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**BUREAU OF SUGAR EXPERIMENT STATIONS  
QUEENSLAND, AUSTRALIA**

**REPORT BY THE CONSULTANT  
PHYTOPATHOLOGIST ON THE MISSION  
TO INVESTIGATE THE FIJI DISEASE  
SITUATION IN MADAGASCAR  
FAO PROJECT TCP/MAG/8958:  
Constat d'éradication de la maladie de Fiji**

by  
B T Egan

*This Mission was undertaken under an F.A.O./BSES Consultancy Agreement negotiated in April 1991, following an initial approach to Mr Egan as an expert in Fiji disease.*

**June 1991**

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## 1. EXECUTIVE SUMMARY

### FINDINGS, CONCLUSION AND RECOMMENDATIONS OF THE MISSION TO INVESTIGATE THE FIJI DISEASE SITUATION IN MADAGASCAR

This Summary was prepared in English and confirmed and signed by Mission members on 7 June in Antananarivo. A French translation of the English text was made also, and was approved by Mission members at the same time. This is given as Appendix 1.

#### 1.1 FINDINGS AND CONCLUSION

- 1.1.1 Fiji disease of sugarcane was not seen during the inspection from Soanierana-Ivongo to south of Vatomandry.
- 1.1.2 Despite widespread inspections for more than 20 years by the Malagasy authorities, no Fiji disease has been seen in Madagascar since 1971.
- 1.1.3 The *Perkinsiella* vector was present in all areas during the inspection, but at quite low levels. However, numbers in the early-mid summer period were higher, and it is reported that relatively heavy populations have occurred in some years.
- 1.1.4 Sugarcane was present in the town of Tamatave both near the port and the airport.
- 1.1.5 M134/32 has been planted widely in most areas except Brickaville, for distillery and betsa-betsa use. It is still being expanded, as are some known susceptible local varieties.
- 1.1.6 Arguments for and against the eradication of Fiji disease were considered at some length. The absence of Fiji disease for more than 20 years and the presence of large amounts of M134/32, suggested that eradication may have occurred. However, pathology and epidemiological theory, and experiences in Australia and Fiji where the disease has disappeared from time to time, all suggest that the disease may still be present. The conclusion of the Committee must therefore be based on the probability of disease being present or absent.
- 1.1.7 If present, Fiji disease must be at extremely low levels. This is consistent with previous experience.
- 1.1.8 **It is concluded, on the basis of probability, that the causal agent of Fiji disease has not been eradicated from Madagascar as yet.**

## 1.2 RECOMMENDATIONS

- 1.2.1 Discontinue the planting of the Fiji trial with 10 varieties and M134/32 at Menarano on Brickaville plantation. This is now required by law, but it has had no useful purpose for many years.
- 1.2.2 Plant at least 4 plots of M134/32 on Brickaville at locations where Fiji disease was heavy in the 1950's, including one at Menarano. These must be at least 1 hectare each, to act as a trap crop for any reappearance of Fiji disease. Inspections should be made monthly.
- 1.2.3 Permit the planting of a wider range of varieties on Brickaville. Susceptible varieties (rated 6, 7, 8, 9) should be prohibited, but resistant (rated 1, 2, 3) and intermediate (rated 4, 5) should be permitted.
- 1.2.4 Do NOT consider glasshouse trials for determining Fiji disease reactions of varieties. Australian experience since 1970 shows that not only are these trials very difficult to carry out satisfactorily, but the results for many varieties are not accurate.
- 1.2.5 Accept Fiji resistance ratings made in Australia and Fiji, in the absence of any trial results in Madagascar. Although some varieties may be given a wrong reaction for Madagascar, the great majority of varieties should be accurate enough. There is no feasible alternative.
- 1.2.6 Enforce the prohibition under Decret No. 59-19 on plantings of M134/32 and other susceptible local canes as soon as possible. Widespread plantings have been made in recent years for distillery, betsa-betsa and chewing purposes. These will hasten the time when Fiji disease reappears, if it is still in Madagascar.
- 1.2.7 Locate and distribute a suitable, resistant, alternative variety to M134/32 for the above purposes. Present alternative varieties are not accepted by the people as being adequate, for various reasons. A suitable variety would help to overcome opposition to removing M134/32.
- 1.2.8 Continue to inspect and monitor for Fiji disease recurrence in all East Coast sugarcane growing areas. This will provide an early warning of any Fiji disease outbreak.
- 1.2.9 Extension officers in the Fiji disease eradication program should be trained to recognise M134/32 and other susceptible varieties, as well as symptoms of Fiji disease. Consideration also should be given to a visit to Australia by a senior field person who has experience in sugarcane, to become conversant with Fiji disease.

