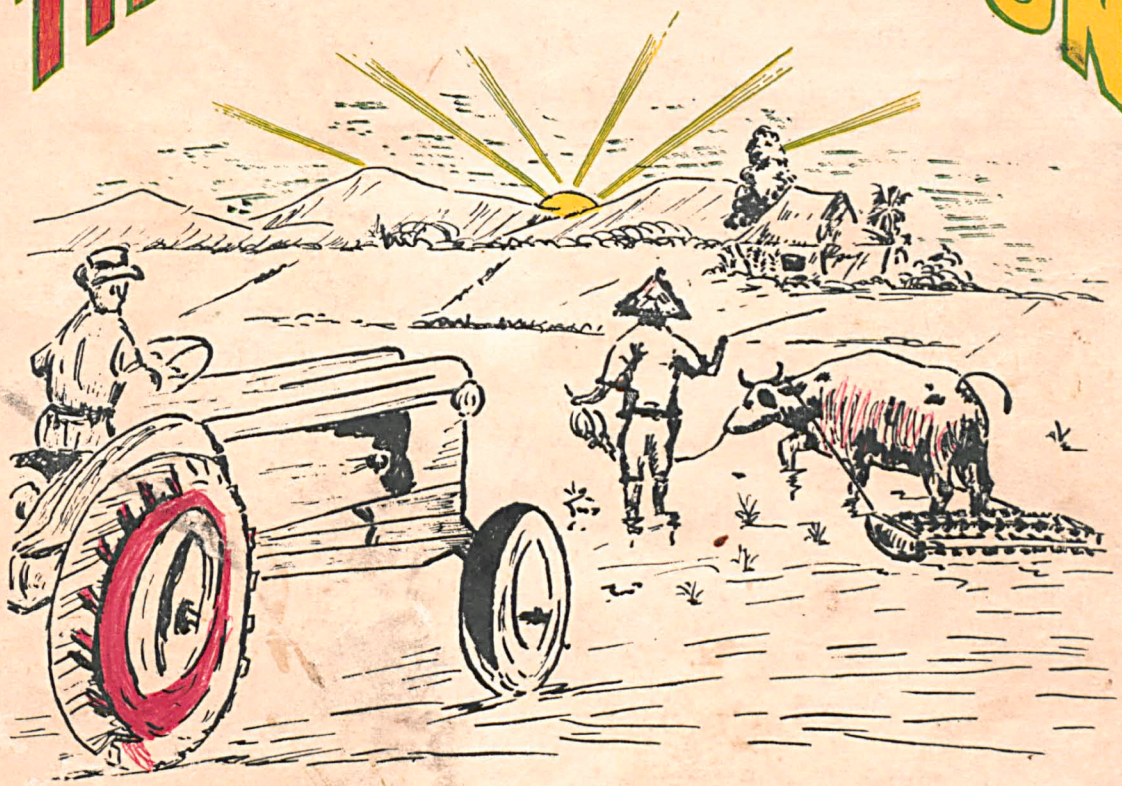
# THE SERDANG SUN



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College of Agriculture Students' Union

1958/9

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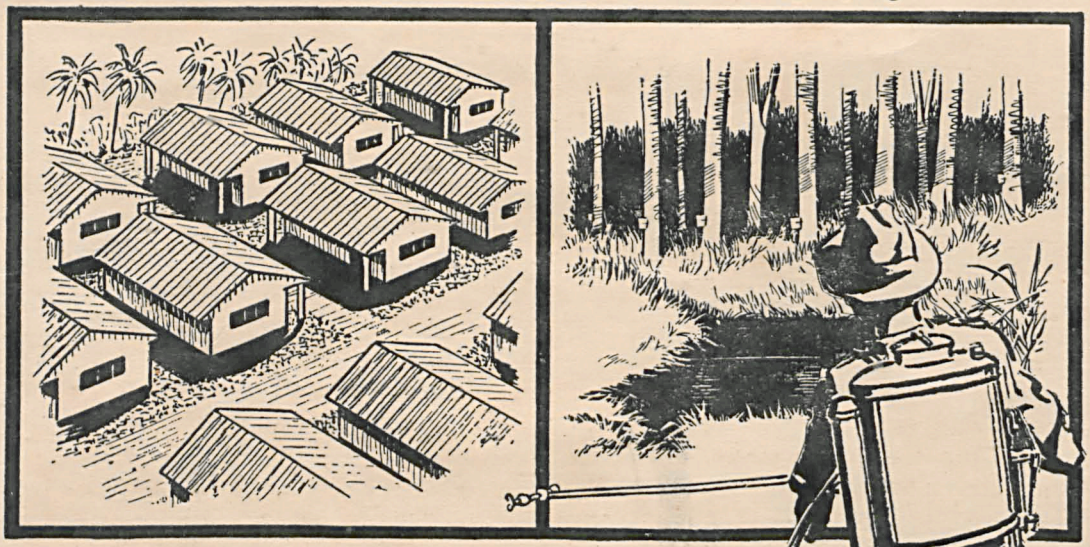

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**LEADERS IN INSECTICIDES**

D·54·Z

**MINISTER OF AGRICULTURE**

# MESSAGE

The year 1959 is a very significant year in the history of our young nation; for it is the year that we are having the first election of our parliament since independence in which we shall be doing it entirely on our own. There is not the slightest doubt that we are going to do it as smoothly and efficiently as any other politically matured and democratic country in the world.

The significance of this is that we in this country—men, women, young and old—have accepted unconditionally the challenge of independence and the entire responsibility of guiding our own destiny. I am singularly pleased to see that your Student Union is not excepted. Your members are not only training themselves in the science and the skill of agriculture but also equipping themselves for the role of leadership in our agriculture.

Speaking about rural leadership I must say that our country needs it in unlimited quantity if we are going to bring about progress in the well-being of our people. Scientific training and skill alone are not sufficient to provide this leadership; there must also be the spirit of service—SEMANGAT BHARU. I trust that when you finish your studies you will leave the college with this spirit.

I should like to congratulate your Editorial Board for once again publishing this "Serdang Sun."

ABDUL AZIZ ISHAK,
**Minister of Agriculture.**

# *Tiger Testimonials*


MR. ETHELRED TAPE,
recently appointed to the Secretariat, intimated that official circles placed considerable reliance upon the refreshing effects of TIGER BEER.

1.TT.52

# THE SERDANG SUN

## MAGAZINE

OF THE

## COLLEGE OF AGRICULTURE STUDENTS' UNION

No. 7 APRIL 1959

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## REPORTS



## MISCELLANEOUS

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# FOREWORD

THIS annual magazine tells all members of the College of Agriculture, both past and present, what the students are thinking and doing about the problems of the land in the Federation of Malaya.

Its publication is a tribute to the energy, initiative and interest of all students who have decided to take the future of the land for their own purpose in life, to adopt as their profession a career devoted to the betterment of our national agriculture.

The problems of the farmers are of paramount importance to Malaya which is still principally a primary-producing country. The development of the rural areas and the improvement of the standard of living and production of the ra'ayat are top-level priorities in Government's policy.

Consequently any publication at all which is directed to objective and informed discussion of agricultural problems is worthy of support.

I therefore wish the "Serdang Sun" every success, because I am sure that its readers are men whose present activities and future work will be of great benefit to our country.

DATO ABDUL RAZAK BIN HUSSEIN,
Deputy Prime Minister.

11th March, 1959.

# MESSAGE FROM THE HONOURABLE MINISTER OF NATURAL RESOURCES

I AM very glad to accept the invitation kindly offered by your Editor to send a short message to all readers of the "Serdang Sun."

Malaya is primarily an agricultural country, and it will remain so for several decades to come. Any increase in the country's prosperity must therefore come mainly from an increase in the area of land being opened up for development and an increase in its agricultural production. Moreover, if this prosperity is to be permanent, agriculture must be based on the rules of good husbandry and must protect and, if possible, increase our natural resources. Our concern must be with the establishment and increase of agriculture, so that our national development proceeds on the best line. All these will require wide-spread knowledge, skill and enthusiasm on the part of those who guide this development and those who take part in it. There is no better centre in Malaya than the College of Agriculture at Serdang for implanting this skill and enthusiasm, and I know no body of people better qualified than the readers of the "Serdang Sun" to spread these ideas throughout the whole countryside.

I therefore wish the College and its magazine, together with all its readers, every success in the work they are doing and which they will have to undertake in the future. In particular, I hope their enthusiasm and tenacity will assist and be refreshed by the "Serdang Sun" throughout their lives.

BAHAMAN BIN SHAMSUDDIN,
Minister of Natural Resources.

10th March, 1959.

## MESSAGE FROM CHAIRMAN, COLLEGE ADVISORY COUNCIL

I have been requested by the Editor of the 'Serdang Sun', magazine of the Students' Union, College of Agriculture, to write a message for the 1958/59 issue. This is my short message as Chairman of the College Advisory Council recently appointed by the Government under its revised constitution.

The College of Agriculture is less than thirty years old, but the part she has already played in the development of the country is in no way a small measure judging from the success contributed by her graduates from the very junior Agricultural Assistants in the Department of Agriculture to the managers of rubber plantations in the field of agriculture. I foresee that the College will be called upon to play a much greater part in the future well-being of the country. The need for suitably trained men and women in agriculture has never been greater than it is today as present trends in the improvement of our agricultural and natural resources indicate.

If we have a quick survey of all the development schemes in the country, we should find that none could be divorced from agriculture. The very foundation of rural development is agriculture—sound and scientific knowledge of the subject. This is a requirement the College will be called upon to meet. The numerous land development schemes in operation now again fall on the College for her graduates—trained agriculturists and more of them. The list of the many and varied enterprises requiring trained personnel in agriculture is too long to be included in this short message, but suffice it to say that our country is only 20% developed and readers will then have a better appraisal of the importance of agricultural education.

The Advisory Council will endeavour to make the College of Agriculture fulfill the expectations of her and I am sure other members of the Council will agree with me that no task in the improvement of agricultural education is too big for the Council to accomplish.

DATO HAJI MOHAMED NOAH BIN OMAR.

# COLLEGE OF AGRICULTURE, MALAYA

## 1958/59

### THE ADVISORY COUNCIL

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The Secretary to Ministry of Agriculture.

The Director of Veterinary Services, Federation of Malaya.

The Principal, College of Agriculture, Malaya.

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**Secretary:**

Mr. Yap Chin Hee,
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College of Agriculture, Malaya.

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**Registrar and Bursar:**
Mr. Yap Chin Hee.

**Senior Lecturers:**
Inche Khalid bin Abdul Rahman, B.Sc. (Agric.).
3 Vacancies.

**Assistant Lecturers:**
Mr. G. R. Kurup, B.A. (Madras).
Mrs. Vijayama Thomas, M.Sc. (Madras)—(Temporary).
Mrs. Mary Joseph, B.A. (Madras), M.Sc. (Benares)—(Temporary).

**Agricultural Assistants:**
Mr. Goh Kim Swee*.
Inche Ahmad bin Mohamed Noor*.
Raja Shaharuzzaman bin Raja Hussein*.

**Part Time Lecturers:**
Mr. Van Thean Kee, B.Sc. (Hons.).
Mr. Lee Sin Fook, B.Sc. (Agric.), (Wye).

**Farm Manager:**
Tuan Haji Abu Hassan bin Sidong*.

**Farm Bailiff:**
Sakrani bin Haji Mohd. Sidek.

**Chief Clerk:**
Mr. L. N. Rajah.

**Hostel Superintendent:**
Inche Khalid bin Abu Bakar.

**Store-keeper:**
Che Abdul Rais bin Karim.

* Graduate, College of Agriculture, Malaya.

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**English Section**
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Mohd. Shah bin Haji Lassim.

**Business Manager:**
Chan Yik Kuan.

"THE SERDANG SUN"—EDITORIAL BOARD (1958/59)

**Sitting (Left to right):** Hashim bin Abdul Wahab, Mr. Chew Hong Jung (Principal), Tan Yean Kheng.

**Standing (Left to right):** Mohd. Shah bin Haji Lassim, Chew Chang Gi, Chan Yik Kuan.


# The Serdang Sun

## *Editorial*

With this issue the 'Serdang Sun' enters its 7th year of publication and once more we come to the close of another fruitful and glorious academic year. The preceding production was an excellent one but the present editorial board felt it should be improved, especially in depicting life in the College.

Much has already been said on the importance of agriculture but I would further add that until and unless the Government adopts positive policies on the introduction of modern methods of agriculture it would be hopelessly impossible to cater for the masses in the years to come. It is as clear as day that more and more of our young men are being 'thrown into the streets' to add to the population of gangsters, thugs and hooligans. Here again, agriculture can play a substantial part.

The Government strongly supports all agricultural undertakings and practices, yet it does not think this institution is important to be worthy of much attention. Time and time again we have been assured that our 'grouses' will receive due consideration but till now little has been done. The students here are finding it difficult to make ends meet with the bare subsistence allowance of $85/- a month from which catering charges, Union fees, books and other necessities of life are deducted. In the end the student will find himself with only a few dollars to last the whole month. Our appeal for an increase was met with disheartening retorts. It is indeed a great blow for us to hear that everyday things like hair oil and visits to the barber are being considered as luxuries that agricultural students should not permit themselves to indulge in. The above discontent simply reflects the attitude of the Government towards the plight of our students or rather towards agriculture in general and at a time when it is so agriculturally minded, too ! I shall not elaborate on this subject but it is sincerely hoped that the Government will favour us with a more sympathetic ear.

I would now like to acknowledge the splendid work of our recently appointed principal, Mr. Chew Hong Jung, who, in spite of this indifference, has given a new look to the College, and, I should say, made it a more comfortable place to live in.

This editorial would be incomplete without a few words of thanks to the old boys for their generous contributions, the Principal for his invaluable advice and especially to all our members whose co-operation has been a great help to the success of this production. Finally, I would like to bid all the outgoing students godspeed !

## RUBBER RESEARCH AND THE SMALLHOLDER

The Rubber Research Institute of Malaya was established in 1925 to take over from the Department of Agriculture and the Rubber Growers' Association all research and advisory work on Malaya's major crop. Although established by a Government Ordinance the Institute is financed entirely by the rubber industry which it serves. This is done by collection of an agreed cess at the rate of $\frac{3}{4}$ cent on every pound of rubber produced and exported from the country. The money is collected by the Customs Department on behalf of the industry and is paid into the Malayan Rubber Fund. This fund is now controlled by a Board, composed of representatives from both the Government and the Industry, which directs how the money available should be used for the benefit of Malayan rubber growers. Not all the money goes to the Rubber Research Institute; some is spent on research work on the processing of rubber carried out in England by the British Rubber Producers' Research Association, and some on publicity by the Natural Rubber Development Board which operates in the major rubber consuming countries throughout the world. The Rubber Research Institute, however, takes the lion's share of the Malayan Rubber Fund and is responsible for research on the cultivation of rubber and the processing of the crop into forms suitable for export to the consumers. This is a very wide field which is conveniently divided into two major parts. First, research on rubber as an agricultural crop is undertaken by the Soils, Botanical and Pathological Divisions of the Institute and second, research on the product, from the time the latex leaves the tree, is the work of the Chemical Division.

The research done in Malaya occupies over forty graduate staff and the total annual cost comes to approximately $2\frac{1}{2}$ million dollars. A similar sum is spent on advisory and development work and the total budget for the Institute is thus some 5 million dollars. This may, at

first sight, seem to be a very large sum but when compared with the value of the rubber exported each year—nearly 1,300 million dollars—it is seen in true perspective.

Research on the agricultural side is concerned with the breeding of new planting material, methods of tapping, the control of pests, diseases and weeds and with the manuring of the trees. All these lines of research are obviously of immediate value to the rubber grower in Malaya. The aims of the Chemical Division need more detailed explanation. Here the object is primarily the improvement of the product as exported, whether it be as sheet rubber, crepe or latex and the value of this in a keen market is again obvious. But a great deal of work is done also on more fundamental studies of latex and rubber and the benefit to be obtained from these is not perhaps so clear. The fact is that basic knowledge of latex as a physical system and of its various constituents as chemical substances is essential if new developments in practical processing procedures are to be made. Such knowledge is not available and hence the pure research is done in Malaya. The value of research is lost to the industry if its results are not applied in practice. This is comparatively easy for the large estates who not only have managers able to correspond direct with research workers but also experienced planting advisers and visiting agents who keep abreast of developments and translate research results into practical instructions to the estates.

But what of the smallholder ?

A total of over 1½ million acres of Malayan rubber is owned by small growers holding less than 100 acres each, and of these most have 3 or 4 acres only. These smallholders produce about 42% of the rubber exported—and hence pay into the Malayan Rubber Fund 42% of its total receipts, some 4½ million dollars each year. What do the smallholders receive for their very substantial contribution to rubber research and advisory work ?

Many smallholders are but semi-literate and can certainly not read those R.R.I. publications which are published in English for scientists and planters. Neither can smallholders afford to visit the Institute in Kuala Lumpur to obtain verbal advice from research officers. This was realised at the time the R.R.I. was established and in 1934 a special Smallholders' Advisory Service was inaugurated. It was, and is, the responsibility of this Service to make available to smallholders the immediately useful results of research.

How is this done ?. First, members of the field staff of the Service, Malay and Chinese Rubber Instructors and Junior Rubber Instructors

posted in rubber growing districts throughout the country, are in contact with individual smallholders. Advice is given verbally and actually on the holding after it has been inspected and the problem assessed. This is perhaps the best method of providing information to small rubber growers but can reach only a small number of the 390,000 smallholders in Malaya. To contact each man individually would require an enormous staff.

Second, more general extension work is carried out. Film shows are given in the kampongs where instructional films on rubber growing and processing, with commentaries in Malay or Chinese, are used and followed by a talk on the subject and discussion of local problems raised by questioners. Publications, specially written for smallholders and dealing with specific subjects, are published in Jawi, Rumi and Chinese for distribution to those interested and posters are used for display in kampong centres. Exhibits are provided at agricultural shows and a mobile demonstration unit is used in the kampongs. These activities provide the results of research for smallholders generally but without consideration of individual problems. Arising from them, however, requests for visits to holdings pave the way for more detailed advice on the lines mentioned above.

Third, and perhaps most important in the long run, training courses are arranged for groups of smallholders or their sons. Courses are held at the R.R.I. Experiment Station, at a Smallholders' School near Ayer Pa'abas, Malacca, and at kampong centres throughout Malaya where there is a demand for instruction and facilities are available. These courses enable smallholders to get right up to date with methods of rubber growing and processing resulting from research and later enable them to follow developments through vernacular publications and conversations with Rubber Instructors.

Fourthly, and least important from the kampong point of view, smallholders seek advice by writing direct to the Smallholders' Advisory Officer at the R.R.I. in Kuala Lumpur or by calling at the Institute to discuss their problems.

The smallholder also benefits, although indirectly, from the co-operation of the R.R.I. with the Department of Agriculture, the Rubber Industry (Replanting) Board, the Federal Land Development Authority, and other Government Departments concerned with rural developments in which the growing of rubber plays a part. Working together these organisations provide not only advice and information but also material assistance to the rubber smallholder for the improvement of his holding and his product or the development of new plantings.

Let us consider the smallholder with an area of worn-out, old rubber trees which he intends to replant. First he will apply to the Rubber Industry (Replanting) Board for a replanting grant to help finance the work. But how can he benefit from his contribution to research funds ? He will contact, at the local Agricultural Office, a Rubber Instructor of the Smallholders' Advisory Service, initially for advice on slaughter tapping and disposal of his old trees. Practical suggestions will be provided on the basis of work undertaken by the Botanical, Pathological and Soils Divisions of the Rubber Research Institute. He will then require advice on the best type of planting material to use (Botanical Division), planting techniques, cover crops and manuring of his rubber (Soils Division), maintenance and disease control (Pathological Divison). Later, advice on tapping techniques (Botanical Division) and the processing of his latex (Chemical Division) will be required. Through the Smallholders' Advisory Service therefore he benefits directly from the work of each Division of the R.R.I. Similarly he will benefit from the efforts of the British Rubber Producers' Research Associations and the Natural Rubber Development Board when his rubber is sold to consumers overseas.

The resources of the Malayan Rubber Fund, subscribed by all rubber growers, are clearly used to the benefit of all rubber growers, whether large or small, in Malaya. Smallholders, in fact receive special consideration through the Advisory Service which over the past 24 years has served their particular interests in matters of rubber research and extension work.

Rubber Research Institute of Malaya,
Smallholders' Advisory Service,
Kuala Lumpur.

## HAEMOGLOBINS IN MAN

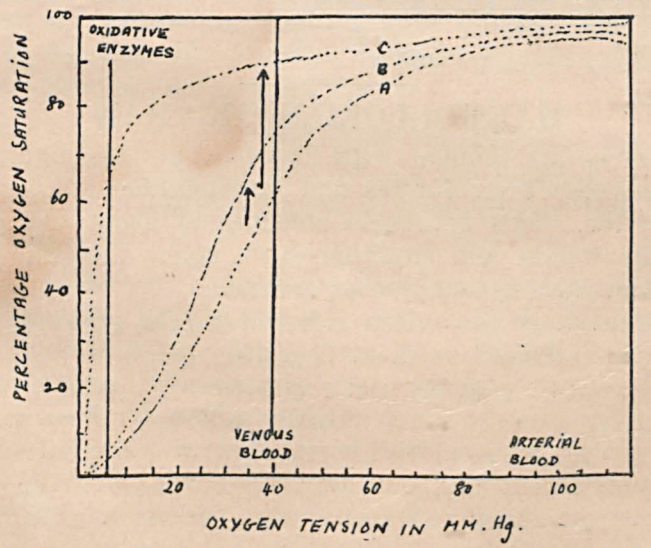
Most of us are familiar with haemoglobin—the pigment found in the red corpuscles of vertebrates and invertebrates responsible for the blood colouration. This substance amounts to about one per cent. of the total body weight and anything much below this will give rise to the pale and breathless condition of anaemia.

Haemoglobin is now often referred to the respiratory pigments of small complexes known as haems together with a protein called globin. Formerly, the blood pigments of invertebrates were also known as haemoglobins but they are now usually called erythrocruorins as distinguished from the haemoglobins of vertebrates. The difference between the two groups is that the basic protein—globin—of both vary though the haems are the same. Certain worms possess a green-red pigment

known as chlorocruorins which are composed of other haems and also other globins. Also, the pigments of invertebrates consist largely of molecules much greater than haemoglobin. Haem is a ferrous iron porphyrin and is shared by all myoglobins and haemoglobins, chlorocruorins of invertebrates and enzymes-like catalase and peroxidase. A haemoglobin molecule contains four haem groups oriented in the same plane. The iron atom is in the centre of the haem group and is attached to a globin Nitrogen atom. When an oxygen molecule becomes attached to the other side of the Iron atom the Iron remains in the ferrous state and this is known as oxygenation. When oxygen is added an alteration in the electronic structure of the haem complex is produced.

The concentration of haemoglobin in the red cell is extremely high, about thirty-five per cent. and disturbance of the free rotation of the molecules would decrease their efficiency in reacting with oxygen and carbon dioxide. The haemoglobin makes up about fifteen per cent. of the blood as a whole. The peculiar biconcave disc-shape of the red corpuscle dominant in mammals favour the rapid diffusion of gases across the large surface area.

Not much is known of the globin molecule except that its molecular weight is about 67,000 and the molecule has a prolate ellipsoidal shape. The chief functions of the haemoglobin are the transport of oxygen from the lungs to other tissues of the body and of carbon dioxide in the opposite direction. Having known its function we shall now consider how these are carried out. The proportion of haemoglobin in a red corpuscle is determined by the concentration or tension pressure of the gas around the cell. The higher the tension pressure the more the haemoglobin is oxygenated. This can be shown in the graph below.




OXYGEN DISSOCIATION CURVES

Curve A shows the rate of oxygenation of haemoglobins in adults at different Oxygen tensions.

Curve B indicates foetal haemoglobin, and,

Curve C of myoglobin found within the cells of muscles.

From the graph one will see at a glance that haemoglobin is more or less fully oxygenated at the Oxygen concentrations in arterial blood which is about the same as that in the lungs. Oxygen concentrations are much lower in the tissues than in the lungs and here part of the oxygen of the haemoglobin (venous blood) is given up. The oxygenation of blood in the normal circulation does not fall further to the left than the 'Venous Blood' line in the figure. At low oxygen tension the oxygen liberated by the haemoglobin to the tissues is made use of in various oxidative reactions. In Curve C of the figure the myoglobin of the muscles takes up oxygen released by the haemoglobin and stores it till oxygen shortage arises.

Transport of carbon dioxide by the haemoglobin from the tissues to the lungs is done through the formation of 'carbamino' compound both directly and indirectly. Four acidic groups are found in the haemoglobin molecule and are coupled with the haem complexes in a manner giving rise to a greater acidity in the blood and result in the expiration of carbon dioxide through the formation of carbonic acid from some of the bicarbonate which breaks down to carbon dioxide and water. The changes are reversed when deoxygenation of the haemoglobin takes place in the tissues.

**Kinds of Haemoglobin.** It has been shown from X-ray analysis, immunological tests and many others that haemoglobins of different species differ from one another.

Antibodies against haemoglobin which can be prepared with difficulty by injecting members of one species with haemoglobin of another. The reactions between haemoglobins of the same species are very vigorous; not so strongly with haemoglobin of related species and very weakly or not at all with haemoglobin from distant species.

Haemoglobin types can also be shown by the reaction of haemoglobins with strong alkalis. It is indicated by the rate in which the haemoglobins are split up from the molecule and the polypetide chains unfolded. For example in human adults it takes about twelve seconds for half the molecules to react while it is about ten hours in bovine haemoglobin.

Haemoglobin types also differ in solubility. The haemoglobin of human beings is very soluble in water whereas that of rodents like rats and guinea pigs is practically insoluble and forms crystals instantly when water is added to the red corpuscles. Lastly the analysis of haemoglobin acids—the units which make up the polypeptide chains of the globin reveals the fact that haemoglobin of different species have different composition.

Thus one can imagine the number of haemoglobin types each characteristic of a species. However, in all species the molecules possess certain common properties which makes it possible for them to carry out the transport of oxygen and carbon dioxide and they have about the same molecular weight. The whole set-up is not as easy as it seems since in all the vertebrates that have been investigated, the haemoglobin produced during foetal life is different from that of the adult. The former have a greater liking for oxygen than that of the latter. Thus it can be expected that at whatever oxygen concentration oxygenation is greater in the foetus blood than in that of the mother.

Not long ago another type of haemoglobin synthesized in the young embryo has been discovered. There are three generations of red corpuscles in the intra-uterine life, viz. Embryonic cells produced chiefly in the yolk sac and foetal membranes which are large and mostly nucleated; Foetal cells which are of medium size and not nucleated found mainly in the liver; and, Adult cells at the end of foetal life which are small and found chiefly in the bone marrow. Foetal cells are soon replaced by adult cells soon after birth (five months in man). As soon as one of the three types of cells disappears another appears to take its place, thus it can be safely concluded that each of these types has its own haemoglobin type.

Genetics play a very important part during these three processes. An example of this comes from a common hereditary disease known as 'thalassaemia'. In this a gene is known to influence the production of adult haemoglobin without any effect on foetal type and most probably on the embryonic type too. If the thalassaemia gene for a child is homozygous he is born healthy but the synthesis of enough blood haemoglobin is effected and this results in the severe anaemic condition for the first few months of post-natal life. The foetal type may continue to be produced long after anaemia has normally disappeared thus the haemoglobin of children several years old may be largely or even entirely of the foetal type. Children with such an abnormality usually die before they can reach adulthood.

Another cause of such abnormalities is produced by the sickle-cell haemoglobin. It has been shown that the normal adult haemoglobin

molecule carries a slightly different electrical charge from the abnormal molecule. They appear to have the same haemoglobin-acid composition and a similar crystal form. They probably differ only in one small detail of configuration which is of great importance as it enables deoxygenated sickle cell haemoglobin molecule to combine with one another into long root-like units. The attraction of these units for one another tends to distort the red corpuscles into a sickle shape. Long thin filaments often project from both ends of the sickle cell. On addition of oxygen the relatively weak bonds of the sickle-cell haemoglobin give usually two strong bonds between haem iron and oxygen and thus the sickle transformation is reversed.

The sickle-cell gene may be found in single or double dose. In homozygotes with two abnormal genes the haemoglobin is all of the sickle type except a small part of foetal haemoglobin and the red cells in venous blood are continuously being transformed into the sickle shape. The sickle cells are easily broken up in the circulation producing anaemia while the rigid sickle cells tend to block the small vessels and cut off the blood supply to some of the tissues. Thus, homozygotes suffer from sickle cell anaemia from which many die in childhood. In Africa about 4 per cent. of the children born are sickle cell homozygotes while those with heterozygote sickle cells are not diseased since the chromosome pair carry a normal gene while the other carries an abnormal one and the contents of each red cell is usually of sickle cell and normal adult haemoglobin in equal amounts. The cells also do not undergo the sickling transformation in the blood circulation.

There are many other abnormal haemoglobins, in Man, the sickle cell haemoglobins are the best known. These are classified as haemoglobin types CDEGHIJK & M. DGHIJK & M are rare while C is quite common in West Africa where the C heterozygotes reach a frequency of 28 per cent., E is common in Siam with a heterozygote frequency of 13 per cent. while the Thalassaemia gene attains a frequency af about 18 per cent. in Italy.

The behaviour of the sickle cell gene also plays a very important part in the principles of population genetics. Heterosis or hybrid vigour brought about by the presence of the heterozygote of a selective advantage of both the normal and abnormal homozygote results in a stable frequency of occurrences of a gene; also it has been discovered that the possession of heterozygotes is resistant to malaria. Those children lacking in sickle cell generally perish of malaria before they can acquire immunity to it. The interaction between the sickle cell and other genes in natural population gives rise to some effects. This can be shown in the following example. In East Africa, where the haemo-

globin C is absent the frequency of heterozygous sickle cell amounts to about 40 per cent. whereas in West Africa it is only 30 per cent., seldom more. Taking it for granted that this condition is due to the interaction of haemoglobin C it can be concluded that those who have two sickle cell gene has much lesser chances of surviving than those with a combination of both sickle cell and haemoglobin C disease gene. The haemoglobin C heterozygote must have an advantage of about 9 per cent. over the normal homozygote to keep the system in equilibrium. The above is an example of polymorphism; another example is that of the presence of different blood groups in Man and other species. It is known that blood groups are more or less responsible for the resistance and susceptibility to diseases in numerous unexpected ways.

Therefore, those with blood group A are more likely to die of broncho-pneumonia and those with other groups while adults with group O usually suffer from peptic ulceration and toxic toxaemia of pregnancy.

Thus the discovery of haemoglobin types in Man has proved invaluable.

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## PLANT VIRUSES AND AGRICULTURE

One of the main causes of crop failure may be due to diseases caused by bacteria, fungi and viruses. In this article, we shall confine ourselves with viruses that are found in plants.

**Properties of Viruses**

Before we proceed further in this subject, it is best to obtain a fair idea of the micro-organisms.

Viruses are particulate and their sizes can be determined by observing their ability to pass through filters of known pore size. They cannot be detected by ordinary microscope but through modern science development, we have to-day the electron microscope which possesses the power of detecting and even photographing the virus particles of less than $\frac{1}{400,000}$ mm. in diameter. Furthermore, viruses are able to reproduce themselves but only within a living susceptible cell. Some authorities think that the virus stimulates the host cells to produce more of the virus. Because of their size, virus can be transmitted to other plants, mostly through aphids (sometimes leaf-hoppers and mealy bugs) which have sucking mouthparts that are capable of withdrawing the viruses from the affected parts of the plant and injecting them into healthy plants.

**Crops Attacked by Virus**

To date, over 150 viruses have been discovered to attack plants. Potatoes are known to suffer from diseases like mosaic and leaf curl or roll which can totally reduce the world production by 10%. Mosaic, curly top and such infectious diseases like " yellows " occur in sugar beet.

In the tropics, cocoa is frequently found to suffer from swollen shoot disease in which characteristic swellings occur in parts of the plant causing die-back of the leaves which may also show symptoms like yellow mottling. Diseased cocoa pods are small, somewhat distorted in shape and the quality greatly deteriorated. Another agricultural crop, the tea plant, is subjected to a virus disease, technically known as 'phloem necrosis' in which the phloem cells are infected and give a brown discolouration. External symptoms are the bending and curling back of the leaves mainly along the midrib.

It should be noted that there is little or no cure for a virus diseased plant and the majority of the control methods are mainly aimed at preventive measures, for example, the spraying of the insect vectors with insecticides thus killing them and hence reduce the range of virus infection.

