

EXPERIMENT TO TEST THE EFFECTS OF STREAK DISEASE ON UBA CANE.

By H. H. DODDS and P. FOWLIE.

The following paper was read by Mr. FOWLIE:—

In order to get exact information on this important subject, this experiment was planned in such a way that there would be exactly the same number of plants on each plot. The cane was planted in squares four feet apart each way. Only one plant was left in each hole, being the growth from a single eye of cane.

There were 4 plots planted with cane affected with streak disease and 4 plots with healthy cane. Planting was done on 26th October, 1927. The plots were approximately $\frac{1}{9}$ th acre in extent, being 36 feet by 54 feet and each containing 144 stools. When planting, 3 seed pieces, each having one eye were planted in each hole. After the plants were well up the number that had germinated were counted, when it was found that out of 1,728 healthy eyes planted, 1,535 germinated and 1,411 out of the same number of streak diseased ones. This is equal to 88.82% of the possible in the case of healthy eyes and 81.65% in the case of diseased eyes.

The plants were then thinned out so that only one was left in each hole. All the plots then had exactly the same treatment during growth. Especially during the first season, but in a smaller degree during the second there was a noticeable difference between the diseased and healthy plots in favour of the latter.

The plant cane crop from this experiment was cut on 22nd to 24th July, 1929, and gave the following results:—

| Plots | Weight per acre lbs. | Weight per acre tons | Number of sticks per plot | Number of nodes in 10 Kilos |
|-------|----------------------|----------------------|---------------------------|-----------------------------|
| 1. H | 4,272 | 40.38 | 3,588 | 501 |
| 2. S | 3,926 | 37.11 | 3,553 | 574 |
| 3. H | 5,131 | 48.50 | 3,648 | 414 |
| 4. S | 4,964 | 46.92 | 3,777 | 478 |
| 5. H | 4,909 | 46.40 | 3,562 | 413 |
| 6. S | 3,844 | 36.34 | 3,664 | 401 |
| 7. H | 4,613 | 43.60 | 3,530 | 405 |
| 8. S | 3,996 | 37.78 | 3,447 | 528 |

| | |
|---|--------|
| Average yield of streak plots .. tons per acre | 39.75 |
| Average yield of healthy plots .. " " " | 44.78 |
| Average increased yield of healthy plots .. " " " | 5.03 |
| Average % increased yield of healthy plots .. | 12.65% |
| Average % decrease caused by streak disease .. | 11.24% |
| Average % increased number of nodes in streak plot samples .. | 14.33% |
| Average % increased number of sticks in streak plot sample .. | 0.78% |

These figures show that the disease decreases the size of the cane nodes in a marked degree and also the weight of individual sticks.

The plants make a brave effort to counteract this effect by producing more nodes and also a slightly greater number of sticks than healthy plants. In spite of this there was an average advantage in yield in favour of the healthy plots of just over 5 tons per acre. This on the yields obtained is equal to a lowering of yield by the disease of 11.24%. This in spite of the fact that the healthy plots had suffered from a fairly heavy secondary infection as the following figures show.

On the 19th November, 1929, and 31st December, 1929, the number of stools in the healthy planted spots were counted and the number which had become streak diseased from secondary infection noted.

| Plot | Number of stools in plot | No. of streak infected 9/11/29 | No. of streak infected 31/12/29 | Per cent. on 31/12/29 |
|------|--------------------------|--------------------------------|---------------------------------|-----------------------|
| 1 | 144 | 59 | 66 | 40.97 |
| 3 | 144 | 98 | 99 | 68.05 |
| 5 | 144 | 75 | 80 | 52.08 |
| 7 | 144 | 72 | 74 | 52.00 |

In spite of this heavy secondary infection it was decided to carry out the experiment and get results from the first ratoon crop.

