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FEASIBILITY STUDY ON THE ESTABLISHMENT OF A  
PESTICIDES FORMULATION PLANT IN JORDAN \*  
(TS/JOR/77/001).

Report on mission to Hashemite Kingdom of Jordan  
21 October 1977 - 7 January 1978

by

Christopher Maltby  
UNIDO Expert

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### INTRODUCTION

His Royal Highness Prince Hassan asked UNIDO during his visit to Vienna in April 1977 that the feasibility study on the establishment of a pesticide formulation plant in Jordan, undertaken in 1974, by Dr. O. Zeiser (IS/JOR/73/017/11-01/05) be updated.

Dr. O. Zeiser and the writer commenced this Project (TS/JOR/77/001/11-01/32.1.0) in October 1977 to update the previous study.

Dr. Zeiser completed the chemical and engineering aspects of this study in his draft report dated 3rd November 1977 (TS/JOR/77/001/11-02/32.1.0).

The purpose of the Project, which is the subject of this report and the writer's duties, are noted in Section 7.1.

The writer and his counterpart visited Damascus (10th - 15th December 1977) to assess the pesticide use in Syria, Syrian interest in a joint Jordanian - Syrian pesticide formulation project and the export potential there for the products from a Jordanian plant.

Dr. O. Zeiser undertook a feasibility study on the establishment of a pesticide formulation plant in Syria, in 1975 (IS/SYR/72/819/11-01/05).

2. SUMMARY

The erection of a pesticide formulation plant in Jordan is proposed following a market study in Jordan and a brief visit to Syria.

A plant designed to supply the Jordanian agricultural pesticides market alone is unlikely to yield a reasonable return on capital investment.

For this reason, export markets are desirable and Syria has been proposed as top priority.

Two alternative projects are considered in this report, one assuming Syrian investment, and the second assuming no investment by Syria but that exports are made to Syria from the Jordanian plant.

The estimated capital cost of a 1000 ton multi-purpose formulation plant plus a 3000 ton dueting sulphur plant, in 1977, is \$1,070,000.

Both projects are forecast to yield profits from the first year, and provide a substantial return on investment.



### 3. PESTICIDE USE

#### 3.1. PESTICIDE USE IN JORDAN

The annual average agricultural income during 1972/75 was JD 26.4 million, which represented 12% of Gross Domestic Product. 18% of the total labour force was employed in agriculture. The Five Year Plan 1976 - 80 noted that agricultural production is conducted by the private sector. It had been hoped to include data on the West Bank because it is a part of the HASHEMITE Kingdom of Jordan, but owing to the lack of statistics and other information, it is regretted that this report has been restricted to the East Bank. Nevertheless, it is reported by the private sector that the use of agricultural pesticides on the West Bank is of a similar volume to that used on the East Bank. This view is considered realistic in view of the substantial area of citrus on the West Bank which receives intensive pesticide treatment.

##### 3.1.1. CURRENT AND FORECAST USE

The documented volume and value of agricultural pesticide imports are listed in Section 7.3 and summarised in 7.4. It can be seen that in 1977:

- the imported volume had risen from 152 tons in 1975 to 1980 tons including 1500 tons dusting Sulphur
- the value of imports had risen from US\$ 757,000 in 1975 to US\$ 1.61 million

The Trade Statistics show imports under Tarif item 38-11 (formulated pesticides and disinfectants) as:

- 621.49 tons valued at JD 595574 (US\$ 1,787 million) in 1975
- 663.98 tons valued at JD 657,637 (US\$ 1.97 million) in 1976

Insecticides in retail packs for domestic use are included in these latter figures and account for the higher values. One merchant in the private sector reported his sales of domestic insecticides at 45,000 litres.

The present situation regarding the import and sale of dusting Sulphur for agriculture is outlined in Section 7.5. This product accounts for 75% of the volume of agricultural pesticides, and is:

- easily applied, by shaking it from the bag over a crop
- mainly used on tomatoes and cucumbers
- useful in the uplands, where water is restricted
- considered to stimulate plant growth by the farmers, as well as control mildew and mites.

Important pests and pesticides in use are noted in Section 7.7.  
It is reported that:

- other than dusting Sulphur, 90% of agricultural pesticides are used in the Jordan Valley and Southern Ghors, of which 60% is applied in the Middle Ghor and that 75% of all agricultural pesticides are used in vegetable crops
- 90% of the total volume of pesticides are sold in one kg/litre containers, excluding dusting Sulphur which is retailed in 50 kg bags.
- the facilities of the Ministry of Agriculture include two Research stations in the uplands and three in the Jordan Valley, and 58 Extension officers in the uplands and 27 in the Jordan Valley who are directed by 9 District Agricultural Officers and advised on pesticides by centrally based experts.

The chief constraints on the use of pesticides are reported to be the shortage of land, water and equipment. While plans exist to increase the irrigation facilities, a definite reluctance by the farmers exists to the purchase of application equipment. Equipment suppliers report that machines are freely available for sale but that only some 4000 hand sprayers/dusters and 100 motorised sprayers/dusters are in use, in addition to the machines operated by the Ministry, mainly in citrus, at the comparatively low cost to the farmer of JD  $\frac{1}{2}$  per dunum or per hour. A substantial expansion of the Ministry's equipment facilities would increase the use of pesticides.

It is reported frequently that the use of pesticides at present is no more than 10% of the optimum. It is argued no less frequently that the return the farmer secures for his crop is usually neither reasonable nor secure, and that while legislation seeks to protect the consumer's interest by fixed retail prices and banning exports of primary agricultural produce, that farmers are dependent upon their own ingenuity.

The use of pesticides in agriculture, and any realistic forecast of use, is dependent upon the actual/planned return the farmer obtains for his crop, in any free economy, and in centrally planned economies where private farmers exist, except where other constraints exist, for example:

- in Poland where farmers not using the recommended pesticides risk a heavy fine and imprisonment
- in Colombia where the use of pesticides recommended by qualified agriculturalists, permits special loans to the farmer at 4% annual interest, as opposed to the farmer borrowing money at more than 20% interest to buy pesticides of his own choice

Many countries legislate for an agricultural marketing policy including a support for the farmers on price and/or volume on many crops. The actual return that the farmer receives for his crop, may be added the constraints on the use of pesticides. It is planned and hoped, that the Jordan Valley Farmers Association (see Section 7.8) will be able to improve the return that the farmer secures for the crops that he grows.

Caterpillars, mites and mildew in vegetables are the most important pests, and the pesticides used to prevent/control them are used in greatest volume. There are now 5000 dunums plastic houses and 7000 dunums plastic tunnels in the Jordan Valley in which vegetables are grown, with a substantial increase forecast. In the conditions under plastic, pests multiply faster, develop resistance more swiftly and require more frequent pesticide applications. Speciality (new and patented) pesticides are preferred to commodity (older, non-patented or patent lapsed) pesticides under these conditions, although resistance is already noted to LANNATE (a comparatively new compound) by caterpillars in some areas.

The comparatively high prices of agricultural pesticides are reported as a constraint on use. High prices appear to be due, inter alia, to:

- shortage of supply, particularly during periods of high pest incidence. This is due in part to the reluctance of importers to purchase large volumes which they may have in stock for long periods incurring high finance charges. Such shortages are remedied sometimes by airfreight purchases with the attendant costs passed on to the farmer in higher prices.
- the natural acquisitiveness of importers/distributors and dealers to exploit market pressures which are advantageous to them

It is considered very doubtful that pesticide use would double if prices were halved, in the present circumstances.

Farmers change from using one pesticide to another only slowly after comparison of effect and price.

The Ministry of Health and Municipalities buy and use pesticides as follows:

- the Malaria Section procures insecticides either free or at a very advantageous price from W.H.O. agencies
- the Environmental Sanitation Department advises Municipalities on appropriate insecticides, but only buys insecticides for the smaller townships. They possess application equipment
- the larger Municipalities, especially Amman, ZIRKA and IRBID tender for their own insecticide requirements and apply the products with their own machines and staff. Their major pest problems are flies, mosquitoes and rats

The Five Year Plan 1976 - 80 forecasts a 40% production increase relative to 1975, or some 7% increase annually.

The planned increase in cropped areas, cropping intensity and irrigation, particularly in the Jordan Valley, is noted in Section 7.6. Any increase in the area of vegetables grown under plastic will influence a greater volume of pesticide use, because whereas vegetables grown in the Jordan Valley normally receive a pesticide treatment once every ten days on average:

- vegetables grown in plastic tunnels are treated every seven days
- vegetables grown in plastic houses receive an application every three days

In assessing the balance between the several factors influencing the volume use of agricultural pesticides within the frame of the potential crop growing land on the East Bank and the attendant plans for an increase in the irrigated areas, it is forecast that the volume use of known formulated agricultural pesticides will increase 15% annually up to 1985. This forecast includes only a 5% annual increase in use of those pesticides known in 1977 as commodities (unpatented or patent lapsed compounds).

The use of insecticides for public health by the Ministry of Health and the Municipalities is forecast to remain static in volume, but the use of rodenticide baits is forecast to increase four fold by 1982.

### 3.1.2. REGULATIONS

Agricultural pesticides must be registered with the Plant Protection Department prior to importation and sale. Certificates of origin, free sale, use and registration in the country of origin, and of analysis, are required. Should the pesticide formulation project be implemented in Jordan, some amendment to this regulation is necessary to enable locally formulated products to comply with the law.

A pesticide registration may be withdrawn at any time, if new data becomes available which implies inherent risks in continued use.

No proof of local biological efficacy is required for registration, indeed, while some field work is undertaken by the Research Department in the Ministry, there is insufficient staff and equipment to conduct the valuable local proving of a pesticide and the comparison of cost/benefits of pesticides, both commodities and specialities, recommended for the control of the same pests. Perhaps help on this important aspect might be possible from the University.

It is proposed that the importation and sale of dusting Sulphur for agriculture be brought under the control of the Ministry of Agriculture, in addition to that of the Ministry of the Interior as at present, for both reasons of safety and of ensuring that only products of quality are sold and used.

There appears to be no law for the control of importation and sale of domestic insecticides for retail sale to the public. The Pharmacy Department of the Ministry of Health advises the appropriate tariff number to Customs, but have no legal force to approve, question or forbid any such imports, neither at present do the Ministry of Agriculture. At worst therefore, there appears to be no means of prohibiting the importation and sale of aerosols or domestic retail packs containing highly toxic and dangerous insecticides. It is proposed that all pesticides, agricultural and

domestic, be registered with the Ministry of Agriculture, prior to importation and sale. Alternatively, control of domestic insecticides could be undertaken, by law, by the Department of Preventive Medicine in the Ministry of Health.

In countries with generous facilities and the advantages of an abundance of qualified personnel, all pesticides must be registered, with clearance from the Ministry of Health on grounds of toxicology and from the Ministry of Agriculture for biological efficacy.

While the Ministry of Agriculture operates a control over the private importers purchases and sales of agricultural pesticides other than dusting Sulphur, there are a variety of organisations, who have special dispensation to import, sell and use pesticides without recourse to the Ministry of Agriculture, including:

- Municipalities, who obtain approval from the Prime Minister's Office
- the Jordan Cooperative Organisation, and recently the Jordan Valley Farmers Association
- the Ministry of Health
- importers of domestic pesticides
- importers of dusting Sulphur

It is proposed that this situation be corrected and that the Ministry of Agriculture be responsible by law for the import and sale of all pesticides, and they include all such imports from all sources in their currently well maintained register. It is suggested that this action be taken prior to the operation of any local pesticide formulation plant.

Two laws exist which are difficult for the Ministry of Agriculture to implement without more staff, which are:

- price control of pesticides is designed to limit the selling price to the dealers by the importers of their delivered cost plus 20%, and the selling price to the farmers at maximum the dealers purchase price plus 10%
- before buying and using any pesticide farmers must obtain a prescription from their local agricultural Extension officer

It is anticipated that more extensive implementation of both regulations will assist the operation of a local pesticide formulation plant. An excellent price control model exists in Jordan, operated by the Technical Committee for the Control of Drugs at the Ministry of Health. This committee study also the prices in neighbouring countries.

Legislation provides that all traders, both importers/distributors and dealers in pesticides, be registered with both the Ministry of Agriculture and the Police. It is desirable that this law be enforced prior to the operation of a local pesticide formulation plant.

### 3.1.3. DISTRIBUTION

All agricultural pesticides are imported as ready formulated products, almost entirely by private importers, except for the small volume of dusting Sulphur ground at Menahia.

There are 15 private importers/distributors, of which 7 companies are important. In total these distributors employ more than 35 agriculturalists who promote their products directly to farmers and to dealers, conducting field tests and product demonstrations and exerting sales pressure on farmers and dealers to buy their products. The main sales pressure is exerted on the more profitable exclusive branded speciality products by each distributor, since normally these specialities can be obtained only from the one distributor. There appears to be no exchange or sale of products between local distributors.

All distributors sell to both dealers and to large farmers. The main exception is SUKHTIAN who concentrates upon sales directly to farmers. This marketing philosophy probably stems from their consumer product experience, and indeed the dealers undertake no sales promotion to the farmers and stock only those products which the farmer buys, which are established by the sales promotion of the distributors sales staff as well as the farmers experience.

All distributors sell their products through the same 50 dealers, of which:

- 10 are Cooperatives, which are strong in the North, but weak in the Valley where they may be replaced by the legislatively strengthened Jordan Valley Farmers Association

- 15 are commission agents, many of whom deal in agricultural produce, sometimes on a contra account basis, and are a valuable source of credit to the farmers
- 25 private dealers, mainly in the Jordan Valley

Eight pesticide stores owned by dealers and distributors are situated close to the fruit and vegetable market in Amman where farmers are frequent visitors.

Pesticides are distributed normally through a two step system:

- importers of formulated products distribute to dealers, adding 10% upwards to their delivered cost to strike the selling price to the dealer, and an additional 11% to strike the recommended retail price to the farmer
- the dealers resell to the farmers, either at the recommended retail price which allows them a 10% margin, or they set their own farmer selling price at will. Dealers may gross less than 10% on a cash sale, and normally nearer 15% on a credit sale

Section 7.3 lists:

- CIF purchase prices, which for the same active ingredient may considerably vary
- selling prices to dealers and farmers, where available

There is substantial difference in the cost and selling price of products between different sized packings, which has led several importers to consider seriously the profit to be obtained from local repacking.

The Jordan Cooperative Organisation, comprising 115 voluntary agricultural Societies with 11,500 farmer members hold near to 40% of all pesticide sales to farmers, import to their own account and buy from local importers at dealer price less 5%.

The normal delivery time from placing an order with a foreign company is six weeks, or eight weeks at maximum.

The normal pattern of pesticide sales to the farmer is:

- 15% in the first quarter of the year
- 50% in the second quarter



- 10% in the third, and 25% in the fourth quarter of the year

Distributors plan to deliver products up to a month before the dealer sells them to the farmer.

Normally advertising is not used to promote agricultural pesticides in Jordan. The most important methods of sales promotion are:

- field trials and demonstrations
- verbal selling

The delivered cost of pesticides in Amman is normally calculated as C+F AQABA price plus 8%, when packed in larger than 16 oz containers. Details of the taxes, charges and freight rates are shown in Section 7.9.

#### 3.1.4. PROJECTED SALES

The forecast sales in Jordan, if profitable, are shown in Section 7.10. These forecasts assume:

- Jordanian farmers will accept locally formulated commodity pesticides only slowly, and therefore sales in the first year are forecast at 10% of the market, 50% in the second year, and finally 100% in the third year assuming the products are of the highest quality
- the earliest a plant could be on stream, assuming an immediate decision is taken, is 1979. Thus year 1 is 1979 and Year 7 is 1985 in these forecasts.
- it is preferable to undertake one operation at a time and perfect it, so that commodities are formulated first, and after two years of experience specialities are formulated. There may be some companies who are unwilling to permit local formulation of their specialities, therefore only 80% of total sales are forecast at maximum. Thus in the first year of formulating specialities, 10% sales are forecast, 40% in the second, rising to 80% in the third year.
- that there are two exceptions to the timing of product acceptance outlined above, dusting Sulphur and rodenticide bait. The acceptance of dusting Sulphur and its biological effectiveness depends upon its physical and chemical characteristics, and providing that suitable rock/lump Sulphur is used and milled so that all dust passes through

a 325 mesh sieve. There is no reason why it should not be immediately accepted by both the Cooperative and private traders to replace imports. Similarly it is proposed to substitute 0.005% WARFARIN bait for the imported speciality used now, and no reason is known why it should not be at least as effective. It will be necessary to select the most appropriate bait mixtures during field tests, which could be undertaken by the Municipality of Amman. Bait shyness can be mistaken for rodent resistance to a particular rodenticide. There is no reason why the locally produced bait based on warfarin should not replace the imported material in the first year.

- that half the Sulphur dust will be sold at \$115 ton C+F Amman to compete with Kuwaiti material, and half the tonnage at \$131 ton to compete with the Lebanese product, hence the median price of \$123 ton C+F.
- Copper oxychloride 50WP tends to be phytotoxic, hence a mixture with Zineb (Sandoz MILTOX) is selected
- that although DICOFOL (KELTHANE) is selected as an acaricide, a mixture with TETRADIFON may be preferable since it would confer both adulticide and ovicidal activity
- although up to 80 tons Sulphur 80 WP is used in Jordan, it would not be possible to micronise such a product on the plant specified, and the addition of an air mill would increase the plant cost substantially. A non-micronised 80 WP would compare unfavourably with the imported products, therefore this product is not included in the local formulation programme.
- that although there are many differing views as to which products should be formulated, a list is specified here in order to specify the plant, raw materials and costings. A minimum of product substitution is implied in this product list, while some will object to the inclusion of Diazinon and Parathion on grounds of toxicity, the Municipalities indicate preference for Diazinon for fly control.
- all products are in 1 kg/litre packings, except Sulphur

3.1.5. EXPORT SALES

One visit was made to Syria and data on that pesticide market is given in Section 3.2. Sales to Syria from the Jordanian plant are forecast on two bases:

- if Syria invests in the Jordanian project, sales are forecast in Section 8.8
- should Syria make no such investment, neither operate a pesticide formulation in Syria, export sales to Syria are forecast at half those listed in Section 8.8

In the absence of visits to other potential export markets, no reliable information has been obtained, nor can any realistic export sales forecasts be made.

It is reported that:

The Under Secretary  
Ministry of Agriculture and Fisheries  
P.O.B. 1509 DUBAI U.A.E.

issues a tender each January for pesticide requirements which for 1977 included:

- 7 tons NUVACRON 40 SCW
- 6 tons LANNATE 90 WP
- 5 tons TAMARON 60 EC
- 6 tons DIMETHOATE 40 EC
- 10 tons D.D.V.P. 50 EC
- 4 tons KELTHANE 42 EC
- 3 tons AFUGAN/SAPROL
- 10 tons B.H.C. dust 2.6% g.i.
- 3 tons MANEB 80W

Other relevant points regarding the export market include:

- the use of pesticides in Iraq is of a similar volume to that in Syria, and no local formulation plant is known except the Sulphur mill
- Agricultural Materials Company, with head office in Damascus, in addition to their activity in Jordan, have sales offices in Iraq, Saudi Arabia, Arabian

Gulf Territories, Lebanon and Libya, enjoyed sales of US\$ 7.5 million in 1975 and in principle are interested in buying formulated pesticides from Jordan for export

- JORDAN OBEGI have sales associates in export markets and indicated a possible interest in purchasing for export, although no details were available, and they operate a formulation plant in Bisrut
- the Arab Pharmaceutical Manufacturing Company at Salt reported having made an investigation in the Sudan, with favourable results. However, caution is advised on including sales to the Sudan in any financial budgets, since any change in the purchasing pattern of the Sudan OBEIMA Board for the substantial volume of cotton insecticides will be slow and cautious
- SUDANIAN have offices in Saudi Arabia and the on the West Bank

### 3.2. PESTICIDE USE IN SYRIA

The writer and his Jordanian counterpart visited Damascus at the request of the Jordanian Ministry of Industry to investigate:

- Syrian Government interest or otherwise, in investing with Jordan in a joint pesticide formulation plant in Jordan;
- the use of agricultural pesticides in Syria, and the potential market in Syria as an export market for a Jordanian pesticide formulation plant.

#### 3.2.1 Background to date

The present Prime Minister of Syria aroused interest in the erection of a pesticide plant in Syria in 1971.

In 1972 UNIDO is reported to have offered Syrian £  $\frac{1}{2}$  million towards such a project. This offer lapsed subsequently.

In 1975 Dr. O. Zeiser UNIDO expert undertook a mission on pesticides and wrote a report.

UNDP Damascus report that no official answer has been received from the Syrian authorities regarding their interest in a local plant, and that such a project is not included in their now current budget.

It is not entirely clear which Syrian Ministry may become responsible for a pesticide project, but probably one of:

- the Ministry of Agriculture, who indicated that:
  - should the Jordanian pesticide formulation plant be feasible the Syrian Government would consider a joint investment;
  - although it was planned to eliminate the private sector they fulfilled a useful function at present and would be permitted to invest in a joint venture;
  - the Syrian Government would buy pesticides formulated in Jordan provided the quality was high and prices competitive, on T.A.F.C.O. tenders;

- probably the Arab Union Organisation would be the executing agency.
  
- the State Planning Commission, who reported that:
  - a pesticide formulation plant in Syria was included in the current 5 Year Plan;
  - the Arab Union Organisation had expressed interest in the local pesticide plant and may undertake a further feasibility study;
  - the Director of Industrial Planning indicates consideration would be given to investment jointly with Jordan in a feasible project at the Syria-Jordan Joint Economic Committee, and willingness to purchase Jordanian pesticides of high quality and competitive price on government tenders.
  
- Arab Union Organization for Agricultural Development (A.U.O.) (see Section 8.7) reported:
  - the State Planning Commission had agreed that they would be the executing agency for a Syrian pesticide formulation plant, and in their letter of 15th February 1977 had expressed pleasure that the A.U.O. would continue the study, and that they would give technical and official assistance;
  - they have asked the State Planning Commission to request UNEP/UNIDO for an expert to up-date the 1975 Syrian feasibility study, and to provide financial assistance if the project is found to be viable;
  - that the original idea was for a plant in Syria, but should there also be a plant in Jordan, that the two plants should be complimentary;
  - that if Jordan sought a Syrian partner for the Jordanian plant, they would be that partner, and not precisely the Syrian Government;
  - that no further work has been done on the local pesticide project since the UNIDO 1975 report.

It is suggested that, if the Government of Jordan decide to erect a pesticide formulation plant in Jordan, and consider the project at the Joint Industrial Collaboration Committee with Syria, that:

- the support of the Syrian Prime Minister is sought for a joint project;
- although the present volume of pesticides used in Syria is greater than that in Jordan, that faster progress may be made on a plant in Jordan and its attendant requirements.

### 3.2.2 Current and Forecast Use

The important crops, pests and pesticides are listed in Section 8.2.

The pesticide treatments planned by the Ministry of Agriculture and Agrarian Reform for the two agricultural years 1976/77 and 1977/78 are shown in Section 8.3.

The volume and C + F value of pesticides purchases on tender, by the Foreign Trade Organisation for Foodstuffs and Chemicals (T.A.F.C.O.), reporting to the Ministry of Economy and Foreign Trade, in 1976 and 1977 are shown in Sections 8.5 and 8.6 respectively.

Section 8.4 lists the estimated 1975 imports by both T.A.F.C.O. and the private sector, the estimated volume sales to farmers in 1976 by Government and the private sector, as well as the active government selling prices to farmers in 1977.

Syrian 1975 import statistics for Tarrif item 38-11 (formulated pesticides and disinfectants) show:

<u>Use</u>	<u>Volume-tons</u>	<u>C+F value SE millions</u>
Agriculture	1604	15.040
Animals	44	0.633
Domestic-bulk	67	0.765
Domestic-retail	295	1.457
Others	54	0.906

Actual use of pesticides in the field depends, inter alia, upon the level of pest incidence, which in Syria in 1976 was low.

It can be seen from Sections 8.4, 8.5 and 8.6 that:

- estimates sales to farmers in 1976 were 766 tons (including 224 tons sulphur dust) by government plus 2117 tons (including 1530 tons sulphur dust) by the private sector, totalling 2883 tons.
- government tender purchases in 1976 totalled 1671 tons (including 150 tons sulphur dust), and due inter alia to a low pest incidence substantial stocks were carried into 1977 when only 381 tons (including 100 tons sulphur dust) was purchased on tender.

The current 5 Year Plan Forecasts an annual 8 - 10% increase in agricultural production.

The Ministry of Agriculture's plan for pesticide treatment indicates little change between 1976/77 and 1977/78, as shown in Section 9.3.

It is considered incautious to forecast more than 10% per annum increase in volume use of pesticides up to 1985, with the growth in use of commodity pesticides being limited to 5% per annum.

### 3.2.3 Regulations

Pesticides must be registered with the Ministry of Agriculture before sales can be made. Registration requirements are similar to those in Jordan.

The Ministry of Economy issues the necessary import licences for pesticides. When stocks are high and/or when foreign exchange is limited, no import licences are issued for some months.

A strict price control is enforced on the private sector which permits that the farmer buy at no higher than the importers delivered cost in store plus 34%.



Prospective suppliers to T.A.F.C.O. must submit a 2% Bid Bond when quoting on tenders, which upon purchase confirmation must be replaced with a 10% (of the value of the goods) Performance Bond valid until three months after delivery of goods.

Duty of 1% ad valorem is paid on the C and F value of pesticides plus 6% taxes. A unified customs tariff agreement exists between Syria and Jordan, thus no duty would be levied on Jordanian pesticides. It is not clear whether Syrian taxes would be levied on pesticides imported from Jordan, but the situation is probably negotiable.

#### 3.2.4 Distribution

All agricultural pesticides are imported as ready formulated products.

Members of the private sector have:

- mixed a Carbaryl formulation with local clay, packed and sold it for cockroach control, but this activity has ceased;
- mixed up to 200 tons cotton dust per annum, but the Ministry for Agriculture enforced a stop on this activity;
- repacked an iron suspension for use in citrus, into small containers;
- requested an industrial licence to mill lump sulphur locally to produce sulphur dust. Such applications have been refused on the grounds that a mill exists at the HOMS Refinery, and plans exist to operate it when the sulphur extraction unit operates nearer capacity.

Importation and distribution of pesticides is undertaken by both:

- the public sector, where the Ministry of Agriculture specifies the products for use, T.A.F.C.O. issues the tenders, and the Agricultural Bank:

- pays for the imports;
- distributes the products through their stores;
- adds 5 - 10% to their delivered store cost to strike the farmer price;
- concentrates distribution of pesticides to cotton, olive, wheat and sugar beet growers, where they hold some 80% market share;
- the private sector where the important companies number six, who:
  - are permitted to sell to private dealers at delivered cost plus 24%, and direct to farmers at delivered cost plus 34%;
  - concentrate distribution to vegetable and fruit growers, and who, between all distributors hold 85% of the pesticide market in these crops;
  - represent the major international pesticide companies.

The Tobacco Monopoly import Zineb fungicide for tobacco growers. Delivered cost in store at Damascus or Aleppo is calculated as C and F LATAKIA plus 10%, which comprises:

- 1% customs duty
- 6% taxes
- 1% insurance
- 1% clearing charges
- 1% inland freight.

Inland freight from Latakia (where more than 80% of products are imported) is currently:

- SF 55 per ton to Damascus
- SF 35 per ton to Aleppo.

Should the Syrian Government decide to invest in the Jordanian pesticide formulation project, it is anticipated that the project will sell directly to the Government tendering authority, regardless of whether any members of the Syrian private sector also invest in the project.

If the Syrian Government decides against investment in the project, and regardless of whether the Syrian private sector invests, it is suggested that the project seeks to sell products to all the important private importers at prices competitive to those at which they now buy. Some pressure can be expected from the important private importers for exclusive distribution arrangements for both the Public and Private Sectors, but this should be restricted at least to a product by product basis. MIQDADI and TARABEIN specified their interest in purchasing only on an exclusive basis. AL-CHAHBA and CHACCOUR made no such condition. AL-CHAHBA's interest is limited probably due to their association with the ADONIS Company. Beirut which has recently started formulating pesticides, which is partly financed by OBEGI, as is AL-CHAHBA.

At the outset the project will sell directly to Syrian buyers. After two years of successful operation consideration may be given to opening a store in Syria from which Syrian buyers may draw their requirements at short notice.

### 3.2.5 Projected Sales

The forecast sales in Syria, if profitable, are shown in Section 8.8. These forecasts assume:

- Syria invests in the Jordanian project. Should Syria make no such investment, exports to Syria are forecast to take no more than half these forecast in Section 8.8 providing no local formulation plant commences operation in Syria;
- sales can be made to both public and private sectors, and that local circumstances continue unchanged;

- the public sector continues to purchase 1000 tons cotton dust annually, and the private sector an additional 500 tons. The use of cotton dusts has dropped from 6000 tons annually. Some forecasts indicate cotton dusts will be replaced by speciality liquid sprays in the future;

- that since sales volume varies considerably from year to year, that the attempt to strike an annual average volume is correct;

- the same general parameters as for Jordan;

- for dusting sulphur that separate use figures provided by the Ministry of Agriculture are valid, which indicate the the tonnage used as follows:

- 1973 3,600 tons
- 1974 4,500 tons
- 1975 4,900 tons
- 1976 2,776 tons
- 1977 5,407 tons

from which the average volume used of 4,230 tons has been calculated;

- that part of the 20 tons Zinc phosphide technical (equivalent to 4,000 tons rodenticide bait) may be replace with a 0.005% MANFARIN bait;

- that HCB seed dressing of which 150 tons was used annually, will be replace by speciality liquid seed dressings for seed application in the Government PANOGEN machines, and for which no formulation licence will be granted during the period up to 1985;

- no plan to formulate herbicides, because of the risk of contamination to insecticides and fungicides, although near 100,000 litres TRIFLURALIN and 60,000 litres 2,4-D are used annually.

Relevant points regarding the formulation of sulphur dust for Syria are:

- in 1973 a mill of capacity 3,000 tons per annum on one shift, capable of milling to a fineness such that 100% passes a 325 mesh sieve, was delivered to HOMS Refinery;
- this mill still remains in its original packing at the Refinery, which suffered damage during 1973 and has not been used;
- the mill was intended to use sulphur fed from the Refinery but since 1973 no lump sulphur has been produced by the Refinery, except during 1977 when 800 tons was produced which was sold to Lebanon from whence part of the dusting sulphur is purchased;
- some reports indicate that the HOMS Refinery proposed to operate the mill as soon as possible, while others indicate that the mill could be made available to a joint Syrian-Jordanian pesticide formulation project, or even to a Jordanian project.

The exchange rate of Syrian £ 4.00 equals US\$ 1 has been used.

