

# STUDY ON MAJOR PESTICIDES AND FERTILIZERS USED IN NEPAL

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**Abstract:** The data of Nepal Government shows that nine major pesticides groups with seven subgroups of Insecticides were imported from the year 1997 to 2003. The pesticide use amounts to 142 g/ha which is low compared to other countries. The highest pesticides quantity imported & quantity consumed from the 2056/57 (1999) to 2060/061(2003) were fungicides, bactericides, acaricides & seed treatment. group. For the year 2056/57 (1999) & 2057/58(2000), no import & consumption of bio-pesticides were done but from the year 2058/59(2001) to 2060/061(2003) no import & consumption of plant regulators was done. The various types of pesticides with 306 trade names and 71 technical names are registered / enlisted and used in Nepal which includes Insecticides, Fungicides, Herbicides, Rodenticides, Acaricides and Others. Moreover, twelve types of pesticides are band in Nepal for its import and use. Similarly, the demand of fertilizers were increased from 1997/98 to 2001/02 and then decreased dramatically with high amount from 2001/02 to 2002/03 and since then again it again increased up to 204/05. This trend is same for Urea and Diammonium Phosphate whereas Murate of Potash is increasing from 1997/98 to 2004/04. Seven types of fertilizers are being used in Nepal viz. Urea, Diammonium Phosphate (DAP), Murate of Potash (MOP), Ammonium Sulphate (AS), Single Super Phosphate (SSP), Ammonium Phosphate Sulphate (APS) and NPK. These are imported by Public institution like Agricultural Input Corporation (AIC) , Private Institutions and also donated/granted by the Government of Japan called as 2KR (Two Kenny Round). The import of fertilizers shows irregular trend. The import of fertilizers was highest in 1998/99 which amounted to 219038 metric ton and since then it decreased although there showed fluctuations. The distribution of fertilizers was increase from 1997/98 and reached highest in the year 2002/03 and since then it started decreasing. Similarly, the fertilizer consumption was highest in the year 1994/95 which was 30.4kg/ha which declined since then and showed fluctuation. The fertilizer consumption is regularly decreasing in the recent years from the year 2002/03.

**Key words:** Agriculture; Fertilizer; Insecticide; Pest and pesticide.

## INTRODUCTION

A pest is any species that competes with the us/plants for food , invades lawns and gardens, destroys wood in houses, spreads disease, or is simply a nuisance. Worldwide , some 10,000 species of insects attack crops, whose yields are also reduced by about 1800 species of weeds and some 80,000 – 100,000 plant diseases caused by bacteria, viruses, fungi, and algae. In natural ecosystems and many polyculture agroecosystems, natural enemies (predators, parasites and disease organisms) control the populations of 50-90% of pest species, a crucial type of earth capital. However we have upset the natural balance and we need the device to protect our monoculture. This purpose is served using pesticides. Pesticides are the chemicals to kill organisms which we consider undesirable. Common types of pesticides are insecticides (insect – killer), herbicides/ weedicide (weed-killer), fungicide (fungi-killer), nematocide (nematodes killer) and rodenticide (rodent – killer) (Miller 2002). According to Pesticide Act, 1991 “Pesticides means the poisonous medicines used for killing or destroying the harmful pests that appear in seeds, plants, trees, animals, fowls etc.”

Before World War II, pest control in agriculture was mainly based on sound agronomy. Pesticides were used only occa-

sionally, and were simple chemicals such as copper or sulfur, or derivatives of plants such as tobacco, neem or pyrethrins (Pyrethrins are naturally occurring and are based on the pyrethrum plant). Discovery of DDT in 1938 by Paul Muller won a Nobel Prize used in WWII for mosquito (malaria and Yellow Fever) control. After the war, the chemical industry expanded their use in agriculture. However, pesticides boomed during and after WWII (Palikhe 2006).

