

economic transplanting of paddy and green manures and his work bore such remarkable results that he was known in the district as the "single seedling Iyer". He is still remembered in the District for the good work done by him then. He worked for 4 years at the Agricultural College as an assistant to the Entomologist. Later on, he was appointed chief teaching assistant at the Agricultural College and was promoted to the gazetted rank in 1918. He was for a number of years in charge of the Cambodia Cotton Improvement work in Coimbatore, which developed rapidly under his careful supervision. As Deputy Director of Agriculture, Coimbatore, he was responsible for developing and shaping the potato agricultural station, Nanjanad. He took enormous pains to introduce cattle power and labour saving implements in the cultivation of potatoes on the Nilgiris. His services were placed for some time at the disposal of the Co-operative Department for the development of the Co-operative Loan and Sales Societies in the Presidency.

During the last 18 months of his service he was at Madras as the Headquarters Deputy Director of Agriculture assisting the Director of Agriculture. Wherever he worked he earned a good name for his enthusiasm and earnestness in his activities.

As a mark of appreciation of the good work done for the Agricultural Department he was awarded by the Government the title of Rao Sahib in January this year. He retired from service on 17th November after 33 years of active and loyal service. We wish him long life and well earned rest.

SCHEME FOR ECONOMIC DEVELOPMENT OF MADRAS PRESIDENCY*

Recommendations of the Agricultural Development Committee of the Provincial Economic Council.

The Provincial Economic Council Sub-Committee which considered problems relating to the improvement of Agriculture and the economic development of the Presidency has submitted its report.

The Sub-Committee consisted of the Hon. Mr. P. T. Rajan, Minister for Development, (Chairman), Rao Bahadur D. Ananda Rao, Director of Agriculture, Mr. T. Austin, Mr. T. A. Whitehead, Mr. F. M. Dowley, Mr. P. T. Saunders, Dr. P. J. Thomas, Dr. B. V. Narayanaswami Naidu, Mr. T. A. Ramalingam Chettiar, Mr. C. V. S. Narasimharazu, Mr. A. Ranganatha Mudaliar, Mr. A. B. Shetty, Mr. V. Subbiah Mudaliar, Mr. Hunterboyd, the Rev. Father Basenach, Mr. R. M. Palat, and Rao Bahadur C. J. Paul (Secretary).

Mr. T. A. Ramalingam Chettiar has submitted a short minute of dissent.

The Committee which was appointed in November 1936 considered the following subjects.

(1) The preparation of a ten year plan for development of agriculture in order to make the Province self-supporting in the matter of agricultural production.

* Reproduced from the Madras Mail, dated 17th November 1936.

(2) Ways and means to co-ordinate the work of the various agencies for agricultural credit and the steps to be taken to give effect to the recommendations contained in Mr. M. Sathianathan's report on agricultural indebtedness,

(3) The standardisation of ways and measures, and

(4) Proposals for a consolidation of agricultural holdings and the prevention of fragmentation.

Four Sub-Committees were appointed to consider these different problems. Sub-Committee I, which had the Director of Agriculture as its convenor, was to deal with (1) the expansion of agriculture; (2) the improvement of cattle; (3) regeneration of fodder grasses; reduction of grazing fees and production of leaf manures; and (4) consolidation of agricultural holdings and prevention of fragmentation.

Sub-Committee II which had the chief Engineer for Irrigation as the convenor, was to report on: (1) extension of irrigation facilities for the development of agriculture; (2) irrigation wells (3) sinking of irrigation wells in river beds and (4) comparative sinking of irrigation wells.

The Director of Industries was the convenor of Sub-Committee III which was to consider (1) extension of the cultivation of sugarcane in the Tanjore district; (2) fruit preservation and canning; (3) the dairy industry in India, milk, powder and like products, and (4) the open pan system of sugar manufacture.

Sub-Committee IV with the Registrar of Co-operative societies for its convenor was to examine (1) the facilities offered by co-operative credit societies, co-operative loan and sale societies and land mortgage banks to the ryots for agricultural and other purposes; (2) how the agencies for agricultural credit are now correlated and how they can be further co-ordinated; (3) Mr. Satyanathan's report on agricultural indebtedness; and (4) the recommendations of the Madras Provincial Banking Enquiry Committee.

The main Committee reserved for consideration by themselves the question of "Weights and Measures".

The several Sub-Committees concluded their labours by the end of April and submitted their reports. The main Sub-Committee considered these reports and reached the following conclusions.