#### 4. FORMULATION AND PLANT

Since Dr. Zeiser completed the chemical engineering and chemical aspects of this mission mid-November 1977, while the writer continued until end of December 1977 when new data became available; upon request the writer attempts in this section to highlight certain aspects of Dr. Zeiser's report (TS/JOR/77/001/11-02/32.1.G) of November 1977 and the substance of subsequent dissension relating to the equipment, buildings, formulations and other aspects which influence the feasibility of the project which were not known in November 1977.

The writer gave Dr. Zeiser certain forecasts and prices in November, which, with apologies, in the light of new information, the writer has now amended, and such amendments are contained in this report.

It is proposed that the reader should refer to Dr. Zeiser's own report, as referred to above, for detailed information regarding plant and chemical requirements.

##### 4.1. Personnel, Company Structure and Payroll

The project should employ the most effective personnel available to ensure the production of high quality products and the provision of the best possible service to the pesticide trade and farmers. At the same time, the project should employ no more persons than necessary.

Adequately experienced personnel are reported to exist in Jordan to man the project, with the notable exception of a Plant Manager trained to operate a pesticide formulation plant. This post should be filled by an experienced ex-patriate for one or two years whose responsibilities will include the training of a successor, or if a suitably qualified man exists locally he should be subjected to training in a formulation plant abroad prior to working the local formulation plant.

Suitable business and management experience is reported to be available to operate the project, although it may be difficult and costly to find a Director who combines both management and the necessary technical abilities necessary to lead this project during the demanding formative period.

Section 9.1. shows the proposed organisation chart of the project.

Section 9.2. shows the personnel requirements and Section 9.3. the annual salaries of such personnel, for the operation of plants of varying capacities.

Details of Job Descriptions for the Plant Manager, Quality Control and Application Development employees are shown in Dr. Zeiser's report, as well as recommendations for their training.

In addition to the staff of the formulation plant, the following personnel are required:

- Director, with business management and organisational abilities, together with technical understanding of both the operation of the plant and of agriculture and pesticide use, at an annual salary of JD 7,000
- Director's Secretary at an annual salary of JD 1,000
- Purchasing Assistant with knowledge of buying procedures, import and export and raw materials, annual salary JD 2,000
- Commercial Assistant, with an agricultural qualification, knowledge of pesticides and the pesticides distributors and an understanding of farmers requirements, at an annual salary of JD 3,000
- Accounts Assistant, to maintain the accounts, invoice sales and pay suppliers with annual salary of JD 2,000

The personnel required for the 1,000 ton capacity formulation plant, working on one shift, are:

<u>TITLE</u>	<u>NO. OF PERSONNEL</u>	<u>ANNUAL SALARY JD</u>
Plant manager	1	5,000
Assistant (material handling)	1	2,000
<u>Secretary</u>	<u>1</u>	<u>1,000</u>
Store House Officer	1	2,000
Secretary	1	1,000
Store House Workers	3	3,000

<u>Driver</u>	1	1,500
<u>Workshop Engineer</u>	1	2,000
<u>Workers</u>	2	2,000
<u>Production Assistant</u>	1	2,000
<u>Production Workers</u>	6	9,000
<u>Formulation Laboratory Assistant</u>	1	2,500
<u>Assistant</u>	1	1,500
<u>Quality Control Assistant</u>	1	2,500
<u>Assistant</u>	1	1,500
<u>TOTAL</u>	23	38,500

Thus the annual payroll comprises:

- office staff JD 15,000, which is not anticipated to increase when more than one shift is operated in the plant, nor when an extra unit is added.
- plant staff JD 38,500 as above plus ten additional workers for the 3,000 ton Sulphur plant at an annual total cost of JD 10,000, with a grand total of JD 48,500 annually for the plant staff of a 1,000 ton mixed formulation plant plus the 3,000 ton Sulphur dust plant on one shift.

As either of the plants change from working one shift to two or three shifts, so more workers are required and the plant salary bill will increase by an estimated 56%, and from two shifts to three shift operation a similar cost increase will occur, thus the annual cost of plant staff will be:

- one shift JD 48,500
- two shifts JD 75,660
- three shifts JD 102,820

#### 4.2. FORMULATION

A clear distinction is made between two types of pesticides:

- commodity products, which are non-patented or patent lapsed compounds, of which the active ingredient is available from many, several or at least two sources



- speciality products, which are developed as a result of original research, which are patented by the originator and are still in patent and of which the active ingredient is only available from one source. The originator's approval/licence is normally necessary to formulate specialities as well as the supply of the active ingredient (technical material) at an economic price, from which to formulate

It is proposed that the formulation plant during the first two operating years formulate only commodity products, because of the probable difficulty in persuading the originators of speciality products to agree to local formulation until some experience has been gained. A start on the formulation of speciality products is proposed in the third year of operation.

Four types of pesticide formulation have been selected as noted in Section 9.4.

#### 4.2.1. RAW MATERIALS

At present, no commercial grade of suitable material is available in Jordan (or in Syria except for a limited volume of Sulphur).

The active ingredients must be imported and it is assumed that they will be imported from Europe. The selected technical materials, their cost FOB European port (except Sulphur) freight and other anticipated delivery charges to the plant site (Amman/Salt) are shown in Section 9.5.

Details of solvents and carriers which are available in Jordan which are not yet of proven use for pesticide formulation, but with upgrading and modification may be suitable, are shown in Section 9.6. Solvents and carriers, as well as emulsifiers and dispersants must be imported, at least initially. Product costings are based upon imported materials. Their FOB cost built up to delivered cost at plant is shown in Section 9.7. (which includes the delivered cost of packing materials). Local production of winter oils at Zirka is possible. Summer oils are not. Sulphur could be produced at Zirka with the third extension, perhaps up to 3,000 tons annually.

#### 4.2.2. COMPOSITION

The commodity products selected for formulation, for sale in both the Jordanian and Syrian markets, are listed in Section 9.8., together with the content of each ingredient (active ingredient, solvent or carrier, emulsifier or dispersant) in each product. Calculations are based upon the use of the noted content in each formulation, as technical material, not active ingredient.

The estimated costs of the diluents are:

- Xylene (Solvent No. 1) \$200 ton FOB Iraq
- Solvent No. 2 (CYCLOHEXANONE or Similar) \$1000 ton  
FOB European port
- Emulsifier \$2000 delivered Amman
- Dispersant No. 1 \$200 ton delivered Amman
- Dispersant No. 2 \$1000 ton delivered Amman
- Inert Carrier No. 1 (Kaolin) \$150 ton delivered Amman
- Inert Carrier No. 2 \$60 ton FOB Turkish Frontier Point

#### 4.2.3. PACKING MATERIALS

The following packing materials will be required in which to pack, store and sell pesticides. Costings and selling prices assume all products are packed in 10 x 1 kg and 1 litre Aluminium bottles, except for dusting Sulphur and other dusts in 25 kg bags with polypropylene outer and polyethylene inner.

The estimated FOB European port cost for small runs are:

- 1 litre Aluminium can (epoxy lined) \$0.25 each
- 1 kg plastic or paper bags with polyethylene liner  
\$0.07 each. Cardboard boxes, to hold 10 x 1 kg  
\$0.30 each. Thus, cost of packing materials is  
\$0.10 per kg.
- 25 kg bags for dust Sulphur \$0.50 each. Thus cost  
of packing material for Sulphur is 2 US cents/kg.

Thus essential steps in formulation of pesticides are:

- Select and identify biologically active chemicals best adapted for the end use;

- Identify the best timing for application;
- Identify the best physical form (granular, dust, wettable powder, emulsion concentrate or solution);
- Find locally available inert carriers. Solvents for liquids will not be available till 1978. Good carriers for dry formulations as clay, phosphate rock, sulphur, must still be selected;
- Select stabilizers and baits to obtain the best results;
- Find the best combinations of surface active agents for each product;
- Find suitable containers of plastic, aluminium and paper; and
- Guarantee safe transport to the farmer and 2 years storage stability.

To satisfy these requirements various employees must contribute their experience. A well trained group within the formulation plant must work continuously.

A satisfactory formulation plant can exist, only if the problems of the farmers are fully understood and resolved. This means, that between farmers, University, extension department, distribution and application system on one hand and the formulation plant on the other, a very good co-operation must exist.

#### 4.3. PLANT

Formulation plants with different capacities can be erected to suit the needs of the market, as shown on page 4 of Dr. Zeiser's report, from 500 - 10,000 tons per annum. Section 9.10. shows the fundamental assumptions made which influence the equipment required for plants of capacities from 500 - 10,000 ton per annum, and higher and lower cost estimates of installed equipment.

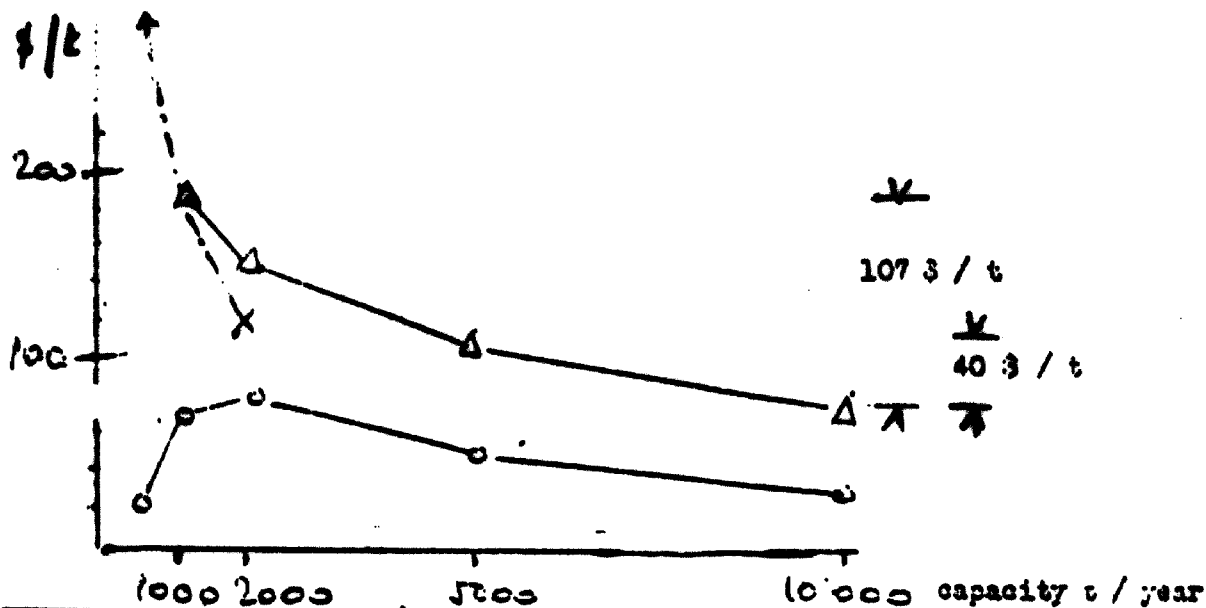
The simplest case is a dustmill without laboratory and services. Investment per ton of production is very low. However, flexibility is also low. No future development is possible.

The smallest formulation plant comprises two or more formulation units. The activity is based on internal formulation developments

and quality control. Investment per ton is high and future development is easy.

The table below shows cost variations per ton.

Cost price



- o - average amortisation for equipment and building
- payroll at full capacity + average amortisation
- cost price at different occupation levels

Average amortisation	500	1000	2000	5000	10,000 t/y
\$/t	20	66	80	50	35

Payroll \$/t	34	121	73	53	45
	54	187	153	103	80

The 1000 t/y plant used with two or three shifts

	50%	100%	200% capacity used
Amortisation \$/t	88	66	40
Payroll \$/t	200	121	80
	288	187	120

If a plant starts at half capacity costs per ton are very high. This is the problem of start up. As full capacity is reached in the second or third year, costs fall. Cost/ton on a 1000 t/y plant is high compared with that on larger units.

Only if a second or third shift with 200% of nominal capacity is reached, can a small unit operate at comparable costs to larger plants with 5000 t/y and upwards.

The difference in production cost of a plant with 1000 and 10,000 t/y is 107 \$/t. This can be reduced to 40 \$/t, if a second shift operates. The total difference is \$80,000, nearly 5% of material and formulation cost.

Every effort should be made to operate at higher capacities as soon as possible, with exports to neighbouring countries.

The variation in cost of depreciation of installed equipment (amortised over 10 years) and of payroll, dependent upon the percentage of capacity used, by size of plant, is shown in Section 9.10.

#### 4.3.1. CAPACITY

Sales forecasts for Jordan (Section 7.10.) and Syria (Section 8.8.) are combined to form the total requirement of the plant in Section 9.11.

It can be seen that the tonnage in the seventh year of plant operation of a joint venture with Syria is forecast as 8,867 tons, of which 5,000 tons is dusting Sulphur and 1,100 tons rodenticide bait. The tonnage required for a Jordanian project, but including export to Syria is less.

The lay-out is proposed for 1,000 ton capacity, one shift, multi-purpose plant plus 3,000 ton capacity dust Sulphur plant. Provision should be made for increase in output. Capacity of the plant should be expanded only if a second or third shift provides insufficient tonnage, by adding more equipment.

The production units which are considered, their installed capacities and tender description are to be found in Section 9.12. In fact, slightly larger vessels may be necessary particularly for

the rodenticide bait unit, and the 3,000 ton Sulphur unit may require further specification. Caution is proposed prior to agreement to purchase, install or in any way take responsibility for the Sulphur mill reported to be in its original packing at HOMS Refinery. An informed professional examination of this equipment and detailed consideration of its potential usefulness is recommended prior to any action being taken.

#### 4.3.2. EQUIPMENT

The actual cost of the necessary installed equipment can only be ascertained by offers received in reply to tender.

The estimated costs of the installed equipment in 1977 for the 1,000 ton capacity (one shift) multi-purpose plant are:

- Powder and dust \$150,000
- Liquids \$24,000
- Rodenticides \$35,000 plus additional \$20,000 to provide maximum tonnage requirement, totalling \$55,000
- Laboratory \$64,000
- Auxillaries \$44,000
- Various \$40,000

and in addition the installed cost of a 3,000 ton capacity (one shift) Sulphur mill with bagging unit has been estimated (verbally) at \$250,000.

The estimate total cost of installed equipment in 1977 is US\$ 627,000.

It is proposed to depreciate the cost of installed equipment by 10% annually so that the total cost will be amortised after 10 years. However, it is reported that should a plant be operated on a three shift basis for any length of time that the cost should be amortised within seven or at least eight years. It is reported also that this necessity can be offset sometimes by the purchase of slightly larger vessels at relatively small cost increases. In this study, annual depreciation on the plant will be taken as \$63,000.

#### 4.3.3. BUILDINGS

The buildings required for the 1,000 ton multi-purpose plant, and their surface requirements are shown in Section 9.14., together with the type of construction.

In addition, the estimated cost of the building for the 3,000 ton Sulphur dust plant is \$50,000.

Thus, the total cost of buildings is estimated in 1977 as:

- JD 100,000 or \$300,000 for the 1,000 ton plant plus laboratory, offices and storage
- JD 16,667 or \$50,000 for the Sulphur plant

totalling \$350,000, which in this study will be depreciated 5% annually, in a straight line, so that the cost of the buildings will be amortised after 20 years. Annual depreciation is taken as \$17,500.

#### 4.3.4. SITE AND LAND

The total area required is 20 dunums (2 ha), with the possibility of extension to 30 dunums.

Salt is selected from the potential sites listed in Section 9.15., as the most suitable.

Consideration may be given to erecting the plant in the industrial zone near RAMTHA on the Jordanian-Syrian border, providing facilities and services become available, especially if a joint project between the two countries is agreed upon.

The cost of land at Salt is estimated at JD 1,500 per dunum, JD 30,000 for 20 dunums which is a capital cost of \$90,000 and which is not subjected to depreciation in this study.

#### 4.3.5. SERVICES AND MAINTENANCE

Maintenance and service requirements are shown in Section 9.16. for the 1,000 ton multi-purpose plant.

It can be seen that the cost of energy is estimated at JD 0.011 or 3 US cents per KW hour and that the anticipated consumption per kg product is one third KW hour at a cost of 0.9 US cents per kg product or \$9 per ton product.

The annual cost of maintenance on the 1,000 ton plant operating one shift at capacity is \$40,000 plus \$10,000 for the Sulphur plant

totalling \$50,000 per annum, rising to:

- \$63,000 when operating two shifts, and
- \$75,000 for three shift operation



## 5. PESTICIDE PROJECT

The operational organization of a local pesticide formulation plant is noted in the previous section, headed by a Director possessing both management ability and technical awareness. It is reported that the only kind of expertise required for the successful operation of this project, not readily available in Jordan, is a Plant Manager. Should this prove to be the case, consideration will be given to employing a suitably qualified ex-patriate for 1 - 2 years, to ensure that only products of the highest quality are produced, from the outset.

Production of the highest quality products is fundamental to the success of the operation (project). This point is stressed as the prime factor. It implies that only high quality raw materials and packing materials are purchased and that no short cuts are attempted.

It may be seen that a plant producing products for Jordan alone, based on the forecasts in section 7.10. is unlikely to provide a reasonable return on investment when:

- 8% per annum can be earned on Government bonds
- the cost of money is 9% (8% interest plus 1% fees) per annum

Since:

- the forecast sales tonnage in Jordan rises from 1270 tons in year 1 (assumed to be 1979) to 1698 tons in year 7 (assumed to be 1985), of which 1000 tons is sulphur dust with a raw material cost of \$60 ton and a selling price of \$131 ton
- the fixed overhead as depreciation on 1000 ton plant, with the necessary facilities to ensure production of quality materials is \$50.70 ton (\$35.70 ton/year for equipment and \$15 ton/year on buildings) operating on one shift before payroll, energy and packing materials are included.
- investment in equipment, buildings and land required for 1000 ton plant is \$747,000 (equipment \$357,000, building \$300,000 plus land \$90,000)

Two projects are considered in this report, and their financial viability in this section, which are:

- Project 1 which assumes a joint project with Jordan and Syria, in a plant in Jordan
- Project 2, which assumes no Syrian investment in a Jordanian plant and no competitive plant in Syria, so that export sales

to Syria are made from the Jordanian plant but at only half the tonnage forecast for Project 1.

However, if in the event it is decided to implement neither project 1 nor project 2, consideration may be given to building a small pilot/demonstration formulation plant at a capital cost of \$50 - 100,000 to include installed plant and buildings, in order to:

- develop technical skills
- make commercial contacts both with suppliers and buyers
- develop knowledge of and experience with pesticides

In the absence of immediate profit motive, such a pilot plant could be used to develop some experience upon which potential investors could decide whether to invest in project 1 or 2.

All costs are struck in 1977, in 1977 money, as are selling prices.

Increasing interest is reported in local pesticide formulation, both by Government in Syria, by private companies in both Jordan and Syria, and by recent visitors from Abu Dhabi and Kuwait, all of whom would consider investment and/or purchasing production, always assuming such a project was viable and that high quality products are available at competitive prices.

#### 5.1. Prospective Investors and Project Objectives

Prospective investors in the project include:

- the Jordan Government, who will decide the prime objectives of the project, the extent of their investment, the number of their nominees on the Board of Directors and the extent of any protection, subsidies and special arrangements which the project shall enjoy
- The Syrian Government
- pesticide distributors in Jordan and Syria, in the private sector, selling in their own country only or also into other countries. Their interest in investment will be geared probably to the availability to them of the right products at the right price
- private investors and investment houses
- farmers in Jordan, and agricultural dealers in Jordan
- foreign pesticide companies, who it should be appreciated are concerned with the production and sale of their products but

possess expertise that if offered, may more than offset the possible disadvantages of their investment

It will be clear that almost without exception, each of these types of prospective investors would set a different order of priorities for the project.

The variables are numerous and include:

- encouragement of pesticide use in order to increase agricultural production
- profit. Optimum or maximum
- export
- reduction in selling prices
- local availability of pesticides
- restriction/expansion of types of pesticides available for sale and use

Some investors may believe that the project should be protected during the formative years by a ban on import licences, or by imposition of a 20-30% import duty on formulated pesticides containing the same active ingredients (or similar) as those products formulated locally by the project. Others may argue that in a free economy such protection should not be necessary as was the case with the Arab Pharmaceutical Manufacturing Company, who, it is reported, received no such protection. However, it is reported that the Single Superphosphate project received protection since no import licences were granted for products of a type which were made locally.

The Jordanian Government will decide who may invest in the project and on the constitution of the Board of Directors. It is proposed that consideration be given to members of the Ministry of Agriculture, J.C.O., J.V.F.A., private sector distribution companies and the opinion forming farming community, from among the investors, to serve on the Board of Directors.

All prospective investors among the pesticide distributors in the private sector which were contacted, the J.C.O., J.V.F.A. and farmers, indicated interest in financial participation in a viable project, and where appropriate, also in purchasing products of quality at competitive prices for home and export, in some instances on contract.

The Jordanian Government will decide upon the financial shape of the project, and upon the method of funding it.

## 5.2. Marketing Strategy

It is recommended, and assumed that investors in the project will include the more important pesticide distributors in the private sector at least in Jordan, the J.C.O. and the J.V.F.A., and in Jordan a number of important or opinion forming farmers.

Involvement of the Jordanian private pesticide distributors in the project is considered to be of paramount importance unless punitive protection is to be given to the project. Indeed, it is proposed that they are bound to the project, both by financial participation and if possible, by contract to purchase products, assuming:

- competitive pricing. The projects selling prices are equivalent to the 1977 invoice prices to importers/distributors
- acceptable quality

The objective is to give the present importers every justification for drawing their requirements of the products formulated by the project from the project, and indeed act as custom formulators for them. Otherwise, without punitive legislation the importers would, at worst, continue to import as before, leaving the project to distribute and sell their own production.

It is proposed that it would be unwise for the project to attempt to compete with the private sector in Jordan in selling to dealers and farmers, at least for the first three years of operation. Farmers will be slow to accept the locally formulated products, and it is preferable that the existing distributor's considerable facilities are used to assist acceptance and use of the project's products, not to hinder it. An example will be shown below on the profit which could be attributed to a project sales and technical service force. If private distributors buy from the project at prices competitive to which they import now, they shall be responsible for promotion, credit, proving, field demonstrations and sales in the same way as they are now to their foreign principals. The project will become their principal for these products which it formulates, and with similar responsibilities.

It is recommended that the project sells directly to distributors, the J.C.O. and the J.V.F.A. at the same price, and initially only at this level of trade. This strategy has several functions:

- it demonstrates to the importers that the project does not seek to undermine their business by selling directly to dealers or farmers. Therefore, distributors will be encouraged to invest and thereafter maximise their purchases from the project
- it provides a competitive check on retail prices, since the J.V.O. and J.V.F.A. will not only abide by the price control law, but probably sell at even lower prices than legislated. Some distributors will object to the J.V.O. and the J.V.F.A. (which are virtually co-operatives) buying at equal prices to them (private distributors in every country seek to maintain their margins in competition with co-operatives). As long as these two co-operatives provide technical and distribution facilities similar to these of the private sector, and not merely take advantage of the private sectors facilities and consequent high overheads, no objection is likely to be sustained. Indeed, it should be a stimulant to these two organizations to intensify their pesticide facilities.
- it reduces the project's risks of bad debts and enforced long term credit, increased overheads of numerous clients and a sales force and the necessary technical service force, at least during the critical formative years.

By implementation of this sales policy, with Government nominees on the Board, published lists of recommended prices and sufficient local stocks, it is anticipated that retail pesticide prices will fall, at least for those products which are formulated by the project.

Exclusive purchase arrangements will be sought. These should be resisted, assuming no punitive protection is implemented, on the grounds that if the project refuses to sell to any importer/distributor, that they will continue to import those same products from the same foreign sources as previously and compete with the project, and its investors.

If the products were to be offered at below the equivalent price of the imported products, it is anticipated very little would be achieved except to imply that imported products are superior. The local product

must be as good as the imported product, and should be sold to distributors at no lower price.

Contracts to purchase should be sought from importers/distributors (listed in sections 7.2. and 8.1.). They may be difficult to negotiate until the second year when products have been proven.

Earlier in the report it has been proposed that the project start formulating specialities in the third year of operation. It is a firm recommendation that the project custom formulates specialities. This implies that the project will draw technical material and formulation technology for those specialities from the originator (Bayer for BAYLETON, DOW for DURSEBAN, etc.) possibly through the local agent, and deliver the formulated speciality to the local agent.

There is a big difference in risk, margin and responsibility between:

- custom formulation, where one formulates to the customer's specification, under confidential cover and delivers the formulated product to whom instructed. The usual margin is around 10%.
- being the local agent or exclusive distributor, with or without formulation facilities, who accepts the full responsibility of attempting to develop a market for the product and prove its biological efficacy in local field trials, and subsequently market the product, if satisfactory. If not satisfactory, the considerable expense of the work involving a development department (similar to the Research Department at the Ministry of Agriculture) is spent, and lost. The usual margin is around 40% of the distributors average net selling price.

It is proposed that for the foreseeable future that the project continue its activities on speciality products to custom formulation and not undertake agencies or exclusive distribution agreements and so compete with the private distributors in Jordan. The situation in Syria could develop in a different way and detailed discussion with the Government of Syria will elucidate their requirements on this aspect, should they invest in the project. An exclusive distributor has an onerous responsibility to his principal.

The project should seek to establish its own brand name on all products that it formulates and repacks. Labels on all products, at least those sold in Jordan, should bear the brand name, which has a positive or at least neutral meaning, can be protected as a trade mark and is easily pronounced. The writer suggests PHILADELPHIA BRAND, but no doubt this can be improved upon. The brand name needs to be acceptable to the farmers in the main market which is the Jordan Valley. Should Syria invest in the project, a brand name which is common for both countries has the advantage that only one label rather than two is necessary for each product.

While the Jordan Government will consider and legislate what if any protection will be given to the project, it is proposed that in particular, the project:

- enjoy preference on Government, Municipal tenders, and on any bid calls made by the J.C.O., J.V.F.A. and similar organizations, for products which they are able to formulate. If no precedent exists it may be helpful to note that the S.G.B. in the Sudan allows at least a 10% preference to products formulated locally.
- enjoy an exemption from the 4% import licence tax and 2% additional taxes (customs fee) on all materials entering Jordan for use by the project. This exemption should include all packing materials (even though they could be used for some other purpose) and all equipment and associated materials for the project. No duties are payable on tariff item 38-11, but should duties be payable normally on any other tariff item applicable to any material, product or additive intended for the project, it is proposed they be waived.

Whether Syria invests in the project or not, it is reported the 1% duty would be waived. If Syria invests no doubt the 6% taxes would be waived. If Syria does not invest, the waiving of the 6% taxes is probably negotiable, but in the absence of any firm ruling the financial calculations below include payment of such 6% tax on sales to Syria.

### 5.3. Financial Statements

#### 5.3.1. Fixed Costs and Energy

Financial statements will be prepared separately for project 1

(with Syrian investment) and Project 2 (no Syrian investment but with export sales to Syria). Both projects have certain common costs.

In the absence of any directive, it is assumed in these calculations that the total capital cost is funded as equity in the project, and that capital is paid up as required to pay for land, equipment and its installation and for the buildings, which for the 1000 ton multi-purpose plant plus the 3000 ton sulphur dust plant, as shown in section 4. comprise:

- 20 dunums land \$90,000. No depreciation.
- installed equipment \$630,000. Depreciated at \$63,000 or 10% annually.
- Buildings \$350,000. Depreciated at \$17,500 or 5% annually.

Thus the total capital cost is \$1,070,000, which it is assumed will be funded by the investors and paid out in the construction year, year 0 (assumed to be 1978). Thus, the total depreciation each year in the period under review is \$80,500, which as a fixed cost divided by the forecast sales tonnage (section 9.11) gives an annual cost of:

- \$35.26/ton in year 1, falling to \$9.08/ton in year 7, in Project 1
- \$45.33/ton in year 1, falling to \$15.24/ton in year 7, in Project 2.

The payroll (section 4.1.) varies according to the number of shifts worked and the annual totals (at US\$ 3 to JD 1) are:

- \$190,500 on one shift
- \$271,980 on two shifts
- \$353,460 on three shifts

Maintenance costs (Section 4.3.5) vary according to the number of shifts worked and the annual totals are:

- \$50,000 on one shift
- \$63,000 on two shifts
- \$75,000 on three shifts

Payroll and maintenance costs total annually:

- \$240,500 on one shift (taken as \$240,000)



- \$334,980 on two shifts (taken as \$335,000)
- \$428,460 on three shifts (taken as \$428,000)

It can be seen from the forecast sales tonnage (Section 9.11.) that:

- one shift will be worked for years 1 and 2 on projects 1 and 2
- two shifts will be worked in years 3, 4 and 5 on project 1 and years 3 - 8 inclusive on project 2
- three shifts will be worked in years 6 and 7 on project 1

A conservative engineer may argue that to accommodate down time for cleaning and maintenance, that a plant will work at maximum 80% of rated capacity, on one, two or three shifts. However, it is assumed that vessel size can be amended to accommodate any criticism on this point.

Thus, the total annual payroll and maintenance cost divided by the tonnage forecast yields the fixed annual cost of:

- \$105.12 ton in year 1 down to \$38.98 ton in year 5 and \$48.27 ton in year 7 in project 1
- \$135.14 ton in year 1 falling to \$63.42 ton in year 7 in project 2

The total fixed cost of depreciation, payroll and maintenance divided by the tonnage forecast yields a fixed annual charge per ton of:

- \$140.38 in year 1, through \$48.35 in year 5 and \$57.35 in year 7 in project 1
- \$180.47 in year 1 falling to \$78.66 in year 7 with project 2

The estimated cost of energy is 0.9 US cents per kg product (Section 4.3.5.), which totals:

- \$20,547 in year 1 rising to \$79,803 in year 7 in project 1
- \$15,984 in year 1 rising to \$47,538 in year 7 in project 2

### 5.3.2. Direct Cost of Products

The direct cost of formulated products (except energy which is shown above) comprise the following components at the Salt factory:

- technical materials (active ingredient) from section 9.5.
- diluents and additives and packing materials from section 9.7.

costed according to their composition (see section 9.8.) plus the cost of appropriate packing materials. Thus the total direct cost of each product forecast for sale is struck, packed, at the Salt factory gate, ready for sale to the Jordanian distributors and Syrian buyers.

