

Farming will never be a success unless the farmer
had more voice in the disposal of
his produce—P, Merrel.

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The Nineteenth College Day and Conference July 1929

Between the 9th and 13th of July—both days inclusive—the Madras Agricultural Students' Union once again brought to a successful conclusion its two important annual functions—the celebration of the College Day and the holding of the Agricultural Conference. The functions would not have been the success they were had it not been for the zealous and arduous labours, zeal and hard work not always unmixed with unpleasantness—of the different committees and the enthusiasm of the band of student volunteers. We offer our grateful thanks to one and all of the several ladies and gentlemen who have contributed, in so many directions, to the success of the festivities.

When it is remembered that the College Day week that has just now past was the nineteenth since the inauguration of the Union, mingled feelings of pride and

anxiety crowd our thoughts ; pride because, the infant of twenty years ago, nourished and tended with indefatigable zeal by our veterans—prominent among them being Mr. (now Rao Bahadur) M. R. Ramaswami Sivan—has passed through the stage of childhood and entered youthdom and anxiety for its future, for it can no longer expect from the public the same indulgence as in its infancy and its capacities for self-reliance, self-control and self-help will now be closely watched with a critical eye. We are, however, hopeful, that if given the chance and backed up by good will, the Union will be capable of blossoming into vigorous manhood.

The Union has this advantage. Thanks to the efforts of previous workers, the College Day week has come to be looked upon as an event of great importance in our activities. Its advent is looked forward to with great interest and excitement by the residents on the estate, and the members of the department in the districts as also by the general public. For resident members, it is surely a welcome change from the dull monotony of daily routine ; it provides opportunities for renewing old acquaintances and for making new ones ; for the mutual exchange of ideas among workers at the institute and in the districts ; for the display and discovery of new talent in the different lines of activities of the week and in general to maintain that feeling of fraternity which is so essential for the progress of communities or institutions. This is no small achievement to the credit of the union and if carefully nurtured, properly developed and vigorously sustained, still greater achievements are possible. Let us, therefore, work on and prosper.

The weather, in spite of its proverbial reputation for fickleness, proved very propitious to the Union's functions ; the cool cloudy mornings, the bright, fine days, and the delightfully cool evenings, added greatly to the comfort of the visitors and made every function really enjoyable.

Amidst all these rejoicings there was one sad thought that was oppressing everyone. It was of the circumstance that the central figures of our festivities, Mr. and Mrs. Anstead, were attending their last College Day and that

we would soon be missing them from our midst. Advantage of their presence at this time, was taken, by the members of the department and the students, in bidding them farewell. The great esteem in which Mr. and Mrs. Anstead have been held by one and all of the department and their popularity were evidenced by the many entertainments got up in their honour every day of their stay here.

The Ansteads have been the embodiments of courtesy, sympathy and kindness, and the Union owes them a deep debt of gratitude for all that they have done. We are sure we shall miss them very much in our future celebrations, and we take this opportunity of wishing them *bon voyage* and a happy life in their country.

This year, there was a slight departure from the usual order in which the different functions came off. The conference gained the precedence over the Athletic Sports, which in previous years used always to form the first big function.

The Conference:—The conference met in the spacious hall on the ground floor at 12 noon on Tuesday the 9th July with Prof. Gilbert J. Fowler, D. Sc., F. I. C., Principal, Technological Institute, Cawnpore as the president. It was so kind of Dr. Fowler to have been able to find time to come down to Coimbatore at great personal inconvenience and sacrifice, in the midst of his other duties. Among the visitors present were Messrs. E. F. Thomas, C. I. E., I. C. S., C. V. Venkatramana Iyengar, V. C. Vellingiri Gowndar, Rao Bahadur J. Chelvaranga Raju, A. V. Thirumuruganatham Pillai and N. Subramania Ayyar. Messages of congratulations and good wishes were received from Sir Frank Noyce, Raja of Dharakota, Dr. P. Subbaroyan, Dr. W. S. Shaw, Rao Bahadur V. N. Viswanatha Rao, Messrs. M. V. Vellodi, K. B. Jones, and William Bembower.

The President having declared the conference open, the President of the Union, Mr. C. Tadulingam rose to extend a hearty welcome to the visitors. In the course of his speech he gave expression to our satisfaction on the appointment of Sir T. Vijayaraghavachariar as the Vice-Chairman of the Council of Agricultural

Research, paid a tribute to Dr. Fowler for his abiding interest in agriculture, and referred to Mr. Anstead's reorganisation proposals as the crowning glory of his memorable regime of seven years as the Director of Agriculture in this province. On the motion of Mr. R. D. Anstead, it was unanimously resolved that a telegram of congratulations be sent to Sir Frank Noyce, Simla, on the knighthood recently conferred on him by His Majesty the King on his birth day.

Mr. M. C. Cherian, the General Secretary then read his annual report for the past year (published elsewhere in this issue), after which the president amidst deafening cheers rose to deliver his presidential address, (printed elsewhere in this issue) the theme being "Wealth from Waste". He emphasized the value of organic manures to Indian soils, and set up a vigorous plea for the better utilisation of all waste material including village and town refuse and advocated the disposal of night soil and domestic sullage, by the activated sludge process, to the scientific development of which process he had contributed a good deal. In this connection, we are glad to be able to say that we will very soon be having an activated sludge plant in working order on our Agricultural College and Research Institute estate.

Prizes were then awarded to the following successful candidates in the B. Sc, Ag, degree examination held in April last.

The Robertson Prize—Mr. P. Seshadri Sarma.

The Keess Prize—Mr. K. Gopala Marar.

The Clougston Prize—Mr. T. V. Rangaswami.

The Anstead medal instituted by Rao Bahadur K. S. Venkatarama Ayyar—Mr. T. Achyutarama Raju

The Goschen medal instituted by Rao Bahadur K. S. Venkatarama Ayyar—Mr. T. Nataraj.

The D'Silva Prize—Mr. T. Nataraj.

The Dewan Bahadur R. Raghunatha Rao Prize—Mr. M. Ramayya Shetty.

The Certificate Course cup—Mr. T. S. Lakshmanan.

We offer our hearty felicitations to the recipients of these prizes.

The resident Vice-President of the Union Rao Sahib Y. Ramchandra Rao then presented to the Principal, on behalf of the Council of the Union, a portrait of Mr. R. D. Anstead and requested Mr. E. F. Thomas, i. c. s., our Collector, to unveil it. In doing so, Mr. Ramachandra Rao stated that the Union owed Mr. Anstead a debt of gratitude, for his uniform kindness and sympathy in its affairs and that in recognition of the keen interest he has always taken in the welfare of the Union and in memory of the various kind offices received at his hands, the Council of the Madras Agricultural Students' Union for the current year have had the portrait prepared for presentation to the Principal of the College.

Mr. E. F. Thomas, in a speech suited to the occasion, unveiled the portrait which was an excellent reproduction of the original. The Artists of the Research Institute, who were responsible for the production of the portrait are to be congratulated on the excellence of their work.

The Principal, Mr. C. Tadulingam, expressed his great pleasure in accepting the portrait. Mr. Anstead expressed the appreciation of the honour done to him and regretted that the time had come when his portrait had to be hung on the walls of the Institute instead of himself sitting amongst us.

Two papers, one on the "Role of the Teacher in rural reconstruction" by Mr. S. V. Duraiswami and another on "A plea for the inclusion of Agriculture in the school curriculum" by Mr. R. Swami Rao were then read and discussed. Most of the papers submitted to the conference will be published in the subsequent issues of the journal.

The conference then stood adjourned till 1 p. m. the next day.

The usual group photograph was then taken.

At 5 p. m. the officers of the Agricultural Department entertained Mr. and Mrs. Anstead at Tea. Mr. C. Tadulingam in a neat, little, flowery speech referred to the phenomenal all-round progress the department had made,

during Mr. Anstead's office as Director of Agriculture. On the social side he referred to the amiable disposition, general qualities and the kind and sympathetic nature of Mr. and Mrs. Anstead, which endeared them to all, and wished the Ansteads bon-voyage, long life, health and happiness in the enjoyment of their well-merited rest. Mr. Anstead in conveying the thanks of himself and of Mrs. Anstead said that the success that followed his labours was due largely to the inspiration and encouragement he had received from Mrs. Anstead and in no small measure to the loyalty and co-operation of his officers.

At 7 p. m. Dr Fowler showed a series of interesting and instructive lantern slides explaining the working of the activated sludge process.

On the 10th July there were visits to the Cotton and Millets Stations during the forenoon

The conference met again at 1 p. m. and the whole of the session was devoted to a symposium on cotton. The papers submitted were:—

(1) Cotton Research work and its relation to the cotton work of the department Mr. G. R. Hilson.

(2) Chemistry and cotton:—Rao Bahadur B. Viswanath.

(3) Our present position as to cotton pest control in South India:—Mr. Y. Ramachandra Rao.

(4) The diseases of cotton in the Madras Presidency —Mr. S. Sundararaman.

