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8-2

DEPARTMENT OF THE ARMY
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11 December 1969

SUBJECT: Report of Cambodian Rubber Damage

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Inclosed is a copy of the report of damage to Cambodian rubber plantations prepared by the four-man survey team following a survey in June 1969. This version of the report has been released to the press by the State Department.

FOR THE COMMANDER:

C. E. MINARIK
Director, Plant Sciences Laboratories

1 Incl
as

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8-2

A REPORT ON **TO BE RETIRED**

HERBICIDE DAMAGE TO RUBBER AND FRUIT TREES IN CAMBODIA

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SAIGON

12 July 1969

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INTRODUCTION

On June 2, 1969 the United States Government received notice of a charge by the Cambodian Government that major defoliation damage to Cambodian rubber plantations near the border of the Republic of Viet-Nam (RVN) had occurred as the result of U.S. defoliation activity. In replying to this charge, the U.S. State Department offered to send a team of experts to examine the ... area of alleged damage and the Cambodian Government agreed. The team members were selected and met in Saigon on June 27, 1969 for a formal briefing.

Members of the four-man team included:

Dr. Charles E. Minarik, Director
Plant Sciences Laboratories
Department of Defense

Jack B. Shumate, Chief
Forestry Branch
Office of Commercial and Capital Assistance
Agency for International Development
Saigon, Viet-Nam

Dr. Fred H. Tschirley, Assistant Chief
Crop Protection Research Branch
Agricultural Research Service
Beltsville, Maryland

Dr. Nader G. Vakili, Agronomy Adviser
Office of Development and Domestic Production
Agency for International Development
Saigon, Viet-Nam

Purpose

The purpose of the trip was to determine the cause, severity, origin, and extent of reported damage to rubber and fruit trees.

Saigon Briefings

Team members received a briefing from military and State Department personnel on June 27. They were provided with pertinent information on military operations--especially defoliation activity--near the Cambodian border. Three of the team members went via helicopter to Xuan Loc on June 28 to visit with Mr. Poliniere of the Rubber Institute. On June 29, the group travelled via helicopter to the defoliation target area in Tay Ninh Province to observe the defoliated areas from which drift of the herbicide may have caused damage to rubber and fruit trees in Cambodia. On June 30, the four-man team left by commercial aircraft for Phnom Penh.

Cambodia: Itinerary and Contacts Made

Upon arrival in Phnom Penh, Cambodia, shortly after noon on June 30, the team was met by a representative of the Cambodian Foreign Ministry, by Mr. Mack Williams, Australian Deputy Chief of Mission, and by Mr. Neil Manton, Third Secretary and Vice Consul. Mr. Manton handled all local arrangements and served as liaison officer for the team during the entire stay in Cambodia. After checking in at the Monorom Hotel, the team went to the Australian Embassy for a briefing. Members of the embassy staff contacted included Mr. Graham Feakes, Ambassador; Mr. Mack Williams; and Mr. Neil Manton.

On Tuesday July 1, a meeting was held with Cambodian representatives who outlined conditions as they saw them and presented a proposed schedule for field travel (Appendix A). We agreed with the schedule, and a general discussion followed. Individuals attending the meeting in addition to team members and Mr. Manton included:

Mr. Min Sarim, Ministry of Agriculture, Chairman of the committee appointed by the Cambodian Government to study and report on damage to rubber trees, fruit trees and farm crops.

Mr. Hing Un, Director of Agriculture - Committee member

Mr. Suon Kaset, Director of Water and Forestry - Committee member

Mr. Ho Tong Lip, Research Agronomist, Ministry of Agriculture - Committee member

Field travel began on July 2, with a visit to the Chup rubber plantation and an overflight in small fixed-wing aircraft, of the entire area of alleged damage. Purpose of the visit was to see an undamaged plantation (Chup) in operation and get a general picture of the damaged area. People contacted at Chup were: Mr. Meas Keth Caimira, Director General of SOKAR; Mr. Francis Ninane, agronomist, Mr. Chai Kim Chun, chemist, and Mr. Gilbert De Coninck, pathologist, of the Rubber Research Institute (IRCC); and M. Digoy, manager of the Chup Plantation. Travel from and to Phnom Penh was by Dakota aircraft and over the Chup, Mimot and other holdings by small, single-engine aircraft, both furnished by the Royal Cambodian Air Force. Ground transportation was furnished by plantation officials and the Cambodian Government furnished security forces at all times. Team and committee members returned to Phnom Penh each night.