The following assumptions have been made:

- product composition is based upon technical material, not active ingredient
- the specific gravity of liquids is taken as 1
- freight calculations are struck on net product weight
- all purchases are made at the prices noted which include six months credit. Delivery is assumed at maximum two months after supplier's receipt of order, one month for formulation, with three months credit included in the projects selling prices to buyers in both Jordan and Syria. Thus, it is assumed that payment is received for sales at the same time as the invoices become due relating to the raw materials and packing materials, as shown in the Cash Flow.
- Endosulfan 6% dust is selected as a typical COTTON DUST for sale to Syria
- Supracide 40 EC is taken as a typical liquid speciality product, at an average selling price between Jordan (SF 24 C+F) and Syria (ST 21.60 C+F) at \$10 litre ex Salt factory. Topsin - M 70 WP is taken as a typical wettable powder speciality product, of an average selling price between Jordan (\$9.70 C+F) and Syria (\$u.95 C+F) of \$8.50 kg ex Salt factory. The price of speciality technical materials and the composition of formulated specialities are known only to the originating companies. It is assumed that prices would be struck at a level permitting the project to secure 10% gross margin off the selling prices noted above, and the costs are so calculated
- warafarin technical 99.9% can be purchased at \$35 kg (\$35,000) ton FOB European port and delivered Salt factory at \$35.085 kg. Since the percentage active warafarin in the rodenticide bait is 0.005%, it is assumed that

1 kg bait material comprising milled cereals and flavours will be required for each kilo of rodenticide bait. It is estimated that the bait material can be purchased for \$ 0.25 kg (\$250 ton) in Jordan. Packing is anticipated in 1 kg containers.

Detailed and total product costs are shown in section 10.1. for project 1 and in Section 10.2. for project 2.

### 5.3.3. Selling Prices of Products

Product sales are proposed as indicated above to:

- existing distributors in Jordan, ex Salt factory, at prices equivalent to the distributors current invoiced cost. The current distributor's cost C+F AQABA for each product is shown in section 7.10. (drawn from section 7.3.). Charges incurred by distributors to deliver their imports to Amman/Salt are shown in section 7.9. Thus, on products packed in larger than 16 oz containers, their costs are C+F AQABA plus 7% (1% clearing, 4% import licence and 2% additional taxes, of which the project is assumed to only pay 1% clearing charges on the projects imports, as shown above) plus \$12 ton inland freight from AQABA to Amman/Salt. The build up of distributor's costs to delivered Amman/Salt, which is the level at which it is proposed the project should sell to distributors, is shown in Section 10.3.. The selling price of dusting sulphur was struck at C+F Amman and therefore imported dusting sulphur incurs no additional freight charges. The selling prices for both liquid and powder specialities are those indicated in Section 5.3.2.. Imports in 16 oz containers attract an additional 10% tax (4% University, 1½% Sports City and 4½% Security) on which the project would have a 10% advantage.
- Syrian buyers, both Government (TAFCO) and private, ex Salt factory at prices equivalent to those paid by the buyers at present.

Syrian buyers pay different prices for the same products to the Jordanian distributors, moreover, the most important storage/selling

point in Syria for pesticides is Aleppo, except for dusting sulphur which is Damascus.

In Section 10.4. the build up of the Syrian buyer's cost prices are shown in Column 3, which comprises:

- the C+F Latakia cost price shown in Column 1, as in Section 8.8. and drawn from Sections 8.5. and 8.6.
- a total of 9% charges on the C+F price comprising 1% duty, 6% taxes, 1% insurance and 1% clearing charges, as itemized in Section 3.2.4., and shown in Column 2.
- inland freight in Syria from Latakia to Aleppo of \$8.75 ton (\$£35 ton as shown in Section 3.2.4.) for all products except dusting sulphur for which the freight from Latakia to Damascus is \$13.75 ton (\$£55 ton as shown in Section 3.2.4.) and shown in Column 3.

To establish the ex Salt factory selling prices to Syrian buyers, equivalent to their current purchase prices, the following charges have been deducted from Column 3 in the table in Section 10.4.:

- the freight charge from Amman/Salt factory to Aleppo of \$24 ton (as shown in Section 7.9.) for all products, except dusting sulphur for which the freight from Amman/Salt to Damascus is \$12 ton (Section 7.9.), shown in Column 4.
- 7.41%, which is the equivalent of the 8% charges which would have to be added to the ex Salt factory selling price to the Syrians, comprising 6% taxes (which if in the event are waived, would result in a greater profit than shown in these financial budgets), 1% insurance and 1% clearing charges at the border, and shown in Column 5. It is assumed no duty would be levied on Jordanian products.

Thus, the prices/ton shown in Column 6 in the table in Section 10.4. show the prices at which the project would have to sell products to Syrian buyers ex Salt factory in order to compete with the prices which Syrian buyers now pay C+F Latakia.

Endosulfan 6% dust is taken as a typical cotton dust with C+F Latakia price of \$764 ton.

Section 10.5. shows the sales value for years 1 - 7 for Jordan and by the addition of maximum sales to Syria shows the total sales

value for project 1.

Section 10.6. shows the sales value to Syria for years 1 - 7 if Syria invests in the project, which sales values are added to those for Jordan to strike sales for project 1 above. Sales to Syria for project 2 are half those for project 1, so half project 1 Syrian sales are shown added to sales for Jordan to show the total sales value for project 2, on the bottom line in Section 10.6.

#### 5.3.4. Cash Flow

Cash flows for projects 1 and 2 are shown in Section 10.7., where the assumptions made have been referred to previously in this report, including:

- the capital cost of land, installed equipment and buildings is funded by the investors, as paid up capital in year 0 (1978) in time to make appropriate payments.
- payment to suppliers, on six months credit, is covered by debtors who are allowed three months credit and pay promptly. In the cash flows it is assumed that four months credit may be obtained on payment of inland freight from Aqaba to Salt factory, and on clearing charges, so that they too will be covered by debtors payments and that products are formulated in one month from delivery.
- 65% of total sales (and material purchases) are made in the first half of the year (Section 3.1.3.)
- Other expenses are intended to cover insurance of plant, of the formulation art, and office expenses.

It can be seen that both projects are in credit from the first half year, and if deliveries, formulation, sales and payment are prompt, both projects should be able to finance their working capital requirements from income except during the first six months.

It is estimated that bank facilities will be necessary for the first six months for both projects as follows:

- \$240,000 for six months at 9% (8% interest and 1% fees) interest per annum, which is an interest charge of \$10,800 to be set against the profits in year 1, project 1.

- \$210,000 for six months at 9% interest per annum, which is an interest charge of \$9,450 to be set against profits in year 1, for Project 2.

One important consideration inherent in these projects is that ample stocks of formulated products be readily available, so that prices to farmers may be kept at a reasonable level. Such stocks imply a stock carry over at each year end. No such allowance has been made for stock carry over or work in progress in the cash flow or Balance Sheets, nor in calculating interest payments in the first year.

#### 5.3.5. Profit and Loss

The forecast profit and loss statements for projects 1 and 2 are shown in Section 10.8.. It can be seen that:

- both projects are forecast to show a profit from the first year.
- the net profit available for distribution/funding working capital rises from 63% up to 244% per annum on the assumed issued capital of \$1,070,000 on project 1 and from 34% up to 144% on project 2.

There may be additional expenses which the Government of Jordan may decide should be incurred, for example Director's fees, for which no provision is made in the financial forecasts in this report. However, should the 6% taxes be waived on exports from the factory into Syria, then selling prices 6% higher than those forecast may be charged, resulting in a 6% greater profit on sales to Syria.

Should consideration be given to the project making sales directly to dealers in Jordan in the fourth year, the increase in profit could total the difference between:

- the additional sales value of \$158,000, which is a 20% uplift on the forecast sales to distributors of \$790,000 (total Jordanian sales of \$1,479,628 less the rodenticide bait sales of \$689,600), when sales are made to dealers, and
- the additional expenses of such a venture which includes:
  - 7 field men (5 salesmen and two field development men) at JD 200 month salary and JD 100 month expenses including car, which totals \$75,600 per annum.

- cost of bad debts and delayed payments of \$8,000
- transport cost to Jordan Valley \$5,000

which totals \$88,600

which is \$69,400, at the risk, in the writer's opinion of antagonising distributors in the private sector, some of whom may be investors in the project. Alternatively, half of the Jordanian sales to dealers could be attempted with half the expense incurred, and half the profit possibly accruing. However, the latter alternative is unlikely to be successful.

The Government of Jordan will decide the tax allowances to be granted to the project. The financial forecasts in this report assume no tax is payable during the first seven years of operation.

#### 5.3.6. Balance Sheets

The forecast Balance Sheets for projects 1 and 2 are shown in Section 10.9.. The following assumptions are made:

- no debtors, creditors or accrued charges are outstanding at end year
- dividends are paid amounting to the profits shown in the Profit and Loss Forecasts (although in practice some retention would be made to fund working capital). Thus, cash at bank (or investments) each year end are struck by the addition of opening bank balance plus income less expenses less the dividend paid for the previous year.
- interest due on bank facilities in the first year is assumed to have been paid prior end year.
- at the end of the seventh year, the value of land stands in the accounts at the cost price of \$90,000, while the written down value of the installed equipment is \$189,000, and that of the buildings \$227,500.
- no carry over stocks, as indicated above.

#### 5.3.7. Risks and Break-even Analysis

All prices and costs have been struck in 1977, in 1977 money, thus the profits forecast to accrue are in the same terms.

The major risk is associated with any disadvantageous change in the relationship between one or more of:

- the cost of installed equipment, and to a lesser extent, of land and buildings
- the cost of the raw materials
- the selling prices ex factory, remaining competitive with foreign offers of formulated products.

A second equally important risk, which while it can not be over-emphasised, it is assumed it will be overcome, is that of the project producing any formulated product not of the highest quality, since not only would poor products arouse damaging adverse publicity for the project but possibly involve the project in very costly damage claims.

It can be seen that the product mix comprises twenty-three products, each of which are sold at a different price in both Jordan and to Syria, which means that there are forty-six different gross margin percentages, varying from:

- 79.6% on rodenticide sales in Jordan, to
- 9.6% on Zineb 80W sales in Jordan.

Moreover, as the volume relationship in the product mix each year changes so does the average gross margin percentage. Hence, the assumption in the sales forecast that the high gross margin rodenticide is sold in volume from year 1, while the low gross margin specialities are not sold in volume until year 5, is a material factor in the percentage gross margin on sales:

- falling from 65.7% in year 1 in project 2 to 36.8% in year 7
- falling from 65.3% in year 1 in project 1 to 35.9% in year 7

Clearly, therefore, the profit will be maximised, and the risk of loss minimised if most effort is placed behind those products attracting the higher percentage gross margin and especially the rodenticide bait. At the same time, the average gross margin per ton of product varies from year to year in each of the two projects.

There are many calculations which may be made regarding the break-even point. Four examples are given below.

Assuming that the forecasted percentage gross margin is maintained, the break-even point:

- in the first year in project 1 is on sales of 770 tons at a gross margin of \$443.32 ton (\$452.32 less \$9 ton for energy)



- to meet the expense cost (including interest) and depreciation charge of \$341,400.
- in the seventh year in project 1 is on sales of 1,536 tons at a gross margin of \$356.74 ton (\$365.74 less \$9 ton for energy) to meet the expense cost and depreciation charge of \$548,000.
  - in the first year of project 2 is on sales of 858 tons at a gross margin of \$396.12 ton (\$405.12 less \$9 ton for energy) to meet the expense cost (including interest) and depreciation charge of \$339,950.
  - in the seventh year of project 2 is on sales of 1,153 tons at a gross margin of \$377.62 ton (\$386.62 less \$9 for energy) to meet the expense cost and depreciation charge of \$435,500.

#### 5.4. Benefits of Project

The major benefits which will accrue in Jordan if either project 1 or 2 is executed, include:

- extra employment at the plant of annual salaries totalling \$190,500, rising to \$353,460 when the plant works three shifts.
- saving in foreign exchange on a greater volume use of formulated pesticides.
- increased work for local labour in the erection of buildings and plant installation.
- adequate stocks of formulated pesticides in Jordan, which will lead to a reduction in retail prices for farmers, which in turn will result in more competitive production locally of primary agricultural products.
- a stimulation to secondary industries connected with pesticide formulation, including local production of suitable fillers, solvents and packing materials, and perhaps lump sulphur.
- profits on investment as shown in the forecast financial statements.
- an ability to formulate almost any pesticide product, so that if and when resistance develops to products used at present, only the active ingredient has to be changed.
- a stimulant to the local use of pesticides, since invariably once a local formulation plant starts operating, use increases

faster than previously.

- export, and the consequent foreign exchange earnings.
- development of technological skills.
- a possible extension of the plant to domestic insecticides and aerosol packs, with the attendant advantages of added profit, local availability of these products and a consequent improvement of public health.
- reduction in transport costs.
- reduction in dependence on foreign suppliers.
- reduction in risk of product degradation, because of speedier delivery.

## 6. CONCLUSIONS AND RECOMMENDATIONS

Agricultural pesticide use in Jordan has risen comparatively slowly to 1980 tons in 1977 at C+F value of \$1.61 million. Use of agricultural pesticides is forecast to rise 15% annually up to 1985.

A formulation plant to supply the Jordanian market alone is unlikely to provide a reasonable return on capital invested.

For this reason, export markets were sought and a brief visit made to Syria, where Government indicated interest in principle in joint investment with the Government of Jordan in a Jordanian formulation plant. This report includes financial forecasts for the erection and operation of two alternative projects, one a joint Jordanian/Syrian plant, and secondly a Jordanian plant supplying the home market and making some exports to Syria.

Should the Government be unwilling at present to progress either project, consideration may be given to the erection of a pilot/demonstration plant in Jordan at a cost of \$50 - 100,000 from which experience may be gained, and upon which prospective investors may decide which project should be implemented in the future.

Use of agricultural pesticides in Syria varies annually with the intensity of pest incidence and dropped from \$6 million in 1976 to \$4.5 million in 1977 plus dusting sulphur, which varies from 3,600 tons up to 5,400 tons annually. Use in Syria is forecast to increase 10% annually to 1985.

Proposals are made in this report to tighten some regulations, assuming the necessary staff is available, to ensure safety when pesticides are formulated locally.

Local formulation will influence retail prices of pesticides to fall because of local availability of supplies, with less dependence on foreign suppliers.

A 1,000 ton multi-purpose formulation plant plus a 3,000 ton sulphur dust plant is proposed, starting on one shift but increasing to three shift working, at a capital cost of \$1,070,000.

No local source of any proven raw materials exists, but the erection of a plant will stimulate efforts to produce suitable fillers and solvents

and perhaps lump sulphur and packing materials. Any such success will tend to increase the return on capital invested still further, from the already substantial figures shown in the financial forecasts in this report.

Production of only formulated products of the highest quality is of fundamental importance. This entails purchase of only high quality technical materials, additives and packing materials.

Since pesticide formulation is new to Jordan, it may be necessary to employ a suitable experienced ex-patriate as Plant Manager for the first 1 - 2 years.

It is proposed that the project sell to the existing private distributors in Jordan and to the existing Government and private buyers in Syria, some of whom may invest in the project. Selling prices are proposed as those which are equivalent to the present invoiced prices from foreign suppliers.

No punitive protection is proposed for the project, but it is assumed that the total of 6% taxes (on containers of more than 16 oz) will be waived in Jordan and 1% duty in Syria. Should the Government of Syria waive the 6% taxes, the profits forecast in this report from sales to Syria, would be increased by 6%.

Gross margins vary between products and between markets. The rodenticide bait carries a very large gross margin. Dusting sulphur accounts for a small gross margin but carries a large part of the overheads.

As can be seen from the forecast financial statements, both projects 1 and 2 show a profit from the first year of operation, and provide a substantial return on capital invested.

#### 6.1. Recommendation

1. It is recommended that a pesticide formulation plant be erected in Jordan, and that Syrian financial interest be sought.
2. Sales are proposed to the existing private distributors in Jordan and Syria, and to the Syrian Government controlled T.A.F.C.O.
3. Selling prices are recommended as equivalent to those which are paid now to foreign suppliers of formulated products.
4. Every effort should be made to ensure that only formulated products of the highest quality are produced. It may be necessary to

employ an ex-patriate plant Manager for the first one or two years of plant operation, when he may train a suitably qualified successor.

5. Technical assistance and training of key technical personnel is recommended by UNIDO during the plant start up period. Perhaps a token contribution may be made to the cost of laboratory equipment by UNIDO/UNDP, if the Government of Jordan decides to implement the project on a priority basis, and if UNIDO/UNDP funds are available.

7. JORDAN

7.1

JOB DESCRIPTION

TS/JOR/77/001/11-01/32.1.0

<b>POST TITLE</b>	<b>Pesticides Marketing Expert</b>
<b>DUTY STATION</b>	<b>Amman, with travel within the country and possible visits to neighbouring countries</b>
<b>PURPOSE OF PROJECT</b>	<b>To examine the trend of market development for pesticides and update existing feasibility studies and cost estimates on the establishment of a local pesticides formulation plant.</b>
<b>DUTIES</b>	<p>The expert will be assigned to the National Planning Council and in consultation with the appropriate Government Agencies will specifically be expected to:</p> <ol style="list-style-type: none"><li>1. Survey current and project short-term (up to 1985) domestic pesticides demand and assess the export potential for formulated pesticides, by volume and value of individual product type.</li><li>2. Analyse expected sales of proposed enterprise by volume and value for each product type.</li><li>3. Advise on marketing strategy to achieve such sales.</li><li>4. In co-operation with the technical expert, establish the organizational requirements of the enterprise including the financial strength and business experience of prospective owners, management and labour.</li><li>5. Prepare financial statements, balance sheets, projected net cash flow and break-even analysis.</li><li>6. Assess impact of project on national level in socio-economic terms and benefit/cost analysis.</li><li>7. Recommend follow-up UNIDO/UNDP technical assistance as required for contracting, erection and start-up of the plant.</li></ol>

7.2

VISITS IN JORDAN

1. Mr. D. Monson - Deputy Resident Representative  
Mr. A.M. Naghanay - Programme Officer  
Mr. D. Alkhas  
UNDP Amman
2. Mr. Ghaleb Arafat - Director  
Mr. Awni Jacob Abdul Rahim - Counterpart  
Industrial Studies and Investment Promotion Centre  
Ministry of Industry. Amman.
3. Dr. H. Dabbas - Under Secretary  
Ministry of Industry. Amman.
4. Dr. Mohamed Rida Rawfaaq  
Malaria Section  
Dr. M. Dajani  
Environmental Sanitation Division  
Mr. Khalil Katawneh  
Pharmacy Department  
Ministry of Health. Amman.
5. Mr. M. Malkawi - Rodenticides  
Mr. A. Fatah - Tenders Section  
Dr. A. Faraon - Director of Health Affairs  
Municipality of Amman. Amman.
6. Dr. Akram J. Karmoul  
Mr. M. Azer  
National Planning Council. Amman.
7. Dr. S. Sonash - Director  
Jordan Valley Farmers Association (Farmers Union) Amman
8. Dr. S. Qasim - Dean of Agriculture  
Jordan University. Amman.
9. Dr. Hassan R. Gharaybeh - Director  
Mr. Khalil Kabour - Research  
Agriculture Research and Extension Department  
Ministry of Agriculture. Amman.
10. Dr. M. Odeh - Director of Public Health  
Municipality of Zirka. Zirka.
11. Dr. Abdul Razaq  
Municipality of Irbid. Irbid.
12. Mr. Burhan Abu Howayej  
Agricultural Economy Department  
Ministry of Agriculture. Amman.

13. Mr. Takroori  
Department of Statistics. Amman.
14. Dr. H. Haddadin - Director  
Plant Protection Department  
Ministry of Agriculture. Amman.
15. Dr. Arafat R. Altamemi - Director Chemistry Department  
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16. Five Farmers and Agricultural Extension Directorate in the Jordan Valley.
17. Mr. Yousef M. Marto - Manager  
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18. Mr. Rafat Qashu - Manager  
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19. Mr. Muhi-Eldin Elabbasi  
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20. Mr. Ghaleb Sh. Bisharat - Owner  
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21. Mr. M. E. Kalisse - Manager  
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22. Mrs. S. Ma'ani - Principal Shareholder  
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Arals Company for Agriculture Products  
P.O. Box 1457. Amman.  
(Representing Bayer)
23. Mr. Ibrahim A. Al-Kharouf - Manager  
Sukhtian Drug Stores  
P.O. Box 1027. Amman.  
(Representing American Cyanamid and Rohm & Haas)
24. Mr. Baker Suleiman Shanti  
P.O. Box 1418. Amman.  
(Representing Procida)
25. Agriculture Supply Company  
Alwehdad. Amman.  
(Dealer)
26. Al-Sharq Company  
Alwehdad. Amman.  
(Dealer)



27. Mr. A. L. Al-Masri - Manager Supplies & Marketing  
Jordan Co-operative Organisation.  
P.O. Box 1343. Amman.
28. Mr. Fouad A. Mango - Managing Director  
Afif Mango Trading Co.  
P.O. Box 424. Amman.  
(Representing R.S.R. France for Sulphur dust)
29. Mr. Shawqi Hamam  
Agriculture Materials Trade  
P.O. Box 9157. Amman.  
(Representing Schering and Verdugt)
30. Abdul Hafiz Agriculture Company  
P.O. Box 1561. Amman.  
(Representing Servos, Ligtermoet, Duphar and Biesterfeld)
31. Mr. Hamdi H. Ghuneim - General Manager  
Oasis Trading Company  
P.O. Box 10133. Amman.  
(Representing Iraqi and Kuwaiti Sulphur dust producers)
32. Mr. Nizar Jardaneh  
Jordan Drugstore  
P.O. Box 422. Amman.  
(Import domestic insecticide concentrate)
33. Mr. Kamal Hassan Hatek  
Mr. Idrees Shabsough  
Kanaris Factory  
P.O. Box 3001. Amman.  
(Operates Sulphur dust plant at Menshia)
34. Dr. Sobhy A. Tieby - Managing Director  
The Arab Pharmaceutical Manufacturing Co. Ltd.  
P.O. Box 1695. Amman.

7.3 PESTICIDE IMPORTS INTO JORDAN 1975/76/77

1975 IMPORTS

INVOICE DATE	ORIGIN	PRODUCT AND FORMULATION	PACKING	VOLUME kg/litre	COST PRICE kg/litre	TOTAL COST PRICE	BASIS OF COST PRICE	REMARKS	WHOLESALE PRICE	RETAILER PRICE
21-1-75	HOECHST	* HOUSTATION 40 Bb	1 litre Al. cans	2000 l	DM 18.80	DM 37600	CIP AQUANA			
22-5-75	HOECHST	"	"	1000 l	DM 23.07	DM 23070	"			
26-9-75	HOECHST	"	"	996 l	DM 23.07	DM 22977	"			
21-3-75	CELANESE	ROXION 40 Bb	1 litre Al. cans	300 l	DM 11.55	DM 3465	" (1.80 days)			
"	"	"	1/2 "	100 l	DM 14.10	DM 1410	"			
"	"	" S 50	1 "	500 l	DM 14.90	DM 7450	"			
"	"	"	1/2 "	100 l	DM 18.00	DM 1800	"			
27-10-75	"	" 40 Bb	1 "	300 l	DM 11.55	DM 3465	"			
"	"	"	100 cc "	100 l	DM 22.25	DM 2225	"			
15-1-75	ION	* BURSAL 4	5 US GAL.	250 US gal (94 tl)		US\$ 13500	CIP AQUANA			
22-5-75	SHELL	AZORIN 24 Bbc	1 litre	1680	£ 2.615	£ 4.394	"			
30-2-75	CIFA GIGY	MUYACON 40 Sow	1 litre	2000	SP 28	SP 56000	"			
"	"	* SUPRACINE 40 Bb	50 litre	250	SP 25.50	SP 6375	"			
"	"	"	1 litre	250	SP 28	SP 7000	"			
21-11-75	"	"	" Al. cans	700	SP 20	SP 14000	C + P AQUANA			
"	"	"	5 litre	600	SP 21.25	SP 12750	"			
25-8-75	LIGTMOBT	MALATHION 57 Bb	1 litre Al. cans	1000	D. Pl. 9.02	D. Pl. 9020	"		1.080	1.200
"	"	"	20 litre	1000	D. Pl. 6.85	D. Pl. 6850	"			
"	"	LIBOTHION (PARATHION) 50 Bb	1/2 litre Al. cans	520	D. Pl. 10.20	D. Pl. 5304	"			
"	"	"	1 "	1000	D. Pl. 8.55	D. Pl. 8550	"			
"	"	"	30 litre	1020	D. Pl. 5.90	D. Pl. 6018	"			
4-8-75	AYER	POLIDOL E 605 Bb	1 litre	2000	DM 18	DM 36000	CIP AQUANA			3.800
"	"	"	1/2 litre	500	DM 22.20	DM 11100	"			4.500
"	"	"	250 cc	250	DM 25.80	DM 6450	"			
"	"	"	100 cc	100	DM 38.70	DM 3870	"			9.000
"	"	"	1 litre	1000	DM 10.60	DM 10600	"			
15-8-75	"	POLIDOL OIL	1 litre	1000	DM 5.22	DM 5220	"			
25-8-75	LIGTMOBT	POLIDOL OIL 10%	25 litre	1000	D. Pl. 8.62	D. Pl. 8620	C + P AQUANA			2.000
15-8-75	AYER	EMERIN 19.5 Bb	1 litre Al. cans	1000	DM 25.40	DM 50800	CIP AQUANA			5.500
"	"	* THARON 600 Lc	1 litre Al. cans	2000	DM 31.80	DM 15900	"			
"	"	"	250 cc "	500	DM 22.40	DM 11200	"			4.200
15-8-75	"	GUSATHION A 400 Bb	1 litre Al. cans	500			"			

1975 IMPORTS

DATE	CIM-CHEGTY	MARK	UNIT	QUANTITY	UNIT PRICE	TOTAL VALUE	TERMS
4-8-75	AMAR 50 Bz		550 l				
9-12-75	BYFELON 4 Bz		50 US Gal. (189 l)				
A 1-2) 21-3-75	CILAMINE	*MELON 40 WP	250 kg				
22-5-75	DOM	PLICTHIN 24 WP	400				
A 1-4) 9-12-75	PRC	*POMAR 5 G	2200 lb. (1000kg)				
"	"	*POMAR 10 G	2200 lb (1000kg)				
A 2-1) 18-4-75	EDUCIST	*APICAN (780 Bz)	600				
27-10-75	CILAMINE	*RAPROL	150				
"	"	"	50				
"	"	"	25				
3-11-75	DOM + HAAS	KAMZAN Bz	1 litre Al. bottl	1000			
A 2-2) 25-1-75	DIAMOND	*MACOIL M 75	100 kg				
3-11-75	DOM + HAAS	DITHANE WP	2002				
15-8-75	LIGHTMOBT	MAIRD 80 WP	2000				
"	"	ZIMB 75 WP	10000				
15-12-75	DOM + HAAS	DITHANE M 45	5000				
18-11-75	NIYSUI	*POPSIL B-70 WP	300				
A 3-1) 16-1-75	BLANCO	TREPLAN	1 US quart. (227				
3-11-75	DOM + HAAS	TOX E 25	240 USquarts litres				
A 3-2) 18-3-75	BLANCO	BRID 80 M	240				
12-4-75	"	"	55				
25-4-75	DIAMOND	INACTAL M 75	100				
A 4) 11-7-75	BRONCH	PROPOKIL TABLETS	64.8 kg				
"	"	BRIVEL TABLETS	1 lb 192 lbs (87.2 kg)				

1975 IMPORTS

Item No.	Date	Local Companies	Description	Quantity	Unit Price	Total Value	Dept.	Min. of Health
B 1-1)	1975	LOCAL COMPANIES	BOXION 50 Bc	5 litres	JD 2.100	JD 10.500	"	"
"	"	"	RAMBOR 41 Bc	181 litres	JD 1.430	JD 258.83	"	"
"	"	"	PRINSTONE 5/50 Bc	21 litres	JD 3.450	JD 108.19	"	"
D 1-1)	May 1975	CELAMINE	*MORPHOS 40 Bc	70000 litres	JD 2.150	JD 150.500	"	Amman Munic.
"	1975	"	DIAXIDIN 40 Bc	3000 litres	-	-	Deol. IRIBD	IRIBD Munic.
D 1-2)	"	CELAMINE	MORPHOS 40 W	5 tons	JD 2.200	JD 11.000	Deol. Zarka	Zarka Munic.
B 1-2)	1975	LOCAL COMPANIES	LITHAM 75 MP	30 kg	JD 1.180	JD 35.400	Deol. Amman	Min. of Health
"	"	"	CELORAM 40 MP	50 kg	JD 0.580	JD 29.000	"	"
"	"	"	DILURIN 55 MP	50 kg	JD 0.950	JD 47.500	"	"
"	"	"	MALATHION 50 MP	1344 kg	JD 0.850	JD 1142.40	"	"
"	"	"	MALATHION 25 MP	100 kg	JD 0.400	JD 40.000	"	"
"	"	"	MAYOON 50 MP	55 kg	JD 3.270	JD 179.850	"	"
"	"	"	MAYEK 40 MP	125 kg	JD 1.500	JD 187.500	"	"
"	"	"	DICAMIN 85 MP	43 kg	JD 1.000	JD 43.000	"	"
"	"	"	*MELION 40 MP	10 kg	JD 2.350	JD 23.500	"	"
"	"	"	CANALAM 25 MP	70 kg	JD 0.580	JD 40.600	"	"
C 1-2)	1975	IND	NET 75 MP (IND)	20000 kg *	FREE	FREE	"	MALARIA CONTROL
B 1-3)	1975	LOCAL COMPANIES	LITHAM 14 MP	605 kg	JD 0.380	JD 229.900	Deol. Amman	Min. of Health
B 1-4)	"	LOCAL COMPANIES	CARBENTL 5 B	29 kg	JD 0.194	JD 5.626	Deol. Amman	Min. of Health
"	"	"	CELORAM 5 G	23 kg	JD 0.220	JD 5.060	"	"

