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AN OVERVIEW OF PESTICIDES INDUSTRY IN INDIA

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AN OVERVIEW OF PESTICIDES INDUSTRY IN INDIA

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Pesticides industry can be classified in terms of five groups: 1) Insecticides, 2) Fungicides, 3) Rodenticides, 4) Herbicides, and 5) Fumigents. The constituents of the industry includes Technical Grade material manufacturers, Formulators, Dealers (sale points) and Consumers.

The working group on Pesticides Industry for the 7th Plan estimated that about 8 to 10 million tonnes of foodgrains alone are lost due to pests and diseases every year. In addition, pesticides also play an important role in the National Health Programmes by providing effective control of diseases like Malaria, Filaria, Cholera, and Kala-azar. The pesticides are also widely used in households for control of insects like mosquitoes, cockroaches, flies and bedbugs.

The use of pesticides in India started even before independence for the control ^{of} mosquitoes. In India, prior to 1951 all pesticides were imported and the total value did not exceed Rs.6 million. The real beginning of pesticides industry in India was in 1952. The

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first plant to produce Benzene Hexachloride (BHC) was set up in 1952 in the private sector at Rishna near Calcutta. In 1954, Hindustan Insecticides Ltd. was incorporated to manufacture DDT for the malaria control scheme. The production and use of pesticides in agriculture experienced a rapid growth and structural changes in the product mix with the advent of high yielding crop varieties. Major growth came during the last 20 years (between 1966-67 and 1985-86). (Table-1)

This paper attempts to analyse the growth of the production of pesticides during the last 20 years and changes in the structure of the product mix, product dominance and flow of materials. The profile of this industry including the technical grade material manufacturers, formulators and dealers is examined. The issues facing the industry are studied for technical grade material producers, formulators and dealers. This paper also analyses the problems faced by the farmers in buying and using pesticides.

The paper is divided into five parts: Part-I analyses the growth of installed capacity and production for the last 20 years (1965-66 to 1986-87). Part-II briefly presents the industry profile. Part-III presents the use pattern and spatial distribution of pesticides. Part-IV presents the regulatory environment in the country for pesticides production, imports, exports formulation and marketing. And Part-V presents some of the observed problems.

I. INSTALLED CAPACITY AND GROWTH OF PRODUCTION OF TECHNICAL GRADE MATERIALS

Since inception, there has been considerable emphasis on self reliance in the production of technical grade materials for pesticides. The installed capacity has grown from 19,280 tonnes in 1966 to 102,328 tonnes (Table 1) in 1985-86 (rate of growth is 8.3%). Actual production as a percentage of installed capacity has fluctuated from year to year and it has been about 68% of the installed capacity during the last twenty-years. The rate of growth of actual production in quantity terms between 1966 and 1985-86 is shown in the following estimated equation:

$$\text{Log } Y = 9.636 + .076t \quad R^2 = 0.93 \\ (15.99)^*$$

$$\text{Growth rate} = 7.6\%$$

* Figure in bracket indicates t-value

As per above computation, the growth rate in production between 1966 and 1985-86 has been 7.6%. More important feature of this growth has been that weightage of BHC and DDT has come down from 82.3% in 1965-66 to 56.2% in 1985-86 (Table 2). This indicates a structural shift from low value products to high value products, over the years. This also indicates that the growth of industry has been much faster in value terms. The imports have contributed only Rs.7.9 crores in latest year 1984-85, out of the total turnover of the industry which is in the order of Rs.600 crores. The industry has also contributed 3.9% of production to exports in the year 1985-86.

Table 1 : INSTALLED CAPACITY AND PRODUCTION OF
TECHNICAL GRADE PESTICIDES

(Quantity in tonnes)

Year	Installed Capacity	Production	Capacity Utilization (%)
1966	19280	13948	72.34
1967	20969	15342	73.17
1968	25746	18913	73.46
1969	35348	18721	52.96
1970	38238	24361	63.71
1971	42973	24908	57.96
1972	44110	26882	60.94
1973	45140	30799	68.23
1974-75	45930	34203	74.47
1975-76	50050	35036	70.00
1976-77	49918	35812	71.74
1977-78	60800	42598	70.06
1978-79	70485	52631	74.67
1979-80	74695	50294	67.33
1980-81	74850	43281	57.82
1981-82	81640	49414	60.53
1982-83	90940	57926	63.70
1983-84	96890	59730	61.65
1984-85	99122	58416	58.93
1985-86	102328	54919	53.67
Total	1058172	717351	67.79

Source: Indian Chemicals Statistics, 1986-87, Department of Chemicals and Petrochemicals, Ministry of Industry, Government of India, New Delhi, Page 96.

