

# Projections of Fertiliser Demand and Supply – India and the World

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**Demand – Supply – Past Trend**



**Consumption, Production, Surplus/Deficit  
of N ('000 te) – Past trend**

Year	Consumption	Production	Surplus(+)/Deficit(-)	Import
1951-52	58.7	28.9	-29.8	28.8
1961-62	249.8	154.3	-95.5	307.0
1971-72	1,798.0	949.2	-848.8	481.3
1981-82	4,068.7	3,143.3	-925.4	1,055.1
1991-92	8,046.3	7,301.5	-744.8	566.1
2001-02	11,310.2	10,689.5	-620.7	282.9
2002-03	10,474.1	10,507.6	+33.5	134.9
2003-04	11,076.9	10,556.8	- 520.1	205.1
2004-05	11,713.9	11,304.9	- 409.0	413.1



**Consumption, Production, Surplus/Deficit  
of P<sub>2</sub>O<sub>5</sub> ('000 te)– Past trend**

Year	Consumption	Production	Surplus(+)/Deficit(-)	Import
1951-52	6.9	9.8	+2.9	15.5
1961-62	60.5	65.4	+4.9	-
1971-72	558.2	290.3	-267.9	247.8
1981-82	1,322.3	949.7	-372.6	343.2
1991-92	3,321.2	2,561.6	-759.6	967.8
2001-02	4,382.4	3,835.2	-547.2	494.3
2002-03	4,018.8	3,904.1	-114.7	228.2
2003-04	4,124.3	3,617.0	-507.3	371.5
2004-05	4,623.8	4,027.8	-596.0	307.3



**Consumption, Production, Surplus/Deficit  
of K<sub>2</sub>O ('000 te) – Past trend**

Year	Consumption	Import
1951-52	-	7.7
1961-62	28.0	75.0
1971-72	300.6	268.2
1981-82	676.2	643.8
1991-92	1,360.6	1,236.4
2001-02	1,667.1	1,697.2
2002-03	1,601.2	1,568.4
2003-04	1,597.9	1,552.8
2004-05	2,060.7	2,058.3



Note: Entire requirement of potash is met by imports.  
There is no known source of potash in the country.

**Level of Self-Sufficiency**

Year	N	P <sub>2</sub> O <sub>5</sub>	N+P <sub>2</sub> O <sub>5</sub>
	← % →		
1951-52	49.2	142.0	59.0
1961-62	61.8	108.1	70.8
1971-72	52.8	53.6	52.6
1981-82	77.3	71.8	75.9
1991-92	90.7	77.1	86.8
2001-02	94.5	87.5	92.6
2002-03	100.3	97.0	99.4
2003-04	95.3	87.7	93.2
2004-05	96.5	87.1	93.8



**States surplus in domestic production  
of N and P<sub>2</sub>O<sub>5</sub> – 2004-05**

N	P <sub>2</sub> O <sub>5</sub>
Assam	Orissa
Orissa	Andhra Pradesh
Uttar Pradesh	Kerala
Kerala	Tamil Nadu
Tamil Nadu	Gujarat
Gujarat	Goa
Madhya Pradesh	
Rajasthan	
Goa	



**Review of 2005-06**

**Weather**

- South West monsoon arrived 4 days behind the scheduled date
- Break in monsoon from end July to August 28
- 32 meteorological sub divisions received normal to excess rains
- Total rainfall was close to 100% of the long period average

**Fertiliser consumption**

- Impressive growth in fertiliser consumption. Total nutrient consumption is estimated to increase by 8.2%
- Consumption of N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O recorded a growth of 6.3%, 10% and 15.6%, respectively, over 2004-05

**Fertiliser production**

- Marginal increase in N and P<sub>2</sub>O<sub>5</sub> production
- Production of N and P<sub>2</sub>O<sub>5</sub> is estimated to increase by 0.9% and 3.2%, respectively, during 2005-06 over 2004-05