Agricultural Produce. "Many of us do not consider it feasible to make the province self supporting in the matter of agricultural produce", say the Committee. "But we all agree that in view of the growing population of the province there is need for a larger internal supply of rice and other food-stuffs and that it must be the aim of Government to increase the production from the land now cultivated and to bring new land under cultivation.

A five-year plan was drawn up by Sub-Committee II, with this object in view. We are aware that plans and programmes framed years in advance will have to be modified to suit changing conditions and circumstances but this should not deter Government from framing any at all.

Improved seed. We consider that the Agricultural Department should grow in Government farms pure and improved strains of seed stock and sell them to the cultivators. We are convinced that the seed produced at these farms will not be adequate to meet even a small fraction of the requirements of the ryots. The additional seed material required should be secured by the department entering into agreement with the grower, the terms of the agreement being:—

(i) that he will grow, harvest and stock the contracted quantity of seed under departmental control and direction and sell the same as seed material, and

(ii) that he shall be paid a definite rate of fair compensation for such portion of his seed material as remains unsold.

When the supply by this method is also likely to prove insufficient, the department should buy, stock and sell the balance of the required quantity. The Deputy Directors of Agriculture should be authorised to fix the premium rates as may be fixed by the Director from time to time.

Paddy Breeding Stations. "In our view two more Paddy Breeding Stations should be opened, one in the Vizagapatam District and the other in the Chingleput District for evolving semi-dry, dry, and drought resistant varieties of paddy and varieties suitable for cultivation in the months of September and October in the South-West monsoon. We also consider that small sub-stations for paddy should be opened in the Kistna delta, Nellore, Periyar tract of Madura, Tinnevely and South Kanara. The Godavary Agency offers room for great development and a farm may be started in that area for work on wheat, fruit and other crops suitable to the locality.

The departmental work so far as coconut is concerned, is now practically confined to the West Coast and in view of the large extent of the area under coconut in the Circars, the Committee consider that the Director of Agriculture should be instructed to pay immediate attention to the question of opening a coconut station in Godavari. In this connection we examined the position of the coconut industry in South India and being convinced that the dumping of coconuts from abroad has had very prejudicial effect on the local industry, recommend that an increased import duty be imposed on copra, coconut and coconut oil.

Tobacco Farm. "In our view there is urgent need for introduction of improved varieties of tobacco required for cigars. The Circars afford ample scope for experiments in this direction.

"We recommend that a Cigar Tobacco Farm be opened in a suitable place in the Presidency".

It has been represented to us that the agricultural stations at Samalkota, Aduthurai and Pattukottai are hardly large enough for the work to be done at these places. We accordingly recommend that the area in these farms be increased by 35, 15 and 15 acres respectively.

We are glad to note the work being done for encouraging fruit cultivation. We consider, however, that to each agricultural station where climatic and soil conditions permit a fruit section should be attached by extending the station, if necessary.

Propaganda Measures. We are convinced that propaganda and publicity require greater attention and closer coordination.

"We therefore recommend strongly the appointment of a Deputy Director to be in charge of publicity. To aid in the dissemination of new ideas and practices, associations of agriculturists and others interested in the development and improvement of agriculture should be formed in every important village and for every firka, with a central association to coordinate and guide the work of the various local associations.

The assistance of Revenue and Agricultural Officers should be made freely available in the working of these associations. These associations may work under the auspices of the District Economic Councils. The membership of the associations should be limited to actual cultivators, owners of land who cultivate it by hired labour and those who contribute to the funds of the association.

Another effective means of propaganda is the visual representation of the improvements through exhibition vans and films. We understand that the Agricultural Department has already been doing some work in this direction. We recommend that a suitable cinephotographic and projection equipment be purchased and arrangements made for the production of suitable films for propaganda purposes.

"Each assistant director of agriculture should have a motor cinema van. Each agricultural demonstrator should have a well equipped depot from which he should be in a position to supply ryots with improved seeds and agricultural implements such as ploughs, cultivators, chaff-cutters, bund farmers, hand-hoes, dusting appliances, sprayers etc.

Rural Uplift. "To improve the condition of the rural masses should be the predominant aim of the Agricultural Department. We recommend that trained rural guides be appointed, one for each group of villages to work under the guidance of the District Economic Council. It will be the duty of these rural guides to spread improved strains of seeds and better methods of cultivation, to demonstrate suitable subsidiary industries in the villages, to improve the health and sanitation of the village, to effect reform of diet, to organize farmers' clubs and rural amusements, to improve the artistic side of village life, to improve the livestock in villages and to interest the villagers in the work of rural uplift by all kinds of propaganda. The local officers of all the development departments—Agriculture, Veterinary, Industries, Education and Public Health should render them all the help they can.

