

Impact of Fertilizers on the Economy of Pakistan: An Analytical Study from 1990-03

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ABSTRACT

This paper presents the impact of fertilizer on economy of Pakistan and examine the importance of fertilizers, and how they affect economy, further it focuses on the domestic availability and import of fertilizers. it investigates the province wise nutrient off-take and fertilizer off-take and provides extensive details of demand/supply, distribution and consumption of fertilizers by nutrients particularly to the main products eg: urea, dap and nitrophos.

1. INTRODUCTION

Pakistan's economy has undergone considerable diversification over the years, yet the agriculture sector is still the largest sector of the economy. With its present contribution to GDP at 23.30 percent it accounts for 42.10 percent of the total employed labor force and is the largest source of foreign exchange earnings by serving as a base sector for the country's major industries like textile, sugar, and fertilizer. It also contributes to growth by providing raw material as well as being a market for industrial products. What happens, therefore, to agriculture is bound to have substantial impact on the growth of the overall GDP.¹

Pakistan has achieved self-sufficiency in urea production with an annual production of 4.80 million tons and off-take 4.26 million tons in 2001.

According to official sources annual demand of phosphates and Potash fertilizers is 1.4 million tons, which is entirely met through import, including import of 1.2 million tons, DAP. The government is taking new initiatives for further improvement of the over all situation.²

The year 2002-03, recorded a growth of 4.2 percent in the agricultural sector compared to a decline in the previous year. The growth was primarily due to high per hectare yields, improvements in water availability, relatively higher prices of crops and increased use of inputs including fertilizers. The overall nutrients off-take during the fiscal year 2000-03 was 3,020 thousand tons, which represents an increase of 3.1 percent over the previous year 2001-2002. Nitrogen off-take witnessed a recovery of 2.8 percent and phosphate off-take by 4.1 percent. The increased use of nitrogen (+2.8 percent) and phosphate (+4.1 percent) slightly improved Nitrogen to Phosphate use ration from 3.66 in 2001-2002 to 3.61 during 2002-03. There was a marginal decline in total nutrient off-take in Kharif of 0.1 percent and substantial increase of 15.6 percent in Rabi 2002-2003, over the preceding seasons. The potential fertilizer use could not be achieved due to the shortage of

irrigation water, increasing costs of fertilizer, POL, electricity and other agricultural inputs. Urea off-take during 2002-2003 went up by 1.8 percent, while DAP off-take decreased marginally by 0.4 percent compared against 2001-2002. The supply situation during 2002-2003 generally remained satisfactory. Ample quantities of various fertilizer products were available in market.³

This research paper provides extensive details of demand/supply, distribution and consumption of fertilizers by nutrients in respect of principal products namely urea, DAP and nitrophos in particular.

2. DOMESTIC PRODUCTION & AVAILABILITY

The performance in the year 2002-03 of the local industry particularly in urea plants was good. The overall nutrients production, increased by 1.3 percent from 2286 thousand nutrient tons during the year 2001-2002, to 2315 thousand nutrient tons during the year 2002-2003. Out of total domestic production 2192 thousand nutrient tons comprised of nitrogen and the remaining 111 thousand nutrient tones were of phosphates. Fertilizer production increased to 29 thousand nutrient tones more from the previous year's production, which also includes 11 thousand tons of imported and granulated potash.⁴

The overall fertilizer production during 2002-2003, was about 5269 thousand tons which is about 70 thousand tons more than the previous year, an increase of 1.6 percent. Of the total fertilizer products manufactured in the country, the share of the private sector was 77.6 percent and the public sector was 22.4 percent. In product terms, five products Urea, CAN, NP (22:23), SSP (18% P2O5), and various grades of NPK's is manufactured in the country. Urea is the most important single straight nitrogen fertilizer produced. The share of urea in total fertilizer production was 81.37 per cent (79.64 percent during 2001-2002) followed by CAN (6.18 percent), NP (5.63 percent), SSP (5.81 percent) and NPK's various grades (1.38 percent). Table – 1 indicates products manufactured during 2002-03, which are: urea 4408, CAN 335, NP (23:23) 305, SSP 147 and NPK's of various grades were 75 thousand tons.⁵

