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ENGLISH

ESTABLISHMENT OF A PILOT PLANT FOR PESTICIDE FORMULATION

DP/BUR/80/011

BURMA

Technical Report: Pesticide Formulation Technology *

Prepared for the Government of the Socialist Republic of the Union of Burma
by the United Nations Industrial Development Organization,
acting as executing agency for the United Nations Development Programme

Based on the work of R.G. Teuber-Weckersdorf,
Consultant in Pesticide Formulation Technology

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United Nations Industrial Development Organization
Vienna

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LIST OF ANNEXES

I. Findings and Recommendations:

The mission was arranged to endorse and approve (right or wrong) the project and to make a cost/benefit analysis.

Findings:

1. The use of pesticides in Burma is absolutely necessary for increasing the yields.

2. The mainly used pesticides are liquid formulations.

3. The government supports the liquid pesticides by buying spray-equipment.

4. The local formulation is essential for saving foreign exchange.

5. The persons involved are well-prepared and trained abroad in formulating liquid products.

6. The question of packaging was solved by using local produced glass bottles.

7. The local produced solvents are suitable for the local formulation.

8. The safety precautions are taken into consideration by different subcontractors who submitted the biddings.

9. The total expenditures for the Fiscal Year 1986/87 were US$ 3,056,519, therefrom 87% were liquid pesticides.

10. The total amount was 374077 kg/l.

11. The real demand on liquid pesticides would be approx. 580,000 l for fiscal year 1986/87.

12. The project site has to be replanned by the government to-gether with the subcontractors. The already built up buildings have to be combined.

13. The government spent US$ 2.7 million to purchase 337,000 l liquid formulated materials.

14. If the same amount is locally formulated using locally available solvents the government would have saved more than 50% of the foreign exchange, that is about US$ 1.35 million.

15. Even if there would be no local inputs the government would save upto 40% in foreign exchange.

Recommendations:

1. Installing of a committee between the Pharmaceutical Industries Corporation (PIC) - the Agricultural Corporation - and the Project Management.

2. To start as soon as possible the discussions between the subcontractors, the Project Management and UNIDO.

3. To start as soon as possible the production, so that 1988/89 the first local formulated pesticides can be used.

II. Pesticide Management in Burma

1. General information:

The Plant Protection Unit of the Extension Division, Agricultural Corporation, Ministry of Agriculture and Forests, is the sole national agency responsible for the selection, planning, requisitioning, acceptance, storing and distribution of pesticides. Purchases (on the basis of international bidding) are made by the purchase department of the AC in accordance with the availability of foreign exchange and generally do not meet the full demand. Under the goverment planning system foreign exchange is alotted by the Centre. When the formulation plant is established the foreign exchange will be automatically re-assigned to the Ministry of No. 1 Industry for the purchase of active ingredients and other inputs. It is expected that with the same amount of foreign exchange the supply of pesticides will increase. After starting the formulation plant this department will meet the demand of active ingredients and emulsifiers and also identify the suppliers. It is absolutely necessary that a committee is established between PiC and PPU to obtain a smooth running off from planning to production.

2. Fields Tests:

Field tests are required for the introduction of all new formulations. Such tests are being conducted by the laboratory of the Plant Protection Unit. In future such tests will be carried out on a routine basis in co-operation with the PPU by the laboratory of the formulation plant. In fact, such tests should be started as soon as the laboratory is installed in January 1987.

3. Distribution:

50 % of the imported quantity in 1985/86 had been supplied in 0,5 l and 1 l tin containers, the rest in 20 l tin barrels. They are being transported from Rangoon to the townships and there they are given out to the farmers by COOPs. The farmers come with empty glass or PE containers and draw off their demand from the 20 l barrels. The farmers are being informed about the handling with pesticides by the government. There are regular courses of instruction and I had the chance to satisfy myself about the surprisingly high information standard of some farmers.

4. Equipment:

The use and demand on liquid products is steadily increasing therefore the PPU makes every effort to place sprayers at the farmers disposal.