"A start has already been made in the Vizagapatam District where concentrated work is being done by demonstration maistries in 9 taluks. The existence of the Agricultural department is being felt by the ryots who have begun to appreciate the work of this department and to take advantage of the presence of the maistries amongst them. It may not be possible to introduce these guides in all parts of the presidency at once. One or two taluks may be selected in each district for the present and the scheme may, if successful, be gradually extended to the entire Presidency in the course of about 10 years.

"The training of rural guides should be the concern of the Provincial Government and we recommend that immediate steps be taken for their training in suitable centres, preferably in agricultural farms and schools, the district staff of the various development departments being used for giving the training.

"The value of cottage industries to improve the economic condition of the ryot has often been emphasized. Effective steps should be taken early to develop these industries. Special officers and committees have examined the question of subsidiary industries in the past. *We feel that there can be no justification for delay in drawing up a plan or programme of work.*

"The evils of fragmented holdings have been long recognised and suggestions have been repeatedly made for the consolidation of holdings. The problem however, is not so acute in the Madras Presidency as in some other parts of India. So far as this Presidency is concerned, we agree with the opinion expressed by the Revenue Commissioner that the experiment should proceed on the line of consolidation of cultivation rather than of consolidation of holdings and, accordingly, recommend that consolidation of cultivation on a large scale on a co-operative basis be encouraged with a view to forming large-scale farms.

"In view of the prevailing unemployment and the likelihood of its assuming greater proportions in the future, we consider that steps should be taken to divert the attention of the educated youth to agricultural pursuits and that facilities should be made available to them.

Land Colonization Scheme. "Land Colonization Schemes for Harijans and unemployed boys, especially those who have passed out of the Agricultural Schools and College should be formulated.

"The Agricultural Department should investigate the question of growing suitable and remunerative crops on the cultivable waste lands available in each

district. A survey of waste lands should be made; the possibility of cultivation by tractors should also be examined.

"Our attention was also drawn to the damage caused to crops by wild animals. We consider that some assistance should be afforded to owners of land in such areas to fence their lands; if the owners refuse to take concerted action, powers should be given to village panchayats to carry out the work provided the owners of not less than two-thirds of the area demand it, the charges being divided amongst them in proportion to the extent of the land owned by each.

"A suggestion was made to the effect that agricultural graduates should be trained in Economics as the business aspect of agriculture is of great importance. We were divided on this question. We agreed, however, to request the Director of Agriculture to examine the system carefully and to take necessary action.

Training in Agriculture. "In order to give an agricultural bias to education, we consider that wherever elementary training schools are located near an agricultural farm, facilities should be provided in that farm for the training of the pupil teachers in agriculture and that in other cases, arrangements should be made at the agricultural stations for the training of teachers deputed by local bodies.

"We also regard it as essential that an agricultural graduate should be appointed in every High School to supervise and conduct gardening classes to teach nature study and generally to give an agricultural bent of mind to the students.

"We consider that with a view to expeditious disposal of applications for *takkavi* loans, Deputy Directors of Agriculture should be empowered to grant loans up to Rs. 250 to purchase seed and agricultural implements.

"Finally we agree with the other recommendations contained in the five year programme of expansion and suggest that Government should take up the various recommendations we have made in regard to the expansion of the activities of the Agricultural Department and others included in that programme for very early consideration.

"When our recommendations are given effect to, the work of the Department will have expanded considerably. To cope with that increase and achieve full and effective results the staff of the Department should be augmented in the following directions :—

"(1) There should be at least one Assistant Director of Agriculture in each district so that more effective control over the work of agricultural demonstrators can be secured. The question of the need for having eight circles should be examined with a view to reducing their number.

"(2) We understand that Government have recently sanctioned an addition to the strength of demonstrators and that it will now be possible to station one demonstrator in each taluk. We desire that in view of the importance of fruit culture, the expansion of which we have recommended elsewhere, an extra demonstrator should be employed in such of the agricultural stations where experiments on fruit culture have been or would be undertaken.

"(3) We also consider that there should be an assistant to be in sole charge of seed selection work and cultivation of improved strains in millets particularly in the I Circle.