# Projections of Demand and Supply in India

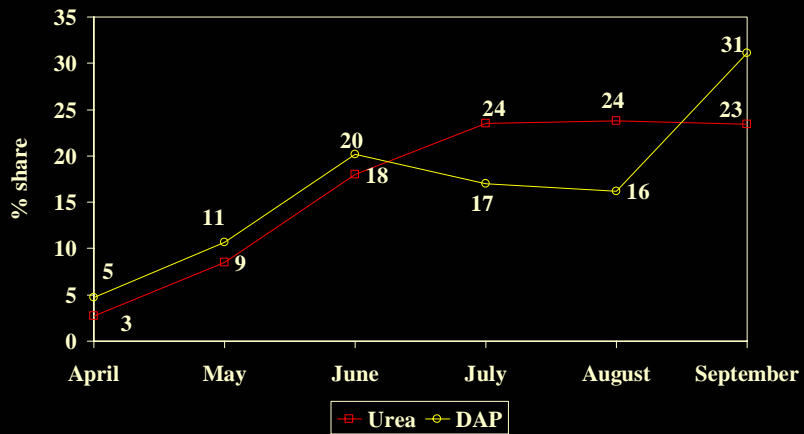


**Fertiliser Demand – Seasonal**

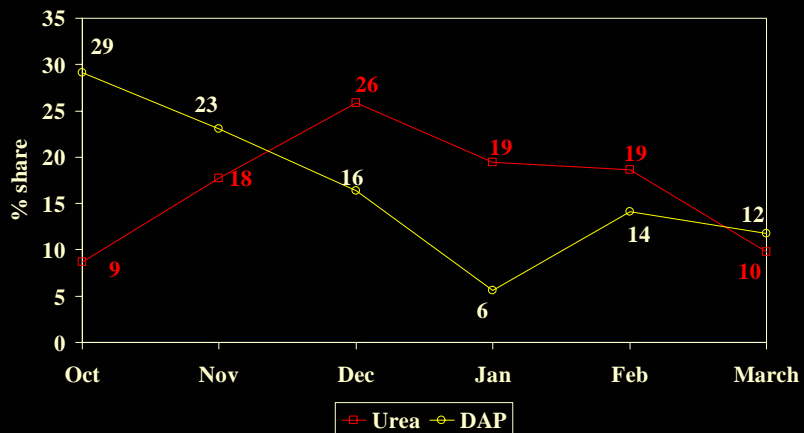
**Fertiliser Supply - Continuous**

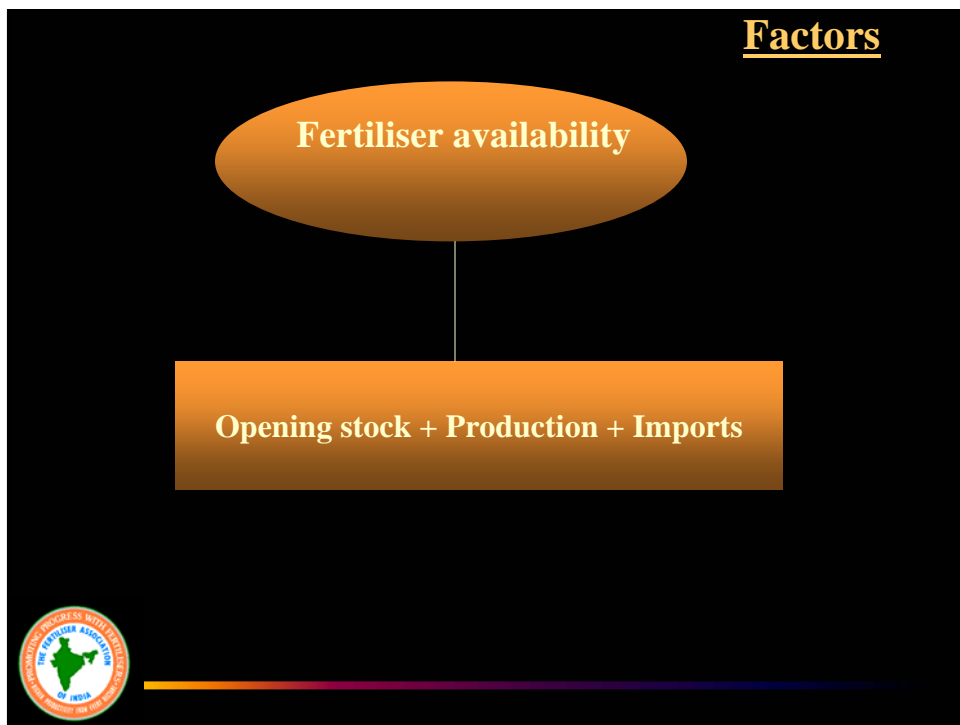
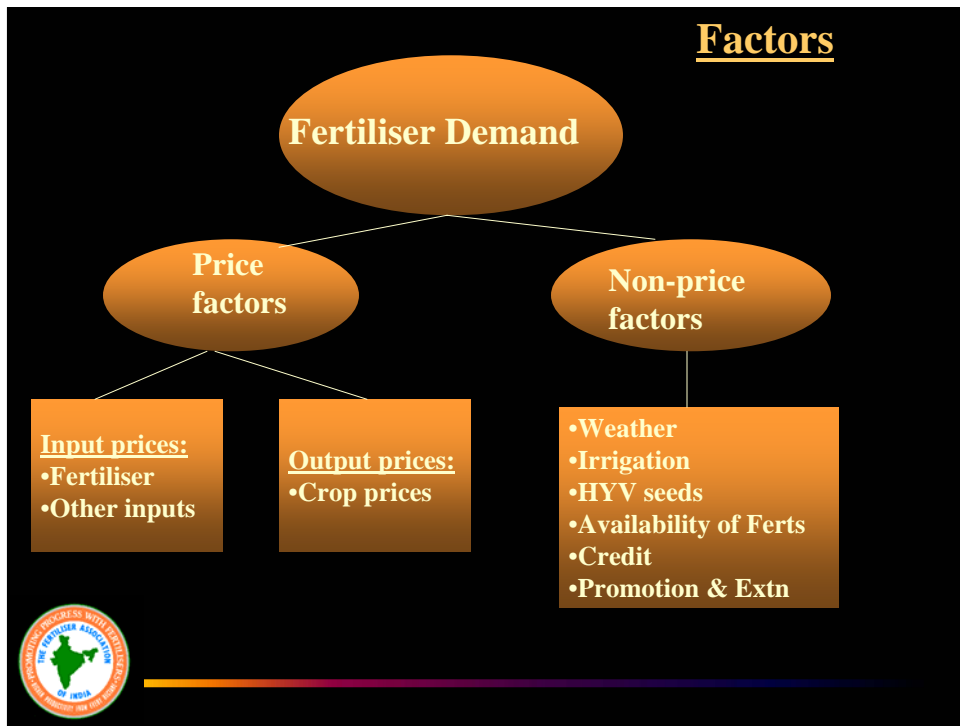


### Monthwise Average Sale of Urea and DAP – Kharif



### Monthwise Average Sale of Urea and DAP – Rabi





## Supply Constraints

### Production

- Technical / equipment problems
- Feedstock / raw material shortage
- Power problem
- Marketing problem
- Labour problem
- Govt policies

### Import

- High international prices
- Low exportable surplus



## Demand Projections - Objectives

To make fertilisers available:

- at right place
- in right time
- in required quantity
- Overestimation leads to glut
- Underestimation causes scarcity



## Need for and Importance of Demand Projections

### Planning and Decision making

- Production planning
- Import planning
- Movement planning ( Requirement and allocation of wagons)
- Warehousing ( CWC, SWC, FCI and private agencies)
- Planning for availability of feedstock / raw materials



