Sugar Week in Durban.

Upon rising, amidst applause, to declare the exhibition open, Mr. Gilbert said:—"Ladies and gentlemen, I feel you have paid me a very great compliment indeed in asking me to come here to open this exhibition. As your President has told you, I do not want to go back into past history, but I was one of the first connected with the sugar industry in 1891, when I had the pleasure of working under two fine men like the late David Don and Sir Marshall Campbell. I am seeing to-day, and I am sure you also are seeing, the wonderful improvement which has gone on in the last few years in sugar machinery. The numerous appliances which have been introduced, not only for the sugar mills but to deal with the cane in the fields, are really wonderful, and I think in time you will have what I know you all want, one of those reapers which will cut the cane automatically and practically take it to the mill. I know there are wonderful experiments going on. To you, ladies and gentlemen of Durban, who have taken a keen interest in the industry, I can say as Mayor of Durban, and perhaps as one of the few mayors who have had an interest in the sugar industry, that Durban is very much bound up with the sugar industry, and Durban would not be so entirely Durban as it is to-day, except for those who have worked hard to make the sugar industry a success. I do like you to feel that we, the Mayor and Town Councillors, and all in Durban, take a very keen interest in you and your work. I congratulate you upon the exhibition, more especially as it has cost us nothing. I trust it will be a great success, and I have great pleasure in declaring the exhibition to be open."

A gratifying feature of the exhibition was the appreciation displayed by all stand-holders towards the work of the Organising Secretary, Mr. A. W. H. Marshall. Several of them suggested a presentation to Mr. Marshall, but for the lack of a proper head this was not proceeded with, but after the exhibition several letters of appreciation were received, one firm enclosing a cheque for two guineas, together with a request that it be devoted to the Durban Creche and Children's Home, and covering it with a letter of personal thanks for the opportunity afforded them of exhibiting.

The letter concluded with the words, "We heartily congratulate you on the success of the function and for your many endeavours to make the exhibition the success it was." Quite a large number wrote expressing the hope that the exhibition will be an annual function.

It is worth mentioning that on Friday, the last day of the exhibition, £32 17s. 6d. was collected for the Child Welfare Society, which, under the circumstances, was very satisfactory.

Experiment Station for Tropical Agriculture.

(Paper by Mr. JOHN FISHER, Principal, Cedara Agricultural College.)

Until a couple of years ago, Natal had a station which was set aside for tropical agriculture. This station undertook certain work in regard to tropical agriculture, and some of the findings, compositions of soils, etc., have been published and are to be found in Volume III. of the "Cedara Memoirs." This station was unfortunate in several ways. I do not think the public, whose interests the station was established to serve, gave it very loyal support. Its location was not ideal, and it certainly lacked the equipment and facilities for carrying out investigational and research work.

Its location, almost at the southern end of the cane-growing area, rendered it unrepresentative of the greater area devoted to sugar cane, and data secured there, where soils were poor and wind-swept and where the rainfall was less than in the northern parts, was unrepresentative of Northern Natal and Zululand conditions. There are different problems facing the cane-grower on rich alluvial flats than on drier, sandier and poorer hill soils. The shortage of equipment and a woeful dearth of knowledge of scientific methods in the management of the station now closed, may have led to a lack of confidence in the station. It is to be hoped that if and when a new station is established, there will be no lack of sympathy and support on the part of the public, and that there will be the means provided for scientific investigators to carry out research upon the many problems that they will find to their hand.

Location.

I am of the opinion that the location of the station will require very careful consideration. It is thought that after careful study the conclusion will be arrived at that there should be a central station where the actual research work will be done, and sub-stations which will act as demonstration areas; or co-operative plots on planters' fields for such

