REPORT ON CONTINUING ERADICATION OF COFFEE IN TWO AREAS IN PAPUA NEW GUINEA

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ABSTRACT

The results of inspections of two areas in Papua from which coffee rust was eradicated in 1965 *are reported for the period December,* 1974 *to December,* 1976. *Some coffee was still found, despite the prohibition on planting, and was destroyed. No coffee rust was recorded during the surveys.*

The measures being taken to minimize the risk of another outbreak of coffee rust are listed, together with an assessment of the great difficulties which would be experienced should another outbreak occur on Papua New Guinea coffee, whose export value for 1976-77 *is expected to exceed* K115 000 000 (*about* $A130 000 000).

INTRODUCTION

One probable and two confirmed outbreaks of coffee rust, caused by *Hemileia vastatrix*, occurred in Papua New Guinea in 1892-3, 1903 and 1965. The outbreaks and the successful eradication campaign of 1965 were described in detail by Shaw (1968).

After the 1965 eradication it was decided to keep a large region, comprising the area around the main Port of Entry (Port Moresby) and the previously coffee rust infected areas, free from coffee. If this were done, it would mean that should viable coffee rust spores reach the country again through the main port or the international airport, there would be no host available for infection or build-up of the fungus. It was realized, of course, that eradication of coffee in this region surrounding Port Moresby would be of no use if the fungus broke out first in the main coffee growing areas of the country, after the arrival of viable spores either wind-borne from overseas, or carried on international travellers or on goods or on seed or other plants from infected countries, despite fungicide pretreatment of plants and seeds at source and on arrival.

The results of regular inspections of the area being kept as free from coffee as possible, were reported by Shaw (1970, 1975).

The present paper records the results of the surveys carried out in the prohibited coffee growing areas since December, 1974 to December, 1976.

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THE SURVEYS

The area of prohibited coffee growing, comprising the immediate environs of Port Moresby, the Sogeri Plateau and the Rigo hinterland, was described and figured by Shaw (1968, 1970).

During the last two year period, foot patrols only were available for the surveys. Despite the prohibition on coffee growing in the area, coffee was found at many sites, either being grown in claimed ignorance of the prohibition, or originating from previously missed, or incompletely dug out bushes, and perhaps in some cases from bird distributed berries.

The number of seedlings and regrowth found at each site was recorded by the survey teams, and an endeavour was made to trace the source of seed, if seedlings were found. Any coffee found was checked for coffee rust, and any queried symptoms forwarded to the Chief Plant Pathologist for checking. All seedlings and regrowth were destroyed by burning.

The main results of the surveys during 1975 and 1976 are summarized in *Table* 1.

From the *Table* it will be seen that—

(*a*) No rust was recorded on any coffee found in either area, indicating the efficiency of the disease eradication campaign carried out in 1965, as is also evidenced by the fact that over

Table 1.—Results of inspections for coffee and coffee rust in a previously eradicated area from December, 1974 to December, 1976

Area	Date of inspection	Number of sites					
		Inspected	Recorded free from coffee	Recorded with coffee			
				Seedlings and/or regrowth			With coffee rust
				1-99 plants	100-999 pants	More than 1000 plants	
Sogeri Plateau	April, 1975	14	3	8	3	0	0
	Nov., 1975	15	7	7	1	0	0
	June, 1976	7	1	1	5	0	0
	Nov., 1976	20	5	9	5	1	0
Rigo hinterland	Oct., 1975	2	0	0	2	0	0

K200 000 000 (about $A227 000 000) has been exported since 1965 up till June, 1976—if rust had reached the main coffee areas the whole industry would have been seriously affected.

(*b*) Coffee bushes, seedlings and regrowth contnued to be found in both areas, despite the previous surveys and eradicaton of coffee since 1965;

(*c*) When compared with the surveys reported previously (Shaw 1970, 1975), it was obvious that in one area at least, the surveys during this two year period were more limited in the number of sites covered.

As stated by Shaw (1975), and as has become increasingly evident, changes in personnel and reductions in the number of trained field staff and supervisory officers, finance for helicopter transport and availability of helicopters, has greatly limited the number and extent of inspections possible and the efficiency of the operations.

As mentioned in the previous report the persistence of coffee in the area, despite its prohibition and the eradication patrols, indicates the difficulty which would be experienced in maintaining a coffee-free zone, i.e., a "cordon sanitaire", of any worthwhile extent in respect of coffee rust, should the need for such arise in the future, unless ample staff and transport were available for continuous patrols.