## Prerequisite of a Good Estimate

- **Unbiased ness**
- **Consistency**
- **Efficiency**
- **Sufficiency**



## Demand Projections made by Various Agencies

1. **Roy L.. Donahue (1966)**
  - Districtwise crop acreage x fertiliser recommendation
2. **Donde and Brown (1972)**
  - Variables used – Districtwise data on area under crops, irrigated area, farm harvest prices, agricultural technology
  - Methodologies – (a) Time series, (b) Multiple regression
3. **National Commission on Agriculture (1976)**
  - (a) Replenishment of nutrients removed by crops
  - (b) Area under crops and recommended doses
  - (c) Demand for agricultural prodn and response rate of crops to addition of fertilisers
4. **NCAER (1978)**
  - Household sample survey



*(Continued)*

## Demand Projections made by Various Agencies

5. **FAI**
  - Population nutrition method
  - Crop area and recommended rate
  - Straight line projections
  - Quadratic projections
  - Multiple regression
6. **National Centre for Agricultural Economics and Policy Research (NCAEPR) (2005)**
  - Normative approach
  - Positive approach



## FAI and NCAEPR Model

### FAI Model

Variables used – irrigated area, area under HYV, fertiliser nutrient price, rainfall as % of long term average value, lagged dependent variable (Fert consn in the previous year)

Methodology – Multiple regression

### NCAEPR Model

Normative approach

- Demand as the quantity of fertiliser needed to produce specified level of agricultural output

Positive approach

- Estimates the quantity of fertilisers that would be demanded corresponding to different scenarios of variables that affect demand for fertilisers.



## Projections of Supply - Methodologies

1. Domestic production
  - (a) Contribution from existing plants:
    - Current normal level of production. Scope for improvement in efficiency in future. Revival of idle plants.
  - (b) New plants
    - Capacity addition according to date of commissioning
    - Apportionment of production according to date of commissioning
    - Work out projections of production according to the capacity utilization of the respective feedstock / raw materials
2. Supply from joint venture
3. Import



## Demand and Supply of Fertilisers - Highlig

### Nitrogen

- Total demand for N is expected to increase at an annual rate of about 3.3% from 13.56 Mte during 2006-07 to 15.94 Mte during 2011-12.
- Total supply of N is forecast to increase at an annual rate of about 3.9% , from 12.51 Mte during 2006-07 to 15.15 Mte during 2011-12.
- Total deficit of nitrogen will progressively increase from 1 Mte during 2006-07 to 1.67 Mte during 2009-10. It will reduce to less than half a million tonnes during 2010-11 and 0.8 Mte during 2011-12
- 14 urea plants proposed for debottlenecking / expansion. Out of a total of 14, 11 plants (capacity - 2.23 Mte) proposed for debottlenecking and 3 for expansion (capacity - 3.35 Mte). Proposals of 2 plants for debottlenecking have been approved by the government. The remaining plants are awaiting clearance.



## Demand and Supply of Fertilisers - Highlights

### Phosphate

- Total demand for P is expected to increase at an annual rate of about 4.8% from 5.68 Mte during 2006-07 to 7.17 Mte during 2011-12.
- Total supply of P is forecast to increase at an annual rate of about 2.4% , from 4.25 Mte during 2006-07 to 4.80 Mte during 2011-12.
- Total deficit of P will increase progressively from 1.43 Mte during 2006-07 to 2.37 Mte during 2011-12.

### Potash

- Total demand for K is expected to increase at an annual rate of about 5.5% from 2.48 Mte during 2006-07 to 3.24 Mte during 2011-12.



