

## **Pesticide Consumption in Agriculture in India - an Update**

India is the third largest consumer of pesticides in the world and highest among the South Asian countries. During the last four decades, the consumption of pesticides in India has increased several hundred folds, from 154 MT in 1953-54 to 80,000 MT in 1994-95. However, thereafter the consumption of pesticides steadily declined to the present level of 54,135 MT (based on 1999-2000 demand) (Table 1). The decline was primarily because of ban or restriction on use of organochlorine pesticides such as HCH (BHC), DDT, aldrin etc. which have high application rates and the introduction of Integrated Pest Management programme. India is also the largest producer of pesticides in South Asia with production of 88,751 MT in 1998-99. It is the second largest manufacturer of basic pesticides chemicals in Asia next to China, and number twelve globally. The total installed capacity is about 124,000 MT for the manufacture of 62 technical grade pesticides which meet 95% of the total need of the country. The imports were in the order of 5,569 MT in 1997-98. The total current investment is about Rs. 1,500 crore with a turn over of about Rs. 4,000 crore.

**Table 1. Production and consumption of technical grade pesticides in agriculture in India**

Years	Production (MT)	Consumption (MT)
1994-95	90758	80000
1995-96	96880	73652
1996-97	94350	66677
1997-98	84154	60143
1998-99	88751	57240
1999-2000	—	54135

Source : Directorate of Plant Protection, Quarantine and Storage, Faridabad

In spite of the significant increase in pesticide consumption, India with about 4% of the world cropped area has a share of around 1.7% of world pesticide consumption. The world's pesticide consumption is estimated to be about 3.1 MT (WHO 1989) of which 24% is consumed in USA, 45% in Europe and 20% in developing countries. The Asia Pacific region accounts for 16% of the total pesticide consumption, out of which 75% is used on rice, cotton and vegetable crops.

### **Pattern of pesticide consumption**

Up to 1995-96, the major group of chemicals used in agriculture was insecticides (80%) followed by fungicides (10%), herbicides (7%) and others (3%). Thereafter, the percentage consumption of insecticides declined with simultaneous increase in the percentage consumption of herbicides and fungicides. The consumption of insecticides in 1999-2000 was 60%, fungicides 21%, herbicides 14% and others 5%. During this period, type of insecticides used also changed, the percentage of organochlorines decreased from 40 to 14.5%, carbamates from 15 to 4.5% and synthetic pyrethroids from 10 to 5% but there was a sharp increase in percentage of organophosphates from 30 to 74%. A modest consumption (2%) of natural pesticides (neem and BT formulation) was also registered during this period. The consumption pattern of insecticides in India is presented in Figure 1.

The consumption of different classes of pesticides is presented in Table 2. In general, there has been decline in all classes of pesticides during the period from 1995-96 to 1999-2000. The decline is more conspicuous in case of insecticides than any other classes of pesticides.

