The Economic Development of the Dry Zone of the Island.

F. A. STOCKDALE, C.B.E., M.A., F.L.S.,
Director of Agriculture.

AT the first Agricultural Conference held in 1926 attention was drawn to the necessity for investigations into the agricultural methods in the drier zones of the Colony and for a replacement of the chena system by a more systematic form of agriculture. I indicated that it was considered that a regular system of village agriculture could be introduced and that Ceylon could in the same way as India produce a vast amount of food stuffs by means of dry-land cultivation. It was also pointed out that rotation stations would be opened up, in order to test out what crops could be grown and to ascertain their correct place in the rotation.

In the present paper, I do not intend to deal with such questions as the improvement of irrigation facilities and the further extension of irrigation works in the Dry Zone, but to limit myself to dry land cultivation, to some of its problems and to make special reference to the work of the Department of Agriculture on the rotation of crops.

The first consideration that was given in dealing with this problem was whether any permanent crops could be established on a successful scale.

The first crop that suggested itself was sisal, and in view of the successful growth of this plant at the old Mahailupalama Experiment Station it was thought that it offered certain possibilities and was worthy of close experimentation. It was known that sisal as a capitalists' crop could only be run successfully if large areas were opened up, in order that costly labour-saving machinery could be installed and kept fully supplied with leaves for treatment. But on the other hand there is in Manuritius a small man's fibre industry and every indication that sisal could be turned out in a similar manner as economically in Ceylon. The results of the trials made at the Anuradhapura Experiment Station have been issued in detail in Bulletin No. 81 and were sufficiently promising to warrant a further extension being undertaken. Government has recently sanctioned that two trials be made with the assistance of the Department—the one in the North-Central Province and the other in the Hambantota district. In these trials, the sisal will be planted by villagers on lands leased to them

on easy terms. Dry grain crops and gingelly will be taken off these lands during the first two years and then the sisal leaves will be supplied by the growers for cash to a factory which is to be erected in the village by Government and the cost of which will be refunded by instalments until the whole factory becomes the property of the village or some organization—such as a co-operative society—working in the village. A beginning has already been made at the village of Rambowa in the North-Central Province and the selection of a suitable locality is now under consideration in the Hambantota district. Throughout the undertakers will receive the assistance and guidance of Departmental officers, and the trials will show whether a village sisal industry is capable of establishment and development. The keenness of the villagers at Rambowa on this experiment is most encouraging and it is hoped that it will prove to be wholly successful.

Another crop of a more permanent character which gives promise of success is Kapok. Certain types of Java Kapok fetch higher prices in the markets than the local product. It is thought that these higher prices may be due to better drying and to better preparation and cleaning. Nevertheless, it was decided to make trials with imported Java seeds. The resultant crops have been sent to Europe for examination and report and the results showed that this product grown from Java seed did show certain superior qualities over the Ceylon product. Further seed will be secured and all the Ceylon grown seed from the Java kapok has been distributed. There is every indication that the cultivation of kapok as a money crop in the Dry Zone is worthy of extension. This plant produces its best crops in areas which are not too dry in the middle of the year. It grows well in the driest parts, but it does not crop so satisfactorily, as in those areas where the rainfall is somewhat higher. There is, however, no doubt that a greater production of kapok is possible and that great improvements in methods of cleaning the floss are necessary.

Another crop which has been tried in a comparatively dry area is citronella. In the Wewagam Pattu of the Eastern Province there are vast areas of talawas covered with a growth of mana. These areas run into several thousand acres, and it was at first thought that the grass was a wild citronella. Investigations were made and trials with true citronella grasses started. The wild grass is not likely to be of value for purposes of distillation, but on the other hand, the true citronella grasses have progressed most satisfactorily. A still has been erected and the first distillations of oil have been made. These oils are now under examination and if satisfactory the possible development of an industry for this poor section of the Batticaloa district is worthy of every encouragement.

