

FBMPs : Voluntary Initiatives in India



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Landmarks in Indian Agriculture

- Remarkable growth in Agriculture (1970-2000)
- Self sufficiency in foodgrain production
- Increased use of fertilisers played a key role
- Annual Fertiliser (NPK) consumption is more than 20 million tonnes, (106 kg/ha)
- India emerged 3rd largest producer & consumer of the fertilisers
- Sivaraman Committee Report (1966) laid foundation of modern fertiliser policy (HYVs, BFU, Credit).

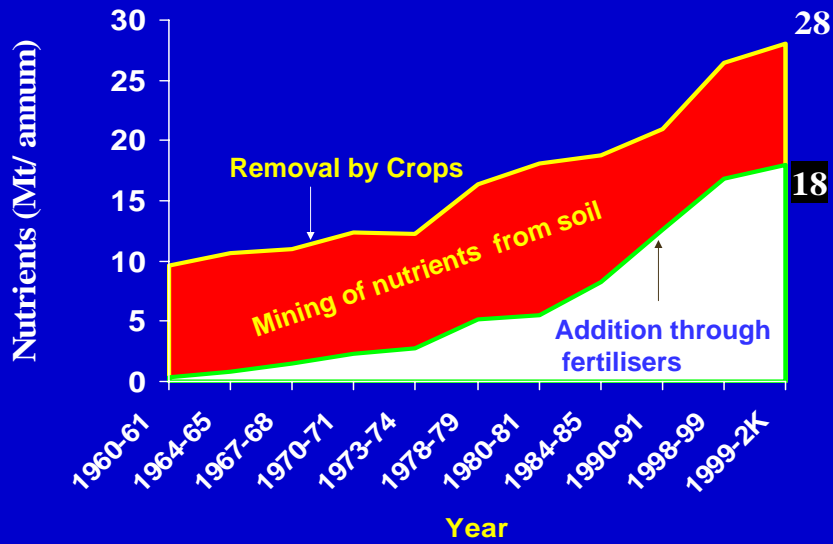
Challenges in Indian Agriculture

- To feed nearly 17 % of world population from less than 2.5 % land area
- Depleting land & water resources
- Green revolution showing signs of fatigue
- Stagnation in food grain production and productivity
- Degradation in soil health (Nutrient mining)
- Increased secondary and micronutrient deficiency
- Low and declining fertiliser use efficiency
- Farmers profitability is declining

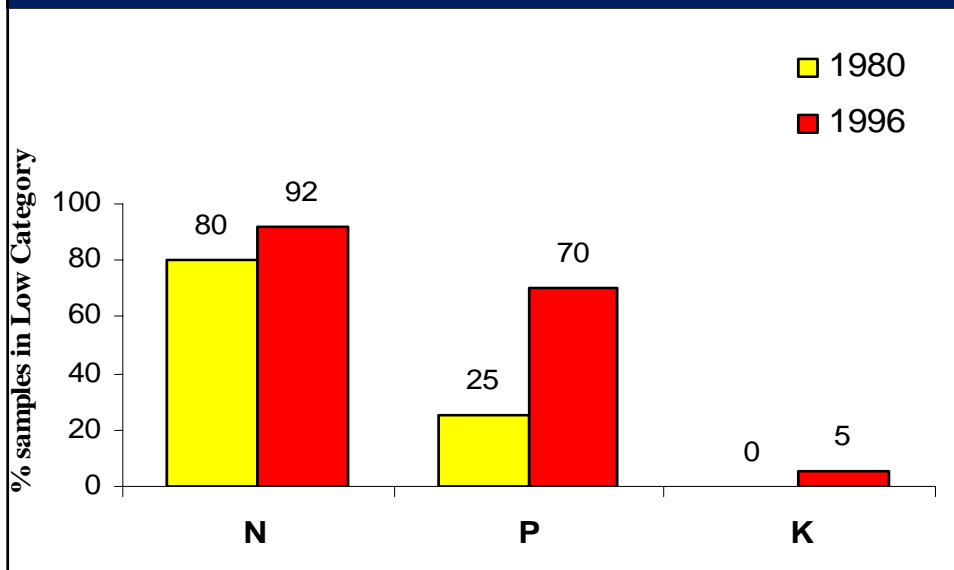
Decline in crop productivity growth rates (%)