The first ratoon crop was cut on 25th and 26th of June, 1931. The results were as follows:—

| Plot | Yield per acre lbs. | Yield per acre Tons |
|------|---------------------|---------------------|
| 1. H | 3,925 | 37.28 |
| 2. S | 3,415 | 32.44 |
| 3. H | 4,055 | 38.52 |
| 4. S | 3,655 | 34.72 |
| 5. H | 3,690 | 35.05 |
| 6. S | 3,260 | 30.97 |
| 7. H | 3,695 | 35.10 |
| 8. S | 3,450 | 32.77 |

| | |
|---|--------|
| Average yield of streak plots .. tons per acre | 32.72 |
| Average yield of healthy plots .. " " " | 36.49 |
| Average increased yield of healthy plots .. " " " | 3.77 |
| Average % decrease caused by streak .. | 10.33% |

The total number of sticks in each plot were not counted, but bundles of cane from each were weighed and the sticks counted.

The average weight of the sticks as found in this was:—

| | |
|---------|---------------------|
| Healthy | 1.06 lbs. per stick |
| Streak | 0.95 " " " |

This again shows that the disease has the effect of decreasing the size of the stick

On 21st November, 1931, when the second ratoons were well up another count of streak stools on the healthy planted plots was made with the following results.—

| Plot | Number of stools in plot | Number of streak infected | Per cent. infected |
|------|--------------------------|---------------------------|--------------------|
| 1 | 144 | 92 | 63.9 |
| 3 | 144 | 115 | 79.9 |
| 5 | 144 | 102 | 70.8 |
| 7 | 144 | 97 | 67.5 |

The new variety CH. 64/21 has been found to be very susceptible to streak and it is considered important that its reactions to the disease should be studied.

Another experiment on this variety similar to the one above described on Uba was laid down in November, 1931, the results of which we hope to be able to publish in due course.

Experiment Station,
South African Sugar Association,
Mount Edgecombe.
March, 1932.

Mr. ASKEW: This is a very interesting paper and, I think, one of the best we have had during the whole of the Conference. It is a very important paper to us as Planters. I see on the first ratoons, if I am correct, that there was a less streak effect than there was on the plant crop.

Mr. FOWLIE: So far as the experiment figures go, yes.

Mr. ASKEW: So that does not seem to show that streak increases on the first ratoon crop.

Mr. FOWLIE: You have to remember that the healthy plant plots were, roughly speaking, half streak diseased when the first ratoon crop was growing; although they were planted healthy, the cane reaped from the so-called healthy plots in the first ratoon was half streaked. In spite of that half streak we still obtained more than half the extra yield we got in the first case, so that although they had become streaked to the extent of about a half we still got the advantage of planting healthy canes.

Mr. ASKEW: Yes, undoubtedly. The next result, so far as we can see, is that we lost 5% of the cane, which is a very serious loss, and this is a paper we ought to think seriously about, I am sure. I should like to ask one or two questions from Mr. Fowlie. Have you come to any conclusion as to what is the cause of streak? Has there been any cure found for streak? Then with regard to planting, what is the effect of carefully selecting the seed for another crop? I know at one place I am interested in, my son had some streak in his cane, and he went into the field and selected sticks of cane which were non-streak. It makes rather a ragged field, but he did that and he planted it, and

I believe had very good results. The crop that came off seemed to be a great improvement on the other. My own impression, as a practical layman, is that we have more streak in the dry weather. It seems when we get plenty of rain we are not troubled so much with streak.

CHAIRMAN: We are fortunate in having with us this morning, the Government Mycologist, Mr. McClean, and I would be pleased if he would give us some remarks which might provide answers to Mr. Askew's questions.

Mr. McCLEAN: It is very difficult to decide the origin of streak. It was known in maize and small grasses probably in the early part of this century, and there is no doubt that the streak in maize is quite different to the streak in cane, and really there is no information on the origin of streak in sugar cane. Undoubtedly, there is some definite connection. The symptoms are very much the same, and the insect carrier is very much the same. As for methods of curing streak, so far as I know, there are none in existence. One has the ordinary control method of eliminating sources of infection and by planting out healthy material and roguing out diseased plants in the early stages. The only satisfactory method of control is by planting resistant varieties, and some of the varieties which have been released recently, such as the Javan types; the Co.290, so far as we know, for all practical purposes is immune to streak.

Mr. ASKEW: Do I understand it is carried by some insect from one to another, and probably they will transmit from a mealie crop to a sugar crop.

Mr. McCLEAN: No; streak in maize is different to that in sugar cane.