It is not, however, in the direction of permanent crops that the greatest development is likely to occur. The growing of food crops in rotation with money crops is the development which it is to be looked for. In the previous paper it was indicated that amongst money crops the Ceylon cultivator would have cotton, ground nuts, tobacco and gingelly and amongst food crops hill paddy, maize, millets, kurakkan, green gram, cow peas, dhall and other pulses. For several years now small trial experiments have been carried out and from two rotation stations in the Hambantota district and from one station at Vavuniya data for two years are now available.

Cotton is a money crop which is suited to dry areas where the rainfall is satisfactorily regular, and does not become too heavy during those months which follow flowering. Our experience shows that cotton crops can be grown on quite a small rainfall if they are sown early, but that considerable flower and boll shedding takes place if heavy showers occur during the period of growth following flowering. The rainfall in Ceylon is irregular, as far as cotton is concerned and heavy showers of rain occur not uncommonly. During last year, when the season was a very wet one during the months of January to March much crop was lost and in Ceylon there is more to fear from rains during these months than from periods of drought. Cotton cultivation is in consequence likely to develop most in those districts which can be relied upon as being dry during the first three months of the year. It is more suited to development for instance in the Hambantota district of the Southern Province than in the North-Central Province, and good results have also been secured from some parts of Uva and from the Kolonna Korale of the Province of Sabaragamuwa. Yields have not been as heavy on the average as was anticipated. This is due to cotton having been grown on new lands, and to the consequent increased vegetative growth. In certain areas better crop yields have been secured in the second year of cultivation and it may be held in Ceylon that cotton rather tends to vegetative growth than to heavy fruiting. The problem for Ceylon is to cheapen the costs of cultivation and this is only likely to occur when greater use can be made of implements for ploughing, weeding, inter-cultivation, etc.

Ground-nuts have given heavy yields on some soils. On light sandy soils this crop is a most promising one, but it cannot be produced economically without the use of implements in the preparation of land and in lifting the crop. In Madras, the cultivation of ground-nuts is now in many parts replacing cotton and special bush types have been evolved for cultivation. In Ceylon field rats and wild pig are the greatest difficulty in regard to ground-nut cultivation. They cause very considerable damage. Losses from the former can be overcome or avoided, but losses

from the latter are not so easy to control. It must not, however, be overlooked that ground-nuts require particularly light soils for satisfactory cultivations and they cannot be recommended for growth except upon such soils.

Chillies have proved to be the most profitable crop and net profits of between Rs. 175·60 to Rs. 176·00 per acre have been secured. Higher profits are realized where parts if not the whole of the crop can be marketed green.

At Ambalantota, tomatos also thrive well and can be readily marketed. Profits of Rs. 70·00 per acre have been realized and can in good years be much higher. This is not a crop which can be grown in areas where transport facilities are not readily available, but experiments made this year indicate that satisfactory transport in small wooden cases is possible.

The trials with tobacco have not yet given results of any importance, but in view of the work on the cultivation of tobacco without irrigation on the Jaffna Experiment Station it is quite reasonable to suppose that good crops of tobacco can be grown without any resource to irrigation.

The trials with food grains such as kurakkan, millets, maize, etc., have shown that satisfactory crops can be raised. As equally good crops of these grains have been grown on land which has been continuously cropped as upon new chena lands. Cultivation prior to seeding is necessary in order to suppress weed growth and early sowing is desirable if the best results are to be secured. Green gram has done the best in the drier season, cow peas thrive well in all districts and form a most useful rotation crop for clearing land of weed growth. Its yields are not high, nor of high value. In wet seasons practically no seed is set but for ploughing in as a rotation crop it has proved most useful. Black gram and horse gram thrive satisfactorily and produce average crops. All the above crops have been grown satisfactorily on lands in rotation with cotton. The experiments with dhall have not yet yielded results which may be said to be conclusive. Crops have been poor and the correct season for sowing has not yet been definitely ascertained. On some stations the crops were ruined by attacks of the blister beetle (*Mylabris pustulata*) which cuts through into the flowers and prevents the fruit from bearing.