Crops	1981-90	1991-00	2001-05
Rice	3.19	1.34	1.27
Wheat	3.10	1.83	- 0.11
Food grains	2.74	1.52	1.20
Oilseeds	2.43	1.15	4.86
Sugarcane	1.24	0.82	- 2.70
Potato	2.20	0.98	- 2.53

Nutrient Mining in Indian Soils



Soil Fertility Depletion due to Nutrient Mining in Haryana



Extent of Nutrient Deficiency in Indian Soils

Nutrient	% samples found deficient
Nitrogen	89
Phosphorous	80
Potassium	50
Sulphur	40
Zinc	48
Boron	33
Iron	12
Manganese	5

Decline in crop response to fertiliser

Period	kg food grains per kg nutrients (NPK)
5 th Plan (1974 -79)	1:15.0
8 th Plan (1992 -97)	1:7.5
9 th Plan (1997 -02)	1:7.0
10 th Plan (2002 -07)	1:6.5
11 th Plan (2007 -12)	1:6.0

Nitrate content of ground waters in India

District/State	Total samples	Samples (%) having $\text{NO}_3 > 45 \text{ mg L}^{-1}$	Fertiliser Consumption kg/ha
Barmer/Rajasthan	351	63	3
Gulbarga/Karnataka	529	49	66
Nagpur/Maharashtra	47	21	75
Mehsana/Gujarat	200	19	96
Satara/Maharashtra	1001	16	123
Kurnool/Andhra Pradesh	143	18	185
Faridabad/Haryana	200	23	203
All India	4496	29	106

Fertiliser Best Management Practices (FBMPs)

Balanced, efficient, integrated, profitable and environment friendly use are the basic principles.

Components:

- Judicious use of chemical fertilisers based on deficient soil nutrients as established by soil testing.
- Use of all sources of plant nutrients including organic manures and bio-fertilisers besides chemical fertilisers
- Use of soil amendments in acidic/alkaline soils to improve the soil productive.
- Ensuring adequate availability of plant nutrients in soils to meet the requirement of plants at critical stages of growth.
- Ensuring adequate soil humus to improve the physico-chemical and biological properties of soils.

FBMPS: Partners/Key Players

- **Indian Council of Agricultural Research (ICAR) & its institutes**
- **State Agricultural Universities (SAUs)**
- **States Department of Agriculture**
- **Union Ministry of Agriculture**
- **Fertiliser Industry / FAI**
- **NGOs**

FBMPS: Government Initiatives

- **Developing BMPs of judicious use of fertiliser for different crops and soils types (ICAR & SAUs).**
- **Revision of general fertiliser recommendations by Uttar Pradesh, Tamil Nadu and West Bengal**
- **Providing secondary and micronutrient facilities in soil testing laboratories**
- **Implementing the Concession Scheme for decontrolled phosphatic and potassic fertilisers in 1992.**
- **Setting up of Task Force on Balanced Use of Fertilisers**

Regulatory Framework

Fertiliser regulatory policies gave birth to Fertiliser (Control) Order in 1957. (Revised in 1985).

Regulatory Initiatives:

- In 1971, FCO prescribed **MANDATORY STOCKING** of NPK fertilisers in the ratio of 5:2:1, to promote balanced use of fertilisers.
- 12 grades of 100% water soluble fertilizers, 3 grades of liquid fertilizers have been specified in FCO for promoting fertigation
- Sulphur has been recognised as nutrient at par with NPK and its specification notified in different S containing fertilisers.