### Forecast of Demand, Supply Balance of Fert nutrients – ('000 te)

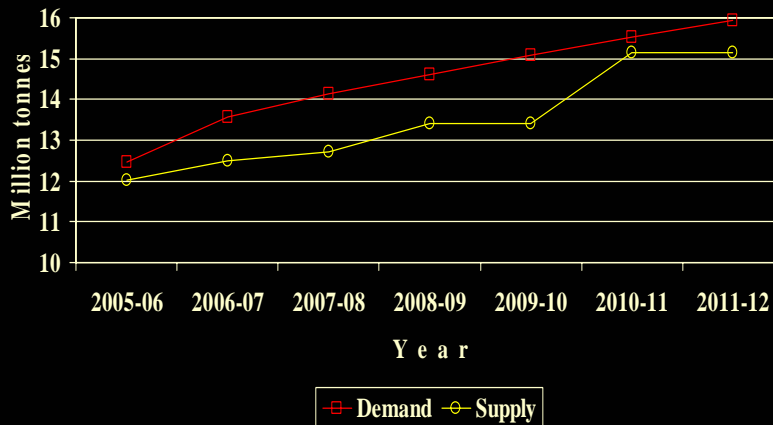
Year	N			P <sub>2</sub> O <sub>5</sub>			K <sub>2</sub> O
	Demand	Supply *	Surplus(+) /Deficit(-)	Demand	Supply	Surplus(+) /Deficit(-)	Demand
2005-06 (Est.)	12,449	12,036	-413	5,085	4,158	-927	2,383
<b>Forecasts</b>							
2006-07	13,556	12,507	-1,049	5,681	4,253	-1,428	2,482
2007-08	14,132	12,728	-1,404	6,003	4,387	-1,616	2,621
2008-09	14,626	13,403	-1,223	6,293	4,538	-1,755	2,762
2009-10	15,088	13,422	-1,666	6,586	4,693	-1,893	2,917
2010-11	15,516	15,146	-370	6,870	4,795	-2,075	3,075
2011-12	15,941	15,146	-795	7,169	4,795	-2,374	3,238



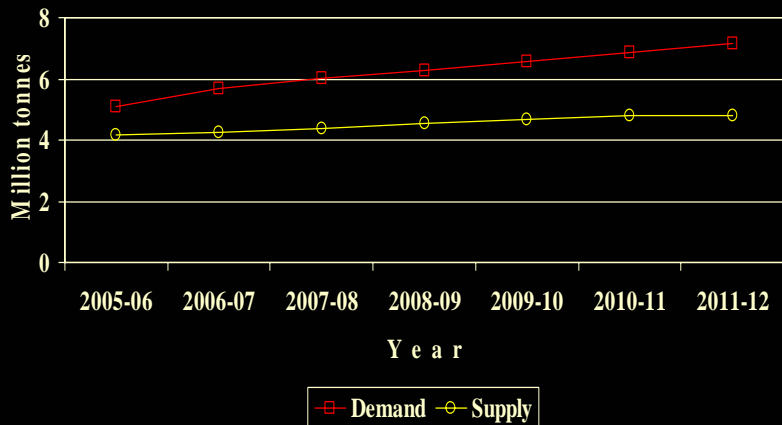
Note : K<sub>2</sub>O demand is entirely deficit, as there is no known source of potash in the country.

\* = Includes supplies from Indo-Oman Joint venture and urea projects under consideration by the Govt. of India