**Preventive Measures**

Viruses are spread through tubers, runners and cuttings of plants and so it is of utmost importance, in vegetative propagation to see that the parent plant selected for the propagation should be virus free. This is possible only through careful selection and study of any viruses. To prevent any infection of the parent or stock plant through insects it should be grown in a glass-house which must occasionally be fumigated with, say, nicotine. This method, admittedly, is only feasible in large scale farming (e.g. of potatoes) as the initial cost is far beyond the means of the ordinary smallholder. It must be realised that planting materials so obtained are only virus free and not virus resistant. A more practicable preventive measure for the ordinary farmer is by the use of insecticides which are either dusted or sprayed onto the plants. In the use of such chemicals it is essential to study the insect vector concerned. It should be borne in mind that the mobility of the insect vector is of greater importance than their numbers. Thus, for example, the range of infection by winged aphids is very much wider than that of wingless aphids which stays on just one plant. There again, the insecticide must be selective in nature and should not destroy beneficial parasites of insect pests. As viruses are mostly transmitted through sucking insects especially the aphids, the selective insecticide used, when sprayed or dusted onto the plant, should be able to enter into the plant tissues and subsequently be ingested by the insect vector.

Weeds or any plants which are liable to act as hosts to a particular virus should be eradicated.

Cutting out the infected plants in a crop seems to be the only effective method of dealing with a virus disease.

**Reaction of Plants to Virus Infection**

You may now wonder whether it is possible to breed plants that are resistant to virus diseases. This actually had been carried out, especially in the U.S.A. and results obtained from various experiments are fairly encouraging.

Resistance or immunity to virus disease in plants may be due to the different properties of the plant itself. A plant variety may guard itself against infection by the production of hairy leaves and various adaptations that may ward off the insect vector. Another rather interesting method is the self elimination nature of the plant. This plant in question is very susceptible to virus and when once infected it dies off quickly and is not visited by the insect vector due to the unpalatability of the attacked plant tissues.

A third type of resistance is the plant reaction to certain viruses. When a certain portion of the plant is infected with the virus, the cells surrounding this portion break down and die and prevent further spreading of the virus to other parts of the plant. It is not possible for the virus to multiply in numbers because (as stated before in the beginning of this article) it can only do so in living cells. With this knowledge in mind plant breeders of today have made attempts to segregate and transfer the gene responsible for this localisation of virus to important crops like pepper and tobacco, which suffer from mosaic.

Through recent experiments, it has been found that it is possible to cure (to a small extent) virus infected plants by using heat. However, this is not very practicable in this country due to the elaborate work involved in finding the infecting strain of virus and the exact temperature at which the virus can be killed without doing any appreciable harm to the host plant.

The detection of viruses on plants is a complex matter as for instance, some strains of potato virus X produce little or sometimes no symptoms at all when infecting any variety of potatoes and it is only through the sudden drop in yield of the normal crop that its presence is realised.

The above article is only a brief outline of the subject and it is intended to give the reader a fair knowledge of the economic importance of viruses in crop production. A detailed study is essential if successful crop management is to be achieved.

Chan Yik Kuan.

## HUMUS — THE FATNESS OF THE LAND

**"Humus is the product of living matter and the sources of it." — A. Thar.**

For too long the role of humus in crop production has been shadowed by that of inorganic fertiliser. Its importance has not been given the proper due. This short article is an attempt to give an understanding of humus and its importance in Agriculture and soil conservation.

Humus is the product of decomposition and built up of intermediary product of organic constituents by microbial activities. The dark mass has no fixed chemical composition. Its nature and proportion varies with the organic matter and the different stages in the continuous process of decomposition.

Bergius considers both cellulose and lignin as the 'mother substances' of humus. The rapidity of the decomposition and transformation depends upon the nature of organic matter, type of soil, its flora, rainfall and temperature.

(a) **Uronic Acid Complex.** The complex is found in the microbial tissue and is designated polyuronides. It has a high carbon content, as much as one third of total carbon.

The cellulose, hemicellulose, fats, etc. are decomposed by micro-organisms. Thus, the acid is the product derived from the process, and is found in the organism tissue. The tissue is quite resistant to decomposition. When the organism dies the polyuronides is reverted to the soil as humus.

$C_5H_{10}O_5 + CO_2 \rightarrow C_6H_{10}O_7$ + microbial dead tissues — tissue.
(pentose) (uronic acid)

(b) **Lignin-protein Association.** Lignin and resistant plant constituents due to microbial activities tend to accumulate in a modified form. This modification unites with the protein to form ligno-proteinate complexes. The association influences soil character. This humus carries about:—

| | | |
|---|---|---|
| Carbon | = | 50% |
| Oxygen | = | 35% |
| Nitrogen | = | 5% |
| Hydrogen | = | 5% |
| Ash | = | 5% |

It has been found that about fifty to sixty per cent. of total organic matter in woody peat consists of lignin-like materials.

**Preparation of Artificial Manure.** Compost is a very good source of humus. Plant residues such as stubble, leaves and twigs are employed together with a certain amount of ammonium salts, super-phosphate and lime. The residues are stacked layer after layer in a compact mass and

kept in a moist condition and is turned periodically. In the decomposition of the cellulose, considerable energy is available for the growth of micro-organisms. This is characterised by the synthesis of microbial cell for which available nitrogen and phosphorus are required by the organisms to be active in the decomposition process. The compost is blackish and is easily transformed into humus.

**Carbon-Nitrogen Relationship in Humus Formation.** This ratio in humus is always at a constant level. But the importance the C/N ratio plays in Agriculture is during its decomposing stage. The plant materials ploughed in, having a high ratio, results in the rapid increase in heterotrophic organisms which result in the competition between them and the plant for available nitrogen. This causes temporary shortage of nitrogen to the plant and thus results in stunted growth. Of course, later the death of the organism will result in the increase in nitrogen content to the soil, but the damage has been done as the plant is most delicate during its early stage.

**The Role of Humus**

(1) **As a Basis of Soil Classification.** The role of humus in soil formation has been extensively studied by Russian pedologists. In the soil profile, the different horizons are characterised by different amount of humus with specific physical and chemical properties. According to Glinka, laterite soil is developed from low humus soil under high moisture condition.

(2) **Soil Conservation.** The humus have a physical binding effect on the soil particles due to various complexes of constituents. In this case fresh organic matter is preferable as the rapid decomposition will produce a slimy mass which will help to prevent wind erosion. About twelve per cent. of the continental soil in the U.S.A. is effected by this form of erosion.

(3) **Soil Improvement.** The humus improves the physical texture of the soil. A clay soil which has all the undesirable characteristics for plant growth has shown to improve considerably with liberal amount of organic manures. The low plasticity and cohesion of humus makes the clay soil more porous. Thus, aeration is improved with the result that it favours root penetration and respiration. In a soil devoid of humus there is a greater likelihood of the root system being restricted and asphyxiation taking place. In sandy soil where water percolates easily humus increases the water-holding capacity which enables the plants to resist drought.

At the same time it helps the soil to absorb more heat as well as increasing the buffering properties. In this way it prevents rapid changes in the acidity and alkalinity of the soil. These changes have

a profound effect on the condition of the plant. A plant which favours an acid soil will rapidly deteriorate in condition when alkalinity sets in.

(4) **Increase in Nutrient Availability.** Certain base nutrients availability are increased by the humus colloids. The humus acids act very much like ordinary acids in the reactions with soil minerals e.g.—

$$KAlSi_3O_8 + H\square \text{ — } HAlSi_3O_8 + K\square$$

Thus, the potassium is loosely held in an adsorbed condition and becomes readily available to the plant. Lack of humus will prevent many bases to become freely available, thus the plant suffers from lack of nutrients.

Lastly humus is said to exert an effect upon the 'vitamin' content of the plant. Thus, organic matter has been found to prolong the maturation period of sugar cane and at the same time increasing the juice content. Hillitzer has shown that certain humus substances have a specific effect on plant development by the expansion of the root system. He designated it as **ausimons.** Some organic compounds e.g. dihydroxy stearic acid may prove to be toxic to the plant but humus may produce certain substances which are antagonistic to the pathogens. Thus artificial curative muds can be prepared by a mixture of clay, fresh organic matter in a green state and minerals e.g. superphosphates and chlorides, to undergo decomposition under water.

The roles of humus have been adequately described. Therefore, its importance in Agriculture and soil management cannot be underestimated. We all know that Agriculture upsets the natural balance of humus accumulation and dissipation, we must therefore counteract the loss and increase the humus level by artificial means. Soil fertility cannot be maintained without humus.

Tan Ah Him.

## FOR THE ORCHID LOVER

Most of us who possess orchids at home have seen them bloom but do not take the trouble to pollinate or, if they are pollinated by nature, collect the seeds and germinate them. Quite a number of us who have seen orchid seeds do not know how to germinate them, thinking this process far too intricate and technical or lack the necessary materials to perform the germination. However, if we are going to propagate our own plants or obtain new hybrids it is best we do our own experiments right now and save unnecessary expenses in the purchase of mature plants. This is, no doubt, one of the ways of enjoying oneself, but the joys to be attained are far more greater if we were to sow

our own seeds and bring these up to maturation. Most people think it a long and tedious process. It may be so at the start but once we have mastered it we will realise that it is not as complicated as we thought it to be.

As this article is intended on the 'know how' of germination I shall refrain from telling my readers the process of pollination. Orchids are, as most of us know, seldom capable of self-pollination by nature of their construction.

**Collecting the Seed Pods:** The correct time to remove the pods is when the cracks (cracks open down the centre of the flutings) begin to show, that is, before they have opened wide enough to allow the seeds to drop out. To prevent the loss of seeds it will be a good idea to wrap a piece of tissue paper over the seed pod a few weeks beforehand, and examine it from day to day. When the time comes for removal, cut the pod cleanly and place it in a clean glass jar or if the weather is rather wet, wrap it tightly in tissue paper and dry in a dessicator containing fused calcium chloride. When the pod is dried and dehisced completely the seeds can be shaken out into a clean container. They can be sown now, if desired, and excess seeds should be properly stored.

**Checking the Viability of Seeds:** Crosses between closely related species usually produce viable seeds and pollens. Though checking the viability of seeds is unnecessary for amateurs it would be beneficial if one wishes to check or obtain results on the percentage of germination. To test whether there are any embryos in your seeds, mix a small amount of them with water and place on a slide under a cover-glass. A magnification of 300 is sufficient to help in the detection of the embryos. A

VIABILITY OF ORCHID SEEDS

relative percentage of 80 to 90 per cent. should be considered good. If no seeds have embryos the lot should be discarded. A further check on seed viability is to sow a flask or two and see how well they germinate. This saves us three to four weeks waiting for the seeds to swell and to turn green (See diagrams).

**Preparation of the Flasks:** The agar medium for growing flask seeds can be prepared in the following way:—

**One litre Solution**

1½ teaspoonful of Hyponex
20 grams of Sugar
15 grams agar-agar
pH = about 5

The exact amount of the above ingredients are carefully measured out and boiled until the agar-agar dissolves completely. A long-necked funnel should be used in the process of pouring the mixture into the flask or bottles to avoid any splashes on the sides of the containers. Care must be taken not to spill any on the inside or outside so that fungus spores will not have a chance to grow. The agar-agar should be about an inch and half deep. Each bottle (or flask) should be stoppered before sterilising.

The flasks used are usually 250 c.c.—500 c.c. but almost any type of jar or bottle will serve as well—large medicine bottles, whisky bottles or milk bottles. All these containers should be capable of sterilisation, preferably those with a large area at the bottom (several square inches) and screw-cap or one which can easily be plugged with cotton. They should be thoroughly washed and rinsed several times with an antiseptic like formalin and boiled to assure that they are free from any substances that might prove harmful to plant growth.

Cotton plugs can be made easily using new cotton wool obtainable from any drug store. For a bottle with a neck 1½ inch in diameter, tear a strip of cotton about a foot long and four inches wide. The wispy edges are folded up to half an inch and the lower end is tightly rolled up with the fingers constantly pressing at the centre. The finished plug should be hard and the ends smooth. It should not be so tight that one must force it into the neck; but it should fit tightly enough so that you can pick the bottle up by the plug. Cotton plugs should be impregnated with supersaturated mercurochrome (mild fungicide) or copper sulphate before inserting into the bottle. It should also be inserted so that two thirds of the length is in the neck with the other third protruding from the mouth. The neck of the stoppered bottles should then be wrapped externally with cellophane paper and tightened with rubber bands to reduce the risk of fungus infection.

**Sterilisation of the Flasks:** Pressure cooker or a hot-water kettle will do very well as a home sterilising equipment, though the former is preferred. In either case you must be sure that no water enters the flasks or bottles. In a pressure-cooker, twenty minutes at fifteen pounds pressure is sufficient. If a kettle is used, adjust the water-level to the level of the agar-agar in the bottle to prevent its tipping over while boiling. Cover the kettle and boil for one hour. After sterilisation remove the bottles while still hot (be sure the pressure in the pressure-cooker is let off) pour the water out of the kettle, then quickly put the bottles back in the kettle and cover it with a clean cloth. This will allow them to cool and the stoppers to dry out, without becoming contaminated.

**Sowing the Seeds:** Before any seeds are introduced into the prepared flasks, the flasks should undergo about a week's observation. By the end of that time if there are any signs of spores germinating the flask or flasks will not be suitable for germination purposes and should be discarded.

Sowing of the seeds is a simple process and it does not take long. Each of the steps described may appear complicated but you will soon realise that the steps are essential and will determine the degree of success. Also, if you go through the process slowly you will discover that they are not as complicated as you imagine. Sowing the seeds consists of two main steps viz:

(a) disinfection of the seeds by soaking them in a solution of antiseptic, and

(b) introduction of the seeds into each flask.

Cleanliness has been emphasized as an important factor in each step so far, and is even more important here. The air is full of spores and precautions should be taken against contamination. A glass chamber should be a good place to do the sowing. The equipment you will need includes a test-tube provided with a cork for disinfecting the seeds, a new medicine dropper, a cup, quality distilled water that a doctor uses for injection, and an open flame (gas burner or alcohol lamp). All these should be placed in the glass chamber for convenient working.

(a) **Treatment of the Seeds:** The seeds themselves may harbour spores during dehiscence and also when they are handled in the open. The seeds can be disinfected by using a solution of **Clorox**, a household item. Cautions regarding the concentration of the solution must be stressed, as beyond a certain strength and exposure beyond the time limit is injurious to the seeds, thus reducing the percentage of germination. To prepare this solution, dilute 1 c.c. of Clorox to 99 c.c. of distilled water (measured with a graduated cylinder). This is strong enough to prevent infection of the flasks and not too strong to harm the seeds.

Fill the test-tube with two-thirds of Clorox solution and add a small amount of seeds using the tip of a knife to pick up the seeds. The knife should be heated and allowed to cool before using it on the seeds. The test-tube is corked tightly and then shaken vigorously to make sure that all the seeds are thoroughly wetted. The seeds should be shaken for exactly ten minutes (no longer !) and sown at once, so that the total time in Clorox does not exceed twenty minutes. An alternative is to use calcium hypochlorite solution. This can be prepared by dissolving ten grams of the solid in 140 c.c. of distilled water.

While you are shaking your seeds put some of the remaining solution into a cup and put the dropper into it to be soaked, making sure that the solution fill the bulb as well as the glass part. Before you open the cover, be sure that all the equipment are close at hand including the alcohol lamp.

(b) **Introduction of Seeds into Flasks:** When the seeds are thoroughly disinfected they are ready to be sown. It would be an advantage if you can get a helper, either to attend to the flasks or to drop the seeds into the flasks, because the whole operation must be done as quickly as possible so that the flask is exposed for only a very short time. It is also a good idea to pour out excess Clorox so that the test-tube is only half an inch full. Distilled water, preferably the one which doctors use for injection purposes is poured into the test-tube to make it three-quarters full. In this way, the seeds will not be injured by the Clorox solution. One flask should be opened at a time. Remove the cellophane paper and slowly open the cotton plug; care must be taken not to put the plug on to anything (a helper will come in handy at this time). The open-neck of the flask is rotated in the flame for a few seconds to kill any spores that might have settled on it.

The seeds are stirred using the end of the dropper and sucked up into the bulb. Hold the dropper in the neck of the flask so that the drops will not run down the sides. Four drops is a good amount to put into each flask, the drops being placed at four different places. As soon as the seeds are dropped in, the neck of the flask, as well as the stopper, is flamed again before the plug is replaced. To flame the plug on the outside, the flame should be allowed to surround it, then very gently blowing out the flame rotating it as you blow. This is an extra precaution against spores but if properly covered this process is unnecessary. Cotton plugs must be covered with the cellophane paper again and tied up with a string. When all the flasks are sown, pick up each one and gently tilt it back and forth to spread the seeds over the surface of the agar-agar. Be sure that all flasks are labelled and dated.

One or two flasks may have been contaminated at the time of sowing, so that spores begin to grow after a few days. If that happens

throw away the medium and start over again. Let it not discourage you, for further trials will eventually turn out to be very successful.

**Care of the Flasks:** The best temperature for germination is between 75°-80°F. All flasks should be kept at this temperature together with the correct humidity. During the development of the seedlings the flasks should not be disturbed. Shaking the flasks sometimes allow spores that have settled on the neck or stopper to drop into the agar-agar and cause contamination.

**Development of the Seedlings:** The seeds begin to swell in about ten to fourteen days. It turns green showing the development of chlorophyll and later acquires a tap-shaped appearance with minute absorbing hairs covering the surface. Between two to three months after the seeds are sown the first leaf makes its appearance in the middle of the depression. This disc-like structure is called the protocorm. Successive leaves apear and the first roots begin to develop. By the sixth month the seedling is well developed. Additional roots are formed and by the end of twelve months the seedlings are ready for transplanting.

**Removal of Seedlings from Flasks:** Most of the seedlings can be easily removed after the agar-agar has turned rancid and soft and the nutrients are already used up. Repeated procedure of pouring in half a cup of water swirling it gently and pouring out seedlings into a shallow pan is what is commonly done. A few seedlings may remain, either between the glass and the agar-agar or embeded in the jelly. You can reach into the flask with a small knife and cut out pieces of agar-agar containing such seedlings.

After you have grown seedlings with Hyponex you may want to mix your own. Dr. Knudson has derived many formulae but his latest is given as the standard:

**Knudson's Formula 'C'**

| Chemicals | Symbol | Amount |
|---|---|---|
| Calcium Nitrate .. | $Ca(NO_3)_2 4H_2O$ | 1.00 gm. |
| Monobasic potassium phosphate .. | $KH_2PO_4$ | 0.25 gm. |
| Magnesium sulphate .. | $MgSO_4.7H_2O$ | 0.25 gm. |
| Ammonium sulphate .. | $(NH_4)_2SO_4$ | 0.50 gm. |
| Sucrose .. | $C_{12}H_{22}O_{11}$ | 20.00 gm. |
| Ferrous sulphate .. | $FeSO_4.7H_2O$ | 0.825 gm. |
| Manganese sulphate .. | $MnSO_4.4H_2O$ | 0.0075 gm. |

These chemicals must be weighed with extreme care, using a common balance. Any increase or decrease in proportions may be disastrous to the seedlings.

Add the above ingredients, one at a time to one litre of distilled water, and dissolve completely. Then add fifteen grams of agar-agar and boil until the agar-agar dissolves. It is necessary to check the pH scale as most seeds grow best in a solution with a pH of 5 to 5.2.

Khaw Cheng Haw.

## THE GREEN PLANT

The main function of the green plant is the absorption of raw materials from the air and soil for the manufacture of the exceedingly numerous and varied substances necessary for its own growth. However, the plant body is eventually transformed into the food of other plants and particularly animals, including Man. Except for a few low forms of organisms such as certain groups of bacteria, all living things are dependent on the green plant.

Although the elements present in the materials that make up the plant body are all derived from the air and soil they are present for the most part in compounds of higher energy content than that possessed by the simpler substances that go to make the plant body. Energy is essential for the synthesis of the substances that constitute the plant body and this is provided by sunlight. The process in which radiant energy is absorbed and utilised for the manufacture of plant food with the aid of carbon dioxide and soil water is known as 'carbon assimilation' or 'photo-synthesis'. During this process, carbon dioxide of the air and water from the soil are converted into carbohydrates, a conversion that calls for a large amount of energy. This can be more clearly illustrated by the following equation:—

$$6CO_2 + 6H_2O + \text{light energy} = C_6H_{12}O_6 + 6O_2$$

The amount of energy utilised will be immediately appreciated from the fact that about 1,700 calories are required to make a pound of sugar. This is about the same as that required to raise the temperature of about four gallons of water from O°C. to 100°C. This equation is supported by the measurements of gases evolved and absorbed, the ratio, Oxygen evolved/Carbon dioxide absorbed, being always unity and by analysis of photosynthesised materials.

Only green parts of the plant are able to do this and these green pigments are collectively known as chlorophyll. Obviously, chlorophyll is an essential factor in photosynthesis. Photosynthesis, without doubt, is of supreme importance in the living world and it has been aptly described as the world's most important manufacturing process. Life of this planet has been absolutely dependent on it, also it has provided us the power we need to run our industries and other modern amenities that distinguishes our present civilisation. The latter has been brought about by the utilisation of the energy stored in coal and mineral oil, the products of plant-remains millions of years ago. No other possible sources of power seem to be able to replace coal and oil efficiently. It was calculated that if all the rain that fell in the United States were collected and transformed into hydroelectric power, this power produced would be the same as that obtained from coal over the same area.

But, since only a fraction of the theoretical hydroelectrical power could actually be used it is clear that water power can never replace oil and coal. What about the so much talked of atomic energy ? At the moment it is difficult to say though it may one day provide us with cheap power. Anyway, we shall hope for the best.

It is interesting to observe the magnitude of the process of carbon assimilation. It has been estimated that the land plants alone produce from forty-five million to seventy-five million tons of sugar. Also, the oceans contain large quantities of photosynthesizing plants, for the most part microscopic, called phytoplankton. According to recent estimates, the total photosynthesis in the ocean is about seven or eight times that of land areas. Assuming that photosynthesis of the ocean flora per unit area is only twice that of plants on land we reach a figure approaching three hundred thousand million tons of sugar produced every year.

In matters concerning agriculture, suggestions on the growing of crops of algae in the sea, have been forwarded. The small plants of the ocean occupy only a depth of about three hundred feet, also excess carbon dioxide is in excess in the sea. It has been estimated that the atmosphere contains six hundred thousand million tons of carbon dioxide while the oceans contain about a hundred times as much. The photosynthetic power of the algae can be utilised to provide food and energy. This may appear as a sort of a dream, but at least it is much more realistic than to imitate photosynthesis without a green plant. Whether the human race will live long enough to reach this stage of scientific development is left to be seen but it suffices to say that green plants still remain the sole converter of solar energy for the maintenance of life.

Sulaiman bin Hj. Nordin.

## AGRICULTURE AND THE WORLD FOOD PROBLEM

Feeding the people of the world is mankind's greatest problem to-day. The world population is increasing at such a staggering pace that it is relentlessly pressing on world resources. Such an alarm had been first sounded by Rev. Thomas Malthus, an English sociologist, in his edition of, 'An essay on the Population as it affects the future improvement of Society' in 1798. He asserted that poverty and distress were inevitable as world population was increasing in a geometrical dimension while subsistence was increasing only in arithmetical dimension. The answers put forth as checks on population were war, famine, pestilence and the influence of miseries derived from a consequent low standard of living. Little notice was given to his statement as in the early nineteenth century the world was witnessing the greatest material evolution. The opening up of vast tracts of new land in North and

South America, Australia, New Zealand and South Africa; the invention of machinery and discovery and application of fertilizers to the soils of Europe, brought about for the next hundred years or so an abundance of food. This was known as the period of plenty.

What we forget is that the world today has no more vast new land awaiting easy development and that the agricultural output is not increasing in proportion to the increasing population. How are we to decide the future world we want ? It has to be either freedom from want or the want and famine prevalent in the years before 1798. The future depends entirely on how much unselfish thinking we put into the solution.

One must bear in mind that a hungry world is never likely to be a peaceful world. As evidence to the fact, we have had two World Wars within half a century. Thus, our efforts in trying to solve the problem of feeding the world population must go on with increasing intensity. The problem should not be a solution of one country at the expense of another but on a basis of co-operation. Each and every country can contribute her share to the solution by trying her utmost to increase her agricultural output. How can this be achieved ? Advanced countries like Britain and America shoud assist the under-developed countries such as India and China to modernize and improve their agricultural practices so that they are able to feed their teeming population. To realise such an aim, fertilisers, the basic requirement for increasing agricultural production, are required. At the moment the demand for fertilisers outstrips the supply and here arises a problem. There is very little hope of increasing production in the world fertiliser-manufacturing centres like Britain and America as the cost of transport and distribution to such distant countries as China and India will send the price of fertilizers to a rate far greater than what the farmers can afford. The reason is that the farmers are poor as can be seen in an extract from 'Our Underdeveloped World' by Prof. Dudley Stamp. He wrote:

> 'In India, agricultural production remains at a relatively inefficient level, because of the vicious circle in which the cultivator is entoiled. He is poor, therefore he cannot buy efficient implements or fertilisers; he plants his seeds laboriously by hand on land which he has scratched with his ox plough. He himself, his family and his animals are under-nourished, lacking energy for hard-work. Because he cannot afford to buy fuel for cooking, he burns the dung of his cattle, the only available material, thereby robbing the land even of animal manure. Consequently, his crops yields are low; he needs nearly all his produce to feed his family and his few poor animals and he has no surplus for sale. Because he has no surplus, he remains poor'.

This is the position of the majority of the peasants in South-east Asia and other underdeveloped countries of the world. One of the solutions is to reduce the cost of fertilisers to a level within the means of every farmer. Again, to do this the advanced countries have to assist the underdeveloped countries to build fertiliser plants. Only then fertilisers will be widely used by the farmers—the wide usage of fertilisers will certainly raise the present agricultural output and subsequently the living standard of the people.

The majority of the peasants are illiterate, with the result that low yields are obtained from their crops as compared to that of their advanced counterparts of Britain and America. This is the problem for education, agricultural advisory and extension work. In fact, our food production can be increased by two or three folds if we set ourselves to applying the knowledge we already acquired in such fields as irrigation, mechanization and manuring; application of genetical science to the breeding of plants and farm animals; soil conservation and other agricultural sciences.

The next problem in feeding the world's peoples is how to prevent the great loss of crops and stock through pests and diseases. The exact damage caused by pests and diseases is hard to estimate. But it is no exaggeration to state that a reduction of ten per cent. in crop loss will mean a loss of six and a half million tons of grain for the world population. Pests and diseases, unlike human beings, respect no political and national boundaries and the loss they inflict can only be checked by the joint efforts of all countries.

Proper organisation to tackle such a task is found in the United Nations Food and Agricultural Organisation which has the full backing of scientific and technical experts throughout the world. A resolution was passed in 1947 asking member nations to take immediate action on any outbreak of pests or diseases so that the initial stages of the attack could be checked. But how far can action follow resolution ? There must be funds made available for F.A.O. to send its experts to the countries concerned and give whatever assistance possible. At the same time the experts can submit a report to the council why some countries have failed to carry out their obligation. In this way invaluable information can be collected—materials which are pointers to methods by which the problems can be solved.

The above are but some of the aspects of agricultural problem in food production. Science, and good husbandry can still feed the present population—more and better in the future. This cannot be achieved by the thoughtless exploitation of nature; but by the wise application of what knowledge man has and co-operation between countries.

Wan Chee Keong.

## THE 'KNOW HOW' OF POULTRY FARMING

The most important thing in poultry farming is that you should have a genuine liking for it. Mere liking won't do, for you must have the patience and you must be observant too, else serious losses may occur. Poultry farming is a 365 days' job. It is always advisable for the beginner to start with a few birds, as a trial.

The next thing is to choose the best land in your holding for poultry. If your garden is small then you can bring your birds up in battery system. Poultry thrives best in dry and moderately cool climate with uniform temperature and plenty of sunlight. These conditions cannot be satisfied in Malaya. So try to get a place in which most of these conditions can be satisfied.

You should have permanent trees for shade during hot weather. The land should be sloping, light and porous, where there is no drainage problems, with grass on the surface which serves as palatable food stuff. The place should be clean and the birds should have access to free supply of water. It is advisable to limit the number of birds between 150 to 200 birds per acre of land. This one acre should be divided and only in half are the birds kept, the other half remaining free. The unoccupied half is for the change-over after six months or after a year, preferably after every six months. There should be night arks each for a maximum of 18 to 20 birds. The size of the night ark is 12 feet long by 7 feet wide.

For poultry keeping at the back yard a semi-intensive system is the best. This gives a limited amount of range which is covered all round by wire gauze. Here each bird should have at least 10 square feet to move about.

**Choice of Stocks**

This is classified into four types:

| | | | |
|---|---|---|---|
| (1) | Egg production | .. | You can go for birds which are good layers. Most of these are too small for table birds. |
| (2) | Table Breeds | .. | Large size fowls which possess good quality flesh but are poor layers. |
| (3) | Dual purpose Breeds | .. | This is for both purposes—eggs and flesh. |
| (4) | Exhibition Breeds | .. | These are for show purposes only. They are neither good layers nor table birds. |

Nowadays, birds are classified into heavy and light breeds. The light breed adult weighs round about 4 to 6 lbs. and the heavy breeds weigh about 5½ to 9 lbs. Most kampong fowls of Malaya, the Leghorns and the Plymouth Rock come under light breed. Rhode Island Red is a heavy breed, as are Light Sussex, Austrolop, New Hampshire etc.

You should always be observant and see that no fowl is ill. This is very easily done when they are let out of the night ark every morning. Any bird that appears to be sick should be removed and isolated without delay to reduce the risk of spreading. It is desirable to slaughter the sick fowl rather than to cure it. If the whole flock is affected then try your best to cure the birds by consulting a Veterinary Surgeon.

Apart from disease, look out for fowls that are poor layers. If these fowls do not repay the housing and feeding expenses it is best to sell them as table birds. Periodical examination of stock and removal of unthrifty ones are essential points of poultry management.

**Feeding**

Feeding should be done at regular intervals and in clean receptacles. There is not one food stuff that adequately supplies the requirements; these are made up of mixtures of various ingredients. Feeding accounts for more than half the total cost of egg and poultry meat production. Working out satisfactory rations for poultry is largely a business of trial and error. Why certain people are successful in one type of feed and others are not is not clearly understood. Certain rations give satisfactory results and departure from them affect egg production, growth and hatchability.

The five essential things in the food are:

1. Protein
2. Carbohydrates
3. Fats
4. Minerals
5. Vitamins

Proportions vary with each type of mash.

**Proteins:** Flesh and eggs are largely proteins. Requirements for protein vary from 15% for laying hens to 20% in the ration for young chicks. The lack of protein in the food results in slow growth, poor feathering and low egg production.

This is how to calculate the protein contents of an ingredient. Wheat meal contains 11% crude protein.

∴ 100 lbs. of wheat meal contains 11 lbs. of crude protein.

∴ 50 lbs. of wheat meal contains 5.5 lbs. of crude protein.

In the same way calculate the rest.

For example:

| | | | |
|---|---|---|---|
| Wheat meal | 11% | 50 lbs. | 5.5 lbs. of protein. |
| Bran | 15% | 20 lbs. | 3.0 „ „ „ |
| Pollard | 15% | 24 lbs. | 3.6 „ „ „ |
| Meat meal | 50% | 5 lbs. | 2.5 „ „ „ |
| Codliver oil | | ½ lb. | — |
| Salt | | ½ lb. | — |
| | | 100 lbs. | 14.6 lbs. of protein. |

Therefore 100 lbs. of mash contains 14.6 lbs. of protein. In other words the mash contains 14.6% protein. So with the addition of cereals the protein contents can be brought up to 20% which is sufficient for chicks.

**Carbohydrates:** These are two forms of carbohydrates.
(1) Fibre. (2) Starch.

**Fibre:** Oat bran and green feed etc. are of high fibre contents. But this is largely undigestible and has no food value for poultry.

**Starch:** Wheat, rice maize etc. are high in starch. This is for the energy, movement and body heat. Without these, slow growth and low egg production is the usual result. Therefore, oat, bran, coconut meal etc. should not form too high a proportion of rations, especially for young stock.

A certain portion of fibre—supplied by bran and oat is probably of some value in preventing cannibalism.

**Fats:** As for fats there should be at least 1 to 6% of fat in the ration.

**Minerals:**

Poultry needs at least 13 minerals: (1) Calcium; (2) Magnesium; (3) Potassium; (4) Sodium; (5) Iron; (6) Manganese; (7) Zinc; (8) Copper; (9) Phosphorus; (10) Chlorine; (11) Iodine; (12) Sulphur; (13) Cobalt.

Cobalt is taken in with the combination of vitamins. Fortunately only a few such as Calcium, Phosphorus, Sodium, Chlorine and Manganese are ever likely to be lacking in ordinary rations.

Calcium is obtained by shell grit, oyster shell and ground limestone. Sodium and chlorine are supplied in the form of common salt. Phosphorus and Manganese are only necessary in a few cases.

Mineral mixtures and "tonics" can be obtained in the market. It is the potential means of increasing production and promoting better health. Furthermore, all feeds contain a small amount of these minerals. Excess can be as harmful as deficiency.

Calcium for growing stock 1% of the ration and for layers 2.5% of the ration. Phosphorus is obtained from Meat meal and Bone meal.