Mr. ASKEW: Do you think that the streak will continue to increase on an estate if you do not attend to it? It will go on, year by year, until your crop becomes very much reduced, I suppose.

Mr. McCLEAN: Yes, streak must increase under those circumstances. You have it at the Experiment Station, where you have healthy plants alongside streak, and they have been infected up to 80% in experiments carried out. If you take no precautions to eliminate that streak, then it must increase.

Mr. ASKEW: Then, so far as I can see, we are faced with a very serious position. If we do not eliminate these streak canes, we shall go on until our fields become decimated and have little crop left.

Mr. McCLEAN: Our position is a very favourable one, as the staple variety grown here is very tolerant to streak disease. Over a fairly large area some precautions are taken to eliminate streak. We have Natal Estates area and several smaller ones north of that, where the percentage of streak varies from about 3% to 10%. It is only in certain parts of Zululand and south of Durban, particularly round Umbgointwini, where the

percentage of streak is 100. In many of the areas the percentage is below 20. At present streak is not a very serious menace to the Industry.

Mr. ASKEW: Do you think that the best way of getting rid of it, or keeping it down, is by selecting from your fields streak-free cane for planting?

Mr. McCLEAN: Yes; start off with a clean sheet and plant only healthy cane.

Mr. ASKEW: There is this difficulty. Say we have a certain amount of streak, and we begin by pulling out the streak-free cane and planting it some distance away. That comes up free, but then you have these beastly insects that carry it from the one to the other.

Mr. McCLEAN: Quite so. We are in the lap of the gods, I am afraid!

Dr. HEDLEY: I want to ask Mr. McClean this: if streak is different in maize to streak in cane, there is no possibility of maize infecting cane. Is that so? In other words, you can have a maize crop growing next to cane, and you would not expect the maize to do any harm. On the contrary, I think it has been said that streak from cane can affect maize. But is it harmful to have maize growing in the neighbourhood of cane?

Mr. McCLEAN: There are certain objections. First of all, the maize plant happens to be a more favourable food plant for the jassid which carries the streak than cane. Therefore, by having maize plants adjacent to cane fields, you inevitably encourage the breeding up of the jassid, which will then possibly pass into the cane. If you have a number of infections in your cane field, the chances are that a certain percentage of those hoppers will feed on those infected plants, and from there carry the disease to healthy plants. The second objection is that the maize plant is susceptible to the virus of diseased canes, and we have evidence that a number of different strains of streak exist. The typical maize streak happens not to affect cane, but the strain of cane streak does affect maize. If you plant your maize, it is possible for the cane streak to pass into

that maize, and when the maize dies down for the hoppers to transmit that back again to the cane; but the normal maize streak does not affect cane at all.

Mr. PALAIRET: As regards this question of streak disease. Mr. Askew has been raising the point how to check it. Personally, a few days before I start planting, I sent a boy through my plant material, and every time he comes across a bit of streak material he cuts out the whole stool, and that goes to the mill, so that there is no loss there. I find that absolutely effective and there is practically no streak there. That is all very fine in a district where secondary infection is practically nothing, but I realise that in these districts where secondary infection is fairly strong there is another problem, but it seems rather as if that problem should centre round our friend *balclutha mbila*, and I wonder whether Mr. McClean could not get into touch with Dr. Ripley on the subject. Between the two of them, they might find something doing. Clearly, we have climatic conditions which do not suit the insect, whereas in other parts it does. We all know that in insect life the tiniest alterations sometimes mean everything.

Mr. ASKEW: Is it Mr. McClean's experience that streak is worse in droughty seasons than in wet seasons?

Mr. McCLEAN: I do not think there is any definite relationship between the two. A cane plant which becomes infected remains infected, and we have no results to show any connection between the incidence of streak and drought periods or wet periods.

Mr. ASKEW: There is only this, that in the wet period the cane is more vigorous and would probably be better able to throw off the effect.

Mr. McCLEAN: The Uba plant, once infected, remains infected in its whole life.

CHAIRMAN: All this comes back to a question we discussed last year—the necessity of having our own Entomologist attached to the Industry at the Experiment Station. We have had a lot of useful work done for the Industry by Mr. McClean, but he is a Government man and has many other things to consider besides sugar cane. We must go on talking about that question until we get our own Entomologist.