On July 3, 4 and 5, we travelled to Mimot via Dakota aircraft and then by car throughout the area of reported damage. Major rubber plantations visited included: Chipeang, Chipes, Dar, Chalang, Mimot, Kantroy, Krek and Prek Chlong. The group also visited a number of other areas to inspect fruit trees, farm crops, ornamental plantings, a teak plantation, and natural forest area. Key personnel contacted at the Mimot headquarters included: Mr. H. Say, Director General - Mimot; Mr. Audureau, Director of farm operations - Mimot; Mr. Girandel, Administrative Officer - Mimot.

July 6 -7. No formal schedule. Team visited undamaged farm and forest areas.

A helicopter flight over the entire damaged area was scheduled for July 8, but was postponed one day. The team took advantage of

this time to meet with the French Ambassador, the Canadian members of the International Control Commission, the Australian Embassy staff and the Cambodian Minister of Agriculture, Mr. Chuon Saodi.

An Alouette II helicopter was made available on July 9 and the investigating team made an overflight of the entire area under study. We returned to Phnom Penh in the afternoon and left for Viet-Nam, arriving in Saigon shortly after 1700 hours.

ANALYSIS OF DAMAGE AND CAUSES

Area and Pattern of Damage

Representatives of the Cambodian Government had prepared a map showing the extent of the damaged area. The boundary representing the perimeter of the damaged area is shown on the enclosed map (Appendix B). In addition, we were also supplied with maps of the Mimot and Prek Chlong plantations that showed rubber trees severely damaged (more than 50 percent defoliation) and slightly damaged (less than 50 percent defoliation). These maps (Appendix C) were prepared at the time of maximum defoliation--before refoliation had begun. Our own observations confirmed the findings of the Cambodian investigating committee.

The total area on which damage occurred was approximately 700 square kilometers or 70,000 hectares. The Cambodian Government claimed damage on about 15,000 hectares, which represents the area in rubber and fruit.

The principal damage reported by the Cambodian investigating committee, and confirmed by us, was through the Dar and Prek Chlong plantations. Lesser damage was noted to the west on the Krek plantation and to the east on the Mimot plantation.

Severity of Damage

The degree of plant response to the herbicide varied from a very slight reaction showing discoloration of older leaves and atrophy of the young leaves, to 100 percent defoliation and die-back of one to four years of branch growth. We were told by the

Cambodians that normal flower development was prevented in teak (Tectona grandis), resulting in the failure to product seed. The defoliant caused malformation of fruits of jackfruit, durian and guava, and in severe cases resulted in rot and fall of the fruits. The vegetable crops mentioned below were either destroyed and replanted by the time of this report or were left in the field and backyards unattended.

The degree of plant reaction to the herbicide differed among species. Within a species, the degree of response was conditioned by variation in varietal tolerance, age of the plant, stage of growth (active or quiescent) of the plant, and dosage received.

Exceptions may be found for any general statement about the nature of damage to crops. However, the following statements are based on two years of surveys and experience with tropical crops in Viet-Nam. Each crop is discussed separately with the crops least tolerant to herbicides mentioned first, followed by the more tolerant ones.

Casurina Pine or Australian Pine (Casurina equisetifolia). This plant is used as a shade tree. It is the species most sensitive to defoliants used in Viet-Nam. After treatment its foliage turns brown and falls, branches die back, and bark peels away from the trunk. One treatment with a heavy dosage is sufficient to cause die-back of most branches and often the tree is killed.

Jackfruit (Artocarpus integra). This fruit tree is easily grown and popular in this region. It is highly sensitive to defoliants, responding with very rapid defoliation and die-back of branches. Young fruit may be malformed and fall. However, trees refoliate rapidly and within 6 to 3 months begin to look normal. Because fruit buds originate from the trunk and limbs of the tree, die-back of the small branches does not result in fruit loss during the next season, but may cause a reduction in yield.