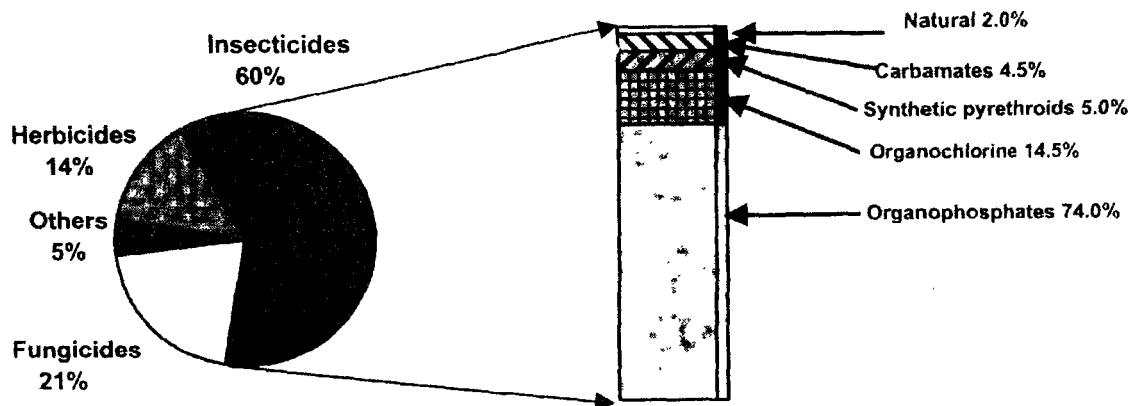


Fig. 1. Consumption pattern of pesticides in India

Table 2. Consumption of different class of pesticides

Group of pesticides	1995-96	1996-97	1997-98	1998-99	1999-2000
Insecticide	46167	42675	36720	34628	31793
Fungicide	14099	12826	11218	11314	10910
Herbicide	8528	7393	7284	7546	7546
Rodenticide	703	655	485	621	627
Acaricide	121	103	127	107	108
Plant growth regulator	65	48	73	149	90
Miscellaneous pesticides	3969	2977	4236	2875	3059
Total	73652	66677	60143	57240	54133

Source : Directorate of Plant Protection, Quarantine and Storage, Faridabad

There has been a slight increase in the amount of herbicides consumed after 1996-97, which increased from 7393 to 7546 MT in 1999-2000.

The leading chemical used in India during 1995-96 was HCH (BHC), which accounted for more than 40% of the total pesticides consumed (73,652 MT) followed by malathion, methyl parathion, endosulfan, carbaryl and dimethoate. The demand pattern of major pesticides used in India during 1999-2000 is given in Table 3. During 1999-2000, monocrotophos was the top insecticide (4149 MT), followed by endosulfan (3794 MT), malathion (3089 MT) and methyl parathion (2962 MT). Among herbicides,

isoproturon was the most used (2544 MT) followed by butachlor (2464 MT) and 2, 4-D (688 MT). Among fungicides, consumption of mancozeb (2828 MT) was the highest followed by sulphur compounds (2628 MT) and copper oxychloride (1423 MT). The total consumption of rodenticides, acaricides and fumigants was less than 400 MT in each case.

It is interesting to note that up till March 2000, 155 pesticides have been registered under Insecticide Act 1968, which include 57 insecticides, 44 fungicides, 33 herbicides, 7 rodenticides, 4 plant growth regulators, 4 fumigants, 3 acaricides, 1 soil sterilent, 1

**Table 3. Demand pattern of major pesticides in India (1999-2000)**

<b>Pesticide</b>	<b>Technical grade (MT)</b>	<b>Pesticide</b>	<b>Technical grade (MT)</b>
<b>Insecticides</b>		<b>Herbicides</b>	
Monocrotophos	4149	Isoproturon	2544
Endosulfan	3794	Butachlor	2464
Malathion	3089	2, 4-D	688
Methyl parathion	2962	Anilophos	457
Phosphamidon	2501	Atrazine	367
Phorate	2378		
Quinalphos	2210	<b>Acaricides</b>	
Dimethoate	1794	Dicofol	108
Chlorpyrifos	1762		
Carbaryl	854	<b>Rodenticides</b>	
		Zinc phosphide	313
<b>Fungicides</b>		Bromadiolone	36
Mancozeb	2828		
Sulphur (Dust & WP)	2671	<b>Fumigants</b>	
Copper oxychloride	1423	Aluminum phosphide	272
Copper sulphate	1314	Ethylene dibromide	114
Carbendazim	812		
Thiram	420	<b>Plant growth regulators</b>	
		Alpha naphthyl acetic acid	36
		Chlormequat chloride	29