Table 2 : COMPOSITION OF PESTICIDES PRODUCTION

(Quantity in tonnes)

Year	Production of BHC & DDT	Production of Other Products	Total Production
1965-66	9911 (82.3%)	2132 (17.7%)	12043
1975-76	28345 (80.9%)	6691 (19.1%)	35036
1985-86	30887 (56.2%)	24032 (43.8%)	54919

Figures in bracket indicate percentage to total production.

Source: Monitoring and Evaluation (Chem.) cell, Department of Chemicals and Petrochemicals, Ministry of Industry, Govt. of India, New Delhi.

II. INDUSTRY PROFILE

The total number of insecticides including fungicides and herbicides in the schedule to the insecticides Act, 1968 (upto July 1987) was 385. Out of them 123 were approved for registration by the registration committee (Annexure 1). During the last five years only 42 products are in actual production.

The pesticides materials produced by technical grade manufacturers are used as raw materials by formulators and the formulated products are sold through wholesalers and retailers to the farmers (Figure 1). A brief profile of each of the constituents of pesticides industry is presented below.

A. Technical Grade Material Manufacturers

There are 79 technical grade manufacturers. Out of them 51 are active in recent years. Out of these 51 companies 10 companies account for 80% of the production of technical grade materials (See Table 3). The remaining 41 companies account for 20% of the production.

Except BHC, Malathion, Ethion, Fenvalerate and Cypermethrin, most other products have a very marked market concentration in the sense that a company has very predominant market share. Information presented in Table 4 indicates that 94.5% of the total production is concentrated with only 20 companies. Out of the 20 companies 16 companies have bulk of the market share of the products group dealt by them.

With a view to ensure proper distribution of pesticides at reasonable cost to the farmers, a scheme has been introduced under which 50% of the technical grade pesticides have to be supplied (under government instructions) by the manufacturers to other non-associated formulators.

B. Formulators

Pesticides are originally manufactured in a pre and concentrated form unsuitable for field use. Hence they are mixed with solvents to obtain a form that can be used by the farmers. The commonly used formulations can be grouped under the following headings.

Formulation applied after dilution with water

- | | |
|--------------------------------|--|
| Soluble concentrates (SC) | - solutions that are mixable with water |
| Emulsifiable concentrates (EC) | - solutions that are an emulsion when added to water |
| Wettable Powders (WP) | - finely milled powders that form a suspension when added to water |

Formulations applied as such

- | | |
|------------------|--|
| Dusts | - Dusting powders with low content of active ingredient |
| Granules | - Granulated products which contain upto 10% active ingredient |
| Ultra-low-Volume | - Low-Volume solutions especially prepared for application by aircraft or ground equipment |
| Fumigants | - Formulations which volatilize as such or release gas after coming in contact with moisture |

The total number of registered formulators are about 800. Out of them 160 formulators are associated formulators and the remaining 640 formulators are non-associated formulators. The associated formulators are associated with technical grade material manufacturers. They get credit and raw materials easily even in peak season from technical grade material manufacturers with whom they are associated. Not only that, their products receive promotion and market support from the big companies. The non-associated formulators are totally independent units. They do not have any mutual understanding with any technical grade material manufacturers.

C. Dealers (Sales Points)

The formulated products are not sold by the formulators directly to the consumers. But they are sold through the wholesalers/distributors and to the retailers. Many local formulators sell their products to the distributors and also to the retailers. In this case, sometimes, distributors take objection. So such formulators pass on a small percentage of their profits from direct sales to retailers to the concerned area distributors.

The retailing of pesticides is done by state departments, cooperatives and private dealers. Table 5 shows the total number of state departments, cooperatives and private traders dealing with pesticides in different states and union territories.

There are 77,080 distribution points of pesticides operated by various agencies. Out of them 4,973 points are operated by State