Synthetic pesticides spearheaded by DDT and BHC got introduced to Nepalese agriculture and public health during 1995. from then onwards their issue increased both on quantity and diversification in terms of newer synthetic pesticides. At that time, the general awareness on environment issues was so minimal and people were not told adequately about the hazardous aspect of the pesticides. People just saw their miraculous effect on malaria and the pests. However, the long-term effect on human health and environment was invisible. People started to call pesticide a medicine. The introduction of new high yielding varieties, intensification and commercialization of crop production, continuous crop growing and the improved access to markets brought about major changes in plant protection (Palikhe 2006). Appropriate crop protection methods became a very important factor for productivity and production of crops. Farmers, particularly in areas of com-

**Table 1:** Pesticides Import and Consumption Data 1999-2003 (in Agriculture and Public Health)

Item	2056/57(1999)		2057/58(2000)		2058/59(2001)		2059/60(2002)		2066/61(2003)		Remarks
	Quantity imported	Quantity consumed	Quantity imported	Quantity consumed	Quantity imported	Quantity consumed	Quantity imported	Quantity consumed	Quantity imported	Quantity consumed	
	a. I. (kg)	a. I. (kg)	a. I. (kg)	a. I. (kg)	a. I. (kg)	a. I. (kg)	a. I. (kg)	a. I. (kg)	a. I. (kg)	a. I. (kg)	
Organochlorines	9969.4	9200.1	9716	8853.6	10006.5	9752.05	7369.25	7484.05	4339	4478.65	
Organophosphates	29067.45	23303.27	41715.4	35630.12	40747.95	43413.52	41704.7	39507.58	70203	72400.12	
Synthetic	3713.45	2882	6542.76	5876.56	7949.87	8294.53	9865.96	9461.028	7060	7464.93	
Pyrethroids											
Carbamates	284.25	243.99	633.45	648.18	696.6	688.71	576	456.38	3306.9	3426.52	
Mixed Insecticides	430	353.35	3801.3	3750.18	923.02	943.54	874.75	815.5	702	761.25	
others Insecticides	3688.78	3622.78	12481.7	12454.38	2827.2	2747.17	18546.1	14168.55	9926	14303.57	pesticide
<b>Total Insecticides</b>	<b>47153.33</b>	<b>39605.49</b>	<b>74920.6</b>	<b>67213.02</b>	<b>63151.14</b>	<b>65839.52</b>	<b>78936.8</b>	<b>71893.088</b>	<b>95536.9</b>	<b>102835</b>	consumed
Fungicides, Bactericides	54530.66	53330.49	102773	94917.98	75444.88	82994.45	90570.4	65584.24	55590.8	55590.8	in 2003=
acaricides and seed treatments											pesticide imported
Herbicides	2678.8	2377.02	14943.4	10860.4	3258.84	6888.57	6843.9	6217.02	11239	11865.88	in 2003+
Rodenticides	4064.4	3339.6	3420	2908	4297.6	4161.6	1240	1628	7868	7480	Remaining
Plant Growth Regulators	0.63	0.58	7.6	7.6	0	0	0	0	0	0	stocks
Bio-pesticides	0	0	0	0	0.02	0.02	0.06	0.06	1.71	1.71	of 2002
Others									6136.4	6136.4	
<b>Total</b>	<b>108427.82</b>	<b>98653.18</b>	<b>196065</b>	<b>175907</b>	<b>146152.5</b>	<b>159884.16</b>	<b>177591</b>	<b>145322.41</b>	<b>176373</b>	<b>183909.8</b>	