Source : Directorate of Plant Protection and Quarantine and Storage, Faridabad

molluscicide, and 1 nematicide, but in actual practice only a limited number of pesticides are being commercially exploited. For example, out of the 57 insecticides registered for use in agriculture, the top 10 (monocrotophos, endosulfan, malathion, methyl parathion, phosphamidon, phorate, quinalphos, dimethoate, chlorpyrifos and carbaryl) account for 80% of the total insecticides used. Similarly, out of the 44 fungicides registered, the six fungicides (mancozeb, sulphur, copper oxychloride, copper sulphate, carbendazim and thiram) constitute 86.8% of the total fungicide used. Sulphur and copper fungicides still constitute about 49.6% of the total fungicides used in the country. Mancozeb is the major organocompound which account for 25% of the total fungicide used followed by carbendazim (7.4%) and thiram

(3.8%). In case of herbicide, out of the 33 herbicides registered, only 14 are being used by farmers. The top five herbicides (isoproturon, butachlor, 2-4-D, anilophos, atrazine) account for 86.4% of the total herbicide used in the country.

#### **Average consumption of pesticides in India**

The area under plant protection is continuously increasing, but still only about 25-30% of the total cultivated area is under pesticide cover. The average per hectare consumption of pesticides in India in agriculture (calculated on the basis of total consumption of technical grade pesticides divided by the gross cultivated area) was 1.2 g ha<sup>-1</sup> in 1953-54 which increased to 377 g ha<sup>-1</sup> in 1985-86 and to 431 g ha<sup>-1</sup> in 1992-93. However, thereafter consumption gradually declined to 288 g ha<sup>-1</sup> in 1999-2000 (Table 4).

**Table 4. Year wise consumption of technical pesticides in agriculture in India**

Year	Total consumption of pesticides (MT)	Consumption (g/ha)
1992-93	80000	431
1995-96	73652	392
1996-97	66677	354
1997-98	60143	320
1998-99	57240	304
1999-2000	54135	288

The values have been calculated on the basis of gross cultivated area in 1994-95 (188.2 million hectares).

Source (Gross cultivated area) : Agricultural Statistics at a Glance, 1998, Directorate of Economics and statistics, Ministry of Agriculture, Government of India.

These values are much lower compared to the consumption pattern of other countries. For example, during 1973-74 pesticide consumption was 10,790 g ha<sup>-1</sup> in Japan, 1870 g ha<sup>-1</sup> in Europe and 1490 g ha<sup>-1</sup> in USA. Though, the national average of pesticide consumption is very low some individual states show very high consumption (Table 5). Pesticide consumption in Haryana, Punjab, Delhi, Pondicherry exceeds 800 g ha<sup>-1</sup> while in some other states the consumption is even less than 100 g ha<sup>-1</sup>.

#### State wise consumption of pesticides in agriculture

The states of Uttar Pradesh, Punjab, Andhra

**Table 5. State-wise consumption of pesticide (technical grade) in India**

State	Gross cropped area	Consumption of technical grade pesticide (MT)	Consumption of pesticide (g ha <sup>-1</sup> )
Andhra Pradesh	12783	7000	548
Arunachal Pradesh	252	19	75
Assam	3825	260	68
Bihar	9871	924	94
Gujarat	11188	5000	447
Goa	163	4	24
Haryana	5963	5030	8481
Himachal Pradesh	971	205	211
Jammu & Kashmir	1056	115	109
Karnataka	12013	2600	216
Kerala	3048	1168	383
Madhya Pradesh	24689	1299	53
Maharashtra	21418	3942	184
Manipur	271	21	78
Meghalya	238	18	76
Mizoram	112	13	160
Nagaland	221	10	45
Orissa	9724	1006	103
Punjab	7693	7100	923
Rajasthan	20380	3300	162
Sikkim	127	5	39
Tamil Nadu	7113	2882	410
Tripura	459	30	65
Uttar Pradesh	25738	7400	288

*Contd.*

West Bengal	8718	4626	531
Andaman Nicobar	46	6	130
Chandigarh	4	3	750
Dadora & Nagarhavely	27	4	148
Delhi	68	64	942
Daman & Diu	5	1	200
Lakshdeep	4	2	500
Pondicherry	46	78	1696
<b>Total</b>	<b>188,234</b>	<b>54135</b>	

Source (Pesticide) : Directorate of Plant Protection, Quarantine and Storage, Faridabad

Source (Gross cultivated area) : Agricultural statistics at a Glance, 1998, Directorate of Economics and Statistics, Ministry of Agriculture, Government of India.

