- PD-AAG-842 fed PP 931-0068 (1)

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT DATA SHEET

1. TRANSACTION CODE: A (A = Add, C = Change, D = Delete)

Amendment Number: TWO

DOCUMENT CODE: 3

931006800490

COUNTRY/ENTITY: DSB Interregional

3. PROJECT NUMBER: 931-0068

BUREAU/OFFICE: S/HEA/M 10

5. PROJECT TITLE (maximum 40 characters): Dev. Environ. Accpt. Replacemnt for DDT

PROJECT ASSISTANCE COMPLETION DATE (PACD): MM 09 DD 29 YY 82

7. ESTIMATED DATE OF OBLIGATION (Under 'B.' below, enter 1, 2, 3, or 4)

A. Initial FY 81 B. Quarter 2 C. Final FY 81

8. COSTS ($000 OR EQUIVALENT $1 =)

A. FUNDING SOURCE	FIRST FY 81 B. FX	C. L/C	D. Total	LIFE OF PROJECT E. FX	F. L/C	G. Total
AID Appropriated Total	280		280	1,298		1,298
(Grant)	(280)	( )	(280)	(1,298)	( )	(1,298)
(Loan)	( )	( )	( )	( )	( )	( )
Other 1.						
2.						
Host Country						
Other Donor(s)						
TOTALS	280		280	1,298		1,298

9. SCHEDULE OF AID FUNDING ($000)

APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE 1. Grant	2. Loan	D. OBLIGATIONS TO DATE 1. Grant	2. Loan	E. AMOUNT APPROVED THIS ACTION 1. Grant	2. Loan	F. LIFE OF PROJECT 1. Grant	2. Loan
S/HEA	511	542		1,016		280		1,298	
TOTALS				1,016		280		1,198	

SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each)

11. SECONDARY PURPOSE CODE

SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each)

A. Code

B. Amount

PROJECT PURPOSE (maximum 480 characters)

To test the effectiveness and safety of various environmentally acceptable alternatives for DDT for use as residual insecticide sprays in field operational anti-malaria programs.

SCHEDULED EVALUATIONS

Interim MM 12 YY 81 MM YY Final MM 05 YY 82

15. SOURCE/ORIGIN OF GOODS AND SERVICES

[X] 000 [ ] 941 [ ] Local [ ] Other (Specify)

AMENDMENTS/NATURE OF CHANGE PROPOSED (This is page 4 of a 15 page PP Amendment.) This project was first funded in FY 1975. Amendment No. 1, 27 June 78, authorized a three year extension (FY 78 thru 80) with an authorized life-of-project total at $1,018,000. Thru 09/30/80, $1,015,621 was obligated. This amendment adds enough authority to complete funding for one additional year. Upon approval of the project, Comprehensive Methods of Vector Control (931-1179), several elements of this activity may considered for inclusion in the new project.

17. APPROVED BY

Signature: Dr. Clifford Pease

Title: Acting Director, Office of Health

Date Signed: MM 06 DD 04 YY 82

18. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION: MM DD YY

1330-4 (3-79)

AUTHORIZATION AMENDMENT

Name of Country/Entity: Interregional - Project No.: 931-0068

Project Title: Development of Environmentally Acceptable Replacement for DDT

Grantee: World Health Organization

Grant/Contract No.: AID/DSPE IGC-0017

1. Pursuant to Section 104 of the Foreign Assistance Act of 1961, as amended, the centrally funded program, Development of Environmentally Acceptable Replacement for DDT was authorized on 6/27/78. That authorization is hereby amended as follows:

   The life of project cost shall be increased by $280,000. This raises the life-of-project authorization from $1,018,000 to the new total of $1,298,000.

2. The authorization cited above remains in force except as hereby amended.

(Acting) AA/DS Bernard Chapnick

6/10/81
Date

Clearances:

DS/HEA, C. Pease date 6/1/81
DS/PO, A. Morales date

ACTION MEMORANDUM FOR THE ACTING ASSISTANT ADMINISTRATOR
FOR DEVELOPMENT SUPPORT

FROM: DS/HEA, Clifford Pease, M.D.

PROBLEM:

Approval of a PAF amendment for a grant with the World Health Organization under Project 931-0068, Development of Environmentally Acceptable Replacement for DDT.