Rubber (Hevea brasiliensis). The rubber tree is highly sensitive to defoliants, but the degree of response varies among varieties. A heavy rate of defoliant, such as is used normally in Viet-Nam, causes complete defoliation and die-back of several years' growth. Refoliation usually begins within a month, but the speed of refoliation is dependent

upon the sensitivity of the variety. The less sensitive a variety, the faster it refoliates. New leaves often show leaf malformation for a period of two to four months, depending on the dosage received. After six months, growth begins to appear normal and the plantation canopy is essentially uniform within 3 to 12 months. Wood-rotting fungi may enter limbs and trunks by way of dead branches. Young (3 to 5-year old) trees on the Dar plantation were severely defoliated and showed extensive die-back. This was due at least in part to the openness of the canopy in the young plantation, which permitted coverage of the entire plant by the defoliant droplets. At Prek Chlong plantations, 5-year old trees of the variety SPRM-1 suffered 13 feet of branch die-back. Seedlings 5 to 7 months old were killed by the herbicides.

The most common rubber varieties in Cambodia are PR-107, PB-36, and AVROS-50, each representing about 30 percent of the total acreage. The variety PB-86 is most tolerant to defoliants. PR-107 is quite sensitive and AVROS-50 most sensitive. Other varieties are variably sensitive, but are of such minor importance that they are not discussed here.

Cainito or Star-apple (Chrysophyllum cainito). This is a colorful fruit tree with purplish-brown foliage and fruit. Affected plants defoliate and young branches die back. However, this tree begins to refoliate within a month. The die-back of the terminal branches results in complete loss of the next season's fruit crop.

Kapok (Ceiba sp.). The cotton-like fibers developed in the large pods borne by this tree are used as stuffing for pillows and mattresses. This tree is abundantly planted in back yards and in hedgerows. It is highly sensitive to defoliant. Leaf malformation, discoloration and defoliation follows even after a small dose of herbicide. Kapok production during the next season is severely affected by death of the terminal branches.

Pineapple (Ananas comosus). The high dosage of the herbicide in some areas visited had resulted in leaf folding and discoloration with malformation and loss of fruits.

Bananas (Edible Musa varieties). The high defoliant dosage received in some areas visited had resulted in reduction in size

and malformation of leaves, splaying of the leaf sheaths, elongation of the fruits and brittleness of the plants. Plants treated while in fruit develop abnormal fruits and that condition may persist for approximately six months to a year and a half. Plants treated before they are in fruit do not produce fruit.

Teak (Tectona grandis). This species is intermediate in its response to defoliants. The young leaves are malformed, turn brown and fall, and flower development is impeded. The teak plantations in the Mimot area was infested heavily by leaf-eating insects. The damage caused by the defoliants was relatively small in comparison to the damage caused by the leaf-eating insects.

Coconut (Cocos nucifera). Coconut is one of the least sensitive crops. However, once the growing tip of this plant is affected, recovery is slow and sometimes trees die.

Papaya (Carica papaya). This is a sensitive plant that easily loses its flowers and fruits. Even though a plant may survive a moderate dosage of the herbicide, fruiting usually does not occur.

Guava (Psidium guajava). Guava is moderately sensitive. The death of young branches results in yield reduction during the next season's growth Refoliation occurs rather rapidly.

Custard apple (Annona reticulata). This fruit tree is moderately tolerant and recovers quickly.

Sapodilla or Chicle (Achras zapota). Slightly sensitive. It can withstand heavy herbicide dosages without suffering defoliation.

Citrus sp.. All citrus species are only slightly sensitive to defoliants and the loss if any, is negligible. The main loss in citrus is due to diseases and insect damage.

Mango (Mangifera indica). Very tolerant. Flower development may be affected if defoliants are applied between the time of flower bud initiation and fruit set.

Soursop (Annona muricata). Very tolerant.

Coffee (Coffea robusta). Very tolerant.

Tomato family (Solanum sp.). Complete loss due to extreme sensitivity.

Bean family (Phaseolus spp.). Extremely sensitive. Complete loss.

Cabbage family (Brassica sp.). Moderately sensitive. Partial to complete loss.

Cucumber family (Cucumis sp.). Moderately sensitive. Partial to complete loss.

Cassava or Manioc (Manihot utilisima). Highly sensitive. The above-ground portion of the plant may recover from defoliant applications, but root formation is retarded. The extent of the damage to the crop is dependent upon the stage of growth at which plants are sprayed with herbicide.

Peanuts (Arachis hypogaea). This is a moderately sensitive crop. Defoliants cause curling of the leaves and reduction in pod formation. The extent of damage to the crop is dependent upon the stage of growth at which plants are affected.

