CULTIVATION OF PLANT CANE: INTENSIVE METHODS.

By J. MARTENS.

Owing to the collapse of the sugar market throughout the world, within recent times, and the heavy slump of prices, which only naturally have reacted unfavourably towards the Sugar Industry in this country, affecting both millers and planters alike, it becomes increasingly apparent and easily understood that many planters will be faced by ruin unless prices for their staple commodity show an improvement in the near future.

At the present time, however, it would seem that there is not much hope of the sugar market stabilising itself for the next four or five years, and my sole object in presenting this paper for your consideration is to endeavour to help planters and others, and try to show the only alternative open to them, viz., the production of their product at a lower cost to meet the present ruling prices for their cane.

Owing to the state of the market, it is therefore necessary for those who intend to "see the thing through" as it were, by endeavouring to retain their farms, to review their present methods of cultivation, and, if possible, or necessary, introduce ways of bringing their crops to maturity, whereby returns will be increased, and expenses substantially reduced.

It is not the intention of the writer to deal with the initial stages of cane farming, that is, the preparation of the land, fertilizing and planting, which in his opinion is only of secondary importance to the actual treatment of the cane when once it has come up. It can, however, be definitely stated that a large number of planters and owners of sugar estates seemed to be imbued with a definite idea that a thorough preparation of the soil is the principal element necessary in cane farming to bring a crop of cane to successful maturity. A good preparation of the soil is certainly to be aimed at, but this is of small avail if after-cultivation is neglected. In many cases the thorough ploughing of the ground is of little use, as the young cane is often left to fend for itself after germination has taken place, a few hand-weedings being considered all that is necessary; the plants become choked with weeds, growth seriously retarded, deterioration often setting in, and, if fertilizer has been applied, the weeds rapidly exhaust the valuable ingredients of this expensive article, needless to say to the detriment of the young cane. That is a gloomy picture but nevertheless a realistic one.

This state of affairs is invariably put down to a shortage of labour for weeding purposes, while cutting operations are the order of the day, although in my opinion the trouble usually lies in bad organisation and faulty methods. No doubt in some cases, financial circumstances do prohibit the employment of a few extra labourers for cultivation purposes only, while the cutting season is in full swing. The postponement of cultivation is without a doubt, not only false economy, but highly detrimental to the development of young cane, plant or ratoon.

Consider the point clearly. The work has to be done in the end, in any case, and by neglect in the early stages the weeds are encouraged to take a firm hold, thereby costing **more** in the end to clear the lands; and, most important of all, the loss in growth the young cane has sustained, which, be it noted, can never be recovered.

Hand weeding of cane is an expensive matter, and is a method that should be abolished from the daily routine of the farm as far as possible, within reasonable limits. It is the pre-historic way of farming. Different methods which will in the end, prove of a more economical nature, and more up-to-date in every way, should be substituted and encouraged.

INTENSIVE METHODS OF CULTIVATION.

As soon as the young cane has germinated sufficiently to be easily seen in the rows, the immediate starting of pony ploughing should commence. These ploughs are worked between the rows of cane at a depth of six to seven inches. Care should be taken to get the implement as near the cane as possible, without damaging the young plants. The furrow must be turned **away** from the row, that is, turned towards the row to the immediate right-hand side of the plough. By coming down the next row—the one on the right—with the plough, the furrows will have joined in the centre forming a ridge of earth, higher than the ground in its immediate proximity. Four days later cultivators follow over the same ground and naturally tend to flatten out the ridge to its previous level, which is in every way desirable. Subsequent to this, the cultivators are again worked over the same ground every eight to nine days **without fail.** Four weeks after the first pony ploughing has been done, the pony ploughs are again introduced to the scene; the cycle commencing again, and the process is kept going until the cane is too high for draught animals to walk between the rows without damaging the crop.

If this method is carried out efficiently, it will be found that by the time cultivation ceases pony ploughs will have been applied four times and cultivators twelve times.