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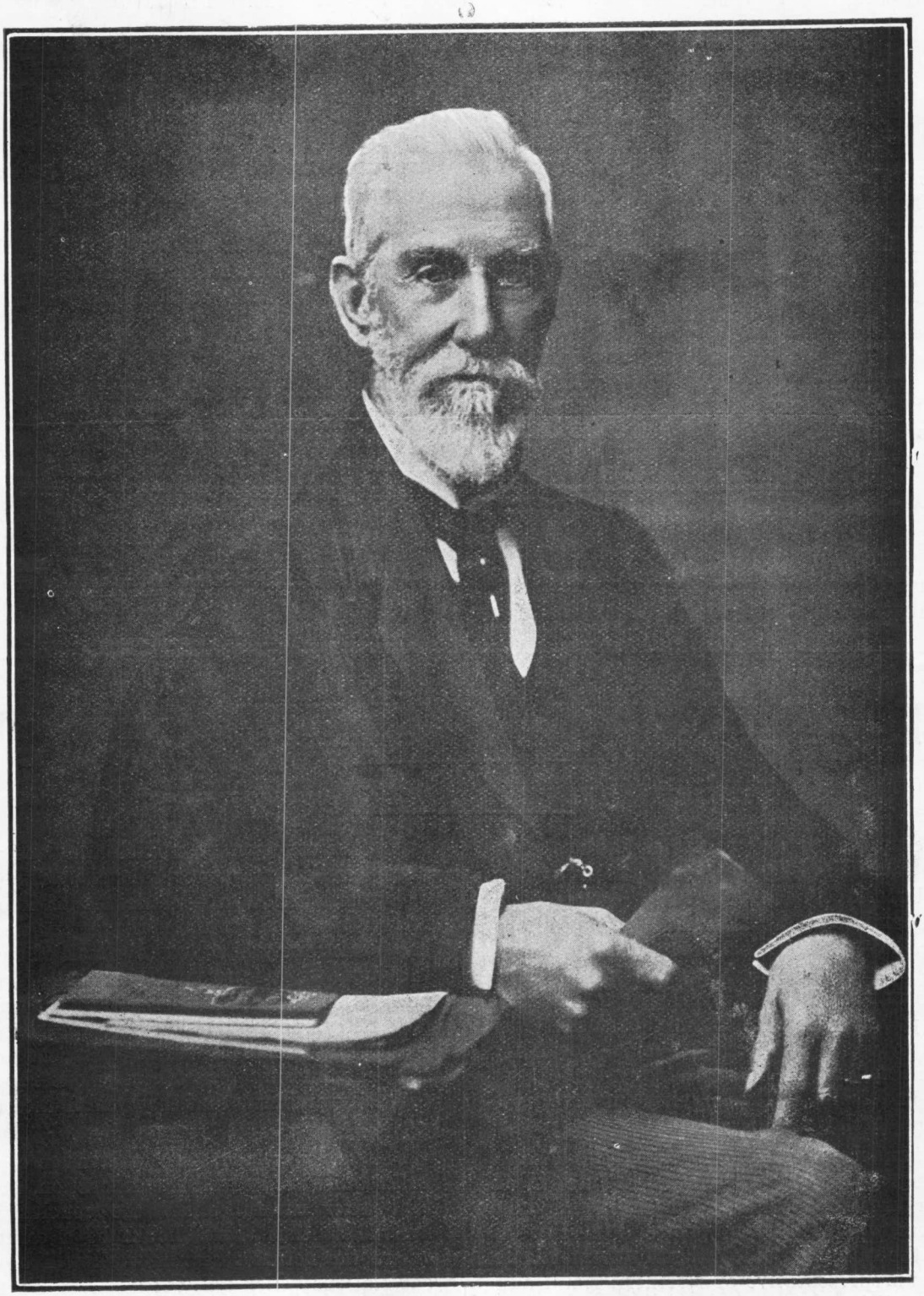

Senator the Hon. Sir J. LIEGE HULETT.

Who celebrated his 85th Birthday in May.

Experiment Station for Tropical Agriculture.

problems as do not require careful research work. Co-operative plots will require very careful supervision. It is not everyone that can lay out an experiment. They require careful laying out, and the interpretation of the results obtained is not an easy task. The farmer is generally impatient for results. To draw conclusions before any point has been thoroughly elucidated often leads to disaster.

The central station, or research station, should be easy of access by both road and rail, to enable anyone to visit it with the least inconvenience. It should be in a healthy locality and where supplies that will be required for it will not have to pay heavy rail charges. The research officers who will live at the station will require as congenial surroundings as can reasonably be had.