Causes of Damage

For the purpose of analyzing the causes of damage, a number of hypotheses were established and the available evidence brought to bear on each. The hypotheses considered were: (1) Drift occurred from defoliation operations in RVN, (2) direct overflight of the Dar and Prek Chlong plantations for the purpose of defoliation, (3) damage caused by drift from ground spraying operations in Cambodia, (4) damage caused by disease, and (5) damage caused by poor environmental conditions for growth of trees. Each of the hypotheses will be discussed separately.

To obtain information on the possibility of the damage in Cambodia being caused by drift from defoliation operations in Tay Ninh Province, the team made a helicopter survey of defoliation

targets in that province on June 29, 1969. It was quite apparent that defoliant had drifted across the border into Cambodia, particularly on the central and western portions of the Tay Ninh target. A similar survey on July 8, 1969 on the Cambodian side of the border confirmed the earlier observation. The defoliation reported immediately north of the border undoubtedly resulted from the Tay Ninh defoliation operations of April-May, 1969.

Defoliation missions in Tay Ninh Province were flown on March 29 (7 aircraft), March 30 (5 & 7), April (7), April 16 (3), April 19 (7), April 21 (5 & 5), April 24 (5), April 25 (6), April 29 (7) April 30 (6), May 2 (3), May 4 (6), May 6 (4), May 9 (4), May 13 (7), May 14 (6), May 16 (9), May 18 (9), May 21 (4), May 22 (7), May 23 (6), May 27 (9), June 1 (5), and June 9 (6). Discussions with the Cambodian committee elicited the information that the herbicidal effect was first noted in the period from April 20 to 25, 1969. Although the Cambodian committee believed that drift may have come from several missions in RVN, we disagree because manioc and bougainvillea both indicated herbicidal damage at only one time or within a period of a few days. Thus, drift from missions in RVN could only include the first five missions listed above.

Examination of the meteorological data provided by the 12th Special Operations Squadron for April 19, 1969 discloses that at 1119 hours, when the spray run was made, the temperature was 90° F and the winds were "light and variable." Meteorological data from Chup, furnished by the Rubber Research Institute of Cambodia for the same day (at 1000 hours Cambodian time) shows temperature as 89° F and wind speed of 10 mph from the south-southeast. The data from Chup are given in Table 1.

Such meteorological conditions are unfavorable for spray operations and undoubtedly were responsible for the spray drift that crossed the border on that date and resulted in defoliation of the area immediately north of the border. We do not feel, however, that drift from the Tay Ninh missions caused damage to a distance of 18 to 20 km above the Cambodian border. If spray drift were responsible for all of the damage observed, one would expect to see a reduction in severity of plant response with increasing distance from the point of application. This is not the case because rubber varieties 15 km north of the border were as severely affected as similar varieties closer to the border. Tapering off

of effects was noted east and west of the severely affected area.

Our second hypothesis was that a direct overflight was made of the Dar-Prek Chlong plantations for the purpose of defoliation. The pattern of extent and degree of herbicidal effect fits this hypothesis more closely than any other. The response of a rather resistant species, such as banana at coordinates XU225045, XU095045, and XU190135, were indicative of heavier doses than one would expect from spray drift from south of the border.

Some drift from the Tay Ninh operations up to and slightly beyond the border was evident. However, there was then a zone of somewhat lesser damage and still farther north there was once again severe damage. In addition, considerable herbicidal effect was noted on native forest trees in an area centering approximately at coordinates XU110140. That this was caused by drift from RVN is highly unlikely.

Only minor damage was noted on the Krek plantation. If the damage in Cambodia were the result of drift from RVN, Krek and Chipeang would be directly on course for prevailing SSE winds. Thus, the RVN missions on the west portion of the spray target would be ideally located for drift damage to Chipeang and Krek. However, the light damage at Krek is further circumstantial evidence that drift from RVN did not cause the major portion of the damage in Cambodia.

The area of heavy rubber damage is about 60 sq km or 15,000 acres, principally in the Dar and Prek Chlong plantations. Assuming that a does of approximately 0.5 - 1.0 lbs. per acre was required to produce the severity of plant responses noted, this would mean a deposit of 750 to 1500 gallons of defoliant, or 1 to 2 UC-123 plane loads. It is highly unlikely that this quantity could have drifted over the border from the Tay Ninh defoliation operations. This strengthens the view that damage was due to herbicide spray during a direct flight over the affected plantations.