A deficiency in Manganese leads to perosis in young stock. Manganese Sulphur (pink powder) at the rate of 4 oz. per ton of feed is sufficient. It can also be mixed with salt at the rate of 1 lb. of Magnesium sulphate to 60 lbs. of salt. This mixture can be used in mash at the rate of $\frac{1}{2}$ to $\frac{3}{4}$% in the mash ration.

**Grit**

Birds have small stones in the gizzard to break down coarse food like grain. Shell grit is different from the type of grit found in the gizzard of birds. Shell grit is soluble to digestive juices and will not stay long in the gizzard.

So the grit should be indigestible. It is a good practice to provide some grit such as gravel and hard granite, in addition to shell grit, if the birds cannot get sufficient grit from the ground.

**Vitamins**

Poultry needs a great many vitamins but only a few need be considered by a practical poultry farmer.

**Vitamin A:** Most often this vitamin is lacking in the food. It is very essential for health and especially to the well being of mucous surfaces of the body like eyes, nose and mouth. It also maintains normal production of eggs which must have a good reserve of vitamin A needed for hatchability.

The vitamin A can be obtained from green feeds. Ready made vitamin A is found in fish oils. The adult birds can store this vitamin for a few months but the chicks retain it for a few weeks only. Vitamin A is quickly destroyed when it is exposed. Therefore, it should only be mixed in the feed when required. You cannot keep the mixture for more than a week. It should be stored in a dark, cool place. Vitamin A is rich in oils which can be used to replace green feeds.

For growing stock 1,400 international units per pound of feed is needed.

For laying stock 3,000 international units per pound of feed is satisfactory.

For breeding stock, 4,000 international units per pound of feed.

When buying these one should see the international units per gram of the oil. For example, 1 gallon of oil with 3,000 international units per gram has double the amount of vitamin A than that with 1,500 international units per gram. 1 lb. oil is equal to 1 pint and an ounce of oil is equal to two table-spoonfuls. This oil can be mixed with bran first and then added to the ration. Emulsified oil can be mixed with water and water can be used to make a wet mash.

**Vitamin D:** Vitamin D is used for the prevention of rickets and for normal growth and hatchability. This can be obtained in three ways:

1. Sunlight
2. Vitamin D from fish oil
3. Manufactured vitamin D

Ultra-violet rays convert pro-vitamin D in the skin to vitamin D which is then available to birds. Where the birds do not receive enough sun-light, as in the case of battery birds, Vitamin D is given in the form of fish oil. When the sun's rays pass through glass most of the potency of the ultra-violet rays is lost. Vitamin D in fish oils varies a great deal.

Only oils of guaranteed vitamin D contents in A.O.A.C. chick units or international units by chicks should be purchased. An oil containing 400 units is worth twice that containing 200 units.

Chickens need 180 A.O.A.C. chick units per pound of feed; laying stock, 360 A.O.A.C. chick units per pound of feed; breeding stock 5,000 A.O.A.C. chick units per pound of feed.

Vitamin D, like Vitamin A, cannot be kept exposed to sunlight. It should be added only when required.

**Riboflavin Requirements.** (Vitamin B2 or G1)

This is very important to chick raisers. Lack of Riboflavin results in poor growth, low hatchability, leg weakness, curled-toe, and paralysis.

Growing stock needs 3.5 parts per million at hatching, decreasing to 1.5 per million at eight weeks. For laying stocks 1.5 parts per million and for breeding stock 2.5 parts per million of the feed are sufficient. Grains contain round about one part per million and this is not enough for growing chicks. Green food also fails to supply the amount needed. Milk powder, butter milk and liver meal should comprise at least five to ten per cent. of the ration. But pure synthetic riboflavin is cheaper. It can be added at the rate of one gram to a ton of rations which equal five per cent. of milk powder in the mash. It is easily mixed by adding two grams of riboflavin to half pound of pollard and nineteen and a half pounds of feed making a total of twenty pounds. These can then be incorporated in the ration at the rate of 7 parts in every 100.

**Vitamin B 12**

Oil meals such as pea-nuts, linseed or coconut meals should not be used as the sole protein supplement in the ration. Animal products like meat meal, liver meal and milk products contain essential animal protein factors or Vitamin B 12. In U.S.A. vegetable protein is cheap and used as a source of Vitamin B 12. They also made use of manufactured Vitamin B 12.

**Feeding System**

(1) **Wet Mash:** This is made by addition of water to the mash till the lumps taken from it crumble easily when squeezed gently. These form of food is usually fed in the morning and can stay fresh for only an hour or two.

Adult birds need 100 lbs. of dry mash for every 800 birds. Consumption falls as the egg production falls and vice versa. Green feed is given about mid-day; if not, fish oil can be included in the mash.

(2) **Dry mash:** It is mash placed in the hopper without being wetted. Birds can eat it through the day. Wet mash has to be made every day whereas dry mash can be given in excess and refilled when convenient.

In the evening the birds are fed with grain, whole or broken. The rate is 100 lbs. of grains for every 800 birds. It is advisable to feed the grains in the evening because, unlike mash, they are less easily digested and hence the birds do not have restless nights due to empty crops.

**Pellets**

Pellets are made out of mash. These are compressed to form small beans or nuts 3/16 of inch in diameter and 3/8 to 3/4 inch long. This can be fed instead of mash or it can be fed in addition to mash. They can also be substituted for grain.

The economic life of a bird is round about 2 to 3 years only. Egg production declines by 20% to 28% in the second year; which is the time for the farmer to bring a new stock to replace the old ones in the following year. Replacement may be done by culling $\frac{1}{2}$ or $\frac{1}{3}$ of the stock each year. He can either buy it or breed it himself.

Breeding requires knowledge and skill. In America and in Europe, these are left in the hands of an expert. They take care of the chicks from a day to three or four months old.

If you want to tave a try at breeding your own stock select only the best birds in your flock and keep them in a breeding pen and feed them well. Then the eggs can either be hatched under a broody hen or in an incubator.

By breeding your own stock you are gambling, (with the sex) for you cannot say which is the male and which is the female. It takes nearly four to five months to know the sex. If you are unlucky 80% of your chicks may turn out to be males. This means a great loss for the male can only be sold as table-birds. It is advisable to buy three month old pullets than buying chicks or eggs for restocking your birds.

K. Umapathy.

## BIOLOGICAL CONTROL

We are not the only organisms in need of food. Those of us who are engaged in Agriculture, whether in food production or in the production of a raw material for export will appreciate the urgency and vastness of that great variety of animal life competing with us for the materials we require for food. Among these animals, insects are of the greatest importance. The main weapons at present in use in the attack on insect pests are the chemical insecticides. The development and use of D.D.T., BHC, etc., have attracted much attention to the chemical control of these pests and other methods of control have been greatly neglected. While chemical control has much to recommend it, in recent years it has become evident that:—

(1) Increasing numbers of insects are becoming more resistant to insecticides.

(2) Insects living within plant tissues are not easily accessible to chemical attack.

(3) Stronger and more concentrated chemicals have to be restored to and the high cost of application has made a more efficient and cheaper method of control desirable.

The 'shortcomings' of chemical control methods have revived interest in biological control, a method which is by no means a new one. In the first place what does biological control mean ?

In a narrow sense it means the introduction of a living organism for the control of another living organism; to use its natural enemies, parasitic or predatory, to control or to check the pest. Insects may be used to control weeds, other insects, etc., Mammals and amphibians, too, can be used for this purpose. A few aspects of biological control includes:—

(1) Crop rotation—an elaboration on this is unnecessary since it is practised widely except to say that its purpose is to control weeds and pests.

(2) Fertilizer applications and their effects on vegetation. I shall have to dwell longer on this: at Rothamsted in England an experiment was carried out which illustrates this very clearly. Different parts of a meadow were given different fertilizer treatments. The result was such that one could tell where one treatment ended and where another began, merely from studying the plants thereon. An area full of weeds may have an adjacent weed-free plot. This is because the soil conditions there are uncongenial for the germination of the weed seeds, owing to the different treatments.

(3) Trap-cropping—an early crop is planted to attract insects which congregate on it and before they have time to breed are destroyed. This method is best used for insects which over-winter in hedges, etc.

(4) Breeding for resistant varieties of crop plants—advancement in the science of genetics has made crop improvement through breeding possible. We can now breed plants to suit our needs.

In our country more and more farmers are practising rotation of crops and increasing use is made of fertilisers to step-up or maintain yields.

Natural enemies destroy large numbers of insects. If these allies are to play their full part in the control of insect pests they must be used with understanding and care. An extensive knowledge of their physiology and behaviour is necessary. In fact, behaviour plays a great part in fixing their values as pests control, e.g. details such as behaviour in finding and choosing hosts and whether they will attack a host which has already been parasitised. A better understanding will be obtained if we consider definite examples.

The early emigrants of Australia brought with them some cochineal insects and the cactus, prickly pear, on which the insects feed. A dye was obtained from these cochineal insects for colouring soldiers' uniforms The insects died but the cacti flourished and got beyond control. Valuable agricultural land in Queensland and New South Wales were infested. Chemical and mechanical treatment would have cost M$100 per acre and was considered uneconomical. Biological control was resorted to. A study of insects attacking prickly pear in America was made and fifty species feeding on the cactus exclusively were recorded. These were sent to Australia and bred in quarantine, during which exhaustive tests were carried out; the most important being the assurance that they would not attack other plants. In these tests the insects were given the alternative of eating various cultivated plants or die. Only those species which died rather than eat useful plants were chosen. This reduced the original fifty species to only a dozen. They were then multiplied and released. Within three years the insects had multiplied and produced sufficient numbers to control the cacti but the real turning point came when the moth, **Cactoblastis cactorum,** from Argentina was used. When the last area of prickly pear was destroyed the vast numbers of Cactoblastis caterpillars died of starvation, confirming starvation tests made before their introduction. An occasional reappearance of the cactus in patches was soon under control again owing to the corresponding increase in the insect population. In a few less fertile areas the cactus proved

too tough for the **Cactoblastis** to feed on; this difficulty was overcome by stimulating the growth of the cactus with nitrogenous fertilisers which increased its succulence and encouraged the insects to feed on it.

Another instance of successful biological control in Agriculture is the use of the ladybird, **Vedalia,** in California to save the citrus industry there whose existence was threatened by cottony cushion scales. An initial hundred and twenty-nine insects produced a large population and soon the situation was under control.

It may seem after reading the above two instances that biological control is achieved very easily. In fact, it is far from it. When introducing an insect into an area we must make very sure that it is not capable of becoming a pest of cultivated plants. In this instance, it may be said that the more specialised an insect is the more it tends to be confined to one host. We must also see that it is free from parasites; otherwise there is the risk of the multiplication of the parasites and this might check the multiplication of the controlling insect. Above all the balance of nature must not be upset in such a way as to be unfavourable to Man; otherwise biological control may do more harm than good. Hence, biological control must be approached with caution.

An example to illustrate the foregoing is most appropriate. In Zanzibar, a species of scale insects is responsible for the spread of a virus disease in cloves. These insects are reared and protected by the red tree ants. The ants cover them with 'fine silk tents'. Since it was not possible to kill the aphids directly the ants were killed as a control measure. It so happens that these same ants also inhabit palm trees. When 'Operation Ants' was launched coconut yields fell. An examination of an unoccupied palm revealed that the tree was infested with a bug (Theraptus spp.) which destroyed the young developing nuts. This bug was absent on palms occupied by ants which preyed upon them.

Biological control then has a lot of potentialities. In the next few years it may find wider and more frequent use in Agriculture. But this must be preceded by detailed studies of parasite behaviour and physiology. Used with understanding, our allies can play a great part in pest control.

Ang Gek Choo.

## INTESTINES OF THE EARTH

Mother Earth abounds in wonders and mysteries, many of which are so mysterious and complex that they defy all understanding, but on the other hand some are so wonderfully simple that they are dismissed or passed by without the mere consideration of a serious thought. And one of these, astounding in capabilities, indispensable in usefulness, in a word, amazing in all respects, is an unbelievably simple animal namely, the common earthworm.

Known to zoologists as an annelid, most species belong to the family Lumbricidae, this animal has since the aeons of time helped mankind in his most important and noble occupation—that of the cultivation and tilling of land for the growing of food and for its distinguished service in this field it has been honoured with appellations such as " the intestines of the earth " so called by the philosopher Aristotle, " nature's plough shares," " colloid mills " and many more. The pioneer of the Theory of Evolution, the first man to make a serious study of earthworms, Charles Darwin said that " it may be doubted whether there are other animals which have played so important a part in the history of the world as have these lowly organized creatures." And to think that they are one of the favourite baits of anglers !

There are many species, living under the surface of the soil to a depth of several feet, working, unknown to them perhaps, for the sole benefit of the higher animals, in particular—man. They are literally found in every nook and corner of the soil. Few soils are found without these wriggling worms and they are invariably present in considerable number to form a major proportion of the biomas of the soil fauna. In size they vary with species; some are quite small but annelids measuring 11 feet in length (Megascolides australis) are not uncommon. The earthworm for its size is reputed to be one of the strongest animals in nature. They are found ranging from a sparse population of a few thousand per acre to one or two millions in favourable conditions, governed by the texture of soil, dampness, temperature and abundance of food materials.

The species are divided between the casting and non-casting groups and it is the former that is most important agriculturally. The casting species are capable of bringing between one to twenty-five tons of soil per acre per year to the surface by their activities in favourable environment, and these activities—feeding and burrowing—by their very nature exercise a profound effect on both the structure and composition of soil in which they are found, hence the great economic importance of these " lowly organized creatures."

Soils well populated by earthworms are made more friable and crumbly. The fertility of these soils show an overwhelming superiority over other fertile soils and their productivity is also vastly increased. All these are brought about by the endless labour of the industrious worms, whose activities comprise the ingestion of soil and ingestion and partial breakdown of organic matter with subsequent intermixing; the ejection of ingested food as castings on to the surface or sub-surface of the soil and the formation of a ramifying burrow system.

These worms are nocturnal in habit and they are most active during the night when they usually feed. Their menu consists of soil, dead or semi-decayed roots, leaves and all dead organic materials, which they devour endlessly day and night. They pull down the organic matter into their burrows, ingesting it, breaking it down partially or completely. In the journey through the efficient alimentary canal of the annelid, the ingested material undergoes a chemical change, takes on new materials, and is ground and thoroughly mixed with intestinal secretions. These worms literally serve as " colloid mills " to produce the intimate chemical and mechanical homogenized mixture of fine organic and inorganic matter which is the resultant casting aggregates, humus-laden with water-soluble nutritional elements, readily available for plant use. Where this perfect mixing is concerned man has yet to produce a machine to reach the vicinity of a par with these efficient alimentary canals.

The physical effect on soils brought about by the process of burrowing—formation of new burrows or extending them—is dependent on several factors of soil environment. Different species have different habits with totally varying effect on the soil in which they are found. Their number per acre and the texture of soils are of primary importance. On heavy soils the turnover has more significance in aeration than on lighter soils. A heavy soil is given a more open structure while the effect on light soils is to cause binding of particles. Then moisture, acidity, organic matter, natural enemies etc. are also some of the dominant factors determining the increase or decrease of worm activities.

Most of the soil is taken in during the process of burrowing along with organic substances and this activity is mainly confined to a depth of a few feet from the surface, resulting in the incorporation of mineral and organic constituents which vastly improve the tilth. The porosity is also greatly increased and along with this the burrows facilitate aeration to an appreciable extent; in some cases increasing the air capacity as much as 60 to 70 p.c. Water penetration is improved and it is also quickly absorbed, resulting in a bigger R.C. (water-retaining capacity) which is relative to the increase in aggregated colloidal material of soil and finely divided organic matter. Thus in areas well populated by them drainage is improved, reducing the possibility of water-logging. Due to the constant translocation of soil particles, the organic content of surface soils is increased; the disadvantage that a certain amount of stratification is caused is negligible compared with the advantages gained.

Chemically, wormcasts contain well-balanced mineral and organic elements. The pH (H-ion Exponent denoting acidity or alkalinity) of wormcasts is nearer neutrality—pH 5.5 to 7.0—than the soil itself, often resulting in the reduction of acidity in some areas amounting to

well over 70 p.c. Present in large numbers they are capable of producing a topsoil of neutral humus and they also reduce the alkalinity. Wormcasts contain a higher percentage of carbonates and nitrate N, more available P, more total and exchangeable K and Mg, and have a greater base exchange capacity. These worms are also responsible for the considerable increase of available N in ammonia ($NH_3$) in the soil. All these are rendered immediately available to the plant in the form of castings formed during the digestive process of the animal. These castings have a higher productive value in the fact that all the elements are water-soluble and hence easily absorbed.

Earthworm activities also have a great influence on bacterial multiplication and functioning in the soil. Due to this the rate of decomposition of cellulose and vegetable matter is increased. Earthworm-infested soils are in the main more resistant to pest and plant diseases and condemned soils have become productive by the introduction of these creatures. That these soils are pest-resistant is due to the fact that the wormcast aggregates together give a well-balanced soil which in itself may be said to be a "pest" to pests.

So far the particular types of worms we have in Malaya (Pheretima) have never been properly studied and their importance in agriculture is rarely understood and they are required more for the hook than for any other purposes. It is high time someone tried to classify and study these creatures. Also, in more advanced countries there are various earthworm farms which in fact, are doing a lucrative trade by providing worms to improve soils and this is an enterprise that could well be imitated in this country where they too can be harnessed.

Chew Chang-Gi.

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For commerce, thought the child of Agriculture,

Fosters his parent, who else must sweat and toil

And gain but scanty fare.

— William Blake.

## GENETICS AND OUR FOOD

In the eighteenth century the Rev. Thomas Malthus warned that the world population would one day outstrip the capacity of the soil to feed it. Until now his prediction has not come true; it was countered during that century by the opening of new lands in North and South America, South Africa, Australia and New Zealand. These new lands fed the teeming industrial population of Europe which Malthus had foreseen would exceed the carrying capacity of the soil. Although the vast potential areas could one day be cultivated, there is still reason to fear that Malthus' prediction may come true if improved methods of cultivation are not carried out.

The earth's capacity to feed its population has been increased by measures which many of us do not know. The biggest factor has been the development of a comparatively new science of plant and animal genetics. Genetics may be defined as the science of heredity and it attempts to discover how and why resemblances run in families and why many differences are also found among members of the same family. It was Mendel who formulated the principle of segregation in 1865, but it was not until 1900 when his work was revived. The knowledge of genetics has made it possible to breed new types of plants, capable, not only of giving higher yields but also of surviving under conditions of climate different from their original. One may think that the major crop plants have reached a high standard as regards yield, resistance to diseases and pest, etc., but this is not true, for there is limitless room for improvement in any crop.

Primitive area domesticated and improved many species of edible plants by applying Mendelism (though they were not aware of the fact) and by methods which are still used today. They changed many species of plants so drastically that the original species from which they were derived are not known today. This is true, for example, of maize, which seems to have been domesticated in Peru or Bolivia, perhaps more than four thousand years ago. We can safely say that the origin of cultivated plants is intimately connected with:—

(a) The selection of plants by man through trial and error of wild plants.

(b) The provision of new ecological niches enabling improved types to manifest themselves.

(c) The wide diffusion of cultivated plants providing possibility for intra and inter specific crossing leading to emergence of new types, to which two or more species have contributed.

Many agronomists and geneticists have worked and are still working to produce better crop plants. The main aims of these workers are to develop plants which have the following characteristics:—

(a) Resistance to diseases and pests.

(b) Good physiological characters such as resistance to lodging, drought and cold as in wheat.

(c) Good morphological characters such as non-shattering grain, good grain size and more grains in one ear, as in cereals.

(d) Good taste and high nutritive value.

Research has been carried out efficiently in most advanced countries where the farmers are very progressive. In U.S.A. stem rust resistant varieties of wheat have been produced and these have been greatly responsible for the tremendous increase in yields. It was estimated that the yields increased by forty-one million bushels valued at twenty-seven million dollars in 1947. A good example of stem rust resistant variety developed in U.S.A. is the 'Thatcher' which is extensively grown there. It withstood stem-rust epidemics when susceptible varieties of wheat were very severely destroyed. The 'thatcher' produces very good yields, has good straw strength, and very satisfactory milling and baking quality. In Sweden new varieties have raised the yield of winter wheat by thirty per cent. The Russians have tried to extend the country's wheat belt to the colder north. Lysenko was the Russian scientist who tried to accomplish the above work. He tried and claimed to be able to do it by vernalisation which is simply the inducement of earlier flowering brought about by pre-treatment of the grains with very low temperatures. Years of breeding and selection have ultimately produced desirable varieties. Practical benefits of this method are to induce early flowering and earlier maturation of the crop in order to escape frost. This has enabled the Russian farmers to grow wheat in Siberia where for ten months of the year the soil remains ice bound and unfit for cultivation. The wheat belt which once stopped at about the zone of eighteen inches annual rainfall now stretches to the twelfth inch zone.

Maize is another crop which receives much attention. Maize hybrids are very popular in the temperate countries. Many years back most of the maize areas of U.S.A. were planted with ordinary varieties but now they have been replaced by hybrid types which are capable of giving much higher yields than the ordinary ones. An area of twenty-million acres planted with hybrid maize gave an increase of a hundred and fifty million bushels over what would have been obtained if hybrid corn had not been available. Its popularity is due to several factors:—

(a) High yields.
(b) Resistant to lodging.
(c) Resistant to smuts and to ear and stalk rots.

Some varieties of maize hybrids are capable of withstanding drought and frost. The reason why normal varieties have lower yield is because of their homozygous nature owing to continued self-pollination. These homozygous types are in general less vigorous than hybrid ones and thus crossing inbreds restores vigour.

Although rice is the staple food of a larger proportion of the world's population surprisingly little research has been done on it. Seventy per cent. of the Asian people depend on rice for food and it is here that the population is multiplying fastest. A few years back, under the sponsorship of the United Nations Food and Agriculture Organisation and with the co-operation of ten rice producing countries, an International Rice Research Station had been set up at Cuttack in Orissa, India. The object is to find high yielding rice varieties. They are cross breeding the japonica and indica types. What they are aiming at is apparent from the comparative yields in pounds of rice per acre of the two types as shown below.

| Japonica (lbs./acre) | | | Indica (lbs./acre) | | |
|---|---|---|---|---|---|
| Japan | .. | 3,326 | Java | .. | 1,493 |
| China | .. | 2,163 | Thailand | .. | 1,126 |
| Korea | .. | 2,618 | Burma | .. | 1,334 |
| | | | Malaya | .. | 1,684 |

From these figures it will be seen that the yields from japonica in Japan is three times as great as the indica in India and more than twice that of Java. However, there are many other reasons besides good seeds, such as better crop husbandry to account for the higher yields in the case of the japonica. The japonica on the other hand cannot be just planted in S.E. Asia as it is the rice of higher latitudes, with more temperate conditions and longer days during the growing season. While indica is the rice of tropical and equatorial Asia, the japonica responds better to manuring than the indica and thus it does not pay to fertilise the indica as much as does the japonica. The problem, therefore, is to secure by hybridisation of the two varieties the combination of the good charactors of the two into the hybrid which is intended to respond well to manuring and to adapt to long days environment.

No definite results have yet been reached as it is still under experimentation. It may be that in the near future some suitable hybrids could be produced for Malaya. Our Padi Test Station at Telok Chengai, Kedah is also doing its part in carrying out selection work

on these two types. At Cuttack, research is not only confined to hybridisation as means of increasing the padi yields but extensive work is also carried out to produce plants resistant to pests and diseases.

Nowadays, breeders no longer confine their choice to the various types with which nature has provided them. They can now produce entirely artificial types by chemical treatment, for example, with colchicine and by bombardment with radioactive elements. The discovery of colchicine has enabled plant breeders to doubling of chromosomes and thus producing polyploid plants. Such plants are usually bigger than plants having 2n chromosome number. The use of colchicine has been successful in many varieties of plants. Doubling the chromosome number has been reported on the compositae, cruciferae, cucurbitaceae, euphorbiaceae, malvaceae and solanaceae plants. Plant breeders are beginning to know much more about the reasons why a plant can withstand drought or cold, or disease, so that it will no longer be a hit-or-miss process. It will be a matter of tailoring of plants to suit precisely the conditions in which food has to be grown.

M. Tamin.

## PAPAIN — PAPAYA LATEX

"Tapping" Papaya Latex.

Papain is the milky latex obtained mainly from immatured papaya. This latex exudes from the fruit on lancing. The instrument used for this process must be sharp and not made of steel or instruments having iron as one of its constituents. The reason is that iron will act as a catalyst and causes oxidation of the latex into a dark brown substance. Besides, oxidised latex produces an offensive odour accompanied by a rise in pH to 7.2 in a matter of twenty-four hours. Oxidation will reduce or destroy the proteolytic activity of papain and thus render it useless. The latex collected has to be processed as soon as possible, after which it should be kept in an air-tight container. The keeping quality or consistency of papain will depend on how much precautions are taken to prevent its oxidation. Good commercial papain can be kept over a period of about a year without losing its proteolytic activity if the necessary precautions are taken. The yield of the latex

is small and varies from plant to plant. The amount of dried latex obtained ranges from twenty to two hundred and fifty grammes per plant per annum. The wet latex consists of about twenty-five per cent. of dry latex by weight.

**Tapping of plants for latex.** As earlier mentioned the young fruit is tapped by lancing with a stainless instrument. Two to four longitudinal incisions at one centimetre apart and one-eighth of an inch deep are made. This operation is carried out from three to seven days intervals. The incisions will not spoil the fruit though the appearance will be affected. The latex is collected in glass or porcelain cups. The collected latex is then processed as soon as possible to ensure the production of quality papain of high consistency.

In Africa, it is found that papaya gives the best yield of latex from February to August. Time factor, too, will affect yield and it is found that the flow of latex is best before ten o'clock in the morning. It is also found that young fruit gives better yield than mature ones.

**Method of Production.** The first thing when the latex reaches the factory is to coagulate it. The latex is bulked in flat wooden or enamel vessels. Coagulation is affected by vigorous stirring which usually takes about ten minutes. The coagulated latex is passed through a colander, string-hopper squeezer or potato-squeezer, made of aluminum, brass or stainless steel. The coagulated latex is exuded in thin uniform layers and placed on drying trays to be put in the sun or dried in oven kept at 50° to 55°C. When it is dried in the sun a muslin cloth is placed on top of the tray. In the case of oven-drying, it should be well ventilated and dried to a required moisture content. This usually takes about six to eight hours. The papain is by then crisp and the optimum moisture content is below eight per cent.

Another method of preparation is by adding common salt when half dried. The common salt acts as a sort of protective agent against oxidation. Ten per cent. of common salt by weight is added to the half dried papain and then stirred. The mixture is then passed through a potato-squeezer and the thin uniform 'worms' are collected and evenly distributed in thin layers on drying trays to be dried either in an oven or in the sun. In the case of oven-drying the time taken is usually two to three hours, and the temperature should be kept between 50° to 55°C. to avoid the loss of proteolytic activity in papain.

The dried papain is packed immediately in rust free air-tight container. It should then be marketted as soon as possible and be kept in a cool, dry place or if possible in a cold storage.

Commercial papain is used in pharmaceutical preparations as a remedy for certain digestive disorders. It is also used for cleansing or removing fruit juice stains and preparing ferment liquors. Meat is made tender and easier to handle by the use of Papain.

Lim Cho Yam.

## CO-OPERATIVE FARMING

Co-operative farming is an entirely new idea to our farmers, though it has been practised for years in several countries, most extensively in Soviet Russia and Mexico. Agricultural co-operation exists in Malaya but restricts its activities merely in the fields of supply, sale, processing and credit. Co-operative societies can be found everywhere both in the urban centres and in the remotest rural areas. They deal only with the means or results of production and not with the systems and methods of production.

Co-operative farming by communities in Malaya is non-existent. However, the type of agricultural co-operation with which we are familiar is now well-established in one way or another and is receiving Government support.

**Origin:**

Co-operative farming has its birthplace in Italy. However, it is not well-established there, although like other Western capitalist countries, it has made splendid development in co-operative marketing and credit. It is quite surprising to find that Socialist Russia is most successful in this co-operative farming and collective productions. The main reason for this, we must admit, is that our democratic government is never much of an influence towards this end.

**Types:**

There are two types of co-operative farming, namely on individualistic and collective basis. In the individualistic type, individual member farmers cultivate their own land and pay rent to the society. Under collective basis, member farmers work together in groups, under a single direction and all products are pooled. The former is popular with capitalist countries while the latter in the Socialist countries.

**Main Problems of Establishing Co-operative Farming:**

The project needs several large scale investments. In the first place, new mechanical equipment and buildings are essential for the farm. Tractors, depending on size of the particular farm unit or a combined harvester and factories may be essential.

Secondly, there must be public services, particularly housing in the urban centres, without which industrial employment cannot be entertained.

Lack of capital for these investments is a common problem for many countries, finally resulting in the failure of the project.

There are various other difficulties encountered by the society both internally and externally. Natural difficulties, besides local economic difficulties, also form a hindrance to progress. Some members are prone to be irresponsible for the maintenance and care of the properties of

the society. Normal desire of a member simply to be first in harvesting his crops or cultivate his land is not extraordinary. In starting a co-operative farm, transferring farmers to a new area may be most difficult since many prefer to remain in their small holdings and maintain their independence rather than be turned into a collectivist, so long as they can make a living.

**Co-operative Farming Possibilities in Malaya:**

How far is it possible for Malaya to start co-operative farming ? Whether local conditions are favourable or whether this country is capable of investing the large capital necessary are better answered by the authorities.

The prospect of establishing it in Malaya is not too gloomy. It is an undeniable fact that the government is enthusiastic in rural development though nothing much could yet be seen to prove this. Our Government wants to raise the standard of living of rural people, who are the backbone of the country. Various measures have been adopted to remedy their ills. The role of the middlemen in their marketing system has disappeard in most places; the same applies to landlords and money-lenders. They are no longer vital in the life of the farmers. Could co-operative farming be the solution for raising their standard of living ? We should try to adopt either the individualistic or collective forms of co-operative farming or both as means to raise their standard of living.

**Individualistic Method:**

In this case a co-operative society could be established with a number of member farmers. Land may be leased to the members, each having a separate holding; the size of holdings allotted to members depending on the sizes of their families and ages. In this way the farmers need no longer pay rents to the landlords, middlemen or money-lenders, except to their society. To lighten their burdens, the society may accept their payments in the form of fixed amounts of farm produce. The society stated here may be entirely financed and owned by its members or aided by the government.

In Malaya, as one travels through the country, one sees that practically all farmers, padi planters especially, are faced with land problems, in one way or another. Their plots of land are either too small for economic productions, unproductive or leased from landlords. The problem of too small a holding for economic production seems to be most dominant in the State of Negri Sembilan.

Would it be possible then to allot these desperate farmers virgin areas for co-operative farming ? The government has been successful in resettling people under the emergency regulations and opening up new

villages which are now flourishing all over the country. We may achieve similar success should we boldly undertake this project.

**Collective Method:**

In many countries it originated as a remedy for unemployment in the State. In this method, the cultivation is collective. Machineries, store-house, housing, factories and such things as fertilizers are owned by the society or government. Members will be allotted a varying number of acres. To avoid frictions and failures, directions for cultivation operation may be from a manager. Thus the system offers a close tie between the members and the society. Ultimately the society may be able to supply its members social and economic needs. In more advanced areas the societies may even make provisions for old-age pensions.

**Conclusion:**

Co-operative farming is definitely advantageous to a country in many respects. From an economic standpoint, it becomes necessary particularly in the underdeveloped countries since it may form a direct large-scale transfer from agriculture to industry. At best it involves the introduction of machineries in farms, thus altering the trend or structure of the farm. However, it must be emphasized that tremendous capital investment is essential. Should it be found to be insufficient in the middle of the operation, a very uneven progress or even total failure may prove inevitable.

Wan Malik.

## REPORT ON THE NORTHERN TOUR
## (17th — 22nd December, 1958)

Forty-seven second and third year students, together with three members of the College staff went to Perak, Kedah and Penang on an educational tour during the second term holidays. The tour was conducted with a few objects in mind:—(a) to gather first hand knowledge of the different agricultural pursuits in the Northern States; (b) to learn as much practical knowledge by observation right on the spot; and (c) to study more about padi selection, hybridisation and the introduction of imported varieties now in progress.

Our first visit was to Degong Agricultural Station, about seventeen miles away from Teluk Anson. We were met by Che' Ibrahim, the Agricultural Assistant, who gave us a full account of the forty-two acre station of which thirty-two had been developed. The work in the station is mainly concerned with the advisory, demonstration and observations on a few varietal trials on fruits such as rambutans, pulasan, durian and citrus. Here we were informed on the different varieties of rambutans and durians; the various ways of applying complete NPK (Nitrogen, Phosphorus and Potassium) fertilisers quite different from that used at the College. Poultry is also kept, but the main work of the station is on fruits.

Now, what's wrong with the citrus?