Table - 1
Domestic fertilizer production

PRODUCTS	MANUFACTURER	ANNUAL PRODUCTION	2001-02		2002-03		%		
			CAPACITY	Production	%	Production		%	(+)(-)
			('000 t)	('000 t)	Share	('000 t)		Share	
Urea	DH	445.00	398.00	7.44	425.00	7.85	6.78		
Urea	ECPL	850.00	872.00	16.30	888.00	16.39	1.83		
Urea (PS)	NFC	557.00	517.00	9.67	0.00	0.00			
Urea (PFL)	NFC	92.00	99.00	1.85	102.00	1.88	3.03		
Urea (FAFL)	NFC	346.00	301.00	5.63	290.00	5.35	-3.65		
Urea (prilled)	FFC	1,330.00	1,512.00	28.27	1,535.00	28.34	1.52		
Urea (granular)	FFC	550.00	518.00	9.68	555.00	10.25	7.14		
Urea (PSFL)	FFC		43.00	0.80	613.00	11.32			
Urea	Total	4,170.00	4,260.00	79.64	4,408.00	81.37	3.47		
CAN (PAR)	NFC	450	329	6.15	335	6.18	1.82		
NP (PAR)	NFC	305	306	5.72	305	5.63	-0.33		
DAP-SONA	NFC	450	67	1.25	0	0.00			
SSP (J.WALA)	NFC	180	78	1.46	75	1.38	-3.85		
SSP (H.PUR)	NFC		84	1.57	72	1.33	-14.29		
SSP-TOTAL	NFC	180	162	3.03	147	2.71	-9.26		
NPK (Various Grades)	ECPL	100	63	1.18	75	1.38	19.05		
All Products	Total	5,835.00	5,349.00	100.00	5,417.00	100.00	1.27		
		NUTRIENT							
		Nitrogen	2,134.00	93.35	2,192.00	94.73	2.718		
		Phosphate	143.00	6.26	111.00	4.80	-22.38		
		Potash	8.90	0.39	11.00	0.48	23.6		
		Total	2,285.90	100.00	2,314.00	100.00	1.229		

Source: Economic survey (2002-03) Government of Pakistan, Finance Division, Advisor's Wing, Islamabad. p., 37.

3. IMPORT OF FERTILIZER

Fertilizer import business is handled by private sector and the government for standard products imposes no restrictions.

Domestic production met about 81.4 percent of total fertilizer requirement during 2002-2003 (83.1 percent during 2002-2003), and the remaining amount was imported. Import figures reflect those, which are already available in the pipelines and are different from planned imports.⁶

A total quantity of 1224 thousand tons, which mainly comprised of six products, was supplied through imports, which represented an increase of 20.95 percent, compared with the imports of the year 2001-2002. DAP constitutes the major share of 91.83 percent.⁷ the product wise summarized import volume is presented in Table – 2.

Table - 2
Fertilizer imports during 2001-02 and 2002-03
 (000 Tons)

Products	2001-02		2002-03		%	
	Imports ('000) T	% Share	Imports ('000) T	% Share	(+)(-)	
DAP	919.00	90.81	1,124.00	91.83	22.31	
MAP	0.00	0.00	28.00	2.29		
SOP	20.00	1.98	16.00	1.31	-20.00	
NP	26.00	2.57	30.00	2.45	15.38	
MOP	11.00	1.09	-	-		
AS	32.00	3.16	17.00	1.39	-46.88	
NPK (10:15:20)	4.00	0.40	-	-		
TSP	-	-	9.00	0.74		
All Products	1,012.00	100.00	1,224.00	100.00	20.95	
NUTRIENTS						
Nitrogen	178.00		28.48	216.00	28.20	21.35
Phosphate	429.00		68.64	542.00	70.76	26.34
Potash	18.00		2.88	8.00	1.04	-55.56
Total	625.00		100.00	766.00	100.00	22.56

Source: (1) Fertilizer import department (2002-2003), Government of Pakistan
 (2) Agricultural Statistics of Pakistan (2002-03) Government of Pakistan, Ministry of Food, Agriculture & Livestock (Economic Wing) Islamabad. p.,134.