The implements required for the application of this method are two pony ploughs and four Uba

cane cultivators per one hundred acres of land being treated.

The advantages to be derived from this method of intensive cultivation are:—

(1) Very little hand-weeding required.
(2) Cane puts on remarkable growth.
(3) Substantial immunity of cane from effects of drought.
(4) The conservation of moisture.
(5) Increased tonnage over and above cane not so treated.
(6) The after effects on ratoon crops.
(7) Ground kept in excellent condition and cheaper cost of production.

We have to note the important fact that by constant cultivation no grass or weeds are given a chance to establish themselves to run to seed. When once weeds have run to seed in the fields, a big and expensive job can be looked forward to, as the seeds keep on germinating continually, even affecting the ratoon crops that follow later. Hand-weeding is also reduced to a minimum which in itself is of sufficient consideration to amply repay the planter. It can also be claimed that cane that is intensively cultivated will grow into more robust plants than cane that has been only hand-weeded. The rows also " close in " quicker, thereby reducing working expenses, in the process of bringing cane to maturity and fit for milling purposes.

The sugar belt is partial to frequent droughty conditions when young cane often stops growing owing to lack of moisture. Without fear of contradiction to the contrary, the writer has no hesition in asserting that Uba cane which has been intensively cultivated has a far greater immunity against the effects of drought than cane not so treated. Results have proved this time and again. Low rainfall is usually blamed for poor returns, whereas the truth of the matter lies in the fact, generally, that cultivation has been sadly neglected.

In my opinion one of the chief benefits to be derived from intensive cultivation of cane, is the conservation of moisture in the ground after a heavy rainfall. As we all know, in the heavier types of soil on the coast, a tendency exists for such soil to form itself into numerous cracks when a spell of dry weather follows a copious rainfall. When this takes place evaporation of moisture becomes extremely rapid, the rays of the sun forming a direct and ideal contact with the hard baked ground. The harder the ground becomes the quicker will evaporation take place. To cope with this serious matter it is merely necessary to apply the cultivators as speedily as possible to the lands a few days after the rains have fallen. A soft mulch will then be formed by the cultivators loosening the ground to a soft and loose consistency, which will act as an ideal " blanket " between the lower levels of the ground—where the cane roots are stationed—and the rays of the sun, thereby stopping all evaporation to a remarkable degree with, needless to say, highly beneficial results to the young cane, especially if no more rain follows in the immediate future. The subject is undoubtedly a deep, but nevertheless an interesting one.

This method of intensive cultivation is practised on several of the dry portions of the Union and Southern Rhodesia, and incidentally by one of the most successful farmers in the latter country, and is known in those parts as " dry farming."

When cane has been intensively cultivated it will be found without exception that a marked increase in yield per acre takes place. To illustrate this point it will be necessary to quote figures which have, during the past, come under my personal observation, when very fair tests were carried out.

ON ALLUVIAL FLATS.

Area under test, 80 acres.

Rainfall for growing period of 24 months, 73 inches.

The area of 80 acres was divided into two blocks, portions Nos. 1 and No. 2, for convenience sake, of 50 acres and 30 acres respectively. The 50 acre portion (No. 1) of the field was pony ploughed four times and cultivated twelve times. It was hand-weeded twice, but weeds were very scarce owing to the heavy cultivation and the cost of hand-weeding extremely low. The tonnage cut was 3,050, the yield averaging therefore 61 tons per acre.

Portion No. 2 of 30 acres was planted at the same time under the same conditions and the soil being exactly similar in every respect. This portion received no pony ploughing or cultivation whatsoever. Weeds absolutely flourished as was to be expected. Four heavy hand-weedings had to be done and the costs of same were 22 per cent. higher per acre in proportion to the costs combined of pony ploughing, cultivating and hand-weeding of portion No. 1. The total yield obtained from portion No. 2 was 1,140 tons, or 38 tons per acre. It will therefore be seen that there was a balance of 23 tons per acre in favour of block No. 1, which was heavily cultivated.

ON HILL LAND.