mercial vegetables production, are primarily relying on chemical pest control methods. Pesticides are not as extensively used in Nepal as on other countries in Asia in terms of the ratio of active ingredients used per hectare of cropland. The characteristics of Nepalese pesticide use in terms of location, intensity, target crops, types of chemicals and trends, however, point to some disturbing issues. The pesticide consumption is increasing by about 10-20% per year and pesticide expenses in market oriented vegetables and fruit production in Nepal is a major cost factor. According to PPD report from 2003 the annual pesticide consumption comprises of 41% insecticides, 51.8% fungicides, 7.2% others. Agriculture and health imports of 2001 is almost US\$2.03 million of chemical pesticides (PPD 2003). Farmers in general are applying pesticides in crop fields inefficiently and using traditional method in rice field and also overdoses in vegetables and pollution of the environment as a whole. Awareness and skill regarding safety and efficient application of pesticides is not adequate at farmers' level. These can be upgraded to a great extent by providing training to the farmers on the concept of integrated pesticide and pest management. (Palikhe 2006). Various types of pesticides and fertilizers are used in Nepal. The use of pesticides and fertilizers in Nepal is increasing. To meet the food demand of the nation, the productivity of the agriculture should be increased. For this, the pesticides and fertilizers should be used in adequate amount. However, the pesticides use of 142 grams/hectares is very low in compared to other countries.

**OBJECTIVES:**

- i. To know the various types of pesticides and fertilizers use in Nepal.
- ii. To know the quantity of pesticides and fertilizers used in Nepal.
- iii. To know the yearly trend of pesticides and fertilizers use in Nepal.

**MATERIALS AND METHODS:**

Various information, data and status of pesticides use in Nepal was collected from Pesticides Registration and Management

**Table 2:** Pesticides consumption in Nepal 2003

Kinds of pesticide		Quantity of Active Ingredient in Kg.
<b>A.</b>	<b>AGRICULTURAL PESTICIDES</b>	
1	INSECTICIDES	
1.1	Organochlorine(Endosulfan)	4478.65
1.2	Organo-phosphates(Acephate, Chlorpyriphos, Quinalphos, Dichlorovos, Phorate etc.)	72400.12
1.3	Carbamates	3426.52
1.4	Synthetic Pyrethroids (Alphamethrin, Cypermethrin, Fenvalerate, Deltamethrin, etc.)	7214.93
1.5	Botanical products (Azadiractin)	50
1.6	Mixed insecticides (Chlor pyriphos+Cypermethrin, Alphamethrin+Chlopyriphos, Quinalphos+Cypermethrin, etc.)	761.25
1.7	Others(Aluminiumphosphide, Cartaphydrochloride, Imidacloprid ,Propagite, Ethofenox, Fenpropathrin, Fipronil etc.)	14253.57
<b>TOTAL INSECTICIDE</b>		<b>102585.04</b>
2	HERBICIDES (Glyphodphate 2, 4-D, Butachlor, etc.)	11865.88
3	FUNGICIDES	55199
4	PLANT GROWTH REGULATORS	0
5	RODENTICIDES	7480
6	BIO-PESTICIDES (Bt, NPV, etc.)	1.71
7	ACARICIDES	346
8	BACTERICIDES	45.8
9	OTHERS (Metaldehydes, Chloroflurazon, etc.)	6136.4
<b>A.</b>	<b>SUB-TOTAL ( Agri pesticides)</b>	<b>183659.83</b>
<b>B.</b>	<b>PESTICIDES USED IN PUBLIC HEALTH (Alphacypermethrin)</b>	<b>250</b>
<b>GRAND TOTAL(A+B)</b>		<b>183909.83</b>

Note: Pesticide consumed in 2003=pesticide imported in 2003+ remaining stocks of 2002

(Source: Pesticides registration and management section of Ministry of Agriculture and Cooperatives. 2062)

**Table 3:** Description of Enlisted/registered Pesticides

SN	Kinds of pesticides	Commercial Name	Common Name
1	Insecticides	210	40
2	Fungicides	64	18
3	Herbicides	18	5
4	Rodenticides	9	3
5	Acricides	1	1
6	Others	4	4
	<b>Total</b>	<b>306</b>	<b>71</b>

(Source: Pesticides registration and management section of Ministry of Agriculture and Cooperatives. 2062)