1976 IMPORTS

Line No.	Product	Quantity	Unit	Value	Rate	Notes	Value	Rate	Notes
A 1-1	UNIBOYAL	1000	1 litre Al. cans	US\$ 9100	9.10		US\$ 9100		CIF AQUANA
3-8-76	"	1000	"	US\$ 9100	9.10		US\$ 9100		"
30-1-76	CELANEX	300	"	IM 3525	11.75		IM 3525		"
3-8-76	"	2000	25 litres	IM 28230	14.115		IM 28230		" (180 days)
8-9-76	"	500	1 litre Al. cans	IM 5875	11.75		IM 5875		"
"	"	200	1/2 litre Al. cans	IM 2850	14.25		IM 2850		"
30-1-76	NEOLACAMA	500	25 litre	IM 2900	5.80		IM 2900		"
4-11-76	DIMERON 50 Sw	1000	10 litre	SP 21000	21		SP 21000		C + F AQUANA
19-7-76	DIMERON 50 Sw	1000	10 litre	SP 21000	21		SP 21000		"
26-1-76	VERBUOT	1000	1 litre Al. cans	H.F.I. 7055	7.055		H.F.I. 7055		CIF AQUANA
2-6-76	CYAMMID	500	5 US gal.	US\$ 6.87 USgal	6.87	US\$ 3435	US\$ 3435		"
22-6-76	"	"	"	"	"	"	"		"
26-1-76	VERBUOT	1520	1 litre Al. cans	H.F.I. 12927.60	8.505		H.F.I. 12927.60		"
12-3-76	CELANEX	1000	"	IM 14900	14.90		IM 14900		"
12-3-76	"	150	"	IM 2700	18		IM 2700		"
12-3-76	"	75	"	IM 1586.25	21.15		IM 1586.25		"
12-3-76	"	300	"	IM 3465	11.55		IM 3465		"
12-3-76	"	200	"	IM 2840	14.20		IM 2840		"
12-3-76	"	100	"	IM 1725	17.25		IM 1725		"
2-6-76	GTOWM 400 E	750	5 US gal	US\$ 12.20 USgal	12.20	US\$ 9150	US\$ 9150		"
13-10-75	ROGON L 40	2000	1 litre	US\$ 7580	3.79		US\$ 7580		C + F AQUANA
15-3-76	FUMESTON 40	1500	100 cc	IM 18750	12.50		IM 18750		CIF AQUANA
15-3-76	"	500	"	IM 8500	17		IM 8500		"
22-6-76	GTOWM 400 E	500	5 US gal	US\$ 12.20 USgal	12.20	US\$ 6100	US\$ 6100		"
8-9-76	ROXION S (750 E)	100	5 litres	IM 1360	13.60		IM 1360		" (180 days)
"	"	1000	1 litre Al. cans	IM 14900	14.90		IM 14900		"
"	"	150	"	IM 2700	18		IM 2700		"
"	"	150	"	IM 3172.50	21.15		IM 3172.50		"
"	"	100	100 cc	IM 2495	24.95		IM 2495		"
"	ROXION 40 E	500	1 litre Al. cans	IM 5775	11.55		IM 5775		"
"	"	100	100 cc	IM 2225	22.25		IM 2225		"
26-1-76	VERBUOT	1520	1 litre Al. cans	H.F.I. 12935.20	8.51		H.F.I. 12935.20		"
19-5-76	I.C.I.	3000	1 litre	US\$ 4.114	4.114	US\$ 12342	US\$ 12342		C + F AQUANA
13-5-76	I.C.I.	1000	100 cc	US\$ 5.976	5.976	US\$ 5976	US\$ 5976		"

3-500

1976 I M P O R T S

27-5-76	BORDISK ALKALI	PESTOX 50-EC (ethyl Parathion)	1 litre	1000	DKr 20.75	DKr 20,750	CIP AQARA(45 days)	3,000
"	"	"	1/2 "	240	DKr 24.15	DKr 5,796	"	
"	"	"	1/4 "	200	DKr 29.95	DKr 5,990	"	
"	"	"	100 cc	100	DKr 38.60	DKr 3,860	"	
22-1-76	CIBA-GEIGY	MUVACRON 40 SCW	1 litre	1000	SP 26	SP 26,000	CIP AQARA	
3-9-76	"	"	1 litre	2000	SP 22	SP 44,000	" (180 days)	
14-9-76	SHELL	ALDRIN 40 MSC	1 litre	1008	US\$ 7.32	US\$ 7,382.37	"	
8-5-76	ICI	(*) DURSIN 4E	5 US gal.	300 US gal (1136 l)	US\$ 13.50	US\$ 13,500	CIP AQARA	
5-3-76	SUMITOMO	SURITHION 50-EC	20 litres	3000	US\$ 5.50	US\$ 16,500	CIP AQARA	2,700
13-10-75	MORTVEDISON	PAC 40	1000	1000	US\$ 4.57	US\$ 4,570	"	2,000
"	"	CIBIAL 50 L	500	500	US\$ 5	US\$ 2,500	"	2,400
19-7-76	CIBA-GEIGY	AKAR 50-EC	600	600	SP 19,166	SP 11,500	CIP AQARA	4,500
"	"	"	1 litre	1200	SP 19,166	SP 23,000	"	
13-8-76	"	(*) SUPRACINE 40-EC	5 litres	400	SP 22	SP 8,800	CIP AQARA(180 days)	
"	"	"	1 litre	600	SP 24	SP 14,400	"	
3-9-76	"	"	1 litre	700	SP 24	SP 16,800	"	
"	"	"	5 litres	500	SP 22	SP 11,000	"	
"	"	MOGOS 50-EC (DUPP)	1 litre	600	SP 14	SP 8,400	"	
8-2-76	PKC	ETHION 4 EC	5 US gal.	100 US gal (379 l)	US\$ 1.523.10	US\$ 1,523,100	"	3,500
4-8-76	CIBA-GEIGY	IMASDIN 60-EC	1 litre	1000	SP 19.20	SP 19,200	"	
12-1-75	MERCURIS	TOMAPRINE 6 lbs/US gal.	5 US gal.	1093 litres	E.P.L. 5.30	E.P.L. 10,033	"	
28-4-76	SEW OIL	SUNSPRAY 6E	200 litres	10400	SP 200,928	SP 200,928	CIP AQARA (90 days)	
"	"	" 7E		10400	SP 192,296	SP 192,296	"	
21-5-76	ICI	ALBOLINER		10000	US\$ 5,863	US\$ 5,863	"	
13-8-76	LEFFINGWELL	90 PAR		850 US gal (3217 l)	US\$ 2,456.55	US\$ 2,456.55	CIP AQARA	
A 1 2)	DAUER	TRICHLORON 80 SP	50 kg	500 kg	E. P.L. 10.14	E. P.L. 5070	CIP AQARA	1,600
26-1-76	ICI	(*) PIRINOR 50 NP	1/2 kg	60	US\$ 1043.30	US\$ 1043.30	C+F " (120 days)	10,000
13-5-76	"	"	50 gms	60	US\$ 1232.40	US\$ 1232.40	"	9,000
19-5-76	ICI	PLICTAM 25 M	50 kg	2000	US\$ 11.25	US\$ 22,500	CIP AQARA	
22-6-76	CYAMAMID	CYOCIN 25 PND	25 kg	1125	US\$ 1.58	US\$ 1777.50	"	
3-9-76	SHELL	ALDRIN 40 NP		250		US\$ 755	C+F "	3,000

1976 IMPORTS

17-8-76	UNION CARRIERS	SEVIN 85	25 kg	1000	US\$ 3.37	US\$ 3370	CIF AQABA	1000	1100
A 1-3)	VERBOUT	ETHYL PARATHION 5% dust	50 kg	2000	H. Fl. 2.08	H. Fl. 4160	CIF AQABA		
26-1-76									
A 1.4)	PNC	(*) FURANAN 50	3000 kg	3000 kg		US\$ 3366	CIF AQABA		
16-2-76	"	" 10 G	2000 kg	2000 kg		US\$ 3564	"		
"									
2-3-76	MASP	IMASANTO G 90%	3000	3000		IM 18300	" (180 days)	1000	1100
15-11-76	"	"	20 kg	3000	IM 5.96	IM 17880	CIF AQABA		
A 2.1)	CELANESE	(*) SAPROL	1 litre	150	IM 25.50	IM 3825	CIF AQABA		
30-1-76	"	"	1/2 "	250	IM 26.90	IM 6725	"		
"	"	"	1/2 "	25	IM 29.35	IM 733.75	"		
12-3-76	"	" 19 EC	1 litre	150	IM 25.50	IM 3825	"		
"	"	"	1/2 "	125	IM 29.35	IM 3668.75	"		
8-9-76	"	"	1 "	350	IM 25.50	IM 8925	" (180 days)		
"	"	"	1/2 "	250	IM 26.90	IM 6725	"		
1-12-75	ICI	(*) MILGARD SUPER	1 litre	1200	US\$ 8542	US\$ 8542	CIF AQABA		
13-5-76	"	"	1 litre	1200	US\$ 8542	US\$ 8542	" (120 days)		
"	"	"	1/2 "	1000	US\$ 7759	US\$ 7759	"		
15-6-76	"	"	1 "	1200	US\$ 8542	US\$ 8542	"		
"	"	(*) MIMOD	1 litre	500	US\$ 4244	US\$ 4244	"		
2-9-76	"	"	1/2 "	10	US\$ 266.58	US\$ 266.58	CIF AQABA		
12-5-76	ROCKWELL	(*) APORAN	1/2 litre	600	IM 35	IM 21080	"		
19-7-76	"	"	1/2 litre	600	IM 35	IM 21080	"		
20-3-76	MASP	(*) COLLIN	1 litre	1250	IM 29	IM 36250	" (180 days)		
A 2.2)	MILSTREIFELD	SIZAL 60 WP (SULPHUR)	25 kg	15000	IM 1.30	IM 19500	CIF AQABA		
24-3-76	"	"	25 kg	25000	IM 1.385	IM 35625	"		
15-6-76	"	"	1 kg jar	198	US\$ 3639.24	US\$ 3639.24	"		
15-1-76	EUROPT	(*) BROWTL 50 WP	"	120	US\$ 2205.60	US\$ 2205.60	FOB Antwerp		
12-8-76	"	"	"	300	US\$ 5790	US\$ 5790	CIF AQABA		
20-8-76	"	"	"						

1976 IMPORTS

Year	Company	Product	Quantity	Unit	Value	Origin	Notes
15-6-76	ICI	ACRODAM CM	10000	kg	US\$ 6957.30	CIF	Apaba (120 days)
6-3-76	BASF	POLYMAN H	1000	kg	DM 6250	CIF	Apaba (180 days)
25-11-75	MORTERSON	TIEZINE	10000	kg	US\$ 15,600	CIF	Apaba
12-4-76	BASF	POLYMAN COMBI	5000	kg	DM 42,200	CIF	Apaba (180 days)
26-7-76	SANIDIZ	MILFOX	10000	kg	SP 40,000	CHF	Apaba (120 days)
8-7-76	DIAMOND	(*) JACOBIL 2787 - 75 WP	500	kg	US\$ 3,900	CIF	Apaba
30-7-76	BASF	BAVISTIN	500	kg	DM 23,155	CIF	Apaba (180 days)
1976	Bulgaria	ZINER 80 WP	80000	kg	US\$ 96,000	CIF	Apaba
1976	Kuwait	Dusting Sulphur 98 %	500,000	kg	US\$ 57,500	CHF	Amman
A 3.1)	Local company	2,4-D Iso-octyl ester 67% a.o.	7000	kg	JD 5940.20	Del.	Amman
22-2-76	"	2,4-D butyl ester 76.5% a.o.	3000	kg	JD 2656.20	"	"
13-5-76	ICI	CIBACRYNE	2000	litre	US\$ 7461	CHF	Apaba (120 days)
15-6-76	"	"	2000	"	US\$ 7461	"	"
A 3.2)	DIAMOND	IMACTHAL 75 WP	87	kg	US\$ 469.80	CIF	Apaba
8-7-76	UPJOHN	MIFEE 50 WP	175	kg	US\$ 1570	Del.	Amman airport
15-11-76	SCHERING	DI-TRAMEZ	1050	litre	DM 9.85	CHF	Apaba
A 4.1)	ICI	ACRAL 90 (METHYL)	1200	litre	US\$ 8542	"	(120 days)
10-3-76	DOW	DORFUS NC 2	2658	kg	US\$ 11,340	CIF	Apaba
13-5-76	ICI	METHYL MEXONIS	87	kg	DM 806.40	CHF	Apaba
6-7-76	DOW	"	218	kg	DM 208.6	"	"
11-7-76	ICI	"	2727	kg	US\$ 6240	"	"
30-5-76	G.L.K. New York	"	200	kg	SP 6200	CHF	Apaba
20-9-76	"	"	250	"	SP 7750	"	(180 days)
A 4.2)	CIBA-GEIGY	SEQUESTRANE 136 Po	1000	kg	SP 3000	CIF	Apaba
4-11-75	"	"	168	packages	US\$ 549.36	"	"
13-8-76	"	"	50	kg	US\$ 108.0	FOB	US port
3-9-76	"	Miscellaneous products	64.8	kg	DM 2332	CHF	Apaba
2-9-76	ICI	Home garden products	216	kg	DM 7776	"	"
18-8-76	ENCAP, USA	"	52.5	kg	DM 2478	Del.	Amman airport
A 4.3)	ICI	PHOSFONIN Tablets	60	kg	DM 3320	"	"
11-7-76	"	"	102.4	kg	US\$ 233.35	"	"
30-5-76	"	"	100	kg	US\$ 125.64	"	"
A-4.4)	BAYER	ZELIO Creams	25	grams	"	Del.	Amman airport
6-5-76	"	ZELIO paste	30	grams	"	"	"
"	"	(*) METAX	80	grams	"	"	"
2-9-76	ICI	"	1/2	kg	"	CIF	Apaba
"	"	"					



1976 IMPORTS

Code	Origin	Product Name	Quantity	Value	Origin	Value	Min. of Health
A 5)	CIM-CHEGT	PANHEM COMBI 500 PW	20 litre	Free			
15-9-76	"	ALSON 800	50 litre	"			
"	"	ICOM 80 MP	10 kg	"			
B 1.1)	Local companies	PYRETHONE 5/50 EC	65 litre	JD 226.850	Bal. Amman		Min. of Health
1976	"	CTOON 40 EC	1125 litres	JD 1665	"		"
"	"	MALATHION 57 EC	850 "	JD 952.000	"		"
C 1.1)	"	(*) ABATE 500 EC	2582 "		"		Malaria control
1976	"	(*) NUVAL N 20 U	18000 "	JD 58590	"		Amman Munic.
D 1.1)	"	NICOBOL 60 EC	4000 "	JD 9320	"		"
1976	"	NUVAL 100	2000 "	JD 5000	"		"
"	"	EMOPIBUS 40 EC	5000 "		Bal. Irbid		Irbid Munic.
"	"	NUCIBOL 57 EC	1000 "	JD 4000	Bal. Zarba		Zarba Munic.
"	"	NUVAL 57 EC	300 "	JD 300	"		"
B 1.2)	"	MALATHION 50 MP	570 kg	JD 484.500	"		Min. of Health
1976	"	BAYON 50 MP	1835 kg	JD 6000.450	"		"
"	"	DAYTEX 40 MP	125 kg	JD 187.500	"		"
"	"	DICARBAN 85 MP	13 kg	JD 13.000	"		"
"	"	(*) NEXION 40 MP	210 kg	JD 493.500	"		"
"	"	CTOON 25 MP	1950 kg	JD 2080.650	"		"
C 1.2)	WRO	DEPT 75 MP (WRO)	18505 kg	Free	"		Malaria control
1976	"	DEPT TECHNICAL	178 kg	"	"		"
"	Syria	DIELDRIN 40 MP	500 kg	"	"		"
B 1.3)	Local companies	BAYON 15 Durt	982 kg	JD 355.680	"		Min. of Health
1976	"	CAMMAYL 5 G	141 kg	JD 27.354	"		Min. of Health
B 1.4)	"	(*) Actellic Assemblies	17 kg	USD 116.28	CIF Aleppo		
E)2-9-76	ICI						

1977 IMPORTS

Ref	Supplier	Product	Unit	Quantity	Unit Price	Total Price	Incoterms	Remarks	Dealer Price	Farmer Price
A 1.1)	UNIROVAL	(*) ORITE 57 EC	1 litre	1500 litres	US\$ 9.10	US\$ 13650		CIP Agaba	2.000	2.200
15-10-76								" (180 days)	2.800	3.100
7-1-77	BASEP	PERMETHION 40 EC	100 cc	200	DM 8.46	DM 16920		"	.810	0.900
"	"	"	5 US gal.	1250 US gal (4731 l)	DM 14.26	DM 7140		"		
12-1-77	CYBAMID	CIGON 400	"	"		US\$ 15250		"		
"	"	"	"	"		US\$ 15250		"		
7-4-77	VERDUOT	DIMETHOATE 50 EC	1 litre A-1 can	1000	H. Fl. 8.37	H. Fl. 8370		"	2.250	2.500
19-4-77	PROCIWA	SYSTATON 40 EC	25 litre	2000	US\$ 2.65	US\$ 5300		CIP Agaba		
"	"	"	1 litre	2000	US\$ 3	US\$ 6000		"		2.750
26-5-77	SERVOS	DINBOX 40 EC	1 litre A-1 can	500	US\$ 2.40	US\$ 1200		"		2.500
20-10-76	PMC	EMION 40 EC	5 US gal.	200 US gal (757 l)		US\$ 3096		FOB New York		
9-3-77	HOECHST	(*) HOSTATION 40 EC	1 litre A-1 can	1006	DM 23.70	DM 23859.60		CIP Agaba	4.500	5.000
15-6-77	"	"	"	1006	DM 23.70	DM 23859.60		"		
7-4-77	VERDUOT	ETHYL PARATHION 57 EC	"	2520	H. Fl. 8.63	H. Fl. 21757.60		"	3.420	2.500
8-6-77	WATER	POLLIDOL EM	"	2000	DM 21.40	DM 42800		" (180 days)		3.800
14-6-77	PROCIWA	TYPHON 50 EC	"	2000	US\$ 2.75	US\$ 5500		CIP Agaba		2.250
26-5-77	SERVOS	PARTOX 63 EC	"	500	US\$ 5.35	US\$ 2675		"		
"	"	PAMPUS E 50 EC	"	300	US\$ 2.40	US\$ 780		"		
"	"	"	"	100	US\$ 2.85	US\$ 285		"		
"	"	"	1/2 l A-1 can	100	US\$ 3.12	US\$ 312		"		
"	"	"	1/4 l "	100	US\$ 4.37	US\$ 437		"		
"	"	"	100 cc	100	US\$ 4.345	US\$ 4345		"	1.750	1.900
13-7-77	ICI	POSPHENO 50	1 litre	1000	SP 22	SP 44000		CIP Agaba		4.500
15-4-77	CIM-GEIGY	MUVACRON 40 SCH	1 litre	2000	US\$ 8.25	US\$ 8316		"		
27-7-77	SHELL	AZOBIN 40 USC	1 litre	1006	SP 22	SP 44000		"		
29-9-77	CIM-GEIGY	MUVACRON 40 SCH	1 litre	2000	US\$ 3.89	US\$ 3423.20		FOB Italian port	3.600	4.000
15-10-77	SHELL	AZOBIN 40 USC	1 litre	1006	US\$ 5.30	US\$ 2650		CIP Agaba	1.850	2.100
5-4-77	ROHM + HAAS	KELTHANE NP	22 kg	660 kg	US\$ 3.325	US\$ 1662.50		"		3.000
26-5-77	SERVOS	ACAROL 50 EC	1 litre	500	US\$ 3.65	US\$ 3650		"		
25-8-77	BELLAGHET	DICOPOL 42 EC	1 l A-1 can	1000	DM 17.30	DM 25950		" (180 days)		
3-11-77	"	"	"	1500	SP 19.20	SP 19200		CIP Agaba ( " )		3.500
7-4-77	BAYER	MAYCON 20 EC	25 litre	1000	SP 19.20	SP 19200		"		
24-5-77	CIM-GEIGY	MASUDIN 60 EC	1 litre	1000	SP 24	SP 24000		CIP Agaba		4.500
2-8-77	"	"	"	1000	SP 24	SP 24000		"		
24-5-77	"	(*) SUPRACINE 40 EC	"	1000	SP 15	SP 30000		"		
2-8-77	"	"	"	1000	Free compensation			"	2.700	3.000
9-5-77	SANTOZ	ELATIN 25	1 l A-1 can	2000				"	2.250	2.500
"	"	MATHIO 33	"	500				"		

1977 I M P O R T S

Date	Commodity	Quantity	Unit	Value (US\$)	Origin	Value (US\$)	Value (US\$)	Value (US\$)
21-3-77	Sum Oil	26,000			US\$ 0.76	US\$ 19,920	US\$ 19,920	US\$ 19,920
26-5-77	SEWOS	500			US\$ 0.82	US\$ 410	US\$ 410	US\$ 410
"	"	500			SP 26	US\$ 7800	US\$ 7800	US\$ 7800
1-7-77	CIMA-CRIGY	300	1 litre		US\$ 11.50	US\$ 3450	US\$ 3450	US\$ 3450
14-10-77	ICI	700	"		US\$ 12.10	US\$ 8470	US\$ 8470	US\$ 8470
30-11-77	SUMITOMO	300				US\$ 3630	US\$ 3630	US\$ 3630
A 1.2)		200 kg				US\$ 43500	US\$ 43500	US\$ 43500
28-1-77	DALGAARD-ANDERSON	416	kg			IM 4798.80	IM 4798.80	IM 4798.80
7-3-77	HAYER	9492	kg		IM 9.30	IM 88275.60	IM 88275.60	IM 88275.60
15-2-77	"	4000	kg		IM 16.90	IM 68600	IM 68600	IM 68600
7-3-77	"	2000	kg		IM 19.60	IM 39200	IM 39200	IM 39200
14-10-77	"	1500	kg		IM 29.30	IM 43950	IM 43950	IM 43950
15-2-77	"	2646	kg			US\$ 53154.74	US\$ 53154.74	US\$ 53154.74
26-3-77	REPORT	1998	kg			US\$ 16383.60	US\$ 16383.60	US\$ 16383.60
23-6-77	"	540	kg		US\$ 21.13	US\$ 11410.20	US\$ 11410.20	US\$ 11410.20
29-9-77	"	2000	kg		US\$ 0.95	US\$ 1900	US\$ 1900	US\$ 1900
19-4-77	PROCHIA	3000	kg		US\$ 0.50	US\$ 1500	US\$ 1500	US\$ 1500
25-4-77	"	5000	kg		US\$ 0.50	US\$ 2500	US\$ 2500	US\$ 2500
"	"	300	grams			IM 3600	IM 3600	IM 3600
7-4-77	HAYER	400	"			IM 3600	IM 3600	IM 3600
"	"	300	"			IM 3600	IM 3600	IM 3600
26-5-77	SEWOS	500	kg		US\$ 3.42	US\$ 1710	US\$ 1710	US\$ 1710
"	"	500	kg		US\$ 3.30	US\$ 1650	US\$ 1650	US\$ 1650
12-11-77	Union Carbide	2000	kg		US\$ 3.69	US\$ 7380	US\$ 7380	US\$ 7380
"	"	500	kg		US\$ 10.76	US\$ 5380	US\$ 5380	US\$ 5380
A 1.3)		15000 kg			US\$ 0.204 kg	US\$ 3060	US\$ 3060	US\$ 3060
15-2-77	KOBUNA-TARIN	1500 kg			US\$ 0.80 kg	US\$ 1200	US\$ 1200	US\$ 1200
30-11-77	SUMITOMO	4000 kg				US\$ 4312	US\$ 4312	US\$ 4312
A 1.4)		1520 litres				IM 44080	IM 44080	IM 44080
18-7-77	VELSICOL	1000	litre		IM 29	IM 33280	IM 33280	IM 33280
A 2.1)		1200	litre		IM 33.28	IM 42000	IM 42000	IM 42000
28-2-77	BSF	1200	litre		IM 35	IM 42000	IM 42000	IM 42000
23-2-77	Hoechst	1200	litre		IM 35	IM 42000	IM 42000	IM 42000
15-6-77	"	2004	litre		IM 35	IM 72378.15	IM 72378.15	IM 72378.15
28-7-77	"							

1977 I M P O R T S

DATE	SELLER	COMMODITY	QUANTITY	UNIT	PRICE	TERMS	ORIGIN	VALUE	INCIDENCE
16-3-77	CELAMERK	(*) SAPROL	250	1/2 litre	DM 26.90		C+P Agaba (180 days)	DM 6725	4.250
"	"	"	500	1 litre	DM 25.50		"	DM 12750	
5-4-77	Bohm + Haas	KARATHAME BC	100 kg	1 kg	US\$ 3.55		FOB Italian port	US\$ 355	
"	"	KARATHAME LC	250 kg	1 kg			"	US\$ 1771.50	
"	"	STYREL	250 kg	50 kg			"	US\$ 707.50	
8-9-77	"	KARATHAME LC	300 kg	1 kg			"	US\$ 2133	
"	"	ACARTHAME BC	250 kg	1 kg			"	US\$ 887.50	
21-7-77	ICI	(*) MINMOD	100 litre	1 litre	US\$ 7.11		C+P Agaba	US\$ 7110	3.000 5.000
A 2.2)									
28-10-77	HOECHST	COSAM	25000	25 kg	DM 1.325		CIP Agaba	DM 33125	
20-1-77	HOECHST	COSAM (BOG vertétable sulphur)	25000	25 kg	DM 1.325		CIP Agaba	DM 33125	
22-4-77	BIESTERFELD	SIZAL ( " )	30000	30000	DM 1.385		C+P Agaba	DM 41550	
25-2-77	Raffiniers de Soufre	Dusting sulphur powder	200,000	50 kg	FF 1.040		"	FF 208,000	0.250
30-3-77	"	"	200,000	50 kg	FF 1.040		"	FF 208,000	0.075
25-5-77	"	"	200,000	50 kg	FF 1.040		"	FF 208,000	
23-5-77	Lebanon	Yellow dusting sulphur	50,000	50 kg	LE 400 ton		FOB Lebanon	LE 20,000	
9-6-77	Kuwait/Lebanon	Dusting sulphur	600,000	25 kg	US\$ 0.115		C+P Amman	US\$ 69,000	0.045
9-3-77	WYER	(*) BAYLETON 25 MP	300	1 kg	DM 59.60		Del. Amman airport	DM 17888	12.000
"	"	"	1000	1 kg	DM 59.60		CIP Agaba (180 da)	DM 59,600	
12-5-77	"	"	200	1 kg	DM 59.60		Del. Amman airport	DM 11920	
16-6-77	ICI	ZINIB 80	14,000	25 k g	US\$ 1.07		C+P Agaba	US\$ 14,980	0.650
7-11-77	ELLAGHET	ZINIB 280 MP	10,000	25 kg	US\$ 1.17		C+P Agaba	US\$ 11700	0.555
19-1-77	"	MAFET 880 MP	2000	25 kg	US\$ 1.66		"	US\$ 3320	1.200
"	"	"	1000	25 kg	US\$ 1.47		"	US\$ 1470	
3-11-77	"	COSAMIL MP	500	25 kg	US\$ 1.47		"	US\$ 735	
19-1-77	"	COSAMIL MP	4968	1 kg	US\$ 1.22		"	US\$ 6060.96	0.550
17-3-77	PROGIDA	ZINATE 80 MP	2000	1 kg	US\$ 2.35		FOB Italian port	US\$ 4700	1.250
5-4-77	Bohm + Haas	M 45	2000	1 kg	US\$ 2.25		C+P Agaba	US\$ 4500	1.500
3-11-77	ELLAGHET	MARCOYL 80	2000	25 kg	US\$ 1.45		FOB Italian port	US\$ 2900	
5-4-77	Bohm + Haas	Z 78	500	20 kg	US\$ 0.53		"	US\$ 275.60	
"	"	DITHAME 5-60	12,000	25 kg bags			C+P Agaba	US\$ 14726.10	
3-6-77	"	DITHAME Z 78	2000	25 kg	US\$ 1.64		"	US\$ 3280	
26-5-77	SERVO	DIAFEB 80 MP	400	1 kg	US\$ 1.600		FOB Italian port	US\$ 1600	
5-4-77	Bohm + Haas	KARATHAME PM-57	260	1 kg	US\$ 1040		"	US\$ 1040	
8-9-77	"	"	520	130 kg	US\$ 275.60		"	US\$ 275.60	
5-4-77	"	VAPAM	300	1 kg	DM 8400		"	DM 8400	5.250
22-4-77	WYER	MOESTYMI 25 MP	500	25 kg	SP 3.80		"	SP 1900	1.200
18-5-77	CIM-GEIGY	COPMAYOL 50 MP	500	"	SP 3.80		"	SP 1900	
2-8-77	"	"	500	"			"		

1977 IMPORTS

DATE	ORIGIN	COMMODITY	UNIT	QUANTITY	UNIT PRICE	TOTAL VALUE	TERMS	CUSTOMS CODE	EX-RATE	NET VALUE
10-12-76	TURKIE	Various fungicides + insecticides		1796						
28-2-77	INDIA	IMVISTIN 50	5 kg	750	IM 51.90					
8-7-77	DUPONT	(*) Imilato 50 WP	1 kg	204						
28-7-77	"	"	1 kg	504						
7-10-77	"	"	1 kg	540						
8-12-77	"	"	1 kg	540						
14-7-77	ICI	AGROSCAN ON 1.5	25 kg	10,000						
14-9-77	BAYER	ANTHACOL 70 WP	25 kg	2000	IM 7.80					
12-8-77	"	"	25 kg	1000	IM 7.80					
15-8-77	NETSUJI	(*) TOPSIN-M 70 WP	1/2 kg	500	US\$ 9.70					
A 3.1)	PHILADELPHIA	(*) MONSTAR 25	25 litre	2000	US\$ 8.80					
29-10-76	"	"	25 litre	2000						
14-10-77	Bahn + Hoes	TOX E 25	1 kg	400						
5-4-77	ELANCO	TRIFLURIN EC	1 US quart	1000						
10-8-77	INDIA	BASACON	1/2 kg	500	IM 34.05 litre					
26-9-77	"	"	1/2 kg	100	US\$ 3.04					
A 3.2)	SIEGROS	PROFOLIN 50 WP	1 lb	327						
26-5-77	"	"	1 lb	450						
A 4.1)	BERNARDINI	METHYL BROMIDE 98 %	1/2 lb	475						
29-10-76	"	"	-	2400						
11-2-77	SOEBO	"	400x3 gr tabs	324						
25-8-77	ELLAGHET	"	80 gram	512	US\$ 2.2788					
6-9-77	SOEBO	"	1/2 kg	500	US\$ 1.2564					
A 4.3)	BERNARDINI	PROFOLIN Tablets	40 kg	15,000	US\$ 1.60					
29-10-76	"	"	"	15,000	US\$ 1.60					
A 4.4)	ICI	(*) IMTRAK	80 gram	30						
14-12-76	"	"	1/2 kg	50						
25-4-77	"	"	40 kg	20						
4-8-77	"	"	"	5						
A 5)	CIBA-GEIGY	SERQUESTIN 1.38 Pp		30						
14-12-76	"	"		50						
"	"	SUPRACINE 40 EC		20						
"	"	ALSOL 800 SCN		5						
16-1-77	BOOTS	AMITRAS 20 EC		5						
"	"	DICLOFAN 50 WP		5						
17-3-77	PRUCIDA	MANEBS 80 WP		4						

1977 IMPORTS

Year	Country of Origin	Product Name	Quantity	Value	Remarks
21-4-77	PERU	PISICANT Grains	4 kg		
11-5-77	SAMBOZ	MILAMIN Bait	5 kg		
16-5-77		CAMBARD	100 kg		
6-7-77	CYB-GELGY	CESAGARD 80 WP	6 kg		
"	"	TOPOGARD 500 W	10 kg		
2-8-77	SHELL	TORQUE 55 SC	4 kg		
23-8-77	CYB-GELGY	TRECHAM 50 WP	5 kg		
"	"	WOODS 500 EC	10 litres		
5-8-77	Denmark	Poison for flies	36 litres		
29-9-77	Upjohn	EMIDE 50 W	4 lbs		
8-9-77	Bain + Hans	KELTHANE EC	6 litres		
1977	EUROPE	Lemate 90	15 kg		
"	CYAMALID	STOMP 330 E	10 kg		
"	"	ACCOLAGE	4 kt		
"	"	KERB	2 kg		
"	"	ACC 64475			
"	"	THINUP 5 G			
"	"	ML 43467			
"	SHELL	SILICON	25 litres		
"	CYB-GELGY	DICLOMAN	10 litres		
"	ROOTS	MITAC	25 litres		
"	"	ALAMIN	5 kg		
"	"		30 kg		
B 1.1) 1977	Local companies	MERTAMIN 3/30 EC	300 litres	JD 6.000	Min. of Health
"	"	RAYON 20 EC	2000 "	JD 2.470	"
C 1.1) 1977	"	SURITION 50 EC	50 litres		
"	Per-American, H.O.	(*) ALATE 500 EC	3400 litres	US\$ 7.87	Malaria control
D 1.1) 1977	Local companies	RAYON 50 EC	3000 litres		
"	"	RAYON 40 EC	5000 litres	JD 12500	Ammon mmic.
"	"	(*) NEO-HEPTIN	2000 litres		"
"	"	MELION 40 EC	2000 litres	JD 2.300	Irbid mmic.
"	"	MUWAMOL N 20 U	4000 litres	JD 3.000	"
"	"	MUCIDOL 40 EC	2000 "	JD 2.830	Zirba mmic.
"	"	SURION (4% Bromo Phos. + 0.05 Man-thiate)	3000 "	JD 2.250	"
E 1.1) 1977	AL SHAMAM AEROSOL	QUICK	82x72x1602 Aerosol	JD 213.20	Min. of Health
"	"	"	100x72x1202 Aerosol	JD 175	"
"	"	"	50x62 gal	JD 200	"
"	"	"	34x48x1 litre	JD 153	"

3000

2.700

Min. of Health

Min. of Health

Min. of Health

Min. of Health

Min. of Health

Min. of Health

Min. of Health

Min. of Health

Min. of Health

Min. of Health

Min. of Health

1977 I M P O R T S

Year	Origin	Product	Quantity	Value	Min. of Health
1977	Kennit	QUICK	1200	KB 648.96	Min. of Health
"	"	"	1200	KB 500	"
"	"	"	4340	KB 701.2	"
14-5-77	"	"	11672		
1977	Spray Pack, Athens	MINURVOX	40000	US\$ 93,000	CIP Agaba
17-3-77	Mediemaal Cam	FLICK TOK	3203	US\$ 11,909.52	C-P Agaba
8-7-77	ICI	Artellic Aerosol	4030		
17-12-76	Spray Pack, Athens	MINURVOX	2000	JB 3640	Min. of Health
B 1.2)	Local companies	SUMITHION 40 WP	2000	JB 2700	"
1977	"	CARBAMYL 50 WP	1450L	Free	Malaria control
"	"	IMT 75 WP (MMD)	500	"	"
"	"	IMT TECHNICAL (MMD)	500	"	"
"	"	DILURON 40 WP	1500	JB 615	Min. of Health
B 1.3)	Local companies	SUMITHION 35 Dust	90,000	US\$ 144,000	Min. of Health
1977	ICI	(*) MERTAK	1600 kg	US\$ 144,000	Assess memo.
D 4.4)	ANYVILE	KOLLAPT (Gins reducticoids)	-	Libre 832,000	
1977					
6-9-77					

**Sources:** Ministries of Agriculture and Health, Municipalities and the Jordan Co-operative Organisation

**NOTES ON THE TABLES**

(\*) denotes probable patent extent

Code - A : Agricultural use  
B : Public Health use  
C : For malaria control  
D : Municipal use  
E : Domestic use

1	Insecticide	
1.1	"	brands
1.2	"	wettable powders
1.3	"	dust
1.4	"	granules
2	Fungicide	
2.1	"	brands
2.2	"	wettable powders
2.3	"	dust
3	Herbicide	
3.1	"	brands
3.2	"	wettable powders
4	Other	
4.1	"	brands
4.2	"	powders
4.3	"	granules/tablets
4.4	Rodenticides	
5	Samples	

Thus D 4.4 denotes Municipal use of rodenticides.



