

Journal of the Madras Agricultural

Students Union 1

V 16, no. 11, November 1928.

SL

J, g, m 211, N13

N28

169932

Sundalkamur, Coimbatore District.
 C. Arunachala Mudaliar, Zamindar of Chunampet.
 Chingleput District.
 Lodd Govindoss, Madras.
 Khan Bahadur Haji Abdulla Haji Kasim Sahib Bahadur, Udipl,
 S. Kanara District.
 A. M. Kalinga Rayar, Kumara Zamindar of Uttukuli, Coimbatore Dt.
 Raja Sree Krishnachandra Gajapati Narayan Deo Garu,
 Raja of Parlakimidi Ganjam District
 Raja Sri Madana Mohana Simha Deo Garu Zamindar of Dharakot.
 V. Madhava Rajah, Kollengode, Malabar District.
 N. R. Malayandi Chettiar, Udampet, Coimbatore.
 Rao Bahadur Sir A. P. Patro, Madras.
 Dewan Bahadur V. Ramabhadra Nayudu Garu, Zamindar of
 Doddappanaickanur, Madura District
 Rao Bahadur, T. A. Ramalingam Chettiar, Coimbatore.
 Sir C. P. Ramaswami Ayyar, Madras.
 Rao Bahadur C. S. Rathnasabarathy Mudaliar, Coimbatore.
 M. Sambandam Mudaliar, Coimbatore.
 Veerarayan Thirumalpad, Nilambur, Malabar District.
 V. C. Vellingiri Gounder, Coimbatore.
 Venganad Rajah Sir Vasudeva Rajah, Kollengode, Malabar District
 C. V. Venkataramana Ayyangar, Coimbatore.
 R. Jeevandas, Varanasi Parlakimedi.

Benefactors.

TO GET BEST RESULTS
 FROM
 ARTIFICIAL FERTILISERS

USE ONLY

PARRY'S

WHOLE GENERATION OF
 SATISFIED USERS
 CAN TESTIFY TO THEIR
 EXCELLENCE

For Prices and full information
 APPLY TO:—

PARRY & CO.,

MANAGING AGENTS

Presidency Manure Works, Ltd.,

Post Box 12 Madras,

USE ONLY PARRY'S

(ii)

Do you think of buying Farm implements?

:: Remember ::



KIRLOSKAR

Largest Farm Machinery
Manufacturers.

IN INDIA

WE CAN SUPPLY YOU
IRON PLOUGHS,
CANE MILLS,
FODDER CUTTERS,
MNOTE WHEELS,
MAIZE SHELLERS
&c., &c.,

Bulk production enables us to offer these implements of proved quality at prices within easy reach of all farmers. Ask for complete catalogue.

KIRLOSKAR BROTHERS LTD.,

MANUFACTURERS OF FARM MACHINERY,
KIRLOSKARVADI, BOMBAY PRESIDENCY.

(iii)

FERTILISERS.

THERE ARE NO BETTER MANURES THAN THOSE
SUPPLIED BY:—

STANES.

We Manufacture all manures under expert supervision and we supply mixtures and individual Fertilisers suitable for all Tropical crops.

DEAL WITH THE SPECIALISTS OF OVER
40 YEARS EXPERIENCE.

T. STANES & Co., Ltd.
COIMBATORE.

WORKS AT:—Tudiyalur and Cochin.

CONTENTS.

	PAGE.
EDITORIAL :—	... 449
ORIGINAL ARTICLES :—	
Modern Implements in Indian Agriculture—By A. K. Subramania Ayyar, L. M. E.	... 453
Development of Agricultural Societies—By N. S. Kulandai-sami Pillai, Assistant Director of Agriculture, Trichinopoly	... 461
Botany of some useful Plants.—Part V.—By T. S. Ramakrishnan M. A. and S. N. Chandasekhar, M. A.	... 467
EXTRACTS :—	
Principles and Promise of the Co-operative Movement—By K. T. Paul, Continued from September issue	... 477
NOTES	... 482
STUDENTS' ACTIVITIES :—	... 485
DEPARTMENTAL NOTIFICATIONS :—	... 487

ERRATA.

IN OCTOBER ISSUE :—

Delete the last two lines on page 416 and insert them as the first lines on page 415.

farming will never be a success unless the farmer
had more voice in the disposal of
his produce—D. Morrel.

THE JOURNAL

OF

The Madras Agricultural Students' Union.

Vol. XVI]

NOVEMBER 1928.

[No. 11.

EDITORIAL.

The New Messiah.—The world is getting wearied of ageold traditions, ideals, dogmas, and beliefs. The post-war flush of over-enthusiasm and recklessness engendered in newborn nations has set free forces in untold directions and movements have sprung up questioning the wisdom and the methods of the past. What this will all end in no one can predict. But so long as another cataclysmic war is not forced on the innocent nations, fanatics may be permitted to spend all their energy in wordy warfare. For the agriculturist is sane enough not to be drawn into a quarrel which brings sure ruin to himself and his country. No one can deny that he is not dominating world politics to-day. He knows that want of food brought Germans to their knees and any nation however rich and resourceful in other ways cannot long sustain its position if this element is wanting. The supreme need of the hour is the production of food. Agricultural departments are doing what little they can but the people directly concerned do not seem to have become fully alive to the rapidly changing conditions with a view to protect themselves.

The breeder claims to have produced types which give an increased yield of 10-20 per cent. The pathologist is satisfied that his methods are reducing the ravages of pests, the manure-seller is gloating over the roaring sales of artificial fertilisers. The machinemaker is not less vociferous. Co-operative departments pride on increase in membership and share capital. The tax-gatherer assures the world that assessments are paid without the adoption of any coercive measures. The Railway companies are declaring very high dividends. Commercialists are happy that volume of trade is increasing. Doctrinaire economists are rankling over higher standard of living, the Reserve Bank bill, 16d. ratio, gold exchange standard and stabilisation of currency. Trade unions are crying themselves hoarse over shorter working hours, better wages, more humane treatment and sanitary conditions.

Can any one assert that aggregate production of food and other necessities has increased in this country? Still the question of universal rural unemployment and insufficient food awaits a satisfactory solution. Dwellers in 700,000 villages are daily bewailing their fate. Power, prestige, misrepresentation, case-made law, legal quibbling, indifference to understand aright, stand between the urbanite and the villager. Will a new Messiah appear and show the way to prosperity, peace and contentment? Will he inculcate and enforce obedience to the universal truth. "Live and let live in order that you may also live"? Are the conditions favourable for his advent?

The Latest Born:—In the article entitled "Modern Implements in Indian Agriculture" which he read at the last conference and which appears in this issue, Mr. A. K. Subramanya Ayyar complains against the neglect of engineering in its application to agriculture in the past and advocates better attention to it in the future.

He says that with the improvement of agricultural engineering science, larger production of crops and increase in the cultivable areas is possible and in support of his contention quotes a few statements from the "New Bible" if we may, without fear of being accused of blasphemy characterize the recent report of the Royal Commission on Agriculture.

...accused of blasphemy ch...

BIBLIOTHEQUE ROYALE

169932

His able advocacy notwithstanding, we are afraid that there are serious obstacles to the wholesale adoption at present on a large scale of the principles of engineering which form the common stock of farmers elsewhere.

Researches have not been made in this country in this direction. In Madras, one Research Engineer has just been appointed.

The Hydraulic Engineer is not in possession of incontrovertible data regarding the sources and nature of subterranean water-supply so that the poor ryot can embark safely on any campaign of sinking wells.

The Geologist has abandoned his former role of systematic study and is frittering away his energies in the uncertain and dubious direction of economic geology.

The iron ploughs and machinery have yet to become quite acceptable to the ryot despite laudable efforts of agricultural departments and increasing sales year after year. He must have enough resources to keep his raw products sufficiently long, convert and sell them in the dearest market.

The machinery for marketing agricultural products has yet to come to existence.

The ryot does not fight shy of improvements but certainly fights shy of dubious results and wherever demonstration has proved the advantage he is the first to welcome the improvement.

Mr. Ayyar's experience in this line has entitled him to speak with authority on this subject from the technical point of view and all praise is due to him for enlightening readers from this point of view, but how far his advocacy would produce immediate fruitful results from an economic point of view is more than one can safely state at present.

Which is the Better Teacher—the Eye or the Ear.—The answer to this question is furnished in the very lucid and informing contribution of Mr. N. S. Kulandaiswami Pillai in this number

As a circle officer responsible for demonstration work on what one would call one of the most intractable tracts in this province, Mr. Pillai narrates the several stages which demonstration has to pass through, really to become effective. It was in the Cauvery delta that Mr. C. Benson, if we remember aright, found wasteful planting of paddy seedlings and thick seedrate. The Tanjore District Agricultural Association which was soon formed did some really useful work in this direction. The opening of the Mangalore farm and recently of Aduturai has certainly opened the eyes of mirasdars in the Cauvery delta but intensive work of the kind reported upon has become possible only with the next stage in the development of agricultural work—agricultural co-operative societies.—We wish several such societies were formed and functioned in all areas.

Our Dear King George—His Majesty King George has, it is reported, been unwell for some time; the bulletins that are daily being issued are quite reassuring. We hope the prayers of all his objects will be heard and His majesty spared to the British Commonwealth to exert his beneficent influence in critical moments in the history of the countries. For most students of history are not unaware of the noble part he played in unsettling the Partition of Bengal and the grant of freedom to Ireland.

Ourselves.—The question of arrears from members has been pressing heavily on successive committees recently and it has now been decided that with effect from the issue of the next (1929) January number, no copies will be supplied to those who are in arrears to the Union—which has been defined to include subscriptions to the journal, entrance fee, and donations for the College Day and Union Building Fund. It is hoped that all gentlemen who are in arrears and who have the interests of the Union at heart will help it by wiping off the arrears immediately or intimating to the Secretary by what time they would clear them off.

Modern Implements in Indian Agriculture.

By. A. K. SUBRAMANIA AYYAR, L. M. E.