At the central station will be the laboratories, chemical and biological, including botanical and zoological, also tropical houses for research work on the many problems requiring to be tackled. Sub-stations, under supervision, will give particulars as to costs of production, so that the cost accounting side will be looked after and exact cost figures secured for different areas. These sub-stations will not be expensive. They may be dispensed with if there are growers sufficiently keen to do the work and the recording of the experiment plots in their own areas. Such plots will not run for one year only but for a number of years. Those who begin must be prepared to carry on. Their fellow planters will be looking to them for results.

Recently I have been reading over literature on cane growing, and there appear to be very many contentious points upon which definite information is required, and later on I wish to enumerate some of these, in stating what an experiment station should do.

Information is desired upon so many points that it will be the easier if we take them in order.

Soil—Firstly, the Soil—its Physical Characters.

Further studies are required upon the physical character of soils, upon their texture and water-holding capacities as determining the power of such soils to withstand periods of drought, and the means of improving this whether by increasing the humus, by deepening the soil, or by water conservation by means of mulches. Information, costs and returns are badly needed in regard to irrigation.

Its Chemical Characters.—This phase of the subject will be largely dealt with by my colleague, Mr. Williams, in dealing with the manuring of cane lands.

Its Biological Characters.—Information is sorely needed upon the living organisms in the soil. Nitrification has been worked out in other countries, and studies of nitrogen fixation made. In Natal little return to nitrogenous artificial fertilisers inclines me to the belief that considerable free nitrogen fixation takes place. Definite knowledge on this point, there is none, hence a large field is open for research purposes.

Soil Survey.

The Department of Agriculture, through its Division of Chemistry, is organising a soil survey of the Union. Different types of soils will be analysed and studied in regard to their physical and chemical characters. When the various types (and there are not a few) have been studied, it will be comparatively easy to give information regarding them. Each type as occurring in sugar areas would be studied by the chemist in the laboratory, and in the field by the chemist conjointly with the field manager.

Manuring.—This is Mr. Williams' subject, but there are one or two phases of it I wish to mention.

There is a question which is being studied now at Cedara, the reversion of the water soluble phosphate of super into an insoluble phosphate (say iron phosphate) in our soils, and methods of rendering that again available.

The comparative values of our phosphatic fertilisers over a long term of years should be ascertained, not over a single crop or two or three crops, but the ultimate effect. There should be tried bone products, super, basic slag, and ground rock phosphate (rock phosphate with filter press cake). Demonstration plots would be put down showing the need for fertilisers, and the chemist would advise us as to the variation in sucrose content of the cane on various plots planted with similar plant cane and having the same treatment save for the fertiliser. There is also the need for definite figures to show the value of various legumes ploughed into the soil when it becomes necessary to replant. Will the expense and time spent in growing a legume to plough in be repaid or not? Plots would be established which would determine this.

With regard to management, demonstration plots are required to show the variation in succeeding crops, plant cane and the ratoons following on planting cane of various ages, 10 to 12 months old cane, and cane both younger and older, as also the variation in planting butts, middles and tips, etc.

Good management plots in which all the work has been thorough, the ploughings, harrowings, ridgings, etc., would be contrasted with plots on which a lamentable lack of elbow grease has been expended.

Various methods of planting would also be carried out—single row, plus overlap, double row, and holing, etc.

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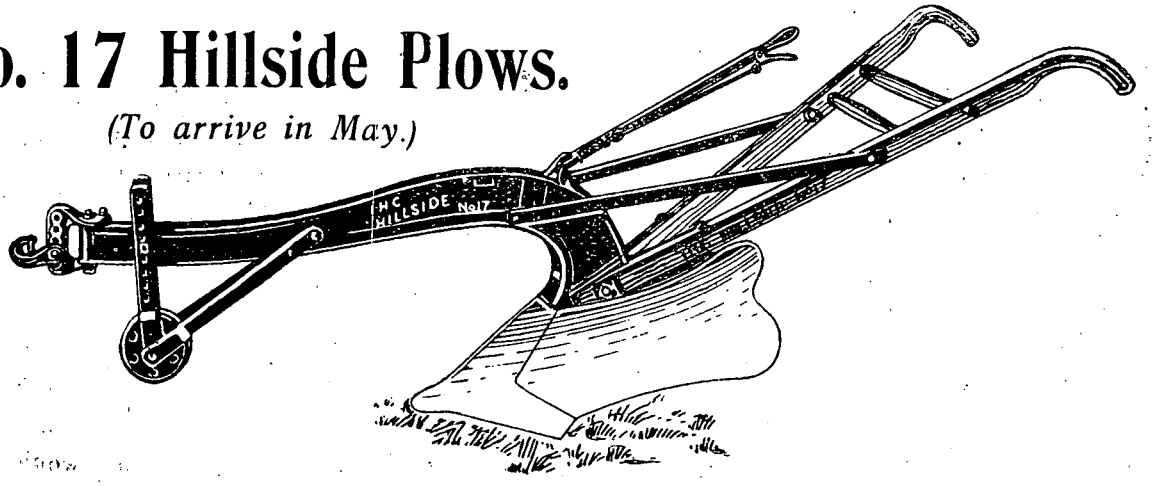