7.4. SUMMARY OF IMPORTS - JORDAN

PRODUCT TYPE	1975	1976	1977
	TONS	TONS	TONS
Insecticides - Liquids - Commodities	20.11	52.06	63
- Specialities	79.24	31.9	11.42
- Powders - Commodities	22.17	28.56	53.41
- Specialities	5.36	0.32	5.18
- Dasts - Commodities	0.6	2.91	18
- Granules - Commodities	0.05	6.14	4
- Specialities	2	5.0	-
Fungicides - Liquids - Commodities	1	-	1.15
- Specialities	0.83	8.86	8.67
- Powders - Commodities	19	156.5	72
- Specialities	0.4	1.12	3.75
Mettable Sulphur			80
Dusting Sulphur (documented)		500	1250
Dusting Sulphur (additional estimate)			250
Winter + Summer Oils	-	34.02	27
Herbicides - Liquids - Commodities	0.48	14	1.35
- Specialities	-	-	4.5
- Powders - Commodities	-	-	0.1
- Specialities	0.4	0.26	-
Rodenticide Bait	-	0.31	122.61
Other Products (mainly Methylbromide + Phostoxin)	0.15	9.92	3.95
<b>TOTAL LIQUIDS</b>	<b>101.74</b>	<b>149.97</b>	<b>120.7</b>
<b>TOTAL POWDERS + DUSTS</b>	<b>47.93</b>	<b>690.09</b>	<b>1731.44</b>
<b>TOTAL GRANULES</b>	<b>2.12</b>	<b>11.42</b>	<b>4.32</b>
<b>TOTAL ALL OTHERS</b>	<b>-</b>	<b>0.4</b>	<b>122.61</b>
<b>GRAND TOTAL</b>	<b>151.79</b>	<b>851.88</b>	<b>1979.07</b>

VALUE (Approximate - CIF/C+P/Delivered) in

US\$ . . . . . 756,882 1,081,316 1,608,057

## 7.5 DUSTING SULPHUR IN JORDAN

No statistics of use or importation of dusting Sulphur for agricultural purposes are maintained.

It is not necessary for an importer to obtain approval from the Ministry of Agriculture prior to importing or selling dusting Sulphur. It is proposed that such approval be initiated.

At present the prospective importer must obtain prior approval of the Public Safety Department at the Ministry of the Interior.

AL AQSA Clearing Company Amman reports that imports of dusting Sulphur attract:

- 4% import licence fees, payable to the Ministry of Interior
- 2% additional taxes

The following organisations/persons are involved currently in the sale of dusting Sulphur for use on agricultural crops:

- two gentlemen who operate a mill at MENSHIA.

They report:

- importing rock Sulphur from Iraq
  - milling to an unknown specification, but submit samples to the Government analyst, and have continuing problems with quality
  - production of Sulphur dust during 1973 - 77 was 2300 tons, although they had planned to produce 1500 tons/year
  - little support from local farmers for their product.
- 
- Mango trading who import from a well-known French supplier, whose imports are known to the Ministry of Agriculture and whose product commands preference by local farmers and sells at a premium over competitive materials at JD 75 ton to the farmers. They had considered erecting a local mill but found it to be too costly, have taken no action but reported interest in a local formulation project and contracting for a high quality local product.

- OASIS trading who represent both the KUWAIT Sulphur Company and the Iraqui producer near MOSUL. The Iraqui Sulphur dust retails to the farmer at JD 45 ton and that from KUWAIT at JD 55 ton. Similarly they had considered a local milling operation and expressed interest in investing in a local formulation plant and contracting to purchase a high quality local Sulphur dust to replace imports.
- OBEGI + Company who are associated with a formulation plant in the Lebanon and import Lebanese dusting Sulphur at a price of US\$ 131 ton CIF Amman.
- Jordan Co-operative Organisation who are the largest single buyers of dusting Sulphur and reported buying on
  - 500 tons in 1976 at US\$ 115 ton C+F Amman
  - 600 tons in 1977 at US\$ 115 ton C+F Amman.

The specification of the Kuwaiti, Lebanese and French products are that all passes through a 325 mesh sieve, while the Iraqui material being slightly coarser only passes a 250 mesh sieve. Farmers in the Jordan Valley report that the Menshia Sulphur dust will not go through a hand duster, and that 3 kg French material has the same benefit as 10 kg Menshia material.

Estimates of the annual use of dusting Sulphur vary from 1500 tons up to 3300 tons. The writers best estimate for 1977 is:

- 600 tons from Kuwait for Co-operative
- 300 tons Menshia product
- 300 tons from Lebanon, although 700 tons was imported
- 400 tons from France, although 600 tons was imported
- 200 tons from Iraq, although nearer 1000 tons was imported.

totalling 1800 tons, of which 100 tons is used in local production of batteries and plastic materials. Thus a cautious estimate is 1500 tons annually for dusting a crops with the market statio, although some reports indicate a 10% annual increase in use.

The three importers and the one local producer sell both to farmers, and to dealers to whom they allow a 5 - 10% discount off the retail price and credit of 3 - 9 months.

Dusting Sulphur is packed in 50 kg bags, the better material in a polypropylene outer and polyethylene inner.

Sources of bright yellow rock or lump Sulphur include:

- Iraq, whose Commercial Attache in Amman verbally through OASIS reported a selling price of US\$ 60 ton delivered Amman (US\$ 40 ton FOB Iraqi plant plus US\$ 20 ton transport by truck to Amman). This is supported by the posted price for Iraqi/Iranian Sulphur of US\$ 42 - 46 ton FOB.
- Kuwait, but their material is all contracted.
- Poland, whose posted price is US\$ 40 - 48 ton FOB GDANSK.
- USA, Canada and Mexico, whose current price is US\$ 66 ton ex Rotterdam terminal.

Thus for 1000 ton lots the Iraqi FRASCH Sulphur appears to be the most competitive source now. However, in the future when the Jordan Phosphate Company comes on stream and starts using some 300,000 tons rock Sulphur annually, it may be that a Jordanian pesticide project could draw 1000 - 5000 tons rock/lump Sulphur from the fertiliser plant at considerable saving.

## 7.6 CROPS, YIELDS AND IRRIGATION IN JORDAN

In 1976 there were 50,791 agricultural holdings covering 3,904,031 DUNUMS (10 DUNUMS = 1 Hectare), of which:

- 8634 holdings were in the farm size 50 - 100 dunums
- 8522 holdings were in the farm size of less than 5 dunums
- 6929 holdings were in the farm size of 10 - 20 dunums
- 5479 holdings were in the farm size of 100 - 200 dunums
- 5337 holdings were in the farm size of 20 - 30 dunums

The Ministry of Agriculture in their 1974 Working Paper indicated:

- vegetables occupied 9% of the cultivated area and contributed 53.3% of the agricultural production.
- fruit occupied 6.6% of the cultivated area and accounted for 12.9% of the total agricultural production.
- field crops occupied 84.3% of the cultivated area and contributed 33.8% of the total agricultural production.

At that time yields were projected to increase between 1975 and 1985 by an average of:

- 142% in irrigated areas
- 134% in dry land areas

Whereas the Five Year Plan 1976 - 80 proposed:

- a production increase of 90% in vegetable production
- 148% increase in fruit production.

In 1974 it was noted that yields were low and could at least be doubled. However, crop areas and yields are reported to be similar in 1977 to those in 1973.

The 1976 - 80 Five Year Plan indicated that of the 92.6 million dunum land that the average annual rainfall was:

- less than 200 mm on 84.6 million dunum
- 200 - 300 mm on 5.3 million dunum
- 300 - 500 mm on 1.7 million dunum
- 500 - 800 mm on 1 million dunum

and also that of the cultivated area (probably 1974) of 5 million dunum 93% was rainfed and 7% (386,000 dunum) was completely or partially irrigated.

Moisture is the main limiting factor in production. The higher the realistically anticipated crop yield, the greater the volume of pesticide use normally, assuming the farmers can obtain a realistic price for their crop.

In 1976 the Department of Statistics report the total cropped area as 2,825,486 dunum, made up as follows:

	Ghora	Hills	Total
Field crops	89,103	2,155,424	2,244,527
Vegetables	169,884	82,705	252,589
Fruit	22,279	306,091	328,370
TOTAL-DUNUMS	281,266	2,544,220	2,825,486

Figures for the irrigated area vary, but by extrapolation, it appears that in 1976:

- 57,000 dunums were irrigated in the hills, mainly from artesian wells
- 280,000 dunums were irrigated in the Ghora.

The 1976 - 80 Five Year Plan indicates 386,000 dunum were partially or completely irrigated in 1974 - 5 and planned an increase of permanent irrigation in the Jordan Valley of 96,000 dunum plus 29,000 dunum in the hills. The Jordan Valley Authority plans to:

- increase the irrigated area up to 360,000 dunums by 1982/83, including 90,000 dunums sprinkler irrigation.
- increase the vegetable cropping intensity from 106% in 1977 to 133% by 1982/83 or sooner.

It can be seen that the Jordan Valley (Ghor) accounts for less than 10% of the cropped areas in 1976 yet produces nearly 70% of the gross value of agricultural production - hence the importance of plans there to both increase irrigation and cropping intensity. Because the implementation of both will directly influence the volume use of pesticides, providing the farmer can sell his crop at a realistic price.

The more important crops on the East Bank are shown below, by area and total production in 1976 (source: Department of Statistics), and alongside the more important crops in the Jordan Valley and Southern Ghora (Ghara) in 1976, and the projected area for 1980 and 1985 (source: Jordan Valley Authority):

CROP	TOTAL NET BASK (including the census)		ACTUAL 1976		1980		FORECAST 1985	
	AREA - BURN	PRODUCTION TONS	AREA - BURN	PRODUCTION TONS	AREA - BURN	PRODUCTION TONS	AREA - BURN	PRODUCTION TONS
BEAN	1,369,455	66,664	309	107	496	300	570	370
BEAN	536,363	13,228	4,900	11,000	8,200	20,000	13,200	33,000
BEAN	229,734	9,300	2,070	6,400	4,600	10,665	6,620	16,570
BEAN	47,491	1,835	11,076	23,354	14,581	34,000	28,581	71,452
BEAN	16,200	370						
BEAN	10,998	96						
BEAN	255,707	-						
BEAN	30,759	13,600						
BEAN	6,415	1,611						
BEAN								
BEAN	24,732	15,771						
BEAN	88,267	87,078	61,051	95,642	81,169	125,000	130,519	201,000
BEAN	12,176	11,409	7,638	9,906	10,666	32,000	20,000	60,000
BEAN	27,019	16,810	6,990	13,350	8,410	16,000	15,709	30,000
BEAN	11,116	4,670	7,500	5,455	8,941	6,500	10,316	7,500
BEAN	7,270	4,223	6,933	5,594	12,393	10,000	23,543	19,000
BEAN	6,794	3,726	4,925	6,075	7,317	9,000	9,756	12,000
BEAN	1,474	562	320	300	512	300	718	700
BEAN	8,834	12,997	2,914	7,348	4,779	12,000	5,948	15,000
BEAN	2,519	1,298	945	644	1,362	2,000	2,726	4,000
BEAN	27,250	42,030	24,839	38,426	36,199	56,000	66,500	103,000
BEAN	5,032	7,675	8,909	21,306	10,537	25,000	12,645	30,000
BEAN	5,830	3,674	576	375	1,075	700	1,536	1,000

7.7 IMPORTANT PESTS AND PESTICIDES IN JORDAN - 1977

CROP	PEST	PESTICIDE
Citrus	Red Scale	Dimethoate or Summer Oil
	Spider Mites	Diocofol or Parathion
	Phytophthora Spp.	Zineb or Copper
Olives	Olive Fly	Dimethoate
	Scale + Psylla	Dimethoate, Malathion or Parathion
	Fruit Fly	Dimethoate or Parathion
Vegetables:	Spodoptera + Heliothis Spps.	Lannate, Tamaron, Parathion or Dursban
- Tomato	Cutworm	Lannate, Dursban or Trichlorfon
- Eggplants	White Fly	Dimethoate or Monocrotophos
- Cucurbits	Mites	Sulphur, Diocofol, Plotran or Omite
- Peppers	Blight + Wilt	Zineb, Maneb or Mancozeb
- Potatoes	Powdery Mildew	Sulphur, Saprol, Nimrod or Bayleton
	Aphis	Dimethoate or Monocrotophos
	Downey Mildew	Maneb, Zineb, Coc or Bavistin
	Nematodes	Vydate or Furadan
Vines	Powdery Mildew	Sulphur, Saprol, Bavistin or Nimrod
	Polychrosis Spp.	Dimethoate, Malathion or Parathion
	Mealy Bug	Dimethoate, Malathion or Parathion
	Mites	Sulphur
Deciduous Fruit + Figs	Powdery Mildew	Sulphur, Saprol, Afugan or Bavistin
	Aphis	Dimethoate, Dimecron or Monocrotophos
	Peach Leaf Curl	Copper
	Wax Scale (Figs)	Parathion or Malathion
Brassicae	Spodoptera Spp.	Lannate, Tamaron or Dursban
	Cabbage Loopers	Lannate or Dipterex
	Aphis + White Fly	Dimethoate, Monocrotophos or Parathion
Wheat	Tilletia Spp.	1½% Mercury Seed Dressing
	Broad Leaf Weeds	2,4-D Amine or Ester



Note.: The pests and diseases noted above are those which are economic to control in some higher yielding areas of the listed crops. Other pests and diseases exist but are not treated.

The number of pesticide applications varies according to yield, anticipated cash return on the crop and pest incidence, and varies as follows:

- olives, one application on 10% of the area
- citrus, one application
- tomatoes and eggplants, 5 - 10 applications with an average of six
- cucurbits, 3 - 4 applications
- potatoes, 1 - 2 applications
- brassicas, 3 applications
- peppers, 1 - 5 applications
- vines, 2 applications

Source: Ministry of Agriculture.

## 7.8 JORDAN VALLEY FARMERS ASSOCIATION

The Jordan Valley Farmers Association (J.V.F.A.) was established by Law No. 19 of 1974 to operate in the Jordan Valley. The requirements, objectives, functions and facilities of this Association include:

- all farmers in the Valley shall be members of the J.V.F.A.
- provision of loans and agricultural inputs to members, including pesticides, and to undertake agricultural operations, such as pest control, common to all or some members
- the sale and marketing of the member's agricultural crops, inside and outside Jordan
- participation in any company or organisation which has interests compatible with those of the J.V.F.A.
- conclusion of agreements and contracts, and invitation to tender, on the basis of free competition, for its requirements
- encouragement of collective action and strengthening agricultural cooperatives, with the Jordan Cooperative Organisation
- the restraint of the sale of agricultural products except through the J.V.F.A., unless inter alia the J.V.F.A.'s price is in competitive

The J.V.F.A. have indicated their interest and planned facilities relevant to this pesticide project, as follows:

- a wish to invest in a viable local pesticide plant
- a wish to draw pesticides of high quality and competitive price from a local pesticide plant
- they will purchase and sell agricultural inputs, including pesticides, to farmers from 24 warehouses in the Valley, each with a knowledgeable storeman
- they will loan money to farmers at a preferred annual interest rate of 7%
- they plan to add 25% to their delivered cost of pesticides to strike the selling price to farmers

7.9. TAXES, CHARGES AND FREIGHT RATES

No duty is levied on pesticides entering Jordan, under Tarif No. 38-11.

The following taxes are levied on pesticides packed in 16 os containers or smaller, entering Jordan:

- 1% importation fees
- 4% University tax
- 1½% Sports City tax
- 4½% Security tax
- 4% Import licence tax
- 1% additional tax

This 16% tax is levied on the C+F value of the goods.

When the pesticides are packed in larger containers than 16 os, as is normally the case with agricultural pesticides, the following taxes are levied on imports:

- 4% Import licence tax
- 2% additional taxes (customs fee)

Clearing charges normally total 1% of C+F invoice value.

Freight rates are reported to be the same for 1 ton to 1000 ton lots in trucks with capacities from 12-30 tons:

- Aqaba to Amman/Salt JD 4 ton (\$12)
- Amman/Salt to Damascus JD 4 ton
- Amman/Salt to Aleppo JD 8 ton (\$24)
- Amman/Salt to Latakia JD 7.500 ton (\$22.50)

7.10. FORECAST SALES IN JORDAN (WHEN PROFITABLE)

PRODUCT	EST. ACTUAL 1976/77		FORECAST SALES IN YEARS 1 - 7 TONS						
	TONS	PRICE 1 KG US\$	1	2	3	4	5	6	7
MALATHION 57	5	2.90	1	3	5	5	5	6	6
PARATHION 50	8	2.75	1	4	8	8	8	9	9
DIMETHOATE 40	20	2.65	2	10	20	21	22	23	24
DIAZINON 60	6	8.00	1	3	6	6	6	7	7
MONOCROTOPHOS 40	6	8.25	1	3	6	6	6	7	7
DICOPOL 42	2	3.32	-	1	2	2	2	2	2
SPECIALITIES	30	-	-	-	4	20	48	54	60
<b>TOTAL LIQUIDS</b>	<b>77</b>		<b>6</b>	<b>24</b>	<b>51</b>	<b>68</b>	<b>97</b>	<b>108</b>	<b>115</b>
SULPHUR DUST 1500	1500	0.123	1000	1000	1000	1000	1000	1000	1000
LINDANE DUST 2.6%	15	0.25	2	8	15	15	15	16	16
PARATHION DUST 5%	2	0.85	-	1	2	2	2	2	2
COC 30%+ZINEB65%	10	1.66	1	5	10	10	10	11	11
MERCURY 1.5%S/P	20	0.70	2	10	20	21	21	22	22
CARBARYL 85WP	3	3.42	-	1	3	3	3	3	3
FLICTRAN 25WP	2	11.25	-	1	2	2	2	2	2
ZINEB 80	80	1.17	8	40	80	85	90	95	100
MANEB 80	8	1.66	1	4	8	8	8	9	9
SPECIALITIES	9	-	-	-	1	6	14	16	18
<b>TOTAL POWDER/DUST</b>	<b>1649</b>		<b>1014</b>	<b>1070</b>	<b>1141</b>	<b>1152</b>	<b>1165</b>	<b>1176</b>	<b>1183</b>
RODENTICIDE BAIT	120	1.60	250	300	350	400	400	400	400
<b>GRAND TOTAL</b>	<b>1846</b>		<b>1270</b>	<b>1394</b>	<b>1542</b>	<b>1620</b>	<b>1662</b>	<b>1684</b>	<b>1698</b>

8.1

Visits in Damascus, Syria

1. Dr. Yahya Kassab  
UNDP Damascus
2. Mr. Radi Suliaman - Commercial Attaché  
Jordanian Embassy Damascus
3. Mr. Mohammed Ali Sabbagh - Director  
Mr. Ahmad Abboud  
Plant Protection Department  
Ministry of Agriculture and Agrarian Reform Damascus
4. Mr. Talal Khoury - Manager  
Société Agricole Al-Chahba  
P.O. Box 3243 Damascus  
(representing Bayer, Degesch, Montedison, BASF, Elianco,  
Duphar, Hercules, Nordisk Alkali and Sipcam)
5. Mr. Mohamed Zaid Dalati  
Comptoir Agricole du Levant  
P.O. Box 180  
Damascus  
(representing Dow, Chevron, Sumitomo and R.S.R.)
6. Mr. Riadeh Saidaldin - Director  
Agricultural Development Department  
State Planning Commission Damascus
7. Dr. Zafer Sawaf - Director General  
Industrial Testing and Research Centre  
P.O. Box 845  
Damascus
8. Dr. Adel Tarabein  
Agricultural Development Bureau  
P.O. Box 940, Damascus  
(representing Dupont, Celamark, Cooper and Kenograd)
9. Mr. Nicolas Chaccour  
Chaccour Frères  
B.P. 6 Damascus  
(representing Ciba-Geigy and Montedison)
10. Mr. Mustafa Saadi  
Mr. Subhi Nahhas  
Arab Union Organisation for Arab Development Damascus
11. Mr. Salah Kurdi - Vice Minister  
Ministry of Agriculture and Agrarian Reform Damascus

12. **Mr. Issam Miqdadi - Manager  
Agricultural Materials Store  
P.O. Box 480  
Damascus**
13. **Dr. Fuad Saad - Deputy Director General  
Foreign Trade Organization for Chemicals and Feedstuffs  
P.O. Box 893  
Damascus**
14. **Dr. Nasuh Malas - Director  
Private Industrial Sector Department  
Ministry of Industry  
Damascus**

8.2. IMPORTANT PESTS AND PESTICIDES IN SYRIA

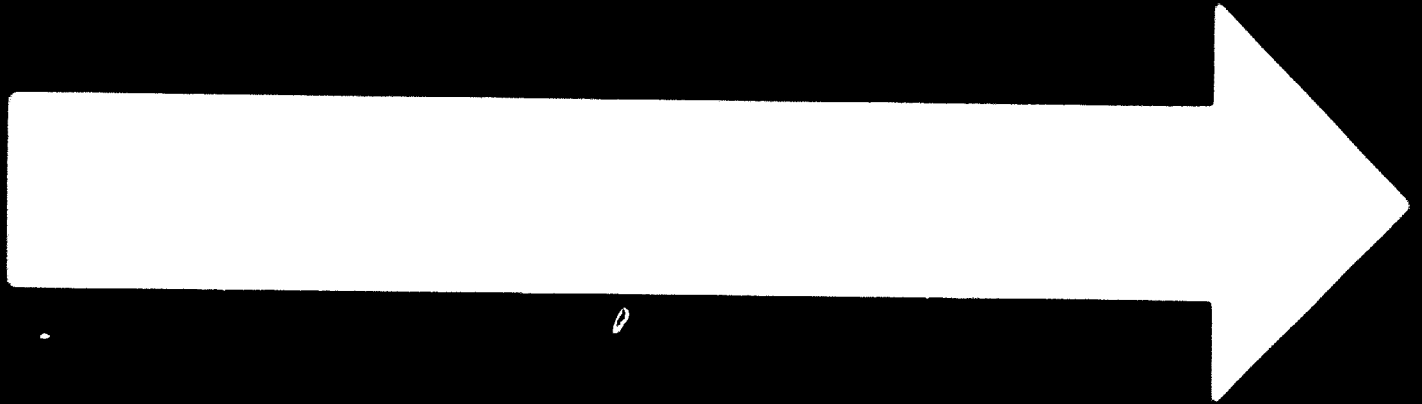
CROP	PEST	PESTICIDE
Cotton	Barias + Heliothis spp. Laphygma Exigua	Cotton dust 3-10-40, Torbidan, Dursban Endrin, Endosulfan + Monocrotophos
	Weeds	Trifluralin + Cobex
Wheat	Weeds	2,4-D, M.C.P. + Banvel
	Tilletia Tritici	Vitavax + Tmtd
	Ustilago Tritici	
	Zabrus spp.	Heptachlor G or WP
Lentils and Chick Peas	Heliothis + Laphygma spp.	Dusts as for cotton and other less toxic insecticides e.g. Carbaryl
Sugar Beet	Weeds	Betanal + Pyramin + Vensar (1977)
	Cerlospora spp.	Mancozeb
	Powdery Mildew	Nimrod + Sapro1
	Weevil	Diasinon G + Furadan G
	Aphis (epidemic only)	Metasystox
Potatoes and Tomatoes	Alternaria + Phytophthora spps.	Zineb, Maneb + Coc.
	Heliothis spp. Wireworm Tuber Moth Weeds	Trichlorfon + Carbaryl Heptachlor G Fenitrothion Small Volume Linuron + Patoran
Tobacco	Peronospora spp.	Zineb
Olives	Dacus spp.	Dimethoate + Lebaycid
	Leaf Miner	Supracide + Kilval
	Eye spot	Bavistin

8.3. SYRIAN MINISTRY OF AGRICULTURE PLANNED PESTICIDE TREATMENTS BY CROP AREA - 1976/77/78

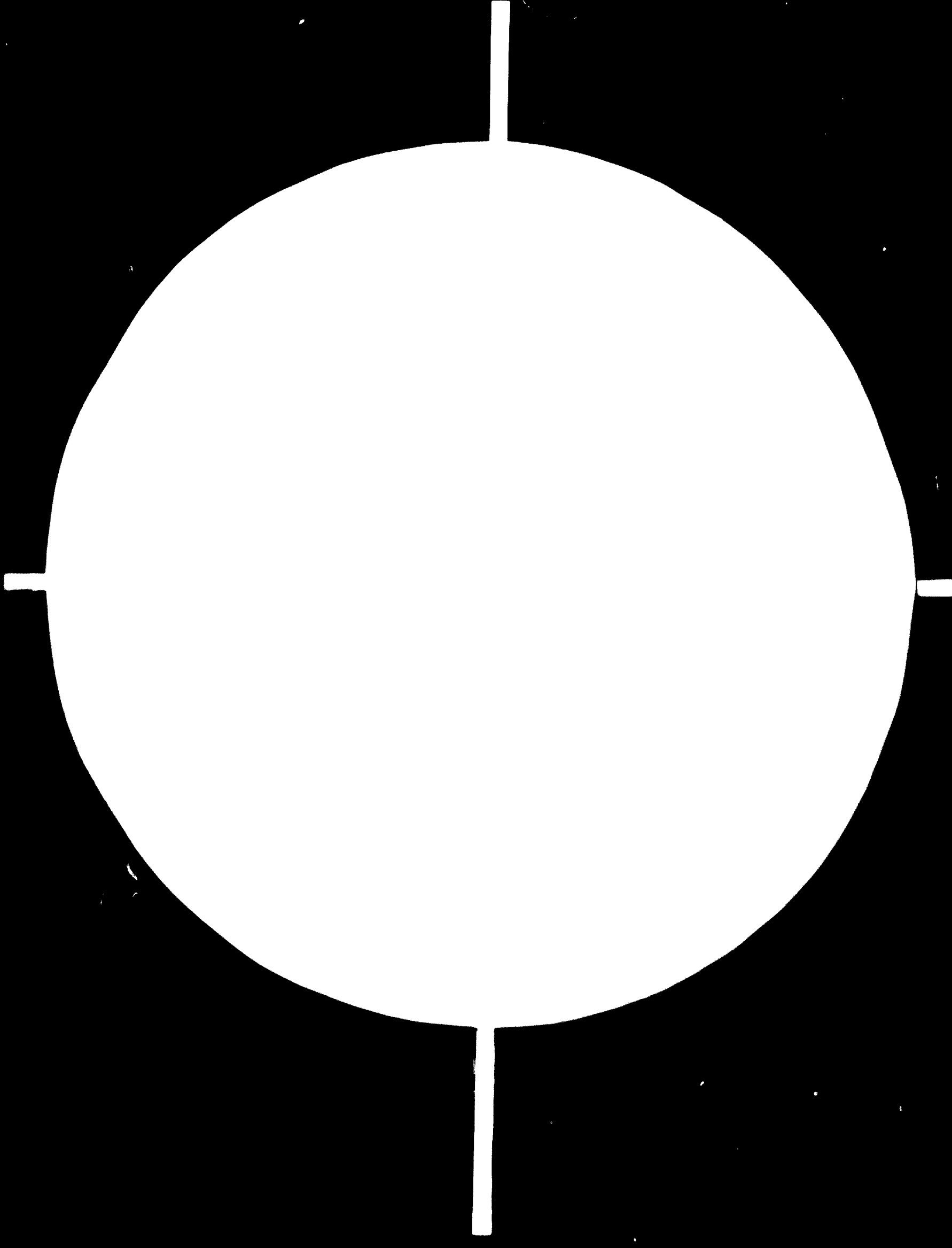
CROP	1976 AREA-000 HA	1976 YIELD-KG/HA	TYPE OF TREATMENT	PLANNED AREA FOR TREATMENT-HA		MINISTRY OF AGRICULTURE FURNISHES/ USE RECOMMENDATIONS
				1976/77	1977/78	
Cotton	198	1998	Herbicide	Nil	22,500	- plus up to an additional 155,000 ha in 1977/78. The supplier should provide sprayers
			Insecticide	125,000	125,000	
Wheat	1590	1126	Herbicide	10,000	50,000	- for 1976/77 proposed to buy 2400 tons dusts of Endosulfan 6%, Carbararyl 12%, Trichlorfon 8%, Leptophos 7%, Bromophos 3% or Methoxychlor 6%, plus sufficient of each of the following liquid formulations to treat 100,000 ha with one application - monocrotophos + DDT -Toxaphene +DDT -Leptophos 30 -Methyl parathion - Endosulfan 35
Barley	1172	904	Insecticide	50,000	25,000	1976/77 10 tons Heptachlor or Aldrin. 1977/78 sufficient Insecticide seed dressing to treat 10,000 tons seed.
Chickpeas	60	583	Herbicide	1,000	60,000	1976/77 70,000 litres Carbararyl, Nevinphos and Bromophos for chickpeas, lentils, peas and beans
Lentils	90	650	Fungicide	1,000	20,000	1976/77 40,000 litres Dimethoate + 5,000 litres Fenitrothion + 10,000 litres for olivefly
Olives	Production - 170,000 M/tons	Not spec.	Herbicide	3,000	1,500 (Alfrefate)	1976/77 45 tons cotton dust and 12 tons O.P. + Carbenate compounds
Sugar	9	35,000	Fungicide	2,000	1,000	
Beet			Herbicide			