- 1.2.10 Maintain the Regional Quarantine on movement of sugarcane from the East Coast Region. The four industrial plantations on the West and North West Coasts must continue to be protected from any possible movement of Fiji diseased cane.
- 1.2.11 Enforce the prohibition under Decret No. 59-19 on the growing of sugarcane in the city of Tamatave, so as to protect surrounding countries from possible introduction of Fiji disease by sea and air.
- 1.2.12 Investigate *Perkinsiella* populations on new varieties being tested at Brickaville. Varieties which are very favourable for the vector should be treated with caution.
- 1.2.13 Monitor *Perkinsiella* populations, as well as parasites and predators (*Tythus*) on East Coast cane. If both species of *Tythus* are present, further biological control measures are unlikely to be worth pursuing.
- 1.2.14 In the current absence of known Fiji diseased stools, research on the disease is not possible in Madagascar. However, as soon as Fiji disease is discovered, a research program should be commenced. The content of this research program will depend on the amount of disease and the extent of the outbreak.
- 1.2.15 When biotechnological tests for the Fiji disease virus become available from Australia in two or more years, tests should be made in Madagascar to determine if the virus is present in sugarcane plants and vectors.
- 1.2.16 In view of the above recommendations, the Malagasy Plant Protection Service requests that concerted action be undertaken by the Plant Protection Services of the three countries. To ensure this, the Malagasy Plant Protection Service undertakes to supply the other parties with a regular flow of information on the implementation of the recommendations.
- 1.2.17 A similar mission to this should be convened in 1995 and again in 2000, assuming that no Fiji diseased sugarcane has been located by then, to continue to evaluate the possibility of eradication.
- 1.2.18 The Malagasy Government should:
  - (a) request funding agencies for assistance in implementing the above recommendations;
  - (b) provide the relevant services with the necessary financial and other resources in order to undertake the urgent actions required to prevent any resurgence of Fiji disease.

## 2. INTRODUCTION

### 2.1 Terms of Reference for the Phytopathologist, specialist in sugarcane diseases

- Inspect the canegrowing areas from Maraontsetra to Mahanoro to verify the absence of Fiji disease.
- Assistance in the inspection will be given by the accompanying group of specialists in plant protection.
- Make any necessary laboratory analyses to determine the presence or absence of Fiji disease.
- Prepare a final Mission Report giving conclusions and recommendations.

### 2.2 Period of Mission in Madagascar

I arrived in Antananarivo, Madagascar, on Friday 24th May and departed on Friday 7th June 1991, with additional time required for travel from and to Australia, and for report preparation in Australia. The actual inspections were made from Tuesday 28th May to Tuesday 4th June, and the Itinerary for this is given as Appendix 2.

### 2.3 Technical background of the Mission

Fiji disease was discovered for the first and so far only time in the western Indian Ocean area in 1954. The history of the outbreak upto 1961 is given in a paper by Baudin and Antoine (1962) - 'Fiji disease in Madagascar', Proceedings of the 11th Congress of the International Society of Sugar Cane Technologists, pp 760-767. The known infected area in the 1950s fell within the inspection limits set by the 1st Term of Reference.

The disease was brought under control in the Brickaville industrial plantation by the early 1960s by removing infected fields and all of the highly susceptible M134/32, and growing only resistant varieties. M134/32 was popular with the large number of small farmers for use by distilleries and for betsa-betsa and chewing. Control here was more difficult because of the widespread and diffuse plantings, often in very inaccessible areas, and the practise of just abandoning fields to let nature take its course. Again, M134/32 and other susceptible 'local' varieties had to be compulsorily removed. However, Antoine (personal communication) considers that complete removal was impossible. Control was achieved, but more slowly than on Brickaville plantation.

The outbreak finally petered out in the late 1960's, mainly through the control measures taken. However, it probably also disappeared partly because the lower threshold level for disease spread had been reached, with only a few diseased stools and small amounts of susceptible varieties present.

The last known Fiji diseased stool was destroyed in a Fiji rating trial at Brickaville in 1971, while the last stool known elsewhere was destroyed a few years earlier.

Plantings of M134/32 and local susceptible varieties have been made for 10 years or more and these have increased considerably recently, despite the legal ban on such plantings.

In the circumstances, it was not unreasonable to ask the question 'Has Fiji disease been eradicated from Madagascar?' Appendix 3 is a Report on the situation submitted to the Mission by the Malagasy authorities, although some parties may not have been fully supportive of all the statements.

### **3. INSPECTION PROCEDURES AND PROBLEMS**

The itinerary provided for inspections to be made along the East Coast from Soanierana-Ivongo in the north to Ilaka Atsinanana below Vatomaniry in the south. This involved inspections during two boat trips on the Ivondro and Sakanila Rivers, where there were many plots of cane; along three roads which headed inland (Ivoloina, Vavatenina, Ambodimanga); and along the main coastal highway. We concentrated on Fiji disease susceptible varieties grown for chewing, betsa-betsa (fermented cane juice) and distillery use. It should be noted that all of the inspected sites were within the Fiji infected area of the 1950s.

#### **3.1 Plots inspected**

A total of 44 M134/32 plots were inspected, often mixed with other canes such as local varieties, S17, Pindar and B46364. Another 11 plots of resistant varieties only (mainly S17) were also inspected. Cane inspected on Brickaville plantation was mainly at Menarano, where plots of M134/32 and other susceptible varieties such as NCO310 are grown on what was the site of the Fiji disease resistance trial. Only Fiji resistant commercial varieties are grown on the plantation.

The majority of inspected plots contained less than 200-300 stools, but the largest contained several hectares. The two most suitable plots of M134/32 inspected contained over 1 ha each.

### 3.2 Selection of plots for inspection

The definitive symptoms of Fiji disease are galls on the back of leaves. There is a progressive reduction in the size of leaves and top in diseased stalks, similar in many ways to the symptoms of pokkah boeng disease; eventually all stalks in a stool become diseased. Subsequent ratoons will be very stunted, and the stools are usually darker green in colour. In a few very susceptible varieties such as M134/32, a witches broom effect is produced on taller infected stalks in the first year of infection, due to production of small multiple diseased shoots by the lateral stalk buds.