(5) Rainfall and Karunganni cotton yields Mr. V. Ramanathan.

(6) Where is money in cotton?:—Mr. Jagannatha Rao.

At this stage Dr. Fowler said that he had to leave for Cawnpore that night and took leave of all present. Mr. Anstead and Mr. Tadulingam thanked Dr. Fowler for all the trouble he had taken in coming down here and for guiding the deliberations of the conference so far.

At 5 p. m. the students gave a tea party in honour of Mrs. and Mrs Anstead.

At 9 p. m. "Ratnavali" a tamil drama was staged. Admission was by tickets. The acting and the scenic arrangements were good and the actors acquitted themselves creditably in the presence of a large appreciative audience.

The morning of the 11th July was devoted to a visit to the Imperical Cane Breeding Station and the Paddy Breeding Station.

At 1 p. m. the third session of the conference commenced under the presidency of Mr. R. D. Anstead. The following papers were submitted.

(1) The relation between growth and intake of nutrients in cholam plant:—Mr. C. Narasimha Achariar.

(2) Influence of weather on parasite breeding:—Mr. K. P. Ananthanarayanan,

(3) The place of economics in agriculture:—Mr. K. G. Sivaswami.

(4) The place of co-operaton in agriculture:—Mr. N. Subramania Ayyar.

(5) Village reconstruction in the Ceded Districts—K. Ambikacharan.

(6) Gulla (looseneess) in soil:—G. Jogi Raju.

On behalf of the Sampson Memorial Committe Mr. Thirumuruganatham Pillai presented a portrait of Mr. Sampson and requested Mr. Anstead to unveil it. Mr. Anstead paid a tribute to Mr. Sampson's work and unveiled his portrait amidst cheers. The portrait is good and is a life like representation of Mr. Sampson.

Before declaring the conference closed Mr. Anstead bade farewell to the members of the department. He referred to the first occasion six years ago when he first addressed the conference as Director, traced the growth and development of the department during the period of his regime, and expressed his hopefulness as to the great possibilities of the newly formed Council of Agricultural

Research. In bidding good bye he said that the words used by Cardinal Newman to the Falsters of his Oratory, were most applicable in his case and quoted.

“ You, who have been so indulgent to my failings, who have grudged no sacrifice if I asked for it, who have been so cheerful under discouragements of my causing, who have done so many good works and let me have the credit of them.”

He thanked every one of the officers from the most senior officer down to the latest joined peon for their loyalty, and paid a tribute to that hard working and lowly paid body of men—the clerks—who play no inconsiderable part in our work and conveyed to them his good wishes. Finally he took leave of the members with a profound *namaskar*, full of feeling. The leave taking was most touching and every one present felt sad at the thought that they would soon be missing the amiable and popular Ansteads from their midst.

Mr. Anstead has endeared himself to every one by his genial qualities. Apart from this, as the head of the department he has given a sympathetic consideration to every reasonable representation and dealt fairly with every one to the best of his lights. In his retirement we are losing a good friend.

At 5 p. m. Mr. C. Tadulingam gave a tea party in his bungalow in honour of Mr. and Mrs. Anstead. It was a very enjoyable function and was attended by a large number of guests from Coimbatore Town and the estate. The honoured guests of the evening conversed with every one present and took leave of one and all.

The annual day of the Upper Subordinate Officers' Association of the Agricultural Department and the sixth annual conference of the Madras Agricultural Lower Subordinates' Association were also held in the course of the day. Short notes of their proceedings appear elsewhere in this issue.

At 9 p. m. Sheridan's "St. Patrick's day" or the "scheming Lien-tenant" in English and "Brahannala" by Krishnamachari in Telugu were enacted. The English

farce was acted entirely by students. The soldiers, the drummer and the bugler in their military uniforms presented a picturesque scene and gave an entirely original touch to the stage. Gulam Ahmed as Dr. Rosy, Gopalan as the Justice and Sankara Ayyar as the Lieutenant acted with ease and naturalness.

“Brahannala” is a well-known episode from the great epic Mahabaratha, The Pandavas-Arjuna and his brothers lived incognito for one year in Virathapuram (Modern Dharapuram,—Coimbatore district) at the end of which their enemies the Kurus, with a view to molest them further invaded the Virata territory. In the battle, which was won, by Viratha Prince Uthara, Viratha's son was helped by Arjuna disguised as Brahannala. The identity of the Pandavas was then discovered to the satisfaction of King Virata, who gave his daughter in wedlock to Abhimanyu, son of Arjuna. The chief actors were students; Gopalan as Brahannala, Subba Reddi as Uttarakumara and Narahari as Halayudha acted their parts very well. The play was a great success. Special mention should be made of the excellent acting of student Subba Reddi

On Saturday the 13th July there was a conference of the Deputy Directors of Agriculture and Heads of Sections presided over by the Director of Agriculture. The meeting was purely official.

At 8 A. M. on the 12th July the General body meeting of the Union was held presided over by the President Mr. C. Tadulingam. We were happy to see in the meeting our retired colleagues Rao Bahadur J. Chelvaranga Raju and A. V. Thirumuruganatham Pillai Avl. It was so good of them to have come down to Coimbatore at considerable personal inconvenience and expense. They did not fail to attend even the General Body meeting, which we are sorry to say is not patronised by many of the members, and this is an abiding proof of their interest in the Union and in the department of which they were distinguished members.

After the Budget and accounts had been passed, (vide appendix) the subject of Ramasastrulu Munagala Prize

was taken up. The working Committee, stated that the competition for the prize was not as keen as it should be, and that the one or two papers that are received were in the opinion of the valuation committee, not up to the mark. This is really unfortunate and it should be the endeavour of every one concerned to devise ways and means of keeping up the dignity and status of a prize awarded in the name of the Union.

The question of the draft rules brought by the committee was then taken up. It was resolved that a meeting of the resident members might consider it first and then circulate it to members of the council and that it might be adopted if the majority of that body agreed; otherwise the subject may again be brought up next year.

In the election of office-bearers, Mr. V. Muthuswami Ayyar was honoured by being elected the resident Vice-President of the Union. This is an honour long over due to him. Rao Bahadur J. Chelvaranga Raju and Rao Bahadur M. R. Ramaswami Sivan and A. V. Thirumurganatham Pillai were elected mofussil vice-Presidents. Mr. M. C. Cherian was again elected Secretary for the third time in succession and this is a fitting tribute to his zeal in the work of the Union. Rao Bahadur B. Viswanath was elected editor and subsequently the election of members of the working committee and the editorial Board was attended to.

Before the meeting broke up a resolution was passed recording the appreciation of Mr. C. Tadulingam's labours in the cause of the Union. Mr. C. Tadulingam has been a zealous worker of the union having served it in various capacities and contributed in no small measure to the development and welfare of the Union.

In the afternoon at 1 p. m there was a cricket match between visitors and residents. Mr. Anstead attended the match though he could not play owing to a sprained ankle. The visitors team included Mr. Bhaskara Rao of presidency same and was captained by Rao Bahadur M. R. Ramaswami Sivan, while the home team was skippered by S. N. Venkataraman. The weather was unfortunately not propitious enough to allow of playing the game to a finish.

The officers' Cricket Club was "At Home" to the visitors and the opportunity was availed of by the Club to bid farewell to Mr. and Mrs. Anstead. Mr. Anstead was a regular member of the club since its inception in 1925.

On the 13th July the morning was spent in visits to Entomological, Mycological and Chemical laboratories and Herbarium.

The Athletic Sports.—The annual Athletic sports came off on Saturday the 13th July in delightful weather. The grounds which were bedecked with flags presented a gay appearance and the northern and western sides of the maidan were packed to the full with a crowd of spectators who turned up in large numbers to watch the contests.

All the items on the card were very keenly contested and it was not till the last minute that the championship of the year was decided. Mahomed Ali who knocked off four first prizes in the long race events turned out to be the champion of the year securing an aggregate of 40 marks with K. Hanumantha Rao the specialist in sprints and jumps, close on his heels with 39 marks. The inter-tutorial relay race was won by Mr. C. N. Iyengar's wards, while the tug-of-war shield was wrested by Rao Bahadur B. V. Nath's wards. The Childrens' race events, the obstacle race and the sack-melee provided much merriment to onlookers. The Union was "At Home" to the guests of the evening. Our thanks are due to Mrs. Karunakar, and Mrs. Cherian who very kindly looked after the arrangements for the "At Home." At the close of the contests Mrs. Anstead very kindly gave away the prizes to the winners:—

The following is the list of prize-winners for the year:

HUNDRED YARDS RACE:—	K. Hanumantha Rao	I.
	M. Damodara Prabhu	II.
	T. Krishnamurthi	III.
LONG JUMP:—	K. Hanumantha Rao	I.
	C. N Subramanian	II.
	P. Parthasarathy	III.

