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INTRODUCTION AND SPREAD OF CULICOIDES AND OTHER INSECT SPECIES BY AIRCRAFT

1. The Problem, Culicoides

The insect species culicoides, better known as the biting midge or 'nono' is a pest species notorious for the nuisance caused by its unpleasant bites. It is a normal inhabitant of Fiji and Samoa where, for some reason, it presents little if any problem and, until the introduction of modern high speed aircraft, it was confined to these islands. Now however it has been introduced to the Society Islands, islands of the Tuamotu group and Aitutaki in the Cook Islands. In these islands, it has found conditions which favour its multiplication and, there, it has become a major pest. Dr. E. J. Reye, Research Officer of the Department of Entomology, University of Queensland, has recently concluded a 3-month investigation in French Polynesia on the problem, its origin and possible control measures on behalf of the Government of French Polynesia, with the assistance of SPC. Perhaps more sinister than the introduction of culicoides is the possibility of introduction and spread of other insects by the same means.

2. Introduction and spread

Members of the species were introduced from Fiji to Bora Bora in 1959 as the result of the opening of air services. From there they became established through the Society Islands by 1961 and some of the islands of the Tuamotu group by 1968. Spread from Bora Bora was relatively easy by way of interisland aircraft and by natural means. Up to 1959, the long journeys involved in passage from one island to another had conferred a large measure of protection against the introduction of 'foreign' insect species such as culicoides, as few could survive. Modern high speed aircraft have largely invalidated this protection and it is clear that other species of mosquito may be introduced to island groups and that culicoides will spread further unless preventive action is taken.

3. The culicoides

3.1. Pest potential

The biting midge or nono is aptly named for its bites are very painful, producing oedema, weal, and later, a papule. Due to its small size, it easily penetrates mosquito nets of normal mesh and it can become so persistent as to make normal community life practically impossible, particularly in rural areas. Where the species exists, the nuisance caused to local inhabitants is very great and it thus acts as a considerable deterrent to tourism; on both these counts having a pronounced effect on local economy.

3.2. Vector potential

The species in French Polynesia is not known to have any other than nuisance activity. However, it does act as vector to viruses and to some filarial worms in other parts of the world. In the Southern Caribbean area, it, with aedes and culex mosquitoes, acts as vector for Venezuelan encephalitis, especially in coastal areas. The filarial worm (Mansonella ozzardi) transmitted is principally a parasite of animals not man.

3.3. Breeding places and their control

The species breeds in brackish water, neither frankly salt nor frankly fresh. Semi-tidal pools, coastal marshes and roadside ditches near the coast are highly favoured but any body of water, small or large, is suitable provided that there is some salt content.

This type of breeding place makes control extremely difficult once the species is established. The conversion of brackish to fresh or sea water by suitable works is effective but is neither easy nor cheap on an extensive coastline. The draining of swamps is effective, but again presents difficulties. Such measures may reduce the density but are unlikely to eliminate the insects from an island.

4. Prevention; disinsectisation of aircraft

Island biological communities are delicately balanced and the introduction of a new species has effects which cannot be foreseen and which can be very undesirable. Once the balance is disturbed, it is very difficult to restore and it is a great deal easier to prevent further introduction of new species such as culicoides than to deal with the situation which arises if this is not done.

At the present time, aircraft on international flights are disinsecticised by aerosol spray of passenger compartments on arrival; few interisland aircraft are subject to any disinsectisation procedure.

To prevent the introduction and internal spread of the Culicoides and other 'foreign' insects, it is strongly recommended that all international and inter-island aircraft within the Pacific area be required to undergo appropriate effective disinsectisation procedures for all flights. At its Eighteenth Plenary Session in 1968, World Health Organization made the following recommendations for the disinsectisation of international aircraft*:-

1. For pressurized aircraft:
   (a) Disinsectisation by vapour during flight, or
   (b) Disinsectisation by aerosols on arrival.

2. For non-pressurised aircraft:
   (a) Disinsectisation by aerosols at "blocks away", or
   (b) Disinsectisation by aerosols on arrival.

3. That the WHO approved vapour disinsectisation system and formula for aerosols be used.

4. That the recommendations for vapour disinsectisation be implemented by 31 December 1970.

These procedures can be used for interisland aircraft but it is recommended that the "blocks away" system is used as insects can be liberated immediately on arrival and as this provides protection in the event of diverted flight or forced landing. The undercarriage and cargo compartments must receive adequate application of the insecticide. A suitable pattern for the disinsectisation of interisland aircraft would consist of:-

a) Placement of dichlorvos strips in cabin and baggage compartments to deal with insects harbouring in grounded aircraft

b) "Blocks away" dichlorvos spray applied to cabin, baggage compartments and undercarriage wells and components.