Fodder grass trials have been made. The kollupatti grass *Pennisetum cencrhoides* has grown most luxuriantly at the Batata Station and *Paspalum commersoni* is quite promising. Sunn hemp has grown well and set good crops of seed and esperiments with fibre production have been carried out. Sweet potato crops and fruit plants are also growing satisfactorily. In brief the results obtained up to date are encouraging and there is little doubt

that a satisfactory system of agriculture could be evolved if holdings of adequate size could be made available to the holders. I am not prepared at this stage to dogmatise as to the exact size which would be necessary for an economic holding, but I feel that it will be between 15 and 20 acres. In the Hambantota district in one area the possibilities before the continuous cultivation of land has been seen by the villagers and they are sufficiently convinced as to enquire if they could not be given such lands for continuous cultivation. Areas have been leased to them for several years and they have cultivated them continuously with cotton and other crops indicated to them by officers of the Department. Similarly areas have been taken on lease in the Kolonna Korale for a continuous system of cultivation and have been culitvated in crops indicated by the Department. In this area plantains have been introduced and will probably be successful for the first two seasons.

Although the Department asked for five years before expressing a definite opinion, it is thought that a satisfactory system could be recommended for trial by Revenue officers. It is as follows:—

In leasing lands for chena or dry-grain cultivations provision for expansion and extension by the occupier should be kept in view. An ultimate expansion up to 20 acres (to include fodder for cattle and wood for fuel) is the minimum that should be aimed at for any holding. In the first year four acres could be allowed and in the second year an additional acre provided one acre of the first grant is properly stumped and similarly in the third and fourth year if one and a half acres are stumped annually. The lessee would then be in possession of 7 acres, four acres of which would be stumped and 3 acres in ordinary chena condition. In the fifth year cattle, ploughs and harrows would need to be acquired, and this could be accomplished if the lessees agreed that funds derived from cotton or other money crops were banked with some Government officer or co-operative organization against the provision of cattle and implements and additional financial assistance. In the Sudan systems of lease of lands require that one-third of the area shall be in cotton, one-third fallow and one-third in food crops. The whole of the food crops are the property of the lessee and one third of the cotton crop—the other two-thirds being payable for lease of the land and for water for irrigation. A similar system is capable of being evolved for the establishment of economic holdings in the dry zone of Ceylon. The original area (4 acres suggested) is thought to be the maximum that could be handled satisfactorily by one family. It has been found that an individual can grow satisfactorily two acres of cotton in addition to his usual chena or paddy cultivations. Stumping in the second year is more difficult than in subsequent

years after clearing. One acre is the average that could be stumped in that year, but in subsequent years 1½ acres annually should be easily possible. It could be arranged if this stumping is done systematically that the ploughing of such lands could be done commercially, but the ultimate aim should be for each holder to have at least one pair of bulls for his own individual use and one cow. As the work progressed so would additional areas of land be given out at probably 2 acres per annum, until the complete area of the holding is provided and brought under systematic cultivation.

The experimental work has progressed sufficiently to warrant trials being made with a scheme such as is outlined above. It is likely to be the most successful in areas where the population is reasonably progressive and where is some pressure for land. The promise of holdings of an economic size in individual ownership will meet with the necessary response and if it is made clear that such holdings and their equipment can only be secured on the result of progressive labour good work may be relied upon and satisfactory results secured.

The necessity for improving the conditions of the growers in the Dry Zones of the Colony is an important one. Permanent improvement cannot for all time rest upon the shifting cultivation of the chena. The provision of holdings of an uneconomic size is unsound, and it is only when a system of dry land cultivation on holdings of an economic size with their proper equipment of cattle and implement that the basis of a sound agriculture for these areas will have been laid. The above recommendations are based on the understanding that paddy lands are not available. With the holdings of paddy lands, the areas required per cultivator for dry-land cultivation are proportionately less, but if such areas are to be cultivated with ploughs and implements such areas should not be less than 7 to 10 acres if they are to be economically sound.

Discussion.