At this time there are

17.000 pcs	at COOP group
15.000 pcs	are in possession of farmers
5.000 pcs	will be supplied by Japan in 1987
4.000 pcs	are ordered in W-Germany

Both deliveries are already pre-paid.

5. Size of the agricultural farms in Burma:

till 2,5 ha	61,6 %
2,6 - 5 ha	24,6 %
5 - 10 ha	11,4 %
10 - 25 ha	2,5 %

6. Labels:

The responsibility for the desigr, printing and supply of appropriate labes will be assumed by the Plant Protection Unit. It has considerable experience in producing information and instruction material for farmers on the use of pesticides.

III. Pesticides used for Fiscal Year 1986/87 in Burma.

1. Liquid Products:

Product	Imported quantity
Elsan 50 EC	50,848 l
Diazinon 40 EC	56,033 l
EPN 45 EC	80,712 l
Sumithion 50 EC	80,712 l
Sumicidin 5 EC	56,500 l
Sumicidin 2,5 ULV	10,100 l
Kasumin 2,5 ULV	2,000 l
Total:	336,905 l

For this imported quantity they had to pay US $ 2,699,426.--

2. Solid Products:

Product	Imported quantity
Padan 50 SP	4,270 kg
Padan 4 G	4,000 kg
Kitazin 17 G	4,270 kg
Topsin 70 WP	8,540 kg
Labilite 70 WP	8,512 kg
Homai 80 WP	2,580 kg
Daconil 75 WP	5,000 kg
Total:	37,172 kg

For this imported quantity they had to pay US $ 357,093.--

3. Real demand on liquid pesticides:

Product	quantity
Elsan 50 EC	80.000 l
Diazinon 40 EC	70.000 l
EPN 45 EC	80.000 l
Sumithion 50 EC	80.000 l
Sumicidin 5 EC	80.000 l
Dimethoate 50 EC	100.000 l
Sumicidin ULV	10.000 l
Diazinon 20 EC*	80.000 l
Total:	580,000 l

* This product would be used instead of the granules-formulation if an own formulating plant is built.

The quantity missing to the real demand is 156,905 l and cannot be bought because of lack in foreign exchange.

4. General use of plant protection products in Burma:

60 % of the insecticides is used in cotton fields

30 % is used in rice fields

10 % is used in wild crops

The use of funigicides and herbicides is by far not so large

Insecticides have the advantage to be formulated as EC almost totally and therefore easy to use.

Equipment for application of fluid products please see I/4.

IV. Project Site:

1. Project Site - general view

In my opinion the present layout needs to be modified in order to facilitate operation and increase productivity. (The different functions are now located in separate buildings at considerable distances.) Such functions as storage of raw materials (except of tanks for local and imported solvents), blending, filling, storage of formulated and packed products and shipping should be blocked together under one roof thus easing transfer of heavy loads, reducing time and providing protection against rain during monsoon season. The production block should be placed as close as possible to the laboratory building to facilitate communication which is essential. Utilities should be built into or adjacent to the production block to save on cables and pipes and to simplify attendance. Access to the storage area for ready formulations prepared for shipment should be reconsidered (shortened) in order to eliminate customers moving across the whole plant terrain. Other functions could also be usefully blocked making their use much more convenient for the services and the staff. I recommend that the whole plant layout is reconsidered by the subcontractor with due consideration to already existing buildings.

2. Laboratories:

Laboratory will be set of end of December 1986. The equipment of the laboratories is corresponding to a very modern laboratory. All works necessary for formulation and trials and quality control can be done there.

They will start with formulation trials at once after opening and installing the analytical equipment. The chemists and formulation technicians have been trained abroad already. PPI will care for the necessary active ingredients and emulsifiers (samples without any charge). They will buy the AI which sould be produced in the new formulation plant.

3. Workshop and Maintenance:

The buildings provided for them are too large in my opinion. Besides, they will be a part of the formulation plant, so a new place for Worksnop and Maintenance must be found only.