DISCUSSION:

This PAF amendment for $280,000 additional life-of project funding will continue this project with WHO for one additional year to provide sufficient lead time for WHO to secure alternative funding. During the next year, one or more state-of-the-art workshops will be sponsored by A.I.D. to develop policy and program guidance for the Comprehensive Vector Control Program (931-1179). It may be possible to include components of this project in the new project.

Although the three year proposal from WHO (attached to PAF) shows (page 8) a budget of $281,808 for the first year, which is the only year we plan to fund, PAF Amendment No. 2 needs to add only $280,000. This is because the earlier Amendment (No. 2 27 June 78) brought the Authorized Life-of-Project funding to $1,018,000 and we have obligated only $1,016,000 to date thus leaving a balance of $2,000.

Funds for the activity are included in the FY 1981 Congressional Presentation and the FY 1981 OYB for the Office of Health. The proposal has been reviewed and approved by the following:

Office of Health (DS/HEA)
Program Office (DS/PO)
DSB Project Review Committee

RECOMMENDATION:

That you sign the attached PAF.

Clearance:

DS/PO, A. Morales _____date_____

W1167/5

AID PROJECT SUMMARY

A. Basic Identification and Fiscal Data

Project Title:	Development of Environmentally Acceptable Replacement to DDT
New or Extension:	Extension
Grantee:	World Health Organization Division of Vector Biology and Control 1211 Geneva 27, Switzerland
Cooperating Liaison Officials:	WHO Project Director of VBC Jakarta, Indonesia and Semarang, Central Java, Indonesia
Duration:	One year
Previous Project Funding:	Six years- $1,016,000
Proposed Funding:	1981 - $281,808.00
Total:	$1,298,000

B. Background

The Vector and Rodent Control Unit (VRCU) was established in Jakarta in 1972 to conduct studies on all aspects of the ecology and control of important insect vectors of disease and of urban and peri-urban rodent populations with special emphasis on dengue haemorrhagic fever, filariasis, malaria, rodents and their ectoparasites. Reports from both WHO and AID consultants indicated that in light of the widespread development of DDT resistance in *Anopheles aconitus* the development and testing of alternatives to the utilization of DDT must be investigated.

Even in those geographical areas in which insecticide resistance has not developed in malaria vector populations, the rising cost of insecticides have made it imperative to reduce, as much as possible, the quantities being used. This can be done by integrating other feasable methods of control which would reduce the amount of residual spray required.

At the present time, this project is the only one in the world with the necessary expertise and experience required for the conduct of Stage IV and Stage V field trials of alternative insecticides as well as developing an intregrated or comprehensive vector control program based on all available methodologies.

C. Descriptions of the Project

This proposed three year extension would continue the current work on the control of A. aconitus and A. sundaicus as well as on their ecology, distribution and vectorial capacity. Such studies and investigations in a comprehensive approach to vector control will be of interest and importance to other South-East Asia and Western Pacific countries currently experiencing a resurgence of malaria.

This project will specifically focus on:

1. Village-scale trials of new insecticides, insecticide formulations and application equipment.

2. The development of comprehensive and integrated methods of malaria vector control.

3. Studies on the ecology of malaria vectors on Java and Bali breeding in irrigation water and brackish water as a basis for testing other methods of vector control.

4. Studies on the vectorial capacity of Anopheles species on the outer islands.

5. Studies on the ecology of Anopheles vectors on the outer islands.

6. Transfer of technology to other countries in the region.

D.. Scope of Work

The detailed scope of work plans are outlined in the Grant Application.

E. External Review

The current project was reviewed in February, 1980 by an indepth team from AID and WHO. The team recommended that the project be continued with a gradual expansion and restructuring to enable the project to continue alternative insecticide studies, as well as phase into additional comprehensive vector control studies.

PP Amendment.Project No. 931-0068

ACTIVITY DESCRIPTION

1. Background

The Vector and Rodent Control Research Unit (VRCRU) was established in Jakarta in 1972 to conduct field studies and research on all aspects of the ecology and control of important insect vectors of disease and of urban and peri-urban rodent populations with special emphasis on dengue haemorrhagic fever, filariasis, malaria, rodents and their ectoparasites. During the first two years, research was started in all of these fields except malaria.