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E.

Experiment Station for Tropical Agriculture.

Various methods of applying fertilisers, and times and methods of top-dressing growing crops. Depth of planting, keeping shallow depression along lines of cane compared with raised lines. Demonstration plots should also be laid down that will show the effect of frequent and shallow cultivations as compared with fewer and deeper ones, testing the belief that the former is decidedly preferable.

All along the line there are trials waiting to be carried out, and in the harvesting of the cane we find many points requiring elucidation.

There is firstly the question of the highest sucrose content at cutting time. With a cutting season spread over the major portion of the year, much cutting must be done at a bad time, when there is far too much glucose and too little sucrose. The crushing season will probably require to be shortened. There is the great question of burning and trashing to be contrasted, and plots showing the one treatment compared with the neighbour plot over a long term of years should be established. Does the one who burns realise that he is living on his capital, the natural fertility of the soil, and that he is heading down the hill? For permanent cane growing such factors must be reckoned with, and the surest way to teach this is by ocular demonstrations. The chemists have much to say as to the chemical control of canes treated in these two ways, the amount of reversion that takes place, etc.

Coupled with the question of burning is that of fungal disease control. At first glance one might think that burning was a safeguard against disease. But is it? Practical cane growers of many years' standing tell me that the Uba variety is very decadent at the present time compared with what it was a number of years ago. In other words, it is losing its vigour, its vitality. Most of you present will know that plants that are not full of vigour are the first to be attacked either by insect or fungal pests. I understand that the burning of cane considerably reduces the vigour, especially if a term of years is taken into consideration. Such a process will thus favour the rapid spread of fungal troubles should they ever break out. Burning, by destroying what should be humus, bye-and-bye dries the land, weedier thinner canes result, with increased susceptibility due to lack of vigour. Burning does not burn out the roots. The fungal infection could easily tide over in the cane stools and infect the young growth as it came along. In the moist warm atmosphere of the coast, infection would spread rapidly through canes with fair susceptibility.

Trashing.

I believe many of the South Coast cane growers are able to keep going through trashing. Were they to adopt the process of burning, they would burn themselves out of the business in a very few years. Other planters should take a leaf out of this South Coast book, and ere this process has gone too far call a halt.

Labour! labour! I fancy, will be the cry advanced against this advice. My reply is that if the South Coast farmers find it an essential, and manage to get the labour and make the two ends overlap, the other growers should not be content to play second fiddle.

Then as to Improvements.

I do not know if the seriousness of the position of the sugar industry in Natal and Zululand is realised by the growers, or millers, or general public. The whole industry is built up on the good behaviour, good character, etc., of the foundling "Uba." What would happen were the Uba variety to suddenly fail? What happened to Natal's coffee industry and the coffee industry of Ceylon?

Many present will know that varieties of potatoes propagated vegetatively, as is the Uba variety of cane, sooner or later fail. How many varieties grown when the oldest present was a boy are now in cultivation? Where have they gone? They have gone out! Is not the Uba cane following the same course? Where is this deterioration going to carry us? It appears to me, gentlemen, that too much attention could not be given to the selection of plant cane with a view to maintaining its vigour, its health.

The experiment station would concern itself most vitally with the endeavour to maintain the Uba variety at its present standard, or, better still, to regain much of the lost vigour. I should be pleased to know that my hearers plant only the best cane, and that they do not follow the farmers in the other parts who sell all the good potatoes and then have to plant the "chats," and wonder why their potato crop is poor.