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- To promote Integrated Nutrient Management, **ORGANIC MANURES AND BIO-FERTILISERS** brought under FCO in March, 2006.
- Inclusion of new category of **PROVISIONAL FERTILISERS** under clause 20A for registration of new products on fast track basis (*Neem* Coated Urea, Fortified NPK Complexes and Bentonite Sulphur).
- A new category of **CUSTOMISED FERTILISERS** included under clause 20B to encourage production and use of soil and crop specific fertilisers.

FBMPs- Industry Initiatives

A number of programmes have been initiated by Fertiliser Industry to educate farmers on balanced and efficient use of fertilisers.

Period	Emphasis
Beginning of planned era	Create awareness about fertilisers
Sixties	Fertiliser as a component of package of practices
Seventies and Eighties	Enlarging the fertiliser consumption base
Nineties	Promote balanced fertiliser use (NPK)
Current decade	Promote balanced, efficient and integrated use of nutrients (IPNS Approach)

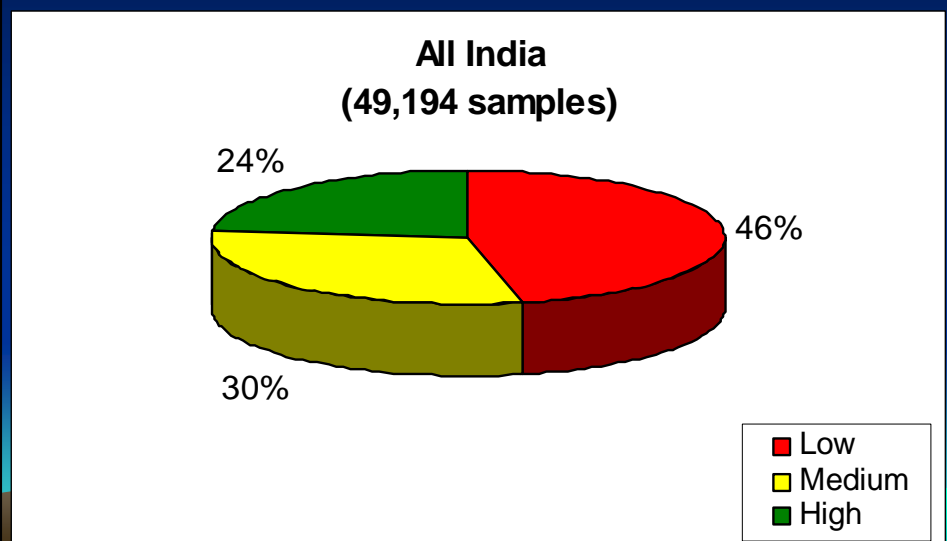
Fertiliser Industry's Programmes

- **Fertiliser Demonstrations-** Two plot demonstrations, Block demonstrations, Front Line demonstrations and Critical input package demonstrations.
- **Field programmes-** Farmers meetings, Field days, Crop seminars, National agriculture inputs fortnight, Kharif & Rabi workshops, Agriculture & social campaigns, Soil testing.
- **Agriculture extension programmes-** Village adoption, Area development projects like land reclamations, watershed management & other area specific projects, High-tech projects like bio pesticides, IPM, Bio-fertiliser, Micro irrigation & use of agriculture implements., Forestry projects.
- **Research & development-** Modified form of fertiliser–USG, Neem coated, Zinc coated urea etc., IPNS trails, Soil test based trails.
- **Farmers service centres-** All agriculture inputs under the one roof. Over a 1000 FSC(s) established by IFFCO, KRIBHCO, CFCL, GSFC, GNVFC, IGFL, NFL, RCF, ZIL, TCL & SFC.
- **Information technology-** E-Chaupal – ITC, IFFCO's KIOSKS, Chambal, GNFC,
- **Trainings-** Orientation training, In service training-Programmes, Dealer training programmes, Training and visit of farmers.