HIS EXCELLENCY THE GOVERNOR said that they were very much indebted to Mr. Stockdale for his paper and also for his experiments, the results of which he recorded that day. The work Mr. Stockdale had been engaged in, was of incalculable importance to the country generally and especially to their fellow countrymen in the Dry Zone. He felt that if the experiments were attended with success, a very distinct step forward would have been taken in solving one of the difficulties which were simply disheartening to one who saw such wealth in Ceylon and at the same time a large proportion of the people living in such poverty in the jungle areas of the Dry Zone. He hoped that every encouragement would be given to Mr. Stockdale in his experiments so as to enable him to carry them to a successful issue. He (the speaker) did not propose to discuss in any detail the results which Mr. Stockdale had described to them of his experience of the various crops. Mr. Stockdale had not referred to a plant which he expected he would have, and that was

the sunflower, of which he had experience in other countries. It might be that the climate of Ceylon was not suitable for the sunflower seed. If it were, he thought that the cultivation of the sunflower for its seed would be profitable as a minor product. There was a ready market in England for sunflower seed. It was largely used as food for parrots, who in their cages impart so much of solace to the declining years of lonely maiden ladies. It was also used for many other less romantic purposes. He was interested and glad to hear that the question of the rotation of crops in the dry zone was receiving the attention of the Director of Agriculture and the officers of the Department. In considering the needs of the Dry Zone, they should not overlook the needs of the Wet Zone. At the last Conference Sir Hugh Clifford had submitted very important proposals. These were submitted to the Finance Committee. As far as he was concerned, he felt great sympathy with the objects Sir Hugh Clifford had in view. He (the speaker) did not propose to say anything about the proposals in detail, partly because he did not know much about the subject, and partly because the matter was under the consideration of the Land Commission whose recommendations he would like to await before he attempted to form any opinion of his own. But he hoped that while they were considering the obvious needs of the Dry Zone the needs of the inhabitants of the Wet Zone would not be overlooked. He (the speaker) thought that some of those present there who were conversant with the conditions in the Dry Zone would throw some light on the very interesting paper that was read.

MR. J. H. MEEDENIYA, ADIGAR, said: I have visited almost all the important centres in the Dry Zone in all the Provinces in the Island during the last 10 years. I find there are excellently suitable lands for paddy cultivation both under the tank areas as well as the other Irrigation schemes, such as the Walawa Ganga Scheme. These lands are not only suitable for Paddy cultivation but also good for cultivation of crops, such as Indian Corn, Chillies, Peas, Onion, Corriander, in fact all those other ingridients which grow in South-India.

Both Tobacco and Cotton grow well, lime and oranges too thrive well. There are excellent pasture lands with plenty of good grass and water, for cattle breeding.

During the period of the rice crisis in 1922, a large number of acreages were taken from Government in the Dry Zone for Paddy cultivation by syndicates and by one or two leading individuals, amongst these about 9,000 acres at Minnèriya was taken by an European Firm, a channel about eight miles was cut from the tank, and a cart road was partly opened but they had to abandon it owing to Malaria and the inability to get labour. I visited this land during those days. It is flat as a table and suitable for the cultivation of all the products mentioned above. It is an ideal place for cattle breeding. Both buffalos and neat cattle there are usually bigger than those found elsewhere in the Island. At present lean cattle are sent there to graze before they are slaughtered.

During the year 1922, I along with Mr. M. G. Perera took 500 acres at Ambilipitiya Village for paddy cultivation; this too is situated in the dry zone, and is a well known Malarial district. We have with great difficulty owing to malaria cultivated paddy about a hundred and seventy-five acres. The villagers too followed us and cultivated very nearly 60 acres, taking about 2 to 5 acres each. I have planted as an experiment cotton, tobacco, onions, chillies, etc., and find excellent results; unfortunately I could not have done better as it is very hard to get labour. I have planted a few orange and lime trees, and they bear such large quantities of fruit, that I have got to keep the trees up with supports during the season for fear the branches would give way. I find through experience that malaria decreases its virulence 2 or 3 years after the opening of lands. If by some means we could only

develop and bring into cutilvation these irrigable lands we will not have to depend on India for rice and other sundry products, besides we will then have plenty of splendid cattle.