In 1974, VBC of WHO/Geneva sent a consultant to Indonesia to review the research programme and make recommendations as to the nature of malaria research appropriate for the Unit to carry out. At the same time, AID/Washington sent two specialists on malaria research and training to Indonesia to consult with the Government of Indonesia malaria officials on the training and research needs of the malaria control programme in connection with the proposed USAID loan for support of the Indonesian malaria control effort. The reports of both WHO and AID consultants indicated that in light of the widespread development of DDT resistance in Anopheles aconitus the highest research priority need of the Indonesia malaria control programme was for the development and testing of alternative residual insecticides to be used in place of DDT.

In late 1975, a sub-unit was established in Semarang, Central Java, supported primarily by a two-year grant from the US Agency for International Development, later extended for a further three years until 29 September, 1980. Significant inputs have also been made by the WHO which supports one staff member of the three professional staff at the Unit and the Government of Indonesia which provides counterpart professional staff, spraymen, laboratory facilities, store houses, etc. (The extent of the Government and WHO input is shown in Annex 1). The primary objective of the grant was to search for an environmentally acceptable insecticide for the control of DDT-resistant An. aconitus, the main vector of malaria in most of the islands of Java and Bali. This was done by carrying out field trials on insecticides emanating from the WHO Scheme for the screening and testing of new insecticides. This programme has a high priority for the Government of Indonesia as malaria represents the number one problem among the communicable diseases listed in the Indonesia Country Health Programme.

2. Field Studies of the Sub-Unit to the Present Time

During the past several years - four OP compounds in different formulations and dosages were tested to determine their residual effectiveness in groups of villages (Stage V trials) and five residual insecticides were tested in house-cale trials (Stage IV). In addition, two village-scale trials were conducted to develop new application methods applicable to local conditions of intensive rice growing areas of Central Java, i.e. outdoor ULV application of fenitrothion technical grade by knapsack machines and partial indoor treatment of fentrothion only on lower parts of walls. None of the compounds had been tested before in this area for the control of DDT-resistant An. aconitus.

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A list of the Stage IV trials is shown in Table 1. Fenitrothion 40% wdp at 1 and 2 gr/m^2 and pirimiphos-methyl 50% EC at 2 gr/m^2 showed sufficient promise to be further evaluated in Stage V trials, i.e. having bioassay mortalities on sprayed surfaces above 50% for about eight weeks or longer, and/or evidence of an airborne effect. A summary of these Stage V trials are shown in Table 2 and comparative results in Table 3. Other research activities have been studied on the ecology and behaviour of An. aconitus in Central Java (Table 4).

Fenitrothion: This compound has been the most effective of all of those tested. However, high cost has prevented large-scale operational use of this insecticide at the standard dosage of 2 gr/m^2 by the MOH. Because of cost, as well as mammalian toxicity and possible resistance considerations, two Stage V trials have been carried out using reduced amounts. In the first trial, with normal total coverage at 1 gr/m^2 manpower requirements were the same as at 2 gr/m^2, but insecticide usage was reduced by one-half and the residual effectiveness only by about one-third, i.e. to two months from three months at 2 gr/m^2. The second trial to reduce amounts of insecticide was by spraying at 2 gr/m^2 only one horizontal swath between 10 and 85 cm from the ground. This reduced insecticide use by about two-thirds and manpower by over one-half. Preliminary analyses of results indicate that vector populations were effectively suppressed for over two months, slightly less than that of total coverage at 2 gr/m^2, but more effective than at 1 gr/m^2 total coverage.

The rationale of this one swath "selective" spraying was based on observations on the resting behaviour of An. aconitus, which showed that about 78% rest below 85 cm from the ground.

Malathion: This OP compound has been the most common replacement for DDT since the early 1960s, because of its safety, relatively low cost and effectiveness. As the DDT-resistant population of An. aconitus prevailed in Java, the MOH became extremely interested in replacement of DDT with malathion. Accordingly, the Sub-Unit tested this insecticide in three trials in 1976 and 1977 against DDT-resistant An. aconitus and found it to be ineffective each time. Man-vector contact indices (indoor and outdoor landing rates) and associated parous rates were not reduced, and other population density indices and parous rates were only reduced for short periods, generally less than four to six weeks. The reasons for this are yet to be established.

Pirimiphos-methyl: Two trials of this compound were carried out, one with a 25% wdp formulation at 2 gr/m^2 and the other with 50% EC at 1 grm/m^2. The 2 gr/m^2 wdp treatment was effective for about three months, but the formulation was shown to be unsuitable because of heavy, unsightly brown deposits left on surfaces and high erosion of nozzle tips. The 1 gr/m^2 EC treatment was effective for about two months and the formulation very suitable.