4. Storage for raw materials and containers and packing materials:

These buildings must be planned completely new.
It is impossible to support a formulation plant when raw materials and packaging stores are separated from the formulation plant and the store with the manufactured products by traffic ways. These three objects must be in one level and under one roof. By my experience for a total capacity of 1 million litres a local place for the single buildings is necessary as following:

raw material & packaging stores: 600 - 700 m2 (storage on pallets)

formulating and filling station: 200 - 250 m2

store for manufactured products: 600 - 700 m2 (storage on pallets)

All the quantity for the planned total annual demand will not be produced at the same time as the demand will depend on the seasons, see following schedule:

Summer	5 %	Most of the imported pesticides are during monsoon season on rice, cotton, groundnut, sesamum,etc.
Monsoon	60 %	
Winter	35 %	

5. Storage tanks for local solvents:

The capacity for local solvents is 3 x 20.000 l. This is enough for the quantity but it has to be discussed if it would be more convenient to have one 50.000 l tank.

6. It must be avoidedto have many little buildings like Locker, Clinic, Recreation hall, sanitary rooms, etc., they should be better united in one building. Because of the long monsoon season the plant would become completely dirty.

Further, long transportation ways between the single departments must be avoided as the communication between Laboratory - Production - Storage must be very good and smooth-running.

V. Packaging Materials:

Packaging of formulations was reviewed. At present over 50 % of imported liquids is ordered in 1 and 1/2 litre metal containers and the balance in 20 litre metal barrels. In my opinion the optimal packaging material for formulations containing solvents would be glass bottles with pilfer-proof caps. This is the opinion of the UNIDO too regarding on their booklet: Formulation of Pesticieds in Developing Countries, page 107 - packaging, and page 203: "Glassbottles are excellent for chemical packaging because of the characteristic inertness".

Plastic and metal are not secure packaging materials in environments with high humidity and temperatures. An integrated plastic bottel producing and filling machine is good only for water solutions. However, the overriding consideration is the high dependency on foreign exchange when plastic or metal containers are used. It was established that the Ministry of Industry No. 1 (Ceramic Industries Corporation - Syriam glass factory) has the know-how and technical capacity to produce bottles of a volume of up to 0,77 litres. Half litre bottles can be supplied technically. For one litre bottles a new mould would be necessary (foreign exchange - US$ 20,000 p.a. for 1,000,000 bottles). Considering that the demand of bottles for all purposes (estimated at 45 millions) exceeds the present output of the glass factory (40 million) an increase in capacity would be necessary. The additional demand of 1,000,000 will improve the economic viability of such an expansion. The supply of 750,000 bottles (1/2 litre) in 1988/89 could be met from present capacity. To reduce breakage the bottles would have to be packed in vertical position in wooden crates with partitions. The manufacturing of the crates could be subcontracted or assigned to the formulation plant.

Another advantage of the glass bottles is the recycling when there are a lot of them. This is surely not a forgetable advantage.

In case of improvement of plastic bottle technology and an enourmous increase in liquid formulated products in the future one could think in installing of a plastic bottle plant.

VI. Local Solvents:

Five types of solvents have been tested for their use in formulations by Kemira Oy on contract from UNIDO. In this interim report the company has prepared a set of recipes and the field tests can be commenced. The Petrochemical Industries Corporation has provided additional information on solvents. "Mann reformate" (from the Mann Refinery) can be delivered in required volumes (500,000 litres p.a.). The specifications are as follows:

BF-90-210

Flash point: about 10 °C
Contents of aromatics: 70 % (vol)
Contents of Xylene: about 20 %
Specific gravity: 0,82

It would be adviseable for the plant to have its own road-tanker to guarantee twice-weekly delivery of 7,000 litres each (14,000 litres per week). The capacity of the storage tank at the plant was suggested to be of 50,000 litres. (See IV/5).

For new compounds coming up in the future trials with the local solvents must be done by the chemists in the laboratories. Two new solvents were offered, see Annex 5, which have to be tested as soon as the laboratory has opened.

The raised question about the flash point is not so important as the electrical installations must be built in an explosion proof quality like all installations.

VII. Safety Aspects:

The security is most important in a plant which works with pesticides and solvents. Exact cleanliness, carefullness and training of the personnel are absolute necessary.
As already mentioned all equipment have to be made in explosion proof quality. The Filling machine is to handle pneumatical.