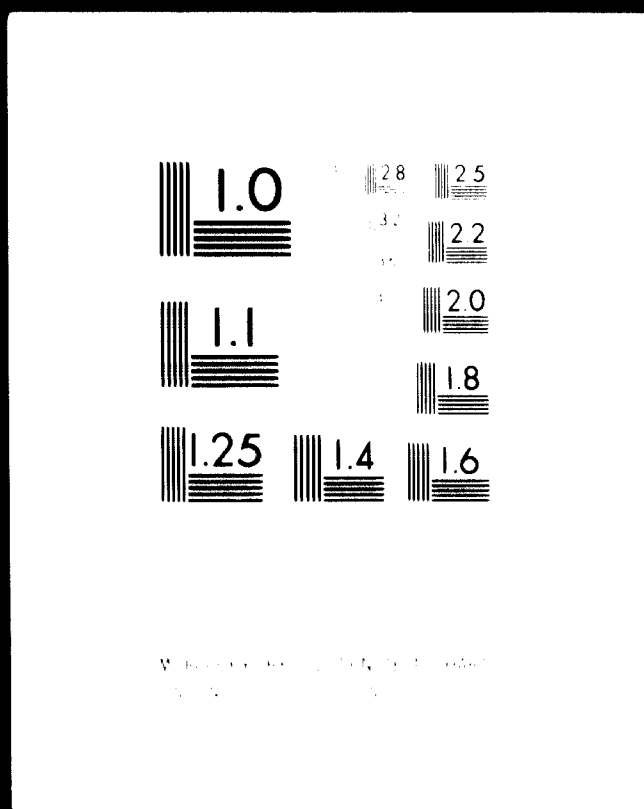
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CROP	1976		TYPE OF TREATMENT		PLANNED AREA FOR TREATMENT-HA		MINISTRY OF AGRICULTURE PURCHASE/ USE RECOMMENDATIONS	
	AREA-000 HA	YIELD-KG/HA	TREATMENT	1976/77	1977/78			
Potatoes	11	12,273)	Insecticide	11,000	7,000	1976/77	3,000 litres Malathion 50 + 15 tons Chlordane G or Dioxinon G for potatoes and 6 tons Methomyl and 3 tons Methomyl or other	
Tomatoes	33	13,636)	Fungicides	4,600	5,100			
Bearing Fruit	Production - 115,000 M/tons		Herbicide	5,000		1976/77	Phosfamidon or Parathion	
			Insecticide	9,000	9,000	1977/78	Mildew Treatment on 2,500 ha	
			Fungicide	9,000				
Citrus	Production - 28,000 M/tons		Insecticide	2,800	3,000	1976/77	as for bearing fruit	
			Fungicide		200			
Soya	-	-	Herbicide	500				
Maize	18	1,672	Herbicide	1,000		1976/77	3 tons Dioxinon and 2 F Dioxinon or Carbaryl	
			Insecticide	2,000	1,000	1977/78	plus products to control soil insects on 2,200 ha	
Sunflower	4	1,111	Herbicide	500				
Sesame	30	467	Herbicide	500				
Summer Veg.			Fungicide	5,000	6,000	1976/77	15 tons of which 8 tons Folpet or Dinocap 1977/78 dust for 500 ha	
Water melon	70	7,143}	Insecticide	13,000	10,000	1976/77	6 tons Malathion + 4 tons other for vegetables and 16,000 litres Carbaryl, Mevinphos or Methomyl for melons	
Vines	80	3,500	Insecticide	4,000	4,000			
Nuts	Production - 46,100 M/tons		Insecticide	9,000	6,000			
			Fungicide	1,000	1,000	1976/77	3,000 litres Delan	
Beans	17		Insecticide	5,000	10,000			
			Fungicide	1,000	800			
Onion	10	15,000	Insecticide	1,000				
			Fungicide	200	200			
Tobacco	17	600	Fungicide					

8.3. Additional items

- 1976/77 -
1. 15 tons Basudin G
  2. 25 tons Pesticide for Caterpillars + 5 tons Protein Hydrolysate
  3. 600 tons dusting sulphur + 10 tons sulphur 80 WP
  4. 15 tons winter oil and 10 tons summer oil
  5. Of the 18 tons Mildewicides, it is proposed that preference be given Benomyl, Thiophenate, Delan and SaproI in that order
  6. 20 tons Insecticide for locust control
  7. Insecticide for 25,000 ha legumes
- 1977/78 -
1. Insecticide to control locusts on 8,500 ha
  2. Winter oil for 700 ha
  3. 100 tons dusting sulphur
  4. 20 tons Zinc Phosphide + 1 ton other Rodenticide
  5. Insecticide for use in forests on 25,000 ha and Bacterial Insecticide on 2,000 ha
  6. 5 tons Aluminium Phosphide
  7. 1 ton general Herbicide (Weedazol)
  8. For Alfrate: 4 tons Treflan, 1 ton Metasystox, 2 tons anthrac, 3 tons Supraoide + 2 tons Primatol
  9. For the General Association for Sugar at HOMS:  
34 tons cotton dust, 2½ tons Metasystox,  
2 tons Dimecron, 7 tons Endrin, 2 tons Cobzin,  
10½ tons Sulphur 80 WP, 2½ tons Heptachlor,  
2½ tons Rogor, 4½ tons Malacthlon and 5 tons  
(Agbank), Sevin 10 tons + 8 tons (Agbank),  
10 tons Aldrin + 3 tons other.

Other relevant points for inclusion in tenders

- 1976/77 -
1. A maximum of 5% premium may be paid for better quality products
  2. Suppliers should send an extra 1% empty containers
  3. Sulphur dust should be used if no water available
  4. The Agricultural Bank pays for the Pesticides, but T.A.F.C.O. tenders for them
- 1977/78
1. The Ministry of Agriculture recommends that no more import licences be given (to the private sector) for products of which stocks (high) exist in Syria.

Sources:

1. FAO Production Yearbook. Vol. 30 for crop areas and yields
2. Ministry of Agriculture. Damascus for all other data.

8.4. ESTIMATED 1975 IMPORTS and 1976 SALES AND ACTUAL 1977 FARMER PRICES BY PUBLIC SECTOR IN SYRIA

PRODUCT	1975 IMPORTS - KG/LITRES		1976 EST. VOLUMES SOLD TO FARMERS-KG/L		1977 FARMER PRICES FROM			
	PUBLIC	PRIVATE	TOTAL IMPORTS	PUBLIC	PRIVATE	TOTAL VOLUME SOLD PUBLIC SECTOR		
						SYRIAN £/KG/L	PACK SIZE	
Cotton dust 3-10-40				258,091	15,500	273,591	2.80	15 kg
Heptachlor 10G	11,000		11,000	2,858	2,040	4,898	3.65	23 kg
Aldrin 40 EC				100	8	108	7.10	5/25 kg
Endrin 20 EC				1,061	1,700	2,761	9.65	10/100 litre
Toxaphene 60 EC				1,959		1,959	2.40	10/100 litre
Torbidan 40-20				10,368		10,368	10.50	10/100 litre
Thiodan 35 EC	65,000		65,000	8,085		8,085	16.50	5/100 litre
Thiodan 6 dust	10,000		10,000	10,395		10,395	3.50	45 kg
Gusathion 40 EC				335		335	12.00	1/25 litre
Malathion 50 EC	11,000	10,000	21,000	3,740	29,465	33,205	9.90	1/20 litre
Cardonna 75 EC				120		120		
Supracide 40 SCW	2,000		2,000	997	671	1,668	52.45	1/25 litre
Phosvel 30 EC	65,000		65,000	914		914	21.00	5/litre
Parathion/Methyl 50EC		10,000	10,000	1,360	53,960	55,320	11.35	1 litre
Cidial 50EC				50		50	17.90	1/10 litre
Fenitrothion 50EC				160		160	22.30	1 LITRE
Folithion 50EC				17		17	39.25	1 litre
Trichlorfon 80 WP	120,000	20,000	140,000	1,204	12,744	13,948	15.60	1 kg
Phosdrin 24 EC		3,200	3,200	5	220	225	22.60	1 litre
Nexion 40 EC	24,000	2,000	26,000	1,446	3,000	4,446	23.50	1 litre
Dimethoate 40 EC	58,500		58,500	24,580	16,481	41,061	13.40	1/25 litre

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PRODUCT	1975 IMPORTS - KG/LITRES		1976 EST. VOLUMES SOLD TO FARMERS-KG/L		1977 FARMER PRICES FROM PUBLIC SECTOR	
	PUBLIC	PRIVATE	PUBLIC	PRIVATE	SYRIAN £/KG/L	PACK SIZE
	TOTAL IMPORTS		TOTAL VOLUME SOLD			
Dimecron 50EC	3,000		1,494	2,673	29.95	1 litre
Anthio 33 EC	6,000		631	2,000	22.00	1 litre
Muvacron 40 EC	5,000	930	55	480	44.35	5 litre
Polimat 50 EC	1,000	120	963	963	42.10	1 litre
Metasystok 25 EC		1,500	1,185	1,185	20.45	1 litre
Sevin 85 MP		2,000	1,245	18,510	19.75	½/25 kg
Sevin 7 dust			94,450	94,450		
Lannate 90 MP	2,305	600	360	980	93.45	1 kg
Pirimor 50 MP		170	55	3,600	69.20	¼ kg
Summer oil 80			812	3,857	4.00	10 litre
Winter oil 80	13,500		5,921	21,506	3.80	10 litre
Trifluralin 48EC	7,000	29,500	22,391	69,964	28.90	1/5 litre
Cotoran			500	500	25.50	1/40 kg
2,4-D 72%			42,633	12,250	15.40	5 litre
Gramoxone		4,788	252	9,300	18.35	1/10 litre
Patoran			5	5	35.50	1 kg
Ryvar I			6	6	64.60	1 kg
Dusting Sulphur 90			224,201	1,530,000	0.75	50 kg
Sulphur 80 MP	5,000	10,000	5,415	72,363	2.70	1/10 kg
Thiram			65	65	6.45	1 kg
Copper 50 MP	5,000	600	1,623	9,888	10.50	1 kg
Enovit/Captan 74%			80	80	24.30	1 kg
Dithane M45		1,500	739	2,015	10.50	1 kg

8.4 cont'd.

PRODUCT	1975 IMPORTS - KG/LITRES			1976 EST. VOLUMES SOLD TO FARMERS-KG/L			1977 FARMER PRICES FROM PUBLIC SECTOR	
	PUBLIC	PRIVATE	TOTAL IMPORTS	PUBLIC	PRIVATE	TOTAL VOLUME SOLD	SYRIAN £/KG/L	PACK SIZE
	HCB 20				22,733	122,906	145,639	2.55
BENLATE 50	1,002		1,002	1,457	124	1,581	72.25	1 kg
TOPSID-M 75				447		447	44.55	1/1 kg
SAPROL				267	700	967	30.75	1 litre
Karathane 25				284		284	25.10	1 kg
Afugan 30				26		26	49.75	1 litre
Calixin 75		400	400	40		40	55.55	1 litre
Dodine 65				469	2,026	2,495	16.30	1 kg
Tedion 18				428		428	6.50	20/25 litre
Delancol 39				18		18	43.00	1 litre
Fadion				132		132	10.00	1 litre
Fenodine 23				572		572	18.00	25 litre
Acaracide				606		606	6.00	2 litre
Acarol 50				38		38	24.95	1 litre
Kelthane				8		8	9.00	1 litre
PAC 40				1,334		1,334	14.60	1 litre
Metaldehyde				352		352		
Topsin	1,000		1,000		1,000	1,000		
Zineb 80					1,420	1,420	8.85	1 kg
DD F.B.					1,000	1,000		
Actellic 10		1,000	1,000		3,950	3,950		



8.4 cont'd.

PRODUCT	1975 IMPORTS - KG/LITRES		1976 EST. VOLUMES SOLD TO FARMERS-KG/L		1977 FARMER PRICES FROM PUBLIC SECTOR			
	PUBLIC	PRIVATE	TOTAL IMPORTS	PUBLIC	PRIVATE	TOTAL VOLUME SOLD	SYRIAN £/KG/L	PACK SIZE
Beatine 25EC	4,000	3,500	7,500		4,000	4,000		
Cobex		12,500	12,500		6,500	6,500		
Nimrod					1,200	1,200		
Agrocide-HC3 2.6%					48,200	48,200		
Muvan 20					227	227		
Mofos					630	630		
Mucidol 60		525	525		567	567		1 litre
Lindane 20		15,500	15,500		7,643	7,643		
DMT 50		15,000	15,000		18,500	18,500		
Dursban 40					2,000	2,000		
Plictran					1,000	1,000		
Banvel K	50,000	24,280	74,280				9.00	10 litre
Sevin 5G	58,000		58,000				15.40	
Herbazol	28,000		28,000				21.50	4½ litre
Vitavax/Vitaflow	2,000		2,000					
Zinc Phosphide	10,000		10,000					
Chlordane	5,200		5,200				3.90	23 kg
Puradan 3G	1,000		1,000				5.45	2½ kg
Select		438	438					
TOX		490	490					
Milcurb Super		3,600	3,600					

8.4 cont'd.

PRODUCT	1975 IMPORTS - KG/LITRES		1976 EST. VOLUMES SOLD TO FARMERS-KG/L		1977 FARMER PRICES FROM PUBLIC SECTOR			
	PUBLIC	PRIVATE	TOTAL IMPORTS	PUBLIC	PRIVATE	TOTAL VOLUME SOLD	SYRIAN £/KG/L	PACK SIZE
Captan		990	990					
Eptam		330	330					
Basamid		1,000	1,000				5.00	25 litre
Parathion		13,500	13,500				43.80	1 litre
Lebacycid 50		500	500					
Tamaron		1,500	1,500					
BHC		65,000	65,000					

Sources: Private sector for 1975 imports  
Ministry of Agriculture for 1976 sales and 1977 farmer prices

8.5 PESTICIDE PURCHASES ON TENDER BY T.A.F.C.O. IN 1976 (JULY) - SYRIA

PRODUCT	PACK	UNIT	VOLUME KG/LITRE	PRICE/UNIT C+F LATAKIA
Dipel	10 kg	kg	10,000	US\$ 8.45
Trichlorfon 80	1 kg	kg	6,000	US\$ 2.846
Methoxychlor 25	1 Gal	litre	5,000	US\$ 3.60 per gal.
Methoxychlor 6% dust	50 lb	kg	300,000	US\$ 0.72681
Ankerk	1 gal	litre	1,000	US\$ 6.85 per gal.
Bavistin	1 kg	kg	1,000	US\$ 10.70
Pyramin	1 kg	kg	3,000	US\$ 10.30
Lebaycid	1 l Al.	litre	8,000	DM 20.001
Croneton	1 l Al.	litre	1,000	DM 20.02
Morestan 25WP	1 kg	kg	1,000	DM 22.33
Metasystox R25OEC	1 l	litre	3,500	DM 13.59
Nexion 40	1 l Al.	litre	8,500	DM 12.35
Nexion dust	25 kg	kg	500	DM 3.30
Roxion 4OEC	1 l Al.	litre	10,000	DM 6.25
Saprol	1 l Al.	litre	2,000	DM 14.15
Dimecron 50	1 l plastic	litre	18,500	SF 11.90
Supracide 40	1 l plastic	litre	8,000	SF 21.60
Nuvacron Combi	5 l Al.	litre	80,000	SF 7.80 (?)
Necidol	5 l plastic	litre	500	SF 18.60
Losan	5 l plastic	litre	300	SF 10.60
Losan CCT	5 l plastic	litre	500	SF 11.50
Diouran 80WP	1 kg	kg	1,000	SF 16.20
Faneron 50WP	1 kg	kg	1,000	SF 14.90
Gesagard 80WP	1 kg	kg	1,000	SF 16.80
Primagram 50WP	1 kg	kg	2,500	SF 13.80
Caragard Combi50	1 kg	kg	1,000	SF 14.20
Dual 50OEC	1 l Al.	litre	3,000	SF 16.80
Cytrolane 250E	5 l	litre	24,000	US\$ 5.75
Cytrolane 250E	10 l	litre	40,000	US\$ 5.62

8.5 cont'd.

PRODUCT	PACK	UNIT	VOLUME KG/LITRE	PRICE/UNIT C+F LATAKIA
Banvel K	10 litres	litre	25,000	OS 28.00
Phostoxin		kg	6,000	DM 37.10
Dursban	1 litre Al.	litre	10,000	US\$ 8.8613
Benlate 50W	1 kg	kg	4,000	US\$ 16.95
Treflan	1 l	litre	53,000	US\$ 5.16
Treflan	1 l	litre	7,200	Free
Plan	1 l	litre	1,000	US\$ 8.83
Fenitrothion 50	1 l Al.	litre	7,000	US\$ 4.196
Methyl Parathion 50	1 l Al.	litre	8,500	US\$ 2.196
Endosulfan 6% dust	40 kg	kg	200,000	US\$ 0.764
Zinc phosphide	20 kg	kg	15,000	US\$ 2.886
Endosulfan 35	1 l Al.	litre	5,000	US\$ 3.2578
Endosulfan 35	10 l	litre	15,000	US\$ 3.1777
Endosulfan 35	25 litre	litre	10,000	US\$ 2.461
Afugan 30 EC	1 l	litre	1,000	US\$ 9.40
Linuron	1 kg	kg	1,000	US\$ 5.30
Pirimor 50	$\frac{1}{4}$ kg	kg	1,000	US\$ 14.335
Delancol	1 l	litre	2,000	US\$ 8.3175
Actellic 25%	25 kg	kg	500	US\$ 7.1172
Actellic 2%	10 kg	kg	1,500	US\$ 1.28615
Nimrod	1 l Al.	litre	1,000	US\$ 7.11
Gramoxone	1 l	litre	1,000	US\$ 4.2167
Gramonol	1 l Al.	litre	2,000	US\$ 4.895
Ratak	-	kg	4,500	-
Heptachlor 40WP	50 lb.	kg	5,000	US\$ 1.97
Chlordane 100	50 lb.	kg	12,000	US\$ 0.74
Vacor	tins	kg	500	US\$ 14.316
Brominal	1L l	litre	18,000	US\$ 4.65
Eradicane	5 US gal.	litre	2,500	US\$ 4.993
Amiben	5 US gal.	litre	5,000	US\$ 3.2496
Malathion 50	1 l Al.	litre	7,500	US\$ 1.86
Cidial 50	1 l Al.	litre	5,000	US\$ 3.38

8.5 cont'd.

PRODUCT	PACK	UNIT	VOLUME KG/LITRE	PRICE/UNIT C+F LATAKIA
Kilval	1 l Al.	litre	3,000	US\$ 5.8613
Micron Sulphur	1 kg	kg	5,000	US\$ 0.5004
Winter Oil 70	10 l	litre	15,000	US\$ 0.608
Summer Oil	10 l	litre	3,000	US\$ 0.6635
Fosdrene 24	1 l Al.	litre	14,000	US\$ 3.42
Diasinon 40	1 kg	kg	3,000	US\$ 3.98
Enovit 70	1 kg	kg	2,000	US\$ 8.45
Diserbene	1 kg	kg	1,000	US\$ 3.14
Betanal	3 l	litre	1,000	DM 27.30
DDT+ Lindane	10 l	litre	5,000	US\$ 1.50
Sevin 85	1 kg	kg	8,000	US\$ 3.50
Omite 57E	1 l Al.	litre	5,000	US\$ 9.50
Dyanap	1 US gal.	litre	1,000	US\$ 2.375
Trichlorfon 8% + Vision 4%	50 kg	kg	200,000	US\$ 0.698
Sevin 12%+Vision 4%	50 kg	kg	200,000	US\$ 0.865
Turbidan	5 l	litre	20,000	US\$ 1.94
Turbidan	10 l	litre	60,000	US\$ 1.83
Sulphur	50 kg	kg	150,000	US\$ 0.1335
Copsin 60 WP	1 kg	kg	5,000	US\$ 1.65

Source: Private sector Syria

8.6. PESTICIDE PURCHASES ON TENDER BY T.A.F.C.O. IN 1977 (DECEMBER) - SYRIA

PRODUCT	UNIT	VOLUME	PRICE	PRICE BASIS
Pyramin 80 WP	kg	6,000	US\$ 11.48	CIF LATAKIA
Dual 72 EC	litre	3,750	US\$ 10.35	CIF Latakia
Dimecron 50 SCIN	litre	2,000	US\$ 5.41	CIF Latakia
Aluminium Phosphide	kg	5,000	US\$ 12.00	CIF Latakia
Zinc phosphide 80%	kg	20,000	US\$ 2.90	CIF Latakia
Cottonex 30 EC ULV (30% DDT + 89% Lindane)	litre	18,000	DM 5.50	CIF Latakia
Lindane 20 EC	litre	500	DM 9.80	CIF Latakia
Saprol 20 EC	litre	10,900	DM 14.90	CIF Latakia
Furadan 5G	kg	52,500	US\$ 1.70	CIF Latakia
Furat (phorate) 5G	kg	16,000	US\$ 1.10	CIF Latakia
Dinocap 25 WP	kg	900	US\$ 4.50	CIF Latakia
Metasystox	litre	3,500	US\$ 5.98	CIF Allepo
Cobrafid (COC) 50WP	kg	8,000	US\$ 1.45	CIF Allepo
Sulphur dust 98%	kg	100,000	US\$ 0.149	CIF Allepo
Racumin 57	kg	400	US\$ 2.80	CIF Allepo
Ethyl Parathion 50EC	litre	500	US\$ 3.045	CIF Allepo
Cobzin (COC+Zineb)60WP	kg	10,000	US\$ 1.835	CIF Allepo
Polygaza (Mancozeb)				
MZA WP	kg	2,900	US\$ 2.05	CIF Allepo
Malafos 50 EC	litre	9,500	US\$ 2.00	CIF Allepo
Galospray (winter oil)	litre	25,000	US\$ 0.78	CIF Allepo
Topstop (Warfarin)5%	kg	600	US\$ 1.71	CIF Latakia
Sevin 85WP	kg	18,000	US\$ 4.79	CIF Latakia
Vydate EC	litre	4,000	US\$ 8.70	CIF Latakia
Morocide EC	litre	2,400	US\$ 7.60	CIF Allepo
Brestan 60 WP	kg	300	US\$ 12.31	CIF Allepo
Acarastine 20WP	kg	1,600	US\$ 8.92	CIF Allepo
Benomyl 50WP	kg	2,250	US\$ 11.97	CIF Allepo
Sipcaplant				
(Captan + Topsin)WP	kg	2,000	US\$ 5.24	CIF Allepo

8.6 cont'd.

PRODUCT	UNIT	VOLUME	PRICE	PRICE BASIS
Rogor 4OEC	litre	2,500	US\$ 2.51	CIF Latakia
Azodrin 4OEC	litre	500	US\$ 7.38	CIF Latakia
Gardonna 20 ULV	litre	22,500	US\$ 3.50	CIF Latakia
Topsin-M 70 WP	kg	1,750	US\$ 7.95	CIF Latakia
Delancol 6OEC	litre	500	US\$ 8.7916	CIF Latakia
Nimrod 25FC	litre	7,350	US\$ 6.684	CIF Latakia
Microthiol 81WP	kg	10,500	FF 2.59	CIF Latakia
Trifluralin 48EC	litre	4,000	US\$ 3.84	CIF Latakia
Bicrocvin (B.T.)	kg	5,600	US\$ 7.40	CIF Aleppo

N.P.: At 15th December 1977 there remained two outstanding purchase requirements by TAFCO:

- 30 tons Cobex herbide for use in cotton
- up to 109,500 litres of insecticide formulations for use in public health.

Source: T.A.F.C.O. Damascus

8.7 ARAB UNION ORGANIZATION

The Arab Union Organization for Agricultural Development with headquarters in Damascus was established by the Presidential Law No. 3 of 1974 of the Arab Republics of Syria, Libya and Egypt, with authorized capital of Libyan Dinars 10 million.

The objectives of this Organization include:

- investment in agricultural projects within the republics of the Union designed to secure self sufficiency and economic integration;
- identification and preparation of agricultural projects, the implementation of viable projects and establishment of companies;
- to engage in processing industries for agricultural products, means and prerequisites of production for these products.

This Organisation enjoys certain privileges including:

- profit exemption from all taxes;
- all equipment is imported free of duty for five years;
- capital and property may not be nationalized, confiscated, requisitioned or subjected to custody.

The Board of Directors comprises the Chairman and Six Directors, including:

- Dr. Mohammed Ibrik - Deputy Ministry of Agriculture and Agrarian Reform of the Syrian Arab Republic, who is Chairman
- two Syrian Directors, who are Mr. Mustafa Saadi previously Director of Agricultural Affairs in the Ministry of Agriculture and now General Director of the Organization and Mr. Mahmoud Said, Director of Irrigation and Agriculture in the State Planning Commission.
- two Egyptian Directors, an Under Secretary of the Agrarian Reform General Organization, and a Technical Advisor in the Ministry of Agriculture



- two Libyan Directors, an Under Secretary of the Ministry of Agriculture, and a Manager of the Agricultural Green Belt and Al-Qattarah projects.

Their active project is the multiplication of seed potatoes, for use in Syria, and for sale to Egypt, Libya and Jordan. This project is owned entirely by the Arab Union Organisation.

8.8. FORECAST SALES IN SYRIA (WHEN PROFITABLE)

PRODUCT	EST. ACTUAL 1975/77		FORECAST SALES IN YEARS 1-7 - tons						
	TONS	PRICE/KG/US\$	1	2	3	4	5	6	7
Malathion 57	50	2.00	5	25	50	52	55	58	60
Palathion 50	50	3.05	5	25	50	52	55	58	60
Endosulfan 35	40	3.17	4	20	40	42	44	46	48
Dimethoate 40	80	2.51	8	40	80	85	90	95	100
Diazinon 60	10	8.08	1	5	10	11	12	13	14
Lindane 20	10	4.26	1	5	10	11	12	13	14
Monocrotophos 40	60	7.38	6	30	60	62	65	68	70
Specialities	70	-	-	-	12	55	130	155	185
<b>Total liquids</b>	<b>370</b>	<b>-</b>	<b>30</b>	<b>150</b>	<b>312</b>	<b>370</b>	<b>463</b>	<b>506</b>	<b>551</b>
Zineb 80	80	1.40	8	40	80	85	90	95	100
BHC2.6 DVST	100	0.30	10	50	100	105	110	115	120
COC 50 WP	30	1.45	5	15	30	32	35	38	40
Carbaryl 85	35	4.79	5	15	35	37	40	43	45
Cotton dust	1500	-	150	750	1500	1500	1500	1500	1500
DDT 50 WP	50	0.80	5	25	50	52	55	58	60
Sulphur dust	4230	0.133	400	2000	4000	4000	4000	4000	4000
Specialities	20	-	-	-	3	16	38	44	53
<b>Total power/dust</b>	<b>6045</b>	<b>-</b>	<b>583</b>	<b>2895</b>	<b>5798</b>	<b>5827</b>	<b>5868</b>	<b>5893</b>	<b>5918</b>
Rodenticide bait	4000		400	450	500	550	600	650	700
<b>Grand total</b>	<b>10415</b>		<b>1013</b>	<b>3495</b>	<b>6610</b>	<b>6747</b>	<b>6931</b>	<b>7049</b>	<b>7169</b>

9.1. ORGANIZATION CHART FORMULATION COMPANY (ZEISER ANNEX 4)

Director

Secretary

Administration

Purchasing

Commercial  
Department

Application  
Development

Quality  
Control

Plant Manager

Formulation  
Development

Secretary  
Materials handling

Workshop

Plant  
Assistant

Storehouse  
Raw material  
Finished Products

Rodenticides

Liquids

Powder

Essential Function of Formulation Company

Field application

Application  
Development

COMMERCIAL ACTIVITY

Formulation  
Development

Quality  
Control

Formulation  
Plant

9.2. PERSONNEL REQUIREMENTS (ZEISER ANNEX 6)

The personnel requirements for plants of varying capacities are shown below:

Plant capacity	Number of Employees				
	500	1000	2000	5000	10,000 tons/ year
Plant manager	-	1	1	1	1
Assistant	-	1	2	3	3
Secretary	-	1	1	2	2
Storehouse officer	-	1	1	1	2
Secretary	-	1	1	1	2
Worker	-	3	4	8	12
Driver	1	1	2	3	5
Workshop engineer	1	1	1	1	1
Workers	-	2	2	4	8
Production assistant	1	1	1	1	2
Workers	1	6	12	30	60
Analytical laboratory	-	1	1	1	2
Assistant	-	1	1	2	3
Formulation	-	1	1	1	2
Assistant	-	1	1	1	2
Agronomist	-	1	1	2	3
Assistant	-	2	2	4	6
	4	26	35	66	115

9.3. COST OF PERSONNEL

The annual salaries of personnel required to operate plants of shown capacities are shown below. At the bottom of the chart is when the cost of plant personnel per ton of formulated product.