Chlorphoxim: This compound was applied as a 50% wdp at 2 gr/m^2 and was found to be only marginally effective, the most important deficiency being failure to reduce indoor and outdoor man-vector contact.

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Fenitrothion ULV: A Stage V trial of ground ULV treatments was carried out using back-pack machines and 95% fenitrothion to apply five-weekly cycles of about 40 ml per house per cycle. Vector populations were effectively suppressed during the treatment and for about two weeks after the last cycle. However, considering the amount of insecticide used (about the same as selective spraying), short residual effects, equipment costs and intensive supervision required, it was concluded that this type of ULV application would only be useful for epidemic situations of limited area.

All of the above trials have been reported upon in special reports and publications. In addition to the field trials of new insecticide compounds, special biological studies have been carried out on *An.aconitus* biting rates, activity cycles, flight levels, resting habits, feeding preference, larval habitats and insecticide susceptibility and, as previously indicated, these are briefly listed in Table 4.

It can thus be seen that the Unit has been extraordinarily productive. The work carried out has been of considerable importance to the Government in guiding the purchase and utilization of insecticides for use in the Indonesian malaria control programmes as detailed below.

However, in addition to the immediate importance of the finding of the Sub-Unit to the Government of Indonesia, the information developed from these field studies has been of immediate relevance and use, particularly to the South-East Asia Region but also to the Western Pacific Region. Many of the countries in both of these Regions are faced with the same problems of resistance and exophilic vectors as in Indonesia and, in several of them not only is the ecology similar, but also indeed the vectors are the same.

The results of the field trials described above have been, for the most part, already published and interest has been expressed in areas as far away as South America; some of the insecticides which have shown promise in large-scale field trials in Central Java have been or will be tested in a number of other Regions.

3. Relevance to Application

The implications of these results for the Government of Indonesia (GOI) and the two Regions, are the following:

(a) The three village trials with malathion enabled the MOH to avoid planned large expenditures for this compound to replace DDT.

(b) The MOH will spray 200 tons of 40% fenitrothion wdp in 1980/81 as a pilot operation, and have proposed an operational trial of "selective" spraying in two high malarious districts in Central Java.

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(c) Also, the MOH is planning to carry out a large-scale operational trial covering a population of over 75,000, with pirimiphos-methyl in Central Java with financial support from the chemical company and technical assistance of VBCRU.

(d) Based on the field studies on the ecology and the behaviour of An. aconitus, advanced selective spray trials can be organized to reduce further insecticide use in the near future by the team in collaboration with local government.

(e) In addition, the GOI and MOH have been taking advantage of the in-service training opportunities for their personnel assigned to the Sub-Unit, both in entomology and spraying operations. Also, some 10 WHO fellows from WHO Member States in the South-East Asia and Western Pacific Regions have visited annually and been trained at the Sub-Unit.

(f) Finally, as indicated above, these field studies have a global importance as well. This Sub-Unit represents one of the few sites where testing of insecticides against malaria vectors in tropical areas can be carried out under the direction of an international/Government team.

4. Proposal for Extension of the Project

While much has been accomplished in the field of insecticide screening against Anopheles vectors of malaria, there are a great many investigations that remain to be carried out both on the control of An. aconitus and An. sundaicus as well as on their ecology but particularly on the distribution, vectorial capacity, ecology and control of Anopheles vectors of malaria n the outer islands of Indonesia. While recent surveys carried out by the Government of Indonesia and WHO/VBCRU have given a better idea of the mosquito species present on some of the outer islands, many where malaria is highly endemic have not as yet been surveyed. In many areas the vector species responsible for malaria transmission yet remains to be determined and, once this has been accomplished, investigations must be carried out on their distribution, seasonal population densities, biology and ecology. Such information is essential for the elaboration of the most effective and selective methods of control. Finally, one of the most important aspects which will be kept in mind throughout is that the facilities of the Unit will enable methods and materials developed and known to be effective under the conditions of temperate, developed countries, to be tested for their efficacy under tropical conditions. The results of such studies, as indicated above, will naturally be of interest and importance to the South-East Asia and Western Pacific Regions as well as to Indonesia.