Thus, the evidence we have seen, though circumstantial, suggests strongly that damage was cuased by direct overflight. We do not deny that the damage could have been caused by drift. But the meteorologic conditions necessary to cause the damage pattern observed forces us to accept this as only a remote possibility.

The third hypothesis, drift from ground spray applications in Cambodia, cannot be considered seriously as a cause of the damage. As far as could be determined, ground sprays with herbicides similar to Orange or White have been used in the rubber plantations. Limited spraying with dalapon, a herbicide used to control grass, is practiced on one of the plantations. However, dalapon does not produce the plant responses noted, nor does it affect broadleaf plants at the usual dosage rates. Weeds in the young plantings are normally controlled mechanically by cutting. Weeds are not a problem in the older plantings since the dense shade of the rubber trees does not permit them to thrive.

The uniformity of plant responses throughout this large area would preclude ground spray operations as the cause. Moreover, we did not see drums or Orange or White during our visit.

The hypothesis of disease as a cause of the damage can be discounted. No disease organism attacks such a broad spectrum of plant species as was observed in the area of interest. Moreover the plant responses prevalent throughout the area were typical of those induced by Orange and White. Undamaged rubber trees adjacent to damaged ones showed minor disease symptoms approaching approaching the epidemic proportions that would have been necessary to cause the widespread defoliation.

Another hypothesis was that the damage in Cambodia may have been caused by environmental conditions unfavorable for growth. Environmental conditions that prevailed in Cambodia during 1969 are believed to be unimportant with respect to the defoliation of rubber and other trees in Cambodia. Neither rubber nor fruit trees in areas adjacent to the damaged area give an indication that adaphic or climatic factros were responsible. In addition, the refoliation that is now occurring suggests that environmental factors are favorable for satisfactory growth and production.

Permanence of Damage

There is no indication that the damage to rubber or fruit trees is permanent. Current observations in Cambodia lead only to the conclusion that recovery is occurring. The rate and degree of recovery among the various rubber varieties complicates the situation to the extent that a generalization is not possible. A highly

susceptible variety such as AVROS-50 was completely defoliated, and refoliation at this time varies from 5 to 20 percent. A variety of moderate susceptibility may or may not have been completely defoliated and foliage on the trees at time of observation ranged from 20 to 70 percent. In the intermediately affected areas of the plantations resistant varieties now have 70 percent or more of their normal foliage. In the final analysis, the degree and permanence of damage can only be equated in terms of latex production. Personnel at the Rubber Research Institute maintain records on production by varieties for the large plantations. There are no good production data for the small holdings, but extrapolation of data from the large plantations should provide a reasonable estimate. These figures indicate that recovery is occurring and normal yields may ultimately be obtained; however, appreciable production losses will be suffered in the interim.

An example of damage and recovery experienced in Viet-Nam is the Gallia Plantation in Phuoc Tuy Province where one plane sprayed herbicide ORANGE directly over rubber trees in 1967. One year later the French manager of the plantation stated that the trees had refoliated 100 percent and production had returned to 90 percent.

In the Herbicide Policy Review issued by the American Embassy, Saigon, 28 August 1968, a report by the CORDS Agricultural Adviser in Binh Long Province is quoted as follows: "The effects of defoliation have not been as disastrous as anticipated; refoliation has begun and blocks of trees marked off as lost will be able to be tapped again. The Policy Review continues, "Other preliminary evidence tends to substantiate further the view that herbicides may be less toxic to rubber trees than was previously thought."

Rubber trees on the island of Phu Quoc have reportedly been sprayed intentionally three times with herbicide ORANGE and have not been killed.

The inspection team feels that an assessment of damage in terms of decreased latex production and decreased fruit production can best be made in July or August, 1970. The timing of the final assessment is important -- it should occur several months after the beginning of the 1970 rainy season. Ideally, the final assessment should be made by some of the same -- but not necessarily all -- members of this inspection team plus an agricultural economist.

One item of great concern to French plantation managers and to the Cambodians was the cost of support for the unemployed rubber tappers. There is no question but that the herbicide damage has disrupted the normal plantation operations and there must be a cost associated with that.