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* Relevant WHO documents

1. Recommendation 18th Plenary Session 24 May 1968, A21/VR/18
2. "Blocks away" technique WHO/IQ/67.147
3. Automatic disinsectisation equipment WHO/VBC/68.85 and WHO/VBC/68.87

It is strongly recommended that these procedures for international and interisland flights be adopted as soon as possible in the Pacific islands area in view of the particular vulnerability of the scattered communities it contains.

TECHNIQUE OF DISINSECTISATION OF INTERISLAND AIRCRAFT

1. Technique:

   a) The use of dichlorvos-resin strips in aircraft on the ground

   b) The use of dichlorvos aerosol for aircraft interiors and landing gear in "blocks away" preflight disinsectisation.

2. Dichlorvos-resin strips

   a) Quantity required: 1 (10 inch strip) per 28 m^3 space in first instance. 28 days after installation of the initial quantity, an equal amount will be added and, thereafter, at the end of each 28 day period the strips that have been in use for 56 days will be discarded and replaced by fresh material.

   b) Placing: Passenger and cargo compartments.

   c) Suggestions for supervision

      i) As the object in using the strip is to prevent harbourage of insects in grounded aircraft, these aircraft should be kept closed as far as practicable.

      ii) Strips should be securely suspended by a long edge to the central part of the ceiling of each compartment in which they are used.

      iii) Strips should be marked with an identifying number or code so that it is clear which ones are to be discarded after 28 days.

      iv) Appropriate log books should be kept to ensure that renewals take place and that the strip-status of any aircraft can be ascertained at any time.

3. Dichlorvos aerosol

   a) Quantity: Cabin 0.8 mg/m^3 immediately after door is closed. Baggage compartment 1.6 mg/m^3 immediately before door is closed.

Landing gear: 15 mg/m of height to each wheel assembly and to housing recesses. Application to be made immediately before motors are started.

b) Measurement: Time of discharge of aerosol can at 10 mg/sec.

c) Suggestions for supervision:

i) Aerosol tins should be stamped with an identifying serial number before issue to individual aircraft and

ii) the duration of discharge on each occasion of use, and total discharge time for each can should be recorded by the aircrew on an appropriate form issued with the can.

iii) When the total discharge time for the can is 300 sec it should be returned with its form to the issuing authority for checking, by weight, that the amount used conforms reasonably with that shown by the aircrew's records.

iv) Similar arrangements should be made for the issue, use and recording for aerosols used for undercarriage by ground crew.

Table of Dichlorvos

Type of aircraft.	Compartment Volume (m^3)	Amount of Strip*	⁄Aerosol (Discharge Seconds) For Compartments	For landing gear each wheel assy	recess
DC.4	Cabin 55	2	5	3	3
	Baggage Fore 4	1	1		
	Baggage Aft 4.5	1	1		
Otter	Cabin 27.5	1	3	2	-
	Baggage Fore 1	1	1		
Cessna U 206	Cabin 3.5	1	1	2	?
	Baggage 0.8	1	1		
Piper Aztec	Cabin 3.5	1	1	2	?
	Baggage 1.5	1	1		
Piper Cherokee	Cabin 3	1	1	2	?
	Baggage Fore 0.23	1	1		
	Baggage, Aft 0.57	1	1		

* Calculated to nearest whole 10 inch 'Vapona' strip

⁄ Calculated to nearest whole second with can discharging at 10 mg/sec.

ISSUED IN THIS SERIES

		Classification
1.	Annual Conference of O.I.E. held in Paris 13-18 May 1968, Report of SPC Observer. September 1968	Livestock Production and Health
2.	South Pacific Commission Publications' Series - Recent Developments. October 1968	Publication
3.	Free Diving Without Breathing Apparatus - Its Accidents. March 1969	Public Health
4.	"A" Level: Australia's Notification on Bovine Pleuropneumonia Regulations. March 1969	Plant and Animal Quarantine
5.	Study Tour to Noumea, Brisbane, Territory of Papua and New Guinea and British Solomon Islands Protectorate. March 1969	Tropical Crops
6.	"A" Level: Agricultural Education - Bulletin No. 1. April 1969	Agricultural Education
7.	Introduction and Spread of Culicoides and Other Insect Species by Aircraft. May 1969	Public Health