Collaborative Efforts:

- FAI-FAO Sulphur Network Field Trials (1987-88)
- TSI-FAI-IFA Project on Sulphur in Balanced Fertilisation (1997-2006)
- IPL-IPC Potash Promotion Project on K in Balanced Fertilisation (2003-2006)
- IPI-FAI Dealers Training/ Fertigation Programmes
- Soil Health Enhancement Campaign (2006-07)

Extent of Sulphur Deficiency



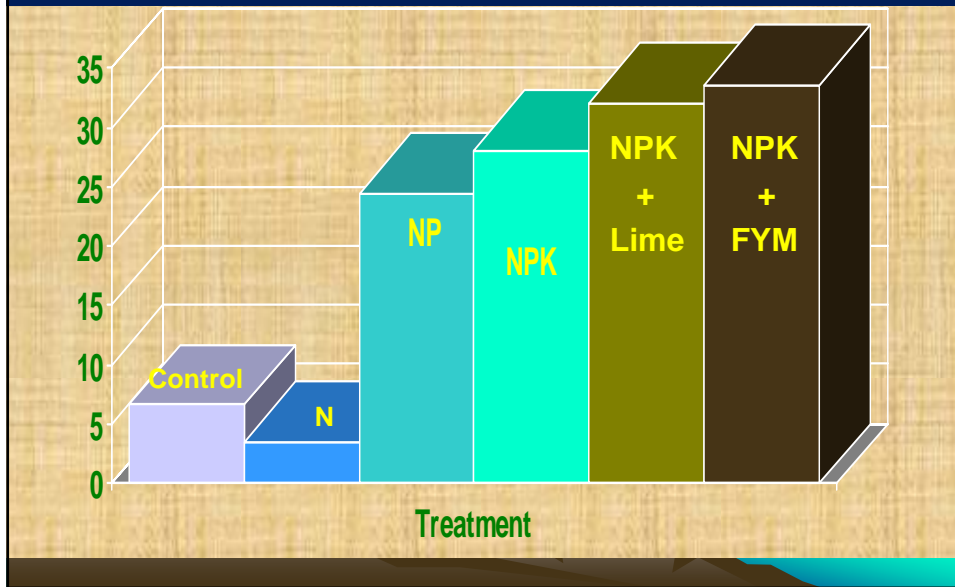
Activities under 'Soil Health Enhancement Campaign'

Fertiliser Company	No. of soil samples Analysed	Farmer Meetings	Crop demos	Field days
CFCL	48824	101	43	16
IFFCO	53455	1726	351	137
Indo Gulf	22461	272	1224	120
KRIBHCO	9213	75	68	-
NFCL	7527	711	752	-
RCF	26131	-	-	-
SFC	3584	2070	882	212
Others	70694	1214	651	20
Total	241889	5169	3971	505