It is therefore proposed to renew support of the Unit for an additional three years, and to reorientate the Unit's programme along the new lines mentioned above while still retaining the capability of carrying out field trials of new insecticides or insecticide formulations which have shown promise elsewhere. From discussions with staff of the Ministry of Health of Indonesia, it is clear that these proposals would fit the priorities

accorded by the Government to this work and would, in fact, greatly complement smaller Indonesian research projects being supported by the WHO Special Programme for Research and Training in Tropical Diseases. These studies, of necessity, are limited in scope and funding and will be unable to accomplish all of the work needed in order to effectively extend malaria control operations to the outer islands.

It is proposed that the work of the Sub-Unit be carried out along the lines of the following revised objectives. It is understood that the studies will be closely coordinated with and supported by those of the VBCRU in Jakarta and that research coordination with all bodies of the Government of Indonesia will be through the National Institute of Health Research and Development and will involve the Institute's Health Ecology Research Centre and, eventually, through the coordination of the Institute, the CDC Malaria Control Programme in cooperation with the WHO Country Malaria Advisers.

However, the research work being carried out by the Indonesian bodies is supported either by funds of their own Government or by grants from the WHO Special Programme for Research and Training in Tropical Diseases. This work is, therefore, entirely separate from that of the VBCRU though coordinated as closely as possible in subject area where they touch.

5. Revised Objectives

5.1 Village-scale trials of new insecticides, insecticide formulations and application equipment

These trials will be carried out in areas where the *Anopheles* vectors of malaria are already resistant to DDT and other chlorinated hydrocarbons. Though earlier work of the Sub-Unit has already demonstrated the efficacy of fenitrothion against *An. aconitus* the possible development of resistance to this compound cannot be excluded, especially as OP resistance has already developed in other malaria vectors. Though the number of new compounds becoming available is much reduced, it is important to retain the ability of testing these under field conditions. The results of these trials would be of importance not only to the Government of Indonesia but also to many other countries in the South-East Asia and Western Pacific Regions.

Studies will be carried out both on newer compounds and those which have already successfully undergone field trials to determine how they might be applied more selectively, effectively and, consequently, more economically whether to homes or animal shelters.

Experience at the Unit has already shown that at minimal cost the villagers can be readily trained to apply and even participate in the evaluation of residual insecticides under appropriate supervision; extending this concept to larger areas could result in major savings in labour costs.

5.2 The development of comprehensive and integrated methods of malaria vector control

Even in those geographical areas in which insecticide resistance has developed in malaria vector populations the rising cost of insecticides has made it imperative to reduce, as much as possible, the quantities being used. This might be done, as noted under 5.1, by their more selective use; another approach, however, is to integrate into vector control programmes other feasible methods of control which would reduce the quantities of residual sprays required. Studies will be carried out to determine the possible applications of environmental management and, particularly, source reduction methods especially those that could be applied by the communities themselves; these might involve either changes of irrigation practices or, where feasible, permanent elimination of breeding sites in the vicinity of villages; changes in salinity might control mosquitos breeding in coastal lagoons. The results of such studies will be of global application to all areas of similar ecology.

When available, biological control agents would also be tested to determine their possible role in an integrated malaria vector control programme.

In some larval habitats such as that of lagoons, the use of larvicides including insect growth regulators, might prove more economical than that of adulticides and this should be examined.

5.3 Studies on the ecology of malaria vectors on Java and Bali breeding in irrigation water and brackish water, e.g. rice fields and lagoons

Fundamental to the development of any more selective control methods whether by insecticides or alternative approaches is the necessity of a better understanding of the ecology of the vector species born of the aquatic and adult stages. Such studies would focus on species breeding in irrigation water, particularly in rice fields and those breeding in brackish water, especially coastal lagoons and fish ponds. Both of these types of habitats, while common in Indonesia, are also of great regional importance. Studies would include those on location of larval population and variations in their seasonal densities, adult movements and resting habits both indoors and out, both in houses and in animal shelters as well as natural resting places.

5.4 Studies on the vectorial capacity of *Anopheles* species on the outer islands

In many areas of the vast outer islands of Indonesia, the relative importance of the various potential vectors of malaria is uncertain. Since such information is a fundamental base to any future control programme, studies will be organized and carried out in collaboration with both research and control groups of the Indonesian Government to determine the species of *Anopheles* responsible for malaria transmission on the outer islands. Such studies will include checking sporozoite rates and bloodmeal feeding preferences.