First season 229 acres planted in light sandy soil. Rainfall for growing period of 24 months, 84½ inches.

The fields were set out as follows:—

Field No. 1.	41 acres.	Cultivated twice.
Field No. 2.	41 acres.	Not cultivated.
Field No. 3.	91 acres.	Not cultivated.
Field No. 4.	56 acres.	Cultivated three times.

The average yield per acre of these fields was:—

Field No. 1.	33 tons per acre.	Cultivated twice.
Field No. 2.	30 tons per acre.	Not cultivated.
Field No. 3.	29 tons per acre.	Not cultivated.
Field No. 4.	34 tons per acre.	Cultivated three times.

Grand average over whole block was 31 tons per acre.

On the following season 200 acres were planted, the rainfall for the period of 24 months being 81 inches. The land was similar in every respect to the block of 229 acres. Intensive cultivation methods were applied, however, to the block of 200 acres, four pony ploughings at intervals of four weeks and twelve cultivations at intervals of eight days. The average yield over the whole block was 38¾ tons per acre. It is interesting to note that the block of 200 acres received 3½ inches less rainfall than the piece of 220 acres spread over their respective periods. It will also be noted how the cane responded to a slight dressing with cultivators in fields Nos. 1 and 4, there being an advantage of three and four tons respectively in their favour over fields Nos. 2 and 3 which received no cultivation.

Of more importance, however, is the comparison between the heavy soil and the light sandy lands, which were treated in identically the same way. It would therefore appear that there is a greater response to cane grown in the heavier types of soil to intensive cultivation, compared to the sandier types. This simply bears out the contention that heavy and frequent cultivation stops evaporation of moisture, as the heavier soils are far more sensitive in this respect, in comparison to the lighter and sandier types. In the latter class of soil it will be found quite sufficient for the cultivators to go through each row twice, but in the heavier soils it may be necessary occasionally to repeat each performance three times.

The object to be obtained is to get the ground in as loose a condition as possible. This will not only conserve moisture as previously mentioned, but will assist rain-drops carrying nitrogen, gathered in their fall through the atmosphere, to the roots of the cane.

It must be very clearly understood that for this method of cultivation to be carried out successfully, the cultivators must be kept hard at work, and even if it is found that the fields are absolutely free of weeds, the work must be continued. Four cultivators will easily go through 100 acres in eight days, and must then commence operations again where they started on the first day, repeating this performance continually.

EFFECT ON RATOONS.

When sugar cane has been heavily cultivated in the plant stage and no weeds allowed to run to seed, it will be invariably found that during the following ratooning crops, the fields will remain comparatively free of weeds, there being no seed to germinate. Ratoons should, however, be also heavily cultivated, the pony ploughs being put through the fields as soon as possible after cutting has commenced, to be followed a few days later by one or two cultivators.

Intensive cultivation tends to produce robust and vigorous plants, especially in plant cane, with a perfect root system. This in itself is a great asset, as a planter has to take a long view of matters. Vigorous shoots, with a perfect root system, will always produce a good crop of cane, rain or no rain, and it therefore behoves planters to pay especial attention to their plant cane crops, thereby laying a solid foundation for their ratoon crops that follow later.

Both the above papers were read by Mr. P. Fowlie in the absence of Mr. Garland and Mr. Martens.

The CHAIRMAN stated that both these papers gave them a very good idea of the amount of work that was being done in the cultivation of plant cane, and the benefits which could be obtained by careful consideration of the problem. He felt sure many of the Planters had experienced the various troubles and gained experience thereby, and he hoped they would bring forward suggestions or criticise what had been placed before them in the papers, so that they could all reap the benefit of each other's experiences.