The next place we visited during the day was the fruit orchard in the outskirts of Telok Anson. This area consists mainly of citrus and they all belong to smallholders. We learned from Che' Din, Agricultural Assistant, Telok Anson, who conducted us round, that the area supplies mandarin oranges to all parts of Malaya, Singapore, Indonesia and even as far as Hongkong. It also supplies marcots to all smallholders in Malaya. During our visit, we noticed that in some areas most of the plants were dying and devoid of leaves. We were told that the area having been under water for a few days prior to our arrival had been responsible for the condition shown by the plants. Such occurrences are compelling the smallholders to switch over to rambutan cultivation—a more hardy crop. The smallholders method of marcotting is different from that done at the College and we had the pleasure to witness a demonstration on the smallholders' way of marcotting. The most troublesome disease in the area is root rot and the practical solution to this is to introduce Tahiti lime which is more resistant to this disease.

At the Jendarata Pineapple Cannery .

Jendarata Estate, a Danish concern, was the next place we visited the following day. On arrival we were introduced to the Manager, Mr. Johenston who gave us a brief account of the estate. The estate deals with pineapples, oil palms and rubber and has its own factories for the processing of the products from the above crops. The estate exports all the products. The manager spoke more on pineapples, the various fertiliser treatments carried out and the prospects of mechanisation as regards the collection of fruits. We were then conducted round the pineapple factory and shown the whole process of canning right from the start when the skin of the fruit is peeled to the time when the finished products are ready for export. There is no labour problem here, as most of the labourers engaged are from nearby villages.

After this we proceeded to the rubber factory where we were introduced to Mr. Joe Wanson who revealed to us that the condition of

rubber here is not very favourable and they are now paying more attention to oil palms which will eventually replace the present rubber areas. There was nothing much to see in the factory as the processes of preparing sheet rubber and smoking them were familiar to us.

**Demonstration on the eradication of Ganoderma at Jendarata Oil Palm Estate.**

**At the Jendarata Oil Palm Factory.**

We next moved on to the oil palm section and were conducted round by Mr. Jednson who gave us a talk on the condition of the oil palms, the diseases that they have to control and eradicate and about an observation trial which was then in progress. The crop consisted largely of young palms and out of the five thousand acres planted only one thousand were in production. A great number of them, especially the older ones, were attacked by Ganoderma and Formes noxius. Various treatments had been carried out on the affected plants but the most effective one is by removing the attacked parts containing the mycelium of the parasites and burning all fructifications. Though this method is quite good, it is not economical and the amount spent on the control of this disease amounts to twenty thousand dollars ($20,000) a year. On completion of this we were brought to the oil palm factory and introduced to Mr. Michelson who gave us a detail account of the machinery and the whole process of manufacturing palm oil. Most of the products are sent overseas. The factory is well organised with equal division and distribution of labour.

The next morning we left Telok Anson for Cameron Highlands. The first place we visited was the Agricultural Station at Tanah Rata. On arrival we were introduced to Mr. Sokalingam who looks after the station and Mr. Tee Teow Yen, who is concerned with extension work. The former gave us an account of the station and the various crops grown on it. Tea is the most important crop here and about nine

hundred acres are under this crop. Here, we learned the types of fertilisers applied, different methods of pruning the tea bush and other manurial trials given to the crop. The common disease of this crop is blister blight and control is done by spraying with any copper fungicide, e.g. Perenox. We also had the opportunity to witness the working of the factory and the production of first class tea.

The next place on our programme was Kea Farm and we were conducted by Mr. Tee Teow Yen who told us that the farm belongs to Chinese smallholders and the crops grown were mostly vegetables. The sight was rather impressive with the slopes of the hills all terrace-cultivated. The Chinese gardeners work very hard and their produce are sent to the big towns of Malaya and to Singapore. Here, we were introduced to a progressive smallholder who has been very co-operative with the Agricultural Department in extension work. Many extension trials to be carried out by the Department were laid down in his holding and thus serve some sort of a demonstration to other gardeners.

The last place to be visited in Cameron Highlands was the Folly Flower Farm and here we were shown the various types of flowers that thrive well on the highlands.

After a night at Ipoh we made for the Titi Serong Agricultural Station at Parit Buntar. Here, Che' Ali showed us all the work carried out by the Department. At the time of our visit there was a Seraup Ear-row selection being carried out; Seraup 50 having reached the advanced stage of selection and had been sent out for regional trials. The multiplication of Seraup 99 for distribution to farmers was also a function of the station. The station also experimented on a few varietal trials such as Machang, Seri Raja, etc. Returning from the field we were introduced to Che' Wan Don, Agricultural Officer, Upper Perak who spoke to us on padi extension work such as the use of fertilisers in nurseries and in the field.

Later, we were presented to Dr. Koyama, from Tokyo University, a Colombo Plan expert who has come here to help Malaya in the study of stem borers of the padi crop.

The next day, we travelled further north to visit Telok Chengai Padi Experimental Station where we were met by Mr. Tong, Plant Breeder of the Botany Division. He took us round the station showing and explaining the many and varied activities of his work. Under the

Botany Division the following investigations were laid down at the station:—(a) F.A.O. padi varietal trials; the object was to study what foreign padi varieties are suitable for our country. (b) Padi hybridisation programme in which both local hybrids and japonica × indica hybrids were under selection; (c) varietal trials, and (d) maintenance of seed lines. Mr. Tang also showed us the padi cage which was constructed to investigate the behaviour of padi plants during the off-season and other ancillary investigations.

Inspecting the "Padi Cage."

The station also carried out agronomic trials under the Agronomy Division which is under Mr. An-Yong. At the time of our visit various trials were under way, the most important are (a) manurial treatment during transplanting time with NPK; (b) experiments on over-age seedlings and manurial treatments, and (c) disposal of padi straw as padi manure.

Students trying the "Padi Thresher."

Retiring to the School of Agriculture we were introduced to Mr. Marsedon, who gave us a talk on a threshing machine and the possibilities of using it in the near future. We then went to the field to see a demonstration on the use of the machine by some local farmers. A few of us also had a try in threshing padi with the machine. The next place we visited after lunch was the Gajah Mati Agricultural Station which was under Che' Aziz Tajuddin who conducted us round. The station is a comparatively big one and it concerns mainly with fruit trees especially citrus and grapefruit. Hence, our Department is experimenting on grapefruits and to find out whether they can do well in the northern parts of Malaya. From the look of the trees in the station, it seems that they are quite successful considering that the soil at the station is one of the poorest in that part of the country. We were also

informed of the fertilisers used, number of times applied and in what proportions.

At the Cockleshell Farm.

Next morning the party left Alor Star for Penang, the last place in our tour. We went straight to Ayer Itam Agriculture Station and were met by Mr. Lai who took us round the station and elsewhere. We were then brought to the Bayan Lepas Cockle Farm. There we were shown how the process of harvesting cockles is done. Then we proceeded to a pig farm run intensively, for, besides rearing pigs, they rear fish in ponds and plant fruit trees. The farm helps the Fisheries Department in carrying out experiments on fish.

In the latter part of the day we visited the Botanical Garden to see the various flowers and the potting shed.

The tour was most interesting and a very successful one indeed. We, students, definitely have learned much of the various agricultural activities in the country. It is hoped that in future we will be able to see more activities of such nature and as frequently as possible to supplement our theoretical and practical instruction at the College.

# LETTER FROM AN OLD FRIEND.

University of Nottingham,
School of Agriculture,
Sutton Bonington, Loughborough,
England.
7th February, 1959.

Dear Friends,

In reply to your " Serdang Sun " editor's request in his letter to me sometime at the end of January, asking me to write something about the life and the studies at this school, and to quote in his own words, " you will be helping many of us if you can write about your life and studies in your University so that students here who are desirous of pursuing their studies overseas can have a better idea of what they are to put up with," well here it is in brief.

At present there are four Serdang old boys in the Faculty of Agriculture and Horticulture of this University.

The Faculty of Agriculture and Horticulture has a separate building by itself, and it is situated some ten miles away from the parent-buildings— the University Park, and is called the School of Agriculture. Nevertheless, the life of the School of Agriculture is almost co-existent with the University itself, and it has shared fully in the burgeoning growth of the University.

The teaching of the Degree of Agriculture and Horticulture in this University follows a common course of what is largely natural science for the first three years (including intermediate year), and then specialisation in the fourth year. The candidate may consequently qualify for honours Degrees in Agriculture, Horticulture or Dairying. Under Honours in Agritural Chemistry, Agricultural Microbiology or Horticulture, or for Pass Degrees in Agriculture, Horticulture or Dairying. Under Honours in Agriculture, candidates may offer either Crop Husbandry or Animal Husbandry; Botany — a selection of the following: Plant Physiology, Genetics, Plant Pathology and Ecology; Chemistry — either Soils Science and Plant Nutrition or Biochemistry and Animal Physiology, and in Zoology, either Parasitology or Entomology. The final year courses for the pass degrees differ from Honours in including a greater diversity of subjects, such as Agricultural Engineering, and Agricultural Economics, to give a more generalised approach then the Honours Degree.

The main emphasis in the teaching at the School has become the study of growth — the growth of plants and the growth of animals, and to allow for this, animal biochemistry, plant and animal physiology and genetics have greater emphasis.

Life in the University is full of activities both academically and socially. During the term students are fully occupied with work. Lectures and Laboratory practicals go hand-in-hand; they start at 9.00 in the morning and finish at 5.00 in the evening, with Wednesday and Saturday afternoons and Sundays off. But there is no Field Practical as you do at Serdang, because here, students are expected to spend a complete year in the farm before joining the school.

With the exception of married students, all other students in this Faculty lodge in the Hall of Residence. Each student has a room to his/her own. As in other hostels, those here are of no exception. But I think overseas students gain a lot of things as a boarder. Food is probably the main complaint, not only among the Malayans but also other students. Different people may have a different opinion on this, but to me, it is worse than that supplied at Serdang. So do not be disappointed when you come over here and taste it yourself. It is not cheap too, I am paying £22 a month, and in term of Malayan currency is about $187/-.

Geographically England is a temperate country, therefore, you would naturally expect a cold winter and windy autumn.

Wishing you all the best.

Yours sincerely,
Osman M. Noor.

(Editor's Note: Inche Osman is at present reading for his Degree in Agriculture in the above University).

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## THE "I BELIEVES" OF FARM LIFE

"I believe that the country, which God made, is more beautiful than the city, which man made; that life out-of-doors and in touch with the earth is the natural life of man. I believe that work is work wherever I find it, but that work with nature is more inspiring than work with the most intricate machinery. I believe that the dignity of labour depends not on what we do, but on how we do it; that opportunities come to a boy in the farm as often as to a boy in the city; that life is larger, and freer, and happier on the farm than in the town; that my success depends not upon my dreams but upon what I actually do, not only luck but upon pluck. I believe in working when you work and playing when you play, and in giving and demanding a square deal in every act of life."

If seeds in the black earth can turn into such beautiful roses, what might not the heart of man become in its long journey towards the stars?

— G. K. Chesterton.

## STUDENT LIFE TWENTY YEARS AGO

Time marches on and one's ways of life changes with time. So has students life in the College of Agriculture changed in the past twenty years.

This article is written for the younger post-war generation of students to have some idea of how their fellow alumni lived and studied within the same four walls of the College. It does not claim to be comprehensive; that would not be possible and space does not permit the writer to do so. Also, no attempt is made to compare past student life with the present nor to discuss its pros and cons. This is best left to the reader to form his own opinion or to a debate to argue it out. Again more senior alumni may not agree with some points in the article. Theirs would be life in the then infant School of Agriculture.

A new student on arrival would meekly settle himself down temporarily on one of the bunks in the west wing dormitories (Morrison and Morris Dormitories) if he was a Malay or in the east wing (Hooker and Watts Dormitories) in the case of non-Malays. He would be lucky if he did not have to move to another bunk again for it was the senior students who decided which side of the dormitory the freshmen should sleep.

Ragging was usually brief and bitter sweet and confined to each dormitory though senior students from other dormitories usually joined in the fun. At the end of the night's ragging all freshmen received prizes in the form of a dose of quinine — two tablespoonful being the first prize, awarded to the one who was most resistant in the ragging, two to the runner-up and one for the rest. The prizes certainly served a useful purpose for malaria was very common then. The next day all members of the dormitory adjourned to the " tuck-shop " (coffee shop) for a party at the expense of the senior students. Thereafter all were on equal status.

Blisters usually began to appear on the palms of new students the next morning after arrival. Field work was from 6.30 to 9.00 a.m. and 4.00 to 4.30 p.m. and Tuesdays were spent working in the Federal Experimental Station (the C.E.S.). Morning field work was devoted to general farm work and the afternoons to student individual plots. All students were allotted 4 beds to grow the prescribed crops and vegetables for the garden.

No weekend leave would be approved if students' progress on his individual plots was not up to the standard or satisfaction and though the compulsory period was half an hour in the afternoon most of the students had to do overtime which was recorded at half-hourly intervals by the dormitory prefects. To grass mulch one's vegetable beds one had to cut or collect whatever grass was available and likewise a student had to get his own supports for his cucumber or cowpea crop.

Generally, practical instruction was along similar lines adopted today but the present system of training has undergone marked changes. It should be recorded here that poultry management and research was the pride of the College and its only kind in Malaya then. The scale and standard reached, would be difficult to repeat or improve with existing facilities in the College.

The Diploma Course in the late thirties of the century was a two-year Course. Very little pure science was taught then. The applied science and agricultural subjects were similar to those lectured today but with less subdivision of the subject. For example Botany taught to the first year students embraced General Botany, Systematic Botany and Agricultural Botany and also one examination paper was set for Major Crops compared with five that students have to sit today.

Lectures though instructive were generally dull and uninteresting especially those read out from printed lecture notes. Humorous academic illustrations were wanting and some students had to put up a great effort to keep awake in a certain lecturer's class.

The students never heard of the Higher School Certificate Examination. It was not necessary and not catered for because there was no scholarships for higher studies in agriculture. For admission to the College (the School of Agriculture), the minimum qualification was the Senior Cambridge School Certificate.

Dormitory life was gay and healthy in those days and hostel regulations strict. All mosquito nets and mattresses had to be rolled up before students went out for morning field work. Heaven help those who failed to do so. Sweeping the dormitory was the responsibility of the first year students. Some did it by just dragging the broom round once ! Lights were out at 11.00 p.m. and it was a must for the watchman to see this regulation obeyed every night.

For indoor recreation the wireless (considered a luxury then) and an old gramophone which squealed out awful noises even from brand new musical records were most popular. The wireless was so popular (a novelty to some of the Minor Course students) that it was never given a rest as long as there was music in the air, and each dormitory was only allowed certain days to tune in.

Organised dances, whether terminal, annual and special in the Students' Common Room were never given any consideration. To those who would like to polish up or improve this form of foot-work their usual places were the dance halls in Kuala Lumpur. But debates, hot-talks were occasionally organised by the more culturally minded students for the benefit of everyone.

Catering was divided into Muslim and Chinese sections. The menu and diet sheet was drawn up by the Principal whose special interest on this

matter was to produce a balanced diet as cheap and appetising as possible. As usual most students disagreed that the food was tasty and except for Wednesday nights (chicken night) it was not uncommon to see students taking a bee-line to the "tuck-shop" or Serdang Village to supplement their "balanced ration".

A few lines on scholarship, in those days: There were three Straits Settlement Scholarships, eight Federated Malay States Scholarships and one Edwin Philip Scholarship. Selection was by means of competitive examination followed by an interview. The terms of the S.S. and F.M.S. scholarships were the same—full board and free tuition plus $5/- pocket money a month. Five dollars were big money then and there was little complaint of it being not enough.

Time erases memory of the past. What has been omitted in this article could well be inserted by other alumni in the next issue of the "Serdang Sun" to produce a clear picture of life in the Alma Mater in the good old days for the benefit of the present.

An Old Boy.

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## THE 'ELEVENTH' COMMANDMENT

'Thou shalt inherit the holy earth as a faithful steward, conserving its resources and productivity from generation to generation. Thou shalt safeguard thy fields from soil erosion, thy waters from drying up, forests from desolation, and protect thy hills from overgrazing by the herds, so that thy descendants may have abundance forever. If any shall fail in this stewardship of the land thy fruitful fields shall become sterile, stony ground and wasting gullies, and thy descendants shall decrease and live in poverty or be destroyed from off the face of the earth.'

# BAHAGIAN MELAYU.

## KATA PENDAHULUAN

Kita berasa bangga dan besar hati kerana dapat bertemu sakali lagi dengan para pembacha-pembacha sekalian yang budiman di-dalam ruangan Bahagian Melayu Majallah "Serdang Sun" keluaran tahun 1958/59 ini. Majallah ini di-dalam bilangan yang ka-tujoh-nya ada-lah membayangkan lidah kata2 dan pendapat penuntut2 di-Maktab Pertanian, Malaya, di-Serdang, dan agak berlainan-lah sadikit keluaran-nya pada kali ini sebab ini-lah kali yang ka-dua-nya Majallah yang saperti ini di-terbitkan semejak terchapai-nya kemerdeka'an negeri kita Semenanjong ini.

Dua tahun telah lenyap dengan pemerentahan merdeka. Masa nya sangat sengkat. Tetapi di-dalam masa yang sengkat itu berbagai2 perubahan yang telah pun bersama2 kita saksikan—perubahan yang menuruti peredaran masa mendorong tetap arah kemajuan, dan kemajuan2 ini akan munkin terchapai-nya lagi degan menimbolkan semangat2 yang baharu dan membenamkan semangat yang lama2 yang kurang 'progressive'. Keraja'an kita yang berkuasa pada hari ini ada-lah bekerja dengan saberapa daya dan giat-nya untok memajukan negeri kita sama ada di-dalam lapangan Pentadbiran, Perekonomian mahu pun Pertanian.

Di-dalam lapangan pertanian, kita patut berasa bangga kerana mengutamakan soal pertanian ada-lah terbentang di-dalam dasar Keraja'an kita. Memang sapatut-nya-lah Keraja'an berbuat demikian sebab negeri ini ada-lah berdasarkan dan berchurak sabagai suatu negara di-mana sabahagian besar daripada ra'ayat2-nya bergantong kapada perusaha'an pertanian.

Manakala kita renongkan sa-dalam2-nya apakah ma'ana-nya ayat "pertanian" itu, maka kita akan dapati pertanian itu ia-lah suatu pekerja'an yang agak kedua tertua-nya di-dalam dunia ini mengenai perusaha'an berchuchok tanam dan memelihara binatang2 ternak yang mana hasil2-nya ia-lah untok menjadi benda2 makanan, pakaian dan, pendek-nya penutop segala keperluan kehidopan manusia sahari-hari. Untok menjadi sa-orang petani yang sabenar-benar arti kata-nya, maka

tidak-lah memadai mempunyai tenaga yang kuat sahaja, tetapi harus juga ia mempunyai pengetahuan yang luas di-dalam hal ehwal pertanian. Di-sini maka sangat-lah terang betapa mustahak-nya pelajaran di-dalam ruangan bertani.

Demi mustahak-nya perkara itu tidak-lah dapat di-napikan. Kemundoran peladang2 kita dan saterus-nya kesempitan penghidupan mereka itu ia-lah kerana kekurangan pelajaran tentang pertanian. Pelajaran dengan sendiri-nya akan memperluaskan pandangan hidup, bertambah2 lagi jika satu aloran pelajaran saja, umpama-nya pertanian, dapat di-amalkan samasa bekerja. Di-negeri2 yang sudah maju kahadapan saperti Britain, Amerika dan lain2 lagi, peladang2 terlebeh dahulu melalui korsus pertanian sabelum memrempoh kerja2 di-ladang. Dengan pelajaran ini pandangan mereka luas dan dapat menjalankan tugas mereka dengan lanchar-nya. Jadi, ta' hairan-lah jikalau mereka2 ini orang hartawan dan di-hormati oleh musharakat. Tetapi dengan chara apakah peladang2 kita dapat mengikuti tauladan2 ini ?

Ta' payah-lah kita pergi sabagitu dalam umpama-nya bagaimana gaya-nya2 bahan2 makanan di-hisap oleh tumbohan2 atau bagaimana chara-nya2 tumbohan2 itu mengeluarkan buah-nya, lebeh baik-lah kita kajikan apa yang terjadi di-samping peladang2 kita sahari-hari. Kerap kali petani2 kita menanam pokok2 yang kurang baik baka-nya, dan kadang2 pula menekala pokok2 sudah tumboh dan tengah subor hidup-nya, berbagai2 pula anchaman penyakit saperti ulat dan belalang yang menyebabkan kekurangan hasil. Sudah-lah bagitu, kerap kali juga kita jumpai apakala mendapat hasil2 dari titek peloh-nya sendiri, maka di-jual sahaja hasil2 itu dengan tiada mengetahui harga dagangan yang tetap. Jadi oleh yang demikian sabahagian besar daripada keuntongan-nya ia-lah di-tangan 'Orang Tengah' yang ta' bersusah payah berusaha mengeluarkan hasil-nya itu dari ladang sachara membantingkan tulang. Sebab itu kalau dengan mempelajari sadikit sabanyak tentang selok belok harga pasaran atau serba sadikit berkena'an dengan Iktisad Pertanian, maka keuntongan besar yang di-genggam oleh 'Orang Tengah' itu dapat-lah di-hadkan. Dengan pelajaran juga penyakit2 yang senantiasa membinasakan pokok dan binatang2 ternak dapat-lah di-chegah, dan dengan mengetahui serba sadikit-nya gaya2 chantom menyantom, baja membaja, memperelok dan memperbaiki baka2 sama ada binatang2 ternak mahu pun tumbohan2 dengan jalan 'Cross' atau kachokan ada-lah perkara yang membawa keuntongan kapada pertani2 kita.

Oleh itu maka ta' lain ta' bukan lagi, dengan chara memberi pelajaran-lah kapada kaum2 peladang kita supaya dapat terchapai-nya usaha Keraja'an untok membela dan meninggikan taraf hidup kaum2 petani di-dalam negeri ini. Perkara ini tidak dapat di-perolehi dengan

serta merta, atau, apa yang di-katakan sa-lepas " semalam lalu " saja, ha-nya dengan chara beransor dan berdikit-dikit baharu-lah tentu kejaya'an itu dapat di-buktikan.

Walhal apa yang terjadi di-masa dulu ia-lah, " Kaum2 peladang yang banyak-nya terdiri dari orang2 Melayu, selama ini ada-lah terbiar dan musharakat-nya tidak terator dan kerap terdapat ladang2-nya pun tidak tersusun, semata2 mengikut panduan chara 'pertanian dato' nenek dulu kala'—kalau tumboh, tumboh-lah, kalau ta' berbuah pokok apa hendak di-buatkan ? Razki di-tangan Tuhan. Dengan chara demikian, hasil keluaran sadikit, keada'an hidup peladang bertambah burok dan anak2 muda kampong lari ka-bandar menchari kerja dan ladang2 di-kampong terus menerus penoh lalang dan belukar. Hal yang demikian ini bukan saja merugikan peladang bersaorangan bahkan juga negera 'am-nya." Bagitu-lah uraian Renchana Penggarang " Panduan Ra'ayat " keluaran minggu kedua, July, 1958.

Perkara ini memang sabenar-nya dan yang sa-elok-nya-lah kaum2 peladang kita sendiri membaharui sikap mereka dengan chara meluaskan lagi tanah ladang umpama-nya dari kawasan2 yang di-buka oleh Keraja'an menuruti Ranchangan Membuka Tanah Baharu dan buat-lah apa jua untok mendidikan anak2 itu supaya kasih pada bumi dan tanah ladang-nya moga2 dapat kita membina peladang2 angkatan baru yang akan mema'amorkan negeri-nya di-masa badapan kelak.

Suatu lagi soalan yang harus di-sebutkan ia-lah mengenai per-champoran kaum2 wanita di-dalam ruangan pertanian. Pekerja'an bertani ini tidak terhad semata2 kapada kaum laki2 saja, ha-nya ia-lah suatu perusaha'an di-mana sama ada laki2 atau perempuan bersama2 berchampor tangan supaya dapat mengeluarkan hasil2 yang tinggi sabagai mana yang telah di-lancharkan oleh negeri2 lain. Tetapi nampak-nya banyak di-antara kaum wanita kita di-sini terutama-nya yang telah terpelajar ada-lah bersalah fahaman terhadap soalan ini. Barang kali banyak di-antara mereka2 menanggong perasa'an bahawa bertani itu senantiasa berlumaran lumpur saja di-tengah2 ladang sapanjang hari—kalau hujan, hujan-lah dan kalau panas, panas-lah. Kerja misti di-jalankan jua. Tetapi, ta' bagitu, dan sabalek-nya ada tempat2 yang berpatutan di-mana wanita2 boleh mengambil bahagian besar umpama-nya menjadi salah sa-orang penyiasat penyakit2 yang di-hidapi oleh pokok2 apa yang di-sebutkan di-dalam Bahasa Inggeris " Plant Patho-logist," menjadi salah sa-orang ahli serrangga atau " Entomologist " dan berbagai2 lagi-lah jawatan yang bersasuaian dengan kaum2 wanita.

Oleh kerana di-pandang penting perchamporan wanita di-dalam lapangan pertanian ini maka Keraja'an sekarang ada-lah membukakan peluang2 kapada wanita2 muda yang berkebolehan untoh di-lateh di-

Maktab Pertanian, Malaya, di-Serdang menjadi salah sa-orang pegawai2 di-dalam Jabatan Pertanian kelak. Kapada wanita2 yang ada kelulusan dan chenderong kapada pertanian, maka ini-lah dia seruan untok membuktikan chita2 itu.

Sekian-lah sahaja dan dari ruangan ini juga saya mengambil kesempatan menguchapkan terima kaseh kapada sudara2 yang telah sama2 berusaha bagi menjayakan majallah ini, dan juga saya minta ma'af kapada sudara2 yang menghantarkan maqallah-nya2 tetapi ta' dapat di-mutkan di-dalam majallah ini oleh sebab kesempitan ruangan yang ta' dapat di-elakan.

Mohd. Shah bin Haji Lassim.

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## PEKERJAAN DAUN-DAUN POKOK

Tiap-tiap sesuatu yang bernyawa berkehendakkan udara oxygen. Manusia boleh bertenaga dengan ada-nya oxygen meresap ka-dalam darah-nya. Begitu juga daun-daun pokok dengan mengambil oxygen dari udara maka dapat ia mengeluarkan tenaga (energy) dari gula-gula (sugars) dan sagu-saguan (starches) yang tersimpan di-dalam daun itu. Dengan tenaga ini-lah, maka pokok-pokok menjadi besar dan subor.

Daun-daun pokok mempunyai dua muka yang berlainan dan oleh kerana demikian maka daun-daun itu boleh membuat dua pekerjaan. Chuba-lah kita ambil sahelai daun, dan kita rasa ka-dua-dua muka daun itu. Kita akan dapati warna hijau tua dan lichin pada muka sebelah atas dan hijau muda pada muka sebelah bawah-nya. Ada pun di-muka daun sebelah bawah ada terdapat beberapa banyak lobang-lobang yang halus (stomata) dan ini tiada nampak pada mata kasar kita. Melalui lobang-lobang ini-lah oxygen memasoki ka-dalam sel-sel daun. Lobang-lobang yang halus ini boleh di-besarkan dan di-kechilkan mengikut pertukaran hawa udara. Pada masa hari panas, daun-daun menjadi layu oleh kerana ayer-ayer yang di-dalam meresap keluar dan terus kering di-muka daun-daun itu. Ini menyebabkan lobang-lobang yang halus itu tertutop. Sabalek-nya pula apabila hari tidak panas, seperti terdapat pada malam hari, lobanglobang ini terbuka sa-luas-luas-nya dan ini menyenangkan bagi pokok-pokok itu bernafas.

Lobang-lobang halus di-daun yang tinggi, seperti di-puchok pokok, boleh menolong membawa ayer-ayer daripada akar di-dalam tanah terus ka-atas. Chara-nya ayer itu naik ada-lah begini. Sa-panjang masa, ayer yang di-bawa naik meresap keluar mengikuti saloran saloran lobang halus dan dengan ini satu kuasa hisapan terjadi di-dalam pokok dan ayer naik ka-atas dengan tidak putus-putus-nya melalui dari sel ka-satu sel.

Ada pun muka daun yang sebelah atas pula mendapat chahaya daripada matahari, dan chahaya ini di-ambil dan di-gunakan bagi daun-daun itu bekerja. Patut kita ambil perhatian di-sini kerana tidak ada jentera-jentera yang bekerja di-dalam daun dan tidak ada asap kotor yang keluar bagi menchachatkan angin udara yang berseh, malahan daun-daun mengeluarkan angin oxygen untok membersehkan udara. Boleh-lah kita katakan daun itu suatu 'gudang' yang mengeluarkan hasil untok makanan-nya sendiri, dan dari hasil ini tidak ketinggalan juga berfaedah kepada manusia, seperti kita dapati kayu-kayuan, sagu-saguan, plastik dan lain-lain. Untok daun-daun menyelenggarakan tugas-nya, maka sa-jenis benda yang hijau (chlorophyll) mesti-lah ada di-samping daun itu, dan dengan ada-nya benda ini dapat-lah daun-daun mengambil tenaga matahari.

Bagaimana pula daun-daun membuat makanan-nya ? Carbon dioxide, sa-jenis angin, masok ka-dalam daun menurusi lobang-lobang halus (stomata) dan ayer yang mengandongi angin hydrogen dan oxygen di-hawa naik ka-atas daripada akar. Sa-telah ada dua perkakas ini dan dengan ada tenaga matahari (energy) yang di-ambil oleh benda hijau (chlorophyll), maka terjadi-lah suatu penukaran (chemical action) daripada perkakas yang mentah kepada kompolan gula-gula dan sagu-saguan. Begini-lah ka-adaan di-dalam tiap tiap daun pada satu-satu pokok, membuat makanan-nya daripada mula matahari terbit hingga-lah ka-petang.

Penolongan besar yang di-beri oleh daun-daun terhadap kita ia-lah udara sehat yang kita sedut apabila kita bernafas. Dalam pembikinan gula-gula dan sagu-saguan, ayer-ayer dan carbon dioxide yang mengandogni oxygen, hydrogen, dan carbon di-pechah-pechahkan dari komoplan-nya. Sunggoh pun pokok-pokok mengunakan oxygen, tetapi ada-lah oxygen yang di-pechahkan daripada ayer dan carbon dioxide itu melebehi dari ka-gunaan pokok. Maka oxygen yang lebeh ini keluar mengikuti saloran lobang halus dan berchampor dengan udara luar. Kita ambil oxygen ini, dan sa-balek-nya pula kita beri carbon dioxide kepada pokok-pokok membuat makanan-nya, dan terus mererus ka-adaan seperti ini berlaku, walau pun ada di-antara pokok-pokok dan binatang-binatang mati dan hilang ghaib dari dunia ini.

Oleh 'I S M'

## PERUSAHAAN NANAS DI-NEGERI KITA

Nanas yang berasal dari Amerika Selatan telah di-bawa ka-negeri kita oleh orang2 Portuguese dalam abad yang ke-enam belas. Pada mula2-nya hanya di-tanam sadikit di-Pulau Singapura dan di-bawa ka-Melaka pada T.M. 1850. Pada tahun 1890 orang2 China telah mengambil

perhatian di-dalam perusahaan ini. Pokok2 nanas telah di-tanam di-antara pokok2 kelapa dan buahan-buahan lain, juga untok menandakan sempadan kawasan2 dan ladang2. Perusahaan2 getah telah meningkat naik pada tahun 1920 dan nanas di-tanam di-antara barisan anak2 getah. Pada masa itu tidak banyak kebun2 nanas yang di-jayakan khas untok-nya saja tetapi hanya untok menantikan anak2 getah itu naik, ibarat kata "Baik-lah berjagong-jagong sementara menantikan padi masak." Kerana pada masa itu harga buah-nya sangat-lah rendah, tetapi ada mendatangkan hasil dan perusahaan-nya bertambah maju. Kilang2 untok mengeluarkan nanas di-dalam tin telah di-tubohkan (Canning Industry).

Pada tahun 1931 perniagaan getah jatoh dan perusahaan nanas mula-lah naik. Banyak hutan2 telah di-terangkan dan nanas di-tanam. Tanah2 pada masa itu sunggoh-nya murah tetapi malang-nya harga nanas pun bagitu juga. Ka-adaan tanah tidak be-berapa sesuai dengan perusahaan ini dan banyak yang tidak mengeluarkan hasil yang memuas-kan hati. Satu bala yang besar tiba di-dalam perusahaan ini apa bila Jepon menguasai Negara kita. Kilang2 terpaksa di-tutup kerana kita tidak dapat menghantar hasil2 kita ka-luar negeri. Maka kebun2 nanas kita terpaksa di-hapuskan dan ubi kayu di-naikkan.

Tetapi sa-lepas perang dunia yang kedua perusahaan nanas di-negeri kita telah di-bena samula dan penanam2 telah di-galakkan men-anam di-kawasan tanah gambut (peat soil). Kebun2 nanas bertambah luas dan banyak, dan kilang2 di-tegakkan samula. Kebanyakkan peru-sahaan ini ia-lah di-negeri Johore yang ada 12,000 ekar kebun2 besar (estates), 8,000 ekar kebun2 kechil, di-Selangor ada satu estate dan 3,200 ekar kebun2 kechil dan di-Perak satu estate dan 400 ekar kebun2 kechil. Tetapi di-merata2 kampong dan cherok negeri kita nanas ada di-tanam untok keperluan sendiri dan di-jual ka-pasar2 kechil. Di-seluroh Tanah Melayu 44,800 ekar tanah terisi dengan nanas pada hari ini.