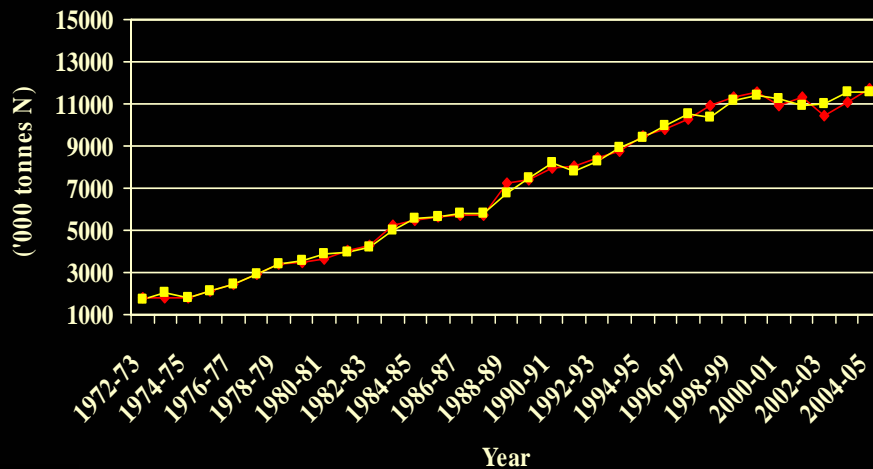
### Demand - Supply Balance of N



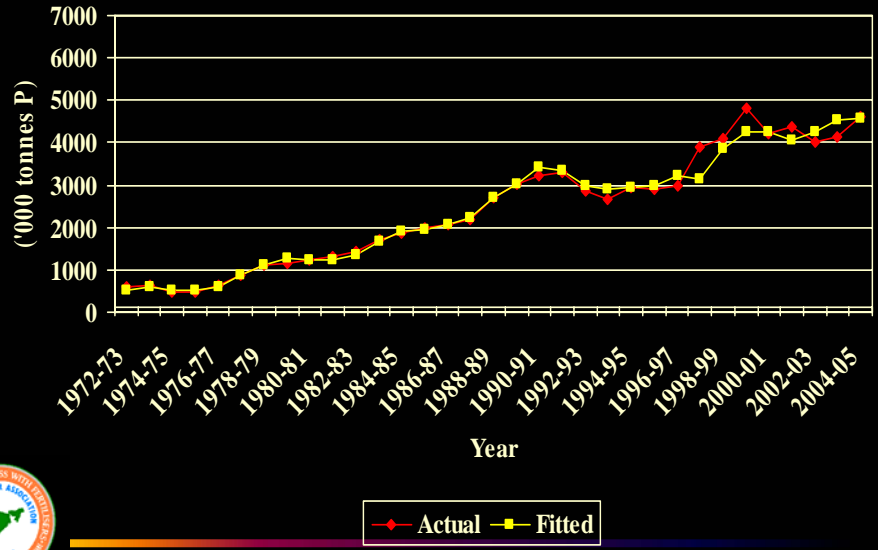
### Demand - Supply Balance of $P_2O_5$



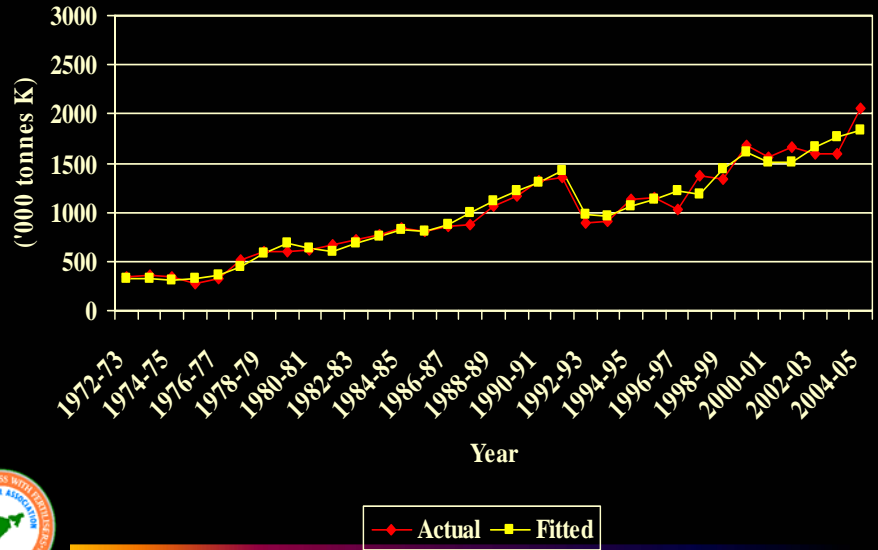
### Consumption of N- Actual vs Fitted Value



### Consumption of P - Actual vs Fitted Value



### Consumption of K - Actual vs Fitted Value



**Demand for Urea towards 2010-11**  
(According to NCAEPR)

**Normative Approach**

Scenarios	Urea ('000 tonnes)
I. Agricultural output growth (AOG) rate 2.72%, NPK ratio 2003	24,829
II. AOG rate 4.08%, NPK ratio 2003	27,786
III. AOG rate 2.72%, NPK ratio 1991	24,022
IV. AOG rate 4.08%, NPK ratio 1991	26,848