That India is preponderantly an agricultural country is the alpha of India economics. This simple truth has been so much emphasised in all text books and class rooms that it has almost become an article of faith. When it is remembered that till recently the controversy raged over the fitness of India for further agricultural advance her potentialities in that direction may be considered to have a peculiar significance. She has always occupied an important position in the markets of the world. But when at the present day, the economic solidarity of the world's markets is a settled fact, the development of India's agricultural possibilities becomes a matter of the widest international interest. It is vital not only to her own financial position and economic welfare of her people but to the continuance of the general economic structure of the world's supply of food and clothing. Nowhere in the world is the landed proprietor or cultivator noted for his readiness to move on new lines, and the conservatism of the Indian ryot is proverbial. He has been content to run in a groove as old as his ancient land.

None the less the activities of the departments of Agriculture in the various Provinces have been so inadequate to combat this initial difficulty that the benefit of their experiences and researches in spite of the considerable progress achieved so far in themselves have not been made use of by the ryots to the desired extent. It may be true, however, that the activities in Madras are developing to a surprising degree; but this is only very recently.

It cannot be contended that on the whole the departments have worked with much co-ordination among themselves. The diversity of conditions in this vast country has, to some extent, rendered this co-ordination difficult. It is obvious that in a field like agriculture the general lines of departmental efforts and enterprise should be chalked out by a combination of the Agricultural Department and an independent body of experienced farmers.

It is admitted on all hands that sufficient attention has not been paid to the science of Agricultural Engineering by the various Agricultural Departments in India in view of the great potentialities which India offers to the development of Agricultural Engineering. It may be worth while to quote here the reference to this subject by the Royal Commission on Agriculture.

"Agricultural Engineering has been regarded merely a secondary sphere of departmental activity"

In Madras alone, the extent of cultivable waste land is estimated at 12.5 million acres. A careful scrutiny of the figures reveals that it should be possible to convert at least 6.5 million acres into cultivable lands. But very little of the available dry land has been attempted to be brought under cultivation. It is therefore clear that a large area of dry lands in India still lies waste awaiting the advent of Agricultural Engineering Science *in the agricultural methods of this ancient country*. Reclamation of waste land is possible only with the bigger capitalists as they alone can acquire large areas and cultivate them according to the most up-to-date methods of farming. It is too well known that Indian Capital fights shy of investment in agricultural development and unless the possibilities are demonstrated in a particularly convincing manner, no appreciable advance can be made in that direction. The brunt of the whole work of demonstration will undoubtedly fall on the neglected child, the Agricultural Engineering Section. It is this section that has to show the cheapest method of reclaiming cultivable waste lands, of tilling the soil, irrigating the lands from canals, rivers, tanks, wells and of harvesting, and converting the raw product into finished products for the market in the most efficient manner. Grant of waste lands in some districts of this presidency for cultivation purposes has not produced the desired results, for the conditions of the grant are far too rigid and the ryots are not prepared to risk their capital for fear that when, at the end of 30 years, they are just in a position to gather their harvest, a good portion of it may be snatched away as tax with the result that all labour and capital spent on such lands is not properly compensated.

Agricultural operations would appear to fall under four broad headings:—
Tillage or the preparation of the soil,
Irrigation or the supply of water,
Seed sowing and cultivation and lastly
Harvest or the gathering of the fruits.

All these operations are being carried on in a crude and primitive way. Each of these has problems peculiar to itself and it is difficult to tell which of the four offers the most difficult of solution. Major portion of these operations demands the attention of the agricultural engineer for efficient execution in addition to reclamation of cultivable waste lands.

Reclamation of waste lands:—This operation requires considerable labour and an initial outlay of capital. Experience in other countries and in some parts of India shows that, with the help of a suitable tractor and the necessary implements, any uneven land can be cut down to the desired depth and levelled for cultivation purposes, in a more economical manner than by manual and cattle labour. By the term "suitable tractor," I mean not the low horse power motor tractors started on petrol and run on high class kerosine, but high power tractors started and run on crude oil (Diesel principle). With the experience I have in the use of different kinds of tractors, I consider that the chief factors governing the utility of tractors in Indian agriculture are:

1. The power of the tractors and
2. The cost of the fuel consumed.

Hitherto low power tractors consuming high quality fuel were used most commonly both by the department and the ryots and the results were obviously disappointing. So far as the durability of a tractor is concerned, the less powerful a tractor the more frequent and greater are the breakages of parts due to excessive stresses offered while working. It will be clear from the above that the cry that motor tractors are uneconomical for the reasons,

- (1) Their life is short and

(2) They are expensive to work on Indian soil, is quite justifiable. If those interested in this sphere of operation, be they Agricultural Departments or enthusiastic ryots, only conduct experiments with suitable types of tractors and implements, they would realise the enormous advantages in the use of tractor power over cattle and manual labour for which there is greater demand.

Tillage.—Timeliness is the governing factor in this operation as is the case in nearly all farm operations. As every farmer is aware, there is only one best time for each item of work on a farm. If the right time is missed, the interest of the farmer is bound to suffer. Only through use of a suitable set of tillage implements can the farmer control the right time of most important operations. The use of improved implements in tillage not only saves time but also achieves better results. In some quarters

the country plough is largely in favour with the ryot because he is accustomed to handle it and it does not necessitate a secondary operation by the cultivator or other such implement. The country plough which cuts a triangular furrow at best does half the work of a mould board plough which cuts a rectangular furrow the effort being the same in both cases. The practical aspect of it is that the mould board plough does not leave a ridge between any two adjacent furrows. Thus the work is complete in one operation. Some land owners rely on their coolies for opinion and they are intent on prolonging the operation and getting more wages and avoiding the initial trouble of getting used to the new implement. In the Central Farm, Coimbatore crops grown on soils tilled by the iron plough have withstood drought better.

The essential purposes of ploughing namely the turning of the furrow slices and the breaking of clods are not served by the country plough.

The saving in time and consequently expenditure in ploughing a given piece of land besides durability of the plough is far more compensating than the extra initial outlay in the purchase of an iron plough. The dislocation of work arising out of the necessity to mend the country plough waiting for the services of the village carpenter and blacksmith is avoided if one chooses to use the iron plough. It is however desirable that agricultural engineers turn their attention towards improving the designs in ploughs in such a manner that the present price is brought down. A reduction or even wholesale abolition of duty on agricultural implements may also be necessary.

It is regrettable that the indiscriminate adoption of iron ploughs in the market without due consideration to the draught capacity of the bullocks available has to a large extent been the cause for retarding progress in the introduction of improved ploughs and this will be seen from the statistics that only 17,000 improved ploughs were introduced in India in 1925-26 while 25 millions were needed for work. The remarks of the Royal Commission on Agriculture on this subject are apt and run as follows:—

“Work on implements has been completely overshadowed with that connected with pumping and boring operations and water lifts. There are difficulties of finance. We think an important obstacle is that a natural disinclination which the ryot has to being regarded as eccentric because he has bought a novel implement. The remedy for this is intensive propaganda.”

From this remark, it should not be understood that the Royal Commission consider that sufficient advance has been made in the progress of lift irrigation; but only that a proportionate advance has not been made in the introduction of improved implements. It appears that the reason for considerable progress in pumping, boring and lift irrigation has been sought for in the fact that these were looked after for a long time by a separate department namely the Department of Industries. Had these been placed under the Department of Agriculture, judging from the amount of attention paid so far to Agricultural Engineering Science even the little progress in these could not have been achieved.

Irrigation:—Historically however agricultural problems in India have always centred round irrigation. So long as there was no necessity to bring even the poorer lands into cultivation, owing on the one hand to the comparatively moderate demand for food stuffs and, on the other, to the presence of large areas of land of high fertility, the subject for earlier people has been.

(i) To secure a plentiful and well regulated supply of water. Water there was—plenty of it in the rivers or in lakes, and tanks, or reservoirs. Once a large anicut is built and the adjacent country is equipped with a net work of canals the larger problems of irrigation are solved and the responsibility for the development of agriculture passes into the hands of individuals. So long as the larger schemes of irrigation are handled and solved by the state the individual farmer of wet lands has no serious problem to face. But on dry land and on certain classes of wet land safely depending on rainfall the farmer is at a great disadvantage. His lot is anything but enviable. He it is that has to face this problem in all its aspects. He has to look far up into the sky and bore down far deep into the earth even for a pailful of water. And in the agriculture of India he has an important place as many a raw material for the manufacture of products for the modern world is provided chiefly from the dry lands.

If the peasantry of India can be taught to sink large wells on improved methods and principles which would ensure large and unfailing supplies of water and to work modern lifts for raising water from wells, rivers, and canals there is no doubt that the Indian would find in the improvement of dry lands and rain fed wet lands a new and fruitful field for investment.

It is extremely regrettable that modern science has not so far been successful in giving a lead in the matter of "reconnoitering" the ground for well sinking. In the experience of landlords, boring has not always been a successful means of opening out subterranean springs. At any rate, there is no need to labour the point that neither science nor intuition has served to mitigate the effects of speculation in well sinking. But this defect has been more than made up by the ardour of the agriculturist as none who has discerned the possibilities of a particular plot of land has been known to throw up his hands in despair over this one point namely "well sinking." He is always imbued with a sporting spirit and launches forth on the scheme with all the enthusiasm of an idealist. The determination to see it to the finish always keeps pace with the increase of difficulties to be surmounted.

The diversity of conditions with regard to sources of water supply in India, is such that it is impossible to introduce a common type of water lift. There are some wells which are suitable only for the picottah lift and some for mhote and others for power pumping plants. But most of the perennial rivers are suitable for power pumping plants. It is well established from practical results obtained from the use of power pumping plants during the past 15 years that if the source of water supply could permit at least 3 mhotes of 40 gallons capacity working at the rate of 50 to 60 lifts, per hour it is economical to replace the mhotes by power pumping plants. Therefore for wells capable of supplying over 120 gallons of water per minute for 10 hours work every day and for perennial rivers supplying large quantity of water there can be no lift better suited than power pumping plant for effecting economy in lift irrigation.