PUTTING THE SHOT:—	K. Hanumantha Rao	I.
	N. S. Vaidyanathan	II.
HIGH JUMP:—	C. N. Subramanian	I.
	K. Hanumantha Rao	II.
	K. Vedantam	III.
QUARTER MILE RACE:—	Mohamad Ali	I.
	A. Abdul Samad	II.
	T. Krishnamurthi	III.
THROWING THE CRICKET:— BALL.	K. Atchutan Nair	I.
	K. Vedantam	II.
HALF MILE RACE:—	Mohamad Ali	I.
	Abdul Samad	II.
	A. R. Sundara Rajan	III.
HALF MILE (Open):—	K. Subojee (Central Police Recruits School)	I.
	Ottmann (Stanee High School)	II.
	Floate (do.)	III.
HURDLES RACE:—	K. Hanumantha Rao	I.
	D. Atchutarama Raju	II.
	C. N. Subramanian	III.
OLD BOYS' RACE:—	P. G. G. Kurup	I.
	T. K. Mukundan	II.
	P. S. Narayanaswami	III.
ONE MILE RACE:—	Mohamad Ali	I.
	Kolandaivelu	II.
	P. Parthasarathy	III.
OBSTACLE RACE:—	G. Krishnamurthi	I.
	Abdul Samad	II.
	Ghulam Ahmed	III.
CROSS COUNTRY RACE:—	Mohamad Ali	I.
	Dasa Rao	II.
	C. N. Subramanian	III.

Service Associations.

The First Annual Day of the Association of the Upper Subordinate Officers of the Madras Agricultural Department was celebrated on the evening of the 11th July, when a very large number of the Upper-subordinate officers were present. After tea, there was a meeting under the presidency of Mr. V. S. Narayanaswami Ayyar. Revised rules of the Association were discussed and passed. Resolutions were passed for taking steps to obtain the Recognition of the Government for the Association and also the several grievances that are to be taken up for representation to the authorities, subsequently.

Messrs. M. Veeraraghava Rao and S. V. Duraiswami were elected President and Secretary respectively for the ensuing year.

The sixth annual conference of the Lower Subordinate's Association was held on the 11th July 1929, under the chairmanship of Mr. G. R. Hilson, Cotton Specialist.

Twelve members from the moffusil were present. The Secretary's report showed four promotions of the lower subordinates to the higher grade and the arranging of a deputation which waited on Mr. D. G. Munro, the special officer.

It was resolved that, at this state, it was not necessary to register the association, under the Company's Act.

The President in his concluding remarks, made a frank and full statement of the situation of the lower subordinates. With the election of office bearers for the coming year, the proceedings terminated.

Mr. H. C. Sampson—An Appreciation.

Mr. H. C. Sampson, after some experience in South Africa came to Madras as Agricultural Adviser to the Court of Wards in the year 1905. He joined the Madras Agricultural Department in the year 1907. For a large portion of his service, he was Deputy Director in the Tamil and West Coast districts. He was appointed as a Special Officer for the cattle Survey of the Madras Presidency and was responsible for the creation of the Live-stock section of this department. He was also the Principal of the Agricultural College for a short period in 1913. He became the Director of Agriculture in 1921 and retired in 1922. Mr. Sampson was largely associated with several beneficent activities affecting the department and the ryot. He contributed in no small measure to the present magnificent structure of the department, specially in the work of improvement of cotton in the south. His name will ever be associated with the Koilpatti Cotton strains which have become popular and secured a well established trade name. His activities with the other Madras crops, especially Coconut on the West Coast, are also well-known from the publication of his book on Coconut.

Wealth From Waste.

BY

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(Presidential Address to the Madras Agricultural Students' Union at 19th Annual Conference at Coimbatore, July 9th, 1929, delivered with the help of lantern slides).

Let me in the first place thank the President and members of this Union for having done me the honour of asking me to preside on this occasion. I cannot claim to be an agriculturist but I do claim to be a chemist, intensely interested in agriculture, and I think you will agree that agriculture is becoming more and more a branch of applied biochemistry. Deeper, however, than my scientific interest in agriculture is my desire to see, if possible, some mitigation of the ills of India through the application of scientific thrift to the uses of agriculture.

You will all probably have seen the statement by Sir James McKenna that the waste that is going on in India is "simply colossal." He holds further that no other country in the world could stand such waste of available raw material and that great responsibility rests with all concerned to put an end to it. I hope that on this occasion we may together try to face this responsibility.

I propose to consider first the utilisation of the waste materials of the farm and country and afterwards those of cities and towns.

As a beginning I will ask you to look at two pictures on the screen, the first represents a bed of hollyhocks planted practically unmanured in the ordinary simple fashion of the Indian *mali*. You will see that the plants are sparse and spindly, only here and there rising to a height of 3 feet or so. In the second picture there is a bed of massive plants 12 feet high, loaded in fact with deep coloured flowers and constituting a magnificent sight. I regret that I can only show you the quantitative effect in the photograph. This extra ordinary difference was brought about

without any expenditure of actual money but solely by the use of well directed labour and scientific application of waste materials, leaves and grass from the garden, rotted down by methods easily learnt by the illiterate. The soil had been thoroughly dug and carefully mixed with the compost which had itself been reduced to a fine powder by rubbing through a sieve, the result you see. I could show you pictures of cannas equally luxurious.

Substitute for the hollyhocks and cannas, wheat and consider the addition to the nation's wealth. In their little volume of condensed experience on Indian Agriculture, recently published, the Howards write concerning wheat.

"At the moment the most pressing problem in wheat production in India is the spread of intensive cultivation coupled with reduction in the volume of irrigation water used in raising this crop. Ground has been broken in this direction. When the amount of organic matter in the soil is increased yields of over 30 maunds to the acre have recently been obtained with only one watering".

I have myself seen fine crops of wheat growing at Indore on land only recently barren but converted under Mr. Howard's instructions into well drained rich soil.

To obtain this result, in the first place the land is broken up and the weeds extracted not by employment of heavy and expensive tractors but by the simple expedient of training oxen to "form fours." In this way deep-rooting grasses can be removed, the land cleaned and the soil can be cultivated to a depth of 8 inches without soil inversion. Weeds when brought to the surface can be rotted down to compost and so a pest is made into an asset.

With the increase of crop resulting from improved methods, increase of straw and trash is obtained and the manure supply automatically increases.

Much work is now being done all over India, I am glad to know, on the scientific preparation of artificial farmyard manure from the ordinary refuse of the farm. I have dealt with the scientific research at the back of this work in my address to the Indian Chemical Society at Madras last January so that I need not enter into details here.

It is important, however, to emphasise certain broad principles.

The work of Richards and Hutchinson at Rothamsted showed us all the principles which must be followed if the preparation of artificial farmyard manure is to be successful. They showed that there must be a defined ratio between the nitrogen and carbon in the raw materials used. They found that the organisms responsible for the breaking down of straw and other carbonaceous material function best in the presence of air and further that the nitrogenous matter must be applied at suitable concentration and under neutral or slightly alkaline conditions.

Just as in the allied problem of sewage purification it has been possible greatly to accelerate the speed at which reactions take place by the production of a suitable "activator" so the efforts of some of us have been directed to find out the conditions under which artificial farmyard manure or "compost," as it used to be termed, can be produced in the shortest possible time. This aim, it can be seen from their published papers' was also present in the minds of the original workers but does not seem to have been very actively followed up. To sum up the result of the work so far done at Cawnpore we find that compost is most rapidly made if the materials are cut either by hand or in a chaff cutter into small pieces and first of all thoroughly rotted down with a mixture of cowdung and cow's urine applied in a thin decoction so that every portion of the mass comes in contact with the inoculant and fermentation takes place evenly in consequence throughout the mass. On piling in a heap not more than 3 or 4 feet high and turning over from time to time, keeping moist with the same decoction, very high temperatures are attained which destroy all insect larvae. When the temperature begins to drop a further quantity of chopped raw material is added to the heap which now becomes the "activator." About 25 percent only of new material should be added at one time and thoroughly mixed with the activator, the cow dung and urine decoction being added at intervals as before. The method, obviously, can be readily systematised. At one end of a long heap is the finished rotted material which can be dropped, if necessary, into a pit to be stored until required and at the other end is the new material. The formula given to the mali is 2 old and 1 new i. e., a given heap of the finished material is divided into three parts one,

part sent to store, the other two parts mixed with one part of partly rotted raw material and so on.

Instead of cow's urine it is possible to use other materials such as sulphate of ammonia, ammo-phos etc. Calcium cyanamide for some reason is not so satisfactory, possibly because of its inhibiting effect on nitrification as pointed out by Walton in a recent Pusa Memoir

There is no doubt whatever that apart from nightsoil which is specially effective, cow's urine is the best material to use in making composts and every care should be taken to conserve this precious source of nitrogen.

It is strange to read in the number of the *Agricultural Journal on India* for May 1929 which has just come to hand that even in Great Britain the value of cattle urine has to be insisted upon. It is not only in India that scientific knowledge takes some time to reach the farmer. More than 15 years ago with the assistance of a grant from the Board of Agriculture through the good offices of Mr. (now) Sir Thomas Middleton of the Linnithgow Commission the whole question of the use of liquid manure was carefully studied in England by Manchester workers and presumably the reports are still in the pigeon holes of Whitehall.