Plant capacity	500	1000	2000	5000	10,000 ton/year \$000/year
Plant manager	-	15	15	20	30
Assistant	-	6	6	10	15
Secretary	-	3	3	4	4
Storehouse	-	6	6	6	12
Secretary	-	3	3	3	6
Worker	-	9	12	24	36
Driver	4	4	8	12	20
Workshop	5	6	6	7	8
Workers	-	6	6	12	24
Production Assistant	5	6	6	7	10
Workers	3	18	36	90	180
Analytic Laboratory	-	7	7	8	8
Assistant	-	4	4	10	15
Formulation Laboratory	-	7	7	8	10
Assistant	-	4	4	5	120
Agronomist	-	9	9	20	30
Assistant	-	8	8	20	30
TOTAL	17	121	146	266	448
\$/t	34	121	73	53	45

#### 9.4. TYPE OF FORMULATED PRODUCT SELECTED

Four types of formulation have been selected:

- dust
- wettable powder
- emulsion concentrate
- rodenticides

Dust The active ingredient is mixed and milled with variable amounts of dust diluents. Sulphur dust contains 1% of diluent, to prevent agglomeration. Lindan dust contains 2.6% active ingredient. This concentration is high enough to obtain good insect control.

Wettable powders are milled and mixed with disperdents and wetting agents to obtain "watersoluble" formulations. Wettable powders are applied in water dilution with a concentration of 0.1 - 0.5%.

Emulsion concentrates are mixtures of dissolved active ingredient with emulsifier.

Rodenticides are selected baits with small amounts of slowly acting poisons (coagulants).

#### 9.5. COST OF TECHNICAL PESTICIDE MATERIALS

These costings of technical materials assume:

- that technical materials are purchased from Europe in minimum 5 ton single/mixed product lots at the FOB European port at prices indicated, with 180 day credit from date of shipment including the sea freight C+F Aqaba
- that sea freight is 7 US cents/kg or \$70 ton to Aqaba
- that no import licence fee or other taxes are levied at Aqaba, except the obligatory 1% clearing charges, or an average of \$3 ton
- inland freight from Aqaba to Salt/Amman factory is JD4 or \$12 ton
- the exception is rock Sulphur at \$40 ton at the Iraqui plant plus \$20 ton transport to give a delivered Salt/Amman factory cost of \$60 ton

PRODUCT AND % ACTIVE	FOB COST \$ TON	SEA FREIGHT \$ TON	CLEARING \$ TON	INLAND FREIGHT \$ TON	DELIVERED FACTORY COST - \$ TON
MALATHION 98	1700	70	3	12	1785
PARATHION 98	2200	70	3	12	2285
DIMETHOATE 95	2500	70	3	12	2585
DIAZINON 95	6500	70	3	12	6585
ENDOSULFAN 95	6000	70	3	12	6085
MONOCROTOPHOS 78	10000	70	3	12	10085
LINDANE 99.9	4200	70	3	12	4285
DICOPOL 80	3650	70	3	12	3735
MERCURY eq. 95	15000	70	3	12	15085
ZINEB 87	1170	70	3	12	1255
MANEB 94	1300	70	3	12	1385
COC 57	1100	70	3	12	1185
CARBARYL 99	3200	70	3	12	3285
PLICTRAN 97	21000	70	3	12	21085
DDT 75 p.p.i.	800	70	3	12	885

9.6. LOCAL DILUENTS (ZEISER 4.2.)

At the moment no commercial grade of inert material for pesticides formulation is available.

Solvents Xylene is the best available solvent in pesticide liquid formulation. It is not necessary to use technical grade xylene. However, the white spirit produced by Jordan Refinery now, contains only 17% aromatics. Better qualities will be available if Unibond up-grading comes onstream at the end of 1978.

	White Spirit 74	Xylene 77	Unibond Fraction 78
Spec. gravity	0.770	0.868	0.817
Aromatics	17%	98%	48%
IBP ° C	142	139	145
50% ° C	158	141	162
FBP ° C	189	143	193
Anilinpoint ° C	57	-	22

The final boiling point is still too high, the "tail" can be phototoxic. Tests with the Unibond fraction must be executed. The price of white spirit is JD 0.073 litre. Xylene can be imported at nearly the same price from Iraq.

Inert carrier For pesticide formulation, the following can be used:

- kaolin
- phosphaterock
- limestone
- sulphur

Kaolin can be imported and obtained through the ceramic industry at a price of 68 JD/t. The quality is good. The world market price is about 35 JD/t.

Clay from Mahis contains more than 25% quartz. Upgrading is not possible. The high quartz content can erode existing equipment within a short time. The maximum quartz content tolerated by high velocity mills is 0.1%.

Mahis clay is very fine and dry as shown below. It can be used in some instances and after test runs, for dusts.

Carama clay in the northern GHOR contains too much iron oxide.

In the middle east no kaolinitic olays suitable for pesticide formulation have been found yet.

Phosphate rock must be upgraded. When upgrading facilities come on stream, tests should be made. The high cost may be justified if upgrading is required for the fertilizer industry.

Limestone is available. However, it can be used only for chlorinated hydrocarbons. Phosphorous esters are unstable if they are diluted with limestone.

Inert carrier gas must be used for the Sulphur milling equipment.



Analysis of Mahis Clay

Quality Number

	1	2	3
SiO <sub>2</sub>	55.35	78.13	82.91
Al <sub>2</sub> O <sub>3</sub>	29.22	12.84	10.42
Fe <sub>2</sub> O <sub>3</sub>	1.25	0.71	0.80
TiO <sub>2</sub>	2.41	2.29	1.41
CaO	0.16	0.09	0.06
MgO	0.26	0.16	0.10
Na <sub>2</sub> O	0.07	0.07	0.03
K <sub>2</sub> O	0.74	0.67	0.29
L.O.I.	10.30	4.77	3.77
H <sub>2</sub> O	1.20	0.90	1.50
Particle size			
200-400 micron	0.20	0.80	3.30
50-200	14.10	8.00	6.00
20-50	16.40	14.70	10.50
5-20	24.20	19.00	20.20
2-5	11.80	7.40	26.10
-2	33.30	50.10	37.90

1.4. 1970 Natural Resources Authority

9.7. COST OF DILUENTS AND PACKING MATERIALS

The same cost structure is used to arrive at the delivered Salt factory cost of diluents that are imported from Europe, as for technical pesticides shown in Section 9.5 and assume no taxes or duties are levied, and that \$82 ton is freight, of which \$70 sea freight is included in the C+F Aqaba purchase price subject to 180 days credit, with only inland freight and clearing charges to be paid promptly.

Thus:

- Xylene from Iraq at \$200 ton FOB Iraqi plant incurs \$20 ton freight to give a delivered Salt plant cost of \$220 ton

- Solvent No. 2 at \$1000 ton FOB European port costs \$1070 ton C+F Aqaba, with \$10 ton clearing charges and \$12 ton inland freight with delivered Salt plant cost of \$10.92 ton.
- Emulsifier at \$2000 ton, Dispersent No. 1 at \$200 ton, Dispersent No. 2 at \$1000 ton and Inert Carrier No. 1 at \$150 ton, all delivered Salt plant
- Inert Carrier No. 2 at \$60 ton FOB Turkish border incurs \$30 ton freight to total \$90 ton delivered Salt factory
- The cost of a local bait base for the rodenticide is assumed at \$0.25 kg delivered Salt factory

At present, no suitable packing materials are known to exist in Jordan, thus it is assumed for the present that they must be imported. The freight costs for packing materials for powders and dusts are assumed to be nominal and that suitable sources may be located locally, so that the cost of packing material for Sulphur and dusts is assumed at 2 US cents/kg and 10 US cents/kg for powders delivered Salt factory.

However, the FOB European port cost of \$0.25 per 1 litre Aluminium can will be \$0.28 each at C+F Aqaba and \$0.30 each delivered at the Salt plant.

Estimated costs of packing materials include the cost of printed labels.

#### 9.8. COMPOSITION OF FORMULATED PESTICIDES

LIQUID PRODUCT	ACTIVE INGREDIENT	EMULSIFIER	PERCENTAGE CONTENT - ADDING ACROSS TO 100%	
			SOLVENTS No. 1 (Xylene)	No. 2
MALATHION	57	5	38	-
PARATHION	50	5	45	
DIMETHOATE	40	8	20	32
DIAZINON	60	8	32	
ENDOSULFAN	35	8	57	
MONOCROTOPHOS	40	6	54	
LINDANE	20	6	74	
DOCOFOL	42	10	28	20

PERCENTAGE CONTENT - ADDING ACROSS TO 100%

DUSTS + POWDERS	ACTIVE INGREDIENT	DISPERSANTS		INERT CARRIERS	
		No. 1	No. 2	No. 1	No. 2
SULPHUR (DUSTS)	99				1
LINDANE (DUSTS)	2.6				97.4
SEED DRESSING (Hg)(")	1.5				98.5
PARATHION (")	5				95
ENDOSULFAN (")	6				94
ZINEB (W.P.s)	80	6	0.6	13.4	
ZINBE (")	13				
COPPER OXYCHLORIDE		5	0.6	51.4	
MANEB (")	80	5	0.6	14.4	
CARBARYL (")	85	7	1	7	
PLICTRAN (")	25	10	2	63	
COPPER OXYCHLORIDE (")	50	5	0.6	44.4	
DDT (")	50	7	1	42	

9.9. CHARACTERISTICS OF RAW MATERIALS

Rodenticides contain only a very small amount of poison, they are mainly bait. It may be a problem to find suitable baits at a low price.

Each product in the programme must be characterised. Standard values of composition and tolerances must be given by the producer or worked out. FAO gives the most important characteristics for active ingredient and formulated products.

Points to be considered are:

- active ingredient
- Inert carrier/solvent
- emulsifier/dispersent
- bait for rodenticides

Active ingredient The standard concentration is given in the text. Most important are impurities. They must be specified.

Inert carrier Humidity, particle size distribution, quartz and iron oxide content must be specified.

Solvent Composition, boiling point range, water content.

Emulsifier and dispersents are difficult to specify. A mixing test can prove their activity.

Baits must be selected in practical tests. Storage stability depends on humidity. The bait must remain fresh and should not be airtight closed.

Active ingredient World market prices are not easily obtained for small quantities. In fact this is one of the most important considerations. Formulation adds only 20% to material value and 80% of total costs are materials. In the first year of activity, the formulation plant can account for more than 20% of total cost. Formulation costs must in this case, be lowered until they are less than 20%. Purchasing however, is an ever challenging problem. Even small price differences can influence the final cost.

Inert carrier Good quality kaolin may be obtained for less than 150 \$/t. But it may be necessary to pay even 200 \$/t. Carriers are not expensive. If the quality is not good, losses can be high (unstable product, bad suspendability). Limestone may be obtained for less than 50 \$/t. Its use is limited. Clay can be used as dustcarrier. Its price can be higher than 50 \$/t.

Solvents Xylene is a good standard and can be imported. Jordan Refinery solvent will cost less than 150 \$/t. The difference in quality is great. The price difference of solvents will not influence the results. Special solvents cost more than 1000 \$/t.

Emulsifier Provision must be made to obtain always the same quality material.

#### 9.10. PLANT CAPACITIES AND HIGHER/LOWER COST ESTIMATES

##### A. FUNDAMENTAL ASSUMPTIONS (ZEISER ANNEX 8)

###### 1. Formulation programme:

- 50% Dry formulation (Powder, dust, granules)
- 30% Liquid mixtures
- 10% Herbicides
- 5% Rodenticides, Household insecticides
- 5% Differents

2. Formulation capacity

TONS/ANNUM	500	1000	3000	5000	10,000
Dry formulation	500	500	1000	2500	5000
Liquid mixing	-	300	600	1500	3000
Herbicides	-	100	200	500	1000
Rodenticides	-	50	100	250	500
Differents	-	50	100	250	500

3. Number of formulation units

Mills for powder	1	1	2	3	5
Liquid mixing units	-	1	2	4	6
Herbicides	-	1	1+1	2+1	3 mixer + 1 mill
Different production lines	-	2	3	4	7

4. Estimate for equipment cost in .000\$

Wettable powder units	100 - 180	Liquid mixing	20 - 80
Granules	40 - 200	Stock emulsion	20 - 60
Bag filling 1 kg	10 - 100	Filling station	10 - 50
Bag filling 10 kg	10 - 60	Can filling	5 - 10
Dust mill	20 - 100	Production lines general	20 - 200
Laboratory analytical: 10 - 50; formulation 6 - 20; pilot plant 5 - 150			

B. COST OF INSTALLED EQUIPMENT FOR VARYING PLANT CAPACITIES - HIGHER ESTIMATE (ZEISER ANNEX 8a)

Formulation units	in .000\$				
	500	1000	2000	5000	10,000 TONS/ ANNUM
Powder formulation	100	180	360	540	800
Liquid mixing	-	80	160	240	240
Herbicides	-	80	80	160	240
			180	180	180
Rodenticides					
Household insecticides	-	20	200	200	220
Differents	-	20	220	420	640
Packing units	100	380	1200	174	2320
Powders	-	100	200	300	500
				60	120

Liquid	-	50	50	100	150
Herbicides	-	10	20	30	10
	*	160	270	495	910
1. TOTAL	100	540	1470	2235	3230
Analytical laboratory	-	10	20	50	50
Formulation laboratory	-	8	10	15	20
Biological Laboratory	-	5	10	20	100
	-	23	40	85	170
Auxiliaries	10	54	147	223	323
GRAND TOTAL	110	517	1657	2543	3723
Amortisation	22.0	61.7	82.8	50.9	37
				\$/ton	

C. COST OF INSTALLED EQUIPMENT FOR VARYING PLANT CAPACITIES -  
LOWER ESTIMATE (ZEISER ANNEX 86)

	in .000 \$				
<u>Formulation units</u>	500	1000	2000	5000	10,000 TONS/ANNUM
Dry formulation	20	100	200	300	500
Liquid mixing	-	20	40	80	120
Herbicides	-	20	20	40	80
Household insecticide Rodenticide	- 9	20	20	20	20
Differents	-	20	20	20	20
<u>Packing units</u>					
Powders	-	10	20	30	50
				10	20
Liquids	-	10	10	20	30
				5	10
Herbicides	-	5	10	15	20
					10
1. TOTAL	20	205	440	040	960
Analytical Laboratory	-	10	20	30	50
Formulation Laboratory	-	8	10	10	20
Biological Laboratory	-	5	10	10	50
	-	23	40	50	120
Auxiliaries	10	40	68	126	192
GRAND TOTAL	30	268	548	816	1272 in .000 \$
Amortisation	6.0	26.8	27.4	16.3	12.7 \$/ton

D. VARIATION IN EQUIPMENT DEPRECIATION AND PERSONNEL COST  
ACCORDING TO PERCENTAGE OF CAPACITY UTILISED

COST IS SHOWN IN \$/TON

Equipment-higher estimate

<u>Capacity used</u>	<u>500</u>	<u>1000</u>	<u>2000</u>	<u>5000</u>	<u>10,000 TONS/ANNUM</u>
100%	22.0	61.7	82.8	50.9	37.0
66%	33.2	93.5	125.4	77.1	56.1
50%	44.0	123.4	165.6	101.8	74.0
33%	66.0	185.1	248.4	152.7	111.0

Equipment lower estimate

<u>Capacity used</u>					
100%	6.0	26.8	27.4	16.3	12.7
66%	9.1	40.6	41.5	24.7	19.2
50%	12.0	53.6	54.8	32.6	25.4
33%	18.0	80.4	82.2	48.9	38.1

Personnel cost (estimated flexibility)

100%	34.0	121.0	73.0	53.2	44.8
66%	51.5	168.2	99.2	70.0	57.3
50%	68.0	202.0	121.0	78.4	61.6
33%	102.0	275.7	166.7	117.3	84.2

Personnel costs variation in .00 \$ (total cost)

100%	17	121	146	265	448
66%	17	111	131	231	378
50%	17	101	121	161	308
33%	17	86	111	176	278

9.11. TOTAL PRODUCT REQUIREMENTS

1. Joint Jordan - Syria Project - Forecast in tons

Product Type	Year						
	1	2	3	4	5	6	7
Liquids - Jordan	6	24	51	68	97	108	115
Syria	30	150	312	370	463	506	551
<b>Total Liquids</b>	<b>36</b>	<b>174</b>	<b>363</b>	<b>438</b>	<b>560</b>	<b>614</b>	<b>666</b>
Powders - Jordan	14	70	141	152	165	176	183
(cotton dust)	(150)	(750)	(1500)	(1500)	(1500)	(1500)	(1500)
Syria	183	895	1798	1827	1868	1893	1918
<b>Total Powders</b>	<b>197</b>	<b>965</b>	<b>1939</b>	<b>1979</b>	<b>2033</b>	<b>2069</b>	<b>2101</b>
Dust Sulphur - Jordan	1000	1000	1000	1000	1000	1000	1000
Syria	400	2000	4000	4000	4000	4000	4000
<b>Total Dust Sulphur</b>	<b>1400</b>	<b>1300</b>	<b>5000</b>	<b>5000</b>	<b>5000</b>	<b>5000</b>	<b>5000</b>
Rodenticide - Jordan	250	300	350	400	400	400	400
Syria	400	450	500	550	600	650	700
<b>Total Rodenticide</b>	<b>650</b>	<b>750</b>	<b>850</b>	<b>950</b>	<b>1000</b>	<b>1050</b>	<b>1100</b>
<b>Total - Jordan</b>	<b>1270</b>	<b>1394</b>	<b>1542</b>	<b>1620</b>	<b>1662</b>	<b>1684</b>	<b>1698</b>
Syria	1013	3495	6610	6747	6931	7049	7169
<b>Total</b>	<b>2283</b>	<b>4889</b>	<b>8152</b>	<b>8367</b>	<b>8593</b>	<b>8733</b>	<b>8867</b>

2. Jordanian Project with some Export to Syria - Forecast in Tons

Liquids - Jordan	6	24	51	68	97	108	115
Syria	15	75	156	185	231	253	275
<b>Total Liquids</b>	<b>21</b>	<b>99</b>	<b>207</b>	<b>253</b>	<b>328</b>	<b>361</b>	<b>390</b>
Powders - Jordan	14	70	141	152	165	176	183
(cotton dust)	(75)	(375)	(750)	(750)	(750)	(750)	(750)
Syria	91	447	899	913	934	946	959
<b>Total Powders</b>	<b>105</b>	<b>517</b>	<b>1040</b>	<b>1065</b>	<b>1099</b>	<b>1122</b>	<b>1142</b>
Dust Sulphur - Jordan	1000	1000	1000	1000	1000	1000	1000
Syria	200	1000	2000	2000	2000	2000	2000
<b>Total Dust Sulphur</b>	<b>1200</b>	<b>2000</b>	<b>3000</b>	<b>3000</b>	<b>3000</b>	<b>3000</b>	<b>3000</b>
Rodenticide - Jordan	250	300	350	400	400	400	400
Syria	200	225	250	275	300	325	350
<b>Total Rodenticide</b>	<b>450</b>	<b>525</b>	<b>600</b>	<b>675</b>	<b>700</b>	<b>725</b>	<b>750</b>
<b>Total - Jordan</b>	<b>1270</b>	<b>1394</b>	<b>1542</b>	<b>1620</b>	<b>1662</b>	<b>1684</b>	<b>1698</b>
Syria	506	1747	3305	3373	3465	3524	3584
<b>Total</b>	<b>1776</b>	<b>3141</b>	<b>4847</b>	<b>4993</b>	<b>5127</b>	<b>5208</b>	<b>5282</b>



9.12. PROPOSED EQUIPMENT AND TENDER SPECIFICATIONS

Three production units are considered:

- Liquid mixing 2 t/day
  - Powder mill 3 t/day
  - Rodent bait 2 t/day
- 
- 7 t/day

Installed capacities

Tons/Annum

Jordan

	74 report 1 shift	77 report 1 shift	2 shifts	joint venture wit Syria
1 Powder formulation				
1 inert carrier	(800)	-	-	(3000)
2 wettable powder	800	800	1000	600
3 dust				3600
2 Granular	1000			
3 Liquids				
1 emulsion conc	1000	400	800	1000
2 stock emulsion	1200	-	-	-
4 Rodenticide	-	400	800	-
5 Herbicide	-	-	-	900
6 Seed treatment	-	-	-	200
	<hr style="width: 100%;"/>			
	3000	1400	2400	6300

Technical description

Tender specification for milling equipment

1. The plant

Prestanding unit to process preweighed formulations, sulphur or inert carriers in quantities up to 300 kg per batch and 500 kg per hour, producing

- a) Dusts and dust concentrate
- b) Wettable powders
- c) Sulphur and wettable sulphur

with particle sizes 100% below 44 micron.

The plant should be a compact unit to be erected on floor end without separate basements, utilizing proven technology. Two types of separate milling systems should be used. One for mixing and de-glomerating, the second to grind to 44 micron.

Long production runs must be possible. Easy cleaning of poisonous materials is necessary. Explosion proof system. Mixing equipment in stainless steel. Cooling system indispensable, outdoor temperature may reach 40 C.

On a new plant site different problems of milling must be resolved:

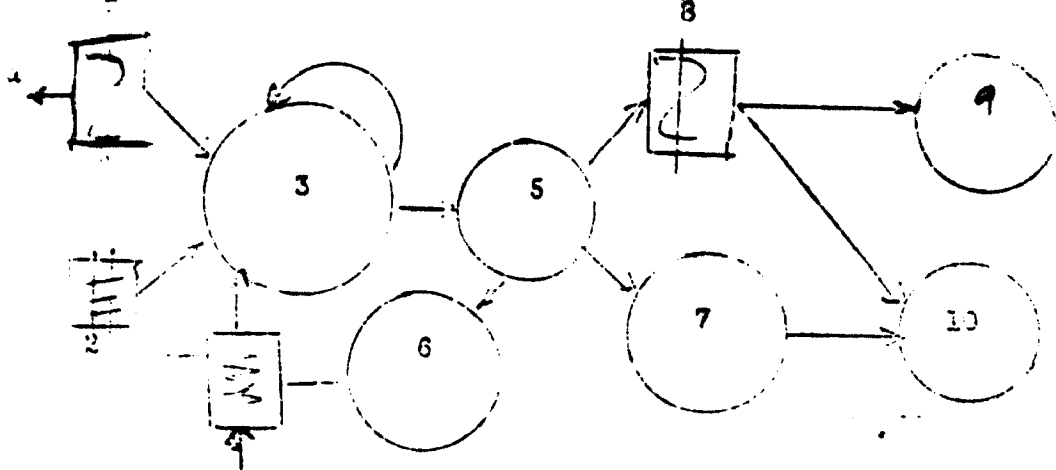
- Once through milling crushing and fine grinding of inert carrier as clay or phosphate rock; sulphur lumps to sulphur dust.
- Mixing fine precipitated or preground products with inert carrier, as different dusts, Zineb
- Mixing and milling dust and dust concentrates, wettable powders including wettable sulphur

The block flow diagram is given below with a short description of essential functions. Annex 10 is a flow sheet.

### 2.a) Design

1. Mixer capacity 300 kg minimum, 1000 l volume. Double ribbon stainless steel. Discharge to sieve mill for deglomeration and homogenisation into a second mixer. The second mixer, constructed also in stainless steel, has two central discharge openings of 200 mm diameter. One is to discharge directly into bags, one is for the feedhopper of the mill.

BLOCK FLOW DIAGRAM POWDER FORMULATION



9.13. Flow Sheets and Site Layout

1. Premixing with 1000 litre double ribbon mixer, deglomerating in sieve mill, second mixer (both stainless steel)
  - a) to be bagged directly
  - b) to feedhopper of mill
2. Precrushing and transport to feedhopper
3. Hammermill with recycle of coarse material 500 kg/h
4. Inert gas preparation and cooling system
5. Cyclon, to collect 99.8% of material
6. Filtercyclon with 99.9% efficiency
7. Silo for sulphur 3 m<sup>3</sup>
8. After mixer 2000 l for wettable powders with silo 2000 l
9. 1 kg bag filling station (screw feeder, balance)
10. 10 - 25 kg bags filling station with balance

2. b) Precrushing

Precrushing is in certain cases indispensable. A small underfloor crushing unit should be installed. Transportation for sulphur or inert carrier to feedhopper (6 m distance) 3 Hammermill with feedhopper and feeder. Installed on floor level it should with variable impact mill different materials to a cornsize 100% finer than 44 micron. An airshifter should be included. Indicate sensibility of mill to quartz and 4 Inert gas producer with small burner and after cooler. Indicate all characteristics as m<sup>3</sup>/h, temperature, O<sub>2</sub> content.

The total recycle of inert gas should be cooled to 30 C, during hot season outside temperature to 40 C.

5 Cyclon to collect 99.8% of material with airlock and transportation unit to silo or/and aftermixer (10 m distance).

6 Filtercyclon to eliminate all dust from recycle inert gas.

7 Silo to collect sulphur, inert carrier or dust 3 m<sup>3</sup>.

8 After mixer in stainless steel 2000 l, on the same level as mixer number 1 to be filled from Cyclon 5 or directly for small bag filling.

9 Small bagfiller with screw feeder and balance. Preformed bags for 1 - 2 kg (2.5 - 5 l) in plastic or coated paper should be used.

10 Bagfiller for 10 - 25 kg bags (threefold paper, polyethylene coated) with balance. Definite size and form of bags till now not definite.

### 3. Services

1. For running the plant, the total installed electrical horse power should not exceed 80 HP; of this it is estimated, that the actual consumed kilowatt consumption should not be more than 50 kw. Please indicate your requirements.

All electrical connexions must be centralized in a control panel with all necessary instruments. The panel must be air-tight and closed. It will be located outside the mill house. Only essential control should remain near the unit, this must be explosion proof.

Design control principles. Electrical equipment in the unit explosion proof.

2. Indicate all other requirements as compressed air, oil.

3. Allowance has to be made for explosion proof construction. Venting to atmosphere, explosion suppression and other precautions must be indicated. Sulphur, Sevin and Maneb are the greatest hazards.

### 4. The Process

The process allows for production runs where necessary and/or individual batches to be handled separately. Process description as mentioned before.

### 5. Plant

1. The plant should be compactly constructed with all necessary connections, to be erected on floor level without any other materials. The platform for premixer 1 and aftermixer 8 must be designed, to be constructed locally. The height of this platform should not exceed 4.0 - 4.5 m.

2. The plant can be used for various purposes:

- pilot operation
- continuous production with or without inert gas.

3. Closed circuit conditions with constant temperature
4. Safe hygenic conditions for cleaning operation
5. Give details about all necessary maintenance
6. Indicate sensibility of material to quarz sand and hard particles

6. Equipment specification

Give for each item quantity and short description to characterize function, power consumption, operation. This list should be the base for the shipping list.

7. Services supplied

1. Plant layout drawing to enable the buyer to erect the plant. Material flow chart is enclosed.
2. Foundation drawings showing fixing details and floor loadings to enable the buyer to prepare the foundations.
3. Plant layout drawing showing main areas of work activity and desired access space.
4. Operation and maintenance instructions
5. Lubrification specification for equipment
6. Schematic wiring diagramm showing position and details of electric motors to enable buyer to supply and install the necessary electrical wiring

Services to be supplied by the buyer

1. Building to house the plant
2. Erection and installation of the plant
3. Supply and installation of electric wiring inclusive isolation of main supply
4. Electrical lighting and installation
5. Washable floor and walls
6. The seller must specify all equipment and services not included in his offer.
7. Supply of compressed air (pressure, temperature and volume must be indicated).

8. Terms

1. Specify the price for each item or groups of equipment giving full details of all included materials
2. Indicate if packaging and transport is included. Give insurance cost.
3. Indicate if given prices are estimated or definite.
4. Give validity of your offer.
5. Provisions must be made to clear all relevant design layout details.
6. Indicate if test runs can be made in your own factory.
7. Give references.
8. Delivery, estimated in weeks beginning from date of definite order. Can you guarantee prompt delivery?
9. Payment conditions.
10. Engineers services. Charges for construction and start up for qualified workers and engineer should be indicated.

9.14. BUILDING COSTS

Site requirements

Surface requirements for pesticide formulation are:

- raw material storage
- formulation area
- warehouse
- office, laboratory, personnel services
- power center, workshop
- waste disposal

Expansion reserves:

- Transportation: roads, ramps

The dimension of each department depends on:

- installed equipment
- volume of material and capacity
- material management
- safety distances

The layout shown in Section 9.13. was worked out during the first feasibility study in 1974.

Surface Requirements

Surface requirements are given in  $m^2$  to be constructed immediately and long range expansion requirements. Reference must be made to Dr. Zeiser's 1974 report page 32 - 37.

Surface requirements for different departments in  $m^2$

	1980/85	1985/90
Raw material storage	500	1600
Formulation units		
Powder	200	350
Liquid	100	250
Household	100	250
Herbicides		250
	400	1000

Warehouse	500	2000
Laboratory	150	150
<hr/>		
<b>Auxiliaries</b>		
Office	100	300
Personnel	150	250
Workshop	200	250
Energy	100	150
	<hr/>	
	550	950
	<hr/>	
<b>TOTAL</b>	2100	4850

**CONSTRUCTION COST**

Various types of construction should be used.

Laboratory and offices require a good isolated roof and must be air conditioned. Floor tiles have to be used. Water, gas and compressed air should be installed. The cost price is estimated to m/be 100 JD/m<sup>2</sup>. The laboratory space is divided into:

<b>Analytical</b>	
General quality control	50 m <sup>2</sup>
Weighing	5
Precision instruments	20
<b>Formulation</b>	
General	20
Small scale formulation	20
Sample storage	35
General Office	20
	<hr/>
<b>TOTAL</b>	150

Auxiliaries as personnel service and office rooms are considered to cost 90 JD/m<sup>2</sup>.

Storage facilities can be prefabricated or constructed with cement bricks. Smooth, heavy duty floor is required. Cost is estimated at 60 JD/m<sup>2</sup>.

Formulation area partly open shed. Milling and liquid mixing must be separated from the surrounding with cement walls. Packing



facilities are in closed areas. Floors must be easy to clean. Walls must have a washable surface. Construction cost 50 JD/m<sup>2</sup>.