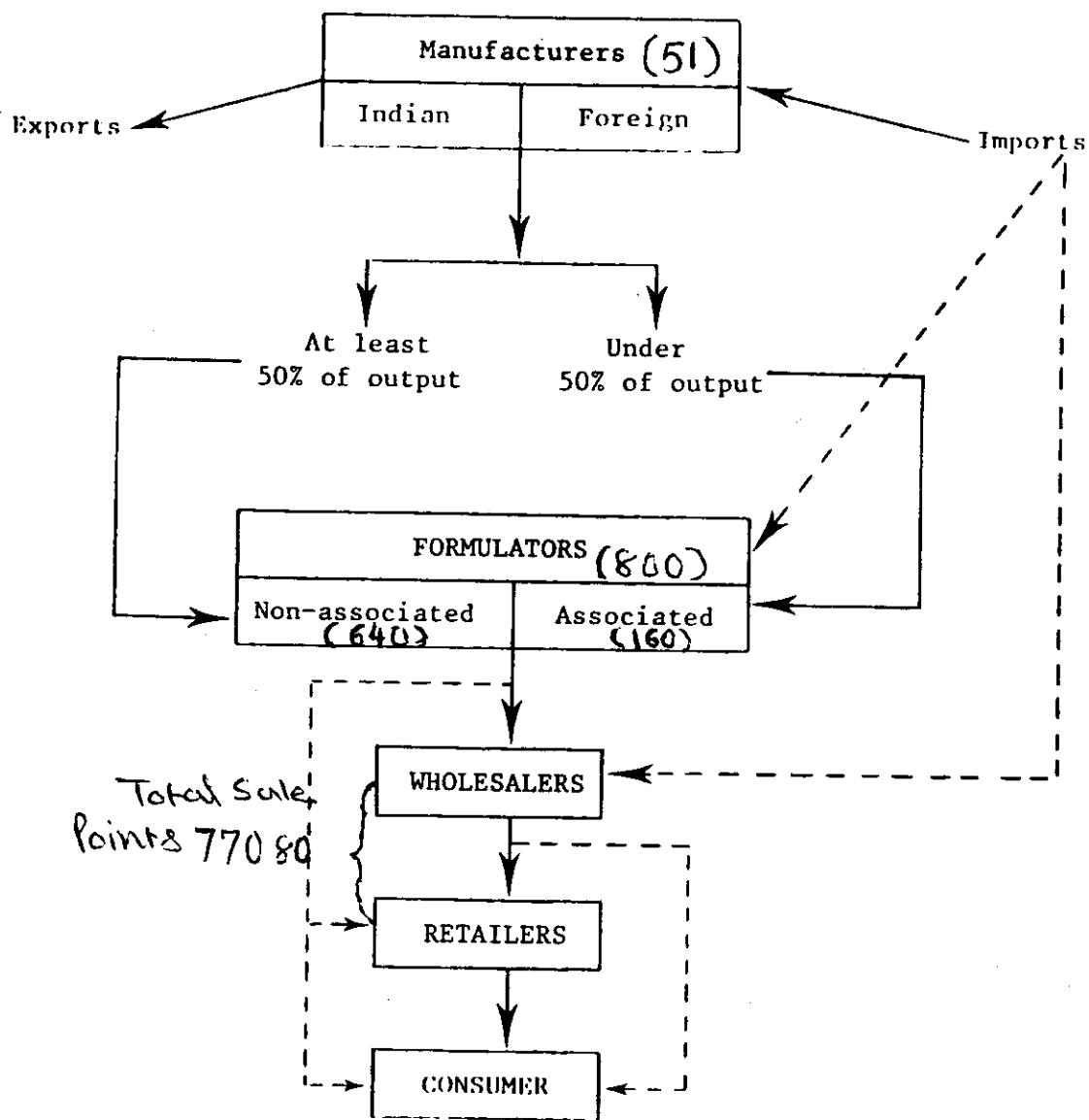
Departments, 16,237 points are operated by cooperatives and 55,870 points are operated by private traders.

About 52.2% of the total sale points of pesticides are located in Andhra Pradesh, Tamil Nadu, Uttar Pradesh, Gujarat and West Bengal and the remaining 44.8% of the total sale points are in the remaining states and union territories.

It seems that the role of cooperatives in the distribution of pesticides is highly significant in Orissa and Madhya Pradesh as 73% and 55% of the total sale points are operated by cooperatives in Orissa and Madhya Pradesh, respectively. In Gujarat the percentage of the sale points operated by cooperatives is about 45.8. The highest number of sale points of pesticides operated by state departments is in Uttar Pradesh (932) and it is nil in Gujarat, Karnataka and West Bengal.

Figure:1. PESTICIDE INDUSTRY

The scheme of manufacture and distribution is as follows:



— Primary route
 - - - Secondary route

Table 3 : MARKET CONCENTRATIONS IN TOTAL PRODUCTION
OF TECHNICAL GRADE MATERIALS (1985-86)

Company	Production of Tech. Grade Materials in Tonnes	% to total Production
1) Kanoria Chemicals	14,993	27.3
2) Hindustan Insecticides Ltd. (HIL)	9,121	16.6
3) Tata Chemicals	6,787	12.4
4) Excel	2,390	4.4
5) Indofil	2,324	4.2
6) Ciba-Geigy	2,309	4.2
7) Bayer	2,137	3.9
8) Nico Farm	1,429	2.6
9) Cynamid	1,343	2.4
10) Rallis India	1,281	2.3
Total of above 10 Companies	44,114	80.3
Other 41 Companies	10,804	19.7
Total of all 51 companies	54,918	100.0

Source : Compiled from the data received from monitoring and evaluation (chem.) cell, Department of Chemicals and Petrochemicals, Ministry of Industry, Government of India, New Delhi.