In the recovery then of the waste litter of farms and garden leaves, weeds, straw etc, as well as cow-dung, urine we have a striking example of the utilisation of one form of waste material for the benefit of agriculture. The Government Farm at Dacca for the first time in its history, we are told, has had in this way an adequate supply of manure. At Indore thousands of cartloads of such manure have been applied to barren soil with the result of a constant increase in crop.

It is some times argued, and in any event practice implies the assumption, that all this artificial preparation of composts is unnecessary and that the raw material can be simply applied to the soil and be allowed to rot there. Biochemical science and the experience of thousands of years of Chinese agriculture contradicts such an assumption. Again to quote from Howards' book page 45.

"The practical problem is to prepare a supply of fermented organic matter and to apply it to the soil at the right moment. In this matter the Indian cultivator has much to learn. His

scanty supplies of manure are allowed to dry outside the house and are applied to the land in an undecayed and unfermented condition. After the seed is sown, the soil has to prepare this undecayed material at a time when all its energies should be devoted to providing the plant with food materials. Both these processes require large volumes of oxygen and thus compete for a substance likely to be in defect. The result is over-work and fatigue. Crop-production really consists of two processes which are best kept separate: (1) the preparation of food materials which should be done outside the field and (2) the growth of the crop—the real work of the soil. The Chinese were the first to discover and to adopt this master idea. They go to infinite trouble to convert all sorts of refuse animal and vegetable matter into finely divided manurial earth ready for the use of the crop."

I shall have to refer again to what is here termed the "master idea" of the Chinese when speaking of the utilisation of another kind of refuse.

Almost all kinds of vegetable matter can be utilised for the preparation of these composts. In Cawnpore we have made use of the miscellaneous weeds which grew up on a local Golf course as well as plantain stems, sun hemp, and *pluchia lanceola* which is best utilised in its early stages of growth before the stems become lignified and which grows in vast quantities over many tracts of country.

Mr. Youngman at Nagpur has been able to utilise cotton stalks as manure by chopping them down into short lengths and allowing them thoroughly to soak in water before undergoing the fermentation process.

The utilisation of oil seed cakes has received much attention and greatly improved results can be obtained with a little scientific attention to the preparation of the material.

Water hyacinth can be readily composted with much resultant benefit from its high potash content.

All the foregoing materials have been referred to simply as possible ingredients of manurial composts. By more advanced technology, products of even greater value can be obtained from many of the waste materials of the country side and it will be of interest if we consider a few of these.

Water hyacinth:—Is a well known pest in the waterways and tanks of Bengal and also in certain districts of the United Provinces. Its use as a source of potash for

agriculture by the simple method of composting has just been referred to.

Professor H. K. Sen of Calcutta has shown, however, that very pure potash salts can be extracted from the plant leaving the organic portion intact.

Prof. Sen has published the results of experiments and calculations which indicate that alcohol can be profitably obtained from the organic material of the plant.

My own view is that after extracting the potash by Prof. Sen's method it will be more technically practicable to ferment the vegetable residue to power gas consisting largely of methane and hydrogen. I am told that the youth of Bengal amuses itself sometimes by collecting the gases which bubble from the bottom of tanks infested with water hyacinth. Here we have evidence of the possibility of the necessary fermentation.

In the Septic tanks which used to abound on the banks of the Hooghly I found in 1906 copious evolution of marsh gas and at that time a small engine was actually driven from the gases produced from the Septic tanks at the Leper Asylum at Matunga near Bombay.

I have long been interested in this problem and a good deal of work has been done and published from Bangalore but the first large scale success is now reported from Birmingham. At the great sewage works of the Birmingham Tame and Rea District Board, Mr. O'Shaughnessey, the Chemist of the Board has for a long time been studying the bacteriological digestion of sewage sludge which contains large quantities of cellulose from which by anaerobic fermentation is produced marsh gas and hydrogen. In a recent paper by Messrs. Vokes and Townsend on the Engineering Staff of the Board, a description is given of the works which have been installed for the collection of this gas from the 400,000 tons of crude sludge which has to be dealt with annually. Briefly the gas is collected from the sludge digestion tanks by means of floating concrete gas collectors of special construction. Sufficient gas is now obtained to run economically an engine of a 150 B. H. P. but it is anticipated that the power available from the gas hitherto liberated into the atmosphere is about 1100 B.H.P. continuously night and day. The quantity of gas is about

150 million cubic feet per annum, its value at 1s. 6d. (one rupee) per 1000 cubic foot is about £. 11,500 per annum.

The sewage sludge of India, as I hope to show you later, is much better employed in fertilising the land than in running gas engines, but I see no reason why the vast growths of water hyacinth in Bengal and elsewhere should not be fermented in this way and the gas converted into power. If this can be done efficiently it will be almost the quickest method of direct conversion of Solar energy into power that I am acquainted with. Experiments are being carried on at Cawnpore from which I have considerable hopes but the conditions are not altogether simple and it is too early yet to do more than draw attention to this great possibility.

If some one was to find oil under the ground in Bengal it would be looked upon as a means for industrialising the country and no one would be alarmed at the cost of piping the oil hundreds of miles if necessary. Why then should not water hyacinth be fermented to power gas and the power gas converted by gas turbines if necessary into electrical energy for the benefit of local industry.

I have spoken of the use of oil seed cakes as manure. There are however other uses possible to the advanced technologist. We hear from the United States of the utilisation of groundnut husks for slab tiles and fibre concrete and attempts are being made to convert them into rayon and paper though these have not yet been successful. A systematic study should be made by thoroughly competent chemists of the possible uses of the waste material from seeds of all sorts.

We hear that Quaker Oats is only one product among many from this cereal, one of the chief accessory products is furfural, a valuable solvent.

More than fifty chemical products can be obtained from corn cobs, and from cereals of all sorts are now being made butyl alcohol, acetone and numerous other solvents by controlled fermentation. These developments so far as India is concerned are rather for the future, although many hundreds of tons of butyl alcohol and acetone were made at one time at Nasik. The first thing we have to do is to handle the simpler problems.

My colleague Mr. J. A. Hare Duke, Oil Expert to the U. P. Government, has recently been experimenting with linseed stalks, a waste product of the linseed oil industry. He has obtained a fibre which he assures me is more than the equal of jute. Basing the value of the fibres at about half that of the lowest quality Russian flax and basing the yield of fibre at 3 maunds of good fibre and 3 maunds of tow per acre it would appear that at present India is annually throwing on the manure heap from linseed alone, fibre and tow of the value of well over six crores of rupees. I have here a sample of the linseed fibre for your inspection. It is true that the conditions of growth of the plant are somewhat different according to whether it is being grown for seed or for fibre, but there is no reason why even when the plant is being grown primarily for seed the fibre should be entirely wasted.

As I have mentioned publicly on more than one occasion there is a great possible market in Europe for tomatoes which with reasonable care can be produced quite freely in various parts of India. The simplest method of marketing tomatoes for consumption out of India is as peeled tomatoes in tins. This yields a large quantity of tomato skins which by suitable treatment can be converted into quite a useful chicken food, and so we come to consider the question of egg production for which there would seem to be an unlimited market, especially since the troubles in China have disturbed the supplies from that quarter.

There was during war time, among the Belgian refugees in England, a lady who had been accustomed to run a large Poultry Farm from which she produced by scientific methods not less than one million eggs per annum. I remember she was explaining her methods to a friend of mine in rather valuable French English which he had some difficulty in following. When he asked her to speak more slowly, she replied, "But if you want to produce one million eggs a year you must be queek!" There is no doubt that her remark contained a powerful truth which the Indian agriculturist will have to live up to. If you wish to produce an adequate amount annually of eggs and make a living thereby you must be "queek." As Mr. Ford has put it in his autobiography :-

“ If to petrify is success all one has to do is to humour the lazy side of the mind but if to grow is success then one must wake up anew every morning and keep awake all day.”

I have here a picture of an Egg Farm at Los Angeles. You see in front of you 100,000 eggs which is only 3/4ths of what this farm produces daily. There are 300,000 laying hens and 200,000 baby chicks, thirty million eggs are exported annually. The food bill has to pay for a million pounds of varied diet, it is stated, to keep these gravel scratchers going. Among the articles of chicken food mentioned are sunflower seeds and I believe that there are great possibilities in the cultivation of this easily grown plant if all its bye-products are utilised and not wasted.

Before we leave the country for the town mention should be made of the great waste due to *kutchas* roads. Any one who has to visit a distant village off the beaten track will soon have experience of the waste of time and energy due to *kutchas* roads. Even in the more public highways the rough and ready methods used for temporarily patching roads are very largely a simple waste of public money. Howard suggests also that if the narrow wheels usually fitted to bullock carts can be replaced by stronger wheels with broad iron tyres roads would last longer and break-downs would be far fewer than is now the rule. The loss of man and cattle power due to the collapse of cart wheels on the main roads to large cotton market towns must run into thousands of rupees annually.