3.1 FERTILIZER OFF-TAKE / CONSUMPTION

An overall increase in nutrient off-take in 2002-03 after experiencing a reversal of 1.2 percent during the proceeding year was noticed. The consumption of nutrients (N+P₂O₅+K₂O) reached a level of 3019 thousand tons compared with 2929 thousand tons during 2001-2002, which reflected an increase of 301 percent. The increase was seen in all three nutrients namely Nitrogen, Phosphate and Potash. Apart from the increase in nitrogen of 2.8 percent (0.9 percent during 2001-2002), consumption of potash also showed an increase of 4.1 percent (-18.0 percent during 2001-2002).⁸ In spite of the fact that the availability of major fertilizer products was adequate, full potential of the fertilizer consumption could not be achieved. A number of factors contributed to this, such as, weather condition, water shortage, high price of fertilizer and DAP and the speculation of fertilizer price reduction in the market. The fertilizer consumption, DAP in particular picked up during Rabi 2002-2003, because of improved cash flow with the farmers due to the good return on cotton and paddy crops, availability of credit coupled with improvement in water compared to 2001-02.⁹

Total nutrients off-take during 2002-03 compared with last five years are given in Table - 3.

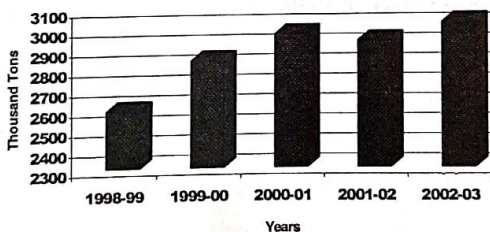
Table – 3
Fertilizer nutrient off-take during 2002-03
compared with last five years

(000 Tons)

Nutrient s	1998-99	% Share	1999-00	% Share	2000-01	% Share	2001-02	% Share	2002-03	% Share
Nitrogen	2099	81.20	2218	78.29	2264	76.41	2285	78.01	2349	77.81
Phosphate	465	17.99	597	21.07	676	22.81	625	21.34	650	21.53
Potash	21	0.81	18	0.64	23	0.78	19	0.65	20	0.66
Total	2585	100	2833	100	2963	100	2929	100	3019	100
N:P Ratio	4.51	-	3.71	-	3.35	-	3.66	-	3.61	-

Source: Ministry of Food and Agriculture (2003), Government of Pakistan, Islamabad, pp.15-20.

Fig-1 Fertilizer nutrient off-take from 1998-99 to 2002-03



4. PROVINCE-WISE NUTRIENT OFF-TAKE

Data pertaining to the overall fertilizer nutrient off-take during 2002-03 showed an increase of 3.1 percent. At the provincial level, total nutrients off-take during 2002-03, had

increased in Punjab, NWFP and Balochistan by 4.4, 9.5 and 9.1 percent respectively, while in Sindh, it went down by 2.3 percent. Nitrogen off-take increased in all provinces.¹⁰ Phosphate showed improvement in all the provinces except for Sindh, where it decreased to some extent.

Table - 4
Province wise consumption of fertilizer

Province	Nitrogen	Phosphate	Potash	Total
1998-99 / Total	2099.4	465	21.3	2585.7
Punjab	1407.6	315.6	18.1	1741.3
Sindh	520.7	117.2	2.8	640.7
N.W.F.P	136.6	26.3	0.3	163.2
Balochistan	34.5	5.9	0.1	40.5
1999-00 / Total	2217.8	597.2	18.5	2833.5
Punjab	1500	415.7	11.2	1926.9
Sindh	518.4	132.3	6.7	657.4
N.W.F.P	144	32.7	0.6	177.3
Balochistan	55.4	16.5	-	71.9
2000-01 / Total	2264.7	676.6	22.7	2964
Punjab	1561	481	18.1	2060.1
Sindh	515.6	148.3	3.6	667.5
N.W.F.P	139.7	35.3	0.8	175.8
Balochistan	48.4	12	0.2	60.6
2001-02 / Total	2282.5	624	18.7	2925.2
Punjab	1537.1	426.1	13.7	1976.9
Sindh	531.6	155.6	3.9	691.1
N.W.F.P	152.8	32.7	1.1	186.6
Balochistan	61	9.6	0	70.6
2002-03 / Total	2335	616.2	9.2	2960.4
Punjab	1568.9	446.9	8.2	2024
Sindh	538.2	129.8	0.9	668.9
N.W.F.P	165.2	32	0.1	197.3
Balochistan	62.7	7.5	0	70.2

Source: (1) National Fertilizer Development Centre.
(2) Agricultural Statistics of Pakistan (2002-03), Government of Pakistan, Ministry of Food, Agriculture & Livestock (Economic Wing) Islamabad, pp.129-130.