Table 4 : MARKET CONCENTRATION (1985-86) FOR
IMPORTANT TECHNICAL GRADE MATERIALS

Sl. Technical Grade No. Material	Name of Company	Market concen- tration % share of market
1. BHC	Konoria Chemicals	58%
2. DDT	Hindustan Insecticides Ltd.	100%
3. Malathion	FICOM Organics	28%
4. Parathion Methyl	Bayer	99.8%
5. Metasystox	Bayer	100%
6. Fenthion	Bayer	100%
7. Dimethoate	Rallis India	77.4%
8. DDVP	Ciba-Geigy	100%
9. Quinalphos	Sandoz	84.5%
10. Monocrotophos	Ciba-Geigy	45.1%
11. Phosphamidon	Ciba-Geigy	75.5%
12. Thimet Phorate	Cyanamid	62.9%
13. Ethion	Shaw Wallace	39.4%
14. Endosulphan	Excel	70.1%
15. Fenvalerate	Gujarat Insecticides Ltd.	31.3%
16. Cypermethrin	Bharat Pulverising	38.7%
17. Copper Oxychloride	Travan Chochin	100%
18. Dithon	Indofil	100%
19. Paraquat	Indian Expo. Ltd. (ACCI)	100%
20. Aluminium Phosphide	United Phos. Pvt. Ltd.	54.4%
Total Production of 20 products = 51811 tonnes		
Total Production of remaining products = 3037		
Grand Total		54918
Share of 20 products in Total Production 84.5%		

Source : Monitoring and Evaluation (Chem.) Cell, Department of Chemicals and Petrochemicals, Ministry of Industry, Government of India, New Delhi.

Table 5 : SALE/DISTRIBUTION POINTS OF PESTICIDES OPERATED BY
VARIOUS AGENCIES - REPORTED BY STATES/U.Ts.

Sr. No.	State/U.T.	State Dept.	Distribution Points		Total
			Co-opera- tives	Private Trade	
(1)	(2)	(3)	(4)	(5)	(6)
1.	Andhra Pradesh	820	2810	6156	9786
2.	Assam	22	10	1075	1107
3.	Bihar	466	500	5000	5966
4.	Gujarat	-	3277	4038	7315
5.	Haryana	436	83	1051	1570
6.	Himachal Pradesh	70	4	191	272
7.	Jammu & Kashmir	88	5	525	618
8.	Karnataka	-	1026	4252	5278
9.	Kerala	400	886	1123	2409
10.	Madhya Pradesh	457	3000	2000	5457
11.	Maharashtra	68	450	4126	4644
12.	Manipur	19	26	54	99
13.	Meghalaya	-	-	27	27
14.	Nagaland	-	-	12	12
15.	Orissa	6	1840	670	2516
16.	Punjab	118	90	1692	1900
17.	Rajasthan	170	400	1540	2110
18.	Sikkim	-	-	-	-
19.	Tamil Nadu	774	1077	7863	9644
20.	Tripura	-	-	-	-
21.	Uttar Pradesh	932	337	7312	8581
22.	West Bengal	-	323	6932	7255

(1)	(2)	(3)	(4)	(5)	(6)
23.	Andaman & Nicobar	35	-	-	35
24.	Arunachal Pradesh	-	-	-	-
25.	Chandigarh	-	1	5	6
26.	Delhi	12	4	163	179
27.	Dadra & Nagar Haveli	10	-	-	10
28.	Goa Daman & Diu	9	150	-	159
29.	Mizoram	50	-	-	50
30.	Lakshadweep	-	-	-	-
31.	Pondicherry	11	8	56	75
	Total	4973	16237	55870	77080

Source : Seventh Plan Working Group Report on Pesticides, Page 117.

III. USERS OF PESTICIDES

The use of pesticides in India is in agricultural sector and non-agricultural sectors. The non agricultural sectors consist of public Health Departments, Leather Industry, construction and households.

A. Consumption of Pesticides in Agricultural and Non-agricultural Sectors:

The percentages of consumption of pesticides in agricultural sector and in non-agricultural sectors for the last 18 years (from 1966 to 1983-84) are presented in Table 6. Upto 1971, the major portion of the pesticides production was consumed for non-agricultural purposes. From 1972 to 1977-78, more than 67% of the total consumption of pesticides was in agricultural sector in each year. There was rapid growth in the consumption of pesticides in agricultural sector from 1966 to 1977-78. On the other side, the growth of the consumption of pesticides has declined in non-agricultural sectors during this period. From 1979-80, the change in percentage of share of agricultural sectors, and non-agricultural sectors is nominal. From 1966 to 1983-84, the average use of pesticides is about 62.3% in agricultural sector and 37.7% in non-agricultural sectors.