Mr. D. M. EADIE said he did not know if any planters had tried a system which he had seen working, and he mentioned it in the hope that it would bring about some discussion which might be of interest. He had seen two ordinary five-tined cultivators harnessed to four oxen working as a cultivating unit. The results obtained and the saving of labour were more remarkable than one would think from the nature of the method adopted. One leader for the oxen and a boy at each cultivator were required, which was a saving of one boy, but there was a remarkable effect—a sort of social effect; the fact of these two boys working together seemed to more or less increase their efficiency to a most extraordinary degree. The oxen very soon got accustomed to the work and worked between the rows very well. By adopting such a method planters would be able to carry out rapid cultivation at critical times. Efficient cultivation was an essential part of farming operations and although many planters knew the benefits to be obtained, there still appeared to be some who did not carry out this work sufficiently.

Mr. PALAIRET stated that a number of planters had tried the system referred to by Mr. Eadie, and

he believed a few still did it, but the general method to-day was one man and one mule to a cultivator. Oxen were very slow and mules were quicker and he thought it extremely likely that one big mule with one boy—if one got a sensible boy (laughter)—would probably do just as much as the two cultivators drawn by the oxen. However, that was a matter for experiment. It seemed to him, however, that the trouble to-day was feeding the animals. For the man who could afford a tractor there was no doubt it was the cheapest in the end. This year he had purchased a tractor for the first time and he was astonished at the result. His costs had come down when he had expected them to go up. There was the question of the small harrows. He thought there was a minimum speed for satisfactory work with these. If they went too slow the harrows did not give such good work, and he was inclined to think the ox was too slow.

There was one rather notable point about these papers, which brought them back to an old controversy that had gone on for years, and that was shallow planting as against the system of planting 14 inches; in fact some planters insisted on planting deeper than they ploughed. No one seemed to know what really happened to the root system. Those who went in for the system of 14in. planting contended the roots came higher each year, but it has never been proved. He would like to have the views of more experienced planters on that. Both sections seemed to be extremely strong on their point of view. He knew Natal Estates planted shallow, whilst he believed their next door neighbours were very strongly in favour of deep planting. Both the intensive methods mentioned in the papers essentially called for the shallow type of planting as the harrow did not do well with deep furrows. Furthermore a pony plough drawing away from the furrow could not do very deep cultivation.

He was sorry to see Mr. Martens' remarks with regard to preparation of the soil. He did not think Mr. Martens meant what the paper seemed to infer, that it was not important to have thorough preparation of the soil. This was vitally important (hear hear). Most of them had had the experience at some time or other of not being able through force of circumstances to properly prepare a field and he had not yet heard of a planter who had not had any amount of difficulty following it. There was no doubt if the soil was properly prepared in the first instance these intensive methods with harrows were really fairly easy, but if this was not done all sorts of difficulties cropped up. He thought the majority of planters did not get deep enough in their preliminary ploughing; on new lands particularly that should be attended to carefully.

Mr. O. J. ASKEW stated he was rather interested in Mr. Eadie's remarks. He had seen six mules scarifying six lines of cane together; it took a very clever man however, to be able to do it. Apparently the mules had the spirit of competition under such circumstances. He had never tried it himself but there did appear to be something in it. In his opinion working with cattle was altogether too slow. He supported Mr. Palairet in his remarks regarding tractors. He agreed it was the cheapest thing. He also agreed with regard to first cultivation. If fields were cultivated well in the first instance good results were obtained right through.

Mr. OWEN JOHNSON stated that he had tried the system mentioned by Mr. Eadie, many years ago and it was too slow with oxen. He had also tried mules, before tractors came in. His experience was that the Uba cultivator was not heavy enough but to-day there was a heavier type available, which was more suitable. With regard to the use of mules, he had two to a cultivator, and generally put a good mover in the front line and the others at the back. By doing this it had been found that there was an incentive to the back mules to get along quicker. He had heavy cultivators on his farm and they could do 25 to 30 acres a day, breaking up the land and saving the expense of pony ploughing.