It would likewise fall to the plant breeder at the station to be established to obtain seedling varieties with "Uba" blood in them and to test them out. I am told that the Uba variety is male sterile, that is, does not produce viable pollen, that sugar cane pollen only lives about one hour after the anthers open unless under special conditions. It is imperative then to have other sorts in arrow at the same time to supply the pollen, the Uba to be the female parent. It might be possible by means of greater heat, greater constant humidity, or other factors, to cause the Uba to produce live pollen. Tropical houses would be required on the station to investigate problems of this nature, to secure seedlings

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Experiment Station for Tropical Agriculture.

of the Uba blood from any source and any kind and try them out, and by the best known methods of selection to improve the vigour.

Varieties from other countries should be secured and tried out under local conditions. Those that prove suitable would be grown in quantity and sold for planting purposes. The United States of America have officers directly concerned with the introduction of plants of economic importance into the U.S.A. Similar officers attached to the Department of Agriculture in this country would earn their salaries and confer lasting good upon the country.

It is pleasing to know that an endeavour is being made to collect all the sorts of cane which are at present in the country to one place, so that they shall not be lost sight of. Without, however, looking into seedling varieties of Uba or fresh introduction to improve our position, what could be done by selection with the material we have at hand. At the moment (of writing) I am not aware that any scheme has been accepted for the payment of cane on its sucrose content. Deerr has the following in his classic work on "Sugar Cane," showing that this work has been studied and considerable progress made elsewhere in the study:—

"By constantly selecting for seed beets of higher sugar content, the richness of that plant in sugar has been greatly increased. A similar process is not possible with the cane owing to its asexual process of propagation. Records of more than one experiment station have been published with regard to this, but the results were inconclusive until definite results were secured by Kobus in Java, his summary being:—'Different stalks of the same sugar cane plant vary widely in sugar percentage even where they are of the same age. Consequently we founded the chemical selection on the analysis of the juice of the whole plant and not on that of single cane stalks.'

"The variability of the percentage of sugar in various sugar cane varieties is very different. Those grown from seed canes do not vary so much as the old varieties. The juice of the heavier plants is richer in sugar than that of the lighter ones, and those plants that have the richest juice are the heaviest.

"Plants grown from cuttings derived from canes rich in sugar are heavier and contain more sugar than those grown from average plants or from plants poor in sugar. When we select the richest canes from the descendants of canes that were already rich in sugar, and also the poorest canes from the descendants of poor canes, and go on in this way for some years, we very soon arrive at a considerable improvement in the rich canes (40 per cent. in five years), and a heavy depression in the descendants of the poor canes (60 per cent. in five years). The descendants of cuttings grown from once selected canes remain richer in sugar for at least four generations and show as an average of 40 experiments only a very small decrease.

"The correlation of a high sugar percentage in the juice and of a heavy weight of cane plant simplifies the method of selection in a remarkable way. It is sufficient to select these 20 per cent. that are the heaviest, i.e., the strongest tillered plants of the cane field, and plant the cuttings of half of these, viz., of those richest in sugar.

"We proved that differences in the juice of the descendants of rich and of poor canes are already visible at an age of 30 weeks, and that it is possible to perform the selection at that age in the fields we use in Java for the propagation of cane cuttings. At 20 weeks no difference is observable in the juice from the rich and from the poor plots."

The experiment station that would be established would pay particular attention to this phase of the work through the combined work of the chemist and the botanist. No mention has been made of the work that would fall to the entomologist. Uba cane enjoys quite a good immunity from the attacks of insect pests. This might not always be so, and at any time the services of a highly specialised officer in entomology might be required to study depredations of insects, to obtain data with regard to their life histories, and so be in a position to advise protective or combative measures.

After the disastrous floods at Umfolozi followed a plague of rats, which did a tremendous amount of damage. It is understood that an appeal for cats to keep down the rats met with a very generous response. New insect pests might invade our cane fields, white grubs or borers or aphides, mealy bug, etc., might very easily become very serious pests. A trained officer on the spot would have the latest knowledge concerning these. He would be studying their life history and suggesting practical measures to lessen the damage done by them.

Intensive and Extensive Methods.

I should also like to see a certain section of such an experiment station operated upon extensive methods. Little elbow-grease expended, rough-shod methods, poor attention to clean culture and selection of plant cane, a disregard of manurial requirements and burning of cane, etc.; in a word, an extensive system with full costs contrasted with a like area of similar character, but upon intensive methods with a motto "Thoroughness in every detail." There would be interesting comparisons in a very few years' time, and these would not all be such as to favour extensive practice.