B. Crop-wise use of Pesticides

The total estimated consumption of pesticides in agricultural sector for different crops was about Rs.555.6 crores in 1983-84 (Table 7). Cotton and Paddy accounted for 67.3% of the total consumption of pesticides and the remaining crops accounted for 36.7% of it. The consumption of

pesticides is less than one per cent in barley, gram, ragi, jute, sugarcane, rape and mustard, soyabean, onion, potato, tobacco, sunflower and topioca. The share of wheat and jowar is 6.4% and 8.9% in the total consumption of pesticides respectively.

The ratio between the cost of fertilizer and pesticides per hectare is 2:1 in the World. In our country, it is ranged from 0.66:1 for cotton in Gujarat to 11383:1 for sugarcane in Madhya Pradesh.

C. Spatial Distribution of Pesticides Use in Agriculture

The data on spatial distribution of consumption of pesticides in agriculture for the year 1984-85 are presented in Table 8. About 33.6% of the total consumption of pesticides in India is concentrated only in Andhra Pradesh. The share of Karnataka, Gujarat and Punjab in the total consumption of pesticides is about 16.2%, 15.2% and 11.4% respectively. Maharashtra accounts for 5.1% and each of the remaining states accounts for less than 5%.

Table 6 : CONSUMPTION OF PESTICIDES IN AGRICULTURAL
AND NON-AGRICULTURAL SECTORS

(In Percentage)

Year	Percentage of Consumption of Pesticides to total consumption	
	For Agri.	For Non-Agri.
1966	45.5	54.5
1967	43.4	56.6
1968	53.6	46.4
1969	50.0	50.0
1970	45.6	54.6
1971	41.6	58.4
1972	67.5	32.5
1973	71.3	28.7
1974-75	75.3	24.7
1975-76	73.8	26.2
1976-77	70.7	29.3
1977-78	67.7	32.3
1978-79	N.A	N.A
1979-80	58.1	41.9
1980-81	58.4	41.6
1981-82	58.6	41.4
1982-83	55.3	44.7
1983-84	61.5	38.5
1984-85	N.A	N.A
1985-86	N.A	N.A
Overall	62.3	37.7

Source : Indian Chemicals Statistics, 1986-87, Department of
Chemicals and Petro-chemicals, Ministry of Industry,
Government of India, New Delhi, Page 96.

Note : N.A = Not Available

Table 7 : CROPWISE CONSUMPTION OF PESTICIDES FOR 1984-85

Crop	Estimated Pesticides Consumption in Million Rs.	% to total Pesticides Consumption
1. Paddy	1272.05	22.8
2. Wheat	354.18	6.4
3. Jowar	495.40	8.9
4. Bajra	99.05	1.8
5. Barley	0.00	0.0
6. Ragi	24.04	0.4
7. Maize	63.62	1.1
8. Arhar	155.20	2.8
9. Gram	12.20	0.2
10. Jute	15.38	0.3
11. Cotton	2472.13	44.5
12. Sugarcane	38.41	0.7
13. Groundnut	136.84	2.5
14. Rape & Mustard	9.10	0.2
15. Soyabean	0.95	0.0
16. Sunflower	3.04	0.1
17. Onion	10.92	0.2
18. Potato	2.45	0.0
19. Tobacco	3.93	0.1
20. Tapioca	0.10	0.0
21. Fruits & Vegetables (Excluding Onion and Potato)	387.38	7.0
Total	5556.37	100.0

Note : Cropwise consumption of pesticides is estimated on the basis of data collected on per hectare use of pesticides for different crops in different states and the area under cultivation of different crops in different states. The source of these data is Directorate of Economics and Statistics, Department of Agriculture and Co-operation, Ministry of Agriculture, Government of India, New Delhi.

Table B : STATEWISE CONSUMPTION OF PESTICIDES FOR 1984-85

State	Estimated Pesticides Consumption in Million Rs.	Percentage to total Pesticides Consumption
1. U.P.	96.28	1.7
2. Bihar	46.67	0.8
3. Assam	15.28	0.3
4. West Bengal	163.58	2.9
5. Madhya Pradesh	56.24	1.0
6. Orissa	108.23	2.0
7. Karnataka	899.73	16.2
8. Tamil Nadu	197.45	3.6
9. Punjab	633.91	11.4
10. Andhra Pradesh	1865.03	33.6
11. Haryana	257.82	4.7
12. Himachal Pradesh	7.10	0.1
13. Rajasthan	7.13	0.1
14. Maharashtra	285.24	5.1
15. Gujarat	842.71	15.2
16. Kerala	73.97	1.3
Total	5556.37	100.0

Note : Statewise Consumption of pesticides is estimated on the basis of data collected on per hectare use of pesticides for different crops in different states and the area under cultivation of different crops in different States. The source of data is Directorate of Economics and Statistics, Department of Agriculture and Co-operation, Ministry of Agriculture, Government of India, New Delhi.