Ada empat jenis nanas yang di-tanam di-negeri kita, ia-itu: (i) Nanas merah; (ii) Nanas hijau; (iii) Nanas Sarawak dan (iv) Nanas Moris. Yang pertama dan kedua itu kebanyakkan di-tanam di-kebun2 besar sahaja kerana untok keperluan kilang2 yang hasil-nya akan di-jual ka-luar negeri. Tetapi yang dua jenis itu lagi memang mashor untok keperluan kita sendiri dan buah-nya sangat manis dan banyak di-tanah di-kebun2 kechil.

Sunggoh un banyak negeri2 lain seperti Australia dan Afrika Selatan mengeluarkan nanas tetapi perniagaan kita memang tidak ter-kebelakang di-dalam perjualan nanas ka-luar negeri. Banyak nanas2 kita di-dalam tin di-hantar-kan ka-negeri Eropah terutama-nya ka-Britain dan lain2 negeri lagi. Ini ada-lah di-sebabkan negeri2 yang

tersebutt tidak dapat menanam sa-jenis nanas yaitu Nanas merah yang sangat di-sukai oleh pembeli2 di-Eropah. Warna nanas ini yang berkilau-kelauan apa bila di-tarok di-dalam tin sangat mengeram-kan penggemar2-nya. Peruhasaan negeri luar memang lebeh dengan negeri kita kerana mereka mengunakan jentera2 dan baja yang baik2 tetapi mujor-lah tanah di-negeri mereka tidak sesuai dengan Nanas merah ini yang telah mendapat tempat bagitu tinggi di-dalam perniagaan nanas khas-nya di-negeri2 Eropah.

Memang banyak kesusahan yang di-alami oleh pekebun2 nanas kita hari ini. Pertama-nya ka-adaan tanah yang di-hadkan untok menanam nanas tidak berapa chantek. Kedua-nya pokok2 nanas yang sedang naik berkahandakkan jagaan yang istimewa. Di-keliling-nya hendak-lah di-rumput terang dan tanah di-pangkal-nya hendak-lah di-tutop dengan rumput mati (mulch). Ketiga-nya banyak lagi penyakit2 yang boleh merosakkan pokok2 nanas kita yang belom di-ketahui terang dan chara2 hendak mengelakkan-nya. Keempat-nya ia-lah kesusahan kita hendak menhadkan kemasakkan buah-nya. Banyak akan terbuang dan burok sahaja jika buah-nya masak terlampau banyak pada suatu masa, kerana buah ini tidak dapat di-taroh lama. Akhir-nya soalan menghantar-kan buah-nya ka-kilang2 sangat-lah penting jika kebun2 kita berjauhan dengan tempat yang mengilang.

Nanas ada-lah satu perusahan besar di-Tanah Ayer kita hari ini dan perniagan-nya dalam tahun 1956 berjumlah sa-banyak $31,670,000. Patut-lah kita memberi perhatian yang tinggi di-dalam perusahaan ini.

Abdul Aziz bin Salehuddin.

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## KEPENTINGAN PERTANIAN DI-TANAH MELAYU

Kebanyakan daripada kita terutama sekali orang2 Melayu tidak tahu apakah yang sabenar-nya 'pertanian' itu dan banyak juga yang sangka-kan bertani atau berladang ada-lah semata2 memegang changkol sahaja. Ini ada-lah salah belaka dan sangka'an yang saperti ini patut-lah di-hapuskan dari jiwa kita. Sekarang mari-lah kita selideki lebeh dalam lagi apa yang sebenar-nya pertanian itu. Pertanian ada-lah suatu 'science' dan seni untok membaiki tanah2 ladang supaya dapat mengeluar-kan hasil2 yang memuaskan. Sa-orang Pa'Tani patut mengetahui sedikit sebanyak ilmu science yang berkaitan dengan perkara2 yang membuatkan pokok2 atau binatang2 subor dan biak, yang mustahak sekali ia misti-lah bergiat dan berchenderong untok berkerja di-ladang. Sa-orang Pa' Tani juga patut mengetahui selok belok perniagaan supaya dapat ia mengeluarkan hasil2-nya dengan chara yang murah dan menjual-kan hasil2 itu di-masa dan harga yang tertentu.

Pertanian ada-lah semata2 untok mengeluarkan makanan kerana makanan itu ada-lah sangat mustahak bagi maanusia. Jika chara2 pertanian kita itu baik, maka taraf hidop kita pun tinggi-lah. Kapada orang2 yang terpelajar, terutama sekali di-Barat, pertanian di-anggap sebagai suatu kerja yang sangat tinggi mutu-nya, kerana pada pertanian-lah bergantong segala perniagaan, perushaan dan perbuatan barang2 lain. Tiada kerja yang lain yang sama mustahak-nya dengan pertanian kerana, makanan untok manusia dan binatang, kebajikan dan kehidopan manusia dan kekayaan negeri ada-lah semua-nya bergantong kapada pertanian.

Persekutuan Tanah Melayu ada-lah suatu negera pertanian dan Kerajaan patut-lah memberi sokongan yang penoh kapada lapangan ini. Selain dari bijih timah kekeyaan tanah ayer kita ada-lah bergantong kapada getah. Tetapi malang-nya pokok2 getah di-Tanah Melayu terutama sekali di-kebun2 kechil telah tua dan tidak mengeluarkan hasil yang memuaskan. Getah tiruan (synthetic rubber) ia-lah suatu musoh kapada ekonomic negara kita, kerana pada masa sekarang, terutama sekali di-Amerika Sharikat, penyelidikan berkenaan getah tiruan ini ada-lah di-jalankan dengan sesunggoh-nya. Masa-nya akan sampai bila getah tiruan dapat di-keluarkan dengan murah dan lebeh tegoh lagi dari getah asli dan pada masa itu perekonomian tanah ayer kita jatoh. Jika sekira-nya getah asli dari Tanah Melayu hendak mengambil tempat yang lebeh tinggi lagi di-pasaran dunia, maka dua perkara patut di-lakukan. Yang pertama getah2 yang tua patut-lah di-tanam samula dengan getah yang baik baka-nya dan boleh mengeluarkan hasil yang banyak. Ini telah pun di-laksanakan oleh Kerajaan. Pada masa ini Lembaga Menanam Samula Getah sedang menjalankan suatu 'campaign' di-merata2 tempat merayu kapada pekebun2 kechil supaya menanam samula getah2 mereka yang telah tua dan tidak berhasil. Kerajaan ada-lah memberi bantuan sebanyak $600.00 untok menanam samula tiap2 saekar getah yang tua. Ini ada-lah satu peluang ke-emasan bagi mereka supaya dapat meninggi-kan taraf hidop diri mereka dan ekonomi tanah ayer mereka. Tetapi sedeh-nya, sangat sedikit sekali bilangan pekebun2 kechil Melayu yang merebutkan bantuan ini. Yang kedua penylidikan berkenaan getah asli patut-lah di-jalankan dengan lebeh giat lagi. Dengan chara penyelidik-lah maka dapat kita keluarkan getah yang lebeh banyak, lebeh tegoh dan lebeh baik lagi dengan wang kapital (modal) yang sedikit.

Sekarang Persekutuan Tanah Melayu telah merdeka dan Kerajaan Perikatan ada-lah beranchang untok mengeluarkan semua makanan2 yang mustahak di-dalam negeri, ia-itu tidak payah di-beli dari luar negeri. Makanan2 yang mustahak bagi pendudok2 di-Tanah Melayu ia-lah nasi dan negara kita membeli lebeh banyak beras lagi dari yang di-tanam,

Jika sekira-nya negeri2 yang menjual beras di-Tanah Melayu saperti Burma dan Siam tidak mahu menjual beras mereka lagi, apa-kah akibat-nya kelak ? Sekarang timbul-lah satu so'alan lagi kapada kita ia-itu dapat-kah negara kita mengeluarkan beras untok makanan-nya sendiri ? Pada fikiran saya negara kita tidak akan dapat mengeluarkan beras sachukop makan pendudok2-nya, tetapi boleh mengurangkan pembelian beras dari luar negeri dengan chara menaikan lagi atau meninggikan pendapatan sa-ekar dari tiap2 sawah. Mengapa saya berkata demikian ia-lah, kawasan padi di-Tanah Melayu ini tidak dapat di-luaskan lagi kerana tanah2 yang sesuai untok menanam padi tidak ada, sunggoh pun banyak lagi tanah2 hutan yang belom di-buka. Pendudok2 pun semakin sahari semakin bertambah dan ini bermaana-lah lebeh banyak lagi makanan yang di-kehendaki. Pendapatan padi dari sa-ekar sawah dapat di-naikan dengan menggunakan baja2 yang kebetullan dan beneh2 yang baik. Di-beberapa tempat di-Tanah Melayu Kerajaan telah pun, membaiki chara2 memasokan ayer kesawah dengan mengadakan tali2 ayer dan sebagai-nya, kerana ayer sangat-lah mustahak untok menanam padi. Boleh di-katakan semua penanam padi terdiri dari orang2 Melayu, tetapi malang-nya kebanyakan dari mereka ha-nya menanam chukop untok makan sekeluarga mereka sendiri. Pendapatan mereka pun rendah kerana jarang2 sekali mereka menggunakan baja dan chara2 menanam pun tidak-lah beraapa baik. Sekarang telah sampai-lah masa-nya untok Pa' Tani sedar ia-itu perekonomian tanah ayer mereka ada-lah bergantong kapada mereka sendiri dan ini-lah masa-nya untok mereka berbukti kapada tanah ayer mereka dengan berkerja lebeh giat lagi untok mengurangkan pembelian dari luar negeri.

Beberapa banyak wang telah di-belanjakan pada tiap2 tahun untok memasoki ka-Tanah Melayu barang2 makanan saperti telor, buah2an dan sebagai-nya. Tidak-kah dapat kita mengeluarkan barang2 ini di-tanah ayer kita ? Jika dapat bukankan banyak wang yang boleh kita gunakan untok lain2 perkara, saperti membangunakan lebeh banyak lagi sekolah2 dan rumah2 sakit ? Perkara ini tentu dapat di-lakukan di-tanah ayer kita dan Pejabat Pertanian telah pun menasehat pekebun2 kechil supaya menanam banyak lagi pokok buahan2 dan menternak ayam yang boleh mengeluarkan telor yang lebeh besar dan banyak. Tetapi barang2 yang di-keluar di-negeri ini tidak-lah mendapat sambutan yang baik dari orang ramai kerana mereka sangat suka dan tertarek kapada barang2 yang di-masokan dari luar negeri walau pun barang2 itu lebeh rendah lagi mutu-nya dari barang2 yang di-keluarkan dari negeri ini. Suatu chara bagi Keraja'an untok melakukan barang2 yang di-keluarkan dari negeri ini dan saterus-nya menaikan lagi taraf hidup pendudok2 ia-lah menghadkan barang2 yang termasok ka-negeri ini.

Di-akhbar2 dan majallah2 selalu juga kita dengar Mentri Pertanian berseru kapada orang ramai, khas-nya kapada pemuda2, supaya pergi ka-pantai Timor saperti ka-Pahang dan ka-Kelantan untok membuka beratus2 ekar tanah hutan. Jika seruan ini di-jawab oleh pemuda2 kita tidak-lah lagi kita nampak mereka merewang di-kaki2 lima, di-kedai2 kopi dan di-simpang2 jalan membuang masa dengan perchuma sahaja. Penting-nya pertanian di-sini ada-lah untok mengurangkan lagi angka2 manusia yang tidak mempunyai pekerja'an. Pekerja'an ada-lah sangat mustahak pada kita dan jika banyak pendudok2 di-dalam negeri tiada mempunyai pekerja'an, maka banyak kechurian, keganasan dan sabagai-nya akan berlaku di-negeri itu. Kebanyakan pemuda2 kita yang terpelajar memandang kapada ijazah sekolah mereka sabagai satu 'ticket' atau 'passport' untok memasok ka-jawatan Keraja'an. Tetapi kebanyakan daripada mereka kechiwa dan terus menaikan lagi bilangan manusia yang tidak berkerja. Jika pemuda2 ini memasakan di-dalam jiwa mereka 'ilmu2 'theory' dan praktic berkena'an pertanian maka tidak payah lagi mereka menantikan pekerja'an dari Keraja'an. Senang sahaja mereka boleh membuka ladang dan menchari makan dengan chara berladang dan berternak.

Di-sini dapat-lah kita ketahui betapa penting-nya pertanian itu di-Tanah Melayu ini kerana segala kekaya'an, kema'amoran, kebajikan dan kehidupan manusia ada-lah bergantong kepada pertanian.

Abu Bakar bin Baba.

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## MAKANAN2 POKOK

Tumbohan2 di-atas muka bumi ini ada-lah sarupa juga keada'an hidup-nya saperti kehidupan lain2 makhlok dunia ini ia-itu manusia dan binatang2 sakadarkan sifat-nya sahaja yang berlainan chorak-nya. Pokok2 juga perlukan makanan bagi kehidupan-nya dan udara bagi penafasan-nya. Makanan pokok ini ada-lah meliput berbagai jenis dzat saperti:—

Nitrogen, Phosphorus, Potassium, Calcium, Hydrogen,
Carbon, Sulphur, Oxygen, Magnesium, Iron,

dan lain2 lagi.

Di-anatar dzat2 yang di-atas ini Nitrogen, Phosphorus, Potassium dan Calcium ada-lah dzat2 yang amat penting dan mustahak sakali bagi pokok untok hidop dengan subur dan sehat. Pokok2 sudah memang tidak akan hidop jikalau ketiada'an ka-empat2 makanan ini. Bagitu juga pokok tidak akan hidop dengan subor jikalau kekurangan salah satu di-antara jenis2 makanan ini, walau pun ada berlebeh2an pada jenis yang lain, kerana ini ta'dapat menggantikan dzat2 yang kekurangan itu.

Peri mustahak-nya ka-empat2 dzat yang tersebut di-atas ada-lah sebab2 yang tertentu.

**Nitrogen:** Ini ada-lah satu dzat yang paling mustahak untok pokok. Ia bertanggong jawab kapada keada'an bentok pokok yang tumboh di-atas tanah itu, saperti membesarkan pokok, mengadakan daun2 dan memberikan warna yang hijau itu kapada daun dan sabagai-nya. Kapada bijian2 pula saperti jagong dan sa-umpama-nya, Nitrogen melebehkan atau membesarkan bentok rupa biji2 itu serta juga menam-bahkan isi 'protein'-nya. Dalam penghidopan pokok2 ia menolong men-dapatkan makanan dzat2 yang lain saperti Potassium, Phosphorus dan lain2 lagi. Nitrogen juga menolong sayor2an saperti salad dan sawi hidop subor, segar dan gemok yang sangat di-kehendaki bagi tumbohan2 saperti ini.

Kekurangan dzat2 Nitrogen kapada pokok sangat-lah jelas di-ketahui, oleh kerana pokok2 itu tergenchat, daun2-nya menjadi kekuningan serta suka luroh dan akar2 pokok ini tidak akan hidop dan menjalar dengan sampurna-nya. Di-sini champoran baja yang mengandongi dzat Nitrogen yang akan dapat menghidopkan pokok itu dengan subur kembali.

Memberikan dzat Nitrogen berlebehan2 kapada pokok ada-lah membahayakan pokok itu sendiri. Batang2 dan daun2 akan keluar atau tumboh berlebeh2an dan akan menjadi sangat lembut. Ini menyebabkan pokok2 itu lekas chondong dan mudah di-serang oleh peyakit. Selain dari itu pokok2 ini akan lambat mengeluarkan buah dan buah2 yang akan di-keluarkan nanti boleh jadi yang rendah mutu-nya.

**Phosphorus** (Phosphate): Phosphate tidak kurang mustahak-nya daripada Nitrogen. Dzat Phosphate menggalakan pokok itu berbuah serta masak juga dengan lebat-nya. Tentang ini Phosphate ada-lah sabagai lawan kapada akibat2 yang akan berlaku ka-atas pokok sakira-nya pokok itu berlebahan2 dzat Nitrogen. Phosphate ada-lah juga menggalakan penghidopan akar2 dan ia sangat-lah berguna sakali pada biji2 yang baharu di-semai, atau di-tanam dan sa-umpama-nya. Kapada batang2 pokok Phosphate ada-lah memberi kekuatan supaya pokok tidak akan chondong saperti yang terdapat jika berlebeh2an dzat Nitrogen. Ada-lah di-ketahui bahawa dzat ini juga menolong sa-tengah2 pokok daripada anchaman penyiakit. Kekurangan dzat Phosphate ada-lah menyusahkan pokok itu daripada mendapat dzat Potassium dengan sa-chukop-nya.

**Potassium:** Dzat Potassium mempunyai kelebehan yang agak istemewa ia itu ia boleh melawan akibat2 yang terjadi sakira-nya kedua2 dzat Nitrogen dan Phosphate itu di-beri berlebehan2 kapada pokok. Di-samping itu dzat Potassium ada-lah sangat mustahak kerana ia menolong membanyakan dzat kanji dan gula kapada pokok. Ia juga

menguatkan pulor2 pokok serta tempurong2 buah saperti kelapa dan sabagai-nya. Pada bijian2 ia bertanggong jawab untok membentok serta mengeluarkan bijian2 itu. Ia pun mustahak tentang menjadikan umbi2 dan ubi2 kapada pokok saperti keladi, ubi kayu dan lain2 lagi. Kelebehan dzat Potassium tidak merbahaya sangat kapada pokok, tetapi sebalik-nya kekurangan-nya sangat-lah berkesan. Daun2 nampak kering di-hujong-nya dan bertompok2 di-atas daun itu jika kekurangan Potassium. Ini akan mengganggu perjalanan 'Photosynthesis' dalam daun itu.

**Calcium:** Dzat Calcium atau kapor ini mempunyai faedah yang bersendirian dan yang amat besar mustahak-nya kapada pokok. Calcium mengelokan bentokan tanah yang liat supaya senang untok berchuchok tanam dan juga senang bagi akar2 menjalar dengan sampurna. Dzat ini boleh juga menyelamatkan tanah daripada menjadi masam atau 'acidic', dan boleh membantu menambahkan lagi dzat Nitrogen. Tetapi jika dzat ini terlampau banyak ia boleh membahayakan pokok dengan jalan mengurangkan pendapatan dzat2 Phosphate, dzat besi serta lain2 lagi.

Dzat2 yang lain daripada empat yang tersebut di-atas pun mustahak juga terhadap penghidopan pokok. Kensuboran tanah tidak akan sa-chukop-nya andaikata dzat2 yang lain berkekurangan atau tidak ada langsong. Kekurangan salah satu di-antara dzat2 ini pun chukop-lah untok menjadikan pokok itu ta'berupaya menghisap makanan2 yang lain dengan sampurna-nya walau pun makanan2 yang lain itu berlebeh2an.

Chara pokok2 mendapat makanan-nya ia-lah apabila dzat2 itu telah hanchor di-dalam ayer di-dalam tanah atau di-tempat2 mana yang ia hidop. Akar yang telah besar-yaitu akar jalaran tidak akan menghisap lagi makanan ini. Jadi saloran2 makanan ada-lah melalui akar2 rambut yang halus. Akar2 rambut ini pula membawa makanan ka-dalam pokok dan sa-terus-nya ka-serata bahagian anggota pokok yang berwarna hijau. Benda2 yang menghanchorkan makanan atau baja2 di-dalam tanah ia-lah:

(a) binatang2 yang hidop di-dalam tanah saperti chaching2, huma2, keridek2, ulat2 tanah dan sabagai-nya.

(b) kapor yang sudah ada di-dalam tanah atau yang di-champor-kan.

(c) ayer, sama ada ayer hujan atau mata ayer dan sabagai-nya yang ada di-dalam tanah.

(d) Udara dan chahaya mata hari yang menolong menghanchor-kan baja2 itu terutama sakali jikalau bentok tanah itu berongga besar.

(e) acid atau pun chuka saperti carbonic acid yang ada di-hujong2 akar2 di-dalam tanah itu.

Untok pernafasan pula pokok2 itu menghisap udara melalui sa-genap bahagian akar pokok, batang2 dan daun2-nya. Oleh itu sa-suatu pokok itu hidop subor dan segar maka mustahak-lah pokok itu tumboh pada tempat yang: (a) chukop ayer dalam tanah; (b) chukop udara dan chahaya mata hari; dan (c) chukop makanan yang di-kehendaki.

Sering kali jua kita dapati tanah yang ta' sesuai untok pokok2 hidop saperti tanah liat yang selalu menjadi padat menekala hujan lebat. Untok menggemborkan tanah yang saperti ini patut-lah di-champor dengan daun2 kering, atau daun2 hijau atau pun lebehan2 tanaman yang sudah di-pungut. Dengan chara itu maka bertambah-lah subor dan gembor-nya tanah serta juga dapat menambahkan dzat makanan saperti 'Humus' yang mengandongi banyak dzat Nitrogen. Nitrogen ini akan lebeh2 banyak lagi jika daun2 yang di-champorkan itu berasal dari pokok2 berjenis 'Legumes' yang bertangkop dua buah sarong buah-nya.

Selalu juga di-dapati pokok2 yang ta'subor hidop-nya walau pun banyak baja, udara dam ayer berada. Ini boleh jadi di-sebabkan oleh tanah yang sangat berongga, atau pun banyak pasir yang penyebab-kan baja2 itu dapat di-hanyutkan oleh ayer terutama ayer hujan. Kadang2 boleh jadi juga telah terlekat pada benda2 yang sangat keras yang ta' ada daya lagi akar2 pokok menghisap-nya. Patut di-ketahui bahwa dzat2 makanan ada-lah sangat mudah di-hanyutkan oleh ayer terutama dzat Nitrogen, Potassium dan phosphate.

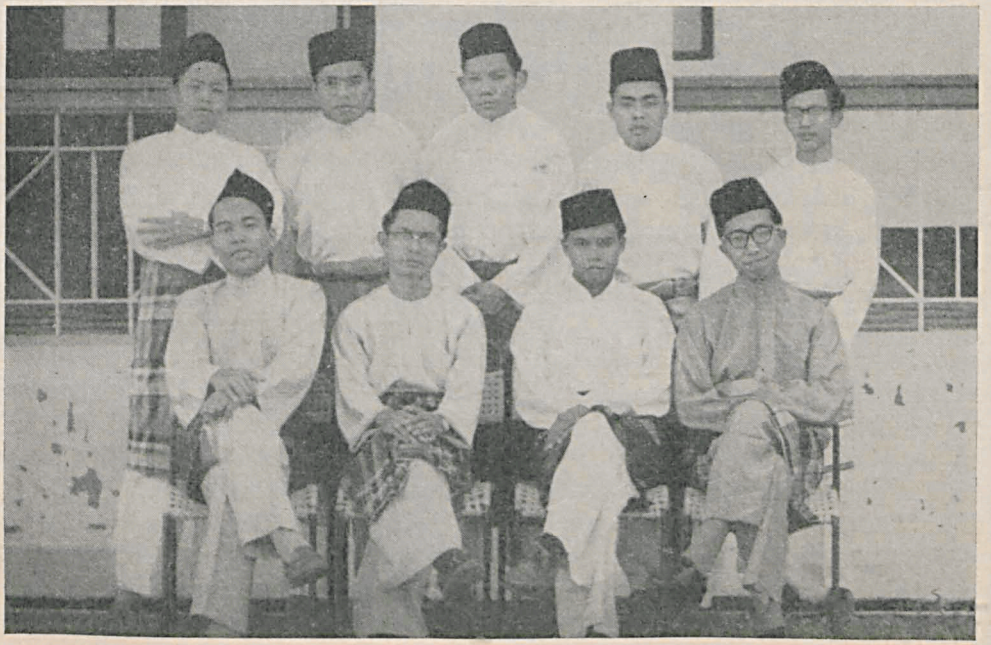
Daripada apa yang telah di-bentangkan di-atas maka kita ketahui-lah bahawa tidak musti-nya pokok itu subor walau pun di-bajai kerana ada banyak sebab2 atau factor2 yang menyebabkan pokok itu boleh mendapat makanan atau tidak. Bagitu juga jikalau kita hendak mem-baja pokok, kita hendak-lah mengetahui akan keada'an pokok, keada'an tanah dan apa-kah baja2 yang di-kehendaki oleh pokok tersebut—ada kah ia berkehendakan banyak Nitrogen atau Potassium dan sabagai-nya. Dan yang lebeh penting sakali kita juga harus fikir ada-kah akan beruntong atau rugi jikalau kita membajai pokok itu. Ini ada-lah masa'alah yang sahingga sekarang dalam pengajian dan penyelidikan sunggoh pun banyak sudah yang di-pelajari !

Sekian-lah serba rengkas tentang makanan2 pokok yang jikalau hendak di-binchangkan lagi memang-lah lebeh lanjut dan panjang untok di-muatkan di-ruangan yang sempit ini.

# PENYATA TAHUNAN
## PERSATUAN PELAJAR2 MUSLIM MAKTAB PERTANIAN, MALAYA
### (Tahun 1958/59)

**Pendahuluan**

Persatuan ini telah di-daftarkan pada 20 hb December, 1950; nama Persatuan pada masa itu ia-lah Persatuan Muslim Maktab Pertanian, Malaya dan tujuan2 Persatuan ini ia-lah meninggikan dan menjaga kepentingan Ugama dan kebudaya'an penuntut2 Islam di-Maktab ini. Tetapi, di-dalam Mashuarat Agong Tahunan 1958/59, nama Persatuan ini telah diubah dengan nama baharu-nya " PERSATUAN PELAJAR2 MUSLIM MAKTAB PERTANIAN, MALAYA," di-rengkas-kan PPMMP/M saja. Bagitu juga tujuan2 Persatuan ini telah di-tambah, dan sa-lain daripada meninggikan dan menjaga kepentingan Ugama serta kebudaya'an dan kebajikan pelajar2 Muslim di-Maktab ini, Persatuan ini juga bertujuan hendak mengembangkan 'ilmu Pertanian. Beberapa bab Perlimbaga'an Persatuan telah di-pinda dan di-tambah.



THE MUSLIM ASSOCIATION (1958/59)
THE EXECUTIVE COMMITTEE

**Sitting (Left to right):** Zahari bin Ayub, Abdullah bin Mohd .Yunos, Qamaruzaman, bin Ismail, Yahaya bin Din.

**Standing (Left to right):** Yusof bin Hashim, Abu Bakar bin Baba, Harun bin Abdul Manan, Ali bin Mat, Mohammad bin Ismail.

Perubahan yang besar ini di-buat kerana memandangkan kedudokan pelajar2 Muslim di-Maktab ini pada hari ini. Dari awal Persatuan ini di-tubohkan hingga tahun 1957, Persatuan ini mempunyai ahli2 yang terdiri daripada Diploma Course dan Certificate Course. Tetapi pada masa sekarang ini ahli2 Persatuan terdiri daripada pelajar2 'Diploma Course' sahaja, seramai tiga-puloh delapan orang.

Dalam tahun 1958/59 ini PPMMP/M menghadap beberapa kesulitan. PPMMP/M telah berikhtiar dengan saberapa yang boleh untok mengatasi kesulitan2 itu. Sunggoh pun sabahagian yang besar ran-changan2 Persatuan telah dapat di-jayakan, tidak-lah boleh di-katakan bahawa gerakan PPMMP/M sangat memuaskan hati. Walau pun demikian, dengan berkat ketabahan hati sekalian pelajar2 Muslim Maktab ini, PPMMP/M maseh dan akan bergerak dengan maju-nya dari sa-hari ka-sahari untoh kebajikan dan kepentingan ahli2-nya.

**Pentadbiran**

PPMMP/M di-tadbirkan oleh Jawatan Kuasa Tadbir yang di-lantek oleh Mashuarat Agong Tahunan. Bagi tahun ini Mashuarat Agong Tahunan telah melantek ahli2 Jawatan Kuasa Tadbir saperti berikut, dan juga telah bersatuju menambah tiga jawatan baharu yaitu Setia Usaha Persuratan dan Kebudaya'an, Ugama dan Perhubongan Luar. Pe-mereksa Kira2 dan Penasehat2 Persatuan telah juga di-lantek sa-masa Mashuarat Agong Tanhunan itu.

**Jawatan Kuasa Tadbir**

| | | |
|---|---|---|
| Yang di-Pertua | - | Che' Quamaruz Zaman bin Hj. Ismail. |
| Nb. Yang di-Pertua | - | „ Yahya bin Din. |
| Setia Usaha Agong yg. Kehormat | - | „ Abdullah bin Mohd. Yunus. |
| Png. S/Usaha Agong yg. Kehormat | - | „ Mohd. Yusof bin Hashim. |
| Bendahari Yang Kehormat | - | „ Zahari bin Ayub. |
| S/Usaha Persuratan & Kebudaya'an | - | „ Ali bin Mat. |
| S/Usaha Rencham | - | „ Abu Bakar bin Baba. |
| S/Usaha Ugama | - | „ Harun bin Manan. |
| S/Usaha Perhubongan Luar | - | „ Mohamad bin Ismail. |

Perhatian: Jawatan Bendahari Yang Kehormat telah di-sandang oleh Y.M. Raja Ahmad Tajuddin bin Raja Razman daripada 26hb July, hingga 6hb December, 1958.

**Dua Orang Pemereksa Kira2**

Che' Udanis bin Mohd. Nor.
Che' Abd. Aziz bin Salehuddin.

**Tiga Orang Penesehat**

Dr. Mohammad Raof, M.A., Ph.D.
Inche' Mohammad bin Jamil, B.Sc., D.I.C.T.A.
Inche' Khalid bin Abdul Rahman, B.Sc. (Agric.).

**Mashuarat Agong**

Mashuarat Agong Tahunan (Academic Year 1958/59) telah di-adakan pada pada 25hb July, 1958. Satu Mashuarat Agong Khas telah di-adakan kerana melaporkan keputusan2 Persidangan Agong G.P.M.S. yang ke-XI di-Alor Star oleh wakil PPMMP/M.

**Mashuarat Jawatan Kuasa Tadbir**

Sunggoh pun Academic Year 1958/59 belum tamat bilangan, Mashuarat Jawatan Kuasa Tadbir telah meningkat sapuloh kali. Ahli2 J/K Tadbir telah membuat dan menyusun ranchangan2 PPMMP/M dan juga membinchangkan chara2 hendak menjayakan ranchangan2 itu.

**Kewangan**

Puncha wang yang tetap untok PPMMP/M ini ia-lah daripada yuran Persatuan. Sa-lain daripada itu PPMMP/M dapat juga menam-bahkan wang di-tabong-nya daripada hasil ahli2 mengambil bahagian di-dalam Ranchangan2 Radio.—Pelajar Di-Udara dan Mahasisua Di-Udara.

**Jawatan Kuasa Kechil Persuratan dan Kebudaya'an**

Jawatan Kuasa Kechil di-atas ini di-pengurus di-oleh Naib Yang di-Pertua dan Setia Usaha Persuratan dan Kebudaya'an menjadi S/Usaha tetap Jawatan Kuasa Kechil. Ahli2-nya terdiri daripada:—

Che' Yahya bin Din (Pengurusi).
„ Ali bin Mat (S/Usaha).
„ Zahari bin Ayub.
„ Ramly bin Syed.
„ Harun bin Din.

Jawatan Kuasa Kechil ini di-tugaskan menglolakan Khutub Khanah PPMMP/M dan perkara2 yang berkaitan dengan persuratan dan kebudaya'an.

**Khutub Khanah**

Khutub Khanah ini di-buka sakali saminggu dan sa-orang ahli di-benarkan meminjam dua buah buku bagi satu kali pinjaman. Dalam tahun ini sa-banyak 16 buah buku yang berchurak bahasa kesusastera'an, cherita (novel), Ugama dan lain2 lagi telah di-beli untok menambahkan bilangan buku2 yang sedia. Untok bacha'an 'am sahari-harian majallah2 dan akhbar2 (Utusan Melayu) ada-lah di-langgan tiap2 bulan, dan untok hiboran pula rekod2 (pireng hitam) ada di-beli dan tahun ini sabanyak 6 keping pireng lagi telah di-tambahkan pada bilangan yang lama.

**Jwatan Kuasa Kechil Rencham**

Jawatan Kuasa Kechil Rencham ini di-pengurusi oleh S/Usaha Rencham, dan di-tugaskan untok menjalankan ranchangan2 PPMMP/M mengenai kebajikan, pergaolan dan sokan. Ahli2-nya terdiri drp.:—

Che' Abu Bakar bin Baba—(Pengurusi).
„ Mohd. Shah bin Hj. Lassim—(S/Usaha Pergaolan).
„ Mohd. Tahir bin Hj. Ahmad—(S/Usaha Lawatan & Sokan).
„ Mohd. Mahadzir bin Hj. Rashid—(S/Usaha Derma & Kebajikan).