Although a regular survey has not been made of the area of land that could be irrigated by means of power pumping plants from rivers or canals passing through such areas one could easily notice that there should be vast scope for the development of lift irrigation by power. The 'Bharatha' river in South Malabar for instance is one that carries a very large quantity of water at a level of say 20 feet below the field level.

The ryots owning unquestionably fertile lands on either side of this river are raising only one crop a year which is fed by rain during the South West monsoon.

The failure of even this crop owing to want of adequate and timely rainfall is also not uncommon. Here is a typical instance of a fertile soil on which two crops could surely and easily be raised in a year with the aid of a power lift. I give below an example showing expenditure; quantity of water raised, and area commanded and this could be compared with the relative cost of other kinds of lifts and the extra yield obtained through lift irrigation by power :—

TAKING :—

Area to be commanded as 20 acres.

Kind of crop —Paddy.

Interval between irrigation—1 day.

Lift through which water has to be raised 20 feet.

The required no of irrigations for the 1st crop—5.

Do. for the 2nd crop—30.

A plant consisting of 8 B. H. P. crude oil engine and 5 inches centrifugal pump which will irrigate 10 acres in a day of 8 hours work to a depth of 1 inch is required.

The cost of the above plant complete including construction of engine room and erection charges would be approx Rs. 2000.

Annual running charges, taking 70 working days of 8 hours each in a year will be as follows:—

Interest on Rs. 2,000 at 6 per cent per annum for 1 year	...	120	0	0
Sinking fund annual contribution so that these may accumulate to Rs. 2,000 at the end of 13 years at 8 per cent per annum c. i.	...	130	0	0
Crude oil for 70 days work—560 gallons	...	225	0	0
Lubricating oil for 70 days work—20 gallons...	...	60	0	0
Petty repairs and renewals	...	35	0	0
Driver at Rs. 15 per mensem	...	180	0	0
Total	...	750	0	0

The expenditure of Rs. 750 per year enables the ryot owning 20 acres to raise two crops every year. In this connection it is to be remembered that as the interval between irrigations increases the area that can be commanded by a plant becomes larger; but it may be pointed out that as the lift increases the power required will be greater and consequently the expenditure also.

It is only when all the cultivable waste lands are brought under the plough with the aid of modern implements, good wells are sunk in places wherever needed and power pumping plants are installed in places of adequate and unfailing water supply that India's material wealth will attain a degree of importance comparable with that of other countries.

Development of Agricultural Societies.

BY N. S. KULANDAISAMI PILLAI.

Assistant Director of Agriculture, Trichinopoly.

Agriculture as an art, is almost as old as the creation of the world. Agricultural Science however is of recent origin and as it has to draw upon all the other sciences for its advancement, it had necessarily to wait for the development which has been taking place only during the last one or two centuries. The problems connected with agriculture are incapable of easy solution, for the practices are so diverse that they would baffle any scientist.

In an old agricultural country like India, where the practices are the growth of centuries and vary not only from tract to tract but almost from village to village, it takes a lot of time to understand the rationale of each practice and suggest improvement.

The variations that could be noticed in a small area of the Cauvery Valley, for instance, could give you an idea of the divergencies in the agricultural practices.

When one farmer ploughs his lands, manures them well, and transplants his paddy crop, another simply floods his fields and broadcasts paddy with no preliminary cultivation whatever. While one lets in water into his field one evening and ploughs and transplants before the next his neighbour ploughs his field for a fortnight but at intervals and then transplants. Again, when one prefers Perum Samba, another chooses Nellore Samba.

When such differences exist in the cultivation of one crop like paddy in a very small tract, you may imagine the magnitude of the problems which a handful of workers scattered over the country, have to face and tackle.

Agriculture is the mainstay of the country, but it is the most neglected of all industries. There has been little or no progress in the agricultural practices for centuries. If an Indian Farmer who had lived some centuries ago were to be brought back to life now, and left in his native village, he would continue to do his work as ever before, without a wit feeling himself out of time with the farming methods of his brethren. This stagnation and inertia of centuries could be overcome by the leaders of the local public taking an intelligent interest in agriculture and awakening the mass conscience.

No other method is more suitable to attain this end than the Co-operative Movement. The Intelligentsia have been avoiding agriculture, considering it probably beneath their dignity and have been leaving the work to third rate men. This is one of the causes for the present degenerate state of agriculture. Agriculture, is, as A. D. Hall puts it, "a gamble with the season" especially in large tracts of our country which are entirely dependant on rainfall. It is probable that frequent failures have driven people to neglect it; but no nation could long afford to remain without gambling with that arch-gambler Nature. True it is that, in the wake of failures, wisdom should dawn upon one. But that wisdom should not take the wrong turn of avoiding it. On the other hand, it should arm us with the power of beating Nature hollow on her own ground. There is an impression prevailing almost throughout the country that agriculture is not a paying business and this feeling is also responsible for diverting average men away from agriculture. For solving the present unemployment problem in our country, the Committee which deliberated upon its causes and the solutions, suggested that the people should go back to the land; but the people are quite in different to do so, as their views on farming as a business, are based on misconceptions. It is therefore necessary to demonstrate to the public that farming is as paying a business as any other. It is true, that princely profits cannot be derived from agriculture but it is equally true that sudden crashes as in trade will never befall a farmer. Agriculture can only assure at all times a steady income as a gift from mother earth.

In the present transitional stage of the country, agriculture is in the melting pot as everything else. To what extent the products from the crucible would be better than those put into it originally will depend upon our skill.

Now coming to the question, which is the subject of this paper, the greatest problem that is confronting the Agricultural Departments is the imparting of education in Scientific Agriculture to the illiterate millions, distribution of leaflets and bulletins. Villager's calendars, etc., containing facts and figures on agricultural improvements are, no doubt, useful in themselves, but only one in a hundred will profit by them. Agricultural shows, and exhibitions held and lantern lectures given during festive occasions may tend to enlighten a few ryots. What is wanted is ocular demonstration.

Demonstrations held on Government Farms at Government expense are always looked upon by the ryot with some sort of suspicion. The superiority of a crop will be attributed to some costly method or a manure which an ordinary ryot cannot afford to adopt. This was the practical difficulty experienced by the officers of the Agricultural Department. To get over this difficulty, ryots interested in agriculture were induced to run demonstration plots in their own lands at their own expense but under the supervision of the departmental officers. This system, no doubt, had the desired effect of removing from the ryots' minds, the erroneous notion that the superiority of the crop was due to some special causes other than the improved methods or the strain of seed or the manure; but the progress of work was not commensurate with the trouble taken for, in most cases, only the ryot who run the demonstration farm profited.

With a view to give a wider publicity to agricultural improvements recommended by the department, attempts were next made to induce Co-operative Credit Societies to carry out demonstrations on the lines mentioned above. Several societies readily undertook this work but even here only the President or the Secretary or solitary members of the society who run the demonstration, were benefited. The reason is very simple—a credit society consists of members whose object is to borrow money. Though agriculturists themselves the members bestow little or no thought on improving the time-honoured agricultural practices and thus bettering the crop-yield. This gave a clue to the solution of the problem—the problem of creating confidence in the work of the department and of educating them to follow the improvements. A society, consisting purely of members interested in agriculture and solely depending on agriculture may bring out the desired effect. With this object in view a society was started at Lalgudy in 1925 which was blessed by the then Development Minister Sir. Sivagnanam Pillai, who kindly lent his name to the Society which is known as the 'Lalgudy Sivagnanam Co-operative Agricultural Society.'

The object of this Society is to cultivate lands according to modern agricultural methods, with the idea of demonstrating to its members and to the general public their advantages and to encourage the cultivator of the tract with the use of improved implements, better seeds, manures etc., recommended by the Department.

To attain this object, about 10 acres of double crop wetlands were taken on lease by the Society on a fixed annual rent of 30 kalams or 2800 lb. of paddy per acre. In the first year, during both the seasons, the advantages of individual improvements such as economic planting, ploughing with improved plough, use of strains, etc., over the local method were demonstrated in two fields. The advantages of all improvements in combination were also demonstrated in three separate fields. Barring a few trials, the rest of the area was cultivated according to the improved method. The season for both the paddy crops was rather unfavourable. Owing to summer showers, the 'Veppal' as it is popularly known, was lost and the yield of the first crop was considerably affected. The fortune of the second crop was no better. The continuous rains in November and December encouraged the multiplication of insect pests which ravaged the crop and reduced the general yield.

In spite of the adverse seasonal factors, the demonstrations proved a success. This stimulated the interest of the members and the public alike. After paying the rent of the lands, i. e., at 2800 lb. per acre and meeting all the cultivation expenses, the society realised a small net profit of Rs. 50.

In the second year at the request of the Society, the demonstration of each improvement separately was discontinued, as the members began to have faith in the several improvements and as these involved a lot of labour and expenditure. The demonstration of all the improvements combined versus the local method was done in two acres. Except for a small area which was reserved for some trials, the whole area was cropped according to the improved method.

Although the results of the demonstration in the second crop were not convincing as those of the first, the total yield was greater than in the previous year.

During the third year 2.25 acres were cropped according to the local method and the rest were put under improved method. The marked feature of this year's results is that with the lowest cost of cultivation the highest yield was obtained as will be evident from the following statement:—

Description of crop.	Area cropped. Ac.	Total cost of cultivation. Rs.	Total net yield in lb.	Lease paid to landowners.	Balance of grain lbs.
1925-26 I Crop ...	8.63	384	21,985	13,965	8029
II Crop ...	9.50	408	20,362	13,870	6492
1926-27 I Crop ...	8.63	442	22,206	13,965	8241
II Crop ...	9.50	366	25,555	13,870	11685
1927-28 I Crop ...	8.53	328	24,146	13,965	10181
II Crop ...	9.50	400	26,648	13,870	12778

The notion that the methods suggested by the Department are costly and the fear that was lurking in the minds of many that the methods adopted may tend to deplete the soil of its permanent fertility has been corrected by the progressively higher yields obtained ever since this block of land was taken by the society and cultivated under the guidance of the Department.