IV. REGULATORY ENVIRONMENT

Generally, the use of pesticides can result adverse effects on human health and the natural environment. So, the control on pesticides availability and use is required in most circumstances. The most important method to control pesticides availability and use is through registration of technical grade material manufacture and formulations. Registration is the process of evaluation and acceptance by the statutory authority of documentation support claims for efficacy and safety made on behalf of a proposed pesticide product manufacture. The purpose of registration is to ensure that the pesticides are effective and efficient for the purposes claimed and will not harm the consumers of the treated foods and natural environment. Thus, the goal of registration is to provide adequate protection to the Society from the adverse effect of the use of pesticides.

As a part of the regulatory process, the introduction of new pesticides requires the basic laboratory work (toxicology, chemistry, environmental studies and epidemiology) to be conducted and evaluated. All the registration schemes are monitored and enforced through Pesticides Inspectors by the State Governments. The decision to restrict or ban a particular product is made after toxicity is assessed and its current use pattern and the availability of less toxic and economically comparable substitutes are evaluated. The regulatory practices and enforcement measures in India are summarised in Table 9.

Table 9 : SUMMARY OF PESTICIDE REGULATORY PRACTICES AND ENFORCEMENT MEASURES IN INDIA

<u>A. Regulatory Scheme</u>	
1. Pesticide Legislation/Registration	The Insecticides Act, 1968 (Act No.46 of 1968); The Insecticides Rules, 1971.
2. Administering Authority	Ministry of Agriculture
3. Registration and Data Requirements compared to FAO Guidelines	Requires additional local toxicology efficacy residue data.
4. Labelling of Pesticides Ref. FAO Guidelines	Don toxicity limits imposed for label purposes.
5. Classification of Pesticides based on WHO	Modified toxicity limits
6. Phased Registration Operated	Yes, Provisional - 2 years, full
7. Average time requirement for Registration	6 months to 3 years
8. Number of Products registered	
- Active Ingredients	127
- Formulations	Not Available
9. Control of Imports of Pesticides	Mandatory
10. Control of Manufacture, Formulation, Sale and Use of Pesticides	Mandatory
11. Controls on use of Persistent/toxic products	Optional; Very high usage of DDT and BHC
<u>B. Enforcement of Regulations</u>	
1. Products Inspected for Quality	
- Production	Monitoring by regulatory agency/ self inspection by private sector
- Post Distribution	Monitoring by regulatory agency

Table 9 Contd..

2.	Registration conditions enforced through Inspection Programme	Occasional
3.	Enforcement of Use Directions	Minimal
C.	<u>Applicator Safety and Human Exposure</u>	
1.	Applicator/Dealer Training Programmes	Regular
2.	Extent of Farmer Training in the safe use of pesticides	Occasional
3.	Medical/First Aid Treatment Facilities for Pesticide Poisonings	Minimal
D.	<u>Monitoring Activities</u>	
1.	Monitoring of Residues on Food and Horticultural Crops	Regular
2.	Monitoring of Residues in the environment	Occasional
3.	Monitoring of Pesticide formulations at Dealers and Distributors	Occasional

Source: Handbook on the Use of Pesticides in the Asia-Pacific Region, November 1987, Asian Development Bank, Manila, Philippines- pp. 72-79.

V. PROBLEMS FACED BY VARIOUS CONSTITUENTS OF PESTICIDES INDUSTRY

- a) Technical Grade Material Manufacturers
- 1) Registration procedure is very lengthy and costly. Once the company has established its data for the commercial use of various formulations and products, there follows the process of registration whereby the products are approved by the relevant government agency for manufacture and sale.
 - 2) A high technology is involved in the manufacturing process, which tend to be hazardous requiring special precautions against fire, explosion and toxicity. Quality control is critical. The products are fundamentally toxic and sometimes dangerous chemicals.
 - 3) The development of new patent of pesticide costs about Rs. 20 crores, but the life of the patent is 7 years only which is too short for pay back of the investment in R&D. After that this product becomes a general product and can be produced by any company.
 - 4) The demand for pesticides is highly seasonal so the utilisation of capacity is low.
 - 5) The pesticide industry is a very high-risk industry. The risks arise in three ways: (a) the basic risk is from failure of monsoon and hence of crops; (b) the second type of risk is product obsolescence; and (c) the third type of risk is obsolescence following the development of new and more effective pesticides.
 - 6) According to the Government regulation, 50% of the technical grade material produced by the indigenous units is allocated to various

State Governments by the Central Government. The State Governments further allot the quantity to the non-associated formulators located within the state. But in off-season, the formulators do not lift the allocated quantity to them, so the technical grade material manufacturers have to bear the inventory cost and to face the problem in disposing off this material.