**Pergaolan**

Satu Majlis Jamuan Teh telah di-selanggarakan untok mera'ikan Hari Keputera'an Nabi Muhammad S.A.W. Untok menyerikan Majlis itu tetamu khas, diantara-nya ia-lah bekas Kathi Kuala Lumpur, Pengetua dan Pensharah2 Maktab ini telah di-jemput untok memberi sharahan2 berkena'an dengan Ugama.

Satu Majlis makan malam akan di-adakan kerana menyambut Hari Raya Puasa.

**Lawatan**

Bagi meluaskan pandangan dan pengetahuan juga memanjangkan persahabatan dengan pelajar2 lain satu lawatan ka-tempat2 ini telah di-jayakan pada tanggal 15hb February, 1959 yang lampau:

Malay Women Training College, Malaka.
Tempat2 yang bersajarah di-Malaka.
Kesatuan Pelajar2 Melayu, Malaka.

**Sokan**

Sunggoh pun sabahagian daripada ahli2 PPMMP/M chenderong kapada sokan terutama permainan sepak raga, ranchangan sokan tidak dapat di-jayakan kerana kesuntokkan masa.

**Derma dan Kebanjikan**

Satu derma khas telah di-kutip daripada ahli2 untok membantu pendudok2 Kampong Tg: Ipoh, Negri Sembilan kerana mendirikan sa-buah Mesjid.

**Jawatan Kuasa Kechil Ugama**

Jawatan Kuasa Kechil Ugama ini, ia-lah suatu jawatan yang baharu di-tubohkan dalam tahun ini, di-tugaskan untok meninggikan shi'ar Ugama Islam, menglolakan kebersehan dan keperluan bilek sembahyang dan perkara2 yang bersangkut paut dengan Ugama. Ahli2 J/Kuasa Kechil ini terdir dari:—

Che' Harun bin Manan—(Pengurusi).
„ Yahaya bin Din—(Imam).
„ Mahadzir bin Hj. Rashid—(Bilal).
„ T. Haizam bin T. Mohamad—(Bilal).

Di-antara ranchangan J/Kuasa kechil ini ia-lah hendak mengadakan sa-orang guru Ugama untok ahli2. Perkara ini maseh di-binchangkan lagi dengan Pejabat Ugama Selangor dan Pengetua Maktab ini.

**Perhubongan Luar**

S/Usaha Perhubongan Luar di-tugaskan menguruskan hal ehwal ahli2 kehormat. Ia telah menghantar surat2 dan borang2 untok menjemput manjadi Ahli2 Kehormat kapada bekas ahli2 Persatuan.

## LAIN2 HAL

**" Pelajar di-Udara " & " Mahasiswa di-Udara "**

Tahun ini ahli2 Persatuan telah juga mengambil kesempatan untok memenohi ranchangan2 radio menerusi Radio Malaya, Kuala Lumpur, di-bawah nama2 Pelajar di-Udara, yang telah di-anjjorkan oleh G.P.M.S., dan Mahasiswa di-Udara. Rekaman yang pertama telah di-siarkan pada 21hb July, 1958 yang lalu, dan yang ke-dua dan ke-tiga-nya telah di-udara pada 17hb November, 1958 dan 20hb March, 1959 yang lampau.

**Persidangan G.P.M.S.**

PPMMP/P telah menghantarkan 3 orang wakil dan 7 orang pemerhati khas ka-Persidangan GPMS ka-XI yang telah di-adakan di-Alor Star, Kedah pada 25hb —28hb December, 1958. Wakil2-nya ia-lah:—

Che' Yahaya bin Din.
„ Mohd. Yusof bin Hashim.
„ Abdullah bin Mohd. Yunus.

**Latehan Sharahan dan Bahath**

Satu Jawatan Kuasa Kechil telah di-tubohkan untok menglolakan latehan sharahan dan bahathan. Pengurusi J/Kuasa ini telah di-lantek di-dalam Mashuarat Agong Khas. Tujuan2 untok mengadakan latehan sharahan dan bahath ini ia-lah hendak melateh ahli2 bersharah dan ber-bahath. Ahli2 J/Kuasa Kechil itu terdiri daripada:—

Che' Qamaruz Zaman bin Hj. Ismail—(Pengurusi).
„ Ja'afar bin Hj. Abd. Rahman—(Nb. Pengurusi).
„ Abdul Aziz bin Salehuddin—(Setia Usaha).
„ Ariffin bin Mohd. Nor—(Pn. S/Usaha).
„ Hashim bin Mohd. Nor—(Ahli Jawatan Kuasa).

Bagi meresmikan pembuka'an latehan tersebut, J/Kuasa Kechil ini telah menjemput Inche' Mohammad bin Jamil, salah sa-orang Penesehat2 Persatuan ini, untok membuka majlis latehan yang terma'alom yang di-adakan pada malam Sabtu, 6hb February, 1959.

**Tata Tertib**

Satu J/Kuasa Kechil telah di-tubohkan untok membentok dan menyusun Tata Tertib dan Panduan Ahlak Masharakat Agong dan Jawatan Kuasa tadbir. Tata Tertib dan Panduan Ahlak ini akan di-kemukakan pada Mashuarat Agong yang akan datang. Ahli2 J/Kuasa ini terdiri dari:—

Che' Abdullah bin Mohd. Yunos—(Pengurusi).
„ Ariffin bin Mohd. Nor—(S/Usaha).
„ Udanis bin Mohd. Nor.
„ Hashim bin Wahab.
„ Qamaruz Zaman bin Hj. Ismail.
„ Abdul Aziz bin Salehuddin.

**Penutup**

Ranchangan2 PPMMP/P bagi tahun 1958/59 yang dapat di-jayakan telah di-selengarakan dengan lichin. Uchapan tahniah dan terima kaseh di-tujukan kapada sakalian ahli2 Jawatan Kuasa Tadbir dan Jawatan2 Kuasa Kechil Persuratan & Kebudaya'an, Rencham dan Ugama yang telah bekerja dengan giat-nya untok memajukan Persatuan ini seluroh-nya; juga kapada sakalian ahli2 Persatuan di-atas kerja sama mereka. Akhir-nya uchapan terima kaseh di-tujukan juga kapada Penesehat2 Kehormat dan Pengetua Maktab ini kerana nasehat2, pedoman2 dan pertolongan yang telah mereka berikan kapada Persatuan ini.

BERKHIDMAT KAPADA BUMI PUTRA,
MENYELAMATKAN TANAH DAN TANAMAN.

Abdullah bin Mohd: Yunos,
Setia Usaha Agong,
Persatuan Pelajar2 Muslim,
Maktab Pertanian, Malaya.

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## SERANGGA DAN PERTANIAN

Dalam kehidupan kita sahari2 sentiasa kita bertemu dengan binatang2 kechil yang badan-nya berkulit keras; berkaki eman satengah bersayap dan satengah tidak. Di-dalam rumah kita dapati lalat2 berterbangan, semut merayap2 dan lipas bersembunyi di-lobang2 yang gelap. Di-keliling rumah di-pohon2 bunga, kita lihat kumbang dan rama2 menyeri bunga kerana manisan-nya dan dengan tidak sadar-nya mereka membuat suatu kebajikkan . . . . kearah pembiakan tumbohan2. Di-waktu malam pula kita dapati nyamok berterbangan dan mereka ini hidup dengan menghisab darah dan dalam itu pula bekerja memindahkan berbagai2 kuman penyakit. Demam kura saja pada satu masa dulu di-dalam sajarah dunia telah mengorbankan berjuta2 jiwa manusia dan juga telah menjadi salah satu sebab kejatohan Keraja'an Rome yang besar itu. Binatang2 kechil ini semua sekali di-panggil "Serangga" mengikut istilah bahasa yang di-chipatakan oleh Dewan Bahasa dan Pustaka. Boleh jadi juga nama ini di-lahirkan daripada kalimah kerengga

kerana bentok badan dan anggota binatang2 kechil ini boleh di-samakan dengan kerengga.

Serangga atau 'Insecta' dalam bahasa Inggeris ada-lah satu daripada kumpolan 'Arthropoda' yaitu binatang kechil yang kaki-nya berhubong2 dan badan-nya berketam2. Tiga lagi kumpolan yang termasok dalam bahagian 'Arthropoda' ini ia-lah:—

Crustecea—saperti udang dan ketam,
Arachnida—saperti labah2.

Myriapoda—saperti lipan, ronggok dan yang lain yang saperti-nya. Di-anatara kumpolan yang empat ini Serangga-lah yang terbiak dan paling berjaya sakali di-dunia ini.

Oleh kerana Serangga ini tersangat biak dan terlalu banyak-nya, dan hubongan mereka dengan manusia dan pertanian sangat penting maka satu pengajian di-adakan kerana-nya. Pengajian ini di-namakan 'ilmu "Entomology" dan orang2 yang pakar di-bahagian ini di-panggil "Entomologist" atau ahli2 Serangga.

Kerosakan yang di-timbolkan oleh serangga itu ada bermacham2:—

(i) Kerosakan kapada tanaman yang di-sebabkan oleh kumbang2 dan ulat2 yang memakan daun dan puchok.

(ii) Di-sebabkan oleh hisapan serangga ini di-batang dan daun2 pokok.

(iii) Di-sebabkan oleh serangga ini menanamkan telor mereka dalam batang2 dan apabila telor2 menetas ia menjadi ulat2 yang memakan akan pokok itu.

(iv) Serangga juga telah membantu memindahkan kuman2 penyakit pokok2.

(v) Terhadap barang yang di-simpan pula saperti tepong dan beras tidak sadikit yang binasa dan rosak di-sebabkan oleh bubok dan lain2.

Untok menchegah kerosakan ini berbagai2 chara di-jalankan:—

(i) Ia-lah dengan menggunakan ubat kimia yang di-buat khas untok membunoh atau menhinddarkan serangga.

(ii) Jika serangga yang merbahaya itu ha-nya sadikit sahaja boleh-lah di-kutib dengan tangan dan di-biansakan dia!

(iii) Satengah serangga memakan serangga yang lain atau daripada jenis-nya sendiri. Ada pun serangga yang memakan serangga yang menjadi musoh tanaman itu sangat berfaedah kepada peladang2. Di-negeri kita ini saperti patong, ketenun atau chengkadak hidop dengan

memakan serangga yang lain. Di-negeri2 yang telah maju serangga ini di-biakan untok membantu petani2 menghapuskan musoh tumbohan2. Tidak beberapa lama dahulu telah tersisir di-akhbar2 bahwa sa-orang ahli serangga Amerika telah mengirimkan beribu2 jenis serangga dari Malaya ka-negeri asing saperti Hawaii, Pulau2 Filipina, Australia, Fiji, Greece dan Mexico. Serangga ini di-biakan untok membinasakan serangga musoh2 peladang di-negeri tersebut.

Selama ini chuma keburokan serangga sahaja yang di-sebutkan. Chuba pula kita tinjau dari segi kebaikan-nya. Manisan lebah ada-lah menjadi makanan yang lazat lagi menyihatkan. Daripada ulat2 daripada sajenis kupu2 di-perdapat benang sutra untok di-tenun menjadi kain yang mahal. Dan fikir saja-lah betapa besar-nya jasa serangga kapada pertanian di-dalam pekerja'an mereka 'mengawinkan' bunga2 atau memindahkan debu2 bunga jantan kapada bunga betina yang mana dengan jalan ini-lah menghasilkan buah dan tumbohan2 dan saterus-nya mengekalkan kehidupan di-dunia ini.

Ada tumbohan2 ada-lah binatang2 dan binatang2 sentiasa bergantong kapada tumbohan2.

Q. Zaman bin Hj. Ismail.

## KEMAJUAN PERUSAHA'AN PADI DI-TANAH AYER KITA

Di-antara perusaha'an2 yang lain, menanam padi ia-lah satu perusaha'an yang tertua sakali di-Tanah Ayer kita. Ini tidak-lah pelek jika kita kajikan betapa berat-nya keperluan beras di-negeri kita; sama-lah saperti mustahak-nya gandom kapada orang2 Barat. Sunggoh pun kita belum dapat lagi mengeluarkan beras untok menchukopi keperluan segala pendudok2 kita, tetapi banyak juga kemajuan yang telah di-chapai di-dalam perusaha'an ini, mahu pun di-lapangan penyelidikan, dan siasatan di-tempat2 perchuba'an atau pun di-ladang2. Walau bagai mana jaoh-nya kejaya'an kita di-dalam perus ha'an ini kita tidak akan dapat menchukopi keperluan kita sendiri kerana pendudok2 di-Tanah Ayer kita semakin bertambah dan sawah2 yang ada sekarang ini tidak dapat di-luaskan lagi. Ini ada-lah di-sebabkan oleh kekurangan tanah2 yang sa-suai untok menanam padi, walau pun beribu2 ekar lagi tanah yang belum di-buka. Tetapi untok mengeluarkan hasil yang lebeh banyak di-tapak2 sawah kita patut juga kita mengetahui serba sadikit kemajua2 yang telah kita chapai. Ini kita harap akan menjadi chontoh dan tauladan kapada peladang2 yang belum mengetahui-nya dan patut juga kita bandingkan dengan kemajuan di-luar negeri supaya kita mengetahui

di-manakah pendirian kita di-lapangan ini. Di-bawah ini kami akan mencheritakan satu persatu kejaya'an dan kemajuan yang telah kita chapai.

**Kejaya'an di-Tempat Penyiasatan & Perchuba'an**

Dengan membandingkan padi pada keluaran tahun 1930 dan 1956 dapat-lah kita ketahui betapa jaoh-nya kejaya'an yang telah kita chapai. Dalam tahun 1930, sa-ekar sawah mengikut hetongan panjang mengeluarkan sa-banyak 277 gantang sahaja, tetapi pada tahun 1956 kita dapati keluaran sa-banyak 358 gantang iaitu pertambahan sa-banyak 81 gantang. Tidak kurang juga kejaya'an yang telah di-chapai di-dalam peruhasa'an padi darat (huma). Statistic menunjokkan iaitu pada 1930 keluaran sa-ekar sa-banyak 87 gantang sahaja dan pada tahun 1956 sa-ekar dapat mengeluarkan sa-banyak 186 gantang iaitu lebeh dari dua kali ganda.

Kejaya'an yang besar ini telah di-chapai dengan chara2 yang berikut:—

Dengan chara 'research' atau menyelidik kita telah pun mengeluarkan beneh2 padi yang baik saperti Siam 29, Nachin57, Serendah Kuning dan sa-bagai-nya. Di-bawah ini kami akan terangkan bagai manakah beneh2 yang tersebut itu di-keluarkan.

**(i) "Selection" (memileh beneh2 yang baik)**

Suatu 'selection' ada-lah mengambil masa tidak kurang dari 15 tahun. Dengan sa-chara rengkas-nya 'selection' atau pun memileh ini di-lakukan dengan memileh sa-jenis padi yang baik dan termashor di-dalam suatu daerah dan di-semaikan di-petak semaian di-Ladang Perchuba'an. Sa-lepas itu anak2 padi itu di-tanamkan samula, ia itu ha-nya sa-batang sa-rumpun, 50 rumpun sa-baris dan semua-nya berjumlah tidak kurang dari 1,000 barisan. Tiap2 barisan ini di-berikan satu nombor—1, 2, 3, dan saterus-nya. Bila padi itu masak kelak, tiap2 barisan di-tuai 20 rumpun sahaja, ia itu rumpun di-tengah2 dan hasil padi bagi tiap2 rumpun itu di-bandingkan. Pada tahun yang ka-dua 500 barisan saja (ya'ani barisan yang telah mengeluarkan hasil yang banyak pada tahun yang pertama) di-tanam. Dengan chara ini barisan itu di-kurangkan pada tiap2 tahun, ia itu di-buangkan barisan yang mengeluarkan hasil yang tidak memuaskan, sa-hingga pada tahun yang ka-lima belas ha-nya tinggal satu atau dua barisan sahaja. Beneh2 yang dapat dari barisan yang di-pileh itu di-biakan dan di-hantarkan ka-merata2 tempat di-daerah beneh itu berasal untok perchuba'an di-ladang atau pun 'Extension Trial'. Bila waktu menuai hasil dari beneh ini di-bandingkan dengan hasil beneh yang tidak di-pileh dan jika sakira-nya ia mengeluarkan hasil yang lebeh banyak, maka beneh ini-lah yang akan

di-akui beneh yang baik sakali. Patut juga di-terangkan di-sini yaitu satu beneh yang baik ha-nya dapat mengeluarkan hasil yang banyak di-tempat yang sa-suai dengan-nya sahaja dan tidak-lah di-mana2 tempat yang lain.

**(ii) 'Hybridization' (Beneh Kachokan)**

'Hybridization' ia-lah menchari beneh kachokkan yang baik. Ini di-lakukan dengan 'mengawinkan', atau membuangkan 'stamen' bunga padi yang baik baka-nya dan di-masokan kapada-nya 'stamen' bunga yang lain, juga dari jenis dan baka yang baik. Beneh2 yang di-keluarkan dengan chara ini tidak selalu mengeluarkan baka2 yang baik dan ada kala-nya ia mengeluarkan beneh2 yang sanga tinggi mutu-nya. Jika ia keluarkan beneh2 yang baik, maka beneh2 ini di-biakkan lagi dan di-hantarkan untok 'Extension Trial' atau Perchuba'an di-ladang di-kampong2. Hasil padi dari perchuba'an ini di-bandinkan dengan hasil padi2 biasa dan jika ia mengatasi padi2 yang biasa itu maka ia akan di-akui baik. Sa-lepas itu beneh itu akan di-biakan lagi dan di-berikan kapada peladang2 untok menanam-nya.

**(iii) Beneh Dari Luar Negeri**

Negeri yang menjadi ahli2 Pertubohan Makanan & Pertanian (F.A.O.) selalu menukarkan beneh2 mereka yang baik di-antara satu dengan lain. Sa-belum beneh2 dari luar negeri ini di-berikan kapada peladang2 ia di-tanamkan dahulu di-ladang perchuba'an. Jika di-ladang perchuba'an ini, beneh yang tersebut mengeluarkan hasil lebeh dari beneh2 yang berasal dari Tanah Ayer kita maka beneh ini akan di-hantarkan ka-ladang untok peladang2. Sekarang di-Tanah Ayer kita beneh2 dari luar negeri, saperti Padi Taiwan (Padi 3-bulan) dan sa-bagai-nya telah menjadi mashor kerana ia dapat mengeluarkan hasil yang memuaskan.

Di-dalam perusahan'an ini baja sangat-lah mustahak dan kejaya'an yang di-chapai di-lapangan ini tidak juga kurang. Tiap2 ladang per-chuba'an di-Tanah Ayer kita telah menjalankan suatu siasatan berkena'an jenis champoran baja yang sa-suai bagi padi. Akhir-nya kita telah dapat mengadakan suatu champoran baja yang boleh mendatangkan hasil lebeh dari dua kali ganda. Patut juga di-terangkan di-sini, yaitu kita wajib mengetahui keada'an tanah di-tapak sawah kita waktu kita mem-baja, kerana tanah di-sawah ada bermacham jenis, dan lain jenis ber-kehendakan lain champoran baja. Tetapi oleh berana peladang2 kita tidak berapa ketahui atau faham chara membaja maka satu champoran baja umum (Standard Ferlilizer) telah dapat di-adakan. Membaja mengikut keada'an tanah sawah lebeh baik dari menggunakan champoran baja umum.

Mengawalkan penyakit2 dan ulat2 yang merosakkan padi sangat-lah mustahak. Disini juga kita telah dapat kejaya'an yang besar. Sa-paroh dari orang tua2 kita maseh lagi perchaya bahawa 'Penyakit Konon-nya penyakit2 itu datang jika kita mengawalkan semangat padi itu dengan chukop. Sekarang ahli2 Science telah menunjokkan bahawa keperchaya'an saperti ini ia-lah kunoh belaka. Sa-bagai mana manusia berkehendakan makanan bagitu-lah padi berkehendakkan baja dan jika sakira-nya ia kekurangan baja, maka ia akan menghidapi berbagai2 penyakit. Penyakit Merah ia-lah di-sebabkan oleh kekurangan dzat2 makanan di-tapak sawah dan penyakit ini boleh di-jaohkan jika kita membaja sawah kita dengan sampura.

Padi kita hendak-lah di-jaga sa-tiap masa. Kerosakkan yang di-lakukan oleh tikus2 dan ulat2 waktu ia bunting besar tidak-lah terkira banyak-nya. Tetapi hari ini dengan ada-nya rachun2 saperti 'Seroxa' dan 'Zinc sulphate' tikus2 itu dapat-lah di-binasakan dan juga dengan DDT, Agrocide, Dieldrin, Eldrin dan sabagai-nya kerosakkan yang di-lakukan oleh ulat2 dapat di-hadkan.

Untok mengurangkan tenaga dan menyenangkan kerja2 di-sawah suatu penyelidekan berkena'an dengan menggunakan jentera telah di-lakukan. Tetapi malang-nya oleh kerana petak2 sawah di-negri kita tidak berapa besar maka jentera sangat-lah susah jika hedak di-gunakan, dan peladang2 kita juga tidak mampu mengeluarkan wang yang banyak untok membeli jentera2 saperti Trektor (Tractor), pembajak dan sa-bagai-nya. Juga di-merata2 tempat di-dalam sawah kelihatan berlubang2 di-sana sini di-sebabkan oleh kerbau berkubang. Jika kita menggunakan Trektor di-tempat yang saperti ini, tambah pula jika keada'an tanah sawah itu lembek Trektor itu akan tenggelam dan payah hendak menjalan-kan.

**Kemajuan dan Kejaya'an di-Ladang**

Perusaha'an ini telah bertambah maju di-negeri kita dan keada'an sawah hari ini banyak perubahan-nya. Tetapi kita misti berusaha dengan lebeh giat lagi untok memajukan perusaha'an ini dan menambahkan keluaran beras kita. Sekarang kami akan bawakan para pembacha kaladang2 kita yang di-buat hari ini dan mengetahui apakan kejaya'an yang telah kita chapai dan apakan yang di-buat oleh peladang2 kita.

Daripada mula2 menyiapkan tapak semaian hingga-lah masa mengeluarkan beras banyak kita lihat perubahan yang di-lakukan oleh peladang2 kita di-merata2 tempat. Satu2 perubahan ini, ia-lah menandakan satu kejaya'an dan kemajuan yang kita perolehi. Kita telah mengamalkan meneyemai dengan serentak-nya dan menggunakan beneh2

yang terpileh. Ini sangat-lah berfaedah kapada kita, kerana di-dalam apa2 pun perusaha'an pertanian beneh-lah satu perkara yang ter-mustahak sakali. Juga hari ini peladang2 kita mengubah dengan mengikut atoran yang di-akui, yaitu menggunakan barisan dan sukatan jarak yang sa-suai dengan padi yang di-tanam. Tetapi sedeh-nya ada juga lagi peladang2 kita yang maseh terkebelakang di-sini.

Kemajuan kita yang besar dalam perusaha'an ini ia-lah mengada-kan empang2 dan tali2 ayer di-sawah kita, untok mengawal ayer keluar dan masok. Banyak lagi empang2 dan tali ayer yang sedang di-benakan dan yang akan di-jayakan dan kami harap kepentingan ayer dalam perusaha'an ini tidak akan menjadi soalan lagi pada masa yang akan datang.

Banyak peladang2 kita sekarang menggunakan baja dagangan dan ini ada-lah di-dapati menambahkan pendapatan mereka. Mereka juga mengawal penyakit2 dan kerosakan yang di-lakukan oleh ulat2 dan binatang2 dengan menggunakan rachun2 yang Datok Nenek kita belom pernah mendengar-nya. Ini ia-lah pertolongan science yang besar kapada pertanian.

Kilang2 padi yang ada pada hari ini telah menggantikan lesong2 kaki untok mengeluarkan beras dengan chepat dan mudah-nya.

Segala kemajuan yang kita perolehi itu sangat-lah kechil jika kita bandingkan dengan kemajuan yang di-chapai oleh negeri2 lain dalam perushaan ini. Mereka telah lama menekmati segala bantuan science kapada pertanian yang kita baru na'menekmati-nya. Dengan per-kembangan ilmu science di-Tanah Ayer kita kami perchaya perushaan pertanian khas-nya padi akan menempoh chorak baru dan kita tetap akan mengurangkan beras datang dari negeri luar.

Abu Bakar bin Baba &
A. Aziz bin Salehuddin.

## SAWAH DAN PIPIT

Sawah ! terbentang bersusun di-kaki gunong
sayup-sayup ujong ka-ujong;
hijau membiru daun padi
berkilau-kilauan di-sinar chahya mata hari pagi.

Oh angin ! berbuai ka-kiri berbuai ka-kanan
pokok padi di-tiup angin Selatan;
burong terbang berderet-deret
menanti padi mulai terbit.

Jenis padi ! Nachin, Serendah Kuning sudah bunting
Acheh Puteh, Radin Siak mulai menguning;
selendang di-hayun muka merah menghalau burong.
gadis-gadis turun ka-sawah berduyun-duyun

Mulai masak ! padi mengurai menguning emas
pipit rioh berlagak tidak endahkan chemas;
bergema ! tempek sorak pekek jerit
suara gadis-gadis menghalau pipit.

Hiba hati ku—mendengar sa-orang gadis merayu,
" Pipit . . . . sunggoh kejam perangai mu,
Tidak belas pada aku—gadis tani,
suara ku serak menjerit sa-tiap hari."

Tetapi, gerang rupa gadis bila ayer sawah di-kering,
padi di-sabit, ibu dan ayah terus membanting,
niru di-hayun padi di-tampi
di-junjong dalam bakul dan di-simpan dalam kui.

Sawah ! lapang terhampar di-liputi sepi
sakali-sakali sahaja jeritan kerbau di-dengari;
pipit ganas tidak kelihatan berterbangan.
Kenapa ? Kerana di-sawah tidak ada lagi makanan.

Sunggoh benar kata orang,
" Habis santan hampas di-buang."

Abmy Pontian, Johore.

## PA' TANI

Nun . . . . di-sana sang suria;
leteh lesu perlahan-lahan—
semenet demi semenit
menuju ka-kamar . . . . . beradu.

Surae beransor malam;
angin sepoi-sepoi bahasa,
unggas berterbangang
pulang ka-sarang . . . . tidor.

Pa' Tani mengambil tajak-nya,
lalu pulang.
Sa-lepas berbanting tulang,
bermandikan peloh;
Rasa pedih, tapi ria.

Genap masa-nya,
titek peloh pun di-bayar.
Kuning bergantikan emas
melambai-lambai dengan senyuman.
Ada padi semua jadi.

Ahmad bin Johari.

## KEMENANGAN

Di-mana ada kemahuan di-sana ada-lah kejaya'an.
di-dalam menempoh perjuangan chita-chita.
Menchari kebahgia'an . . . . .
Berbagai-bagai kita rasai—
manis, maung dan pahit;
namun kita tidak akan hirau.
Maju terus maju . . . . .

Riang, gumbira, ketawa,
berhati megah . . . . .
berjaya di-dalam perjuanangan—
mengalahkan semua lawan.
Dari mana datang-nya kemenangan,
kesanggupan dan kerajinan ?
Di-mana ada kemahuan di-sana ada-lah kejaya'an.

Ahmad bin Johari.

## POKOK DAN PENYAKIT

Pokok2 saperti manusia jua, boleh di-hinggap oleh berbagai2 penyakit. Tetapi malang-nya ia tiada boleh berkata2 untok mengadukan hal-nya serta menunjokkan dengan lebeh tetap lagi akan pehak2-nya yang tergangu itu. Jadi payah-lah bagi kita hendak menentukan sama ada pokok2 itu berpenyakit atau tidak, dan jikalau berpenyakit maka apakah jenis-nya penyakit itu. Walau pun demekian hal-nya, boleh jua di-anggap pokok2 itu berpenyakit sekira-nya keadaan hidopan-nya saharian berubah daripada biasa, atau-pun sekira ia-nya gagal mengeluarkan hasil yang baik dan sesuai serta memuas-kan si-penanam.

Disini ada dua jenis penyakit yang patut kita ketahuwi:—

1. Penyakit yang merosakkan seluroh bahagian pokok atau sebahagian besar daripada-nya saperti penyakit kekuningan, penyakit pasilan (Parasitic diseases) dan penyakit 'virus'.
2. Penyakit yang terhad atau yang tertumpu di-bahagian2 pokok dan memberi kesan kepada tempat2 itu sahaja, saperti di-bahagian2 akar, batang, dahan, daun, bunga, buah dan sebagai-nya. Penyakit2 saperti ini biasa-nya tidak merosakkan atau memberi kesan di-seluroh pokok itu tetapi ia-nya mengangu akan ketenteraman pokok itu.

Sekira kita lihat akan chara2 dan jalan2-nya penyakit2 itu berlaku atau terjadi dan merebak maka boleh-lah kita bahagikan ia kepada tiga bahagian lagi:—

1. Penyakit2 Pasilan (parasitic diseases).
   Penyakit ini di-sebabkan oleh salah satu daripada berikot:—
   (a) Chendawan Kulat atau Kulat (fungi).
   (b) Bektiria (bacteria).
   (c) Pokok2 tumpangan mithal-nya pokok api-api.
   (d) Lumut (algae).
   (e) Jenis2 chaching saperti chaching gelang.
2. Penyakit Virus.
   Penyakit ini mudah merebak daripada satu pokok kesatu pokok apabila terlanggar atau tergesel sahaja dengan ayer sel daripada pokok2 yang berpenyakit.
3. Penyakit2 yang lain daripada penyakit pasilan.
   Ini termasok-lah berbagai2 pekara berkenaan dengan zat2 makanan.

Tiap2 pokok yang terkena penyakit itu biasa-nya ada memberi tanda2 yang boleh di-lehat dengan mata kasar. Di-sini patut-lah bagi kita yang berchochok tanam membiasakan diri kita dengan tanda2 dan kesan2 yang lazim di-lehat berkenaan dengan penyakit2 pokok supaya menjadi panduan bagi kita melawan-nya. Sabelum kita melawan penyakit2 pokok itu mustahak-lah terlebeh dahulu kita menentukan yang pokok itu ada penyakit. Kemudian hendak-lah kita chari sebab2 yang mendatangkan penyakit itu. Lepas itu patut-lah kita memikir-kan pekara2 yang akan berlaku kepada pokok itu dengan ada-nya penyakit tadi, dan akhir-nya menchari jalan2 yang berkemunkinan untok melawan-nya dan menchabar-nya daripada merebak.

Ada pun satengah daripada tanda2 yang menunjokkan pokok2 itu berpenyakit boleh-lah di-rengkaskan saperti berikot:—

1. Kehilangan atau Pertukaran warna daripada asal.
   Ini selalu berlaku di-pehak2 pokok yang biasa-nya berwarna hijau. Dengan ada-nya penyakit di-pehak itu, satengah daripada bahagian2 yang hijau tadi akan berubah dan bertukar warna menjadi puchat, dan lama kelamaan hilang terus warna-nya. Kadang2 warna yang hijau itu akan berubah menjadi perang, merah, kuning, kelabu, hitam dan sebagai-nya.
2. Layu di-seluroh atau di-bahagian2 pokok.

   Di-sini jangan-lah kita terkhilap diantara layu yang di-sebabkan oleh pancharan panas chaya matahari dengan layu yang di-sebabkan oleh penyakit. Ada pun layu yang pertama itu memang-lah kebiasaan yang berlaku sa-hari2 dan akan puleh pada hari redop atau apabila mendapat ayer.

Tetapi layu yang kedua itu amat burok akibat-nya sama ada kepada anak2 pokok yang baharu tumboh atau pun kepada pokok2 yang sudah besar dan yang telah chukop umor. Layu di-anak2 pokok itu ada-lah di-sebab-kan oleh kulat pasilan (parasitic fungus) oleh kerana tanah atau udara di-sekeliling-nya terlalu lembah. Kulat ini menyerang di-bahagian batang yang di-perantaran muka bumi lalu menyebabkan pokok itu tombang dan mati. Layu yang biasa terjadi di-pokok2 yang telah besar dan elok naik-nya ada-lah di-sebabkan kerosakan saloran2 pemandu ayer atau makanan oleh akibah dari serangan2 penyakit di-pokok itu.

3. Mati di-bahagian2 pokok.

   Ini di-sebabkan oleh kematian sabilangan daripada sel2 di-satengah bahagian2 pokok lalu menjadi perang saperti yang selalu terjadi di-ubi kentang. Kadang2 daun, batang, ranting, kuntom, bunga dan buah pokok itu menjadi hitam lalu mati.

4. Merekit atau pun tergenchat tumboh-nya pokok.

   Ini di-sebabkan oleh hawa dan tanah di-sekeliling pokok itu tiada bersasuaian bagi-nya atau pun di-sebabkan oleh serangan pasilan hingga menjadikan pokok itu merekit dan daun, bunga, dan buah-nya menjadi kechil.