To sum up then, apart from all these incidental possibilities the results of intensive cultivation alone show at Shahjehanpur that by the use of adequate manure and water the yield of standard crops such as wheat, gram and sugar cane can be more than doubled as compared with the yield of the ordinary cultivator. More striking figures even than these can be given and it is clear, as Howard states, that in the Punjab and the U.P. alone crores of rupees worth of potential crop production are literally thrown away.

To come now to the second portion of our subject the waste from towns and cities, the main waste materials which we have to consider are (1) Towns' Refuse, and (2) Human excreta.

Considering first Towns' Refuse, the composition of this will vary to some extent according to the season and according to the district and the product of Indian towns is quite different from that which is met with in richer countries. In the United States where there is considerable waste of food, towns' refuse often contain a good deal of fat and before any further treatment it is usually submitted to a rendering process to get out this valuable constituent.

In India so far as my observation goes towns refuse consists mainly of straw and paper and the ordinary sweepings of streets together with a good deal of mere dust. It is often intermixed with a certain amount of night soil and cowdung and consequently has a certain value on this account. At Nasik with a population of nearly 40,000 some 85 cartloads of sweepings are removed daily to the Municipal Depot. Experiments indicated that this material could be rotted down to an excellent manure by a systematic fermentation with cowdung or night soil in the manner I have already described.

The problem of the disposal of this kind of refuse in large cities like Bombay and Shanghai is becoming very serious since in virtual absence of unburnt household ashes such as used to be present in pre-war refuse in English cities disposal by incineration is not likely to be profitable.

In general it seems to me that the best method for dealing with kutchra would be to submit it to a double-screening process, i. e., in the first place to remove large objects such as old tin cans and pieces of glass and metal. The material passing through this open screen should fall on to a second and fine screen through which will pass the dust which can be used for rough concrete or similar purpose. In this simple way the organic material present will be concentrated and can then be scientifically fermented in the manner already described.

Since writing this paragraph I have noticed in the latest number to hand of the Journal of the Society of Chemical Industry that reference is made to processes patented in Italy for dealing with town's refuse on lines apparently very similar to those I have suggested.

We now come to the very important question of the enormous waste involved in the non-utilisation of the

manurial value of *night soil* and *sewage*:—The figures given indicating the possibilities if this material were fully utilised are almost unbelievable. In the very interesting volume "Uses of Waste Materials" compiled by Prof. Brttuini and published by the International Institute of Agriculture at Rome very full statistics are set out on this subject showing the value of the sewage from most of the capital cities of the world. Among them Delhi is mentioned and it is stated that the nitrogen derived from its population of 282,000 is sufficient to fertilise a minimum of 10,000 and a maximum of 95,000 acres according to the dose given. Consider what this means for all the towns in India.

When we consider that a very large proportion of this material is either simply wasted in India or worse than wasted in that it is allowed to become a centre of disease breeding infection by flies and in other ways, we shall realise the wisdom of a recent utterance of Mahatma Gandhi who states that "Indians are clean as individuals, but not as members of the Society or the Nation of which the individual is but a tiny part." "He observes that "corporate insanitation is not the least of the diseases to which India is subject."

Anyone whose duty it is to look into the sanitary disposal of town waste must agree with him.

Of the village the sage of Gurgaon says "There is very little manure in the fields, but plenty of filth in the village and on the children. Do you think that by manuring your children they will grow better?"

It is true that the problem of the sanitary disposal of human waste has been one of increasing complexity but I hope to show you how by the most modern method known as the *Activated Sludge Process*, all this waste abomination can be rapidly transformed into clean and valuable products by a simple process of scientific aeration.

Before discussing this important subject in detail it will be well if we have a clear idea of the main constituents of the sewage which has to be purified. These constituents can be broadly divided under the following heads:—

1. Soluble matters,

2. Colloidal matters.

3. Matters in suspension.

An ordinary sample of sewage taken in a bottle has the appearance of a grey turbid liquid, from which about half an inch of dark grey deposit will generally settle. The turbidity is caused by the colloidal matter, by which we mean very simply, sticky substances which are not entirely dissolved nor yet entirely in suspension, and which are exceedingly difficult to deal with, since they clog up the surface of land or of artificial filters. The colloidal matters in sewage are mainly derived from the churning up of foecal matter in the sewer.

The matter in suspension which settles down at the bottom of the bottle, consists of sand and other mineral detritus which mechanically retains a certain amount of sewage matter.

In solution are the soluble salts of ammonia which are mainly derived from urine.

If this unpleasant mixture is allowed to remain in absence of air it undergoes putrefaction with production of evil smelling substances and hence arises the sewage nuisance.

We may enquire how is it that with the immense quantity of waste products of human life produced day by day there is not an overwhelming catastrophe. The answer is that Nature has provided her own scavengers in the form of minute organisms known as bacteria. These are so small that were one of them to be magnified to the size of a man and the man magnified in proportion, the magnified man would reach from Bombay to Calcutta. Although these scavengers are so minute fortunately there are immense numbers of them and so the work gets done.

Some bacteria work in absence of air and generally give rise to nuisance and putrefaction. The bacteria which are most useful in sewage purification are those which work in presence of air or oxygen, which is available either in the interstices of the soil, or dissolved in water.

The ordinary domestic cat has a thoroughly scientific knowledge of sewage disposal, carefully burying its excreta in the soil and what is more, instructing its children to do so. Once buried in the soil the offensive matter is dealt

with by the bacteria everywhere present in fertile soil, and converted into harmless nitrates which are soluble crystalline salts, and into the brown humus characteristic of good fertile soil. The nitrate deposits found on the sites of old abandoned villages are obviously derived from old organic matter.

The same process can be seen going forward in rivers and streams which are subject to sewage pollution, provided enough oxygen is present in solution to oxidise the sewage. Careful observation will show that under these circumstances the original turbidity gradually tends to clot and the liquid to become clear, the clotted particles gradually settling down and forming a brown inoffensive mud on the bottom. This is what actually happens to sewage when it is discharged into an estuary or into tidal waters. In a case in which I was concerned many years ago it was contended that inasmuch as no nuisance could be proved the discharge of sewage into the estuary under discussion was entirely harmless, and it was even supposed that all the sewage matter had been converted into soluble or gaseous constituents. The observations of the Harbour Engineer, however, indicated the existence of considerable deposits of brown humus in the bed of the channel so that mere discharge into the sea is not necessarily the end of the matter, quite apart from the waste of fertilising material involved.

The activated sludge process is simply an adaptation of Nature's methods, so adjusted and developed as to obtain the maximum results, in the shortest possible space of time.

If air is allowed to bubble through a sample of sewage a number of changes progressively take place. The first to be noticed is the gradual conversion of the colloidal matter which gives the turbid appearance to the sewage, into brown granular particles which readily settle leaving a sparkingly clear liquid. In course of time nothing is left in solution but mineral salts, viz, chlorides and nitrates.

This complete oxidation of sewage by the action solely of air in conjunction with the bacteria originally present in the sample of sewage, occupies a considerable time, possibly many days, and for this reason purification of sewage by aeration alone was long deemed impracticable. It has been found however that if the brown granular deposit which

forms is allowed to settle out from the liquid and the latter decanted away and a further quantity of sewage aerated in contact with the brown deposit and this process repeated, the brown deposit being retained at the end of each operation, then as the quantity of the deposit increases the time required for the purification of the sewage decreases. Finally when the deposit has accumulated to the extent of about a quarter of the total volume of the sewage the latter can be purified in a few hours time and the process becomes a practical proposition. The brown deposit has been termed '*activated sludge*'

For the practical carrying out of the activated sludge process artificial aeration is necessary and the sewage needs to be freed from heavy detritus and from floating solids, that is to say it requires in general to be passed through a system of catchpits and screens before the aeration process.

Briefly the process is carried out in practice as follows : The screened sewage passes into a long narrow aeration tank into which air is forced in a state of fine division. It has been found that this fine division is necessary for the sake of economy of air and it is effected by the use of what are known as diffusers of porous material through which the air is forced creating a fine emulsion of air and sewage. The effluent passing away at the end of the aeration tanks is purified but contains, of course activated sludge in suspension which must be separated and returned to the inlet of the tank. The aeration tank is therefore followed by a settlement tank in which the activated sludge rapidly settles out and from which the clear and purified effluent passes. The deposited activated sludge can be lifted from the bottom of the settlement tank by means of compressed air either back to the inlet of the aeration tank or out of the system altogether on to sludge drying beds from which it can be removed and used as manure. Any surplus over and above the 15 or 20 per cent of the volume of the tank which is necessary to effect purification is thus removed from time to time. The whole installation occupies very little space. The sewage e.g., of 100,000 people can be purified in tanks holding a million and a half gallons, that is a space of 300 feet by 100 feet by 8 feet. In addition buildings will be required to accommodate machinery for air compressing and possibly sludge pressing and drying.

To purify under European conditions the same quantity of sewage to an equal extent by means e.g., of septic tanks and percolating filters, would require approximately double the tank space and in addition 6 acres of percolating filters 6 feet deep.

