REPORT ON A VISIT TO ADVISE ON AERIAL SPRAYING NEAR THE KARIBA GORGE, SOUTHERN RHODESIA, MARCH 1956.

Programme:		
	March 19/20	Journey to Salisbury
	March 21	Discussions with Drs. Ross, Webster, Cockbill and Mr. Lovemore
	March 22	Visit to Kariba
	March 23	Discussions with Mr. Chorley, Drs. Webster, Cockbill and Mr. Lovemore
	March 24	Reporting
	March 25/27	Return to Arusha

OBSERVATIONS AND RECOMMENDATIONS:

A. General

1. For the reasons summarised in Mr. Lovemore's report of March/April 1955, Aerial Dispersal of Insecticides, is the only practicable measure available for reducing the incidence of fly in the valley, especially in view of the short time available.

2. The woodland is eminently suitable for treatment from the air.

3. What information is available suggests that G. pallidipes may be even more susceptible than G. morsitans to aerial treatment by insecticide and although this fly is of unknown importance in the area it is potentially a very serious threat.

4. Extermination is not necessary in this case, which considerably eases the problem and makes considerable economies possible, since the extermination of the last 2% of a population of fly costs about the same as the first 98%. There is considerable evidence that in the absence of immigration from elsewhere residual populations of a few per cent of the original do not increase for several years at least. Since, in the present case, immigration in the wet season is possible it seems best to be content with a moderate degree of reduction, reserving the saving for renewed applications in 1957 or later, which may, in any case, prove unnecessary.

B. Type of Aircraft and Equipment

1. The escarpment end of the affected area appears too steep to be safely treated with an aircraft the size of an Anson, and light single engined aircraft only can be considered.

2. The choice of equipment lies between pressurized boom and exhaust smoke generators. The boom-produced spray is likely to be more reliable when meteorological conditions are marginal but otherwise there is probably little to choose between the two methods of dispersion. However, the spray requires a system of ground marking which not only needs extra men but could not be laid on in the time available. Therefore, smoke equipment must be used. If necessary it should be possible to adapt low volume crop-spraying equipment provided the aircraft engine is fitted with an exhaust manifold and not separate exhaust stubs.

3. The particular machine used will depend on circumstances - availability, hire charges etc. In general, a capacity of 60/80 gallons is preferable to one of say, 40 gallons. The larger machine should fly faster and the more powerful engine permit a higher emission rate. Thus a greater area per machine can be covered in a given time and there will be less dead flying time. Even with no advantage in emission rate the larger load gains whenever good smoking conditions last longer than it takes a small aircraft to dispose of its load. The advantage of small aircraft, if correspondingly cheap, is that more machines can be used giving a greater reserve for inserviceability.

4. The most affective size of drop is of diameter 50 µ. In East Africa we have used aerosols of mmd 60 µ. I know Dr. Cockbill intends to measure the mmd of the equipment and if it is found to differ from 50/60 µ by any considerable amount, I suggest he contacts C.I.R.U. for advice as to whether it is worth attempting to modify the equipment or not.

5. The pilot should be in no doubt that aerial smoking is properly controlled from the ground.

C. Dosage, Spraying Cycle etc.

For this section I have taken Mr. Lovemore's recommendations as a basis for discussion.

1. The area dosage per application previously used is .08 gallon per acre equals .032 lbs. per acre of gamma BHC equivalent to 0.256 lbs. per acre of technical BHC, which is almost identical with the rate used in East Africa. However, the volume dosage is only one-third and there may be losses due to thermal decomposition. The excellent results of individual applications in previous operations suggests that these deficiencies are counterbalanced by the smaller swathe width of 25 yards compared to the 55 to 75 yard swathe used in East Africa. Since extermination is not essential it seems permissible to economise on the flying time by extending the swathe to, say 37½ yards provided the equipment can increase its output proportionately. Fly rounds after the first application will give a check on any serious decrease in efficiency.

2. There is no advantage in a short interval between treatments - when up to four only are made. At the cold season temperatures prevailing at Kariba, a three week interval is more efficient than a two week interval. However, final kill is determined almost entirely by the number of treatments and percent killed per treatment. Lovemore suggests 7 cycles, the first four at two week intervals, which should reduce fly to a very low level. One modification is considered worthwhile. I understand that at the start of operations fly will still be dispersed to a considerable extent through the mopane. If only the riverine bush is treated the affected mortality will be greatly reduced. Say the mean density of fly in the mopane is one-tenth that in the riverine bush and that the mopane covers twice the area, then 2/12ths. (17%) of the total fly will not be affected by the smoke and a prospective 95% kill will be reduced to 78%. For four applications a a theoretical final kill of 99.36% is reduced to 95.7%. I think that it would be worthwhile, for those cycles carried out before concentration is complete, to treat the

more than three times the area of the "preferred habitat" need be treated. This is only a small addition to the total area per cycle and if a three week cycle is adopted throughout will require no more flying than a two week cycle on the "preferred habitat" only. The exact extent of the block can be decided from a consideration of fly catches, bearing in mind the minimum number of hours flying for which the operator will agree to contract. It should include all bush as far east as "Site 2 Area" on Lovemore's map, preferably including Site 2 Area and part of the stream flowing in an easterly direction to the north of this, but I doubt if the exact limit matters a great deal. It would be most satisfactory to block smoke the whole area but this is obviously not possible and the above suggestion offers a compromise by giving most effort nearest the area to be protected. Block treatment requires an overlap between the area treated on successive days. The procedure is described in a number of papers produced by the C.I.R.U.

3. Late in the season when smoking may be limited by the weather block smoking can be dropped and the whole area treated by strip smoking which will reduce the number of hours needed per cycle. The exact length of the interval between two cycles is not material provided it does not exceed by 25% the period required by a young tsetse to mature its first larva and an unavoidable extension of the interval beyond three weeks need not be viewed with alarm.

4. Three weeks is probably the minimum required for a tsetse to become infective after ingesting trypanosomes and a three week cycle should effectively prevent the transmission of sleeping sickness from the start of the operation.

5. <u>Number of Treatments</u>

Assuming the period May to September is available, seven treatments can still be carried out at intervals of three weeks. It is worth making a special effort to get an idea of the mortality caused by the first two treatments (when numbers are still large) both in the block-smoked and the line-smoked areas. In both cases the whole area must be sampled to get the true mortality. This is almost certain to fall in later applications but will not be detectable unless the failure is gross. Table 2 in my report of June 1955 gives a theoretical reduction, to be taken as a guide. If one has to choose between seven applications stinting the area to be treated, and six applications covering all important areas, I would in the present situation choose to do six, since this should give a very satisfactory reduction and the seventh is likely to be the least effective for meteorological reasons. If Lovemore's estimated seven applications are reduced to six it will be possible to increase the area treated in the first four by 25% without extra cost.

It is with pleasure I leave the exact working out of the contract details to someone more intimately connected with this scheme but C.I.R.U. will be glad to help with any further advice on equipment etc.

GFB.

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