**Table 4:** List of pesticides band in Nepal

SN	Name of Pesticides	Remarks
1.	Chlordane	Persistent Organic Pollutant Pesticides
2.	DDT	Persistent Organic Pollutant Pesticides
3.	Dieldrin	Persistent Organic Pollutant Pesticides
4.	Aldrin	Persistent Organic Pollutant Pesticides
5.	Aldrin	Persistent Organic Pollutant Pesticides
6.	Heptachlor	Persistent Organic Pollutant Pesticides
7.	Methyle Parathion	
8.	Mirex	Persistent Organic Pollutant Pesticides
9.	Monocrotophos	
10.	Toxafen	Persistent Organic Pollutant Pesticides
11.	BHC	
12.	Lindane	
13.	Phosphamidane	
14.	Organo Mercury Fungicides	

(Source: Pesticides registration and management section of Ministry of Agriculture and Cooperatives. 2062)

**Table 6:** Import of Fertilizers (APP's Estimate) (in metric tonnes)

Year		1997/98	1998/1999	1999/000	2000/01	2001/02	2002/03	2003/04	2004/05	Total
<b>Public (AIC)</b>	Urea	49660	77857	30000	24189	NA	NA	4134	5370	<b>191210</b>
	DAP	10000	50132	10000	30415	12500	NA	7000	12081	<b>132128</b>
<b>Private</b>	Urea	17550	91049	61347	76454	79350	45190	96146	17161	<b>484147</b>
	DAP	NA	NA	31173	12365	21004	28187	29399	30726	<b>152854</b>
	MOP	NA	NA	NA	NA	NA	NA	1100	135	<b>1235</b>
	AS	NA	NA	NA	NA	3000	6662	4639	4689	<b>18989</b>
	SSP	NA	NA	NA	NA	NA	3400	1498	500	<b>5398</b>
	NPK 12:32:16	NA	NA	NA	NA	NA	NA	500	NA	<b>500</b>
<b>2KR</b>	APS	NA	NA	NA	NA	NA	NA	4666	11747	<b>16413</b>
	Urea	11440	NA	7000	11800	16220	17830	7715	NA	<b>72025</b>
	DAP	NA	NA	14817	10920	13820	10255	9500	NA	<b>59312</b>
	MOP	NA	NA	NA	5140	4300	NA	NA	NA	<b>9440</b>
<b>Total</b>	AS	NA	NA	1500	NA	NA	NA	NA	NA	<b>1500</b>
	Urea	78650	168906	98347	112363	95570	63020	107995	22531	<b>747382</b>
	DAP	10000	50132	55990	53700	47324	38442	45899	42807	<b>344294</b>
	MOP	NA	NA	NA	5140	4300	NA	1100	135	<b>10675</b>
	AS	NA	NA	1500	NA	3000	6662	4639	4689	<b>20489</b>
	SSP	NA	NA	NA	NA	NA	3400	1498	500	<b>5398</b>
	NPK	NA	NA	NA	NA	NA	NA	500	NA	<b>500</b>
APS	NA	NA	NA	NA	NA	NA	4666	11747	<b>16413</b>	
<b>Grand Total</b>		<b>88650</b>	<b>219038</b>	<b>155837</b>	<b>171203</b>	<b>150194</b>	<b>111524</b>	<b>166297</b>	<b>82409</b>	<b>1145151</b>

(Source: Fertilizer Unit of Ministry of Agriculture and Cooperatives. 2062)

**Table 5:** Demand (APPs estimate) (in metric tonnes)

Year	Urea	DAP	MOP	Total
1997/98	144142	61978	2690	208810
1998/1999	163491	70298	3051	236840
1999/000	185437	79734	3460	268631
2000/01	210329	90438	3925	304692
2001/02	238562	102577	4451	345590
2002/03	148488	76087	8000	232575
2003/04	164178	80435	9000	253613
2004/05	179112	97826	10000	286938

(Source: Fertilizer Unit of Ministry of Agriculture and Cooperatives. 2062)

Section of Ministry of Agriculture and Cooperatives (Nepal Government). Similarly, the information, data and status of fertilizers use in Nepal was collected from Fertilizer Unit of Ministry of Agriculture and Cooperatives (Nepal Government). Thus obtained secondary data was analyzed.