Apart from doing demonstration work the Society has also acted as seedsmen and dealers in manures of proved value and improved implements. In the first year of its existence the society distributed nearly 9375 lb of seed, in the second year 4690 lb and in the third year 14,500 lb.

The reputation of the society as a supplier of good seed has spread to the neighbouring taluks of Trichinopoly and Tanjore and enquires are pouring in.

The society took up the work of stocking and distributing manures seriously only in 1926-27 and the following table gives the quantity sold during the three years of its existence:—

Manures.	1925-26 Lb.	1926-27 Lb.	1927-28 Lb.	Value Rs.
Bone-meal	... 10,192	15,680	...	...
Concentrated Super-phosphate	... 672	21,280	98,628	9,010
Ordinary superphosphate	... 160	1,256	22,336	1,477
Ammonium sulphate	... 10	31,600	319,592	31,203
Sodium nitrate	... 112	606	2,709	172
Potassium sulphate		112	...	...
Potassium chloride		125	168	14
Coconut manure mixture	... 2,240	...	...	...

It has gone a step further this year and has taken up the Agency of Messrs. Brunner Mond and Co., with a view to secure to its members and to the general public the manure at as cheap a rate as possible.

The society intends adding another important item of work to its function. It has applied to Messrs. Kirloskar Brothers, Ltd., for the agency for selling their improved ploughs and other implements and it has also resolved to maintain a breeding bull.

I have put before you briefly an account of the work done by the Co-operative Agricultural Society and I leave it to you to judge whether it is or is not fulfilling the object with which it was started. Personally I am convinced that even if three demonstrators had been posted to this sub-circle of Lalgudi the propaganda work turned out by the society could not have been done.

Having started with 36 members with a share capital of Rs. 305 the society has now on the roll 89 members and a share capital of Rs. 1100. The Society has a substantial reserve fund of Rs. 2000. It has been able to engage a clerk and a trained head cooly.

True it is that during its infancy the society depended much on the agricultural department for help and guidance. But now I am confident that the society is able to stand on its own legs with only occasional advice. Time is not far when this society will be able to secure the services of a B. Sc. Ag. and will stand as a training ground for the students of this College.

After the model of Lalgudy Sivagnanam Co-operative Agricultural Society, six more societies have been started in the Fifth Circle—one of them bears the name of our popular Director of Agriculture Mr. Anstead. Except one or two all others are functioning fairly well.

Before concluding this paper, I wish to acknowledge publicly the hearty co-operation evinced by the President Mr. Meenakshisundaram Mudaliar and the other managing Directors of the Society. They had full confidence in my suggestions and followed them very closely.

The successful working of the society is also due in a very large measure to the timely visits of the Director of Agriculture and his encouraging words and sound suggestions.

Botany of some useful Plants.—Part V.

By. T. S. RAMAKRISHNAN M. A. AND S. N. CHANDASEKHAR M. A.

Anonaceae.

This is chiefly a tropical order and comprises trees and shrubs several of them being aromatic. Some are climbers. The leaves are simple, alternate distichous, exstipulate and entire. The flowers are hermaphrodite or rarely unisexual and sometimes very fragrant. The calyx consists of three small valvate sepals mostly free or rarely united. There are usually six thick and fleshy petals arranged in two whorls of 3 each, the inner whorl being sometimes absent, hypogynous and valvate or vaguely imbricate. The stamens are indefinite in number arranged in many series on a thickened torus, the filament being short or absent; the anthers are two celled and adnate dehiscing by longitudinal slits; the connective is usually prolonged into a dilated hood-like structure above the anther. The pistil consists of one or more carpels mostly apocarpous very rarely syncarpous with distinct or united stigmas; the style is short or absent. Each carpel contains one or more ovules. The fruit is a berry. The seeds are provided with a ruminate endosperm.

One of the economically important genera of this family is *Anona* and this is a native of tropical America. Three species of this are cultivated in India.

Anona squamosa.—The custard apple (Tam. Seethapazham) is common throughout India and is grown in the vicinity of dwellings or in small groups in orchards. The fruits come into the market during the greater part of the year. It is a semi-deciduous small sized tree.

The leaves are alternate distichous, oblong lanceolate, obtuse to subacute, glabrous above and glaucous beneath. The flowers are axillary and borne singly or in clusters of two to four, and bracteate with minute bracts at the base of the pedicels. The sepals are free, three in number and green. The corolla consists of three valvate thick petals, triangular in transverse section and concave at the base. Sometimes an inner whorl of 3 minute petals may be present. Numerous stamens are arranged closely round the base of the enlarged torus. The ovary is apocarpous in the flower, but in the fruit the carpels are fused. The fruit is globose or heartshaped and yellowish-green with a bloom on the surface. The surface is tuberculate

and the pulp is white, custard like (hence the name) and sweet when ripe. Each carpel usually contains a brown seed.

The plants are grown chiefly for the sake of the fruits which are much appreciated. In the West Indies it is stated that a kind of drink is prepared from the fruit. The leaves, roots and fruits are used variously in medicine. An inferior fibre is obtained from the bark. The seeds contain oil and resin and the latter is useful as an insecticide.

Anona reticulata.—The 'bullock's heart' (Tam. Ram Sita) is also cultivated all over India but to a lesser extent than the former species. It is a small sized tree slightly bigger than *A. squamosa* growing to a height of 20 to 25 feet. The young branches are tomentose.

The leaves are oblong lanceolate but larger than those of *A. squamosa*, 4 inches to 6 inches long, acute and the upper surface is glabrous while the lower is sparsely hairy; a larger number of veins are present than in *A. squamosa*. The flowers are borne in small clusters on the branchlets. The sepals are small. The corolla consists of 3 outer large oblong linear fleshy petals and 3 inner small scaly ones.

In this plant the fusion of the carpels in the fruit has proceeded to a greater extent than in *A. squamosa*. It is usually heart shaped but may be oval or conical and takes a long time to mature. The surface is smooth usually reddish brown or reddish yellow and with the characteristic rhomboidal areas. Seeds are smooth and blackish.

The fruits though bigger in size than custard apple are inferior in quality and much less appreciated.

Anona muricata.—The 'sour sop' is a medium-sized tree being slightly bigger than *A. reticulata* and is less commonly cultivated. The leaves are only as big as those of *A. squamosa* two to four inches long, but are paler and more leathery; the upper surface is glabrous and the under, pubescent. The flowers occur in the axils and are very large and yellowish in colour. There are 3 small valvate sepals. The corolla is made up of six large petals in two whorls of 3 each; the outer petals are fleshy and bigger, ovate-acuminate and valvate; the inner 3 are somewhat smaller than the outer ones and are ovate, concave and overlapping. The fruit is large and provided with a number of spinulose outgrowths and is sweet when ripe.

NYMPHAEACEAE.

This is a small family; common in temperate and tropical regions all over the world and consists of perennial aquatic herbs. The stem is a submerged rhizome. The leaves are usually floating or raised above water on long petioles, sometimes large and broad, peltate, involute and the shape varies from cordate to orbicular. The flowers are solitary, large and showy, floating or raised above water and borne on elongated axillary peduncles. The calyx consists of 3 to 5 or numerous free petals. The stamens are numerous borne on a fleshy torus and generally free and hypogynous but rarely adnate to a fleshy disc enveloping the carpels. In the flower is often exhibited a gradual transition from the sepals to the petals and from the petals to the stamens. The connective is often well developed. The carpels are 3 or more in number remaining free or embedded in a fleshy disc or fused into a many-celled ovary. In the latter the styles are often united into a disc with radiating stigmas and in the case of free carpels the styles are free and short. Each carpel contains one or more ovules which are pendulous or attached to the inner surface of the carpels. The seeds are sometimes albuminous and arillate and contain perisperm.

Nelumbium speciosum.—The sacred lotus (Tam. Tamarai) is a native of tropical Asia and occurs in China, Japan, Egypt and Australia. It is commonly found in tanks all over India.

It is a large aquatic herb growing in shallow water with a well developed creeping horizontal rhizome (also termed root-stock) with adventitious roots produced from the nodes. The stem is traversed by a number of air cavities. The leaves are orbicular and concave borne on long stalks; the upper surface is dark green in colour and the lower is often light violet. The flowers are of various colours being rose, yellow or white. The flowers open at sunrise and close at sunset and is named by the Hindus as the 'friend of Sun'.

The calyx is represented by four or five free more or less petaloid sepals. The petals are free and numerous. The stamens are indefinite, free hypogynous and the connective is prolonged above the another. The carpels are many and free and sunk in pits on the upper surface of a top shaped receptacle, lying loose in the cavities. Each carpel contains one pendulous ovule. The style is short and the stigma is terminal and peltate. The pericarp

is smooth and hard with the ovule filling up the carpel. The seeds are exendospermous with fleshy cotyledons and spongy testa.

It is held in great esteem by the Hindus and the flowers are largely used in religious observances (pujas). The root stock and the lower portions of the petioles are collected in large quantities, washed and cut into small pieces. These are then boiled with a little salt and sun dried and used later on in the preparation of soups or fried in oil and consumed. The carpels, the young torus and the young seeds are edible. The different parts of the plant are also used for medicinal purposes. The root stock is used in cases of dysentery and dyspepsia and in some fevers. The seeds form a cooling medicine for skin diseases and leprosy and are also believed to be an antidote against certain poisons. The stamens are employed in piles. The seeds are also used as beads for rosaries. The leaves take the place of plantain leaves in Indian households.

CRUCIFERAE.