NCAEPR = National Centre for Agricultural Economics and Policy Research



**Demand for Urea towards 2010-11**  
(According to NCAEPR)

**Positive Approach**

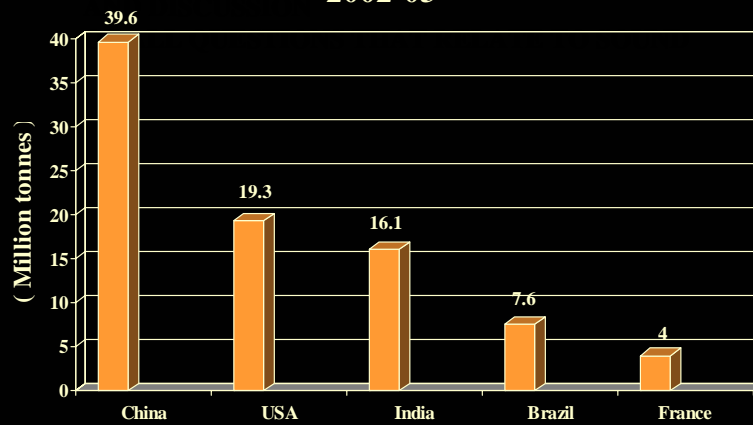
Scenarios	Urea ('000 tonnes)
I. Business as usual (BAU)	24,959
II. BAU and freeze on subsidy	24,122
III. Freeze on subsidy, exploit irrigation	26,303
IV. AOG rate 4.0%	27,452
As per FAI model	26,770



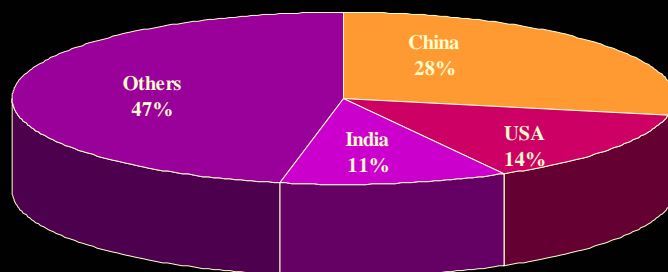
## World Scenario



**Rank of India in World Consumption of Fertiliser Nutrients (N+P+K) 2002-03**



### Share of Major Fertiliser Consuming Countries 2002-03



### World Demand of Fertilisers - Highlights

#### Nitrogen

- World demand for N is expected to increase at an annual rate of about 1% from 90.7 Mte during 2005-06 to 95.5 Mte during 2009-10.
- Total supply of N is forecast to increase at an annual rate of about 2.2% , from 96.5 Mte during 2005-06 to 107.7 Mte during 2009-10.
- World surplus of nitrogen will increase by about 6.4 Mte, from a total of 5.8 Mte during 2005-06 to 12.2 Mte during 2009-10.
- Egypt announced 3 new ammonia/urea complexes between 2005-09. In Iran ,5 nitrogen projects are under construction. China is expanding the small and medium sized ammonia and urea plants. In the Caribbean, several new plants are being planned. In Algeria, a new urea plant is under construction.
- Many plants in the United States have been idle as a consequence of high natural prices.



## World Demand of Fertilisers - Highlights

### Phosphate

- The global  $P_2O_5$  demand is projected to expand at an annual rate of 1.6 percent, from 27.5 Mte during 2005-06 to 30.4 Mte during 2009-10.
- The global  $P_2O_5$  supply is forecast to expand at an annual rate of 1.6 percent, from 30.6 Mte during 2005-06 to 35.1 Mte during 2009-10.
- The total  $P_2O_5$  surplus is expected to increase marginally by 1.5 Mte, from a total of 3.1 Mte during 2005-06 to 4.6 Mte during 2009-10.
- S. Arabia to develop a new phosphate rock mine, to be completed by 2010. Morocco intends to upgrade its all phosphoric acid units. The Russian Federation's phosphate industry has been restructured and MAP production increased by 5%. Small expansion in phos acid and DAP production planned. In Brazil, several phosphate related projects are expected to be commissioned up till 2009.