## RESULTS:

(Table 1 - 4)

## Fertilizers:

(Table 5 - 10)

## DISCUSSION:

From the government data of Pesticides, it is found that 9 major pesticides groups with 7 subgroups of Insecticides were

**Table 7:** Distribution of fertilizers in Nepal (in metric tones)

Year/ Fertilizers		1997/98	1998/1999	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	Total
<b>Public</b>	Urea	59110	59956	43508	29528	15939	34432	8519	10753	261745
	DAP	28530	26298	26156	15633	21249	33330	10522	19881	181599
	MOP	3538	2096	308	58	956	2966	1681	2409	14012
	AS	NA	NA	1490	NA	NA	NA	NA	NA	1490
<b>Private</b>	Urea	17550	68477	61797	67569	62217	69029	75804	41246	463689
	DAP	NA	NA	14930	23847	27590	23708	35157	18150	143382
	MOP	NA	NA	NA	1	300	671	709	335	2016
	AS	NA	NA	NA	NA	1970	4348	6095	5291	17704
	SSP	NA	NA	NA	NA	NA	2327	1741	1559	5627
	APS	NA	NA	NA	NA	NA	NA	1280	10170	11450
	NPK 12:32:16	NA	NA	NA	NA	NA	NA	500	NA	500
	20:20	NA	NA	NA	NA	NA	3359	14408	10670	28436
20:20:10	NA	NA	NA	NA	NA	199	661	2242	3102	
<b>Total</b>	Urea	76660	128433	105305	97097	78156	103461	84323	51999	725434
	DAP	28530	26298	41086	39480	48839	57038	45679	38031	324981
	MOP	3538	2096	308	59	1256	3637	2391	2744	16029
	AS	NA	NA	1490	NA	1970	4348	6095	5291	19194
	SSP	NA	NA	NA	NA	NA	2327	1741	1559	5627
	APS	NA	NA	NA	NA	NA	NA	1280	10170	11450
	NPK*	NA	NA	NA	NA	NA	NA	500	NA	500
	20:20	NA	NA	NA	9559	9718	3359	14408	10670	47714
	20:20:10	NA	NA	NA	10	153	199	660.9	2242	3265
	18:18:10	NA	NA	NA	160	400	NA	NA	NA	560
<b>Grand Total</b>	<b>108728</b>	<b>156827</b>	<b>148189</b>	<b>146365</b>	<b>140492</b>	<b>174369</b>	<b>157077</b>	<b>122706</b>	<b>1154754</b>	

NPK\* 1:32:16 Fertilizers like 20: 20: 0, 20:20:10, 18:18:10 grades are produced from mixing and blending companies in Nepal.

(Source: Fertilizer Unit of Ministry of Agriculture and Cooperatives. 2062)

imported from the year 1997 to 2003. As shown by table 1, Fungicides, Bactericides, Acaricides and seed treatment group of pesticides were imported in highest quantity in the year 1998 to 2002 whereas the organophosphates were imported highest quantity in the year 1997 and 2003. It was observed that the Biopesticides were imported in smallest quantity and their quantities are shown only after 2003 in table 1 with the smallest investment. The highest pesticides quantity imported & quantity consumed from the 2056/57 (1999) to 2060/061(2003) were fungicides, bactericides, acaricides & seed treatment. group. For the year 2056/57 (1999) & 2057/58(2000), no import & consumption of bio-pesticides were done but from the year 2058/59(2001) to 2060/061(2003) no import & consumption of plant regulators was done.

The table 2 shows that particularly in the 2003, insecticides were consumed in the year 2003 which includes organochlorines, organophosphates, carbamates, synthetic pyrethroids, botanical products mixed insecticides and others. This quantity amounts to 102585.04 kg. However, the consumption of plant growth regu-

lators were shown as 0.00 kg which means the value may be in insignificant quantity or its consumption were nil. Except this, biopesticides were consumed in least amount i.e.1.71 kg.