It is a fairly large order being more represented in the cooler and temperate regions of the old world. Several members of this family are cultivated, some as vegetables and others for the sake of the oil contained in the seed. Most of them are herbs being rich in pungent or acrid juices. The leaves are exstipulate, radical or cauline and alternate. The inflorescence is generally terminal or axillary and racemose. The flowers are ebracteate and cruciform. There are four sepals in two series, imbricate in bud, two of them being sometimes of a larger size and saccate. The corolla is cruciform with four clawed petals in one series and imbricate. Six stamens are present arranged in two series and tetradynamous, the outer series consisting of two lateral stamens and the inner of four longer ones, 2 placed anteriorly and 2 posteriorly. There is a prominent disc made up of four glands placed opposite the sepals. There are different explanations regarding the arrangement and number of the stamens. One theory is that the two pairs of long stamens have resulted out of chorisis or division during development of originally 2 single-stamens. Another view is that the glands represent a whorl of modified stamens. The ovary is superior, 2 carpelled and usually two-celled on account of the development of a false septum connecting the two parietal placentas. The style is short or absent, with a two-lobed stigma. Many ovules are present.

The fruit is a silique dehiscing by means of two valves leaving the seeds attached to the replum. The seeds are exalbuminous but the reserve food materials in the embryo often contain oil.

In this family cross pollination is brought about by insects but self-pollination is also common.

Brassica.—This is a very important genus of the family and includes a number of economic plants. It contains about 100 species and is widely distributed in the temperate regions. The cabbages, turnips and mustards come under this genus. Most of the plants are herbs with a well developed tap root which in some cases becomes tuberous and fleshy. The leaves are large and much divided or rarely entire. The flowers develop in elongated racemes and are mostly yellow in colour. The lateral sepals are often saccate at the base. The fruits are elongated rounded or angular and provided with an indehiscent one seeded beak at the end. The valves are convex and one to three-nerved. The stigma is truncate or two-lobed. The seeds are rounded or compressed and arranged in one series.

Brassica juncea.—The Indian Mustard (Tam. Kadugu) is cultivated throughout India and is also found run wild in many places. Several varieties exist differing in the size of the plant. In certain localities it is grown as a subordinate crop or along the borders of the fields. In other places it is often met with as a garden crop and confined to small areas. It is a tall, herbaceous erect, branching annual varying in height from 2 to 5 feet.

The stem is glaucous. The leaves are glabrous and of 2 sorts; the lower ones are very large, petiolate and pinnatifid with a terminal big lobe (lyrate) while the upper ones are smaller, sessile, lanceolate and toothed. The flowers are borne in terminal or axillary racemes and are bright yellow in colour. The fruit is a silique, slightly compressed, and about an inch in length with a slightly beaded appearance. A straight seedless beak is present. The seeds are round, small and black or dark brown in colour.

The seed is largely employed as a condiment for flavouring curries. Some people fry the seeds in oil and add it on to the food preparations while others use it in the powdered form. The seeds contain an oil. In Northern India mustard oil is largely used in cooking, for lighting and for anointing the body and more or less it takes the place of gingely oil of the South. The older leaves are given to cattle, while very young leaves are by some

used as a potherb. The seed is used for various medicinal purposes. It is externally applied in the form of a poultice to relieve inflammation and also in neuralgic and rheumatic affections. It acts as a digestive or emetic. The oil is also used in medicine.

Mention may be made of two other kinds of mustards *Brassica nigra* (black) and *Brassica alba* (white). These are very rare in South India but are cultivated in some parts of Upper India and compared to the Indian mustard, their cultivation is very limited.

Brassica nigra, the black mustard, is about 2 to 7 feet in height with a hispid stem. The lower leaves are petiolate and pinnatisect (lyrate) while the upper ones are entire. The fruits are shorter than those of Indian mustard and cylindrical with a more or less beaded appearance.

Brassica alba, the white mustard, is much allied to the others but differs from *B. nigra* in the more hairy nature of the whole plant. The leaves are all petiolate. The fruits are longer with a longer beak and are hirsute. The seeds are larger and lighter coloured. These two kinds of mustards are also used for the same purposes as the Indian mustard.

Brassica oleracea.—Under this name are included the wild cabbage and the cultivated cabbage with its different varieties. Cabbage has given rise to various fixed forms or mutants and the different parts of the shoot have been variously modified by man in cultivation to serve his needs. The different varieties could be easily distinguished only beyond a certain stage during their growth, while the seeds and the seedlings are similar. The differences are exhibited in the vegetative shoots and in the inflorescences. In Madras the cultivation of these is confined to hill stations and cooler areas.

The varieties are mostly biennial with a stout stem and not more than 2½ feet in height. The lower leaves are large, obovate with lobed or entire margins and glaucous. The upper leaves are smaller and usually sessile. The flowers are borne on long racemes and are pale yellow in colour. The fruits are 2 to 3 inches long and project outwards. The various forms which are all included under the term 'English Vegetables' are:—

1. *B. oleracea* form *capitata*.—This is the cabbage proper. Cabbages are grown on hill stations and also in the cooler

upland districts. The stem remains short. The upper leaves and the terminal bud develop into a globose or compressed head, consisting of close-set overlapping leaves. The head is developed during the first year of its growth. The lower leaves however do not take part in the formation of the head. The upper leaves are mostly crumpled.

This vegetable though grown on the hills is in great demand in most of the towns in the plains. The 'head' is cooked in a variety of ways. The lower leaves are also consumed by the poorer people. As a stock feed it is much valued. Of late the demand for cabbages is on the increase since they have been known to be rich in several kinds of vitamins.

2. *B. oleracea* form *botrytis*. Under this are included the cauliflower and the Broccoli. Just like cabbage this is also confined to hill stations. Here the axis of the inflorescence is very much shortened and the several branches and the terminal portion of the main axis become fleshy and thick. The floral parts are poorly developed. When young the whole inflorescence forms a compact whitish mass, often many inches in diameter and subtended by the lower leaves. The tender forms are known as cauliflower and the hardier ones as broccoli. The lower leaves are tied over the head in order that the edible portion may remain white and not become browned by the sun. The flower head is cooked as vegetable and is more relished than the cabbage. The lower leaves which resemble those of the cabbage are used for food by the poorer people.

3. *B. oleracea* form *gemmifera*. This is the Brussels sprout. In this an erect elongated stem is present. From the main axis numerous axillary branches develop but these instead of spreading or branching out become rounded and compact resembling miniature cabbages. These buds are 1–2 inches in diameter and the leaves enclosing them are much crumpled.

In South India this is found exclusively on hill stations. It is more tender than the cabbage but is cooked like cabbage. Sometimes soups are made by using whole buds without slicing them.

4. *B. oleracea* form *gongylodes* or *caulorapa*. This is commonly known as knolkhol or kohlrabi or sometimes as 'turnip-rooted cabbage.' The plants in this form remain short. The

portion of the stem above the cotyledons is short and becomes much swollen and fleshy. On this are borne several petiolate leaves and the scars of the leaves are left on the swollen stem. Different forms exist varying in the colour and shape of the plants, purple and white stemmed types being the principal ones. This is able to resist drought better than the other varieties.

It is also grown on the hills but can be cultivated on the plains in some districts especially during the cold weather. The swollen stem is sliced and used in the preparation of soups or curries. As a stock feed it is valuable.

Brassica campestris.—Under this name are included the turnips, the rape, and the swedish turnips. These are described by some as varieties of *B. campestris*. The Swedish turnip is named as *B. campestris* proper, the common turnip as *B. campestris* var. *rapa* and the rape as *B. campestris* var. *napus*. But recently these three have been described as separate species, the varietal names being used to distinguish the species.

Brassica rapa. The common turnip included under the term 'English vegetable' is cultivated in South India on the hills or during the cold season in some districts in the plains. There are several varieties differing in the shape and the colour of the flesh of the roots.

It is a herbaceous biennial. During the first year a swollen tuberous fleshy tap root develops. The 'turnip' of the market consists of the swollen tap root and the enlarged hypocotyl. A rosette of leaves develops from the top of this during the first season. These leaves are large, pinnatifid and hairy. During the second season a central branched stem develops. On this are borne smaller entire or slightly toothed smooth and glaucous leaves. The stem and its branches terminate in clusters of flowers. The inflorescence is at first corymbose but later the axis elongates becoming a raceme. The flowers are bright yellow in colour and the petals are shed before the corymb elongates. The silique is $1\frac{1}{2}$ to 2 inches long and has a short beak. The seeds are reddish brown and round.

The tuberous roots are cooked and used as vegetable. Some varieties are coarse while others are fine. The finer varieties are used as food by man while the coarser ones are used as stock-feed.

Brassica campestris.—The swedish turnip resembles closely the common turnip. This also possesses a tuberous swollen root but a short stem or neck is present on the upper part of the swollen structure. The leaves are glaucous; the lower ones are large petiolate, lyrate and hispid while the upper ones are smaller and glabrous. The flowers are yellow and larger than those of *B. rapa* and the petals remain attached till the corymb elongates. The siliques are 2 to 3 inches long and the seeds are larger than those of the common turnip.

The swollen roots are used for the same purposes as the common turnip. The flesh is said to be firmer and more nutritious.

Brassica napus. The rape or coleseed of which there are different varieties is largely cultivated in Northern India. It is a biennial growing to height of 2 to 3 feet. There is no swollen root but sometimes a fusiform root may be present. The stem is much branched. The lower leaves are lyrate while the upper ones are entire; all the leaves are glaucous and glabrous. The flowers are yellow and the petals fall off before the corymb elongates. The seeds are dark purple in colour.

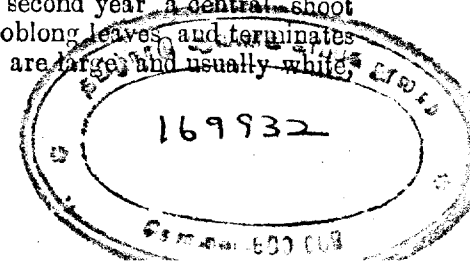
The young plants at the end of the first season are cut and given to sheep. The seed contains an oil which is extracted and largely used in Upper India for cooking and lighting purposes. The oil is inferior to mustard oil. The oil cake is sometimes used as stock-feed.