As I have learnt during my conferences with the responsible employees for the formulation plant they were already trained and educated for their job and they are in the position indeed to run a plant like this.

VIII. Cost/Benefit Analysis:

1. Fixed costs:

a) building and local equipment
paid by the government of Burma

approx. costs: US $ 2,000,000 (local currency)

b) plant equipment, laboratory and power supply equipment
paid by UNDP

estimated costs: US $ 1,500,000

Total costs: US $ 3,500,000

2. Manufacturing costs, running the plant with a max. capacity of approx. 1,000,000 litres
paid by the Government of Burma

a) Employees renumeration/year

74 persons (in my opinion 24 persons too many!)

US $ 85,000

b) Power and electricity US $ 20,000

c) Repair and Maintenance (1 % of fixed costs) US $ 35,000

d) Depreciation (10 % of fixed costs) US $ 350,000

Total: US $ 490,000

3.

Active Ingredient	%	Price/kg US $
Diazinon	98	8.00
Fenitrotion	96	6.00
Fenvalerate	94	60.00
Dimethoate	94	4.50
Cypermethrin	93	59.00
Phentoate		
EPN		

These prices are average prices!

4. a) The prices of the most usual emulsifiers fluctuate between 1.80 US $ and 4.20 US $. In my study I worked with an average price of 3.00 US $.

b) Price of Xylene on the world-market is about 0.80 US $/l

c) Price of Cyclohexanon is about 1.50 US $/l

d) Price of Rheoplast is about US $ 2.50. (Stabilizer)/kg

5. Results documented on 4 different products:

a) Sumithion 50 EC

b) Sumicidin 5 EC

c) Diazinon 40 EC

d) Sumicidin 2,5 ULV

The composition of these products is a common one and can be made with the local solvents. Active ingredient and emulsifiers have to be bought from abroad in foreign currency

f.c. = foreign currency (US $)
l.c. = local currency in US $ (1 US $ = 7 Kyats)

a) Sumithion 50 EC

Costs of 1 l local formulation in US $:

Fenitrothion	3,12	f.c.
Emulsifier	0,30	f.c.
Solvent	0,20	l.c.
Total raw-materials	3,62	l.c.
" packaging	0,70	l.c.
" working-hours	0,50	l.c.

Total price for 1 l own formulation: 4.82 US $
Price for 1 l manufactured product from abroad: 8.07 US $

The part on foreign currency in local formulation is 3.42 US $ that means the government

saves 57,6 % foreign currency

Purchase quantity 1986/87: 80,712 l
Price of imported product: 8.07 = 651,345 US $
Price of local formulated product: 4.82 = 274,561 US $

Sales price 1986/87: 1 l = 7.1 US $.

With the imported products this results in a loss of 78,290 US $
With the local formulated products this results in a profit of 298,494 US $.

b) Sumicidin 5 EC

Costs of 1 l local formulation in US $:

Fenvalerate 50 g	3.19	f.c.
Emulsifier	0.30	f.c.
Solvent	0.43	l.c.
Total raw-materials	3.92	l.c.
" packaging	0.70	l.c.
" working-hours	0.50	l.c.

Total price for 1 l own formulation: 5.12 US $

Total price for 1 l manufactured price from abroad: 10.80 US $

In this case the government

saves 67,6 % foreign currency

Purchase quantity 1986/87: 56,500 l

Price of imported product: 10.80 = 610,200 US $

Price of local formulated product: 5.12 = 289,280 US $

Sales price 1986/87: 1 l = 9.80 US $

With the imported products this results in a loss of 56,500 US $

With the local formulated product this results in a profit of 264,420 US $

c) Diazinon 40 EC

Costs of 1 l local formulation in US $:

Diazinon A.I. 98 %	3.26	f.c.
Emulsifier	0.18	f.c.
Solvent	0.26	l.c.
Total raw- aterials	3.70	l.c.
" packaging	0.70	l.c.
" working-hours	0.50	l.c.