He took exception to the statement by Mr. Martens with regard to ploughing. He had always endeavoured to plough his land three times. He found the third ploughing was as good as a dressing of manure. In his experience there was a danger of ploughing too deep. He had two fields at Amatikulu on each side of the road. He ploughed one 14 inches six years ago and it had never grown a decent crop of cane since. It had been well treated, manured, and ploughed three times, but it had never grown cane properly and he considered that by deep ploughing he had brought up unsuitable soil. He considered each farm needed its own handling and different soils, and the man in charge had to use his brains accordingly. If their farms could be run by clockwork it would be very nice indeed, but the man on the farm had to consider all things, and use his brains in each case to carry things to fruition.

Mr. O. J. ASKEW stated, with regard to cultivation of old fields, that several years ago his son had told him he was going to let one of the fields lie fallow for twelve months. He had told his son they could not afford to do that, but his son had told him it would pay them to do so. They let this field lie fallow for twelve months and then ploughed it three times, and their next crop was 40 tons to the acre. It was on the hills. They had proceeded on these lines since and obtained an average on the whole farm of 39½ to 40½ tons to the acre. They were still working on that principle, but in addition they were planting the fields with buckwheat after ploughing out the old cane. The buckwheat

was allowed to run to seed and then ploughed in again, then before it seeded the second time the green crop was ploughed in and left to fallow for twelve months. He was convinced this was the only thing to do, to let the lands lie fallow and rest for a year. From his own experience he was convinced that what they might lose in the one year they got back the following year in double the crops.

Mr. DODDS (Director of the Experiment Station) stated he was very glad to see these two papers contributed by practical men in charge of large commercial estates. It was noted that both of them emphasised the importance of thorough and frequent cultivation, which he thought was a cornerstone of their sugar cane agriculture. There was no doubt that usually the limiting factor of cane growth in the fields was the lack of moisture. Frequent cultivation tended to conserve moisture in the best possible way, not only by reducing evaporation from the soil itself, but by destroying weeds, which were perhaps the greatest dissipators of moisture in the fields. With regard to Mr. Martens' paper he wished to endorse what Mr. Palairet and the other speakers had said in that it was rather unfortunate that Mr. Martens should have appeared to depreciate the importance of preparation of the soil. In his opinion it was at least of equal importance with the following cultivation, and one could not make up for any neglect in the preparation of the soil by cultivation afterwards. Another point he noticed was that Mr. Martens recommended several pony ploughings whereas Mr. Garland stated that pony ploughing usually was only done once because of the danger of going too deep and destroying the roots. Some years ago at the Louisiana Experiment Station this matter was studied and it was found that the best yields were obtained where the pony ploughing was omitted altogether and cultivation after planting done solely by light cultivators. He thought that this was the idea—to prepare the soil so thoroughly before planting that it was not necessary to do any more than shallow surface cultivation afterwards to keep down weeds and maintain the soil mulch. Mr. Martens had quoted certain experiments on alluvial flats and quoted the improvements that he obtained; this of course was what one would expect from cultivation on heavy soils, but he thought the examples Mr. Martens quoted hardly did justice to the benefits of cultivation in light sandy soils. Mr. Martens had shown comparatively small increases in yields; but he (Mr. Dodds) thought that if conditions were equal these would be found to be considerably larger. It would have been more satisfactory if the average results of each separate form of cultivation in each individual field had been determined. The methods in force now to a very large extent at Natal Estates of harrowing the cane as soon as it has been planted appeared on the face of it to be rather drastic treatment, but one had to admit that it seemed to be justified by the results obtained, and the occasional damage it might do to the plant cane was insignificant compared with the benefit that it gave in maintaining a thorough tilth. He was very pleased indeed to hear Mr. Askew's remarks about the fallowing of fields, especially with a green manure crop. At the Experiment Station there was a striking demonstration of this, where they had alternate strips of the same field which had been fallowed compared with those that had not. The difference was remarkable. There was no doubt that the principle of fallowing and giving the land at least a year's rest between each cycle of cane crops was one that should be adopted as a standard in the industry.