Mitigation of Herbicide Effects

Several practices to mitigate the long-term effects of defoliation had already been instituted. One severely damaged area, tapping was stopped because the net return exceeded production costs. Cessation of tapping would, in essence, husband the food reserves necessary for refoliation. Trees on less severely damaged areas were being tapped, but at 6-day rather than 3-day intervals. Tapping is proceeding as usual on trees that were only lightly damaged.

Fertilization with a complete fertilizer was being practiced at one location. We encouraged this practice because we believe it will increase the rate of refoliation.

At one location on the Dar plantation, the tops of 3-year old trees of Variety PR-107 were being removed in the hope that this would prevent further translocation of the herbicide. Topping done soon after treatment (up to three days) would probably be effective, but downward translocation of the herbicide would certainly be completed during a period of six weeks. Thus, topping at this time would not affect herbicide translocation. A possible advantage

from the topping would be a clean wound (the subject was coated with petroleum) that would be less subject to attack by fungi than would be a wound caused by rotting of a dead branch.

The condition of the rubber trees before chemical defoliation is believed to have been good. There is no reason to suspect that prior condition was a contributing factor to the degree or duration of damage from herbicides. The loss of production due to defoliation will vary with varieties and cannot be satisfactorily assessed now. A reliable estimate of loss should be possible in July or August, 1970.

SUMMARY AND CONCLUSIONS

1. Herbicide damage in the southeastern part of Kompong Cham Province, Cambodia, was extensive due to a combination of two factors: (a) Defoliation of fruit trees on the Cambodian side near the border was a result of drift from spray operations in Tay Ninh Province, and (b) Defoliation of rubber, fruit, and forest trees farther north was probably caused by a direct spray application by an unknown party on a north-south line running through the plantations of Dar and Prek Chlong.

2. Defoliation of rubber trees on the Dar and Prek Chlong plantations was complete, but refoliation is in progress.

3. Few, if any, rubber trees have been killed. The degree and rate of refoliation will depend on the age of the tree, variety, and dosage received.

4. The differential susceptibility of rubber varieties to the herbicide applied is striking. All varieties are defoliated from a heavy dosage such as is used in RVN, but low dosages as would be expected from drift result in a marked differential response.

5. Species of fruit trees also vary in their response to the herbicide. A decreasing rank of susceptibility is: jackfruit, cainito, durian, pineapple, papaya, guava, and mango.

6. A final assessment of damage should be made in July or August, 1970. Damage to rubber must be assessed on the basis of decreased latex production. Data on latex production can be obtained from the Rubber Research Institute of Cambodia.

7. Damage to fruit trees is temporary. Loss of production from the trees should not continue for more than one year.

ACKNOWLEDGEMENTS

Many individuals were helpful to the investigation team in carrying out its mission. Australian Ambassador Feakes and his staff, particularly Deputy Chief of Mission Mack Williams, and Third Secretary and Vice Consul Neil Manton, were most helpful in making arrangements for us in Cambodia and providing wise and appropriate counsel.

Among the Cambodians, Mr. Thach Phiem of the Foreign Ministry provided many services and accompanied us on all tours. The members of the Cambodian Committee appointed by the Minister of Agriculture to assess damages were factual and objective in their assessment of damages. They generated a feeling of trust in terms of both accuracy of observation and honesty in reporting, which made our job much easier. Members of the Committee who accompanied us were:

Mr. Min Sarim, Director General
of the Office of Land Development
in charge of State Plantations