Other problems which an experiment station in tropical agriculture would require to tackle will suggest themselves quite readily to all.

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Experiment Station for Tropical Agriculture.

Sugar cane is one of the world's staple crops, but there are several others worthy of consideration, and probably the most important one after cane is cotton.

Cotton.

There are thousands of acres of land which are rather remote from railway lines and mills, which debar them from the possibility of growing cane at the present time. The final act of production (marketing, or putting on rail) rules cane out of court. There is a growing shortage of cotton in the world, and there are vast areas where this staple could be profitably grown in Northern Zululand, Swaziland, and parts of Natal. In certain thorn veld areas in Natal, under irrigation, cotton is ousting established lucerne. Is it possible that cotton will ever oust established cane? The two sister fibres, cotton and wool, can be produced in very great quantities in South Africa, and Natal, whilst rich in potentialities with regard to cotton, has yet a lot of pioneer work to do in connection with its growth, varieties, pests, marketing, etc. An important coastal firm is turning its attention in this direction, and erecting ginning plant to deal with the seed cotton.

Following upon the establishment of cotton growing on a sure foundation will be an improvement in the cattle industry, for there will be a very valuable by-product, badly needed by stock-feeders, with a ready market at hand.

Cotton is not such a heavy cumbersome crop to transport as cane, and the areas rather remote for cane may yet develop into very valuable cotton lands. A tropical station would undertake to find out facts and figures with regard to this, and would point the way to the establishment of another very great and important staple crop in our midst.

Tobacco.

There could probably be grown also types of tobacco, if not of very high-class quality for cigarette and pipe tobaccos, then for nicotine for the manufacture of sprays, dips, etc. These could be manufactured in this country and so save importation. Quite a wide field requires to be explored in the possibilities of this crop for tropical work.

Tropical Fruits.

With regard to tropical fruits, practically nothing has been done in South Africa. A few sorts of bananas, pineapples, papaws, etc., have been grown, but no exhaustive trials of different kinds under various conditions, supervised by a keen horticulturist have been made. The field for research work in this line is very great.

Starch and Fibre Crops.

Here again is a great field available for trials in many directions, and whilst the importance of these crops is possibly less than that of those already mentioned, valuable findings might be recorded with regard to linseed for both oil and possibly flax, arrowroot, cassava, ginger, sweet potatoes, etc.

Other fibre plants may be grown—furcrae, sisal, hemp. There are no data available as to how these will grow in our northern areas. No returns, no costs of production, practically no information at all.

A thoroughly equipped and staffed tropical station might undertake detailed studies with regard to some of these branches, and so prepare the way for the conquering of lands whose potentialities are as yet unknown.

Thus, in a brief manner, I have tried to indicate how great is the need for such a station as may be called a Research Station in Tropical Agriculture.

I trust my hearers realise the value that such a station and sub-stations would be in their midst, and I would suggest that they should never rest until such a station or stations are established. Never take no for an answer; and when established may you all be proud of and loyal to such a station.

DISCUSSION.

Mr. Alfred Townsend congratulated Mr. Fisher on the very able paper he had placed before them. It had touched him on a sore point, and the members ought to take to heart what had been said. There were one or two points that he (Mr. Townsend) and other old planters could bear out in Mr. Fisher's paper, namely, with regard to burnt cane. He felt certain that the result of continued burning of cane would be disastrous to the industry. His first experience with cane practically was with the burning of cane, and in the early days they found that burning was injurious to the soil and it was abandoned. Lately, however, the practice had been carried out on the North Coast, and he with others had foolishly been persuaded to go in for burning. The result was that they did not get the returns they should have had. The man who burnt his cane came out on the wrong side every time.

The suggestion of an experimental station was a very sound one. He felt convinced that steps should be taken by the combined industry to stop burning altogether and make it a criminal offence to burn cane. As Mr. Fisher has said, in six months time our industry may be gone. Ten years ago the same subject was discussed and yet they were not a step further to-day. Mr. Townsend fully endorsed Mr. Fisher's remarks concerning the manuring of the soil and the selection of the plant cane. The latter especially was a most important matter, and disregard of this would be disastrous.