"(4) The posting of a demonstrator for each taluk will not by itself bring about the much needed link between the department and the ryot and in the very nature of things it is impossible for the demonstrator to make prolonged halts and to pay frequent visits to the villages to the extent necessary to establish

and maintain close contact with, and sustain the interest of, the ryot in the improvements advocated. The system of employing maistries on a wide scale in the Vizagapatam district has had a salutary effect and real progress has been achieved in that district. We consider that at least one demonstration maistry should be attached to each firka or unit of 25 villages whichever is less. We trust that Government will find it possible to provide this additional staff of maistries.

Live-stock Improvement. "Closely connected with the improvement of crops is the question of the improvement of cattle. Its importance can be easily gauged by a remark of His Excellency the Viceroy when he presented two pedigree bulls at New Delhi. 'The cow and the working bullock' he said, 'have on their patient backs the whole structure of Indian agriculture.' The breeding of cattle has been undertaken by Government and the main efforts of the department are now concentrated in Hosur though some work is carried on in Guntur. Dairy herds are maintained at Hosur and Coimbatore. It is unfortunate that the axe of retrenchment should have fallen so heavily on the livestock section. The fine herds of Ongole, bred at considerable expense at Chintaladevi had to be dispersed on the abolition of that farm. We feel that the supply of bulls by the Agricultural Department has in the past been so small that it is imperative to increase rapidly the number of cattle breeding stations in the breeding areas of the Presidency.

"We recommend that a farm be opened in Guntur, in addition to the buffalo-farm which, we learn, is contemplated at Prattur. Another farm may be opened at Vizagapatam for the improvement of the Ongoles. The Kangayams may receive attention at Madura. After the question of improvement of pasture has received the attention of the authorities, the question of starting a breeding station in the West Coast may be considered. Sheep and goats should be added in future wherever suitable.

"Beyond providing the nucleus of pure bred bulls and heifers, no substantial advance can be made through these farms towards the general improvement of the livestock in the Presidency. To effect systematic improvement of livestock other measures have to be taken. Disease control, castration and propaganda have all their share.

Provision of Breeding Bulls. "The main question, however, is the provision of sufficient breeding bulls of the right type. The Government should in our view, select suitable bull calves, purchase them from the ryots, maintain them at their agricultural farms and sell them, when old enough, as breeding bulls. The Government should also encourage the formation of co-operative societies for purchasing suitable calves, and for rearing and selling them as breeding bulls.

"Ryots may also be encouraged to do this with the hope of ultimate purchase by the Government.

"The future work should be mainly concerned with the improvement of stock in the villages. With this end in view, breeding bulls should be distributed to important institutions and individuals who are prepared to undertake their maintenance for the benefit of the public.

"Liberal grants-in-aid should be given to District Boards, Panchayats, Co-operative Societies and private citizens for the purchase and maintenance of breeding bulls. We should aim at supplying at least one bull for each unit of a cow population of 150.

"We attach great importance to cattle shows as a means of improving the breed of cattle. Cattle shows should be organized at least once in every year in

each district under the auspices of the District Economic Council. Intensive propaganda should be carried on through agricultural associations towards the same.

"No permanent improvement can be effected in the breed of our cattle unless energetic action is taken by the authorities to put the scrub bull out of action when necessary. We are of the opinion that Government should take powers to introduce compulsory castration of scrub bulls when in any particular locality there is a sufficiency of breeding bulls.

Livestock Section. "The Committee also examined the question of the future control of the livestock section. The question was whether the livestock section should remain under the Agricultural Department, whether it should be transferred to the Veterinary Department, or whether it should be made an independent section. The subject was considered in all its aspects. The problem really is a matter of administrative convenience. It should be remembered that neither department is complete, but each is complementary to the other under the control of the Minister.

"What is required to-day is an Expert Animal Husbandry Organization, able to carry on scientific breeding control in the villages, combined with systematic castration and disease-control and to ensure that adequate encouragement is given to the conservation and development of natural grazing areas.

"We leave it to the Government to decide the agency to carry out the aim we have in view. Our policy should be to breed cattle for speed and working capacity in the natural grazing areas and, concurrently, along with the systematic development of a dairy industry, to breed cattle in suitable areas strictly for the highest possible milk yields.

Veterinary Work. "We considered the question of expansion of the Veterinary Department, with a view to making its usefulness increasingly felt in the matter of control of contagious and other diseases. Contagious diseases have no doubt been on the decline in the last few years. We are of the opinion that there should be at least one officer in charge of veterinary matters in each district.

"Our attention has been drawn to the desirability of extending veterinary relief more in the direction of providing touring assistants than by increasing the number of veterinary hospitals or dispensaries, as the touring assistant brings relief to the very doors of the ryots. We feel that the Government should endeavour to provide one veterinary dispensary and a touring assistant for each taluk.