It is depicted in Table - 4 that Punjab's share in overall nutrients off-take over a five year average was 68.2 percent, followed by Sindh at 23.2 percent, NWFP at 6.3 percent and Balochistan at 2.3 percent. The N: P₂O₅ use ratio showed substantial improvement in Punjab compared to other provinces.

Punjab uses most of the fertilizer consumed in Pakistan. This is not because the land utilization is more over there but because farmers and growers are more aware of the uses and benefits of fertilizers in that area.¹¹

5. PRODUCT WISE FERTILIZER OFF-TAKE

A total quantity of about 6424 thousand product tones were sold in the country during 2002-03, which was 243 thousand tons more that that of 2001-02, an increase of 3.9 percent. Off-take of domestic products was 5231 thousand tons, representing an increase of 1.8 percent. Off-take of imported products in 2002-03 was about 1193 thousand tons, which was 150 thousand tons more that that of 2001-02, which saw a respectable increase of 14.1 percent.¹²

Table - 5 Fertilizer offtake of different products

Products	2001-02	Percent	2002-03	Percent	Percent
	Offtako	Sharo	Offtako	Sharo	Change
Urea domestic	4185	67.76	4262	66.34	1.84
CAN domestic	308	4.99	359	5.59	16.56
AS imported	17	0.28	16	0.25	-5.88
NP domestic	301	4.87	327	5.09	8.64
NP Imported	9	0.15	47	0.73	422.22
Total NP	310	5.02	374	5.82	20.65
SSP domestic	164	2.66	211	3.28	28.66
SSP Imported	2	0.03	-	-	-
SSP Total	166	2.69	-	-	-
DAP domestic	118	1.91	-	-	-
DAP Imported	984	15.93	1098	17.09	11.59
DAP Total	1102	17.84	1098	17.09	-0.36
TSP Imported	8	0.13	4	0.06	-50.00
SOP Imported	11	0.18	11	0.17	0.00
NPK's Imported	8	0.13	1	0.02	-87.50
NPK's domestic	55	0.89	68	1.06	23.64
Total NPK's	63	1.02	69	1.07	9.52
MOP Imported	6	0.10	8	0.12	33.33
MASP Imported	-	-	12	0.19	-
Grand Total	6176	100.00	6424	100.00	4.02
Total domestic	5137	83.18	5231	84.70	1.83
Total Imported	1039	16.82	1193	19.32	14.82
A.DOMESTIC PRODUCTS					
Nitrogen	2102	71.77	2136	70.75	1.62
Phosphate	164	5.60	126	4.17	-23.17
Potash	8	0.27	10	0.33	25.00
Total	2274	77.64	2272	75.26	-0.09
B.IMPORTED PRODUCTS					
Nitrogen	184	6.28	213	7.06	15.76
Phosphate	460	15.71	524	17.36	13.91
Potash	11	0.38	10	0.33	-9.09
Total	655	22.36	747	24.74	14.05
Grand Total (A+B)	2929	100.00	3019	100.00	3.07

Source (1) Agriculture Statistics of Pakistan (2002-03) Government of Pakistan Ministry of Food, Agriculture & Livestock (Economic Wing) Islamabad pp., 128-138

- (2) National Fertilizer cooperation.
- (3) Fertilizer Import Dept; M/o Food & Agriculture.
- (4) National Fertilizer Development Centre (NDFC), Islamabad

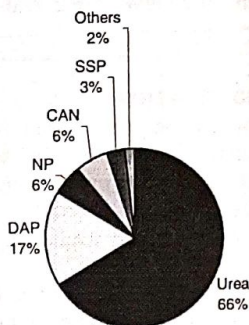


Fig – 2 Product share in total fertilizer Off-take (2002-03)

It is evident from Table – 5 and Fig – 2 that the highest share of 66.34 per cent of urea, followed by DAP 17.09 percent. In this way the share of NP remained 5.82 percent, share of CAN remain 5.59 percent, share of SSP remain 3.28 and share of others 1.88.¹³

5.1 Pvince-wise principal products (Urea and DAP)

Study reveals that urea achieved the highest share of 66.34 per cent in total products consumption in the country. It's off-take at national level increased by 1.8 percent during 2002-2003. Correspondingly it registered its increase in all provinces.

DAP off-take during 2002-2003, decreased marginally by 0.4 percent at national level. The major decrease was noticed in Sindh, whereas its consumption increased in all the other three provinces.