Mr. Townsend mentioned that he was the first to plant the Uba cane in Victoria county, and that the subsequent cane in that district came from that which he had propagated around the mill at Blackburn.

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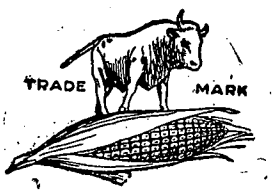

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With reference to Mr. Fisher's remarks on the deterioration of Uba Cane, Mr. Townsend stated that when it was first introduced it was very little thicker than an ordinary grass. The trash clung to the cane and it was almost impossible to take it off with a cane knife. To-day it is entirely different. He had not seen any signs of Uba deteriorating. All his life he had been cultivating Uba, and if it was cultivated as it should be as good results could be obtained as they did twenty years ago. Mr. Townsend referred to the advisability of propagating cane from seed, and emphasised the necessity for an experiment station. Everyone realised the enormous value of the Uba cane from the millers' point of view. In the old days, 30 per cent. of the fuel burnt was foreign fuel, but with Uba it is very different. It will practically keep the mill going all the season with fibre.

Mr. O. J. Johnson also spoke in congratulatory terms of Mr. Fisher's paper particularly with regard to the suggested experiment station. With regard to the burning of cane he stated this was not altogether a question of the effect on the soil; it was an economic question, it was the cost entailed to the planter. With the experiment station it would prove what was required. He would like to see the establishment of places for the growing of plant cane. If such places were established, farmers could then buy their plant cane by the truckload and would get the best that had been produced by scientific methods. The individual farmer had not the time to do this sort of thing himself. Each of them had probably experimented in some form or other, but owing to some rush of other work the experiments had been spoilt.

In conclusion, Mr. Johnson referred to the excellent results which had followed the establishment of experimental farms and agricultural departments in the Free State, and urged the members to press the Government to establish the experiment station which was so necessary for the future welfare of the sugar industry. It was the second or third industry in the country, and should not be neglected any longer by the Government.

Mr. Cree congratulated the Association on bringing about this conference, which had been required for a number of years. It was essential that an industry such as the sugar industry should have an annual conference, at which various points could be discussed.

In establishing the tropical station, as suggested, the question of the principal of such a station would be a very vital one. There must be a very competent scientist there, and he must be an enthusiast. It is not only essential to carry out experiments, but when the results are obtained it is essential to bring these home to the planters and millers. He must be a man who will not be content to sit in his office, but must go abroad and bring the results to the planters. The experiment station that was previously in existence may not have been in the right place, but it also lacked other qualities. It did not have a man who was sufficiently enthusiastic to bring home to the planter his results. That is essential in an experimental station. He urged the members to work together to bring about the accomplishment of the tropical station, and in conclusion congratulated Mr. Fisher on his paper.

Capt. F. Greig considered that the question of trashing cane should be settled as soon as possible. He was strongly in favour of trashing cane, and declared that the burning of cane was a suicidal policy. With regard to the station for growing plant cane, that was an excellent idea, but in the meantime he suggested that exchanges of cane might take place between Natal and Zululand.

Mr. Fisher, in replying to the various speakers, stated that Mr. Johnson had hit the nail on the head when he said that they had not yet got the station they had been speaking about. He urged everyone to put their shoulders to the wheel and shove, and not only shove but shove hard and keep on shoving. It was necessary that they should all sink their little differences and work together for the attainment of that station, which was absolutely essential to ascertain which were the best methods to adopt. The research officers generally were not the best teachers. You may find a man who will spend all his time looking through a miscroscope and gain the fullest information with regard to fungus diseases, and yet he is not the man to go round and tell the planters in language they will understand what had to be done and what had to be avoided.

The research man is somewhat apart from the teacher. In America they have county agents. The research man gets the facts and figures. Another man comes along and says "these are the findings, these are the principles you have got to follow, those are the practices you have got to avoid." Once the canes have been selected in an experiment station they could be distributed among the planters who would carry on the growing themselves. If there are men keen enough to make a speciality of growing cane for planting purposes it would be a good investment for them. Mr. Fisher advised the members to get down to bedrock at their meetings and make definite decisions with regard to the station, and never rest until they had got it.

The Chairman expressed the appreciation of the Association for Mr. Fisher's excellent paper.

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