Raphanus sativus. The radish (Tam. Mullangi) is grown extensively all over India as a vegetable in kitchen gardens, both on the plains and on hill stations. Many varieties are present.

It is a herbaceous biennial but since the plant is grown for the sake of the root, it is removed during the first year of its growth. Those which are kept for seed purposes are of course left over and the seed is gathered in the second year.

The tap root is swollen and fleshy, more or less conical and whitish in colour with 2 rows of lateral roots. The stem is very much condensed and from the crown of the swollen portion (made up of the root and the hypocotyl) a rosette of leaves (radical) springs up during the first year. The leaves are large, petiolate, and pinnatifid (lyrate). During the second year a central shoot elongates with a number of smaller, oblong leaves and terminates in elongated racemes. The flowers are large and usually white.

3, 8, 12, 11, 11, 13
M 28



and of the mustard type. The sepals are erect and the lateral ones are saccate at the base. The fruits are about 2 inches long, slightly beaded in appearance, with a long tapering beak and with 2 or 3 seeds which are surrounded by pithy tissue. The seeds are yellow and globose.

The cotyledons are epigeal and persist as green leaf-like structures for a long time.

The root is the important part of the plant and is made use of as vegetable in various ways. It develops a peculiar flavour and is not liked by some people. The leaves are sometimes used as pot-herb by poorer classes and as fodder for cattle. The roots, leaves and seeds have various medicinal properties.

EXTRACTS.

Principles and Promise of the Co-operative Movement.

BY K. T. PAUL.

(Continued from September issue).

NOT MERELY DESIRABLE BUT INDISPENSABLE.

Let us then take to heart the truth that Co-operation is not merely a method among methods, preferable because it makes for peace and good will, or desirable because it is a kind of philanthropy which brings something to your pocket instead of taking everything away from it. Co-operation is not a mere method, nor is it a kind of philanthropy. It is an essential principle of Man, for Man is a social animal and therefore the Human Personality cannot possibly express itself normally except in terms of social relationships. What is Man apart from society? If he is opposed to society, he is a wild devouring beast. If he is completely isolated from society, he is a 'freak of Nature' outside our consideration. Man, normal Man, is a son, a brother, a member of a family, a citizen of village or a town or a state, with definite relationships to others. And inasmuch as all the problems with which Man is concerned pertain to his social situation, the principle of Co-operation must be taken as one of the masterkeys which Man has discovered in regard to all his problems.

THE INTER-COMMUNAL SITUATION.

And herein lies the promise for the future. Let us now turn to some of the problems which are challenging us in India today. First comes to our mind the tragic fact of the Inter-Communal situation. It is a foolish illusion to imagine that this national evil is confined to any religious antipathies between Hindus and Moslems. The evil is much more serious than even that. It is fundamentally due to economic maladjustments. For centuries the economic solvency of the individual was substantially guaranteed by the obligations implied in Caste or Communal solidarity, each caste or community in a given area operating practically as a trade guild. With the advent of Western ideas the individual has asserted his right to qualify to any line of livelihood irrespective of his caste or community. In asserting his economic independence he has necessarily lost also the economic protection of his group. So long as the number of such individual rebels was small, i. e., not larger than the demand for such in their profession and be it

remembered, so long as the distribution of the plums and prunes was in the hands of a foreign neutral agency, everything was peace. But two things have happened in recent times: On the one hand there is over-production of trained men relative to the demand in the country and on the other hand, patronage has passed substantially into the hands of the Indians. The result is a desperate attempt to secure something of the old communal protection, for there still remains undoubtedly a strong sentiment of social affinity even though the economic unity has passed away. And so everyone strives to put his "own man" into power or influence. It is instinctively assumed that one's own man is better, in eventualities, than a stranger. The resulting scramble is pathetic. It is really a travail of economic adjustment.

THE DISINTEGRATION OF THE CASTE SYSTEM.

But in India there can be no economic readjustment except with a concurrent social reconstruction. The ancient system of Caste has begun to disintegrate. As a social system it has lost its effective and exclusive rigidity. With the weakening of its religious and social sanctions its economic power is going rapidly overboard. Why is it so? The reason is not far to seek. Within the Caste the ethical-principles of Co-operation prevailed. Each was for All and All was for Each. But as between Caste and Caste there was no Co-operative principle. It was rather the Competition principle which operated between Caste and Caste. In pre-British times when the relative scale of Caste and communities was accepted as natural and inevitable; the Body Politique as a whole worked together in peaceful articulation, even communities alien to the Hindu tradition agreeing to take a suitable place corporately, in the socio-economic scheme of the country. But the arrival of the West and the consequent upsetting of the sanctions of antiquity has brought into sharp relief the state of competition between Caste and Caste; Community and Community in the race for the opportunities for power and wealth.

PLUTOCRACY INSTEAD OF DEMOCRACY.

The intercommunal competition is not seen at its worst in the infrequent out breaks here and there where heads are broken. The tragedy is most poignant in two points which do not furnish headlines to the newspapers. Firstly, in the Unemployment situation which causes a tremendous national waste of many thousands of trained human material. Secondly, in Local Self-

Government, where public funds are being wasted in scandalous inefficiency. Rude individualism riding rampant in vanity and pride is inevitably betraying the country to shameless Plutocracy. We bewailed our lot under Bureaucracy. Bureaucracy was at least conscientiously efficient; and whenever imagination and sympathetic understanding were available the administration was beneficent and constructive Plutocracy is an abandoned and unrelieved curse. Specially so when Plutocracy has not the risks which attend the responsibility for law and order, but is itself well protected as all vested interests are bound to be by the strong arm of the State.

COMPETITION NOT ENOUGH.

For all these problems which are not far-fetched but are with us by the day and the hour, we can never get the solution until we realise that Competition is not enough. There was a time when we all swore by Patriotism. Then the Great War came and we learnt that when Patriotism was allowed to run away with itself, it could lead to only one result the eventual suicide of the entire human race. "Patriotism is not enough," and the safety of Man and his uninterrupted progress is possible only in terms of Co-operation among the Nations. Only when Each Nation is for All Nations and All Nations are for Each Nation is there any chance for Mankind as a whole and for Each Nation within it to arrive at its own. The League of Nations is terribly imperfect and it has still a very long way to go before it can be acceptable to us of the Orient. But such as it is, the achievements it has already accomplished, especially in regard to the Minorities within the sovereign States in Europe, are magnificent, for they have been accomplished not through any sanctions of international public opinion. The League is an earnest of that great age of the future when the principle of Co-operation will determine the affairs of the Nations, one towards another, in interdependence and mutual undertaking.

CREATIVE REMEDIES.

So also in the great and complex task of building Jerusalem in the fair land of India, it is wisdom not merely to apply specific remedies to specific diseases but even more to launch on courageous enterprises of every sort which are positive and 'creative'. Every tiny co-operative society faithfully conducted on truly co-operative principles is contributing a live stone, however inconspicuous, to the real foundations of a new and more glorious India.

Every application of the co-operative principle to the economic affairs as between groups and communities in the smallest of of villages and towns is an unerring contribution to the solution of our most tragic of our national problems. Every time a co-operative society or village panchayat, for that matter, engages in education, arbitration, sanitation, or any other line of common well-being not strictly economic, a real score is made in the re-establishment of true neighbourly *dharma* in our Motherland. These and such build the solid foundations of a Nation, for Righteousness alone establishes a Nation, and these are all ethic activities. Something like 90 per cent of our people are rural. Imagine all our 700,000 villages organised on co-operative lines for all their needs, will not then everything else inevitably right itself in line with such a basis?

ALL ALONG THE LINE.

But we need not wait for all the rural foundations to be built in first. Nothing need deter us from applying the principle of Co-operation to any of those other problems which are not strictly rural. As we all know, there are innumerable opportunities afforded by the conditions in Urban and Industrial communities for co operative organisation. Only let us remember two psychological facts. The fiscal lever is the most effective lever in social organisation and therefore we are dead right in placing the economic and even the banking aspect of co-operation as the primary requisite in Co operation. But that truth has to be seriously qualified immediately by an equally potent truth. The economic lever is no more than a lever. Social Re-organisation, as social re-organisation, can come to happen only in the course of what is commonly called non-credit activities. The possibilities of these are absolutely unlimited. Take for example, the inter-communal situation which lies so heavily on all our hearts. I know of a village in South India where the number of cases settled by arbitration by the Co-operative Panchayat amounts to hundreds in three short years. These cases were not by any means all of them or even most of them between Hindus and Moslems. I am speaking from similar personal knowledge when I report that the color problem in the United States is steadily yielding to the pressure of such small local panchayats which in that country are called "The Local Committee on Inter-racial Co-operation." I also have it on the highest authority possible that similar panchayats are now being organised in South Africa to arbitrate between

the Whites and the Africans and that desire is being expressed for a similar activity to clear the issues common to the Whites, the Africans and the Indians in that desperately sad situation. Here is a most promising opportunity for Co-operation to serve in a national calamity. Every village and town in India should have special Co-operative Panchayats devoting themselves to the work between groups, between castes and between communities. The principle of "Each for All and All for Each" should be lifted to cover "Each community for All the Communities and All the Communities for each Community." And this service could be pushed on to the highest possible level. The League of Nations has, for example, a "Committee on Intellectual Co-operation." India has not yet participated in it beyond appointing one representative at Paris. It is high time that India should engage in similar work within its own borders. Happily there are many Arts and Crafts which are common to all the communities in India, and there are more of them which make the communities inter-dependent. Music, painting, and in some of the great languages like Urdu and Tamil the Literature—these are common to the Hindus, Moslems and all else in India. Then there are others like architecture, in regard to which there has been free borrowing and which might be guided to become common achievements. Our Universities and the more leading colleges ought now to devote special attention to activities which will promote the co-operation of the communities in such common cultural interests. And there should be patriotic organisations, national and in local centres, to study, to improve, to popularise and frankly to magnify such inheritances which are common to all the nation.