Total price for 1 l own formulation: 4.90 US $

Price for 1 l manufactured product from abroad: 7.03 US $

In this case the government

saves 51 % foreign currency

Purchase quantity 1986/87 56,033 l

Price of imported product: 7.03 = 393,912.—

Price of local formulated product: 4.40 = 274,561.—

Sales price 1986/87: 1 l = 4.90 US $

With the imported products this results in a loss of 119,351.— US $
With the local formulated products this results in a profit of at par

d) Sumicidin 2,5 ULV

Costs of 1 l local formulation in US $:

Fenvalerate	1.60	f.c.
Emulsifier	0.60	f.c.
Solvent	0.40	l.c.
Total raw-materials	2.60	l.c.
" packaging	0.70	l.c.
" working-hours	0.50	l.c.

Total price for 1 l own formulation: 3.80 US $

Price for 1 l manufactured product from abroad: 10.40 US $

With this product the government

saves 78,7 % foreign currency

Purchase quantity 1986/87: 10,100 l

Price of imported product: 10.40 = 105,040 US $

Price of local formulated product: 3,80 = 38,380 US $

Sales price 1986/87: 1 l = 6.75 US $

With the imported product this results in a loss of 36,865.— US $

With the local formulated products this results in a profit of 29,795.— US $

From these 4 examples it clearly follows that a local formulation saves more than 50 % of foreign exchange. The saving will be the more the lower will be the active ingredient concentration in ECs, as the part of the solvents will increase. (78,7 % at Sumicidin 2,5 ULV)

This is also the trend with new active ingredients:

Low concentration - high effectivity

and therefore the local formulation will become more and more advantageous.

Not only the saving of foreign exchange is important but also by formulating the products locally you can decrease the price for farmers and nevertheless the Plant Protection Corporation can make profit instead of loss as the figures in the 4 examples shown above.

IX. Acknowledgement

I would like to express my reward to UNDP Field office, Mr. Kevin McGrath and UNIDO, Mr. Jerzy Gorski, who assisted me to succeed the mission in Burma, and UNDP New York, Mr. Holcombe and UNIDO Vienna, Mr. Sugavanam, who supported me with their cooperation.