The only trouble being malaria, is the difficulty of getting any labour.

I think it is advisible to start cultivating centres near about Railway Stations with a Dispensary and an Officer from the Co-operative Credit Society to buy and sell the produce as it is being done for cotton by the Director of Agriculture. I would suggest the appointment of a small committee of experienced gentlemen to be associated with the Hon. the Director of Agriculture to visit some of the important places and to recommend to Government some feasible scheme to develop these tank areas.

MR. LESTER SMITH bore out the remarks of Mr. Stockdale with regard to the promising nature of Kapok, as well as cotton and other money crops. As was only natural, he said, in the preliminary stages of such experiments there had been failures. This was bound to occur with variations of climate and with indefinite ideas as to the correct seasons for cultivation and different crops were tried. It was hoped that some definite form of rotation would eventually be evolved. He thought that very promising results should be forthcoming on cotton, cereals, and leguminous crops. With regard to His Excellency's suggestion about sunflowers, he said that he had been able to establish some sunflowers at the Bata-ata Station. There was about an acre at present under cultivation.

MR. J. P. OBEYESEKERE said that it seemed to him that there were two difficulties in the way of the cultivator: (1) the difficulty of cattle, (2) in the bad season there was nothing to fall back on. About 30 years ago they started work under an Irrigation Scheme in a place where people were scarce and stricken with parangi and malaria. After 30 years they had about 200 acres under paddy. They did not take labour from healthy districts but employed the people in the villages themselves who were fairly immune from the disease. They helped them to cultivate a certain area and as the Director had said they put by paddy. When the bad season came they fell back on it and in that way parangi disappeared and there was quite a healthy people. This was in Sabaragamuwa. In the same way if people in the district itself and from neighbouring villages were utilized and barns put up and paddy collected for the adverse seasons, he thought it would be very much easier and there would be less loss of life and more land opened.

A MEMBER of the Conference enquired how the Maha Ilupalama Hemp plantation came to be closed down.

MR. STOCKDALE said that it was a capitalist undertaking of a fairly large area. They did not have a sufficiently large area under cultivation to make it economic to continue cultivation.

MR. A. T. H. DE SILVA enquired whether the same facilities in the matter of providing the necessary machinery to the Rambewa Co-operative Society could not be extended to the Mihintale Co-operative Society which the speaker had the pleasure of organizing. He (the speaker) suggested that coconuts could be planted with advantage on the banks of the tanks in the North-Central Province.

MR. STOCKDALE replied that the request of Mr. De Silva was rather late. Continuing he said: " We are going to try two experiments. We are not prepared to say definitely that those experiments are going to be successful, but everything indicates that they will be, and it was decided that we should start two, one in the North-Central Province and another in the Hambantota District. The position is Government has undertaken to erect two experimental mills in these two places. The cost of the mill is to be considered in the first instance as a loan, so that after a period of 5 to 6 years, it is hoped

that they would have obtained sufficient profit to themselves to pay the whole cost of the mill, and at the same time the cultivators would be able to sell their leaves. The price at which we have arranged to work is 25 cents per 100 leaves and until those experiments have run for a few years, I would not like to make any definite promise to extend them. But if the Mihintale Society can in any way get together a certain amount of capital then I would be very pleased to consider any proposal that they might put up and see whether something can be done in that direction."

MR. BRAYNE asked how, in regard to sisal hemp, a Co-operative Society worked. With regard to the rotation crops, was it practicable to grow two crops a year in the dry season ? Was manure necessary to make the replacement successful ? With regard to the difficulty of stumping, had monkey-jacks been tried ? Was the castor-oil plant a crop that could be used and could plantains be brought into the rotation ?