Particular emphasis will be given to transmigration and development project areas where a special threat of increased malaria transmission occurs.

5.5 Studies on the ecology of *Anopheles* vectors on the outer islands

Once the identity of the *Anopheles* species responsible for malaria transmission has been determined, studies on their ecology must begin. Without information such as that on the nature of the larval habitats, seasonal densities, adult movements and host preferences and favoured resting places, it would be difficult, if not impossible, to plan selective and economic programmes for the control of these vector species on the outer islands by whatever method is found to be most effective and economic.

5.6 Transfer of technology

In working towards all of the objectives the greatest effort will be made to involve Indonesian staff at all levels, both scientists and technicians. The transfer of the technology involved in the implementation and assisting the Government of Indonesia and particularly the Health Ecology Research Centre, and other Governments of the Regions to develop scientific manpower to pursue the research independently, must be regarded as one of the most important objectives of the proposed project extension. The Unit has received numerous fellows from several Regions for training in the past and it is foreseen that this role will be of even greater importance in the future.

6. Budget

The budget for the proposed three-year extension is submitted overleaf.

BUDGET

Personnel	1980-1981	1981-1982	1982-1983
	US$	US$	US$
Entomologist, P.4	70,400	58,000	67,000
Entomologist, P.4	61,000	71,000	73,200
Sanitarian, P.3/4	56,800	54,400	53,300
Administrative Officer Local - DJ 5	4,900	5,600	6,400
Sub-total	193,100	189,000	199,900
Consultants	9,000	9,000	6,000
Operating costs	10,800	10,800	10,800
In-country travel	10,800	10,800	10,800
Supplies & equipment			
Office supplies & expenses	4,500	4,500	4,000
Glassware) Chemicals) Laboratory equipment)	2,000	2,000	1,000
Spraying equipment	1,000	-	-
Vehicles 4-wheel drive	9,000	9,500	-
Insecticides	3,500	3,500	3,500
Miscellaneous	3,500	3,500	3,500
Sub-total	54,100	53,600	39,600
Total	247,200	242,600	239,500
14% overhead costs	34,608	33,964	33,530
GRAND TOTAL US $	281,808	276,564	273,030

THREE YEAR TOTAL = US $ 831.402

Table 1. Summary of Stage IV trials.

Trial No.	Year	Insecticide and formulation	Target dosage
1.	1976	fenitrothion (CMS-43), 40% wdp	2 gr/m^2
2	1976	fenitrothion (CMS-43), 23.9% encapsulated EC	2 gr/m^2
3	1977	biodegradable DDT (CMS-1856), 75% wdp (in a DDT resistant area)	2 gr/m^2
4	1977	As above, in a DDT susceptible area	2 gr/m^2
5	1978	pirimiphos-methyl (CMS-1424), 50% EC	2 gr/m^2
6	1978	carbaryl (CMS-29), 75% wdp	2 gr/m^2
7	1978	fenitrothion (CMS-43), 40% wdp	1 gr/m^2

Table 2.

Summary of Stage V trials: Number of houses treated, amount of, insecticides used and sprayman employed.

Trial No.	Year (No.hamlet)	Insecticides and formulation	Target dosage (gr/m2)	No. houses (pop.)	Amount insecticides per house (kg)	Amount insecticides 1/	Sprayman Total (man day)	Sprayman No.house man day
1	1976 (16)	fenitrothion 40% wdp	2	978 (4469)	1.53	613	200	4.9
2	1976 (8)	malathion 50% wdp	2	819 (3823)	1.22	612	190	4.3
3	1977 (16)	malathion 50% wdp	2	836 (4064)	1.35	675	252	3.3
4	1977 (16)	malathion 2/ 50% wdp	2	1078 (5382)	1.20	599	300	3.6
5	1978 (14)	Pirimiphos methyl 25% wdp	2	1122 (5088)	2.03	509	264	4.3
6	1978 (10)	Chlorphoxim 50% wdp	2	829 (3814)	1.14	572	180	4.6
7	1979 (15)	Pirimiphos methyl 50%EC	1	874 (4152)	0.54	271	210	4.2
8	1979 (18)	fenitrothion 40% wdp	1	1053 (4554)	0.75	298	240	4.4
9	1979 (10)	fenitrothion 3/ 40% wdp	2	1062 (5005)	0.55	221	118	9.0

1/ Active ingredient in grams used per house
2/ The 2nd round in June-July
3/ One horizontal swath between 10 and 85 m above the ground and applies against the 2nd peak.