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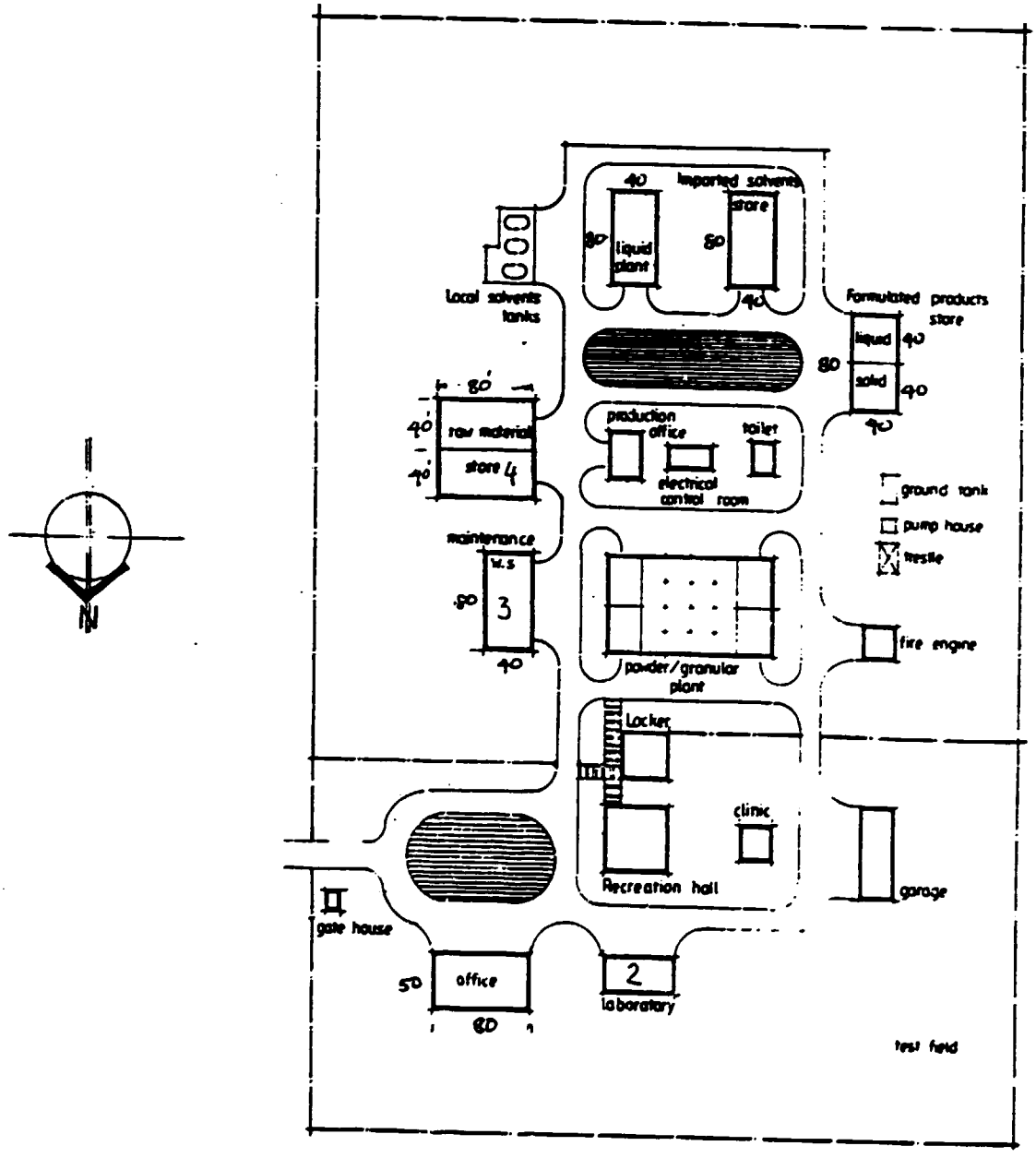
ANNEX 2



APPROVED BY MINISTER ON 6.2.84

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PROJECT PESTICIDES FORMULATION PLANT [Hmawbi]	SCALE 1"=100.0"	DATE 30.12.1983	
	GRP LDR.	STR. CKD.	
TITLE layout plans	CKD. BY	DRN BY	
	DRWG NO. P.F.P / P-1		
ARCHITECT GROUP II Construction Corporation			REGD NO 7387

ANNEX 3

1. PROCEDURES FOR FIELD TRIALS

Pesticides intended for commercial introduction are tried in the field for 3 to 4 crop seasons before recommendation are given for various crop pest control.

2. SEASONAL DEMAND OF PESTICIDES

SUMMER	5%	Most of the imported pesticides are used during monsoon season on rice, cotton, groundnut, sesamum etc.
MONSOON	60%	
WINTER	35%	

ANNEX 4

3. FIELDTRIALS RECORD

SR. NO.	COMMODITY	TEST DATE		NO. OF TESTS	TEST SITE	TEST CROP	TEST AREA
		STARTING	ENDING				
1.	Thiometon EC, ULV	1982	1985	8	Mandalay Pegu, Sagaing Division	Cotton	50 acres each division
2.	Endosulfan EC, ULV	1982	1984	10	-do-	-do-	-do-
3.	Cypermethrin EC, ULV	1981	1984	10	-do-	-do-	-do-
4.	Deltamethrin EC, ULV	1981	1983	6	-do-	-do-	10 acres each division
5.	Fenvalerate EC, ULV	1981	1984	10	-do-	-do-	50 acres each division
6.	Fenitrothion EC, ULV	1981	1983	8	Mandalay Pegu, Sagaing Magwe Division	Paddy, Peanut	10 acres each division
7.	Phenthoate 50 EC/ULV	1981	1983	6	-do-	Paddy	10 acres each division