**During this inspection, we concentrated on looking for stunted ratoon stools and witches broom effects in tall M134/32. Consequently, criteria for selecting plots for inspection were set to maximise our chances of seeing these symptoms.**

Because cane is cut at any time of the year, and often is grown for more than 12 months, all stages of crop were present from recently planted or harvested up to old, heavy, tangled masses. Where possible, plots were selected for inspection because they were accessible, not overgrown with weeds and grass, and of a suitable height and condition for inspection. Unfortunately, we had to inspect quite a few plots which did not meet these criteria.

NB It should be noted that efficiency of inspection is greatly influenced by crop condition. From long experience in Australia, I estimate that we had less than a 50% chance of finding Fiji disease in any plot which contained only a single diseased stool.

### 3.3 Problems encountered

These were no different from those encountered by the Malagasy authorities in making previous inspections, but were more important for the Mission because of the very limited time available.

Accessibility to cane plots visible to us was affected by water (across streams or drains, boggy areas due to rain in the previous week); by weeds and grasses (many plots were overgrown as little weed control was practised); and by distance (long treks and/or climbs up mountainsides would be required to reach them). Many other cane plots known to the local inspectors could only be reached by long canoe trips up rivers and small streams, or by treks of hours or even days.

Crop size prevented many plots from being inspected effectively or at all during the Mission - large, lodged crops restrict movement and vision so that far more time is spent in trying to move through the crop than in inspecting for disease.

Abandoned cane is widespread because of the agricultural tradition, and this helps to perpetuate systemic diseases.

As there were large numbers of plots available and the Mission had to examine cane over a big area, the best strategy was to select only the more suitable plots and not waste time on less suitable ones unless they were the only ones in the locality.

NB If exhaustive inspections are made in a locality, these would have to be done over a period of at least 6 months, and probably much longer, so that each plot receives an inspection at a suitable growth period.

#### 4. FINDINGS AND ASSESSMENT

##### 4.1 Disease

Fiji disease was not observed by the Mission, nor has it been seen for more than 20 years in the small holdings outside of Brickaville plantation. We accept that adequate inspections have been made by the Malagasy authorities since the late 1960s, without finding any Fiji disease.

Consequently, if Fiji disease is still present, it must be at extremely low levels.

##### 4.2 Vector

The leafhopper vector (*Perkinsiella saccharicida*) was present in all areas and most locations, but in quite low numbers. Evidence from egg-laying punctures in cane leaf midribs indicated higher populations earlier in summer. This was consistent with other reports, since populations are generally greatest in the November/February period. We also had reports that populations have been much higher in some years than in the 1990-91 summer.

The vector populations over the past 5-10 years were certainly sufficient to maintain very low levels of Fiji disease in moderately to highly susceptible varieties. However, they were probably inadequate in most years to start any upsurge in the disease.

##### 4.3 Varieties

The supposedly banned susceptible variety M134/32 is being grown by smallholders in all localities except Brickaville. The biggest plot was adjacent to a distillery on the Tamatave/Brickaville road, and was several hectares in area; at least three other plots exceeded 1 ha in area. M134/32 is being expanded in area, more quickly in some localities than others. Some 'local' varieties, known to be Fiji susceptible, are also being expanded.

These varieties are regarded by smallholders as being superior for chewing, betsa-betsa and distillery use, while M134/32 can withstand the difficult conditions under which sugarcane is expected to grow. The presence of reasonable areas of a susceptible variety, without any Fiji diseased stools being found, is consistent with previous experience in Australia and Fiji.

#### 4.4 Locations

Many stools of cane and/or some very small plots are being grown in the town of Tamatave, both near the port and the airport. The varieties include M134/32 and 'local'. This is despite the ban on growing cane there.

### 5. MATTERS CONSIDERED IN REACHING A CONCLUSION

Arguments for and against eradication of Fiji disease in Madagascar were considered at length on two occasions. Only a precis of these will be presented here. In the final analysis, a decision could only be made on the basis of probability.

#### 5.1 For eradication

- diseased stools have not been found for over 20 years despite considerable inspection efforts each year.
- the susceptible M134/32 is now grown widely, and never ceased to be grown in the previously infected area.
- susceptible varieties (M134/32, NCo310 etc) have been grown at the Menarano site on Brickaville since Fiji disease was bad in the mid-late 1950's, but the last stool was rogued in 1971.
- vector numbers have been generally low, which should have assisted in disease disappearance.
- cane cultural conditions are sufficiently different in Madagascar, compared with Australia and Fiji, that precedents from those countries may not apply.
- a distinction was also made between the 'disease' and the 'pathogen' by the FAO representative - diseased stools probably have been eradicated, but is it still possible for the Fiji disease virus to remain in vectors and/or the less susceptible varieties for a considerable time before it is finally eliminated?