The activated sludge process has passed far beyond the experimental stage in the usual sense of that word. That every problem has been solved cannot be said of activated sludge any more than it can be said of human nature itself, but at any rate a great many initial objections have been overcome and the process has shown itself to be one capable of purifying sewage efficiently and at a reasonable cost. At one time it was suggested that blowing air into sewage must necessarily cause nuisance. That nuisance is caused when sewage putrefies in absence of air is well known but aeration in presence of activated sludge completely eliminates offensive odours as can be seen by the photograph of the tanks now in operation at the Madura Mills, Tuticorin which are situated immediately under a latrine serving 2,000 people. A slight smell is necessarily present where the fresh sewage enters the tanks. This can easily be got over by covering up the inlet. When once the sewage has met the activated sludge there is no smell whatever and it is possible to walk about in the space shown in the photograph without experiencing any unpleasantness. The effluent passes away from the tanks as a clear sparkling stream entirely odourless. At the Hague an installation is situated immediately under the windows of two dwelling houses. It has been there for many years without causing trouble.

To come now to the interesting subject of the fertilising value of activated sludge, this from the first has been shown to be quite exceptional, not only is there a high percentage of nitrogen and phosphorus but these elements are present in organic combination and in forms specially suited for plant food. The two pictures of pot culture, shown on the (screen) show trails which were made in the early stages of activated sludge research, in the first is shown a series of pot cultures with equal quantities of nitrogen. The growth in the pots receiving activated sludge is altogether out of proportion to the others. Similarly the Azalea in the next slide show the wonderful effect on the bloom by a dose of activated sludge.

I am told by the P. W. D. Engineer at Ambernath, where for some years a little installation was in operation, that he has obtained marvellous results with roses.

Hitherto the difficulty with activated sludge has been the drying of the material for transport, it is of a jelly-like nature and holds water very tenaciously. In Prof. Brutini's book published in 1923 speaking of activated sludge he says "up to the present the difficulty of eliminating the 98 per cent of water from the activated sludge resulting from the process of sedimentation has not been overcome." That cannot be said to be the case today. At the great works in Milwaukee a photograph of which you have seen the sludge is being handled by band filters and rotary driers in such a way, as to obtain a saleable product at not too great a cost and the latest information is that they have a forward market for the resulting dried sludge which has been given the name of "Millorganite," to the value of £.100,000 per annum, the dried sludge being worth on rail at the works the equivalent of Rs.45.

The methods used for drying at Milwaukee, so far as one can judge from the somewhat scanty details published, may be described as simple but brutal; one hears e.g. of temperatures up to a 1000°C being used. If this is the case it would seem certainly to result in overheating of the sludge with detriment to its special qualities as a plant food. I am now in a position to show you a more recent process which I venture to think will be very much less costly and will result in a product of a greater manurial value. The process depends on the utilisation of the physical effect of innumerable up turned fibres in causing water to drain away rapidly from wet mud. Every one knows that an ordinary tent will give protection from the rain so long as some foolish person does not touch the canvas with his fingers when immediately a stream of water begins to run through. The idea of a filter mat is to multiply these fingers so that excess water very quickly runs away from a thin layer of sludge spread upon the mat. Moreover if the sludge is at the same time heated then the jelly which I have spoken of is broken and the water again quickly runs away and has to be evaporated as in the Milwaukee process.

The sludge is fed on at one end of a slowly rotating mat and meets a stream of hot air passing in the opposite direction. Experiments at Cawnpore have shown that with air entering at a temperature of 200°C a thin layer of sludge on the surface of the mat can be dried in 10 minutes. It is true that the layer must be very thin but if you consider an ordinary paper making machine, wet pulp is fed on to a moving mesh in a thin layer, and gradually appears as a roll of paper at the end of the operation. You will see that the constant production of small quantities, minute by minute, results at the end of the day in quite a large output. If the preliminary small scale results can be confirmed by working experience it would appear possible to dry the sludge corresponding to a population of 50,000 or half a lakh of people by a machine which with its accompanying air heating arrangements and so forth will occupy a space of not more than 400 square feet.

There is every likelihood that the process will come to be even more economical than the construction of sludge drying beds from which the water only drains away, as a rule, very slowly.

When the Agricultural Commission visited Cawnpore, Lord Linlithgow showed a great interest in the activated sludge process, but he told me that he was concerned as to the possibility of conveying infection if this material was transported from one part of the country to another. By the process which I have described, the details of which have been worked out since the visit of the Commission, the heating while not sufficient to spoil the quality of the sludge subjects it to a temperature high enough to destroy all such organisms as hookworm, even supposing these to be present.

I understand, however, from Col. King of the Guindy Institute that he has found means for eliminating these dangerous parasites from a septic tank by a special design of inlet, so that we may hope that they may be prevented even from entering the activated sludge tank.

A very important and critical point to study is that to which I have already referred in speaking of compost

making, viz, the "master idea" as Howard terms it of the Chinese that food should be prepared for the plant before it is put into the soil, that the soil should not be expected to prepare the food and grow the plant at the same time.

Now the activated sludge process does for manure in solution, what the compost making does for solid material, it prepares it for the plant. I have dealt with this point in some detail in a section of a Bulletin of your Department of Agriculture, entitled "The Manurial Problem," which, by request of the Director of Agriculture, I had the honour to contribute.

The aeration of the sewage in the activated sludge tank is equivalent to constant tillage of the soil, and the consequent result is attained in a much less laborious and more efficient way.

Moreover, the effluent, if not required for irrigation can be stored without nuisance, and in such storage ponds fish can be grown as is constantly done in China and in many towns in Europe, or aquatic plants may be grown and afterwards used for compost.

You will shortly have an opportunity in the plant now under construction on this College estate, thoroughly to study these and many other local problems concerned with the activated sludge process. Unfortunately the construction work was not completed before the monsoon came upon us, and flooded the excavations. I was in hopes that the process might have been put into operation about the date of this meeting. However the delay should not be very serious and I look forward with great interest to the research work both in sanitation and agriculture which may be done in connection with this plant.

From what I have been able to bring before you in the short time at my disposal I hope it will be seen that there are vast possibilities of increasing the wealth of this country if material which is at present wasted or worse than wasted is properly made use of. It would seem worth while indeed for a special officer to be appointed by every Government to obtain statistics of the available wealth producing materials in the Province which are at present being wasted and to stimulate and correlate their utilisation by

officers of the various Departments concerned. Such a beginning has already been made in the Bombay Presidency and I have on my files a tabular statement of the receipts from the sale of kutchra and night soil actually collected in 32 towns of the Nasik district. On calculating the actual value of these materials and the price obtained there is a very great discrepancy showing enormous possibilities of increased returns if the matter was seriously taken in hand by the agricultural department working in conjunction with the sanitary officials, the whole work being as I have suggested correlated throughout the Province and ultimately throughout India. Thus, taking Nasik alone the value of its night soil, not theoretically but on the basis of what is paid by Chinese contractors in Shanghai, amounts to Rs. 35,000 annually, actually only Rs. 2,500 are received and no account is taken of the kutchra available. The necessity for such a systematic attack cannot be doubted, if any increase is to be made in the real wealth of India. It is becoming almost a commonplace that without a general rise in the standard of living, real industrial development in this country is hardly possible. In this connection I should like to quote from the Ditcher's Diary of *Capital* of March 14, 1929 :—

“ Inasmuch as it is not possible to attain self-sufficiency in every sphere simultaneously, it is necessary to make a choice, basing the choice on some sort of order of economic precedence. In that event self-sufficiency in regard to food-stuffs would come first on the list.

The plea is not for abandonment of industrial expansion, but for simultaneous progress along the whole economic line. In the post-war period, however, while urban industries have expanded fairly rapidly, agriculture relatively, has made little progress,—the economic dislocation now visible representing the inevitable sequel. If less Indian money went to Java to buy sugar, to Australia to buy wheat, to Siam and Indo-China to buy rice, and to Europe, Aden and other sources to buy salt, there would be more money to buy Indian manufactures. At a moderate estimate, the sum so diverted this year will exceed 30 crores of rupees—an amount probably adequate to purchase the total yearly output, working to full capacity, of all the Bombay cotton mills combined. It would be as futile to endeavour to burke these facts as it would be to try to escape the inevitable conclusion. Deficient purchasing power is indubitably the chief hindrance to larger outputs and sales of Indian manufactures, and, to no slight extent, this deficiency is traceable to import-

ation of food-stuffs which India, by more efficient methods of cultivation, might produce from her own soil. Better work in the fields would mean fuller employment, and larger profits, in the mills. As it has been truly observed :—

“ Modern industrialism, based in India upon a primitive system of agriculture, rests upon a foundation too narrow and unstable to permit of full development. A low net profit in the fields means low dividends and low wages in the factories. The interdependence is complete and inescapable.”