COFFEE RUST RISK IN THE FUTURE

In order to minimize the risk of another outbreak of coffee rust, the following measures continue, or are proposed:

(*a*) The import of all parts of the coffee plant is completely prohibited;

(*b*) The import of plant material from coffee rust infected countries (see (*Figure* 1) is greatly restricted, and imports which are permitted have to be treated with fungicide at source, and again on arrival, and all packagings burnt;

(*c*) The writer has recommended, although this has not been adopted as yet, that the import of all vegetative plant material from coffee rust countries be prohibited, and if material is imported despite the prohibition, it be destroyed on arrival without opening, inspection or treatment.

The main vegetative species imported from such countries are orchids for the gardens of private citizens and some firms and institutions. If the recommendation of (*c*) above is adopted, most of these species could probably still be imported as seedlings in sterile agar cultures, or obtained from non-coffee rust infected countries.

(*d*) A publicity campaign, involving coloured slides* and posters showing coffee rust, is to be promulgated throughout the country, especially through agricultural colleges, agricultural experiment stations and Rural Development Offices, and at the international airport and airstrips throughout the main coffee growing areas.

(*e*) Coffee rust is still a notifiable disease throughout Papua New Guinea, under the *Plant Disease and Control Ordinance* 1953-1968.

The likelihood of another outbreak of coffee rust in Papua New Guinea is even more probable now than at the times of previous warnings (Shaw 1962, 1975) for the following reasons:

(*a*) The coffee catch crop area for windborne spores has extended to an estimated 50 000 ha (about 123 500 acres);

(*b*) Air services from other countries with coffee rust have greatly increased to the ports of entry;

(*c*) Internal feeder services within the country from the main port and international airport have greatly increased, although in the last year some curtailment has occurred;

(*d*) There is no adequate way known to prevent the passive carriage of viable spores on travellers or on goods from other countries with coffee rust;

*The originals of the 25 mm colour transparencies used were kindly made available through the courtesy of Dr J. W. Waller, ODM Liaision Officer, Commonwealth Mycological Institute, England, and were not imported direct from coffee-rust countries.