b) Formulators

- 1) Non Associated formulators do not get credit from technical grade material manufacturers. Most of the technical grade material manufacturers are also formulators or have associated formulators. The Associated Formulators get credit from technical grade material manufacturers for about 3 months. In this situation it is very difficult for non-associated formulators to survive in the market. The period of credit is minimum one month and maximum 6 months. Associated formulators also sell their products on credit, as they get credit from technical grade manufacturers. Thus it is difficult for non-associated formulators to compete others. Sometimes price difference is also there for associated and non associated formulators.
- 2) There is often a shortage of technical grade materials in peak season. For example, monocrotophos, phosphomidon, DDVP and Dimethoate are the technical grade materials in short supply in peak season. Sometimes solvent materials like, Orthozylene, Cyclohexanone-C-IX, etc. are in short supply in peak season. The formulators are not able to buy

- these materials in off-season and stock them, as they are costly and formulators do not get credit on the purchase of these raw materials.
- 3) Formulators believe that technical grade material manufacturers create short supply of some technical grade materials in peak season so that they themselves can formulate more and more products and sell in the market. This way they try to reduce competition and create monopoly in the market in peak seasons.
 - 4) Tax structure is not uniform through out the country. It creates lot of problems in fixing the prices of raw materials and also formulated products. The units which are located in Union Territories do not have to pay sales tax. Some way Octroi is also not uniform in all the big cities in our country. As per views of formulators interviewed from Gujarat, the units which are located in Gujarat have to pay octroi and other taxes which are about 15%, while the units which are located in Delhi have not to pay this 15% taxes. So, they can fix the prices of their products significantly on lower side. Gujarat has about 6 Municipal Corporations. They are purchasing insecticides for their use against malaria and other diseases. Now the prices quoted, by the units which are in Gujarat are comparatively higher than the prices quoted by the units located in the UTs. In this case Government of Gujarat loses revenue (sales tax).
 - 5) Ban on import of some technical grade pesticides has created a situation of monopoly for indigenous manufacturers. For example, a technical grade material monocrotophos was produced by NDCIL and its import was also allowed. At that time, the price of monocrotophos was about

Rs. 180,000 per tonne. After imposition of ban on its import, the price raised to Rs. 200,000 per tonne and today its price is about Rs. 222,000 per tonne. Something happened in the case of Methyl Parathion.

- 6) Per unit price of electricity is not uniform in our country. It is highest in Gujarat. This creates a difference in the cost of formulation of pesticides.
- 7) There is an intense competition in the market of formulated pesticides, therefore, the new formulators produce sub-standard quality products and keep low price to survive in the market. This affects the volume of sales of good formulators which are trying to keep good quality of products.
- 8) Life time of formulated products is short (one year). Due to stamping of the date of expiry for formulated products, formulators do not keep stock of formulated products. They cannot predict the demand for their products, as it is highly related with rainfall and other factors which are not predictable. Therefore, the capacity use is constrained.
- 9) Registration procedure is very lengthy, tedious and takes too much time. Sometimes it takes two years to get registration for formulation of products.
- 10) There is a lot of harassment from Pesticides Inspectors.

C. Dealers

- 1) Period of credit for dealers is very short. Dealers get credit for one month in peak season and for 3 months in off-season. Now on the other side, farmers are in need of credit for about six months i.e. for complete one crop season.

- 2) The life time of the formulated pesticides is about one year for almost all the products. Once a quantity of pesticides is purchased by the dealer, it is his responsibility to sell out before its expiry date. The company is not bound to replace the unsold quantity of pesticides. In this case dealer has to bear loss or try to sell out at low price the outdated stock of the products.
 - 3) In the name of quality control lot of harassment from Pesticides Inspectors takes place.
 - 4) The dealers are not fully trained and aware about the use of appropriate type of pesticides for different crops and for different types of pests attacks. It is necessary that the dealers should get the training in the use of pesticides so that they can guide the farmers properly.
 - 5) A few local formulators produce lower quality products and their packings are underweight. This becomes a major problem for dealers. Some dealers have lost their licences because of the problem created by formulators.
- d) Farmers
- 1) Farmers have complaints about the quality of the products available in the market. They get sub-standard quality of the products of local formulators.
 - 2) Non-availability of credit is a main problem for farmers. Dealers get credit from the distributors and companies. But they do not give credit to all the farmers as there is no guarantee about repayment. Very few well-to-do farmers get credit.