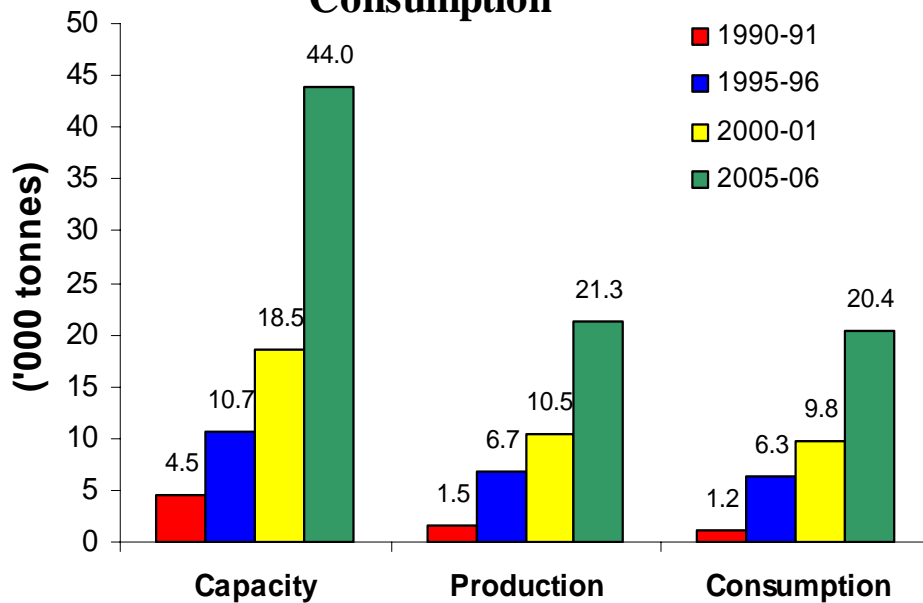
Promising Practices

- Integrated Nutrient Management System
- Use of biofertilisers & vermicompost
- Use of PSM to improve Phosphate Use Efficiency
- Use of *Neem*-coated urea to increase NUE
- Use of products fortified with secondary and micro- nutrients to ensure balanced fertilisation
- Crop & soil specific customised fertilisers
- Fertigation
- Laser Land Leveling

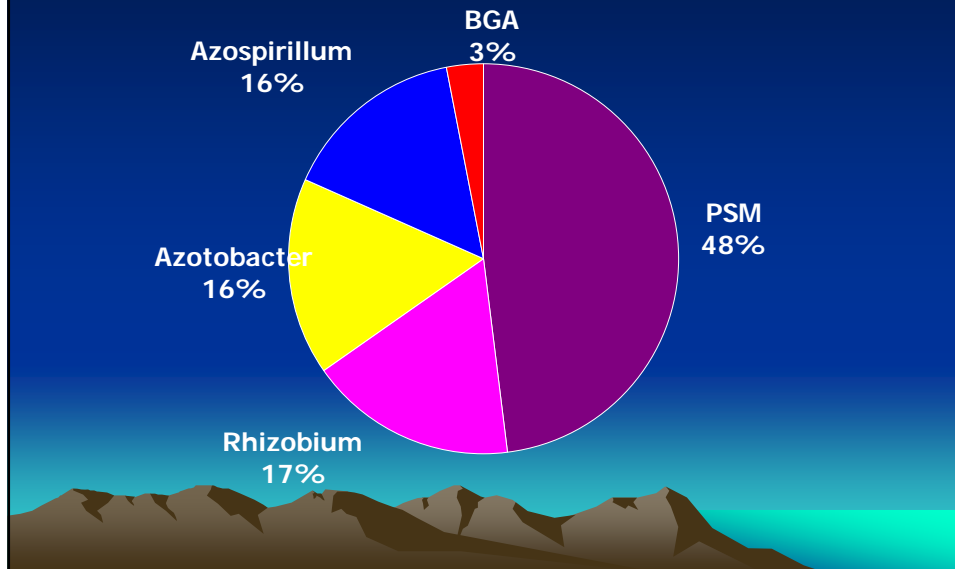
Long Term Fertiliser Use & Wheat Yield ('00kg/ha)