## 5.2 Against eradication

- information from the 1960s suggests that Fiji disease apparently 'disappeared' of its own accord when control measures reduced it to quite low levels of known diseased stools. By about 1962, the virus/vector/ diseased-stool interaction had probably fallen below the threshold level at which the disease could sustain itself at moderately small numbers.
- M134/32 was never eliminated from all smallholdings and abandoned fields existed in remote locations also.
- under the above conditions, it is well within the bounds of pathology theory for Fiji disease to remain quiescent for many years in extremely small numbers of diseased stools, with only the occasional transmission to maintain it, until suitable conditions allowed a new build-up.
- Fiji disease behaved in just this way in the Bundaberg area in Australia, where it could not be found for 16 years from 1953 to 1968, then rebounded quickly into the greatest epidemic of Fiji disease ever seen. There have been other examples in Australia and Fiji.
- historically, Fiji disease has behaved quite cyclically, as do many diseases. The following scenario has occurred on several occasions - an epidemic is controlled by use of resistant varieties and destruction of diseased stools; diseased stool numbers fall to extremely low levels or cannot be found at all for years; less resistant and then susceptible varieties are grown with little or no recurrence of disease for some years; then an epidemic builds up to complete the first cycle.
- the susceptible NCo310 was introduced to the Bundaberg area by 1951, before Fiji 'disappeared' in 1953. It was expanded quickly from 1960 and was grown on almost 40 000 ha (approx 75% of the total cane area) at the time when Fiji disease was rediscovered in 1968.
- this behaviour of Fiji disease in Madagascar and Australia is entirely consistent with epidemiological theory.

## 6. CONCLUSION

Proof that Fiji disease does not exist in Madagascar is almost impossible to obtain. A very high proportion of all plantings of sugarcane would have to be inspected under reasonably favourable conditions - a very difficult undertaking! Does the absence of disease findings for 20 years indicate a high probability of eradication?

On the other hand, do theoretical considerations and evidence from other countries cast sufficient doubt on the likelihood of eradication?

**It is concluded, on the basis of probability, that Fiji disease and its causal agent have not been eradicated from Madagascar as yet.**

## 7. RECOMMENDATIONS

### 7.1 Varieties and trials at Brickaville

The situation re varieties and trials on Brickaville needs to be reorganised to take into account the present position, changed attitudes to Fiji disease and more recent information from Australia and Fiji. The Fiji trial at Menarano outlived its usefulness soon after Fiji disease disappeared from the location, and it would be preferable to plant bigger plots of M134/32 as a trap crop.

Commercial varieties of intermediate, but not susceptible, rating to Fiji would not jeopardise the disease situation. They should also provide a wider range of commercially acceptable varieties for the plantation. Acceptance by the authorities of Australian disease ratings will be necessary; there is no alternative even though a few ratings will be inaccurate. The possibility of using glasshouse tests at some suitable site in Madagascar is not a feasible alternative for several reasons.

#### Recommendations

- Rec. 1** Discontinue the planting of the Fiji trial with 10 varieties and M134/32 at Menarano on Brickaville plantation. This is now required by law, but it has had no useful purpose for many years.
- Rec. 2** Plant at least 4 plots of M134/32 on Brickaville at locations where Fiji disease was heavy in the 1950's, including one at Menarano. These must be at least 1 hectare each, to act as a trap crop for any reappearance of Fiji disease. Inspections should be made monthly.

- Rec. 3** Permit the planting of a wider range of varieties on Brickaville. Susceptible varieties (rated 6, 7, 8, 9) should be prohibited, but resistant (rated 1, 2, 3) and intermediate (rated 4, 5) should be permitted.
- Rec. 4** Do NOT consider glasshouse trials for determining Fiji disease reactions of varieties. Australian experience since 1970 shows that not only are these trials very difficult to carry out satisfactorily, but the results for many varieties are not accurate.
- Rec. 5** Accept Fiji resistance ratings made in Australia and Fiji, in the absence of any trial results in Madagascar. Although some varieties may be given a wrong reaction for Madagascar, the great majority of varieties should be accurate enough. There is no feasible alternative.

## 7.2 Cane plantings outside Brickaville

The law prohibits the planting of M134/32 and other susceptibles in the sugarcane belt along the East Coast, but this is being ignored widely. The ban on cane plantings in and around Tamatave port and airport is also being ignored. We can understand the political problems in this, and the resentment of people prevented from growing 'traditional' canes. Nevertheless, all these matters need to be addressed. If Fiji disease is still present, then widespread plantings of susceptibles will hasten the reappearance of Fiji disease in epidemic form. Why not attempt to get better varieties for these small ploholders, with appearances more like their traditional canes? The Tamatave situation unnecessarily detracts from what has been a good control campaign.

The Regional Quarantine needs to be maintained to protect the West Coast plantations. Inspections for Fiji disease must be continued, with good training for the staff involved and better extension efforts with the canegrowers.

- Rec. 6** Enforce the prohibition under Decret No. 59-19 on plantings of M134/32 and other susceptible local canes as soon as possible. Widespread plantings have been made in recent years for distillery, betsa-betsa and chewing purposes. These will hasten the time when Fiji disease reappears, if it is still in Madagascar.
- Rec. 7** Locate and distribute a suitable, resistant, alternative variety to M134/32 for the above purposes. Present alternative varieties are not accepted by the people as being adequate, for various reasons. A suitable variety would help to overcome opposition to removing M134/32.

- Rec. 8** Continue to inspect and monitor for Fiji disease recurrence in all East Coast sugarcane growing areas. This will provide an early warning of any Fiji disease outbreak.
- Rec. 9** Extension officers in the Fiji disease eradication program should be trained to recognise M134/32 and other susceptible varieties, as well as symptoms of Fiji disease. Consideration also should be given to a visit to Australia by a senior field person who has experience in sugarcane, to become conversant with Fiji disease.
- Rec. 10** Maintain the Regional Quarantine on movement of sugarcane from the East Coast Region. The four industrial plantations on the West and North West Coasts must continue to be protected from any possible movement of Fiji diseased cane.
- Rec. 11** Enforce the prohibition under Decret No. 59-19 on the growing of sugarcane in the city of Tamatave, so as to protect surrounding countries from possible introduction of Fiji disease by sea and air.