Table 3.

Number of weeks showing effective control of *Anopheles aconitus* by various residual sprayings as determined with female densities (d) and parity (p).

Trial No.	Insecticide and dosage	1/	Night landing catches		Resting catches			
			Indoor	Outdoor	houses morning	cattle-shelter night	cattle-shelter morning	natural-si morning
1	CMS-43 wdp 2 g/m^2, 1976	d	12	12	> 30	7	12	< 12
		p	12	13	NA	17	12	20
2	CMS-1 wdp 2 g/m^2, 1976	d	< 2	NS	> 25	< 2	2	< 2
		p	NA	3	NA	7	NA	NA
3	CMS-1 wdp 2 g/m^2, 1977	d	1	NS	7	NS	4	4
		p	7	7	6	7	6	8
4	CMS-1 wdp 2 g/m^2, 1977	d	NS	2	NS	5	1	NS
		p	2	NS	NA	7	1	2
5	CMS-1424 wdp 2 g/m^2, 1978	d	9	9	14	7	> 10	7
		p	9	8	> 10	11	10	12
6	CMS-1197 wdp 2 g/m^2, 1978	d	5	4	> 10	4	> 10	10
		p	7	7	14	5	14	> 14
7	CMS-1424 EC 1 g/m^2, 1979	d	6	5	> 10	7	4	> 10
		p	6	7	NA	6	7	6
8	CMS-43 wdp 1 g/m^2, 1979	d	> 10	10	14	3	17	17
		p	11	11	13	8	9	9
9	CMS-43 wdp 2 g/m^2, 1979	d	11	> 11	> 12	9	> 12	> 12
		p	11	11	NA	6	> 12	8

1/ "d" refers to natural densities while "p" represents parous rate.

NA = not applicable

NS = no significant

Table 4. List of Publications of VBCRU-II Sub-unit, Semarang.

Trials made in	Authors	Insecticides/or subject	Trial	WHO/VBC document
1976	Joshi et al	Fenitrothion wdp 2 g/m^2	Stage V	77.675
1976	Joshi et al	Ecoloy/ *An. aconitus*	Field	77.677
1977	Pradhan et al	Fenitrothion 95% ULV	Stage V	79.729
1978	Shaw et al	Pirimiphos methyl wdp, 2 g/m^2	Stage V	79.722
1978	Fanara et al	Chlorphoxim wdp, 2 g/m^2	Stage V	79.724
1978	Pradhan et al	CMS-43, CMS-1124 CMS-29, 2 g/m^2	Stage IV	79.739
1979	Supratman et al	Fenitrothion wdp, 1 g/m^2	Stage V	79.738
1979	Supalin et al	Pirimiphos methyl EC, 1 g/m^2	Stage V	79.752
1979	Damar et al	Behaviour/ *An. aconitus*	Field	manuscript in preparation
1979	Bang et al	Seasonal abundance/ *An. aconitus*	Field	manuscript in preparation.