"We however, agree that the extension of veterinary dispensaries should be on a contributory basis. Preference should, therefore, be given to localities where the local body or the local landholder is prepared to contribute at least 30 per cent of the capital and maintenance charges.

"With this increase of staff we feel that it may not be possible for the Director of Veterinary Services to control the department effectively. We accordingly recommend that he should be given two Deputy Directors, one for the Northern Division and the other for the Southern Division.

"We also consider that in view of the importance of the work that is being done by the Veterinary Investigation Officer, the Government should consider the question of addressing the Imperial Council of Agricultural Research for the retention of that post for another five years.

"We are convinced that the work of castration, inoculation and treatment of minor ailments can be entrusted to a much cheaper agency than Veterinary Assistant Surgeons. We are also of opinion that the maistries employed by the

Agricultural Department should be utilized for this purpose. We accordingly recommend that short courses of training lasting from three to six months be introduced in select veterinary institutions where the agricultural maistry as well as sons of agriculturists and landlords may be trained.

Grazing and Fodder. "A general improvement in the condition of cattle involves the consideration of the improvement of grass and fodder supply. Similarly, the question of improvement of crops involves a consideration of the supply of green manure. We are aware that the question of grazing fees and supply of green manure from forests has often been debated. It has been held by a few that the rates charged by the department at present should be reduced and brought to a uniform level. On the other hand, it has been contended with equal force that the reduction of rates will, instead, prove detrimental to the interests of the cultivator and cattle breeders. The departmental forests now serve mostly our silvicultural needs, the panchayat forests being specially and mainly intended to serve for grazing. The departmental forests have not however, been altogether closed to grazing. A large number of animals are allowed to graze on permits from the department. We have no recommendations to make on the subject of grazing fees.

"As for the supply of green manure, we are of opinion that in the case of fuel forests where cutting is done by coupes, the coupes should be sold three months in advance of the year of cutting, the contractor being permitted during these three months to remove and sell green leaf for manure.

The forest panchayaths should be induced by reduction or remission of rent in deserving cases to grow green manure crops like wild indigo and other trees for green leaf manure.

"We understand that manure leaf plantations have already been started by the Forest Department. If the experiment turns out a success the question of starting similar plantations in Panchayat forests should be examined.

Irrigation Facilities. "No schemes for the improvement of Agriculture can be carried through without proper attention being paid to the questions of irrigation and the extension of irrigation facilities now available to the ryots. We agree with Sub-Committee II that a systematic and continuous effort should be made to carry out further drainage improvements where necessary, that drainage schemes should be considered as part and parcel of the concerned irrigation systems and that they should be sanctioned without reference to the question of direct and immediate return to Government in the shape of savings in remissions, and that no demands for contribution should be made from the interested parties.

"We also agree with the Sub-Committee that water rates under an irrigation system should be levied on a uniform basis and that extensions of irrigation should, for the purpose of working out the financial return from the scheme be considered as forming part of the original scheme. The Tank Restoration Scheme parties should be revived and the investigation and execution of the works required to improve the numerous tanks yet to be investigated should be pushed through as expeditiously as possible. We endorse the recommendations of the Sub-Committee in regard to minor irrigation works, Kudimaramat, reduction of the minimum return prescribed for productive and unproductive irrigation works, the financing of productive works from 'Loan Funds' and further investigation of the abandoned schemes of irrigation, especially the four schemes referred to by the Sub-Committee.

"We draw attention, in particular to the need for examining the question of the improvement of tanks in Malabar and South Kanara. In regard to the possibilities of extending irrigation facilities by sinking wells in river beds

we agree with the Sub-Committee that where the interests of existing irrigation are not affected, irrigation from such wells should be encouraged by Government who should charge only a nominal water rate in order to maintain their rights over the water. Further, the same procedure should be adopted when water is taken from a spring channel.

Underground Water Resources. "The question of the survey of the underground water resources was considered. The work that has so far been done is negligible. It is essential to make a thorough survey of the underground water resources of the Presidency with the aid of a geologist to be deputed by the Government of India. The services of water diviners should be requisitioned only in respect of the areas selected by the geologist. Work should be taken up in a limited area—say two or three districts, one dry and one Coast district—in the first instance and extended to the whole Presidency gradually. We also agree that further experiments should be made in the red soil areas of the Ceded Districts, these experiments being extended to other districts only if the results prove favourable.