### 7.3 Research

It is not possible to carry out any research on the disease in Madagascar until diseased stools are located, but some work could be done on the vector *Perkinsiella saccharicida*. Information should be obtained on the current population dynamics of *Perkinsiella* and its predators and parasites. The favourability of new varieties to the vector should be examined.

Naturally, a research program should be undertaken if Fiji disease is rediscovered, but the extent of the outbreak will determine what can be done. Disease resistance trials would be desirable, for example, but could only be undertaken if the outbreak was of reasonable size.

The matter of biotechnological or other laboratory tests was raised. Unfortunately, no such tests exist at present. BSES in Australia is attempting to produce monoclonal antibody probes. To be successful, these must have very high sensitivity because of the extremely low levels of Fiji disease virus (FDV) present in infected cane; the exception is in gall tissue, where a probe is not necessary. These probes, if successful, will not be cheap to use on any routine basis, but could be of some use in Madagascar.

- Rec. 12** Investigate *Perkinsiella* populations on new varieties being tested at Brickaville. Varieties which are very favourable for the vector should be treated with caution.
- Rec. 13** Monitor *Perkinsiella* populations, as well as parasites and predators (*Tytthus*) on East Coast cane. If both species of *Tytthus* are present, further biological control measures are unlikely to be worth pursuing.
- Rec. 14** In the current absence of known Fiji diseased stools, research on the disease is not possible in Madagascar. However, as soon as Fiji disease is discovered, a research program should be commenced. The content of this research program will depend on the amount of disease and the extent of the outbreak.
- Rec. 15** When biotechnological tests for the Fiji disease virus become available from Australia in two or more years, tests should be made in Madagascar to determine if the virus is present in sugarcane plants and vectors.

#### 7.4 Other matters

In view of the importance of sugarcane to the economies of Mauritius and Reunion, and the fact that considerable areas of susceptible varieties are grown there, some cooperation between the three Plant Protection Services seems worthwhile. The possibility of eradication should be examined further over the next 10 years, assuming that no diseased stools are located in the meantime.

Funding will be an important consideration for the Malagasy authorities, and some assistance from abroad should be sought.

- Rec. 16** In view of the above recommendations, the Malagasy Plant Protection Service requests that concerted action be undertaken by the Plant Protection Services of the three countries. To ensure this, the Malagasy Plant Protection Service undertakes to supply the other parties with a regular flow of information on the implementation of the recommendations.
- Rec. 17** A similar mission to this should be convened in 1995 and again in 2000, assuming that no Fiji diseased sugarcane has been located by then, to continue to evaluate the possibility of eradication.

**Rec. 18 The Malagasy Government should:**

- (a) request funding agencies for assistance in implementing the above recommendations;
- (b) provide the relevant services with the necessary financial and other resources in order to undertake the urgent actions required to prevent any resurgence of Fiji disease.

**8. ACKNOWLEDGMENTS**

The author would like to express his thanks to the following people, all of whom participated in the Mission except for M Lepissier and M Razatovo, and to their organisations:

**FAO**

Monsieur J Lepissier, Représentant de la FAO à Madagascar.

Monsieur Jean Lu, Expert du Projet FAO sur la Quarantaine Végétale.

**Malagasy authorities**

Monsieur E Rakotobe-Rabehevitra, Chef de Service de la Protection des Végétaux.

Madame Marie Albine Razaimanana, Chef de la Division Inspection Phytosanitaire et Quarantaine Végétale.

Madame Jeannette Elysée Ravololonandrianina, Chef de la Division Défense des Cultures.

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Monsieur Francois Razatovo, Directeur de la Caisse de Stabilisation des Prix de la canne à sucre.

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**Other Mission members**

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Monsieur Guy Basso-Bert, Service Protection des Végétaux, Direction de l'Agriculture et de la Forêt, Reunion.

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Monsieur Abel Mbiele, Scientific Secretary, Interafrican Phytosanitary Council of OAU, Cameroun.



**APPENDIX 1**

VERSION FRANCAISE DU TEXTE ANGLAIS CONCERNANT LE RESUME DES  
"CONSTATATIONS, CONCLUSIONS ET RECOMMANDATIONS DE LA MISSION ENQUETANT  
SUR LA SITUATION DE LA MALADIE DE FIDJI A MADAGASCAR"