The share of urea off-take over a five-year average for Punjab was 67.1, Sindh 24.2, NWFP 6.2 and Balochistan 1.5 percent.¹⁴

6. SUPPLY AND DEMAND SITUATION

The private sector has completely taken over the import of fertilizer and its marketing / distribution in the country. It is therefore very important to monitor supply, prices and stock in order to address the issues of quality, shortfalls in the availability of fertilizer and ensure smooth, timely availability of fertilizers at competitive prices.

Fertilizer supply and demand situation during a month includes factory stocks, stocks at warehouses of Public and Private sector, domestic production and imported products delivered from port on the first day of the month/cropping season/year. In this way the supply and demand situation during a month is arrived at.

One way to assess the comfortable or tight fertilizer supply / demand situation is its off-take as proportion of availability. There is no hard and fast rule to arrive at comfortable or tight fertilizer supply / demand. But on past and present available experience, it has been observed that in order to have a comfortable situation, the monthly nitrogen level should not cross 80 percent of total availability level and in the case of phosphate 70 percent works well. These are the rough indicators, but due to induction of the private sector, supplies move fast where there is demand and shortages are met quickly.¹⁵

7. PRODUCT-WISE (UREA, DAP AND NITROPHOS) SUPPLY / DEMAND SITUATION

Urea and DAP are the most popular and available fertilizer products of nitrogen and phosphate. Urea share 66.34 percent in total fertilizer consumption during 2002-03 and DAP share was 17.09 percent.¹⁶ the off-take of these three products as proportion of supply is presented in Table – 6 in detail.

Table – 6
Fertilizer demand situation during 2002-03

(000 Tons)

Description	Nitrogen	Phosphate	Potash	Total	Urea	DAP	Nitrophos
Opening balance	222	81	12	315	405	78	40
	(220)	(132)	(4)	(356)	(386)	(191)	(19)
Imports	216	542	8	766	-	1124	30
	(178)	(429)	(18)	(636)	-	(919)	(26)
Domestic production	2192	111	11	2314	4407	-	305
	(2134)	(143)	(9)	(2286)	(4260)	(67)	(306)
Total availability	2630	734	32	3396	4813	1201	375
	(2532)	(704)	(31)	(3267)	(4646)	(1177)	(350)
Off-take	2349	650	20	3019	4262	1098	374
		(625)	(19)	(2929)	(4185)	(1103)	(310)
Export	21	-	-	21	46	-	-
	(18)	(-)	(-)	(18)	39	(-)	(-)
Adjustment(+)(-)	5	-	-	5	11	2	1
National Inventory	255	84	11	350	494	106	1

Source: Agricultural Statistics of Pakistan (2002-03), Government of Pakistan, Ministry of Food, Agriculture & Livestock (Economic Wing) Islamabad, pp.128-138.

Figures in parenthesis are for 2001-02.

8. IMPORT OF FERTILIZER

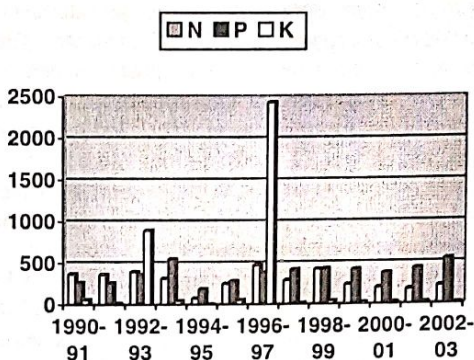
Import of fertilizer in the country due to Pakistan is still not self sufficient in the various productions of fertilizer except urea. During the period from 1990-91 to 2002-03 Pakistan imported fertilizer form various countries.¹⁷ This is depicted in Table- 7.

Table - 7
Import of fertilizer in year 1990-91-2002-03

Fertilizer Import 000 N / Tons					
Year	N	P	K	Total	Value in million Rs.
1990-91	365.00	264.00	56.00	685.00	6,613.40
1991-92	360.00	257.00	15.00	632.00	5,895.50
1992-93	393.00	357.20	8.90	759.10	6,190.30
1993-94	313.00	547.00	43.00	903.00	8,839.90
1994-95	73.00	186.00	2.00	261.00	2,911.70
1995-96	248.80	280.00	51.60	580.40	9,427.00
1996-97	472.80	381.00	24.30	878.10	14,948.00
1997-98	286.90	415.70	11.10	713.70	9,079.00
1998-99	421.80	425.00	37.20	884.00	13,311.00
1999-00	233.00	416.00	13.80	662.80	10,227.00
2000-01	194.00	369.10	16.50	579.60	9,842.00
2001-02	175.50	429.50	17.70	622.70	10,904.00
2002-03	215.70	542.40	7.90	766.00	14,068.00
Total	3,752.50	4,869.90	305.00	8,927.40	122,256.80
% Share of Each	42.03	54.55	3.42	100.00	-

Source (1) Fertilizer import department (2002-03), Government of Pakistan.
 (2) Agricultural Statistics of Pakistan (2002-03), Government of Pakistan, Ministry of Food, Agriculture & Livestock (Economic Wing) Islamabad, p.134.