## World Demand of Fertilisers - Highlights

### Potash

- World potash demand is projected to expand at an annual rate of 1.8 percent, from a total of 26.9 Mte during 2005-06 to 29.4 Mte during 2009-10. About 45% of the growth will take place in Asia and 50% in America.
- The supply capacity of potash is to increase by 2.7 Mte between 2005-06 to 2009-10, with an annual growth of 1.5%.
- Most producers are operating close to capacity. A new mine is under construction in Belarus. In the Russian Federation, rising energy and transportation costs forced producers to improve efficiency and enhance potash recovery. In Brazil, an expansion of mine capacity is foreseen. Jordan is expected to expand one of its projects. Germany completed a project to extract richer potash ore. France is assessing new projects for the production of potassium sulphate.



**World Supply, Demand Balance -  
N (Million te)**

	2005-06	2006-07	2007-08	2008-09	2009-10
Total supply	96.5	100.0	103.6	106.0	107.7
Total Demand	90.7	92.0	93.2	94.3	95.5
Surplus(+)/Deficit(-)	5.8	8.0	10.4	11.7	12.2



**World Supply, Demand Balance-  
P<sub>2</sub>O<sub>5</sub> (Million te)**

	2005-06	2006-07	2007-08	2008-09	2009-10
Total supply	30.6	31.9	32.4	33.9	35.1
Total Demand	27.5	28.6	29.2	29.9	30.4
Surplus(+)/Deficit(-)	3.1	3.3	3.2	4.0	4.6



**World Supply, Demand Balance-  
K<sub>2</sub>O (Million te)**

	2005-06	2006-07	2007-08	2008-09	2009-10
Total supply	32.4	33.3	33.8	34.6	35.1
Total Demand	26.9	27.7	28.3	28.9	29.4
Surplus(+)/Deficit(-)	5.5	5.6	5.5	5.7	5.7



**Realistic Demand and Prod Forecast  
Essential**

Realistic Demand and Prod Forecast essential for

- Planning
- Decision making

- Over estimation leads to glut
- Under estimation causes scarcity



## Glut or Scarcity - Consequence

### Glut

#### High Inventory - Leading to:

- High inventory carrying cost
- Liquidity crunch
- Deterioration in quality of fertilisers due to long period of storage

### Scarcity

#### Higher Import - Leading to:

- High international price
- Addl burden on exchequer

#### Non-availability of Ferts in time – resulting in :

- Less farm yield



## International Prices of Fertilisers

- International prices of fertilisers depend upon the global supply- demand balance. If demand is stronger, then supply-demand balance determines prices rather than cost of manufacture.
- If demand is weak, cost profiles of major exporters influence the floor price.
- Low cost exporters continue to drop prices until their cash costs are covered.
- During mid 70's, in the wake of the oil crisis, C & F India prices of Urea skyrocketed at US \$ 273 -274 per tonne. Again, it was a high of US\$ 240 per tonne during 1980-81 and US\$ 225 and US \$ 206 per tonne during 1995-96 and 1996-97, when India and China bought significantly high quantity from the international market.
- During 2004-05, average C & F India prices of Urea was US\$ 238 per tonne. The prices further increased during 2005-06 and ranged between US \$ 241 and 320 per tonne.



## Conclusion

- In India, the deficit of N will progressively increase from 2006-07 to 2009-10. It is expected to reduce significantly during 2010-11 and 2011-12. The deficit of P and K will continue to increase
- Global supply demand balance of N will increase until 2009-10. The global surplus of N is expected to increase from 2006-07 due to commissioning of new projects. Supply demand balance of P and K may remain tight
- Realistic demand and production forecast is essential for macro planning and decision making
- Over estimation leads to glut and under estimation causes scarcity



Thank you