"We agree with the view of the Sub-Committee in regard to the remission of charges incurred in sinking wells and putting down bore holes in unsuccessful cases. We approve of the recommendations of the Sub-Committee that Government should themselves sink wells and distribute water for irrigation, charging a suitable water-rate for the service rendered.

"In the interest of sugarcane cultivation in the areas covered by the Cauvery-Mettur Project, we recommend that a survey be made of the underground water resources by putting down bore holes at select centres free of charge. If the results are satisfactory, *takkavi* loans should be granted to ryots for the sinking and construction of large wells. We also desire that the possibility of developing cultivation of the sugarcane crop in the area north of Kuttalam in the old Delta in Tanjore should be examined by the Agricultural Department as expeditiously as possible.

Fruit Preservation. "One of the Sub-Committees has, as already stated, considered the question relating to fruit preservation and canning, the possibility of adopting the open-pan system of sugar manufacture and the dairy industry as objects that could well be included in the scheme of agricultural development in the Presidency. We have already drawn attention to the imperative necessity for extending fruit culture in various parts of the Presidency and we have made recommendations for the employment of special staff to attend to these experiments. Fruit cultivation on any extensive scale is, however, impracticable unless a fruit preservation and canning industry is developed contemporaneously.

"We therefore, agree with the recommendations of the Sub-Committee that the Department of Agriculture should undertake research on fruit preservation on the lines recommended by it and that the Fruit Specialist should be asked to undertake research on two or three important kinds of fruit with a view to standardizing the manufacture of fruit juices and fruit syrups, bearing in mind the need for turning this industry into a cottage industry. A station for experiments on fruit preservation and canning should be attached to the research station recently opened by the Government in the Cuddapah district.

"We understand that the Government have received a report on the question of continuing the work initiated by the late Sir. F. A. Nicholson. We consider that Nicholson's work should be continued as part of the experimental work on fruits we have now recommended.

"We are of the opinion that short courses of training in fruit preservation and the preparation of juice, etc., should be provided in the Fruit Research Stations at Cuddapah and Coonoor.

Sugar Manufacture. "We agree that the open-pan method of sugar manufacture is uneconomic. As regards palmyra sugar, the proposal which, we understand, the Director of Industries has submitted for the demonstration of white sugar and improved jaggery from palmyra juice in the West Godavari District, should be favourably considered and that if the demonstration is successful, cooperative societies of tappers should be organized for this purpose, not only in West Godavari but also in Tinnevely District.

"We agree with the conclusions of the Sub-Committee that there is no need to initiate any experiments in regard to the manufacture of sugar from the juice of coconut palm.

"As regards manufacture of activated charcoal used in decolourisation processes, we understand, that both the Departments of Agriculture and Industries have been carrying on experiments with a view to placing in the hands of the ryot an efficient and simple method of cleaning jaggery and rab by methods which will be within his means.

"The activated carbon process for preparing sugarcane products clarifies and decolorises sugarcane juice to an extent which was not possible before and enables a better quality jaggery to be prepared.

"The Department of Agriculture has successfully demonstrated the manufacture of activated charcoal from paddy husk and is at present engaged in manufacturing it from groundnut husk. The Department of Industries has, on the other hand, concentrated its attention on the manufacture of vegetable activated charcoal by processing spent tanning materials. We recommend that small-scale manufacture of activated charcoal from paddy husk, groundnut husk and spent tanning materials should be undertaken with a view to ascertaining definitely the economics of the processes employed.

Molasses. "We examined the several methods, in which molasses may be disposed of. Molasses is now being exported in tankers to Europe where it is used not only for the production of industrial alcohol and by yeast makers but also as an ingredient for cattle foods. In Mysore experiments are in progress in regard to the use of molasses as a road surfacing material. They can also be used in the boiler furnaces of sugar mills, but satisfactory furnaces which will overcome the clinkering difficulty have yet to be evolved. In India we should introduce legislation making it compulsory to mix a certain proportion of industrial alcohol with petrol but this proposal, we understand, has been turned down by the Government of India.

"Another possible way of utilising molasses produced by sugar factories situated not far from ports would be to manufacture butyl alcohol by the direct fermentation process. Butyl alcohol is becoming of increasing importance as it is widely used in the varnish and lacquer industries. By the same process acetone and ethyl alcohol are also produced whilst hydrogen and CO_2 are obtained as by-products. The possibility of attaching a factory for manufacture of these chemicals to a sugar mill located within easy distance of a port seems to be worthy of detailed examination.