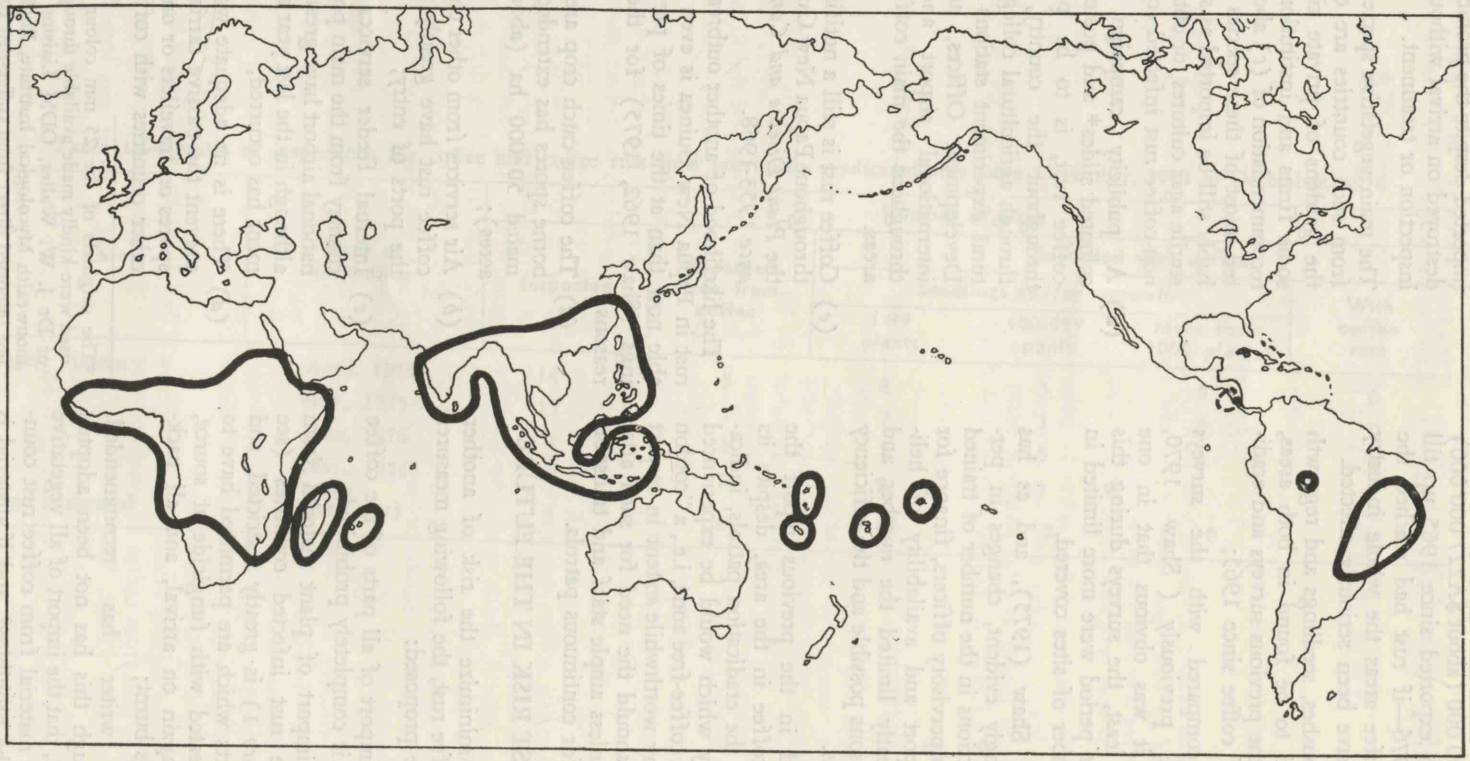

Figure 1.—Coffee rust infected countries of the world (circled in heavy black line). Adapted from CMI Map No. 5 Edition 5 of Distribution Maps of Plant Diseases for *Hemileia vastatrix*. Recent outbreak in Nicaragua circled with dotted line

(*e*) Some unscrupulous people may still succeed in surreptitiously bringing in high coffee rust risk material despite quarantine prohibitions and surveillance;

(*f*) The reduction in trained and responsible agricultural staff throughout the country means less regular and less efficient patrols of routine inspection throughout the coffee growing areas, so that if coffee rust should break out again, it may escape notice for some time, and thereby reach non-eradicable proportions before detection;

(*g*) The position in (*f*) above is compounded by the increasing lack of managerial and maintenance skill displayed by individual coffee growing owners, which again means that any future outbreak may be undetected for such time that eradication, when detected, would be impossible.

A new outbreak of coffee rust, if the quarantine barrier is again breached, could have a most serious affect on the industry. As Shaw (1975) pointed out, although some control is possible by the use of fungicides, the cost of these and spraying equipment, and the cost and difficulties which would be involved in transporting materials and equipment to, and especially within, Papua New Guinea, would be high. Also, many national growers, who are responsible for about 80 per cent of the coffee acreage, are still not technically knowledgeable, and the number of trained officers capable of supervising large scale fungicide control measures is still very limited. Also, with an annual rainfall mainly between 1 880 and 2 745 mm (about 74 to 108 inches) in the coffee areas, a continuous epiphytotic could be expected, probably necessitating an increase in number of applications for effective fungicidal control, with concomitant increase in cost.

In 1960 the Department first began importing coffee varieties resistant to certain races of coffee rust, as these varieties became available through the Centro de Investigacao das Ferrugens do Cafeeiro, Oeiras, Portugal and the Instituto Interamericano de Ciencias Agricolas, Turrialba, Costa Rica. Thirty-two races of coffee rust have been designated (Rodrigues *et al.* 1975), but as these workers point out, not a single cultivar or selection of *Coffee arabica* has ever been found with total resistance to the known races of *Hemileia vastatrix*, the coffee rust fungus. This means that the "resistant" varieties available are in fact only resistant to certain races or groups of races. As it is not known in advance, of course, which race may arrive, should an outbreak occur again, it is not known in advance which varieties, selections or cultivars would be needed for the unknown race or races.

Of the three collections of coffee rust of the 1965 outbreak sent from Papua New Guinea to Oeiras, Portugal, for race identification, two were Race II and one was Race I (Rodrigues *et al.* 1975).

Also, as Schieber (1975) has pointed out, although Race II was the invading race in Brazil in 1970, the appearance of new races of the rust in Brazil has been almost continuous since that time, so that by 1974 four races had been recorded, namely, II, XV, III and I.

Martinez *et al.* (1975) trapped coffee rust spores over Brazil at altitudes as high as 1 000 m, and found that the spores were spread by wind over long distances, even up to 700 km from the main focus of rust. They further found that these spores were brought back from the air to the ground by rain water. Therefore, should coffee rust again reach Papua New Guinea, the spread of the rust over all the coffee growing areas by wind, as well as on people and on vehicles and goods, would probably be very rapid.

For the reasons given above, an outbreak of coffee rust in Papua New Guinea in the future could be catastrophic for the coffee growers and also for the economy of the country as a whole, as coffee exports for the year 1976-77 are expected to reach a value of K115 000 000 (about $A 130 000 000).

Arabica and robusta coffee growers, rural development officers, all members of the agricultural community (whether coffee growers or not), citizens of Papua New Guinea returning from visits to overseas countries with coffee rust, tourists from such countries, the Customs and Quarantine Services, and in fact every member of the general public in Papua New Guinea, should be aware of what another outbreak of coffee rust could do to the economy of this country, and practise the utmost vigilance at all times.

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