Growth in Biofertiliser Production and Consumption



Product-wise Consumption of Biofertilisers



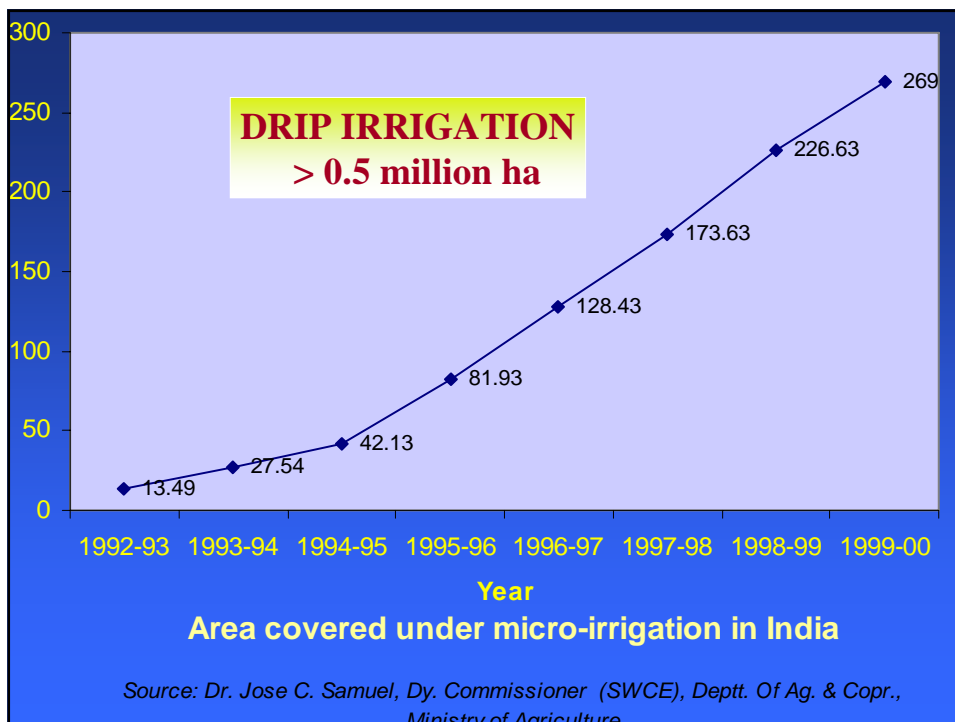
Increase in Yield with Neem Coated Urea (Paddy, 2002)

Districts	Av. Yield (kg/ha)		Increase in Yield (%)
	Normal Urea	NCU	
Panipat (8)	4120	4577	11.1
Karnal (10)	4360	4940	13.3
Rohtak (8)	4219	4502	6.7
Bhantida(10)	6916	7015	1.4
All Districts	4903	5258	7.2

Neem- (*Azadiracta indica*)

Benefits under drip fertigation		
Crop	Saving in fertiliser, %	Increase in Yield, %
Sugarcane	50	40
Banana	20	11
Onion	40	16
Cotton	30	20
Potato	40	30
Tomato	40	33
Castor	60	32
Okra	40	18
Broccoli	40	10

Source: NCPAH, (2001), National Committee on Plasticulture applications in Horticulture, Progress Report 2001, Ministry of Agriculture, GOI, New Delhi.



Failures

- Adoption of proven products/technology (BF, NCU, Drip) is slow
- Inadequate soil testing facilities.
- Lack of farmers' awareness about efficient materials and FBMPs.
- Inappropriate Pricing policy leading to distortion in NPK consumption ratio.
- Regulatory mechanism still a hurdle in development of new, efficient products
- A wide gap between potential and actual yields

Future Plans

- Augment soil testing facilities under public/private sector.
- Emphasise on Integrated Plant Nutrition System by promoting production and use of biofertilisers and organic manures (vermicompost) by providing financial assistance
- Increase the production of *neem*-coated urea and other value added products
- Encourage fertiliser companies to develop crop and soil specific customised fertilisers
- Provide nutrient based subsidy instead of product based subsidy

Conclusions

- **India would require 45 million tonnes of nutrients (NPK) to produce 300 Mt of food grains for the estimated population of 1.4 billion by 2025.**
- **The dependence on fertilisers and other nutrient sources will increase to meet the increasing food demand of ever increasing population.**
- **At the present level of fertiliser consumption, the environmental concern due to fertiliser use is not an issue in India**

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- **National food security will remain a priority of the agricultural and fertiliser policies in India.**
- **Considering the low per hectare fertiliser use and crop yields, India has a good potential to increase the crop productivity by increased use of inputs.**
- **The food grain production can be increased by 60 Mt just by enhancing fertiliser use efficiency and better water management (Swaminathan, 2002).**