"Molasses could also be usefully added to the diet of cattle. We feel that experiments should be carried on in this direction and we recommend the offer of Messrs. Parry & Co., to supply up to five tons of molasses free from their Samalkota factory for experimental purposes be accepted with thanks. Molasses is also useful as manure. Experiments carried on at Allahabad seem to indicate that molasses is a useful fertilizer and reclaiming agent for alkaline soils. We recommend that the Agricultural Department initiate experiment without delay to find out the possibilities of molasses as a fertilizer.

Sugar Prices. "We view with grave anxiety the fact of Holland having gone off the gold Standard and devalued the guilder. This news has caused considerable disquiet among people interested in sugarcane growing and in sugar manufacture. Already the prices of sugar have been steadily falling for some months past, and if the fall continues, there is little doubt that the prices paid to the cultivator for cane will be seriously reduced. At this juncture particularly, a depreciated currency will increase the competitive power of Java very considerably.

"And we are of opinion that measures should be taken in time to meet the contingency of Java sugar being imported to India at cheap prices to the possible ruin of the few sugar factories that have just been started under cover of the protection afforded to the industry and incidentally of the sugarcane grower.

We accordingly by a majority passed the following resolution :—

"This Sub-Committee recommend that the Government of India be addressed to take necessary steps to counteract the effects on sugar prices of devaluation of guilder."

Agencies for Agricultural Credit. "The subject of Agricultural Credit also received our close attention. We agree that the Government agency for lending money is cheaper and speedier than any other agency, cooperative or otherwise, and approve the following Suggestions to make the cooperative agency quicker,

"(a) Introduction of the system of forecast loans. Sufficiently in advance of the cultivation season each society should prepare as carefully as possible an accurate forecast of the requirements of its members for cultivation, purchase of seed, manure, payment of kist, etc., for the whole year. The normal requirements of the society for the whole year should be arrived at and a loan application for the amount so arrived at should be sent to the Central Bank in instalment after executing the necessary bond, and make it available to members as and when there is actual need. Interest will be charged by the Central Bank on the amount drawn from time to time only. The Central Bank should remit the money to the society promptly without requiring any fresh formalities.

(b) "Supply of Agricultural implements, etc.,—Where facilities exist agricultural implements, etc., may be supplied to the ryot by debiting to the member's account through Co-operative Inspector or Agricultural demonstrator. Loans for purchase of implements, etc., need not be disbursed in cash to members. The Agricultural department ordinarily runs a depot at each taluk headquarters or at other central places. The demonstrator in charge of each depot may obtain, with the help of the supervisor of the local co-operative supervising union, an indent of the requirements of members of societies in the area and may supply the articles direct. The cost of the articles so supplied may be adjusted out of the loan sanctioned by the Central Bank to the societies. On the advice of slips issued by the demonstrator, the societies may debit the accounts of members with the cost of articles supplied to each.

(c) Joint indent system.—Similarly other requirements of members may be obtained on a joint indent system with advantage.

(d) The payment of kist loans by Central Banks into the treasury.—Loans for payment of kist need not be paid in cash. As and when instalments of kist fall due, the Central Bank on receipt of a list of kist dues of members of a society may pay the amount directly into the treasury and advise the Tahsildar and the society to make necessary entries in their respective accounts.

Crop Loans. "On the question of granting crop loans to agriculturists, we recommend "that the Departments of Agriculture and Cooperation should encourage the formation of marketing warehouses in rural areas for agricultural product and make arrangements to give crop loans to the members that

undertake to bring their crop to the said warehouses for sale by or through warehouse officers.'

In particular, we consider it necessary to adopt a system of controlled credit as a means of avoiding overdues in cooperative societies. By controlled credit we mean that the loans must be granted in instalments during the different stages of cultivation on the basis of a forecast prepared in advance, that such loans must be made on the security of crops, and that the crops so secured must be marketed by a Loan and Sale society to which the cooperative primary society must be linked. In this manner, an incentive to better cultivation can be created, the ryots can be prevented from diverting loans for other purposes, an orderly marketing of produce can be carried out to the advantage of all parties and the repayment of cooperative loans will be assured. Such experiments have been tried in Cuddalore and in Salem and have succeeded to some extent,

"The need for a Central Committee consisting of the heads of the Revenue, Cooperative, Agricultural and Industries departments, with non-officials representing Cooperation, Banking, Agricultural Interests, and Economists to plan credit work in the Agricultural Cooperative and Industries department was also examined. We are of the opinion that such Central Committee should be established. We feel, however, that the Provincial Economic Council, if enlarged by the inclusion of non officials, may serve the purpose we have in view.