MR. STOCKDALE said that the total cost of the installation of a sisal mill was about Rs. 7,500, but they expected that in the Ranbewe experiment they could cut it down to Rs. 6,000 or a little more. The actual cost of the machine was Rs. 600. Then there was the question of the engine for running and a shed to cover the engine and the machinery. There were also washing tanks required. With regard to the growing of two crops in one year, the dry season varied from district to district. In certain areas one could get a "Yala" crop in addition to the "Maha" crop and there was no reason why two crops should not be obtained provided the rainfall was adequate. In the Hambantota District it was usual to grow only the " Maha " crop, but from the rainfall figures it seems possible that a " Yala " crop of gingelly could also be grown. They were trying that experiment on the rotation stations. If there was slight rains in the early monsoon two crops were quite possible.

With regard to plantains, one had to be assured of the sale of the produce. It was a useful crop if one could get a sale but in many areas in the dry season it could not be grown and in certain areas it was too dry without irrigation. It was again a question of the district one was in.

Castor-oil could easily be grown in places, but it was not very profitable.

Stumping was the most serious problem they had to face, but he believed stumping could be carried on from what he had seen in Hatagala in the Hambantota District, where there was a keen demand from the villager to possess his land, he would manage to get the stumps out. Where there was no land hunger, the cultivator would naturally look to an easier form of cultivation and he would not willingly undertake this laborious question of stumping. But in one of their Experimental Stations, they had been able to stump in the second year at a cost of less than Rs. 40 an acre. From what he had seen in the Hambantota District, stumping out was within the possibility of the individual owner. They had not tried jacks yet. Unless one had trained labour available it was difficult to get good work from jacks. He thought one should be very cautious before introducing jacks, which was unknown to the Ceylon cultivator. He would find some difficulty in handling them.

MR. BRAYNE remarked that Mr. Stockdale seemed to be sceptical of the villager's ability to use jacks. The villager, he thought, was quite intelligent enough to use them.

SIR SOLOMON DIAS BANDARANAYAKE corroborated what Mr. Brayne had said about the use of monkey-jacks. He imported one from England and had all the stumps taken out over an extent of 50 acres of land which was now

under cultivation. The ordinary villager was quite competent to work the jack and take the stumps out, but it was not a case of stumping only.

MR. COOKE said that in the North-Central Province the village device was to burn the stump on the spot. It saved labour.

MR. BRAYNE.—How long is it left to dry before it is burned ?

MR. COOKE.—Third, fourth or fifth year.

HIS EXCELLENCY wound up the discussion by wishing Mr. Stockdale all possible success in his efforts and expressing the hope that they would result in lasting benefit to the people.

MR. STOCKDALE.—Before we closed yesterday His Excellency suggested that we might appoint a Committee of this Conference to consider the question of paddy cultivation in its various aspects. I considered that with His Excellency this morning, and I propose now to move a resolution that the Food Products Committee of the Board of Agriculture together with members of this Conference who are specially interested in paddy cultivation shall go into this matter. With your permission, I therefore move the following resolution :—

> " Be it resolved by this Conference that the Food Products Committee of the Board of Agriculture do make with the least possible delay a detailed investigation of the present conditions of the paddy industry and make suggestions for its improvement; and that this Committee be requested to co-opt for the purpose of this enquiry other gentlemen specially interested in the product.'

I have, therefore, much pleasure in presenting that resolution to this Conference and it is our intention that this Committee should go into the matter during the next year and shall report its suggestions to the conference proposed to be held next year.

GATE MUDALIYAR A. E. RAJAPAKSE seconded.

MR. A. GODAMUNE said that if he might be allowed to suggest any names, he would propose Messrs. F. Taldena, J. H. Meedeniya, Adigar, Harry Ellawala, T. B. Bulankulama, R.M., T. B. L. Moonemalle, J. C. Ratwatte, Dissawe, R. B. Nugawela, Dissawe, and K. B. Beddawela.

HIS EXCELLENCY THE GOVERNOR said that those who wished to suggest any names should send them to Mr. Stockdale.

The resolution was then put to the House and carried unanimously.

HIS EXCELLENCY added.—The suggestion put forward by Mr. Meedeniya, Adigar, regarding visits to development areas may also be referred to that Committee.