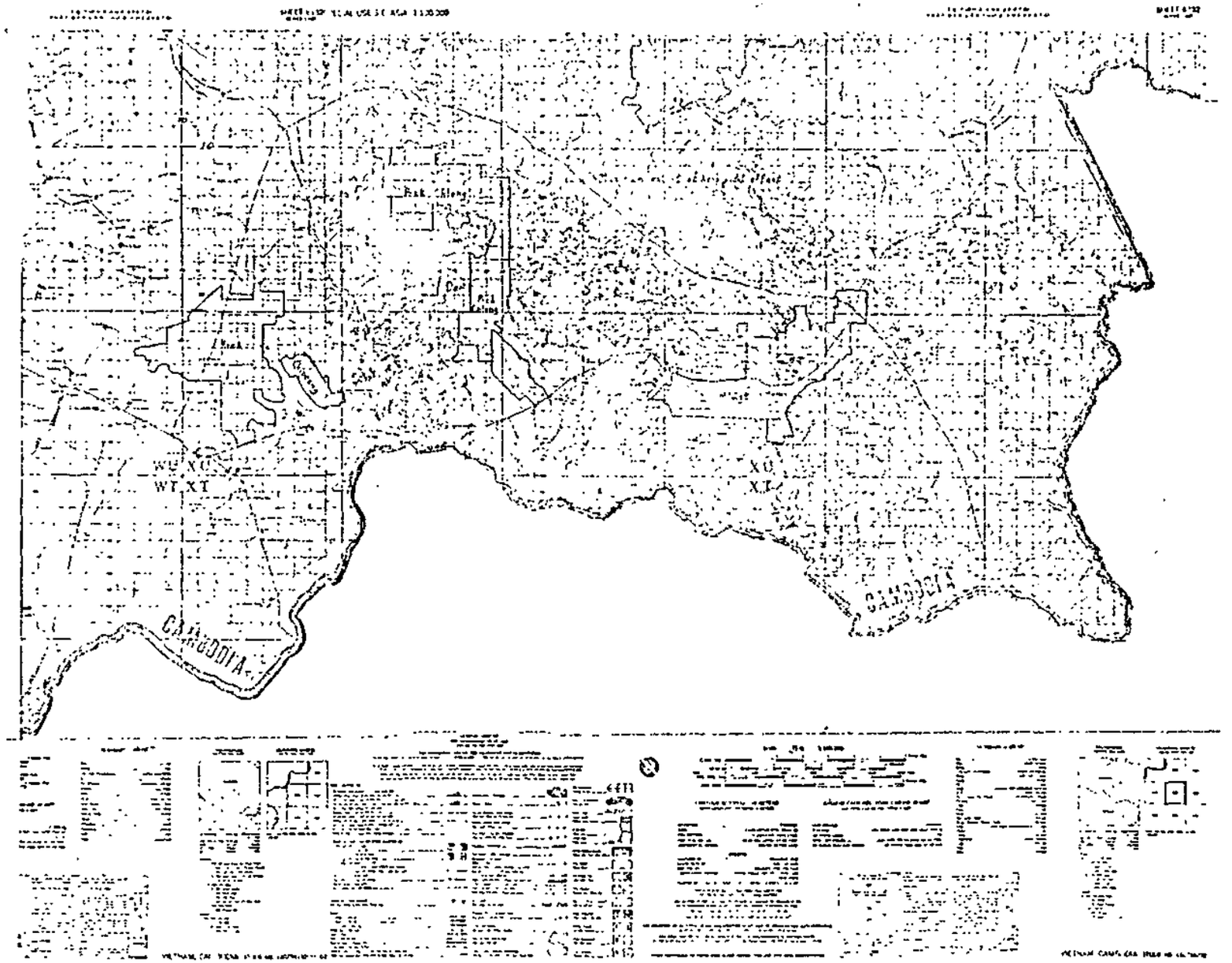
Mr. Hing Un, Director of Agriculture

Mr. Suon Kaset, Director of Water
and Forests

Mr. Ho Tong Lip, Research Agronomist

These men were with us on all tours and provided much necessary background information. Also helpful were Mr. Francis Ninane and Mr. Gilbert De Coninck of the Rubber Research Institute. Lunches were provided on three days by SOKHAR, the Cambodian Government Tourist Information Agency.

Lastly, personnel of the American Embassy and MACV provided us with accommodations, assisted in travel arrangements, and provided necessary background briefings. We are grateful and owe our thanks to all.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JUL 71

Flag/ Folio No	Document Title/ Reference	Synopsis	Associated Papers
SERIAL 1.	LOG SHEET: 125 DATE: 26 JUL 71 SERIAL: 1895 TIME: 0825 FROM: G302 AIR (T/HQ 1 ATF (VNAF))	"~~SE~~ AERIAL SPRAY 26 JUL. The C123 aircraft advised ~~of~~ his c/s was 15, his base was PHAN RANG and he was under MACV and 7 AF orders to spray NUI DAT."	

IE DAIM-A HERBICIDE PROJECT TEAM.

APR 5

FILE SUMMARY

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SERIAL 1.	LOG-SHEET: 063 DATE: 10 APR 71 SERIAL: 0463 TIME: 100800 FROM: CP for Log (T/HQ 1ATF (NHA))	" Aerial Spraying. 1. NUI DAT was sprayed by US ac. The HORSESHOE was not sprayed."	