"To carry out the plans formulated by the Central Committee there should be a District Committee in each district. Such a committee should consist of the local officials concerned, the President of the Cooperative Central Bank and 2 or 3 nominated non-officials. We have no objection to the District Economic Councils being utilised for this purpose.

Board of Economic Inquiry. "We also considered the need for constituting a Board of Economic Inquiry. There can be no doubt as to the need for reliable and accurate information on agriculture and economic conditions in rural areas. The present arrangement of deputing an officer of the Government to undertake any economic inquiry that is considered necessary cannot be said to work very satisfactorily. In several of the Indian Provinces, there are standing Boards of Economic Inquiry. We fully realise that already there are too many Standing Committees. The Provincial Economic Council or a Committee thereof might function as a Board of Economic Inquiry and future enquiries should be conducted under its auspices.

"To measure the effect which any plan of development has on the economic condition of the people, it is essential that we know their present income and their standard of living. We suggest:—

"That an inquiry on the subject of rural income and standard of living, should be made by the Provincial Economic Council at an early date."

Weights and Measures. "We had the benefit of a note on the subject relating to the standardization of weights and measures prepared by the Development Secretariat. In the course of the discussions it was pointed out to us that under the reformed Constitution legislation regarding standardization of weights would be a matter for the Federal Legislature. After considering the necessity for legislation, at the present juncture, in regard to weights and measures, we, have come to the conclusion that the matter might well be deferred until after the inauguration of the new constitution,

"We would, in conclusion, emphasise that the recommendations and suggestions we have made in the foregoing paragraphs will involve an appreciable expenditure of money. We are convinced that if any effective and lasting progress is to be made and the lot of the agriculturists improved and their economic condition bettered, this expenditure is inevitable.

"We know that all the schemes and proposals cannot be immediately adopted and given effect to; but the Government may, after a consideration of our suggestions, work out a programme of expansion for a period of five or ten years. It is a matter entirely for them to set forth in a systematic form their plan of expansion subject, as it will no doubt be, to financial exigencies. We regard it as important that some plan or programme should be adopted and when once adopted, that plan should as far as circumstances permit, be adhered to and carried out."

ABSTRACTS

Growing plants without Soil. Thanks to Dr. W. F. Gericke, the pioneer in plant nutrition of the University of California, growers in Los Angeles and California are successfully growing vegetables and berries in nutrient solutions, heated by electricity.

Electric heating cables run under the bottom of vats. A mesh wire layer covers the top on which litter is spread to serve as seed-bed and insulation against heat-loss. The plants or seeds are placed on the bedding, and kept moist by the water in the vats. As a result of growth, the roots descend into the water when the necessary chemicals are added to the water in the right proportions. The electric cable keeps the solutions at the required temperature.

Success has been reported in the case of tomatoes, sweet-peas and strawberries. The tomatoes come to harvest earlier than 'soil grown' ones, the yield large, the quality better and hence the premium on the market price higher.

Dr. Gericke is expanding the use of this technique to the growing of tobacco, cucumbers, papaya, and other floral crops. (*Scientific American*, October 1936).

K. S. R.

The Stock Improvement Scheme in S. Rhodesia. A stock improvement scheme has recently been launched by the Government to assist stock owners to import or to improve their herds or flocks. The scheme is to be operative for the official year 1936-37 and to be limited to £ 3000 provided.

Applicants for the Government subsidies should satisfy the following conditions:—

Sufficient supplementary feed must be available for the cattle and the sheep during dry weather and arrangements made to prevent heifers from breeding till the proper age is reached. The flock must be dosed regularly for internal parasites and in the case of sheep, mating to be allowed only during the breeding season. The farrowing pens for the pigs are to be provided with concrete floors.

The bull, ram, or boar selected should be approved by an officer of the department.

In the case of animals imported from the United Kingdom, the Government will contribute a sum not exceeding half the certified landed cost of the bull, limited to the maximum of £ 75, and in the case of pedigree rams or boars, limited to £ 20 per animal. The export from the United Kingdom in these cases is to be arranged through the High Commissioner for S. Rhodesia. The importer should specify that the animal is certified to be good value for the money.

In the case of animals purchased in the colony of S. Rhodesia and imported from any territory in S. Africa the Government will contribute a sum not exceeding half the certified cost of the bull or ram and boars, subject to the limit of £ 15 and £ 4 respectively. But at the discretion of the Minister of Agriculture and Lands, the contribution may be increased to £ 25 for stud bulls got in established pedigree herds. The assistance to any one breeder will be limited to 2 bulls, 2 rams or one boar during the year.