FAO MISSION TCP/MAG/8958 :  
CONSTAT D'ERADICATION DE LA MALADIE DE FIDJI

6 Juin 1991

## I. CONSTATATIONS ET CONCLUSIONS

- 1.1. La maladie de Fidji de la canne à sucre n'a pas été observée au cours des inspections couvrant la région de Soanierana-Ivongo (Nord de Tamatave) jusqu'au Sud de Vatomandry.
- 1.2. En dépit du nombre élevé d'inspections effectuées depuis plus de 20 ans par les autorités malgaches, aucune touffe atteinte de la maladie de Fidji n'a pu être observée à Madagascar depuis 1971.
- 1.3. De faibles populations du vecteur, Perkinsiella, étaient présentes dans toutes les zones inspectées. Toutefois, leur nombre au début-milieu de l'été était plus élevé, et il a été rapporté l'apparition de populations relativement plus importante au cours de certaines années.
- 1.4. La canne à sucre était présente dans la ville de Tamatave, près du port et de l'aéroport.
- 1.5. La variété M134/32 a été largement plantée dans la plupart des zones, excepté à Brickaville, pour les besoins de distillerie et de betsa-betsa. Sa culture est toujours en expansion, ainsi que celle de variétés locales connues pour être sensibles.
- 1.6. Les arguments en faveur et contre l'éradication de la maladie de Fidji furent longement analysés. L'absence de la maladie de Fidji depuis plus de 20 ans et la présence de nombreux champs de la variété M134/32 suggèreraient que l'éradication aurait pu avoir lieu. Toutefois les connaissances acquises en pathologie et en épidémiologie, ainsi que les expériences passées, en Australie et aux îles Fidji, où la maladie a disparu pendant certains temps, suggèreraient que la maladie serait toujours présente. La conclusion du comité sera désormais basée sur la présence ou l'absence probable de la maladie.
- 1.7. Si la maladie de Fidji est présente, cela ne peut être qu'à un niveau extrêmement faible. Cela va dans le sens de l'expérience acquise sur la maladie.
- 1.8. En conclusion, en se basant sur les lois de probabilité, l'agent pathogène, de la maladie de Fidji, n'a pas été éradiqué de Madagascar à ce jour.

## II. RECOMMANDATIONS

- 2.1. L'essai de résistance à la maladie de Fidji implanté à Menarano, avec 10 variétés et la M134/32, doit être supprimé. Son implantation est requise par un décret mais n'a été d'aucune utilité depuis plusieurs années.
- 2.2. Quatre parcelles de la variété M134/32 d'une superficie d'au moins un hectare chacune doivent être implantées à Brickaville dans les localités où l'incidence de la maladie était excessive dans les années 50, dont Menarano. Ces parcelles doivent être inspectées mensuellement et serviraient comme un piège en cas de resurgence de la maladie de Fidji.
- 2.3. La culture d'une gamme plus large de variétés doit être autorisée. Ainsi les variétés résistantes (notation 1, 2, 3) et intermédiaires (notation 4, 5) pourraient être autorisées alors que la prohibition des variétés sensibles (notation 6, 7, 8 et 9) doit être maintenue.
- 2.4. Des essais en serre pour déterminer la réaction variétale à la maladie de Fidji ne doivent pas être entrepris. L'expérience acquise en Australie depuis 1970 démontre que ces essais ne peuvent être effectués d'une façon satisfaisante et que les résultats concernant plusieurs variétés ne sont pas valables.
- 2.5. Les résultats obtenus dans les essais de résistance en Australie et aux îles Fidji doivent être pris en considération à Madagascar, en l'absence de tests équivalents dans ce pays. Quoique la réaction à la maladie peut, pour certaines variétés, quelque peu varier entre l'Australie et Madagascar, pour la majorité des variétés les résultats obtenus en Australie seront valables. Il n'y a aucune autre alternative.
- 2.6. La prohibition de la culture de la M134/32 et d'autres variétés "locales" sensibles selon le décret 59-19, doit être mise en vigueur au plus tôt. De nombreuses plantations ont été faites au cours des années récentes à des fins de distillation, de betsa-betsa ou comme cannes de bouche. Ces plantations vont hâter la resurgence de la maladie de Fidji si elle est encore présente à Madagascar.

- 2.7. Une variété résistante à la maladie de Fidji doit être identifiée et distribuée afin de constituer une alternative à la variété M134/32. Pour diverses raisons, les variétés actuellement disponibles ne répondent pas aux souhaits des planteurs. Une telle variété aiderait à surmonter toute opposition des planteurs à l'enlèvement de la M134/32.
- 2.8. Les prospections pour déceler toute réapparition de la maladie de Fidji sur la côte Est doivent être poursuivies. Elles serviraient à détecter dès le début et très rapidement toute nouvelle épidémie de la maladie de Fidji.
- 2.9. Dans le cadre du programme d'éradication de la maladie de Fidji, les agents du service de vulgarisation doivent être entraînés à reconnaître la M134/32 et autres variétés sensibles cultivées ainsi que les symptômes typiques de la maladie. Il serait souhaitable qu'une personne d'expérience en ce qui concerne la culture de la canne à sucre, effectue une visite en Australie pour acquérir des connaissances sur la maladie.
- Un poster reproduisant les symptômes pourrait être produit et serait distribué dans toute la zone touchée par la maladie dans le passé. D'autres actions telles que des causeries, démonstrations etc devraient aussi être entreprises. Une récompense pourrait être offerte à toute personne qui en premier rapporterait une touffe atteinte de la maladie de Fidji.
- 2.10. La quarantaine régionale concernant les mouvements de la canne à sucre de la côte Est doit être maintenue, ceci afin de protéger les quatre autres périmètres de canne du Nord-Ouest et de l'Ouest contre toute introduction possible de boutures atteintes de la maladie de Fidji.
- 2.11. La prohibition de la culture de la canne à sucre dans la ville de Tamatave (décret 59-19) doit être maintenue afin de protéger les pays avoisinants de toute introduction de l'agent de la maladie de Fidji, à travers les liaisons aériennes et maritimes.
- 2.12. La dynamique des populations de Perkinsiella doit être étudiée à Brickaville sur les nouvelles variétés de canne à sucre. Celles qui sont favorables au vecteur doivent être traitées avec circonspection.