FELLOWSHIP IN SERVICE.

Most potent of all is the experience acquired in the fellowship which men and women have when they engage in common service for suffering humanity. Lift up your eyes and look over vast India. Is there a corner anywhere in our mighty cities or in our tiny hamlets which does not call out in imploring terms of humanitarian service? In such service let us deliberately yoke together people of different communities. Bring to it the potency and efficiency of co-operative organisation and the redemption of India economically, socially, politically and in every way will then be an inevitable sequence as Day dawns on the longest and weariest of Nights.

"Hold aloft the light and stand firm to the post,
Till all wandering souls have reached their goal in safety.
Service brings strength and renewed life,
Love cures all weariness.
And Faith, the shining jewel of life performs all miracles."
So writes Swami Paramananda from his rich world-wide experience.

Turn to the Bhagavat Gita and you will find this:
The self-subjugated Truth-seers whose impurities are washed off, whose doubts are destroyed, and who are engaged in in doing good to all beings, attain supreme liberation."

Listen to the words of my Master:
"Whoever wants to be first among you must be your slave:
Just as the Son of Man has come not to be served but to serve.
And to give even His life as a ransom for many."

NOTES

Vegetable carbons and Canemolasses: The alcoholic fermentation of molasses solutions can be greatly accelerated by the addition of small quantities of vegetable carbons. The accelerating effect of these substances, while quite pronounced in solutions of ordinary density, is specially so in those of higher density. This acceleration appears to be partly due to the more rapid liberation of CO_2 in the presence of carbons but the increased rate of the reduction of the acetaldehyde to alcohol on the carbon surfaces seems to play an important part, and also the stimulating effect of the carbon on the cell-development on the yeast stimulating effect of the carbon on the cell development of the yeast is partly attributable to the absorption of toxic substances from the medium.

The very small amounts of vegetable carbons that are required to produce the accelerating effect upon fermentation suggest catalytic action, and the fact that substances carrying positive charges are more active in this capacity than negatively charged colloids indicates that the nature of the charge carried is of significance in this connection. Since the fermentation of some of the hexose sugars is accelerated to a greater extent than others by the presence of carbons, some action between these substances and

the sugars themselves is indicated. A prior filtration of the molasses through carbon tends to prevent any acceleration of fermentation of the former when subsequently treated by the latter. The accelerating action of carbons appears to be relatively greater under conditions where the H-ion concentration is low than where it is nearer the optimum for fermentation.—"Facts about Sugar," 29th September 1928. Y. R. R.

Cheap Fuel Alcohol.—Several processes have recently been proposed for making synthetic alcohol says the "Petroleum Times." In the French process known as the Prodor, wood-cellulose is converted into sugar (glucose) by the employment of acids, and glucose into alcohol by fermentation. The particular feature of the Prodor process is that, contrary to previous practice where hot diluted acids were used, cold concentrated acids are used, effecting a complete conversion of the cellulose to glucose in a form which is fermentable. Instead of 7 litres of alcohol per 100 kilos. of wood, the yield is about 25 litres of 100 % alcohol.

Hydrochloric acid is used because it can be recovered from the solution by distillation and used over and over again indefinitely. Sulphuric acid cannot be recovered. Practically any kind of wood can be used provided it is cut into pieces small enough to be readily acted upon by the acid. The process is still in the development stage. One feature of the process is that the glucose can be stored without deteriorating until the alcohol is required.

The other process has been invented by Doctor Bergius, of coal-liquefaction fame, and is controlled by the International Sugar and Alcohol Co. with a plant at Vernier, near Geneva, Switzerland. No detail of this process is available, but it does not seem to differ much from the Prodor process.—(The "Mechanical World and Engineering Record" August 31, 1928). Y. R. R.

A challenge to Mendelians: J. P. Foster in reviewing the subject of mutability in the light of the primary law of heredity which involves a review of Mendelism, gives extensive references to the recent work of Muller, on Mutations induced in the vinegar fly by X-rays and to the work of Godspeed, Olson and others on mutations induced by irradiations of plants and discusses the possibility of obtaining useful results from similar methods of creating new varieties of sugar-cane. Work of this nature involving radiation of buds as well as the tassels of sugar-cane has already been studied in Hawaii and should prove instructive.

("Facts About Sugar", 6th Oct. 1928).

The "combine" or the Harvester-Thresher. For harvesting and threshing in one operation, this machine seems to be the latest in the realm of agricultural machinery. Tests have just been carried out in England officially and the report is eagerly awaited especially by those who cultivate extensive areas. Curiously such a machine is suited to the needs of only the big farmer having extensive areas under cereals in plain country. Plain country, because, the Combine ordinarily does not work satisfactorily in undulated tracts. It has been made in America and is said to be particularly suited to the needs of big farms in that continent, South Africa and Australia. We cannot say that this may not suit Indian conditions also, as there are extensive tracts like the blacksoil tracts of the Deccan and the South, where this can be successfully tried. It is also said that there are special hill-side combines suited to hilly tracts also.

Under ideal conditions the harvester-thresher has returned "62 quarters of threshed and finely dressed grain as the tally of an eight-hour day" employing only three men. The cost of the machine is about £400.

In this connexion it is very interesting to note how South Australia was very enthusiastic about employing labour saving implements even as early as 1878. It seems in that year the Government appealed to the engineers to perfect a machine which could "combine within itself the various operations at the same time of reaping and cleaning and bagging on the field the various cereal crops of South Australia."

Dodging the Hunter.—North of New York, City, in Westchester country, farmers have painted their cows blue to protect them from amateur hunters who otherwise mistake them easily for deers and stalk them. Every year till now, several hundreds have been killed in this manner. Painting them cryptically, i. e., with such a colour as to make it blue with that of the natural surroundings, proved also useless. Blue is being tried and we hope they will be successful in preventing innocent animals being killed for no fault of their own.

Women Students of Agriculture.—It is learnt that the Agricultural College at Sutton Bonington has been recently extended to accommodate an increasing number of women students. It is interesting to see how this college has become famous due to a certain incident connected with the War. During the war period

this college was utilised as a prison for captured Germans and Capt. Von Muller of Emden fame was one of them. Some of them including Muller attempted to escape by digging a tunnel and using their pillow cases to remove the soil. They removed about 15 tons of soil in this way though ultimately they were caught. "Now they are teaching at the college, the movement of the soil by something much more substantial than pillow cases."

The Madras University Commission.—In accordance with the provision made in the Patro Education Act of 1923, the Madras University appointed a Commission to inspect the Agricultural College and submit a report. The Commission was composed of Dr. L. C. Coleman (Director of Agriculture, Mysore), Dr. N. Kunjan Pillai (Director of Agriculture Travancore), Mr. I. Raman Menon (Superintendent of Agriculture Cochin) Mr. V. Krishnamurthi Ayyar (Vice-Principal, Madras Veterinary College) and Mr. K. Ramunni Menon, (Vice-Chancellor, Madras University). The Vice-Chancellor could not make a visit until the 20th but the other members arrived on the 15th and spent that day and the next in going round the teaching departments, meeting the lecturers and seeing students at work. They were entertained at "Tea" by the Principal, the Vice Principal and lecturers and dispersed on the 16th afternoon. Dr. Kunjan Pillai however stayed a day longer visiting the Imperial Canebreeding Station.

STUDENTS' ACTIVITIES

This time the agricultural tour was projected into the northernmost reach of this Presidency—Ganjam, Vizag and other Circar districts.

After the Michaelmes vacation, class III students and lecturers met on the 1st of October at Berhampore in Ganjam. Here the students could study a number of weeds and local flora with the help of Mr. P. S. Jivanna Rao, Lecturer in Botany. At Aska a detailed study was made of local agricultural conditions in regard to sugarcane, paddy, ragi and vegetable crops. The interesting system of nursery for canes locally known as "Gonda Manji" was gone into in detail. The Aska Sugar Factory—the first to be started in the south and the only one working on the diffusion system was visited and the present proprietor Mr. Gopinath Saha was kind enough to show the party round and explain the working. This town boasts of a High school where agriculture is taught in S. S. L. C. class and is handled by a diplomate of the Nagpur Agricultural College.

At Golanthra, 7 miles away from Berhampore the cultivation of the Betelvine crop was studied. The party next halted at the picturesque little town of Mandasa—the residence of the Zamindar of that name. The Rajah Sahib is a keen sportsman by whose gun many a man-eater has been brought down and the trophies in the palace were emulating and embodied accounts of a thrilling character. The small estate is fertile and self-contained. It is surrounded on three sides by hills on the East by the Bay of Bengal. This Zamindari is well served by the stream of Mahendra tanaya; in the centre of the estate is located an extensive tract full of coconut gardens interspersed here and there by the jack, mango and other trees. Paddy and plantains grow here very luxuriantly. Ragi, redgram, castor and cowgram are found here. This little tract is called Udhiyanam or a garden which it really is. The students and party were the guests of the Rajah Sahib who is a great enthusiast in Agricultural improvements and takes personal interest in cultivating his own farms and gardens. In this work he is very ably assisted by his Dewan—Mahasayo R. K. Deo and his electrical and mechanical adviser Mr. Ramachandra Rao Naidu. After spending two useful days here the party left for Vizagapatam.

From here the interesting village of Yerada was visited and the permanent plantain areas were inspected. The Simhachalam hills near were next visited with a view to study the extensive pine apple cultivation and opportunity was availed of by a few to get into the famous Vishnu shrine built in the midst of a wonderfully wooded slope.

Leaving Vizag, the party halted at Anakapalle. At the Agricultural station, the farm authorities explained all details of cultivation and experiments and the students were treated to 'TEA' by Mr. Bapayya one of our old boys.