Pradesh, Haryana, Gujrat, West Bengal and Maharashtra accounts for 79.4% of the total pesticide consumption with only 53.4% of the total gross cultivated area. The trend of pesticide consumption has drastically changed in many states. In 1995-96, the total pesticide consumption was highest in Andhra Pradesh (12,775 MT) which alone accounted for 15.7% of the total consumption, followed by Uttar Pradesh (11,500 MT), Punjab (7,600 MT), Haryana (5,390 MT), 250 MT, West Bengal

(5,338 MT) and Maharashtra (4,898 MT). However, thereafter the consumption in all the states gradually declined (Figure 2). In 1999-2000 the pesticide consumption was highest in Uttar Pradesh (7,400 MT), followed by Punjab (7,100 MT), Andhra Pradesh (7,000 MT) Haryana (5,030 MT), Gujarat (5,000 MT), West Bengal (4,696 MT) and Maharashtra (3,942 MT).

These data clearly show that there is definite trend of decline in the consumption of pesticide in India in all states particularly the ones which

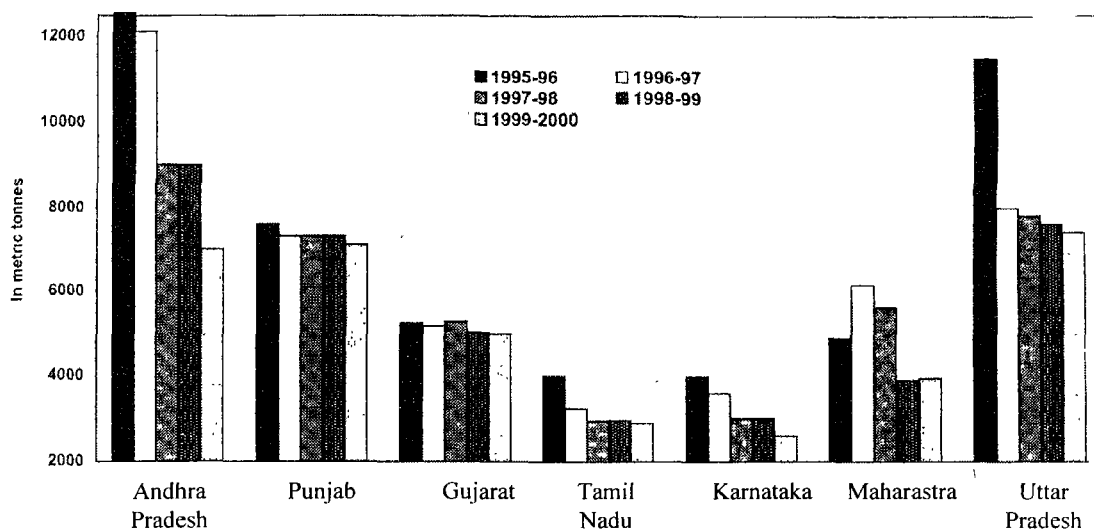


Fig. 2. Declining trend of pesticide consumption in major states of India from 1995 to 2000

were earlier using high amounts of pesticide like Andhra Pradesh, Tamil Nadu, Karnataka and Maharashtra. The typical example is Andhra Pradesh where pesticide consumption declined from 12,775 to 7,000 MT. In general, the decline is more conspicuous in the case of insecticides than other classes of pesticides. Within insecticides, there is tendency to discard use of persistent and toxic pesticides. Consumption of many organochlorine and organophosphorus pesticides has either been banned or restricted

both because of general consciousness about the environment and international pressure on export of food commodities having undesirable residues.

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