The table 3 shows that various types of pesticides with 306 trade names and 71 technical names are registered/ enlisted and used in Nepal which includes Insecticides, Fungicides, Herbicides, Rodenticides, Acaricides and Others. As shown in the table 4, fourteen types of pesticides are band in Nepal for its import and use.

As shown in table 5, the demand of fertilizers were increased from 1997/98 to 2001/02 and then decreased dramatically with high amount from 2001/02 to 2002/03 and since then again it again increased up to 204/05. This trend is same for Urea and DAP whereas MOP is increasing from 1997/98 to 2004/04.

Seven types of fertilizers are being used in Nepal viz. Urea, Diammonium Phosphate (DAP), Murate of Potash (MOP), Ammonium Sulphate (AS), Single Super Phosphate (SSP), Ammonium Phosphate Sulphate (APS) and NPK. These are imported by Public institution like Agricultural Input Corpo-

**Table 8:** Consumption of fertilizers in Nepal

Year	N	P	K	Total	Kg/ha	Ratio of nutrients		
						N	P	K
1994/95	64385	24300	1578	90263	30.41	1	0.38	0.025
1997/98	40399	13124	2123	55646	18.75	1	0.32	0.053
1998/99	63813	12097	1258	77168	26	1	0.19	0.02
1999/00	55836	18900	185	74921	25.24	1	0.34	0.003
2000/01	54453	20526	20	74999	25.27	1	0.38	0.0004
2001/02	47005	24512	809	72326	24.37	1	0.52	0.017
2002/03	49484	27321	2202	89007	29.99	1	0.46	0.037
2003/04	51620	24721	1581	77922	26.25	1	0.48	0.031
2004/05	36493	22360	1871	60723	19.65	1	0.61	0.051

(Source: Fertilizer Unit of Ministry of Agriculture and Cooperatives. 2062)

**Table9:** % contribution in import of fertilizers

Year	AIC	Private	2KR	Total
1997/98	67	20	13	100
1998/99	58	42	0	100
1999/00	26	59	15	100
2000/01	32	52	16	100
2001/02	8	69	23	100
2002/03		75	25	100
2003/04	7	83	10	100
2004/05	21	79		100

(Source: Fertilizer Unit of Ministry of Agriculture and Cooperatives. 2062)

**Table 10:** Production of Fertilizers in Nepal (in metric tones)

Year	20:20	20:20:10	Total
2000/01	10253	310	10576
2001/02	10610	399.5	11114
2002/03	3578		3799
2003/04	14289		14958
2004/05	11064		13543

(Source: Fertilizer Unit of Ministry of Agriculture and Cooperatives. 2062)

ration (AIC), Private Institutions and also donated/granted by the Government of Japan called as 2KR (Two Kenny Round). In the past till 1998/99 highest quantity of fertilizers were imported by Public Institution i.e. AIC however its share decreased since then. In the year 2003/04, AIC imported only 7% whereas private institutions imported 83% and 2KR imported 10%. But again the import by AIC increased to 21% in the year 2004/05. The import of fertilizers was highest in 1998/99 which amounted to 219038 Metric ton and since then it decreased although there showed fluctuations. The distribution of fertilizers was increase from 1997/98 and reached highest in the year 2002/03 and since then it started decreasing. Similarly, the fertilizer consumption was the highest in the

year 1994/95 which was 30.4kg/ha which declined since then and showed fluctuation. The fertilizer consumption is regularly decreasing in the recent years from the year 2002/03.

#### CONCLUSION:

In Nepal, nine Major Pesticides groups with seven subgroups of Insecticides are in use. The pesticide use amounts to 142 g/ha which is low compared to other countries. Similarly, seven types of fertilizers are being used in Nepal viz. Urea, Diammonium Phosphate (DAP), Murate of Potash (MOP), Ammonium Sulphate (AS), Single Super Phosphate (SSP), Ammonium Phosphate Sulphate (APS) and NPK in Nepal and the its consumption is 19.65kg/ha in 204/05.

#### ACKNOWLEDGEMENT:

We are very grateful to Ministry of agriculture and Cooperatives for providing data related to the study.

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