The next move was to Etikoppaka the proprietary estate of the Hon'ble Mr. C. V. S. Narasimha Raju Garu, under the care of his nephew Mr. Sudarsana Raju who is also one of our 'old Boys'. In this place Mr. Raju explained the cultivation of plantains, sugarcane and paddy and showed the party round the estate and gave us a rich dinner and tea. We left the place carrying very lively impressions of the tract. The heavy and unprecedented

floods which occurred later in the month are reported to have caused a good deal of damage to the very excellent crops. The sympathy of the whole party is extended to the ryots affected. Leaving Etikoppaka the party arrived at the Samalkota Government farm. All details of cultivation and experiments were studied with the help of the Manager Mr. Jogiraju, the local sugar factory and distilleries were also visited here. We next halted at Rajamundry from which we sallied across the Godavari at Dowleshwaram and the Lankas where tobacco is grown. Thence we proceeded to Guntur; while here opportunity was availed of to visit the Lam farm. The details of buffalo breeding and cultivation of cotton and of tobacco were taken note of.

Leaving Guntur the party entrained to Madras where they inspected the Adyar gardens. The Superintendent Mr. Jessawallah kindly explained various interesting items. The next day the 17th the party returned to the regular college life again.

Thus ended our informing and instructive fortnight's tour in one of the most interesting tracts of the presidency, and the thanks of the lecturers and students are due to various landlords and gentlemen and to the managers of the Government farms visited.

DEPARTMENTAL NOTIFICATIONS.

GAZETTED:—Mr. K. Gopalakrishna Raju, Assistant Director, extension of leave for 12 days from 13th November. Mr. V. Ramanatha Ayyar Assistant Cotton Specialist Koilpatti leave on average pay for one month from 23rd November.

NON-GAZETTED:—Appointments etc:—Mr. T. V. Balasubramanyam B. Ag., to be Upper subordinate Vth grade, on probation and posted to IV Circle.

~~LEAVE ETC:—~~

SECOND CIRCLE:—Mr. Balasubramania Ayyar, Cotton assistant, Guntur, leave on average pay for one month from 1st November.

THIRD CIRCLE:—Mr. N. Annaswamy, Manager, Hagari, leave on average pay for 12 days from 13th November.

FOURTH CIRCLE:—Mr. N. Lakshminarasimhaswami, Assistant demonstrator, leave on average pay for one month from 18th October.

SIXTH CIRCLE:—Mr. S. Bhimaraju, demonstrator, Sivakasi, extension of leave on average pay for one month and 15 days from 30th November.

SEVENTH CIRCLE:—Mr. P. Abdulla assistant demonstrator, extension of leave on average pay on medical certificate for 20 days. Mr. K. V. Sheno, demonstrator, Udipi, leave on average pay for 15 days from 12th November. Mr. A. P. Balakrishna Nayar, demonstrator, leave on average pay for 10 days from 20th November.

EIGHTH CIRCLE:—Mr. M. C. Krishnaswami Sarma assistant demonstrator extension of leave on average pay on medical certificate for 25 days from 19th October and leave on half-average pay not due for one month and 20 days in continuation. Mr. Dasappa Malli, assistant demonstrator, leave on average pay for one month from 5th November.

LIVE STOCK:—Mr. P. K. Krishnan Nambiyar, assistant manager, Hosur, leave on average pay for one month and 15 days from 8th November. Mr. A. K. Annaswami Ayyar, Manager, leave on average pay for 18 days from 5th November.

G.M's SECTION:—Mr. R. Narasimham, sub assistant leave on average pay for 3 months from 14th November.

G. S. B's SECTION:—Mr. J. David, Sub assistant, leave on average pay for 15 days from 16th November.

M. S's SECTION:—Mr. V. Gomathinayakam Pillai, assistant leave on average pay for 16 days from 19th November.

G. E's SECTION:—Mr. C. V. Sundaramayyar, assistant, leave on average pay on medical certificate for 21 days from 29th November.

G. A. C's SECTION:—Mr. G. Ganapathi Ayyar, assistant leave on average pay for 10 days from 11th November.

(v)

The "Agriculturist."

A TAMIL MONTHLY DEVOTED TO
AGRICULTURE AND ALLIED SUBJECTS.

Editor: Rao Bahadur J. Chelvaranga Raju.

Printer & Publisher: J. R. Ranga Raju, Saidapet, MADRAS.

Annual Subscription Rupee one post free.

The Journal of the
Mysore Agricultural & Experimental Union
BANGALORE.

Published Quarterly by an Expert Board of Editors.

Chief Editor—Dr. B. Narasimha Iyengar, B.A., Ph. D.,

Subscription Rs. 3 per annum.

The "Kamma Balan."

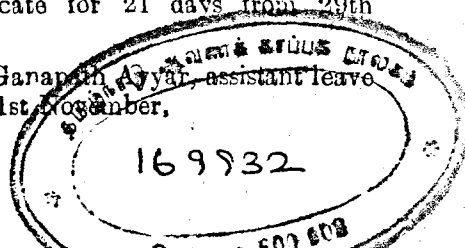
A Tamil Monthly Devoted to rural Problems

EDITOR AND PUBLISHER:—

R. VENKATASAMI NAIDU,

TIRUTANGAL (RAMNAD DISTRICT).

Annual Subscription Re. 1.



32
J. 8. 10. 2. 11. 11. 12.

(vi)

The Ramasastrulu-Munagala Prize 1929.

1. The Prize will be awarded in July 1929.
2. The Prize will be in the form of a Medal and will be awarded to the member of the Union who submits the best account, of original research or enquiry, carried out by him on any agricultural subject.
3. The subject matter shall not exceed in length twelve foolscap pages type-written on one side.
4. Intending competitors should notify the Secretary of the Madras Agricultural Students' Union not later than the 15th May the subject of the paper which they propose to submit and the paper should be sent in so as to reach the Secretary, Madras Agricultural Students' Union not later than the 1st June 1929, with a covering letter showing full name and address of the sender. The author's name should not be shown on the paper which should be entered under a *nom-de-plume*.
5. Four type written copies of the essays should be sent in.
6. The name of the successful competitor will be announced and the prize awarded at the time of the Conference.
7. The Union reserves to itself the right of publishing all or any of the papers.
8. All references in the paper to published books, reports or papers by other workers must be acknowledged.
9. Papers submitted will become the property of the Union.

Any further particulars may be obtained from the Secretary, Madras Agricultural Students' Union, Lawley Rd. P. O. Coimbatore.

The Cardamom Planter

A TAMIL MONTHLY

Organ of the Travancore Cardamom Planters' Association.

Editor and Publisher:—R. NARAYANASWAMI NAIDU,

Uthamapalayam, MADURA. (Dt).

Annual Subscription:—Inland Rs. 2.

OFFICE-BEARERS FOR 1928—29.

The Council (25 Members.)

President.

President (Ex-officio) Principal—C. Tadulingam F. L. S

Vice-Presidents (4)

Resident:—Rao Saheb Y. Ramachandra Rao.

Mofussil:—C. Ramaswami Nayadu, Guntur.

„ K. T. Alwa, Bellary.

„ G. Rajagopala Nayadu, Periapalayam.

„ K. Unnikrishna Menon, Tellicherry.

Members (20)

Resident: (10) M. C. Cherian, *Secretary*.

„ D. Srinivasa Rao, *Treasurer*.

„ V. Muthusami Ayyar, *Editor*.

„ R. Narasimha Ayyar, *Manager*.

„ C. S. Krishnaswami *Member*.

„ T. R. Naganatha Ayyar „

„ M. Rajagopala Ayyar „

„ M. V. Raghava Rao „

„ H. Shiva Rao „

„ U. Vittal Rao „

Mofussil: (10) D. Panakala Rao, (Samalkot).

„ R. Swami Rao, (Nandyal)

„ V. N. Subbannachar, (Bellary.)

„ S. Rama Rao, (Clittore).

„ C. S. Namasivayam Pillai, (Usilampatti.)

„ M. U. Vellodi, (Nileshwar).

„ V. S. Narayanaswami Ayyar (Salem).

„ V. G. Dhanakoti Raju, (Hosur.)

„ K. G. S. Bhandari (Ootacamund).

„ T. Paramanandam, (Anakapalle.)

Working Committee (14 Members).

The resident Vice-President and the ten resident members with the following student members form the Working Committee.

Student-Members (3)

C. Annamalai of class III

Kerala Varma „ II

K. Venugopal „ I

AUDITORS:—S. N. Venkataramanan.

C. V. Sankaranarayanan.

Editorial Board (as per resolution passed in July).

T. V. Rajagopalachari.

M. C. Cherian.

V. Muthuswami Ayyar,

P. N. Krishnan.

G. Renga Rao (Student).

S. V. Duraisami Ayyar.

THE JOURNAL
OF THE
Madras Agricultural Students' Union

PUBLISHED MONTHLY.

A Journal in English devoted to the study of improved agriculture. Contains articles of scientific as well as of general interest. Extracts and reviews from various Journals both Indian and Foreign a special feature.

Widely circulated and therefore an excellent medium of advertisement.

RATES.

SUBSCRIPTION:—		ANNUAL.		
For members, new associates and Patrons of the Union. Free.				
For others—	(Inland)	...	Rs. 4—0—0.	
Do.	(Foreign)	...	Rs. 4—8—0.	
ADVERTISEMENT:—		Per annum.		
	Single insertion.			
For full page	...	Rs. 5—0—0.	...	Rs. 20—0—0.
For half page	...	Rs. 3—0—0.	...	Rs. 12—0—0.
For quarter page	...	Rs. 2—0—0.	...	Rs. 8—0—0.

The rates of Advertisements of Trade, other than Agricultural subjects, will be one and a half times the above. Preparation of blocks, unless supplied by firms, extra.

N. B.—All advertisements are subject to the approval of the M. A. S. U. Working Committee before insertion, and the charges are payable in advance.

All business communications should be addressed to:—

THE MANAGER, M. A. S. U. JOURNAL,
AGRICULTURAL COLLEGE, LAWLEY ROAD P. O. COIMBATORE.

Printed at the Electric Printing Works, Tower Building, Coimbatore.