots and which will give us the same information in very much sho time, and at much less cost.

Unfortunately all plants do not require the same nutrients in exactly the same amo and pot trials will not give us the final answer. However, in general terms they do show nutrients are in short supply and therefore likely to affect the coconuts. In this way they us a lead to the probable deficiencies, and we may use this information in subsequent field tr with coconuts.

These pot studies will be an important part of the work that I hope to do in Ceylon. closely related to the work already started by Dr. Salgado and by Mr. Nathanael, with wh I shall be working in close co-operation.

No one can forecast the results of any research, but in the light of my Australian experien we have reason to expect that this work will be worthwhile. I am sure that all of you here share my hope that it will lead eventually to higher yields and to reduced costs of productio in other words, to the future prosperity of this great industry.

EXPERIENTIA DOCET

'THE COMPLEXITY OF MODERN EXPERIMENTS IS NOT A FAD ON HIS PART, BUT AN ATTEMPT TO IMPROVE THE ACCURACY OF HIS FINDINGS. HE MIGHT ALSO SAY THAT IT IS NOT ALTOGETHER REASONABLE FOR THE AGRICULTURIST TO EXPECT THAT THE TECHNIQUE BY WHICH HE STRIVES TO ATTAIN THIS ACCURACY SHOULD BE PLAINLY UNDERSTOOD IN LAY CIRCLES. WE DO NOT EXPECT THAT WE SHALL UNDERSTAND THE COMPLEXITIES OF TECHNIQUE USED BY A MEDICAL MAN IN DIAGNOSIS AND TREATMENT, OR BY A CHEMIST IN THE PREPARATION AND ANALYSIS OF USEFUL DRUGS, OR BY THE BACTERIOLOGIST WHO GUARDS THE PURITY OF WATER SUPPLIES OR PREPARES A SERUM TO CONTROL AN EPIDEMIC. IN BRIEF, THE FIELD EXPERIMENTALIST HAS A RIGHT TO EXPECT THAT HE SHOULD BE ACCORDED THE SAME DEGREE OF CONFIDENCE IN HIS PURELY TECHNICAL EFFORTS THAT OTHER SCIENTIFIC WORKERS ARE GIVEN IN THEIRS. THIS DOES NOT ABSOLVE HIM FROM DOING WHAT HE CAN TO ENLIGHTEN HIS CLIENTELE ABOUT SUCH MATTERS'.

Eden : *Elements of Tropical Soil Science*, page 120.
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