Fig - 3 Import of NPK from year 1990-91 to 2002-2003



It is evident from Table -7 and Fig-3 that fertilizer was imported from other countries, as the domestic production of fertilizer was not sufficient to meet the internal requirements of the country. It is clear from the study that Pakistan imported 8927.40 thousand nutrient tons of fertilizer worth Rs.122, 256.80 millions during the study period from 1990-91 to 2002-03. If a portion of this amount is set aside for some years a medium size fertilizer unit can easily be installed for the same needs that are being fulfilled by imports.¹⁸

9. CONCLUSIONS & RECOMMENDATIONS

In the light of the above study it is finally concluded that:

With the use of various inorganic fertilizers, agriculture contributes about 25 percent to GDP and is the largest source of foreign earnings. Crops make a vital contribution to the overall growth and earnings. In this regard use of recommended doses of fertilizers is necessary and there are two seasons, Kharif and Rabi, Rabi season consumed 16.02 percent more as compare to Kharif season during the period from 1990-2002.

In 2003-04, 11 units are operating in Pakistan. Four of them - Fauji Chemicals, Dawood Hercules, Engro Chemicals and Fauji-Jordan Fertilizer - are operating in the private sector with a combined production capacity of 3.62 million tons. These private units dominate the industry by producing 66 per cent of the total fertilizers and over 77 per cent of total urea output.

The fertilizer production in 2002-2003, was about 600 thousand tons, which was 82 thousand tons more than the previous year, an increase of 1.6 percent. Of the total fertilizer products manufactured in the country, the share of private sector was 77.6 percent and public sector 22.4 percent

The share of urea in total fertilizer production was 83.6 per cent (82.1 percent during 2001-2002) followed by CAN (6.4 per cent), NP (5.8 per cent), SSP (2.8 per cent) and NPK's various grades (1.4 percent). Domestic production met about 81.4 percent of the total fertilizer requirements during 2001-2002 (83.1 percent during 2002-2003), and rest 18.6 percent was imported.

Total quantities of 1223 thousand tons mainly six products were supplied through imports, which represented an increase of 20.7 percent, compared with 2001-2002. DAP constitutes the major share of 91.9 per cent. Consumption-wise Punjab shared 68.20 percent, Sindh 23.20 percent, NWFP 6.30 percent and Balochistan 2.30 percent in between 1998-99 to 2002-03. Pakistan isn't self sufficient in nitrogen products but it exported 21 thousand tons of nitrogen and 46 thousand tons of urea in 2002-03.

RECOMMENDATIONS

In the light of above conclusions it is finally recommended that:

In Pakistan the growers are not utilizing proper dose of fertilizer as compared to developed nations. Government should encourage new fertilizer plants and distribute fertilizer among the growers on nominal prices.

Pakistan should utilize the full capacity of all the fertilizer plants, which is 17 million tons, and provide fertilizer to the

growers at concessional rates and the remaining, if there is a surplus, should be exported for foreign exchange earnings.

Domestic production of fertilizer, which is not sufficient to meet the local requirement of the peoples and on the other hand there, is a huge wastage of foreign exchange. In this regard it is advisable that the Government of Pakistan boost the production of fertilizer specially DAP which is 90 percent of our total fertilizer import.

Growers utilize more fertilizer as compared to developed nations therefore production should increase thrice for each crop and at the same time encourage our own fertilizer industry for various types of fertilizers.

New fertilizer units should be installed as only about 82 percent of the fertilizer demand is being produced locally, even fertilizer consumption per hectare is low, and we can produce cheaper fertilizer for export, therefore this gap should be bridged as soon as possible.

Pakistan grower training programs should be organized and education about new technology, trends and importance of proper and required quantity of fertilizer to be used should be given in order to achieve optimum output level.

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