5. Mengugor daun, buah atau ranting.

   Ada-lah berkebiasaan bagi satengah2 pokok2 itu melurohkan daun-nya apabila sampai musim saperti yang biasa di-lakukan oleh pokok getah di-Malaya. Ini bukan-lah kerana penyakit bahkan kerana hendak mengurangkan daripada kehilangan ayer di-musim panas. Tetapi jikalau pokok itu mengugorkan daun-nya semasa ia belum chukop, besar, atau-pun sudah chukop besar tetapi berlebehan menggugorkan daun atau melurohkan buah, maka boleh-lah kita anggapkan ini sebagai tanda penyakit.

Selain daripada itu banyak lagi tanda2 yang patut kita kenal saperti membesar atau mengerekot di-bahagian2 pokok dan kadang2 berayer pula dan pendek kata bermacham-macham lagi tanda2 yang boleh kita ketahui dengan jalan menyiasat, membacha buku2 dan sebagai-nya. Jikalau kita berusha dan berjaga2 setiap masa untok menchegah dan melawan segala penyakit2 pokok sabelum ia-nya boleh bermahrajalela maka tak dapat tiada segala tanaman kita itu akan subor tumboh-nya dan dengan jalan ini dapat-lah ia mengeluar-kan hasil2 yang boleh mendatangkan ka-untongan besar kepada kita.

Muhammad bin Ismail.

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## PERTANIAN SABAGAI PERNIAGA'AN

Pertanian dalam arti kata yang sa-benar2-nya ada-lah berkehendakan kedua2 yaitu tenaga dan pengetahuan serta pengalaman. Kedua2-nya hendak-lah berganding sama dalam menjalankan perusaha'an ini. Kalau ha-nya kita bertenaga sahaja dengan bertongkos lomos, tetapi tidak ada pengetahuan tentang pertanian dalam zaman manusia mengejar kemajuan ini, harus-lah berlaku beberapa kesulitan dan munkin juga gagal. Sa-balik-nya kalau dengan pengetahuan sahaja tetapi tidak di-amalkan maka serupa juga saperti pokok yang tidak berbuah.

Di-sini saya suka menegaskan bahwa perusaha'an pertanian ini ada-lah berupa dua chara. Pertama-nya, berusaha untok menchukopi keguna'an dan keperluan sendiri, dan yang lebih-nya di-jual untok menambah sara hidup. Perusaha'an yang bagini-lah yang biasa di-buat oleh orang2 kita.

Kedua-nya, berusaha dengan berbesar2an dengan menggunakan modal yang banyak. Ini ta' ubah-lah sabagai 'perniaga'an dan boleh di-buat dengan chara bersharikat atau bersa-orangan.

Perniaga'an yang sabagini biasa-nya di-buat oleh saudagar2 Eropah dan China di-dalam negeri ini. Di-lain2 negeri yang maju saperti di-Amerika Sharikat, England dan Australia, perusaha'an yang bagini mengambil peranan yang penting bagi perekonomian negeri-nya.

Di-Persekutuan Tanah Melayu ini, perusaha'an yang bagini ada-lah berupa ladang2 getah, kelapa, kelapa sawit, teh dan sabagai-nya, dan sekarang telah banyak pula tumboh di-cherok rantau negeri ini saudagar2 berternak ayam, berkebun bunga, dan berkebun buah2an.

Sa-saorang yang ingin menjalankan usaha yang bagini, sangat-lah mustahak ia mempunyai 'ilmu pertanian atau sakurang2-nya tahu bagaimana menguruskan ladang atau 'Farm Management', di-samping itu ia jua musti tahu akan 'ilmu pasaran atau 'Marketing System'.

Perusaha'an yang sa-macham ini hendak-lah berlunaskan dan berdasarkan perniaga'an. Untok mendapatkan keuntongan dan kejaya'an dalam melaksanakan perniaga'an yang berupa pertanian ini, ia harus mengkaji terlebeh dahulu akan masa'alah2 yang akan berlaku dan yang akan di-lakukan. Pendek kata satu plen atau ranchangan musti-lah di-buat terlebeh dahulu.

Ini termasok-lah memileh tempat yang sa-suai dan kemudah2an tentang pengangkutan dan sa-bagai-nya, ke-ada'an tenah yang sa-suai dengan jenis pokok yang akan di-tanam, memileh beneh2 dari baka yang terpileh, dan membuat anggaran perbelanja'an dari satu masa ka-satu masa. Dan lagi mustahak pula ia mengkaji chara2 kerja yang akan di-jalankan dan kemudian di-bahagi2kan kapada beberapa bahagian dan di-atorkan langkahan2 yang patut di-jalankan dari sa-hari ka-sahari dan saterus-nya. Soalan pekerja2 jua amat penting, ini hendak-lah mengikut sa-bagai mana peratoran dan perlembaga'an Keraja'an dalam undang2 boroh.

Sa-lain dari itu kita harus mengkaji terlebeh dahulu kerana sa-bagai mana juga perniaga'an kita misti bersedia menghadapi di-antara dua, yaitu keuntongan atau kerugian. Kerugian munkin berlaku dengan beberapa sebab. Kadang2-nya perkeluaran kita jatoh harga dan ada kala-nya tanaman atau penternakan itu di-serang oleh penyakit2 atau di-rosakan oleh musoh2. Ini boleh di-elakan kalu di-uruskan dengan terator dan dengan chara 'scientific'.

Satu2 daripada-nya hendak-lah berikhtiar dan menchari jalan bagai mana mendapat hasil yang sa-tinggi2-nya dengan menggunakan tenaga dan perbelanja'an yang sa-kurang2-nya. Ini boleh di-buat kalau

mithalan-nya di-ladang2 gunakan jentera2, rachun2 dan baja2 dagangan. Dan kalau berternak jalankan dengan berperatoran.

Musoh2 dan penyakit2 juga dapat di-chegah kalau di-perhatikan dari mula serangan-nya, kerana tiap2 penyakit ada dengan ubat-nya dan tiap2 musoh itu ada dengan lawan-nya. 'Ilmu Science telah dapat membuat segala ubat2, baja2 dan rachun2 ini.

Kalau segala2-nya yang di-sebutkan tadi dapat di-jalankan, bukan berma'ana perniaga'an itu sudah sampurna, kita patut mengkaji pula bagai mana dan di-mana pengeluaran mendapat harga yang tinggi. Maka di-sini sabagai yang di-sebutkan tadi 'ilmu pasaran jua mustahak di-ketahui. Kemudian kita harus mengetahui pula tentang kedudokan ekonomi dalam dan luar negeri. Ini boleh di-buat dengan mengikut dan menyemak harga pasaran dari sa-hari ka-sahari dan berhubong rapat dengan pasaran dunia. Dengan sharat2 yang rengkas yang di-binchang-kan tadi, bukan sahaja dapat menggalakan kerugian tetapi boleh juga mendapat untong yang berlipat ganda.

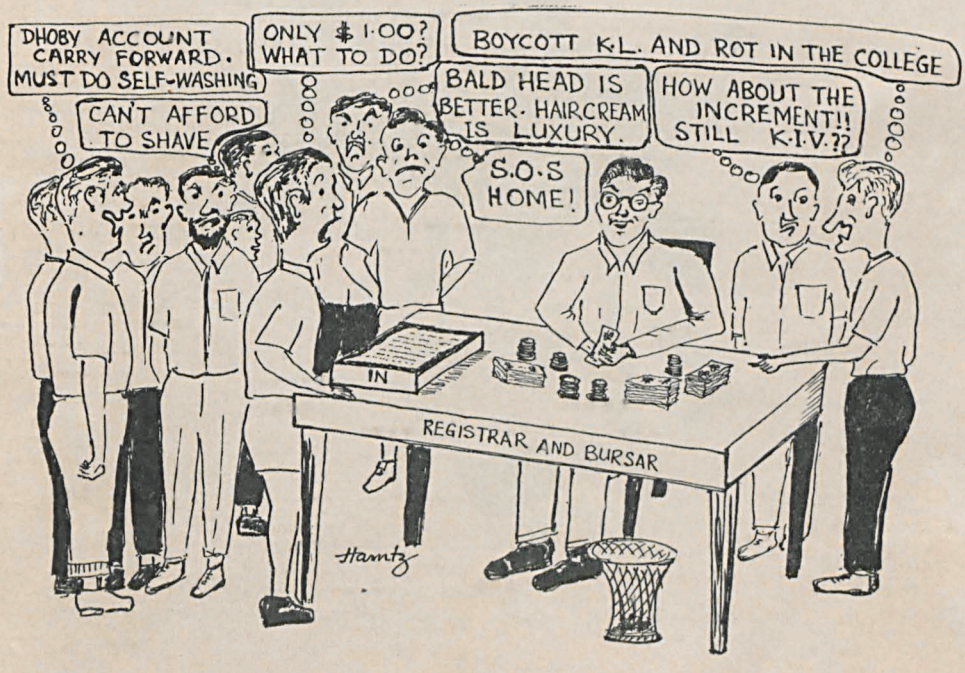
Sekarang telah sampai masa-nya kita mengambil langkahan baharu bukan sahaja dengan berkebun kechil dan berternak sambila2an, tetapi juga membuka ladang2 yang besar dan beternak chara berbesaran dengan jalan bersharikat. Kalau bangsa2 lain boleh menjalankan per-niaga'an yang bagini dengan maju-nya, maka tidak-lah ada sebab2-nya jika orang2 kita ta' boleh menjalankan-nya, sakira-nya mempunyai modal dan pengetahuan yang sama.

Maka dengan jalan2 ini-lah orang2 Melayu akan dapat meningkat dalam lapangan ekonomi-nya yang mana kita sama2 ma'alom bahwa kita telah dan sedang tertinggal jaoh ka-belakang dalam perekonomian kalau di-bandingkan dengan rakan2 kita yang sa-nagara.

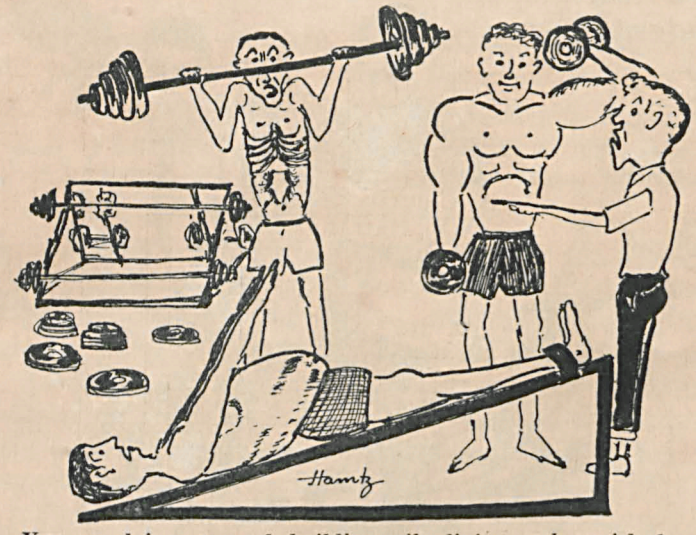
Jikalau kita ada mempunyai ladang2 dan perusaha'an yang besar2 maka tentu-lah akan memberi peluang pula kapada warga nagara-nya pekerja'an2 yang sa-suai dan sa-imbang dengan pengetahuan serta kebolehan masing2.

Yahaya bin Din.


.... it is strange to see that all the labourers here are very young

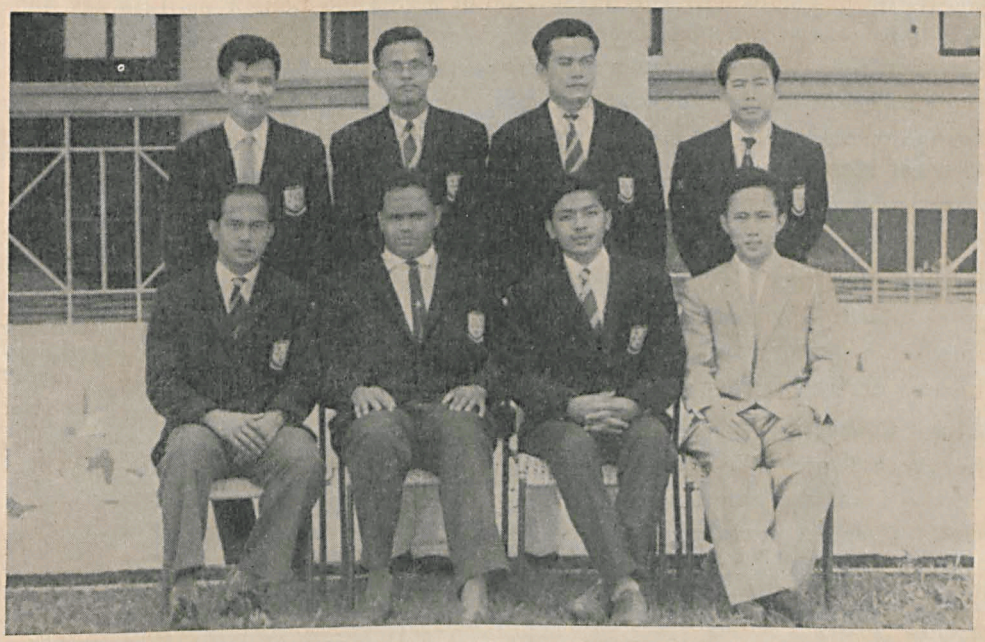



Allowance ..... insufficient !




You are doing stomach building, ribs lining and semi-body swelling.


Foul there, play the ball and not the man or jersey or shorts.



THE COLLEGE OF AGRICULTURE STUDENTS' UNION COUNCIL (1958/59)
**Sitting (Left to right):** Zainal Abidin bin Ahmad, K. Umapathy, Hashim bin Abdul Wahab, Tan Peng Hock.
**Standing (Left to right):** Wan Malik bin Wan Mohd., Ismail bin Haji Othman, Raja Ahmad Tajuddin, Ahmad bin Johari.

# COLLEGE OF AGRICULTURE STUDENTS' UNION ANNUAL REPORT

## ACADEMIC YEAR 1958/1959

The Academic Year 1958/1959 marks the 12th year of the College of Agriculture Students' Union. The Students' Council started to function on 3rd July 1958 after a quiet general election.

The following comprises the 12th Students' Council:

| | | |
|---|---|---|
| President | .. | Che Hashim bin Abdul Wahab |
| Vice President | .. | Mr. K. Umapathy |
| Secretary-General | .. | Mr. Tan Peng Hock |
| Asst. Secretary | .. | Che Ahmad bin Johari |
| Financial Secretary | .. | Che Ismail bin Haji Othman |
| Students' Welfare Secretary | .. | Y.T.M. Raja Ahmad Tajuddin |
| Sports Secretary | .. | Che Zainal Abidin bin Ahmad |
| Literary & Social Secretary | .. | Mr. Khoo Beng Poh |

We regret to record here the resignation of Mr. Khoo Beng Poh, Literary and Social Secretary, who has been replaced by Che Wan Malik bin Wan Mohd.

**Membership**: There has been an increase in membership to 72 this year with the enrolment of 25 first year students. However, membership was reduced by one when a member left the College in the middle of the first term.

**General Meetings**: The 12th Annual General Meeting was held on the 29th July, 1958. There was no cause for further General Meetings in the course of the Academic Year.

**Council Meetings**: Council Meetings were held regularly where our problems were solved. As usual, finance was a big poser at these meetings. This was inevitable owing to our energetic Secretaries having to work on a meagre income derived from a small membership.

**Social Contacts**: It has been a very successful year especially in this field. Southern Tour: We started well with a Southern Sports Tour. Although the results from the games were not very favourable, we have achieved a wider circle of social contacts.

C.A.S.U. Plays Host. In October, 1958 the Union had the privilege of entertaining members of the Football Team from Chulalongkon University in Thailand to lunch. In January, 1959, C.A.S.U. again played host to a party of 5 Australian students. Termly Dances were held as usual, which greatly increased our circle of friends.

**National Union of Federation Students**: The following members of the College Union have been appointed as office bearers of the National Union of Federation Students:

| | | |
|---|---|---|
| Che Hashim bin Abdul Wahab | .. | Chairman, N.U.F.S. |
| Mr. Tan Soon Cheng | .. | Publication Secretary |
| Mr. Tan Peng Hock | .. | Information Secretary |

**Eighth International Students' Conference**: It is much regretted that both our representatives Che Hashim bin Abdul Wahab and Mr. Tan Peng Hock, selected to attend the 8th I.S.C. to be held at Peru, South America between 15th February and 25th February, 1959, were unable to attend.

**General**:

1. Increase of Allowance: It is with regret we have to report here that our pleas for the increase in our maintenance allowance seem to have been put in "cold-storage".

2. Female Agriculturists: Perhaps a subject of considerable interest for quite some time, is the Union's request to introduce girls into the College. The Government has approved the enrolment of girls for the next and subsequent academic years.

3. Council Room: The Council Room has been suddenly requisitioned by the Authorities and turned into an office. We are at present occupying the former Staff Common Room. However, we have been assured by the Principal that the Union will have a separate building of its own by the beginning of the next academic year.

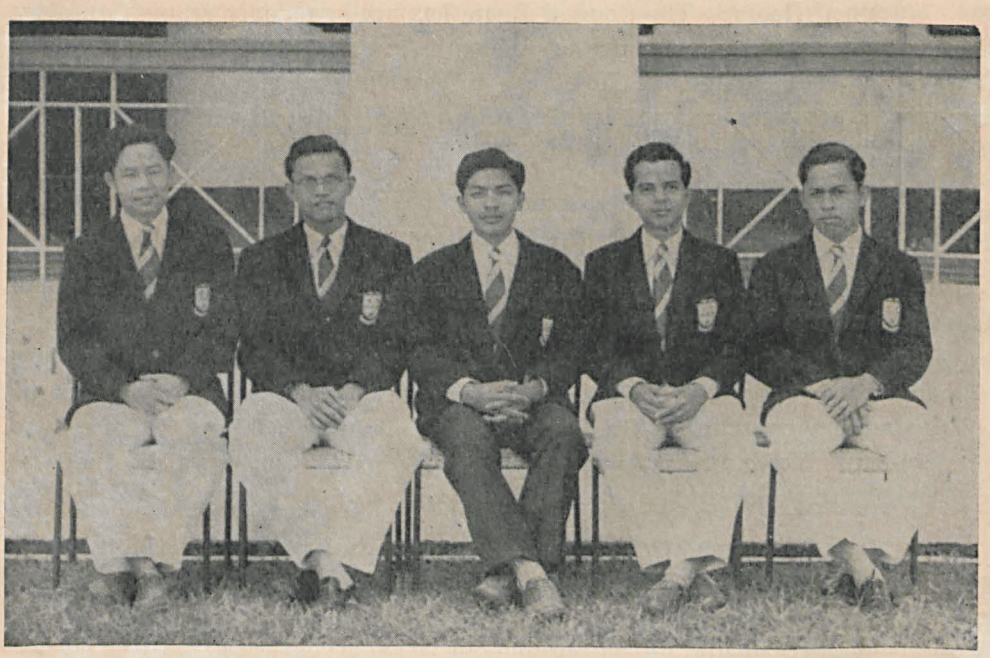
4. Much has been said of achievements in the past year, but there is much yet to be accomplished by the Students' Council.

In the course of the year many a letter sent out by the Union to some Government Institutions has been referred back to us by the authorities concerned stating that they were not being sent through the "proper channels" i.e. via our Principal. Such procedures towards correspondence of a legitimately constituted Students' Union shows the failure to recognise the Students' Voice and still a lacking for due recognition towards students' movement from Government quarters.

It is with much regret that our representative Mr. Tan Peng Hock who has been selected by the National Union of Federation Students to attend the 8th International Students' Conference was not granted leave by the Ministry of Agriculture, on the grounds of the short notice given to consider the application for leave and our representative being a Government Scholar, could not be allowed leave owing to the disruption of studies. There is great need for understanding and sympathy towards activities of the Union from the Ministry in this respect that the Union's participation at such an important event of the Students' World as the 8th International Students' Conference should be denied. To this end, the Students' Union should thrive harder for better understanding and closer relationship with the authorities concerned.

**Acknowledgement**: The Students' Union would like to extend its thanks to all Institutions who supplied us with facts and figures to draw up a comparative table of monthly expenditure in conjunction with our claim for increase in monthly maintenance allowance; the Principal, Mr. Chew Hong Jung for his invaluable help and guidance to the Union often at great inconvenience to himself; the Senior Lecturer, Che Khalid bin Abdul Rahman for his much appreciated assistance in the sports activities and last but not least, to the various Secretaries and all members of the Union, without whose hardwork and co-operation the successful year would not have been achieved.

TAN PENG HOCK,
**Secretary-General,**
**College of Agriculture Students' Union.**



THE FINANCIAL COMMITTEE (1958/59)
**(Left to Right):** Teo Ban Kiat, Ismail bin Haji Othman, Hashim bin Abdul Wahab, Mohd. Shah bin Haji Lassim, Ramli bin Haji Mohd. Syed.

## THE FINANCIAL COMMITTEE 1958/59

The members of the Financial Committee are:-

| | | |
|---|---|---|
| Chairman | .. | Che Hashim bin Abdul Wahab |
| Secretary | .. | Che Ismail bin Hj. Othman |
| Committee Members | .. | Che Mohd. Shah b. Hj. Lassim |
| | | Mr. Teo Ban Kiat |
| | | Che Ramli b. Hj. Mohd. Syed |

As usual, the three Committee Members were appointed by the Students' Council, during its first meeting at the beginning of the year.

The duties of the Committee are:

1. To draw up a provisional budget for the general programme of activities of the Union for the Financial Year and submit to the Council for approval.

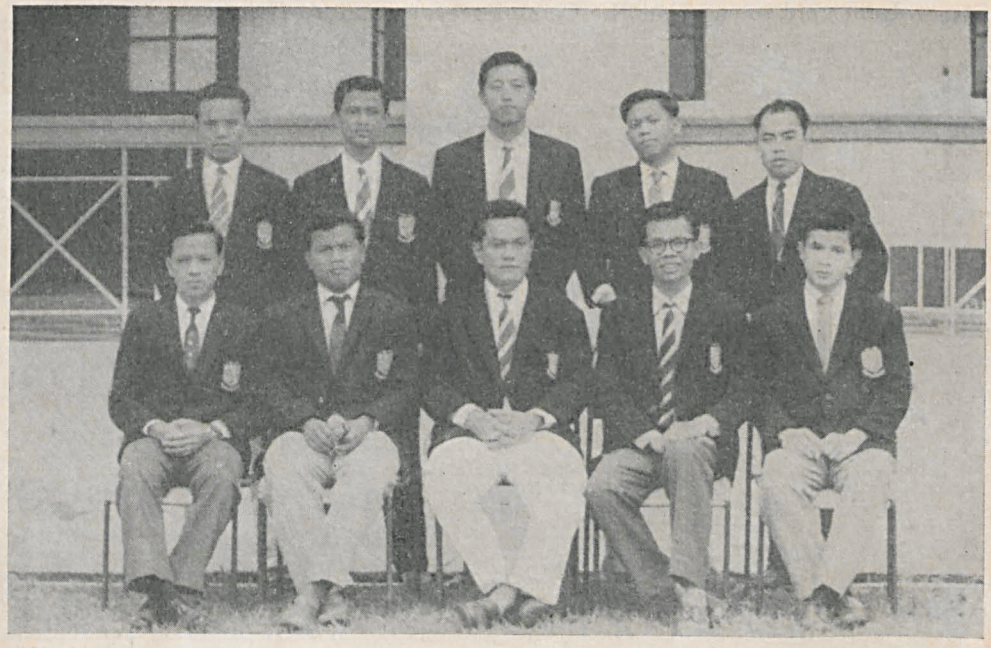
I am glad to say that the Committee was able to function smoothly and this was very much due to the whole-hearted support from its members.

## THE UNION'S ESTIMATED BUDGET FOR THE FINANCIAL YEAR 1958/59

| ESTIMATED INCOME | | ESTIMATED EXPENDITURE | |
|---|---|---|---|
| By Balance from previous year | $ 117.40 | To Union Secretariat | $ 239.00 |
| Entrance Fees | 125.00 | Sports Committee | 1,706.00 |
| Subscription Fees | 1,278.00 | Literary and Social Committee | 950.00 |
| Sale of Kitchen Scrap | 50.00 | Finance Committee | 3.00 |
| Sale of Ties | 21.00 | N.U.F.S. Affiliation Fees | 71.00 |
| Cash withdrawn from Bank | 54.00 | | |
| Govt. contribution to purchase of sports materials | 1,500.00 | | |
| Total | $3,146.09 | Total | $2,969.00 |

| | |
|---|---|
| Total Estimated Income | $3,146.09 |
| Total Estimated Expenditure | $2,969.00 |
| Estimated Balance | $ 177.09 |

ISMAIL BIN HAJI OTHMAN,
**Financial Secretary,**
**Students' Union.**



**STUDENTS' WELFARE COMMITTEE (1958/59)**

**Sitting (Left to right):** Chin Siew Lock, Sulaiman bin Wahab, Raja Ahmad Tajuddin bin R. Razman, Nordin bin Ramly, Mok Kum Ming.

**Standing (Left to right):** Abu Bakar bin Baba, Udanis bin Md. Noor, Tan Soon Cheng, Yusof bin Hashim, Ali bin Mat.

## STUDENTS' WELFARE COMMITTEE 1958/59

The office-bearers of the Students' Welfare Committee are:-

| | | |
|---|---|---|
| Chairman | .. | Raja Tajuddin bin R. Razman |
| Hon. Secretary | .. | Che Nordin bin Ramly |
| Hon. Hostel Secretary | .. | Che Sulaiman bin Wahab |
| Hon. Asst. Hostel Secretary | .. | Mr. Chin Siew Lock |
| Hon. Secretary and Treasurer (Relief Fund) | .. | Mr. Mok Kum Ming |

Dormitory Representatives:

| | | |
|---|---|---|
| Burnett | .. | Mr. Tan Soon Cheng |
| Faulkner | .. | Che Udanis bin Md. Noor |
| Belgrave | .. | Che Abu Bakar bin Baba |
| Tempany | .. | Che Yusof bin Hashim |
| Voelcker | .. | Che Ali bin Mat |

Work for the Academic Year 1958/59 went on without a hitch until the end of the Second Term when we were faced with a deficit shown on the

students' Account. Meetings were held to look into this matter and to check and cover up the deficit before the next Academic Year. It was thus resolved that daily checks should be made on the kitchen supplies. In addition a new 'menu' was drawn up. Suggestions on the increase of catering charges were waved aside as students could hardly make both ends meet with a meagre sum of $85/- a month, not excluding catering charges.

**Hostel.**

The total enrolment this year comes to seventy-one. The hostel has a new look with the introduction of new mattresses and additional cupboards. Two electric fans were allocated to each dormitory—a great relief when compared to the warmth and stuffiness of yore.

The hostel was infested with flies for the earlier part of the year during which life was unbearable especially when taking the much welcomed siesta. 'Operation flies, with D.D.T. sprays and 'fly-traps' were introduecd and these had greatly helped in the decrease of the fly population in the hostel.

The health of the students has been excellent. There were very few hospital cases, except for one who had an attack of appendicitis. Visits to the Dental Clinic were made weekly.

**Kitchen.**

There were minor changes in the Kitchen staff. I would like to mention here that vegetables supplied by the College's vegetable garden have greatly reduced our catering charges and we are looking forward to the day when we will not have to buy vegetables from outside.

**Relief Fund.**

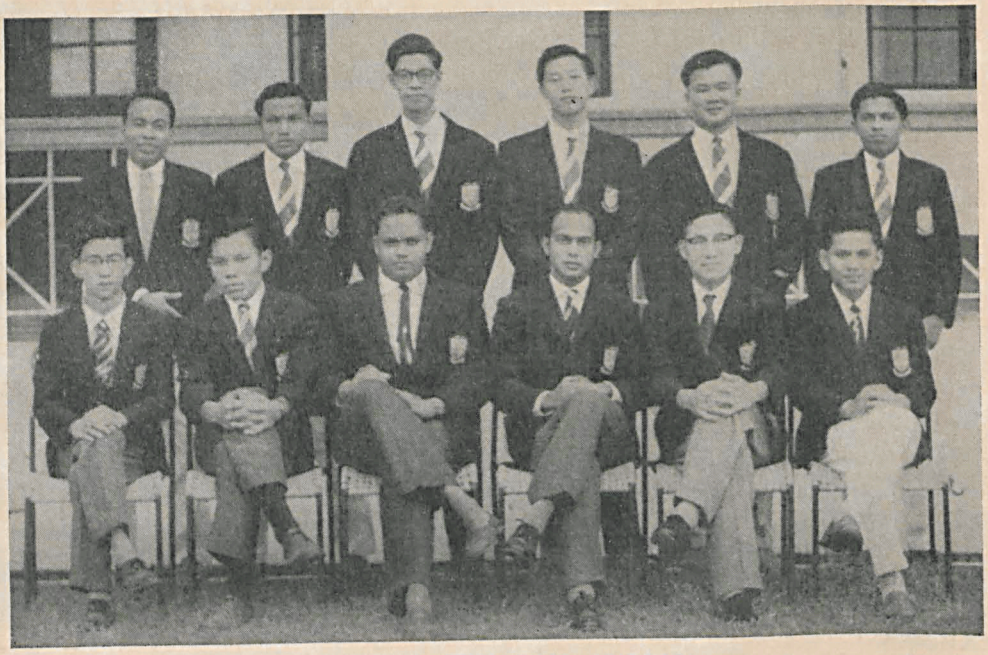
Only fifty-three students contributed towards the fund, but they should not be blamed for the poor response as the present allowance which they receive from the Government is hardly enough. The sum contributed to the Relief Fund at the end of February, 1959 amounted to $1,280.59. During the year only ten students borrowed from the Fund but the money was recovered within one month of the loan.

**General.**

At the moment the students are crammed into five dormitories and with this in mind the Committee sincerely hopes that the new hostel promised will materialise soon.

Our thanks go to the members of the Students' Union, the Principal, Registrar and Bursar and the Hostel Superintendent for their much appreciated co-operation without which the smooth running of the Committee would not have been possible.

NORDIN BIN RAMLY,
Hon. Secretary.



SPORTS COMMITTEE (1958/59)

**Front Row (Left to right):** Tan Yean Kheng, Harun bin Abdul Manan, K. Umapathy, Zainal Abidin bin Ahmad, Nainy bin Awang Chik, Jabar bin Mohd. Kamal.

**Back Row (Left to right):** Zahari bin Ayub, Othman bin Ya'acob, Yeoh Ewe Teik, Tan Soon Cheng, Thien Thau Shen, Mohd. Tahir bin Haji Ahmad.

## SPORTS ROUND-UP

**(June 1958—February 1959)**

| | | |
|---|---|---|
| Chairman | .. | Mr. K. Umapathy |
| Sports Secretary | .. | Che Zainal Abidin bin Ahmad |

### CAPTAINS

| | | |
|---|---|---|
| Soccer | .. | Che Harun bin Abdul Manan |
| Badminton | .. | Che Zahari bin Ayub |
| Athletics | .. | Mr. Thien Thau Shen |
| Tennis | .. | Che Nainy bin Awang Chik |
| Table Tennis | .. | Mr. Yeoh Ewe Teik |
| Hockey | .. | Che Othman bin Ya'acob |
| Volley Ball | .. | Che Abd. Jabar bin Mohd. Kamal |
| Rugger | .. | Mr. Tan Soon Cheng |
| Body Building | .. | Che Mohd. Tahir bin Hj. Ahmad |
| Indoor-Games | .. | Mr. Tan Yean Kheng |

Members have shown much more interest in the Sports activities this year. The main games for this Academic year were football, badminton, tennis, hockey, rugger and indoor games like Chess, Draughts and Carrom. The highlight of the Sports activities was the Southern Sports Tour organised at the end of the first Term. Although we lost badly in the badminton matches played at Johore Bharu and Muar, I should say it had been a great success as far as the tour is concerned. The co-operation of the members and the availability of the College bus played a great part in the success of the tour.

There were numerous friendly matches with schools, Technical College and the University of Malaya, Kuala Lumpur, during the first and second term.

**Soccer.** With the addition of a few promising players our Soccer team was comparatively strong. Several matches were played and the results are as follows:

| | | | |
|---|---|---|---|
| College | vs. | School of Agriculture, Serdang | Won (Home) |
| College | vs. | Federal Experimental Station | Lost (Home) |
| College | vs. | Agriculture Headquarters, K.L. | Won (Home) |
| College | vs. | High School, Muar | Drew (Away) |
| College | vs. | English College, Johore Bharu | Lost (Away) |

**Badminton.** Only a few matches were played this academic year. We were victorious in the match against the school of Agriculture, Serdang but we lost badly in the matches played during the Southern Tour.

**Hockey.** Four matches were played during the year and the results are:—

| | | | |
|---|---|---|---|
| College | vs. | Varsity of Malaya (Eng.Sec.), K.L. | Drew (Away) |
| College | vs. | Technical College, K.L. | Lost (Away) |
| College | vs. | High School, Klang | Won (Away) |
| College | vs. | King George's School, Seremban | Lost (Away) |

**Table Tennis.** Members have shown much interest in this game, specially after the purchase of a new table. Inter-Dormitory and Individual Championships were held at the beginning of the Final Term.