- 3) The period of credit is not enough from the farmers point of view. They are not able to repay money before harvest of the crops is over. For them, the normal credit period should be six months.
- 4) Most of the farmers are illiterate so they are not able to read the expiry date written on the label in English. Many times, farmers are cheated by dealers in this case.
- 5) Farmers have lack of knowledge about the method of application of pesticides. They are not able to recognise the pests attack and type of diseases in their crops. At the village level, training should be provided to the farmers about it.
- 6) The price per litre varies with packing sizes. The smaller packing size is comparatively costlier than bigger packing size. The price difference is more than the cost difference due to packing sizes. Most of the farmers are small farmers and their requirements of pesticides is also less at a time. So every time they have to pay more price.

ANNEXURE 1

I N S E C T I C I D E S

Approved by the Registration Committee

- | | | | |
|-----|--|-----|-------------------------------|
| 1. | Aldrin ^o | 45. | Decamethrin |
| 2. | Aluminium Phosphide | 46. | Dithianon |
| 3. | Allethrin | 47. | Dicamba (for export) |
| 4. | Alachlor | 48. | EMC |
| 5. | Alpha Naphthyl Acetic Acid | 49. | Ethylene Dibromide + |
| 6. | Atrazine | 50. | EDCT |
| 7. | Aureofungin | 51. | Endosulphan* |
| 8. | Aldicarb* | 52. | Ethion |
| 9. | B.H.C.+ | 53. | Ediphenphos (Hinosan) |
| 10. | Butachlor | 54. | Ethepon |
| 11. | Benomyl | 55. | Ferbam |
| 12. | Barium Carbonate | 56. | Fenthion |
| 13. | Benthiocarb | 57. | Fenitrothion |
| 14. | BPNC | 58. | Fluchloralin (Basalin) |
| 15. | Copper Oxychloride | 59. | Formothion |
| 16. | Cuprous Oxide | 60. | Fenvalerate |
| 17. | Copper Sulphate | 61. | Gibberlic Acid |
| 18. | Carbryl* | 62. | Glyphosate |
| 19. | Chlordane ^o | 63. | Heptachlor ^o |
| 20. | Captan | 64. | Isoproturon |
| 21. | Calcium Cyanide | 65. | Kitazin |
| 22. | Chlorebenzilate | 66. | Lindane (Gamma B.H.C)+ |
| 23. | Chlorothalonil | 67. | Lime Sulphur |
| 24. | Coumachlor | 68. | Malathion |
| 25. | Chlormaquat Chloride | 69. | NEMC |
| 26. | Carbendazim (Bavistin) | 70. | Methyl Bromide* |
| 27. | Carbofuran | 71. | MCPA |
| 28. | Carboxin | 72. | Maleic Hydrazide+ |
| 29. | Chlorfenvinphos | 73. | Metalddehyde |
| 30. | Chlorpyrifos | 74. | Monocrotophos* |
| 31. | Calixin | 75. | Mancozeb |
| 32. | Copper Aceto Arsenate
(Paris Green) | 76. | MSNA |
| 33. | Cypermethrin | 77. | Methyl Parathion+ |
| 34. | D.C.T + | 78. | Methabenzthiazuron (Tribunil) |
| 35. | Dimethoate | 79. | Metoxuron |
| 36. | Diazinon | 80. | Menazon |
| 37. | Dalapon | 81. | Nicotine Sulphate |
| 38. | Dichlorvos | 82. | Nickel Chloride |
| 39. | D.D. Mixture | 83. | Nitrofen f |
| 40. | Diuron | 84. | Oxydemeton |
| 41. | Dicofol | 85. | PMA |
| 42. | Difenphos | 86. | Pyrethrum |
| 43. | Difolaton | 87. | PCNB |
| 44. | Dinocap | 88. | Paradichlorobenzene |
| | | 89. | Pentachlorophenon(PCP) |
| | | 90. | Pendimethalin |

Annexure 1 Contd..

91.	Phosphamidon	105.	Streptocycline
92.	Phorate*	106.	Thiram
93.	Phenthoate	107.	Thiometon
94.	Phosalone	108.	Trichlorophon (Dipterex)
95.	Paraquat Dichloride*	109.	Triforine
96.	Propoxur	110.	Tetradifon
97.	Propanil	111.	Trichloro Acetic Acid (TCA)
98.	Paraquat Dimethyl Sulphate	112.	Triallate
99.	Pirimiphos Methyl	113.	Thiophanate Methyl
100.	Quinalphos	114.	Warfarin
101.	Sodium Cyanide	115.	Ziben
102.	Sulphur	116.	Ziram
103.	Sirmate	117.	Zinc Phosphide
104.	Simazine	118.	2, 4-D*
		119.	Toxaphene ‡
		120.	Dibromochloropropane (DBCP) ‡
		121.	Acephate
		122.	Bromodiolorie
		123.	Metalaxyl

- * Restricted in some other countries of Asia
o Restricted some countries of Asia including India
+ Banned in some other countries of Asia
‡ Banned in some countries of Asia including India

Source: Directorate of Plant Protection Quarantine and Storage, Faridabad