- 2.13. Les populations de Perkinsiella ainsi que celles de ses prédateurs (Tytthus) et parasites doivent être surveillées sur la côte Est. Si les deux espèces de Tytthus sont présentes, il n'y a pas lieu d'entreprendre d'autres mesures de lutte biologique.
- 2.14. Comme aucune touffe infectée de la maladie de Fidji n'a été identifiée au cours de la présente prospection et au cours de celles faites antérieurement, les travaux sur la maladie sont par conséquent impossible à réaliser à Madagascar actuellement. Dès qu'il y aura résurgence de la maladie, un programme de recherche devra être entrepris. Le contenu de ce programme devrait dépendre de l'intensité et de l'expansion de la réapparition de la maladie.
- 2.15. Quand les techniques de biotechnologies, actuellement à l'étude en Australie, sur le diagnostic de la maladie de Fidji seront disponibles, dans deux ans ou plus, elles devraient être utilisés pour déterminer la présence du virus dans la canne à sucre et le vecteur.
- 2.16. Compte tenu de ce qui est recommandé précédemment, le service de la protection des végétaux de Madagascar demande à ce qu'une concertation soit entreprise entre les services homologues de Maurice et de la Réunion. Pour favoriser cette concertation, l'exécution des présentes recommandations fera l'objet d'une information par écrit aux intéressés, dans le temps, dès que les résultats sont disponibles.
- 2.17. Des missions internationales comme celle-ci, devraient être effectuées en 1995 et en 2000, assumant que la maladie n'aurait pas encore été détectée à ces périodes et afin d'évaluer les possibilités d'un constat d'éradication.
- 2.18. Le Gouvernement malgache devrait :
- a) Faire une requête auprès des bailleurs de fonds pour la réalisation des recommandations citées ci-dessus.
  - b) Prendre ses dispositions pour donner aux services concernés les moyens nécessaires aux actions urgentes pour prévenir toute résurgence la maladie de Fidji.

## APPENDIX 2

## ITINERARY FOR INSPECTIONS, MEETINGS AND DISCUSSIONS

27th May	Monday	am	Meeting with FAO representatives.
		pm	Meeting with other members of Mission. (Hotel Colbert, Antananarivo)
27th May	Tuesday	am	Depart for Brickaville by 4WDs.
		pm	Boat trip from road to rail bridges, Ivondro River. Inspect 6 plots with M134/32, largest > 1 ha. (Hotel Noor, Tamatave)
29th May	Wednesday		Ivoloina to Antsiramandroso; Fenerive Est - Ambalateza-Antaratasy. Inspect 10 plots with M134/32 and local varieties, and 4 plots of resistant canes. (Hotel Le Recief, Mahambo)
30th May	Thursday		Vavatenina, Ambodimanga. Inspect 13 plots with M134/32, alone or mixed with local varieties and/or resistant canes. (Hotel Le Recief, Mahambo)
31st May	Friday		Fenerive Est, Ampasina, Soanierana-Ivongo. Inspect 18 plots with M134/32 and/or local canes, half of which also had the resistant S17; also 6 plots of S17 only. (Hotel Noor, Tamatave)
1st June	Saturday		En route Tamatave-Brickaville. Inspect 9 plots with M134/32, including a field of many hectares adjacent to a distillery. (Brickaville compound)
2nd June	Sunday	am	Fiji trial, M134/32 and variety plots, Menarano.
		pm	Initial discussion on situation. (Brickaville compound)
3rd June	Monday		Vatomandry-Sakanila River Boat trip on river, only 4 of many M134/32 plots inspectable. (Hotel Fonsy, Vatomandry)

4th June	Tuesday	am	Ilaka Est One plot M134/32, one plot S17.
		pm	Second discussion, consider draft recommendations. (Brickaville compound)
5th June	Wednesday	am	Meeting on draft conclusion and recommendations.
		pm	Return to Antananarivo; draft translated into French. (Hotel Colbert)
6th June	Thursday	am	Drafts typed.
		pm	Final meeting to amend and approve both draft versions of Executive Summary. (Hotel Colbert)
7th June	Friday	am	Executive Summary signed by Mission members.
		pm	Depart Madagascar.

## APPENDIX 3

RAPPORT COMMUN DE LA PARTIE MALGACHE  
SUR LA SITUATION DE LA MALADIE DE FIDJI  
A MADAGASCAR

I - GENERALITES

La maladie de Fidji fut signalée à Madagascar en 1954 sur la Côte-Est dans les plantations des régions de Brickaville.

Pour préserver l'économie sucrière de Madagascar, l'administration de l'époque a promulgué le Décret n° 59-19 du 15 Novembre 1958 organisant la lutte contre la maladie de Fidji, et a instauré :

- une taxe spéciale sur la production de Sucre pour financer les mesures de lutte contre la maladie de Fidji, par Arrêté n° 289-CC du 24 Décembre 1957

- une section de lutte contre la maladie de Fidji au sein du Service de la Défense des cultures pour effectuer des prospections des régions connues infestées par la maladie

- des moyens de lutte et des mesures de protection pour empêcher l'extension de la maladie.

Par la suite des prospections périodiques ont permis de constater l'absence de symptôme de la maladie de Fidji à Madagascar, situation confirmée par différents phytopathologistes en provenance de l'extérieur en mission à Madagascar :

- Exemple : Drs RICAUD et LALLMAHOMED en 1976  
Dr AUTREY en 1987.

## II - Justification du Programme de Coopération Technique avec la F A O

Certaines îles évoquent la présence de la maladie de Fidji à Madagascar pour imposer un freinage au développement des échanges commerciaux entre les îles de l'Océan Indien.