ANNEX 5

Test result of Mineral Turpentine and Aviation Turbine Fuel

Test	RESULTS	
	ATF ex B.74 drawn on 26-8-86	MT ex C.O.D. drawn on 26-8-86
Sp. Gr. at 60/60°F	.8122	.7970
I.B.P./F.B.P.°C	153/222	153/210
10%	162	162
20%	166	164
30%	170	166
40%	174	168
50%	178	171
60%	183	173
70%	189	176
80%	198	180
90%	207	187
% Vol. recovery 175°C	43	66
" " 200°C	84	98
Flash Point° C	40	39
Aromatic content % Vol.	19	18

ANNEX 6

4. ANNUALLY IMPORTED QUANTITY OF FORMULATED LIQUID PESTICIDES

COMMODITY	A/U	1980/81	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87
ENDRIN 20% EC	1G	80,000	80,000	119,871	49,777	-	-	-
DDT 25% EC	"	31,000	10,790	23,511	4,930	-	-	-
MALATHION 90 EC	"	7,802	60,000	61,915	33,372	-	-	-
ELSAN 50% EC	"	-	5,830	-	3,864	70,000	11,200	11,200
DIAZINON 40% EC/ULV	"	500	4,780	13,737	6,223	22,222	12,342	12,342
DIMECRON 50% EC	"	1,100	9,540	2,000	2,124	-	-	-
EPN 45 EC	"	200	10,890	13,737	2,051	15,800	17,778	17,778
Talex C EC	"	-	1,800	-	-	-	-	-
Sumithion 50 EC	"	-	-	-	4,130	4,444	17,778	17,778
Sumicidin 5% EC	"	-	-	-	-	6,666	12,444	12,444
" 2,5% ULV	"	-	-	-	-	-	2,222	2,222
Cypermethrin	"	-	-	-	-	-	-	-
Deltamethrin	"	-	-	-	-	-	-	-
Thiometen	"	-	-	-	-	-	-	-
Kitazin 48 EC	"	-	-	-	-	-	949	-
Kasumin 2% EC	"	-	-	-	-	-	444	444
Monocrotophos	"	-	-	10,889	11,156	4,444	-	-
Saturnil 60% EC	"	-	-	1,987	253	-	-	-

1.G = Imperial Gallon - 4.54 lt.

ANNEX 7

5. VALUE OF IMPORTED LIQUID PESTICIDES

YEAR (1986-87)

SR NO	COMMODITY	A/U	QUANTITY	UNIT PRICE FOB		TOTAL AMT. (¥) (thousand)
				A/U	AMT Yen	
1.	ELSAN 50% EC	Lit	50,400	Lit	1,260	63,504
2.	DIAZINON 40% EC/ULV	Lit	55,540	Lit	1,150	63,871
3.	EPN 45% EC	Lit	80,000	Lit	1,150	92,000
4	SUMITHION 50% EC	Lit	80,000	Lit	1,320	105,500
5.	SUMICIDIN 5% EC (10%)	Lit	56,000	Lit	1,730	96,880
6.	SUMICIDIN ULV	Lit	10,000	Lit	1,700	17,000
7.	KASUMIN 2% EC	Lit	2,000	Lit	1,370	2,740

Total amount in US$ 2,699,426 (US$ 1 = 163)

ANNEX 8

6. PRICING OF IMPORTED LIQUID PESTICIDE (A/C)
From FOB to Selling Price

SR NO	COMMODITY	A/U	UNIT PRICE FOB (Yen)	A/U	Selling Price Kyats - Pyas
1.	ELSAN 50% EC	Lit	1,260	I.G	193-50
2.	DIAZINON 40% EC	Lit	1,150	I.G	153-70
3.	EPN 45% EC	Lit	1,150	I.G	188-40
4.	SUMITHION 50% EC	Lit	1,320	Lit	49-45
5.	SUMICIDIN 5% EC	Lit	1,730	Lit	68-49
6.	SUMICIDIN ULV	Lit	1,700	Lit	47-26
7.	KASUMIN 2% EC	Lit	1,370		-
	I.G. Imperial Gallon				

ANNEX 9

5. VALUE OF IMPORTED SOLID PESTICIDES

YEAR (1986 - 87)