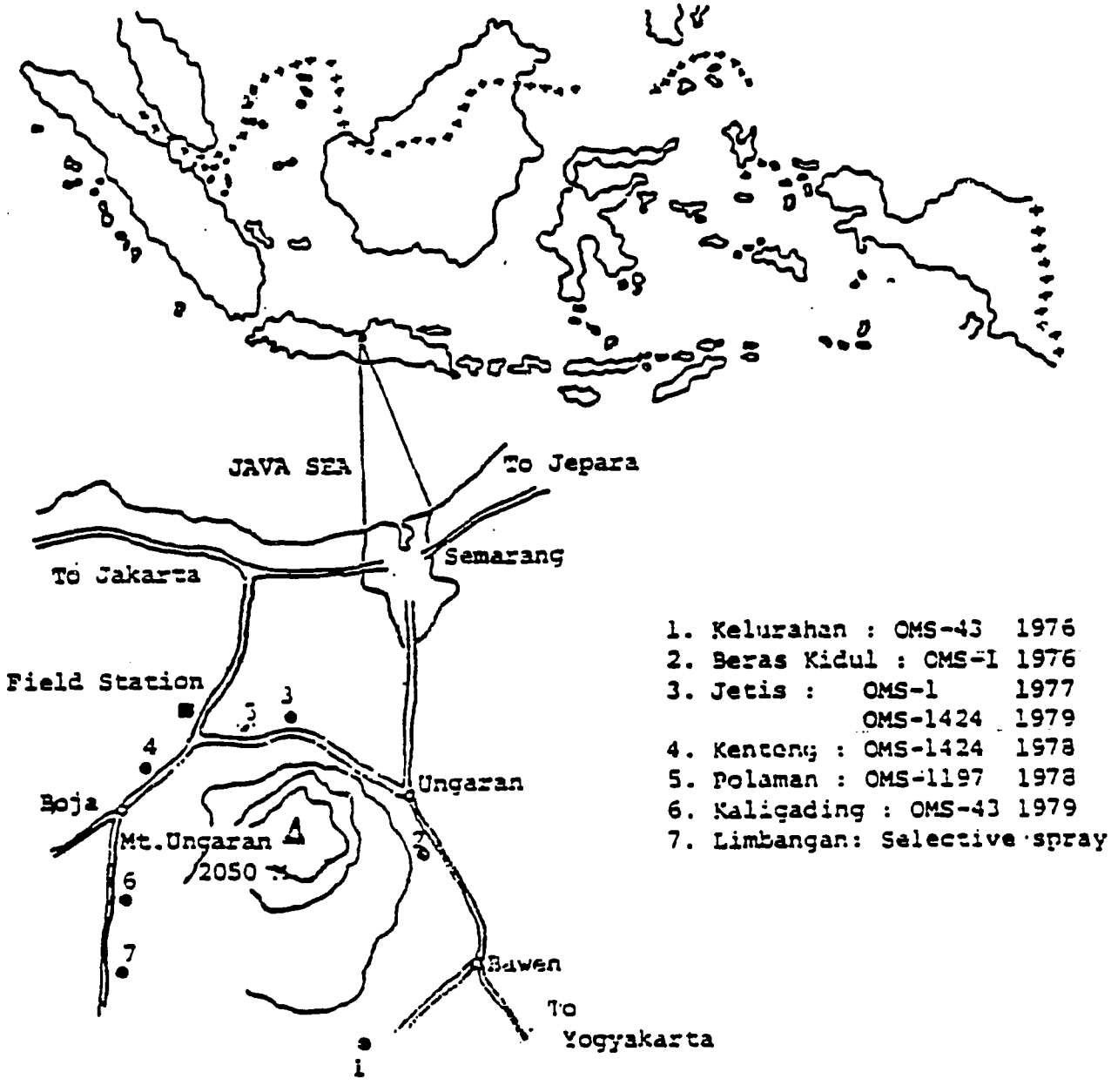

Fig. 1 Stage V trial areas near Semarang, Central Java, Indonesia.

ANNEX 1

CONTRIBUTIONS TO APPLIED FIELD STUDIES AT THE SEMARANG SUB-UNIT

Year	Government of Indonesia 1/		World Health Organization	USAID
	Funds	Personnel	Personnel (VBCRU)	Funds ($) 2/
1975/76	9,000	1/2 Professional (Ph.D.) 2 Biologist (B.Sc.) 14 Field staff 3 Drivers	1 Entomologist 1/2 Project Leader 1/4 Entomologist (VBC/HQ)	118,200 (2)
1976/77	15,000	1 Professional 2 Biologists 17 Field staff	1 Entomologist 1/3 Project Leader 1/4 Entomologist (VBC/HQ)	169,930 (2)
1977/78	13,000	1 Professional 1 Biologist 20 Field staff 3 Drivers	1 Entomologist 1/3 Project Leader 1/4 Entomologist (VBC/HQ)	176,981 (2)
1978/79	14,700	1 Professional 1 Biologist 25 Field staff 3 Drivers	1 Entomologist 1/2 Project Leader 1/3 Entomologist 1/4 Entomologist (VBC/HQ)	188,053 (1)
1979/80 3/	18,000	1 Professional 1 Biologist 27 Field staff 3 Drivers	1 Entomologist 1/2 Project Leader 1/3 Entomologist 1/4 Entomologist (VBC/HQ)	144,818 (1)

1/ Four laboratory/office rooms are also provided

2/ Based on WHO allotment notification. In parenthesis are the number of long-term staff members assigned with the funds.

3/ Contribution for the next 3 years (1981-83) from the Government of Indonesia and WHO will be at the same level of 1979/80.