Mr. FOWLIE (Experiment Station) supported what Mr. Johnson had said about planters using their brains in deciding what was the thing to do in cultivating from field to field and from day to day. It was an excellent thing to have a scheme mapped out and to follow it as closely as circumstances would permit, but it was very necessary indeed in his opinion that the carrying out should be dependent on circumstances being suitable, and that the planter should use his own judgement and vary the programme as required. It was not possible to treat all fields alike; it was not possible to use even the same implements on all fields. The implements have to be suitable for the conditions of working. The number of animals required will vary also, and the general time-table of operations would vary according to the weather and soil. It came down to this, that the man on the spot must have a certain freedom of action if he is a manager, and if he is a master on his own he must be prepared to stick closely to his job to see it through (hear hear).

Mr. NUTMAN stated he was rather interested in the question of deep ploughing. He had studied it for many years and he could not agree with Mr. Johnson. He took it that the object of deep ploughing was to open up the soil and gather as much moisture or rain into that as possible and that then became their reservoir. But there was one thing that had struck him, and he thought it was admitted by scientists, that the first six inches of the soil was the best, the second not so good, and the third six inches very poor. He planted his cane in trenches, and if it was planted too shallow it was apt to get dried out. The point he wished to make was this, that if they got the cane down as deeply as possible was it not advisable to get the best of the soil down on to the place where the cane was going to rest, so that it would get the best nourishment to give it a start in life. By ploughing deeply they brought the worst of the soil to the top, but that in time became good soil, and by that process the soil was continually being improved. He would be glad to hear the views of others who had studied this subject. The question of pony ploughing

should be carefully considered. He referred to the action of turning over sand, sawdust, or any such substance on a floor with a shovel; the result was to dry it out. Similarly he thought there was a danger of drying out the soil by using the pony plough too much. He was of opinion that they should consider their farms as dry farms and go in for a system of dry farming.

Mr. JOHNSON said that he was not a scientific farmer but he farmed for £ s. d. and when he saw a field of cane "going west," and giving only 18 tons when it should be at least 35, he realised that he had ploughed that field too deep. He considered that they should not plough too deeply all at once. He thought 8 to 10 inches was sufficient the first time and then go deeper the next time, and so work down to the lower soil.

Mr. D. MOSES stated that he had not had much experience with sugar cane but there were one or two points he would like to speak on. Mr. Martens made a point in dry weather of carrying out cultivation and pony ploughing no matter what the circumstances were. He could not altogether agree with that. A lot had been written about the value of cultivation, but as far as he knew with most other crops the value of cultivation had been found to be due to the actual killing of weeds and not so much to the actual stirring of the soil. He knew from experiments that had been carried out with maize in the United States that plots kept just with the weeds cut off at the surface gave just as good results as plots very well cultivated. He was not denying the value of thorough preparation of the soil, but he would take issue with Mr. Martens with his programme of keeping up cultivation in dry weather. He was of opinion that by stirring the soil in dry weather it resulted in the loss of more moisture than if left until more favourable circumstances. With regard to pony ploughing he would like to ask Mr. Dodds whether any extensive research had been carried out on the root system of the sugar cane plant. It seemed to him that the plants adapt themselves no matter how the plants were planted, the roots either came up or went down. He knew that with other plants it made very little difference whether they were planted deep or shallow. He was of opinion that the roots came up to within about two inches of the surface and it was a mistake to cultivate very deeply. If they could kill the weeds with shallow cultivation it seemed to him the cane would benefit more without having its root system disturbed. He certainly thought if these questions had not been investigated under local conditions the Experiment Station should be supported in carrying out these experiments. He knew the plots quoted by Mr. Martens but he did not think it was a fair comparison because the fields were all of different soils, and contained varying amounts of hillside and low-lying land, and in his opinion the plots were far too big.