Pour remédier à cet état de chose, le Gouvernement malgache a présenté comme un des projets prioritaires du MinAgri parmi les projets TCP/PNUD-FAO, le projet : "Confirmation de l'éradication de la maladie de Fidji à Madagascar". Ce dernier a été retenu par la F A O.

Les objectifs de l'assistance du Programme de Coopération Technique avec la FAO comprennent :

- la prospection des régions connues infestées dans le passé (de Maroantsetra à Mahanoro) pour constater et confirmer l'inexistence de symptôme de la maladie de Fidji à Madagascar

- la soumission d'un rapport final au Gouvernement malgache pour rassurer les membres de la Commission de l'Océan Indien (COI) et du Comité de Collaboration Agricole (COCOLAG) en affirmant l'absence de symptôme de la maladie de Fidji à Madagascar, levant ainsi les contraintes techniques imposées aux exportations des produits végétaux en provenance de la Côte-Est de Madagascar.

### III - Actions entreprises par l'administration malgache

Les membres de la Commission FAO, à part le consultant phytopathologiste sont des spécialistes de protection des végétaux, et des délégués d'Institut de Recherches sucrières des îles voisines (Ile Maurice et Ile de la Réunion), des observateurs de la FAO et de l'OUA.

Pour préparer la venue de cette Commission, la partie malgache intéressée par la maladie de Fidji (à savoir : le Service de la Protection des Végétaux, le Centre National de la Recherche Appliquée au Développement Rural (CENRADERU/FOFIFA) et la profession sucrière) a déjà entrepris une approche générale sur la maladie de Fidji, par des prospections générales assorties d'un certain nombre de mesures.

#### Au cours de ces inspections, la partie malgache a constaté :

- l'absence de symptôme de la maladie de Fidji sur les cultures de la canne à sucre en milieu industriel et paysannal, là même où la variété M.134-32 sensible à cette maladie devient dominante
- l'importance de la population des insectes vecteur de la maladie.

#### Mesures prises par l'administration malgache sur la maladie de Fidji :

- Renforcement des barrières physiques pour la circulation des variétés sensibles (M.134-32 et autres)
- Remplacement progressif des variétés sensibles par des variétés ayant les mêmes qualités technologiques
- Continuation de l'inspection périodique de la maladie de Fidji dans les foyers de maladies.

- Formation des agents sur terrain pour connaître et contrôler les Variétés de cannes prohibées, et les symptômes de la maladie.

- Actualisation des méthodes d'approche pour l'application des dispositions du Décret n° 58-19 du 15 novembre 1958 relatif à la lutte contre la maladie de Fidji.:

- Installation du test de la résistance à la maladie de Fidji, en même temps que les essais multiloceaux dans des sites bien déterminés et contrôlés périodiquement.

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\* \*

Pour prévenir toute éventualité de résurgence de la maladie, les Responsables de la Recherche Scientifique malgache proposent :

- l'orientation des actions vers la lutte biologique contre les vecteurs de la maladie tenant compte des études déjà réalisées à Madagascar auparavant

- l'installation d'une serre d'études en partie grillagée en milieu naturel dans une zone écologique favorable au développement de la maladie, pour la continuation des travaux de Recherche

- l'utilisation d'autres méthodes non conventionnelles pour poursuivre l'étude épidémiologique et pour faire des diagnostics rapides de la présence du virus et de la résistance à la maladie de Fidji

- la collaboration avec les pays créateurs de variétés pour tester la résistance à la maladie de Fidji, non seulement sur les boutures, mais sur des seedlings et sous différentes écologies à Madagascar. Ceci dans l'intérêt mutuel de chaque partenaire.

IV- CONCLUSION

La partie malgache peut affirmer l'absence de symptôme de la maladie de Fidji à Madagascar. Cette absence signifie que cette maladie est maîtrisée à Madagascar.

- L'administration malgache a déjà pris des mesures pour :

- . inspecter périodiquement les foyers de maladies
- . surveiller et contrôler la circulation des Variétés sensibles à cette maladie et les remplacer progressivement
- . effectuer le test de la résistance à la maladie de Fidji en même temps que les essais multiloceaux dans des sites bien déterminés et contrôlés périodiquement.

- Les responsables de la Recherche scientifique malgache comptent préserver l'avenir et les relations futures inter-iles par des programmes de recherches de collaboration sur les moyens et méthodes pour tester la résistance à la maladie de Fidji et les mettre à la disposition de toutes les iles avoisinantes.

est  
- Toutefois, il/à souligner que cette situation ne peut être maintenue et les préventions de l'avenir réalisées sans source de financement adéquate pour continuer à faire face aux travaux sus-mentionnés.

- A la fin de la mission et au vu du compte rendu final exposant les conclusions et recommandations, les responsables nationaux prendront les dispositions pour diffuser les conclusions de la Commission FAO.

Fait à Antananarivo, le 11 Mai 1990

MINISTERE DE L'INDUSTRIE,  
DE L'ENERGIE ET DES MINES

MINISTERE DE LA RECHERCHE  
SCIENTIFIQUE ET TECHNOLOGIQUE  
POUR LE DEVELOPPEMENT

MINISTERE DE LA PRODUCTION  
AGRICOLE ET DU PATRIMOINE  
FONCIER

C.S.P.C.S.  
Le Directeur de la D.S.P.C.S.

SIRAMA  
BRICKAVILLE  
Le Chef de Service des Recherches  
Agronomiques

CENTRE NATIONAL DE LA RECHERCHE  
APPLIQUEES AU DEVELOPPEMENT  
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Le Chef du Service,

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