SR NO	COMMODITY	A/U	QUANTITY	UNIT PRICE FOB		TOTAL AMT (¥) (thousand)
				A/U	AMT YEN	
1.	PADAN 50 S.P.	Kg	4,270	Kg	1,150	4,910
2.	PADAN 4 G	Kg	4,000	Kg	330	1,320
3.	KITAZIN 17 G	Kg	4,270	Kg	480	2,049
4.	TOPSIN 70 W.P.	Kg	8,540	Kg	2,100	17.934
5.	LABILITE 70 W.P.	Kg	8,512	Kg	2,100	17,875
6.	HOMAI 80 W.P.	Kg	2,580	Kg	2,000	5,160
7.	DACONIL 75 W.P.	Kg	5,000	Kg	1,831	9,155

ANNEX 10

6. PRICING OF IMPORTED SOLID PESTICIDE

From FOB to Selling Price

SR NO	COMMODITY	A/U	UNIT PRICE FOB (Yen)	A/U	Selling Price	
					Kyats	Pyas
1.	PADAN 50 S.P.	Kg	1,150	Kg	-	-
2.	PADAN 4 G	Kg	330	Kg	-	-
3.	KITAZIN 17 G	Kg	480	Kg	-	-
4.	TOPSIN 70 W.P	Kg	2,100	Kg	-	-
5.	LABILITE 70 W.P.	Kg	2,100	Kg	-	-
6.	HOMAI 80 W.P.	Kg	2,000	Kg	-	-
7.	DACONIM 75 W.P	Kg	1,831	Kg	43	04

(-) Price to be fixed.

ANNEX 11

Pertinent Documents

Establishment of a Pilot Plant For Pesticde Formulation.

Terminal Report. I. Bendefy

UNIDO. Vienna 18 July 1984 .

Terms of Reference For Contractor Services to Plan.

Design, Engineer and Establish A Pilot Plant

For Pesticide Formulation At Hmawbi, Near Rangoon,

Socialist Republic of the Union of Burma

DP/BUR/80/011 October. 1984.

Formulation of Pesticides In Developing Countries

UNIDO, Vienna, United Nations, NY. 1983.

International Code of Conduct on the Distribution and Use

of Pesticides Conference, FAO. Rome. 9-28 November 1985.

Establishment of a Pilot Plant for Pesticide Formulation

BUR/80/011/A/01/37 3 March 1983.

Report of Evaluation Mission to Clarify

The Agricultural and Medical

Needs For Pesticides In Burma

by

E.H. Smith

December 1985

ANNEX 12

PRICES OF LOCAL SOLVENTS

Sr. No.	Commodity	Price/Gallon	Remarks
1.	SBP Solvent 62/82	K. 2.40	
2.	SBP Solvent 50/135	K. 3.15	
3.	Superior Kerosene	K. 2.50	
4.	Naphtha	K. 3.60	
5.	Mann Reforamate	K. 3.50	
6.	Mineral Turpentine	K. 0.90	
7.	Aviation Turbine Fuel	K. 3.00	

ANNEX 13

CHEMICAL NAMES FOR PESTICIDES USED IN BURMA

Trade Name	Technical Name	Chemical Name
Daconil	Chlorothalonil	Tetrachloroisophthalonitrile
	Diazinon	O,O-Deithyl-O-(2-isopropyl)-4-methyl-6-pyrimidinyl-phosphorothioate
Elsan	Phenthoate	O,O-Dimethyl-S-(α-ethoxy carbonylbenzyl)-phosphorodithioate
EPN	EPN	O,Ethyl-O-(4-nitrophenyl)-phenylphosphonothioate
Homai	Thiram and Thiophanate methyl (mixture)	-
Kasumin	Kasugamycin	Carbohydrate derivative
	Kitazin	O,O-Diisopropyl-S-benzyl-thiophosphate
Labilite	Maneb and Thiophanate-methyl (mixture)	-
Sumicidin	Fenvalerate	α- cyano-3-phenoxybenzyl-2- (4-chlorophenyl)-3- methylbutyrate
Sumithion	Fenitrothion	O,C-Dimethyl-O-(3methyl-4-nitrophenyl) phosphorothioate.