Mr. DODDS stated that he was inclined to agree with Mr. Moses that it was possible to overdo cultivation during dry weather. The idea of cultivation was to establish and maintain a soil mulch, that was a finely divided surface soil layer of a few inches in depth, and more especially to keep down all weeds. If that was maintained he did not see any object in going through the ground again until it was required, as shown by the surface beginning to cake, or weeds to appear. He thought that as far as possible after every shower of rain cultivators should be put through the soil to re-establish the mulch. He certainly did not see any object in going through the fields with cultivators time after time in dry weather when the soil mulch was already established and no weeds were apparent. With regard to the question of deep planting he also agreed with Mr. Moses; he did not think it mattered very much within limits as regards the ultimate growth of the cane. He did not think one could lay down hard and fast standards for all conditions, as these would vary with different soils. In a light sandy soil for example cane should be planted rather deep because the moisture tended to fall a long way below the surface, and the cane shoot could easily find its way through this kind of soil. But in heavier soils it was better probably to plant the cane more shallow so as not to have it buried too low where it was apt to be cold and damp and have difficulty in forcing its way to the surface. No systematic studies had been made of the sugar cane root system in this country although they had been begun in India and in other places; he hoped they would be able to follow suit here within the near future.

Mr. PALAIRET referring to the depth of cultivation, said he thought it would be just as well to touch on the cultivation of ratoons. This last season he had been going very much deeper with a tractor immediately after cutting than he had been doing in the past, and in the fields where he had been doing this the difference was perfectly astounding. He found that other people had the same experience, that where they could go really deep it seemed to give a tremendous growth. His idea was that having done that he would not go deeper than two inches in the later cultivation. Some people however, were in favour of six inches, and he would like to hear more views on the subject. He thought of trying next season fitting disc cultivators to his tractor cultivator, in front and just inside the inner tines with a view to a good pruning of the stools and to prevent the inner tines ripping out any of the stools. The main point he thought was that the deeper they could go immediately after cutting the better the results.

Mr. ASKEW, Jr. stated that he ploughed from 10 to 12 inches deep and all old lands that were ploughed out were allowed to lie fallow for a year. When the property was first taken over they were

only getting 10 tons to the acre but now they were getting about 30 tons. The cane was always beautifully green even when there was no rain. There was one point he wished to mention with regard to ratoons. He always put a pony plough through with a cultivator behind it, even in dry weather. The pony plough opened up the soil and the cultivator coming behind closed it and kept the moisture in the soil. He had a field of about 30 acres of second ratoons which had been planted before he took over the property. Half of the field on the top of the hill was rather short but the other half was beautiful cane. The top portion was rather high to put a pony plough through but he thought he would chance it as it would save a lot of weeding. He put the pony plough in with a scarifier behind it and loosened up the soil; he did not even trouble to put in a gang of boys to weed it afterwards. The result was astonishing as that cane was now better than the lower portion of the field. With regard to Mr. Martens' paper, he could not understand how the pony plough was put through as described. The method he adopted was to put a gang of boys through when the weeds appeared and a week afterwards to put the ordinary Uba cultivator through. He did not see any necessity for the pony plough, and thought it was a waste of money. The ordinary cultivator with a gang of boys following was sufficient in his opinion.

Mr. RATTRAY stated that Natal Estates had planted 2,950 acres this year, which was a thousand acres more than previous years. Every year it has been a problem to weed the plant cane during the cutting season; when labour was so short they could not deal with it properly and the weeds became very bad. This last season through using these light harrows, at the end of the cutting season it had been a very small job to do the weeding. Instead of doing 15 to 25 acres they had been able to do 70 to 80. By using light harrows constantly they had been able to keep the weeds down to such an extent that their weeding had been negligible. He had noticed that very few of the planters on the North Coast used these harrows. If they would only realise what a huge success they were he felt sure more would invest in them. They would find it saved a very large amount of money in weeding and scarifying.

Mr. FOWLIE stated that in connection with these light harrows he had suggested to Mr. Garland, and he would like to put the suggestion to the meeting also, that it would be more economical to use a slightly heavier and wider harrow to be drawn by two animals than to use the one mentioned.

The CHAIRMAN said he was very gratified at the amount of interest these two papers had aroused, and he hoped the discussion would have beneficial results. He proposed a hearty vote of thanks to Mr. Martens and Mr. Garland. (Loud applause.)