The argument is frequently used that even supposing that Milwaukee does produce £ 100,000 worth of activated sludge per annum, it costs a lot of money to get it. True, it also costs a lot of money to keep alive. Really to save money the best thing would be to die. It costs little to lie in the grave. And indeed that is the alternative. It costs little apparently to allow human excreta to fester in the streets, and to poison the wells and watercourses.

In Milwaukee formerly the sewage used to flow into Lake Michigan from which the water supply of Milwaukee and other cities is derived. The expenditure on the great works I have referred to means an enormous reduction in the risk of water borne disease. The money too has largely passed into salaries and wages of intelligent and educated mechanics, engineers and chemists, who also find employment for others in the spending of their salaries. The sludge which used to defile the bright waters of the lake now reappears as wheat on the wide acres of western prairies, or as smooth rich turf on countless golf greens. Surely there is profit and true wealth in all this.

Here in India how many offices and factories run a whole month without absences due to sickness? What is the average expectation of life of an ordinary citizen in the bazaar, let alone the babies, perishing from infantile diarrhoea and other filth caused diseases? Let the Directors of Public Health tell us.

It is true it costs money to be clean, but the interest comes back a hundred fold in more and better employment than that of sweepers, striking as they have been in Nagpur and elsewhere for some increase in their monthly pittance. Let this labour be put to better use on the land, let employment be found for the students of our engineering and

agricultural colleges, and this expenditure will have as its result, health and happiness, instead of disease and misery.

How often it has been said to me when discussing possibilities of improvement, "That is all very well but India is too poor." India does indeed suffer from what in the jargon of present day psychology is termed a deep seated "poverty complex", which is due not to fate or to foreign rule but to ignorance, superstition and inertia. It is for the students of such Colleges as this in which we are here assembled to spread the enlightenment which they have received within these walls and on these fields to their less fortunate brethren in the scattered villages all over the Presidency. It is not an impossible task, Gurgaon, Indore and the demonstration vans of your own Agricultural Department have shown the way. Good humour, kindness, energy deep and whole-hearted sympathy and desire for better things will in due time cause to arise that new India which is present in the mind of every man of good will.

APPENDIX I

Income and Expenditure Account for the year ending 31st May 1929

M. A. S. UNION, COIMBATORE.

EXPENDITURE.	Amount	Rs. A. P.	INCOME.	Amount	Rs. A. P.
Advances paid	...	5 8 0	Advances recovered	...	126 0 0
Excess subscription refunded	...	2 8 0	Interest on current deposit	...	38 7 0
Establishment charges	...	273 2 0	Interest on fixed deposit	...	32 14 0
Lighting charges	...	3 8 0	Journal subscription	...	1557 1 6
Postage charges	...	88 15 0	Hire on crockery	...	13 7 3
Printing charges	...	984 9 0	Postage recovered	...	15 2 0
Stationery	...	8 12 6	Printing charges recovered	...	37 0 0
Refund of Jubilee subscription	...	25 4 0	College Day subscriptions	...	427 2 0
College Day expenses	...	215 14 2	Auction sale proceeds	...	4 9 7
Entertainment	...	164 7 8	Entrance fees	...	11 4 0
Miscellaneous	...	73 8 0	Drama collections	...	266 8 0
Quit-rent	...	1 0 0			
Sports Expenses	...	129 4 0			
Excess Income over Expenditure	...	548 3 0			
Total Rs.	2524 7 4	Total Rs.	2524 7 4

APPENDIX II

Statement showing receipts and expenditure of the M. A. S. Union for the year ending 31st May 1929

	Amount.		Amount.
RECEIPTS.	Rs.	A. P.	Rs. A. P.
Advances recovered	126	0 0	6 8 0
Interest on current deposit	33	7 0	2 8 0
Interest on Fixed deposit	32	14 0	273 2 0
Journal subscriptions	1557	1 6	76 15 0
Hire on crockery	13	7 3	3 8 2
Postage charges recovered	15	2 0	88 15 0
Printing charges recovered	37	0 0	984 9 0
College Day subscriptions	427	2 0	8 12 6
Auction sale proceeds	4	9 7	25 4 0
Entrance fee for Sports	11	4 0	215 14 2
Entertainment	266	8 0	129 4 0
Current deposit withdrawn from Urban bank	1945	7 0	73 8 0
Building fund	58	0 0	164 7 8
	1945	7 0	1 0 0
	58	0 0	3131 7 11
			1000 0 0
	4527	14 4	6184 11 5
	1797	4 2	140 7 1
Add-Opening balance			Closing balance
	6325	2 6	Total Rs. ... 6325 2 6
Total Rs. ...	6325	2 6	Total Rs. ... 6325 2 6

APPENDIX III.

Balance Sheet of the Madras Agricultural Students' Union as it stood on 31st May 1929.

LIABILITIES.	Amount	ASSETS.	
Rs. A. P.	Amount	Rs. A. P.	Amount
Building Fund	... 58 0 0	CASH:—	
Excess of Income over expenditure for 1928-29	... 548 3 0	With Urban Bank (Ltd.) 1186-0-11	1326 8 0
Capital Fund	... 5329 12 3	Advance with Secretary 33-0-0	}
		On hand with treasurer 107-7-0	}
		Fixed deposits (towards Reserve Fund).	1000 0 0
		Do. (Ramasastralu-munagala prize).	693 7 3
		In fixed deposit with the Bank	... 500 0 0
		Furniture	... 35 0 0
		Drama materials	... 500 0 0
		Union flags	... 20 0 0
		Sports materials	... 20 0 0
		Old journals	... 20 0 0
		Crockery etc.	... 100 0 0
		Photos, light and typewriter	... 21 0 0
		Union Building	... 1700 0 0
Total Rs. ...	5935 15 3	Total Rs. ...	5935 15 3

APPENDIX IV.

College Day Account 1928-1929.

RECEIPTS.	Amount.	EXPENDITURE.	Amount.
	Rs. A. P.		Rs. A. P.
Donations	427 2 0	Reception expenses	215 14 2
Entertainment	266 8 0	Cost of prizes for sports	129 4 0
Auction sale	4 9 7	Miscellaneous	78 8 0
Entrance fee for sports	11 4 0	Entertainment:—	
		Printing charges ...	28—6—0
		Drama expenses ...	136—1—8
Total Rs. ...	709 7 7	Total Rs. ...	588 1 10

(27)

Journal Account 1928-29

RECEIPTS.	Amount.	EXPENDITURE.	Amount.
	Rs. A. P.		Rs. A. P.
Subscriptions	1557 1 6	Printing charges	973 9 0
Advertisement charges	57 0 0	Charges for preparing blocks	10 0 0
		Establishment	273 2 0
		Miscellaneous	1 0 0
Total Rs. ...	1594 1 6	Total Rs. ...	1257 11 0

K. S. Subramania Ayyar & C. V. Sankaranarayana Ayyar, Auditors.

APPENDIX V

Budget for 1929—30 of the Madras Agricultural Students' Union, Coimbatore.

RECEIPTS.	Amount.	EXPENDITURE.		Amount
	Rs. A. P.			Rs. A. P.
Cash balance	... 107 7 1	College day celebrations	...	500 0 0
Advance with Secretary	... 33 0 0	Repairs to building	...	25 0 0
Cash at Urban Bank	... 1186 0 0	Furniture	...	25 0 0
Fixed deposit	... 1000 0 0	Lighting charges	...	12 0 0
Fixed deposit (Ramasastrulu Muna gala prize)	... 693 7 3	Purchase of Stationery	...	20 0 0
Fixed deposit	... 500 0 0	Journal account	...	1000 0 0
College day subscriptions	... 500 0 0	Ground rent	...	0 8 0
Journal subscriptions	... 800 0 0	Peon's wages	...	130 0 0
Collection of arrear subscription	... 125 8 0	Postage charges.	...	80 0 0
		Miscellaneous	...	5 0 0

		Closing balance		... 1797 8 0

Total Rs. ...	4955 6 4			... 3157 14 0
		Total Rs. ...		4955 6 4

M. C. Cherian, Secretary

DEPARTMENTAL NOTIFICATIONS.

GAZETTED ;—

Mr. C. Tadulingam, Principal, leave on average pay for 4 months and leave on half-average pay for two years from 1st September. Mr. P. H. Ramareddi, Vice-Principal to act as Principal. Mr. J. H. Hensman Auditor, Accountant General's office to be Personal Assistant to the Principal. Mr. T. V. Subramanya Ayyar, Entomological Assistant to be Assistant Entomologist on probation. Mr. H. E. R. Dunhill, Assistant Agricultural Engineer, extension of leave on average pay for one month and 8 days from 24th May. Mr. K. S. Viswanatha Ayyar, Assistant Agricultural Chemist, leave on average pay for 3 months and one day from 1st July. Mr. P. A. Raghunathaswami Ayyangar, assistant to act as Assistant Agricultural Chemist. Mr. P. H. Ramareddi, Vice-Principal, leave on average pay for 12 days from 23rd June.