**Tennis.** Interest in this game returned and regular practices were held soon after the repair of the court was completed.

**Indoor Games.** Members are constantly playing games like Carrom, chess and draughts in the common-room during their leisure hours.

**Bodybuilding.** The response to this form of sport was very encouraging and as a result more weights were purchased.

**Volley-Ball.** Though new to the College this game received excellent response from the members. Voelcker beat Burnett in the final round of the Inter-Dormitory Championship held at the end of the Final Term.

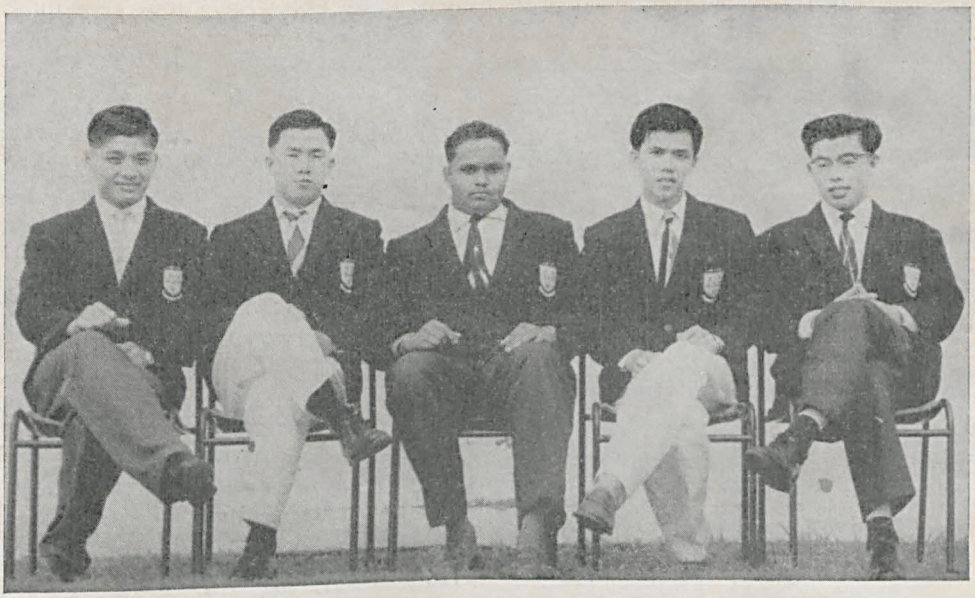
**Athletics.** Nothing was done for this form of sport. Time factor and lack of interest from the members made its revival impossible.

**Tournaments.** Open individual championships and the results of some of them are:—

| Games | Champions | Runners-up |
|---|---|---|
| TABLE-TENNIS | Yeoh Ewe Teik | Hashim bin Abdul Wahab. (Singles). |
| | Chan Yik Kuan and Abdul Jabar | Hashim bin Abdul Wahab and Abd. Aziz bin Salehudin. (Doubles). |
| CARROM | Tan Yean Kheng | Lim Cho Yam. (Singles). |
| | Tan Soon Cheng and Wan Chee Keong | Lim Cho Yam and Abu Bakar bin Baba. (Doubles). |
| CHESS | Aziz bin Salehudin | Abdul Jabar bin Mohd. Kamal |

**Acknowledgements.** Our thanks go to all games captains for their full co-operation, to Che' Khalid bin Abdul Rahman for the invaluable assistance received and last but not least, to the Principal, Mr. Chew Hong Jung for the great interest shown in the smooth running of the Sports Activities.

ZAINAL ABIDIN BIN AHMAD,
**Sports Secretary,**
**C.A.M.,**
**Students' Union.**



THE LITERARY AND SOCIAL COMMITTEE (1958/59)

**(Left to right):** Tan See Yeok, Wong Mooi Fah, K. Umapathy, Wan Malik bin Wan Mohd., Chew Chang Gi.

## THE LITERARY AND SOCIAL COMMITTEE

**(June 1958—February 1959)**

| | | |
|---|---|---|
| Chairman | .. | Mr. K. Umapathy |
| Hon. Secretary | .. | Che Wan Malik bin W. Mohd. |
| Film Secretary | .. | Mr. Wong Mooi Fah |
| Librarian | .. | Mr. Tan See Yeok |
| Committee Member | .. | Mr. Chew Chang Gi |

As usual, the Literary and Social Committee of the Students' Union had its hands full with the social activities of the students here as a whole.

The Committee had great success in organising a lively dance at the beginning of each term in spite of the various difficulties incurred in the organisation of such.

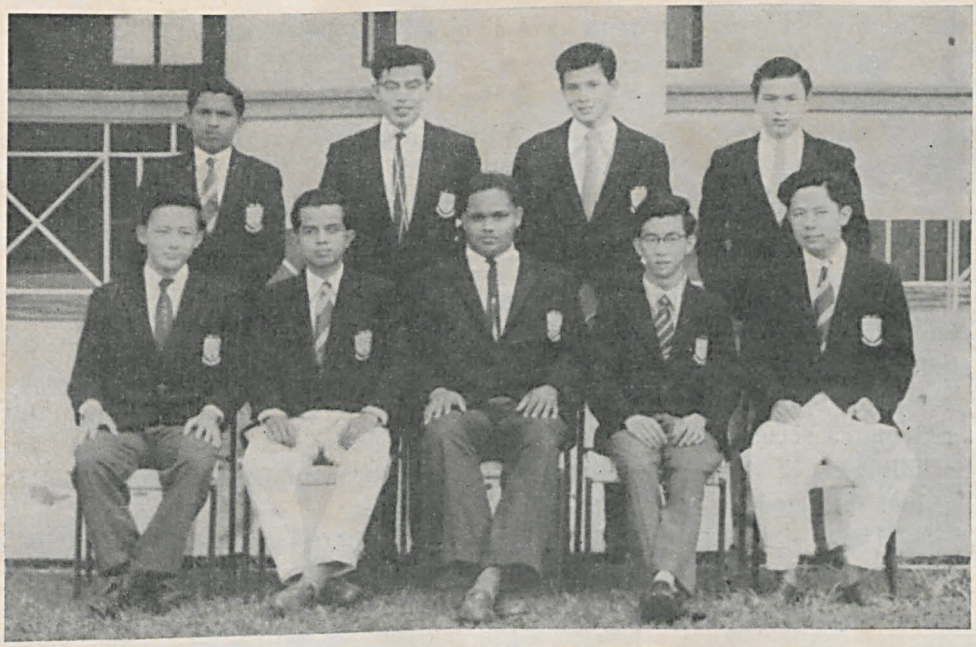
A new film projector has been purchased enabling us to have frequent film shows. Sometime ago, a group of our students were invited to watch the proceedings of the last Federal Legislative Council Meeting.

A grand tea-party was given in honour of the confirmation of Mr. Chew Hong Jung as the Principal of the College sometime towards the end of last year. Another memorable occasion was the welcome given to the Australian students on their visit to our College.

More periodicals were made available from various sources while popular books were purchased for the Union's library.

The Committee, I must say, did its best to fulfill the needs of the students. In conclusion, the committee would like to convey its heartiest thanks to all those who have helped in the smooth running of the Committee.

WAN MALIK BIN WAN MOHAMED,
(LITERARY AND SOCIAL SECRETARY),
**College of Agriculture,**
**Students' Union.**



THE AGRICULTURAL BIAS SOCIETY (1958/59)
THE EXECUTIVE COMMITTEE

**Sitting (left to right):** Tan Wee Seng, Mohd. Shah bin Haji Lassim, K. Umapathy, Tan Yean Kheng, Teo Ban Kiat.
**Standing (left toright):** Mohd. Tahir bin Haji Ahmad, Chew Chang Gi, Mok Kum Ming, Wan Chee Keong.

## THE AGRICULTURAL BIAS SOCIETY (1958/59)

### THE EXECUTIVE COMMITTEE

| | |
|---|---|
| President | .. Mr. K. Umapathy |
| Vice President | .. Che Mohd. Shah b. Hj. Lassim |
| Hon. Secretary | .. Mr. Tan Yean Kheng |
| Hon. Treasurer | .. Mr. Teo Ban Kiat |
| Editor | .. Mr. Tan Wee Seng |

### THE EDITORIAL BOARD

| | |
|---|---|
| Editor | .. Mr. Tan Wee Seng |
| Secretary | .. Mr. Tan Yean Kheng |
| Sub-Editors | .. Mr. Wan Chee Keong |
| | .. Mr. Chew Chang Gi |
| | .. Che Mohamed Tahir |
| Business Managers | .. Mr. Wong Mooi Fah |
| | .. Mr. Mok Kum Ming |

The 1958/59 Academic Session marks the end of the fifth year of the Agricultural Bias Society's existence and the beginning of another. The Society has been forging ahead ever since and from a mere handful of students she has now an enrolment of almost seventy members. The Society has gone through a hectic year and I am sure every member has had his share of

satisfaction. I must admit we have disposed of a large part of the Society's fund, but then it has been put to good account.

The objects of the Society, in brief, are:-

(a) To promote and create a general interest in Agriculture among the public and all institutions in the country through the dissemination of Agricultural news and views.

(b) To encourage discussions on topics of Agricultural interest among its members.

Early this year we proposed to undertake the organisation of an Educational Tour to Indonesia, but owing to the poor financial standing of the students and the lack of time we had to abandon the project. In its stead we made a successful trip to Cameron Highlands during which all members participated. Our heartiest thanks go to Mr. Ti Teow Yen and Mr. Sockalingam of the Agricultural Station for the trouble they had taken to conduct us round.

The Editorial Board for the publication of the Society's organ 'The Agricultural Bias' was in a mess at the beginning of the year. This, followed by the resignation of the Editor made the publication of the First Term's magazine impracticable. In such wise, the existing Editor was appointed by the Executive Committee at the end of the First term. With an early start and under the guidance of the newly elected Editor a fine production materialised by the beginning of the Final Term. Sale of the magazines was met with much success resulting in the procuration of a handsome profit. The Editor and members of the Editorial Board should be given a pat on the back for the excellent work done.

Preparations for the Third Term publication is on its way and is expected to be out in the near future. A brand-new 'Smith-Corona Silent-Super' was purchased early this year to assist in the publication of the termly organ.

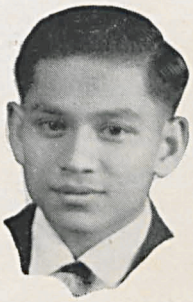
Social evenings were rare by reason of the poor financial position of the Society. At the beginning of the Third Term the Society and the Students' Union jointly held a lively dance in conjunction with the Chinese New Year.

This more or less sums up the achievements of the Society for this Academic Year. Before bringing the report to a close the Society wishes to convey her gratitude to all members, particularly, the senior members who will be graduating soon and also the College authority for their much-appreciated co-operation towards the smooth running and progress of the Society.

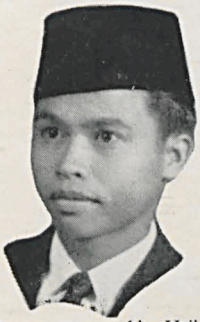
TAN YEAN KHENG,
**Hon. Secretary,**
**Agricultural Bias Society,**
**College of Agriculture, Malaya.**

# COLLEGE ALBUM

# FINAL YEAR STUDENTS (1958/1959)



Abdul Jabar bin Mohd. Kamal,
Major Scholar, Perak.

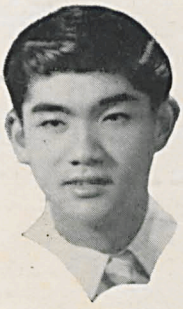


Quamaruzzaman bin Haji Ismail,
Major Scholar, Perak.

Ismail bin Haji Othman,
Major Scholar, Selangor.

Chum Fook Nyen,
Major Scholar, Selangor.

Loh Chow Fong,
Major Scholar, N.S.



Tan Lay Soon,
Major Scholar, Pahang.

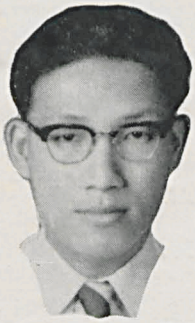
Abdullah bin Mohd. Yunos,
Major Scholar, Johore.

Mohamed bin Ismail,
Major Scholar, Johore.

Hashim bin Abdul Wahab
Major Scholar, Kedah.

Ahmad bn Darus,
Major Scholar, Perlis.

Jaafar bin Haji A. Rahman,
Major Scholar, Kelantan.

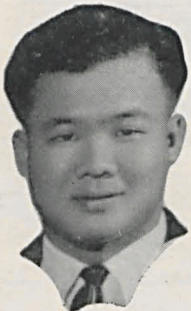


Nainy bin Awang Chik,
Major Scholar,
Trengganu.

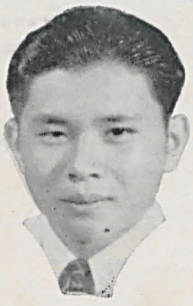
Tan Peng Hock,
Major Scholar,
Penang/P.W.

Tan Ah Him,
Major Scholar, Malacca.

Ng Kar Foo,
R.R.I. Student in Training.



Thien Thay Shen,
North Borneo Student in Training.



Liew Nyuk Phin,
North Borneo Student in Training.

Kong Hon Hyen,
North Borneo Student in Training.

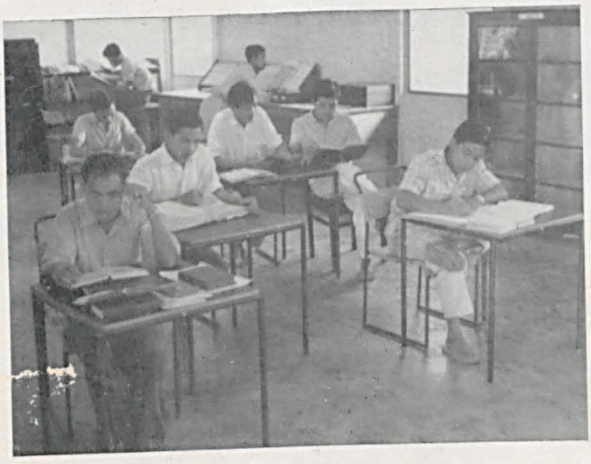
Khaw Poh Seng,
Private Student,
Penang/P.W.

On the verge of starvation !

Tea Time.

In the Botany Laboratory.

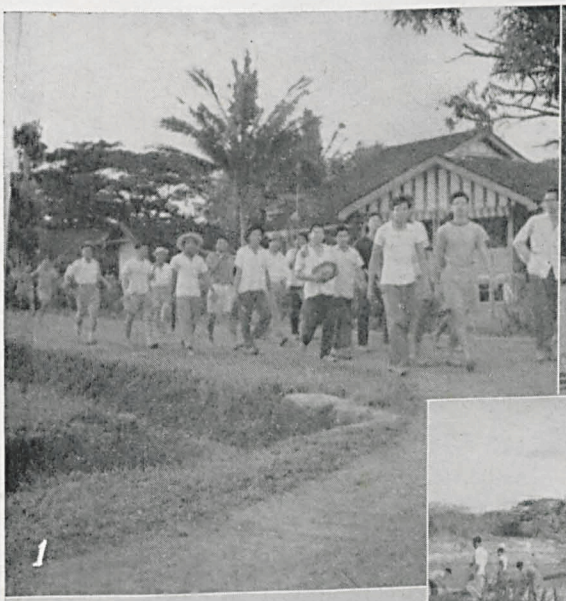
In the Common Room.



Research work in the Library.

"Darling, as I write this letter....."

# IN THE FIELD

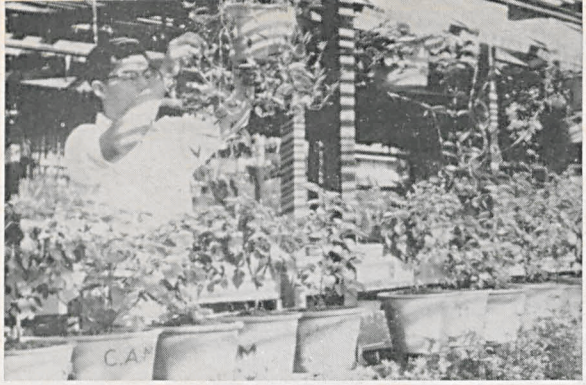






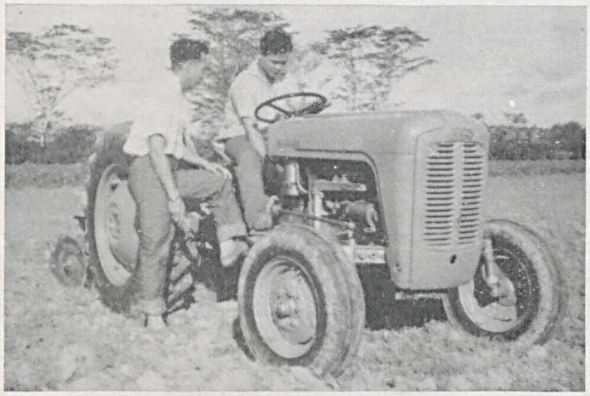



1. Off to the Padi Fields.
2. Planting Malaya's staple Food.
3. "Like to join us?"
4. The Vegetable Garden.
5. "Hey! I can hear them growing!"
6. "Tickling Nut-grass."
7. Like to have one?"



Any ailments ?

"Tapping—Malaya's Lifeblood."



What's wrong, Mike ?

"New hostel" for rabbits !

Careful, Mr. Teo !

Anxious hands at work.

"Sweating away at....."

Keeping the beds cool !
(Mushroom Culture)

Cheers !

A dance.

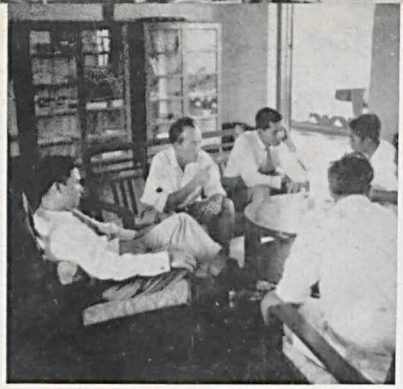
Modern cha-cha.

Recruits on parade .....

" Fashion " parade.

Wow ! !

" The Missing Link."

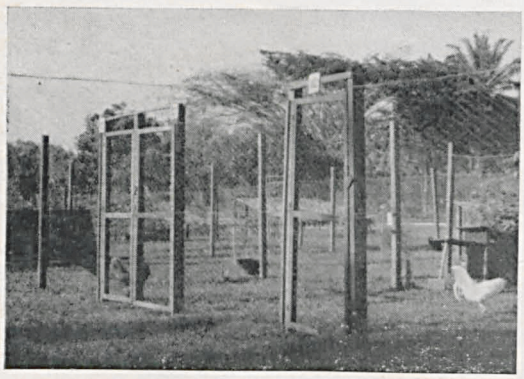


Visitors from Siam.

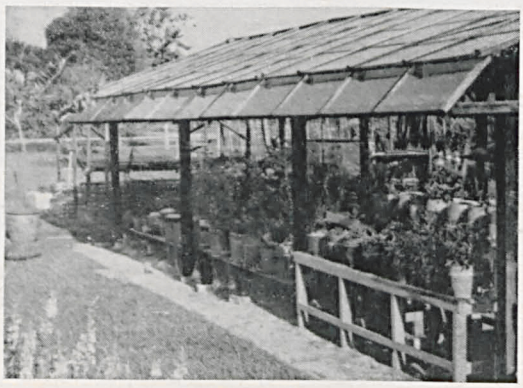
Australian Students at the Federal Experimental Station.

Speech by our guest.

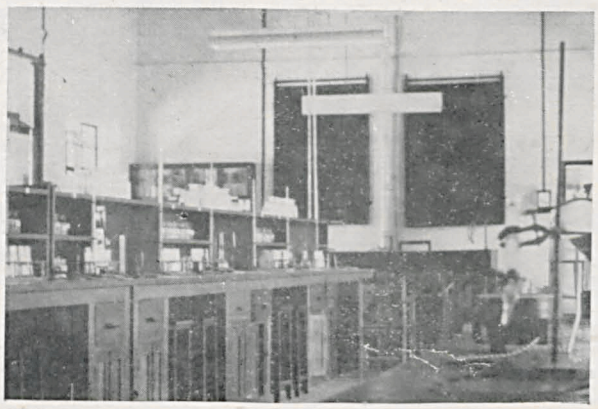
Our Japanese visitors.



"The palace of Pertelote and Chauntecleer."



Hydroponicum.



Chemistry Laboratory.

Getting fresh ? !

A talk on padi selection.

Something on "Chelloping."

"The Deep Litter System is....."

"Poultry farming....."

Muar Ferry.

At High School, Muar.

Stopover in P.D.

Upland tea.

.... .... At Kea Farm.

Collecting insects.

Intensive but Expensive.

"On the 'haystack'"
(Telok Chengai)

Its delicious ! — (Jalan Kebun).

By the "Leaning Tower" of
Teluk Anson.

In Seremban.

In Port Dickson.

## LIST OF SCHOLARS AND THEIR ADDRESSES

### FINAL YEARS

1. Abdul Jabar bin Mohd. Kamal,
   107, Kampong Bharu, Parit, Perak.
2. Ang Gek Choo,
   51, Cheviot Hill, Singapore 15.
3. Ahmad bin Darus,
   Jalan Rani Estate, Arau, Perlis.
4. Hashim bin Abdul Wahab,
   Pekan Kuah, Pulau Langkawi, Kedah.
5. Ismail bin Haji Othman,
   33C, Perkins Road, Kuala Lumpur, Selangor.
6. Ja'afar bin Haji Abdul Rahman,
   Kg. Jeram, Pasir Puteh, Kelantan.
7. Khaw Poh Seng,
   9, Service Road, Penang.
8. Loh Chow Fong,
   Batu Belang, Tampin, Negri Sembilan.
9. Liew Nyuk Phin,
   Messrs. Yun Len Hin, Beaufort, Jesselton, North Borneo.
10. Mohammed bin Ismail,
    529B, Gunong Soga, Batu Pahat, Johore.
11. Nainy bin Awang Chik,
    29, Jalan Batu Burok, Kuala Trengganu.
12. Tan Lay Soon,
    66, Loke Yew Street, Bentong, Pahang.
13. Tan Peng Hock,
    62, Kelawei Road, Penang.
14. Thien Thau Shen,
    Basel Mission Road, Kudat.
15. Tan Ah Him,
    8, Koon Cheng Road, Malacca.
16. Abdullah bin Mohamed Yunoss,
    30, Mohamed Salleh, Pontian Kechil, Johore.

## SECOND YEARS

1. Abu Bakar bin Baba,
   2¾ Milestone, Bukit Piatu, Malacca.
2. Ahmad bin Johari,
   16, Jalan Market, Baling, Kedah.
3. Ali bin Mat,
   25, Seberang Titi, Pengkalan Asam, Kangar, Perlis.
4. Chan Yik Kuan,
   9, Court of Justice Road, Kuala Lumpur, Selangor.
5. Harun bin Abdul Manan,
   448K, Jalan Pass Tumpang, Kulim, Kedah.
6. Hii Siew Ann,
   Hock Hwa Bank Ltd., 3, Central Road, Sibu, Sarawak.
7. K. Umapathy,
   8, Pringgit Hill, Malacca.
8. Lim Cho Yam,
   84, Tranquerah Pantei I, Malacca.
9. Mohd. Yusof bin Hashim,
   1322, Sg. Ara, Penang.
10. Mokhtar bin Tamin,
    College of Agriculture, Serdang.
11. Mohd. Shah bin Hj. Lassim,
    Kg. Paya Kumboh, Gunong Pasir, P.O. Sri Menanti, N.S.
12. Md. Hashim bin Md. Noor,
    31, Pahang Road, Penang.
13. Nordin bin Ramly,
    No. 1, Road 57, Petaling Jaya, Selangor.
14. Phang Cheng Chong,
    95, Kamansut Village, Bentong, Pahang.
15. Raja Tajuddin bin Raja Razman,
    Agricultural Office, Kuala Kangsar, Perak.
16. Tan Yean Kheng,
    1887A, Batak Rabit Road, Teluk Anson, Perak.
17. Teo Ban Kiat,
    3003, Klebang Besar, Malacca.
18. Tan Wee Seng,
    39, Upper Circular Road, Singapore 1,
    **or** 55A, Bukit Bintang Road, Kuala Lumpur, Selangor.
19. Tengku Haizam,
    Kg. Temenggong Lama, Kota Bharu.
20. Tan Soon Cheng,
    2, Cecil Street Ghaut, Penang.

21. Udanis bin Mohd. Noor,
    22¼ Miles, Pulau Sebang, Tampin.
22. Wan Chee Keong,
    564, Lorong Silibin, Ipoh, Perak.
23. Yeoh Ewe Teik,
    58, Cairnhill Road, Singapore 9.
24. Yahaya bin Din,
    Kampong Serdang, Sitiawan, Perak.
25. Zainal Abidin Ahmad,
    6, Pangkor Road, Lumut, Perak.

**FIRST YEARS**

1. A. Balasubramaniam,
   1213, Pasar Road, Kuala Lumpur, Selangor.
2. Abdul Kadir bin Hassan,
   7th Milestone, Simpang 4, Kangkong, Alor Star, Kedah.
3. Ariffin bin Mohd. Nor,
   Kg. Semerbok, Kota Rembau, Negri Sembilan.
4. Abdul Halim bin Hj. Hashim,
   Pulau Tiga, Telok Anson, Perak.
5. Abd. Aziz bin Salehudin,
   Kg. Chenor, Temerloh, Pahang.
6. Chew Changi,
   c/o, 28, Jalan Abdullah, Segamat.
7. Chin Siew Lock,
   11, Ceylon Lane, Penang.
8. Harun Din,
   6¾ Milestone, Titi Bharu, Alor Star.
9. John Yap,
   15, Main Street, Kuantan.
10. Khaw Cheng Haw,
    35, Cheeseman Road, Penang.
11. Khoo Beng Poh,
    5A Mk. 16, Ayer Itam Road, Penang.
12. Mok Kum Ming,
    33-B, Imbi Road, Kuala Lumpur, Selangor.
13. Mohd. Tahir bin Hj. Ahmad,
    13¼ Milestone, Ulu Bendul, P.O. Tanjong Ipoh, N. Sembilan.
14. Mahadzir bin Abdul Rashid,
    Jalan Makam, Langgar, Alor Star.
15. Nik Hassani Mohamed,
    1655, Jalan Merbau, Kota Bharu.

16. Othman bin Yaacob,
Batu 1, Jalan Raja Syed Alwi, Kangar, Perlis.

17. Ramly bin Hj. Mohd. Syed,
4th Mile, Segambut Road, Kuala Lumpur, Selangor.

18. Sulaiman bin Hj. Abd. Wahab,
Kg. Belanja Kiri, Parit, Perak.

19. Sulaiman bin Haji Nordin,
19¾ Milestone, Padang Sebang, Alor Gajah, Malacca.

20. Tan See Yeok,
148, Jalan Salleh, Muar, Johore.

21. Wong Mooi Fah,
592, King Street, Serdang Bharu, Selangor.

22. Wan Zulkifli bin Haji Mohd. Hassan,
1495, Jalan Atas Paloh, Kota Bharu, Kelantan.

23. Zahari bin Ayub,
Pasir Panjang Laut, Sitiawan, Perak.

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## ACKNOWLEDGEMENTS

WE THANK:-

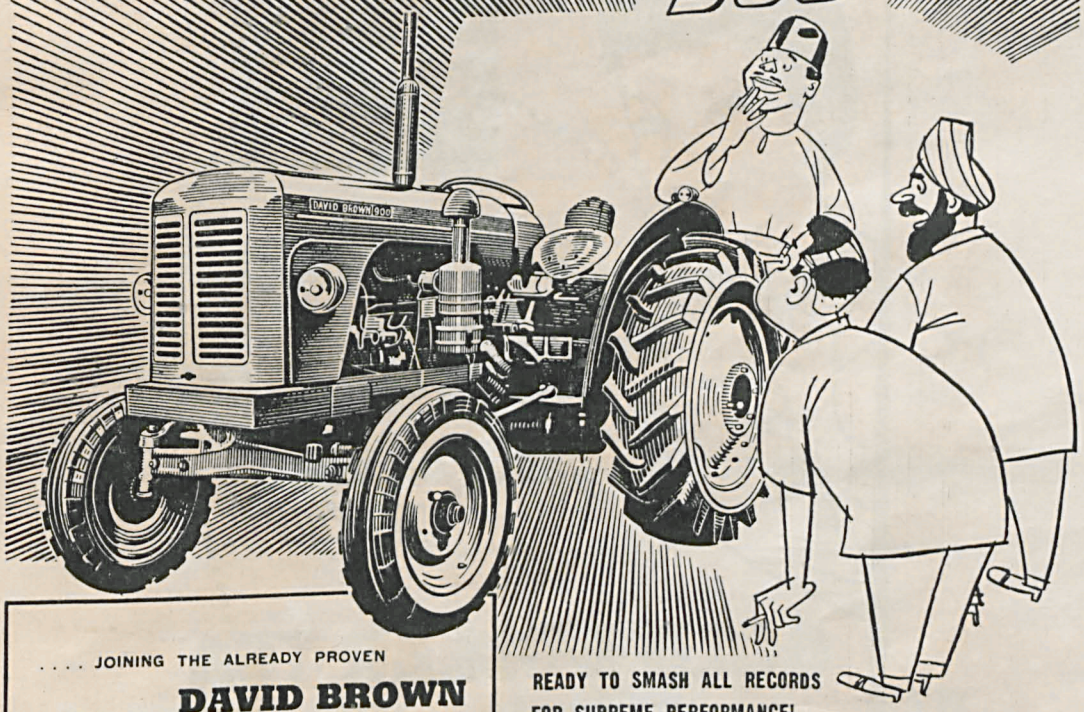
All Schools and Colleges for sending us complimentary copies of their magazines.

All Old Students of the College who have kindly contributed to the success of our magazine.

All our advertisers for their generous help.

Our photographer, Mr. Lim Cho Yam, for the services rendered.

# THE NEW DAVID BROWN 900

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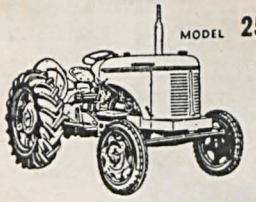

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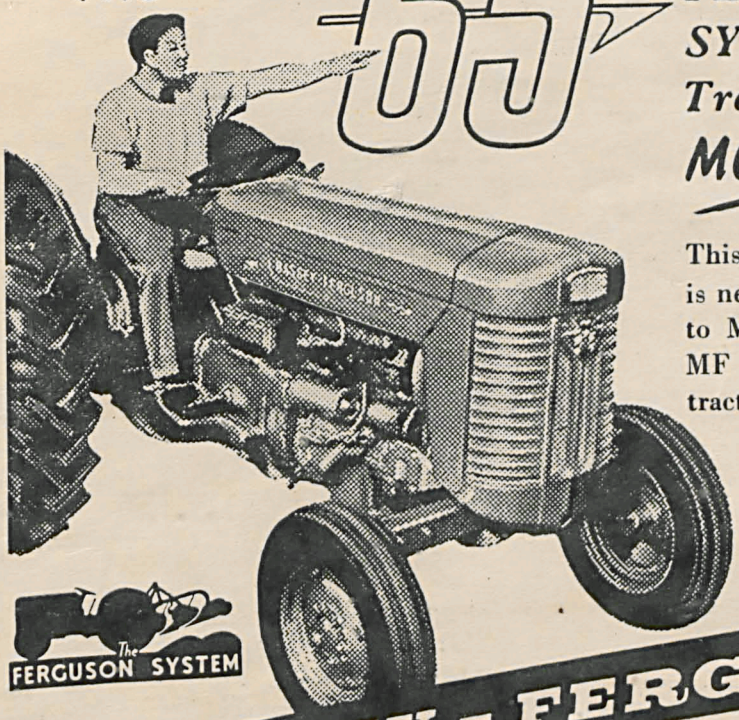

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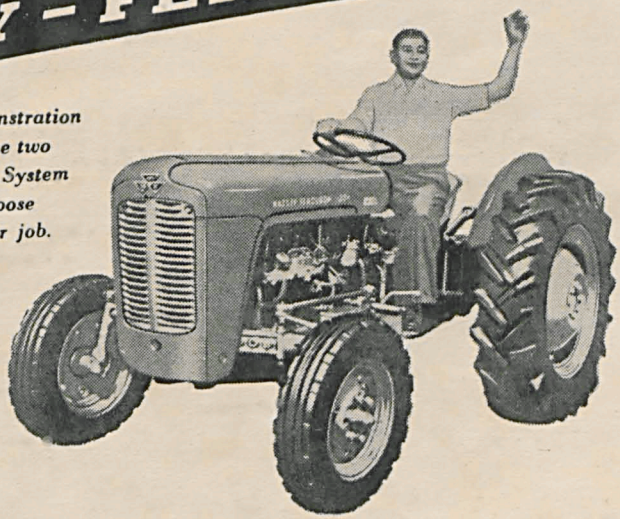

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