CONSTRUCTION COST

	m <sup>2</sup>	JD/m <sup>2</sup>	Total cost - JD
facilities	1000	60	60,000
Formulation area	400	50	20,000
Laboratory	150	100	15,000
Auxiliaries	550	90	5,000
	2100		100,000

JD 100,000 equals US\$ 300,000.

9.15. PLANT SITE

Five plant sites were considered:

- Sahab
- Aqaba
- Zarqa
- Jordan Valley
- Salt

Sahab is not yet developed, no infrastructure is available. It is too far away from the main markets. Pesticide formulation is not suitable for an industrial estate.

Aqaba is too far away.

Zarqa is highly populated. The plant could be located near the ceramic industries. Infrastructure available. Good road connexion.

Jordan Valley is in the center of main Jordan pesticide consumption. Good contacts with all farmers might be easier. However, part of production will be used for public health in town areas like Amman. Export would be difficult. Imports have a long bad road to negotiate. High temperatures make some products unstable. Difficult working conditions. Infrastructure with services and spare parts are not yet developed.

Salt is being suggested as a good compromise. The industrial estate is outside town with no infrastructure. The land is difficult to build on. Transport from Aqaba, and to Lattakia is possible. Manpower may be available in Salt.

#### 9.16. MAINTENANCE AND SERVICES

Power consumption A 500 kw, 380 V main supply should be available. 150 kw will be used immediately. A small compressor for the fluid energy mill, to be installed in the future needs 300 kw.

Power consumption will not be more than 0.3 kwh/kg production 1 kwh costs 3 US cents. Power consumption may reach 1 kwh/kg on some products.

An oil burner with 300.000 kcal/h must be installed for warm water supply. Maximum temperature should not exceed 60°C. This 60°C maximum is of utmost importance for security in the factory.

40 - 80 tons gas oil will be burned every year.

Water consumption may reach 10 m<sup>3</sup>/day, mainly for personnel requirements and cooling. Sewage contaminated with pesticides should not be more than 3 m<sup>3</sup>/day. Contaminated water can be concentrated and burned in a special furnace, to destroy all pesticide residues.

Maintenance As much work as possible should be performed within the plant workshop. Spare parts must be available and \$5000 will be spent every year.

Cars should be sent to specialized service stations. The laboratory will have at least \$4000 chemicals annually.

10.1 Project 1 (With Syrian Investment) - Cost of Products (Raw Materials and Packing Materials)

Product	Factory Packed Cost - \$/ton	Forecast Tonnage for Jordan and S. Y. - '000							Forecast Cost of Products - US\$						
		Year 1	2	3	4	5	6	7	Year 1	2	3	4	5	6	7
Melathion 57	1,501.05	6	28	55	57	60	64	66	9,006	42,029	82,558	85,560	90,063	96,067	99,069
Parathion 50	1,641.50	6	29	58	60	63	67	69	9,849	47,603	95,207	98,490	103,414	109,980	113,263
Dimethoate 40	1,887.44	10	50	100	106	112	118	124	18,874	94,372	188,744	200,069	211,393	222,718	234,043
Diazinon 60	4,481.40	2	8	16	17	18	20	21	8,963	35,851	71,702	76,184	80,665	89,628	94,109
Endosulfan 35	2,715.15	4	20	40	42	44	46	48	10,861	54,303	108,606	114,036	119,467	124,897	130,327
Monocrotophos 40	4,572.80	7	33	66	68	71	75	77	32,009	150,902	301,804	310,950	324,669	342,669	352,960
Lindane 20	1,439.80	1	5	10	11	12	13	14	1,440	7,199	14,398	15,838	17,278	18,717	20,157
Dicofol 42	2,348.70	-	1	2	2	2	2	2	-	2,349	4,697	4,697	4,697	4,697	4,697
Specialities	9,000.00	-	-	16	75	178	209	245	-	-	144,000	657,000	1,602,000	1,881,000	2,205,000
<b>Sulphur Dust</b>	<b>80.30</b>	<b>1400</b>	<b>3000</b>	<b>5000</b>	<b>5000</b>	<b>5000</b>	<b>5000</b>	<b>5000</b>	<b>91,002</b>	<b>385,708</b>	<b>1,011,716</b>	<b>1,562,824</b>	<b>2,553,646</b>	<b>2,890,664</b>	<b>3,252,771</b>
BHC Lindane 2.6 Dust	219.07	12	58	115	120	125	131	136	112,420	240,900	401,500	401,500	401,500	401,500	401,500
Mercury 1.5 Dust	334.93	2	10	20	21	21	22	22	2,629	12,706	25,193	26,288	27,384	28,698	29,793
Parathion 5 Dust	219.75	-	1	2	2	2	2	2	670	3,349	6,698	7,034	7,034	7,368	7,368
Endosulfan 6 Dust	469.70	150	750	1500	1500	1500	1500	1500	70,455	352,275	704,550	704,550	704,550	704,550	704,550
Zineb 80 WP	1,142.10	16	80	160	170	180	190	200	18,274	91,368	182,736	194,157	205,578	216,999	228,420
Zineb + DDC WP	711.75	1	5	10	10	10	11	11	712	2,449	7,118	7,118	7,118	7,829	7,829
Maneb 80 WP	1,245.60	1	4	8	8	8	9	9	1,246	4,982	9,965	9,965	9,965	11,210	11,210
Carbaryl 85 WP	2,926.75	5	16	38	40	43	46	48	14,634	46,828	111,216	117,070	125,850	134,630	140,484
Plictran 25 WP	5,505.95	-	1	2	2	2	2	2	-	5,506	11,012	11,012	11,012	11,012	11,012
DDC 50 WP	774.10	5	15	30	32	35	38	40	3,870	11,611	23,223	24,771	27,093	29,416	30,964
DIT 50 WP	629.50	5	25	50	52	55	58	60	3,148	15,737	31,475	32,734	34,623	36,511	37,770
Specialities	7,650.00	-	-	4	22	52	60	71	-	-	30,600	168,300	397,800	453,000	543,150
<b>Subtotal</b>									<b>228,058</b>	<b>789,041</b>	<b>1,545,726</b>	<b>1,704,939</b>	<b>1,959,947</b>	<b>2,049,163</b>	<b>2,154,490</b>
Rodenticide Bait	351.76	650	750	850	950	1000	1050	1100	228,644	263,820	298,996	334,172	351,760	369,348	386,936
<b>TOTAL</b>									<b>547,704</b>	<b>1,438,569</b>	<b>2,856,438</b>	<b>3,601,935</b>	<b>4,865,353</b>	<b>5,309,175</b>	<b>5,794,197</b>

10.2. Project 2 (Including Export Sales to Syria) - Cost of Products (New Materials and Packing Materials)

Product	Factory Packed Cost + \$ Ton	Forecast Tonnage for Jordan and Syria - Tons												Forecast Cost of Products - US\$						
		Year 1	2	3	4	5	6	7	Year 1	2	3	4	5	6	7					
Malathion 57	1,501.05	3	15	30	31	32	35	36	4,503	22,516	45,036	46,533	48,034	52,537	54,038					
Parathion 50	1,641.50	4	17	33	34	36	38	39	6,566	27,905	54,169	55,811	59,094	62,377	64,018					
Dimethoate 40	1,887.44	6	30	60	64	67	70	74	11,325	56,623	113,246	120,796	126,458	132,121	139,671					
Diazinon 60	4,481.40	2	6	11	12	12	14	14	8,963	26,888	49,295	53,777	53,777	62,740	62,740					
Endosulfan 35	2,715.15	2	10	20	21	22	23	24	5,430	27,151	54,303	57,018	59,733	62,448	65,164					
Monocrotophos 40	4,572.80	4	18	36	37	38	41	42	18,291	82,310	164,621	169,194	173,766	187,485	192,058					
Lindane 20	1,439.80	-	2	5	5	6	6	7	-	2,880	7,199	7,199	8,639	8,639	10,079					
Dicofol 42	2,348.70	-	1	2	2	2	2	2	-	2,349	4,697	4,697	4,697	4,697	4,697					
Specialities	9,000.00	-	-	10	47	113	132	152	-	-	90,000	423,000	1,017,000	188,000	1,368,000					
		1200	2000	3000	3000	3000	3000	3000	55,078	248,622	582,566	938,025	1,551,192	1,761,044	1,960,465					
Sulphur Dust	80.30	7	33	65	67	70	74	76	96,360	160,600	240,900	240,900	240,900	240,900	240,900					
Lindane 2.6 Dust	219.07	2	10	20	21	21	22	22	1,533	7,229	14,240	14,678	15,335	16,211	16,649					
Mercury 1.5 Dust	334.93	-	1	2	2	2	2	2	670	3,349	6,698	7,034	7,034	7,368	7,368					
Parathion 5 Dust	219.75	75	375	750	750	750	750	750	35,277	176,138	352,275	352,275	352,275	352,275	352,275					
Endosulfan 6 Dust	469.70	12	60	120	128	135	142	150	13,705	68,526	137,052	146,189	154,183	162,178	171,315					
Zineb 80 WP	1,142.10	1	5	10	10	10	11	11	712	3,559	7,118	7,118	7,118	7,829	7,829					
Zineb + Coc WP	711.75	1	4	8	8	8	9	9	1,246	4,982	9,965	9,965	9,965	11,210	11,210					
Maneb 80 WP	1,245.60	3	9	20	21	23	24	25	8,780	26,341	58,535	61,462	67,315	70,242	73,169					
Carbaryl 85 WP	2,926.75	-	1	2	2	2	2	2	-	5,506	11,012	11,012	11,012	11,012	11,012					
Plictran 25 WP	5,505.95	2	7	15	16	17	19	20	1,550	5,426	11,626	12,402	13,177	14,727	15,502					
Coc 50 WP	775.10	2	12	25	26	28	29	30	1,259	7,554	15,737	16,367	17,626	18,255	18,885					
DDT 50 WP	629.50	-	-	3	14	33	38	45	-	-	22,950	107,100	252,450	290,700	344,250					
Specialities	7,650.00								161,092	469,430	888,548	1,249,554	1,148,830	1,203,347	1,270,804					
Rodenticide Bait	351.76	450	525	600	675	700	725	750	158,292	184,674	211,056	237,438	246,232	255,026	263,820					
TOTAL	-	-	-	-	-	-	-	-	374,462	902,726	1,682,170	2,425,017	2,946,254	3,219,417	3,495,089					

10.3 Product Selling Prices to Jordanian Distributors

Ex Salt Factory - US.Dollars Per Ton/1,000 Litres

Product	Distributors C+F Aqaba Cost	Add 7% Charges and Taxes	Add Inland Freight	Delivered Cost (Selling Price) At Amman/Salt
Malathion 57	2,900	203	12	3,115
Parathion 50	2,750	192.50	12	2,954.50
Dimethoate 40	2,650	185.50	12	2,847.50
Diazinon 60	8,000	560	12	8,572
Monocrotophos 40	8,250	577.50	12	8,839.50
Dicofol 42	3,320	232.40	12	3,564.40
Specialities EC	-	-	-	10,000
Sulphur Dust	123	8.61	-	131.61
Lindane Dust 2.6%	250	17.50	12	279.50
Parathion Dust 5%	850	59.50	12	921.50
COC 30% + Zineb 65%	1,666	116.62	12	1,794.62
Mercury 1.5% S/D	700	49	12	761
Carbaryl 85 WP	3,420	239.40	12	3,671.40
Pliotran 25 WP	11,250	787.50	12	12,049.50
Zineb 80 WP	1,170	81.90	12	1,263.90
Naneb 80 WP	1,660	116.20	12	1,788.20
Specialities WP	-	-	-	8,500
Rodenticide Bait	1,600	112	12	1,724

10.4. Product Selling Prices to Syrian Buyers

Ex Salt Factory - US Dollars Per Ton / 1,000 Litres

Product	C+F Lattakia Cost Col. 1	Add 9% Charges Col. 2	Add Inland Freight Col. 3	Minus Freight From Factory Col. 4	Minus Charges Col. 5	Selling Price to Syrian Buyers Ex Salt Factory Col. 6
Malathion 57	2,000	2,180	2,188.75	2,164.75	160.41	2,004.34
Parathion 50	3,050	3,324.50	3,333.25	3,309.25	245.21	3,064.04
Endosulfan 35	3,170	3,455.30	3,464.05	3,440.05	254.91	3,185.14
Dimethoate 40	2,510	2,735.90	2,744.65	2,720.65	201.60	2,519.05
Diasinon 60	8,080	8,807.20	8,815.95	8,791.95	651.48	8,140.47
Lindane 20	4,260	4,643.40	4,652.15	4,628.15	342.95	4,285.20
Monocrotophos 40	7,380	8,044.20	8,052.95	8,028.95	594.94	7,434.01
Specialities	-	-	-	-	-	10,000
Zineb 80	1,400	1,526	1,534.75	1,510.75	111.95	1,398.80
BHC 2.6% Dust	300	327	335.75	311.75	23.10	288.65
COC 50 WP	1,450	1,580.50	1,589.25	1,565.25	115.98	1,449.27
Carbaryl 85	4,790	5,221.10	5,229.85	5,205.85	385.75	4,820.10
Endosulfan 6% Dust	764	832.76	841.51	817.51	60.58	756.93
DDT 50 WP	800	872	880.75	856.75	63.48	793.27
Sulphur Dust	133	144.97	158.72	146.72	10.87	135.85
Specialities	-	-	-	-	-	8,500
Rodenticide Bait	1,600	1,744	1,752.75	1,728.75	128.10	1,600.65

10.5. Forecast Sales Value for Jordan - US Dollars  
And Sales Value for Project 1

Product	Selling Price Ex Salt Factory - \$/ton	Sales Forecast for Jordan - Tons							Sales Forecast for Jordan - Value US \$						
		Year 1	2	3	4	5	6	7	Year 1	2	3	4	5	6	7
Malathion 57	3,115	1	3	5	5	5	6	6	3,115	9,345	15,575	15,575	15,575	18,690	18,690
Parathion 50	2,954.50	1	4	8	8	8	9	9	2,954	11,818	23,636	23,636	23,636	26,590	26,590
Dimethoate 40	2,847.50	2	10	20	21	22	23	24	5,695	28,475	56,950	59,797	62,645	68,340	68,340
Diazinon 60	8,572	1	3	6	6	6	7	7	8,572	25,716	51,432	51,432	51,432	60,004	60,004
Monocrotophos 40	8,839.50	1	3	6	6	6	7	7	8,839	26,518	53,037	53,037	53,037	61,876	61,876
Dicofol 42	3,564.40	-	1	2	2	2	2	2	-	3,564	7,129	7,129	7,129	7,129	7,129
Specialities EC	10,000	-	-	4	20	48	54	60	-	-	40,000	200,000	480,000	540,000	600,000
Sub-Total									29,175	105,436	247,759	410,606	693,454	779,781	842,629
Sulphur Dust	131.61	1000	1000	1000	1000	1000	1000	1000	131,610	131,610	131,610	131,610	131,610	131,610	131,610
Lindane Dust 2.6%	279.50	2	8	15	15	15	16	16	559	2,236	4,192	4,192	4,192	4,472	4,472
Parathion Dust 5%	921.50	-	1	2	2	2	2	2	-	921	1,843	1,843	1,843	1,843	1,843
Coc 30%-Zineb 65	1,794.62	1	5	10	10	10	11	11	1,795	8,973	17,946	17,946	17,946	19,741	19,741
Mercury 1.5% S/D	761	2	10	20	21	21	22	22	1,522	7,690	15,220	15,981	15,981	16,742	16,742
Carbaryl 85 WP	3,671.40	-	1	3	3	3	3	3	-	3,671	11,014	11,014	11,014	11,014	11,014
Plictran 25 WP	12,049.50	-	1	2	2	2	2	2	-	12,049	24,099	24,099	24,099	24,099	24,099
Zineb 80	1,263.90	8	40	80	85	90	95	100	10,111	50,556	101,112	107,431	113,751	120,070	126,390
Maneb 80	1,788.20	1	4	8	8	8	9	9	1,788	7,153	14,306	14,306	14,306	16,094	16,094
Specialities WP	8,500	-	-	1	6	14	16	18	-	-	8,500	51,000	119,000	136,000	153,000
Sub-Total									147,385	224,779	329,842	379,422	453,742	481,685	505,005
Rodenticide Bait	1,724	250	300	350	400	400	400	400	431,000	517,200	603,400	689,600	689,600	689,600	689,600
Total Sales Value for Jordan - \$									607,560	847,415	1,181,001	1,479,628	1,836,796	1,951,066	2,037,234
Add Total Sales Value to Syria - Project 1 - (See Section 10.6.) - \$									972,791	2,320,267	4,169,880	4,869,371	5,984,925	6,464,483	6,999,974
Grand Total Sales Value for Project 1 - \$									1,580,351	3,167,682	5,350,881	6,348,999	7,821,721	8,414,549	9,037,208

10.6. Forecast Sales Value to Syria - US Dollars  
And Sales Value for Project 2

Product	Selling Price Ex Selt Factory-\$/ton	Sales Forecast to Syria (Project 1) - Tons							Sales Forecast to Syria (Project 1) - Value US\$						
		Year 1	2	3	4	5	6	7	Year 1	2	3	4	5	6	7
Malathion 57	2,004.34	5	25	50	52	55	58	60	10,022	50,108	100,217	104,226	110,239	116,252	120,260
Parathion 50	3,064.04	5	25	50	52	55	58	60	15,320	76,601	153,202	159,330	168,522	177,714	183,842
Endosulfan 35	3,185.14	4	20	40	42	44	46	48	12,741	63,703	127,406	133,776	140,146	146,516	152,887
Dimethoate 40	2,519.05	8	40	80	85	90	95	100	20,152	100,762	201,524	214,119	226,714	239,310	251,905
Diazinon 60	8,140.47	1	5	10	11	12	13	14	8,140	40,702	81,405	89,545	97,686	105,826	113,967
Lindane 20	4,285.20	1	5	10	11	12	13	14	4,285	21,426	42,852	47,137	51,422	55,708	59,993
Monocrotophos 40	7,434.01	6	30	60	62	65	68	70	44,604	223,020	446,041	460,909	483,210	505,513	520,381
Specialities	10,000	-	-	12	55	130	155	185	-	-	120,000	550,000	1,300,000	1,550,000	1,850,000
Sub-total									115,264	576,322	1,272,647	1,752,042	1,577,939	2,896,839	3,253,235
Zineb 80	1,398.80	8	40	80	85	90	95	100	11,190	55,952	111,904	118,898	125,892	132,886	139,880
BBG Dust 2.6%	288.65	10	50	100	105	110	115	120	2,886	14,432	28,865	30,308	31,751	33,195	34,638
COC 50 WP	1,449.27	5	15	30	32	35	38	40	7,246	21,739	43,478	46,377	50,724	55,072	57,971
Carbaryl 85 WP	4,820.10	5	15	35	37	40	43	45	24,100	72,301	168,703	178,344	192,804	207,264	216,904
Endosulfan 6% Dust	756.93	150	750	1500	1500	1500	1500	1500	113,539	567,697	1,135,395	1,135,395	1,135,395	1,135,395	1,135,395
DDT 50 WP	793.27	5	25	50	52	55	58	60	3,966	19,832	39,663	41,250	43,630	46,010	47,596
Sulphur Dust	135.85	400	2000	4000	4000	4000	4000	4000	54,340	271,700	543,400	543,400	543,400	543,400	543,400
Specialities	8,500	-	-	3	16	38	44	53	-	-	25,500	136,000	323,000	374,000	450,500
Sub-total									217,267	1,023,653	2,096,908	2,229,272	2,446,596	2,527,222	2,626,284
Rodenticide Bait	1,600.65	400	450	500	550	600	650	700	640,260	720,292	800,325	880,357	960,390	1,040,422	1,120,455
<b>Total Sales Value to Syria Project 1 - \$</b>									<b>972,791</b>	<b>2,320,267</b>	<b>4,169,880</b>	<b>4,869,371</b>	<b>5,984,925</b>	<b>6,464,483</b>	<b>6,999,974</b>
<b>Sales Value to Syria - Project 2 (Half Project 1) - \$</b>									<b>486,396</b>	<b>1,160,134</b>	<b>2,084,940</b>	<b>2,434,686</b>	<b>2,992,463</b>	<b>3,232,242</b>	<b>3,499,987</b>
<b>Add Total Sales Value for Jordan (See Section 10.5.) - \$</b>									<b>607,560</b>	<b>847,415</b>	<b>1,181,001</b>	<b>1,497,628</b>	<b>1,836,796</b>	<b>1,951,066</b>	<b>2,037,234</b>
<b>Grand Total Sales Value for Project 2 - \$</b>									<b>1,093,956</b>	<b>2,007,549</b>	<b>3,265,941</b>	<b>3,914,314</b>	<b>4,829,259</b>	<b>5,183,308</b>	<b>5,537,221</b>



10.7. Cash Flow - Projects 1 and 2 - US Dollars

	Year 0	1st Year 1	2nd Year 1	Total Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Cost of Land, Equipment, Installation and Buildings	1,070,000									
Capital Injection to Meet Capital Costs by Investors	1,070,000									
<b>Project 1</b>										
Sales Income		1,027,228	553,123	1,580,351	3,167,682	5,350,881	6,348,999	7,821,721	8,415,549	9,037,208
Expenses - Direct Cost of Products		356,008	191,696	547,704	1,438,569	2,856,438	3,601,935	4,865,353	5,301,175	5,794,197
- Energy		13,356	7,191	20,547	44,009	73,368	75,303	77,337	78,597	79,803
- Payroll and Maintenance		120,000	120,000	240,000	240,000	335,000	335,000	335,000	428,000	428,000
- Other Expenses		5,000	5,000	10,000	20,000	20,000	30,000	30,000	40,000	40,000
(Total Expenses)		(494,364)	323,887	818,251	1,742,570	3,284,806	4,042,238	5,307,690	5,855,772	6,342,000
Difference Between Income and Expenses		532,864	229,236	762,100	1,425,112	2,066,075	2,306,761	2,514,031	2,559,777	2,695,208
<b>Project 2</b>										
Sales Income		711,071	382,885	1,093,956	2,007,549	3,265,941	3,914,314	4,829,259	5,183,308	5,537,221
Expenses - Direct Cost of Products		243,400	131,062	374,462	904,726	1,682,170	2,425,017	2,946,254	3,219,417	3,495,089
- Energy		10,390	5,594	15,984	28,269	43,623	44,937	46,143	46,872	47,538
- Payroll and Maintenance		120,000	120,000	240,000	240,000	335,000	335,000	335,000	335,000	335,000
- Other Expenses		5,000	5,000	10,000	10,000	20,000	20,000	20,000	20,000	30,000
(Total Expenses)		(378,790)	261,656	640,446	1,480,995	2,080,793	2,824,954	3,347,397	3,621,289	3,907,627
Difference Between Income and Expenses		332,281	121,229	453,510	826,554	1,185,148	1,089,360	1,481,862	1,562,019	1,629,594

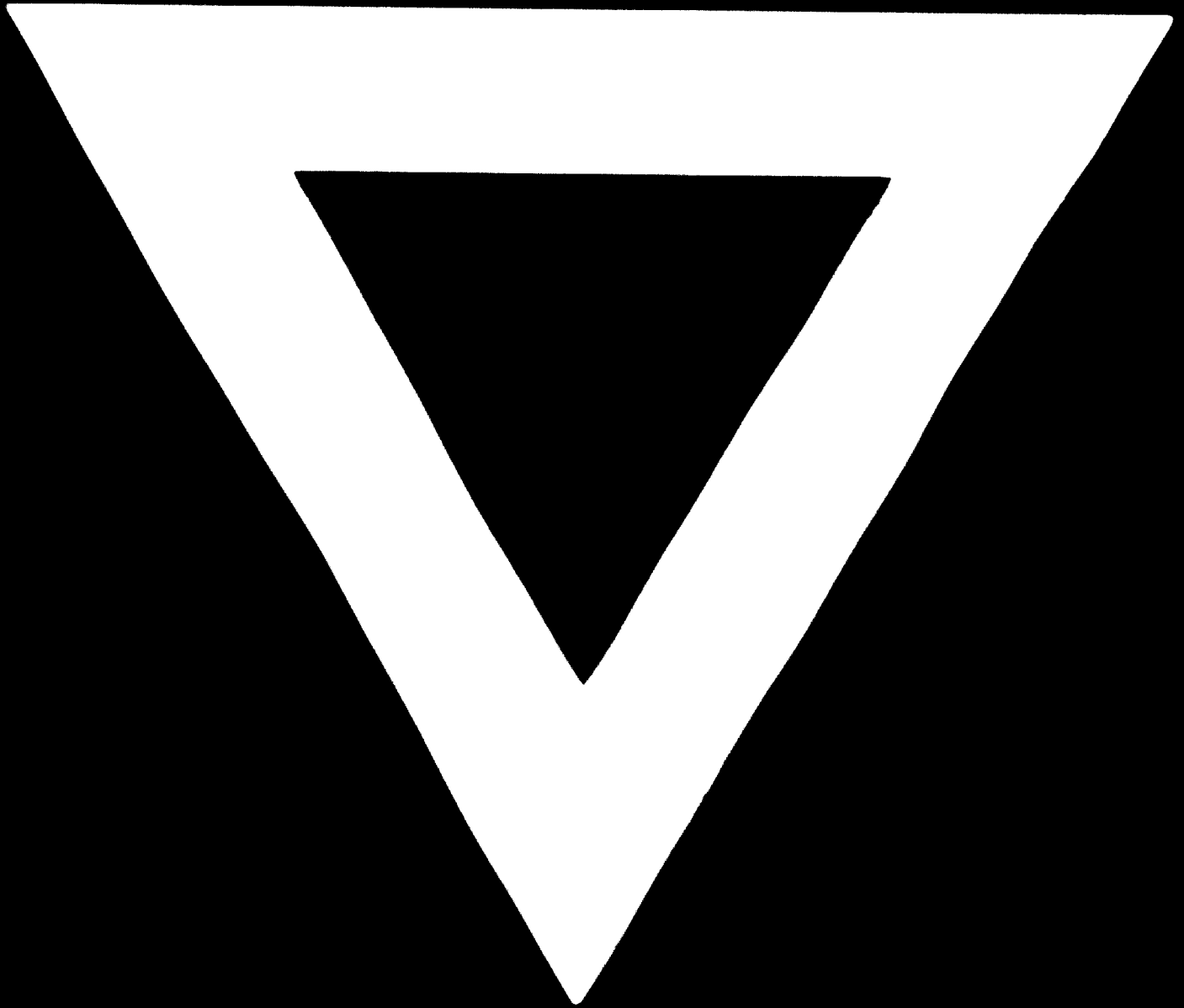
10.8. Profit and Loss Forecasts - Projects 1 and 2 - US Dollars

	Year 1	2	3	4	5	6	7
<b>Project 1</b>							
Sales Income - Ex Factory	1,580,351	3,167,682	5,350,881	6,348,999	7,821,721	8,415,549	9,037,208
Expenses - Direct Cost of Products - Ex Factory	547,704	1,438,569	2,856,438	3,601,935	4,865,353	5,309,175	5,794,197
- Energy	20,547	44,001	73,368	75,303	77,337	78,597	79,803
- Payroll and Maintenance	240,000	240,000	335,000	335,000	335,000	428,000	428,000
- Other Expenses	10,000	20,000	20,000	30,000	30,000	40,000	40,000
- Interest	10,800	-	-	-	-	-	-
Depreciation on Plant and Buildings	80,500	80,500	80,500	80,500	80,500	80,500	80,500
Net Profit/Year Available for Distribution/Funding Working Capital	670,800	1,344,612	1,985,575	2,226,261	2,433,531	2,479,277	2,614,708
Return on Issued Capital (\$1,070,000) - Percentage	62.7	125.7	185.6	208	227	231	244
<b>Project 2</b>							
Sales Income - Ex Factory	1,093,956	2,007,549	3,265,941	3,914,314	4,829,259	5,183,308	5,537,221
Expenses - Direct Cost of Products - Ex Factory	374,462	902,726	1,682,170	2,425,017	2,946,254	3,219,417	3,495,089
- Energy	15,984	28,269	43,623	44,937	46,143	46,872	47,538
- Payroll and Maintenance	240,000	240,000	335,000	335,000	335,000	335,000	335,000
- Other Expenses	10,000	10,000	20,000	20,000	20,000	20,000	20,000
- Interest	9,450	-	-	-	-	-	-
Depreciation on Plant and Buildings	80,500	80,500	80,500	80,500	80,500	80,500	80,500
Net Profit/Year Available for Distribution/Funding Working Capital	363,560	766,054	1,104,648	1,008,860	1,401,362	1,481,519	1,549,094
Return on Issued Capital (\$1,070,000) - Percentage	34	69.7	103	93.4	131	138	144

10.9. Balance Sheets - Projects 1 and 2 - US Dollars

	Year 1	2	3	4	5	6	7
<b>Project 1</b>							
Fixed Assets at Cost	1,070,000	1,070,000	1,070,000	1,070,000	1,070,000	1,070,000	1,070,000
- Less Depreciation	80,500	161,000	241,500	322,000	402,500	483,000	563,500
- Written Down Value	989,500	909,000	828,500	748,000	667,500	587,000	506,500
Current Assets - Debtors	-	-	-	-	-	-	-
- Cash at Bank	751,300	1,505,612	2,227,075	2,548,261	2,836,031	2,962,277	3,178,208
Total Net Assets	1,740,800	2,414,612	3,055,575	3,296,261	3,503,531	3,549,277	3,684,708
Financed by:							
- Share Capital	1,070,000	1,070,000	1,070,000	1,070,000	1,070,000	1,070,000	1,070,000
- Profit and Loss Account	670,800	1,344,612	1,985,575	2,226,261	2,433,531	2,479,277	2,614,708
Total Finances	1,740,800	2,414,612	3,055,575	3,296,261	3,503,531	3,549,277	3,684,708
<b>Project 2</b>							
Fixed Assets at Cost	1,070,000	1,070,000	1,070,000	1,070,000	1,070,000	1,070,000	1,070,000
- Less Depreciation	80,500	161,000	241,500	322,000	402,500	483,000	563,500
- Written Down Value	989,500	909,000	828,500	748,000	667,500	587,000	506,500
Current Assets - Debtors	-	-	-	-	-	-	-
- Cash at Bank	444,060	907,054	1,346,148	1,330,860	1,803,862	1,964,519	2,112,594
Total Net Assets	1,433,560	1,816,054	2,174,648	2,078,860	2,471,362	2,551,519	2,619,094
Financed by:							
- Share Capital	1,070,000	1,070,000	1,070,000	1,070,000	1,070,000	1,070,000	1,070,000
- Profit and Loss Account	363,560	746,054	1,104,648	1,008,860	1,401,362	1,481,519	1,549,094
Total Finances	1,433,560	1,816,054	2,174,648	2,078,860	2,471,362	2,551,519	2,619,094

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