NON-GAZETTED :—

Appointments, transfers etc.—

Mr. B. N. Padmanabha Ayyar to be temporary assistant on Rs. 85 in connexion with the subsidised manurial experiments at Paddy Breeding station, Maruteru. Mr. V. Ramaswami Mudaliyar to be temporary assistant for work on Herbaceum cotton. Mr. S. V. Kuppuswami to officiate as assistant, chemistry section. Mr. A. Chinnatambi Pillai, demonstrator, to be farm manager, Agricultural Middle School Usilampatty. Mr. A. K. Ganesha Ayyar is transferred to Madura. Mr. T. V. Ayyaswami Ayyar, demonstrator, from Srivaikuntam to Sankarankoil. Mr. V. G. Dhanakoti Raju from Live-stock section to Ambasamudrum. Mr. P. Kannappa Pillai to Melur on relief.

LEAVE :—

Second circle. Mr. V. Achyutham, assistant demonstrator, Bapatla extension of leave on average pay for 2 days. Mr. V. Ratnaji Rao demonstrator, extension of leave on average pay for 5 days.

Third circle. Mr. K. Raghavachari, Manager, extension of leave on average pay for 5 days and leave on half-average pay for days. Mr. K. T. Bhandary, demonstrator, extension of leave on average pay for 2 days; Mr. C. Subbarao Naidu, assistant demonstrator, extension of leave on average pay on medical certificate for 4 months.

Fourth circle. Mr. Gopalan, manager, Palur, leave on average pay for one month from 20th July.

Fifth circle. Mr. V. Krishna Rao, demonstrator, Perambalur, leave on average pay for 2 months on medical certificate from 8th July.

Sixth circle. Mr. P. R. Subramanya Ayyar, assistant demonstrator extension of leave not due on half-average pay for 22 days from 16th July 1929. Mr. L. Sankarakumara Pillai, leave on average pay on medical certificate for two months from date of relief. Mr. C. J. Balraj, assistant demonstrator, Teni leave on average pay for three weeks from 1st August 1929.

Seventh circle. Mr. P. Kannan Nambiyar, assistant demonstrator, leave on average pay for 2 weeks from 11th July 1929.

Live-stock section. Mr. M. Alaghiriswami Naidu, leave on average pay for 15 days. Mr. M. C. Menon, manager leave on average pay for 3 weeks.

G. S. B. section. Mr. M. Ratnavelu, sub assistant leave on average pay for 16 days from 28th June 1929.

Principal's section. Mr. M. Raman, Manager, leave on average pay for one month from 22nd July 1929.

The Cardamom Planter

A TAMIL MONTHLY

Organ of the Travancore Cardamom Planters' Association

Editor and Publisher :—R. NARAYANASWAMI NAIDU,

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ANNUAL REPORT
OF THE
Madras Agricultural Students' Union.
For 1928-29.

Mr. President, ladies and gentlemen,

The Working Committee of the Madras Agricultural Students' Union begs to submit its report for the year ending 30th June 1929.

The 19th College Day and Conference were held from 7th to the 13th July. His Excellency Viscount Goschen until recently our Governor and now Viceroy and Governor General of India was graciously pleased to open the Conference on the 9th. After a short welcome speech by the Principal and the reading of the report by the Secretary, His Excellency the President delivered a stirring address in which he referred to the very useful recommendations of the Royal Commission on Agriculture and promised that His Government would give immediate and sympathetic consideration to their recommendations. This over, Viscountess Goschen who also graced the occasion very kindly gave away the prizes to successful students in the examinations.

Of the 26 papers which were presented to the Conference five papers which formed the symposium on Paddy were first taken up. A very interesting discussion ensued. As their Excellencies had to leave hurriedly the same evening to proceed on their tour to Anantapur, Mr. R. D. Anstead in a fitting speech gave expression to the feeling of thankfulness of the Union to their Excellencies. Their Excellencies sat for a group photograph with members of the Union before they left Coimbatore. During the interval Mr. E. F. Thomas, the Collector, occupied the Presidential chair and guided the discussion.

The second and third sessions of the Conference were very kindly presided over by Mr. Anstead. The committee takes this opportunity of publicly thanking their Excellencies for their kind interest in matters agricultural and the affairs of the Union and also Mr. Thomas.

The sports were held on the 7th July. The weather was ideal. All the events were keenly contested for. The champion of the year was Mahomad Ali of Class II. The Committee tenders its grateful thanks to Mrs. Anstead for kindly giving away the prizes.

During the College day week the staff and students of the College staged four plays in English, Tamil, Telugu and Malayalam.

The Cricket Match between the visitors and the residents which ended in a draw was kindly arranged by the Agricultural Officers' Cricket Club, for which the Committee thanks them.

On the 2nd day of the Conference the officers of the Nitrauns Limited had a friendly discussion with the officers of the Department.

With the business meeting on the 13th July the proceedings came to a close.

Royal Commission on Agriculture. The recommendations of the Royal Commission on Agriculture bore fruit during the year. We hope that the Agricultural Research Council which has recently been brought into existence will bring in an era of happiness and prosperity to the Indian ryot. In this connection we are glad to announce that Dewan Bahadur Sir T. Vijayaragavachari, Vice Chairman of the Research Council has kindly accepted the Honorary membership of our Union.

The Provincial Governments also are alert in the matter. Madras is the first Province to constitute its local committee and this is mainly due to His Excellency Viscount Goschen and the Minister for Development, the Hon'ble Mr. Seturatnam Iyer.

Popular lectures. During the year under review arrangements were made by the Committee for popular lectures by prominent public men. One such lecture was delivered by Mr. K. T. Paul, B. A., O. B. E., National Secretary of the Y. M. C. A. of India, Burma and Ceylon, on "the recommendations of the Royal Commission on Agriculture" The beginning thus made, the outgoing committee hopes, will continue to engage the attention of its successors.

Journal. With the emergence of the Journal under the new title "The Madras Agricultural Journal," the Committee hopes that it has entered on a fresh era of life. The size as well as the scope of the Journal has been enlarged and the committee trusts that with this change it will now attract more readers and serve a more useful purpose.

Finance. The finances of the Union continue to be satisfactory. The suggestions of the Arrears Committee appointed by the General Body were considered by the Working Committee and carried out as far as possible. The balance sheet shows that the cash on hand and deposits in Bank, amount to Rs. 3519-15-4. The details will as usual be submitted at the Business meeting.

Revision of rules. The working committee on the recommendations made by certain members of the Union appointed a Sub-committee to revise its rules. These have now been published for consideration at the business meeting.

Ramasastrulu Munagala Prize. For the Ramasastrulu Munagala Prize only one paper was tendered and this was valued by a committee consisting of Messrs. P. H. Rama Reddi, D. G. Munro and V. Muthuswami Iyer, and considered not up to the mark. The successive working committees have felt some concern regarding the scope of the papers intended for presentation for the prize. This committee hopes that some arrangements will be made to make the prize more attractive and useful in other ways.

Obituary. The committee regrets very much to record the deaths during the year of two of its patrons the Raja of Ramnad and Mr. N. R. Malayandi Chettiar, one of its honorary members, Rao Bahadur N. Krishnaswami Iyengar and one of the student members Mr. R. Krishnamoorthi Rao, B. A. The Raja of Ramnad was our patron for several years. As the President of the Tamil University Commission, as a member of the Legislative Council and of the Land-holders Association his services were invaluable and his loss is deeply felt by the Union and by the landed interests generally. Mr. Chettiar was an enlightened landlord and public man. Rao Bahadur N.

Krishnaswami Iyengar was an honorary member of the Union for several years. Mr. Krishnamoorthy Rao was one of the very promising students of his class and was holding a scholarship.

Personal. Mr. and Mrs. Anstead who have been taking very great interest in the Union ever since their arrival at Coimbatore are, we regret to note, leaving us in September next. Mr. Anstead has been our Director for nearly seven years, a period much longer than that of any predecessor of his. By his agreeable manners and talent for clear exposition he has contributed a great deal to the popularisation of the Department. In token of the high regard which the Union has for him for his continued interest in its affairs, the council of the Union is presenting a portrait enlargement of Mr. Anstead to the College.

We hope and trust that Mr. Anstead's successor who is in our midst today will also evince a similar interest in the affairs of the Union.

We are gratified to see it announced that our President Mr. C. Tadulingam has been elected to the Imperial Council of Agricultural Research by the Inter-University Board. He has been one of the most zealous workers of the Union since its inception and has served the Union in various capacities. He is going on leave for two years. We are sorry his helpful guidance will not be available to the Union during this period.

The Union offers its congratulations to Rao Bahadur B. Visvanath on the recent honour conferred on him by the Government, and to Messrs. K. Venkata Rao Badami and C. J. George for their being awarded the Ph. D., degree by the Cambridge and London Universities respectively and to Mr. K. Ramiah for having secured the M. Sc., degree from Cambridge.

One of our members Rao Bahadur T.S. Venkataraman is now on two months deputation in distant Java to attend the International Sugar Technologists Conference, and our greetings go to him.

In conclusion, the committee wishes to thank all the ladies and gentlemen who helped the Union in various ways to make the College Day and Conference, a success.

M. C. CHERIAN,

Secretary.