"Begging Bowl to Food and Nutritional Security: Feeding the Millions The Indian Way"

and

Way forward for African-Asian counries'

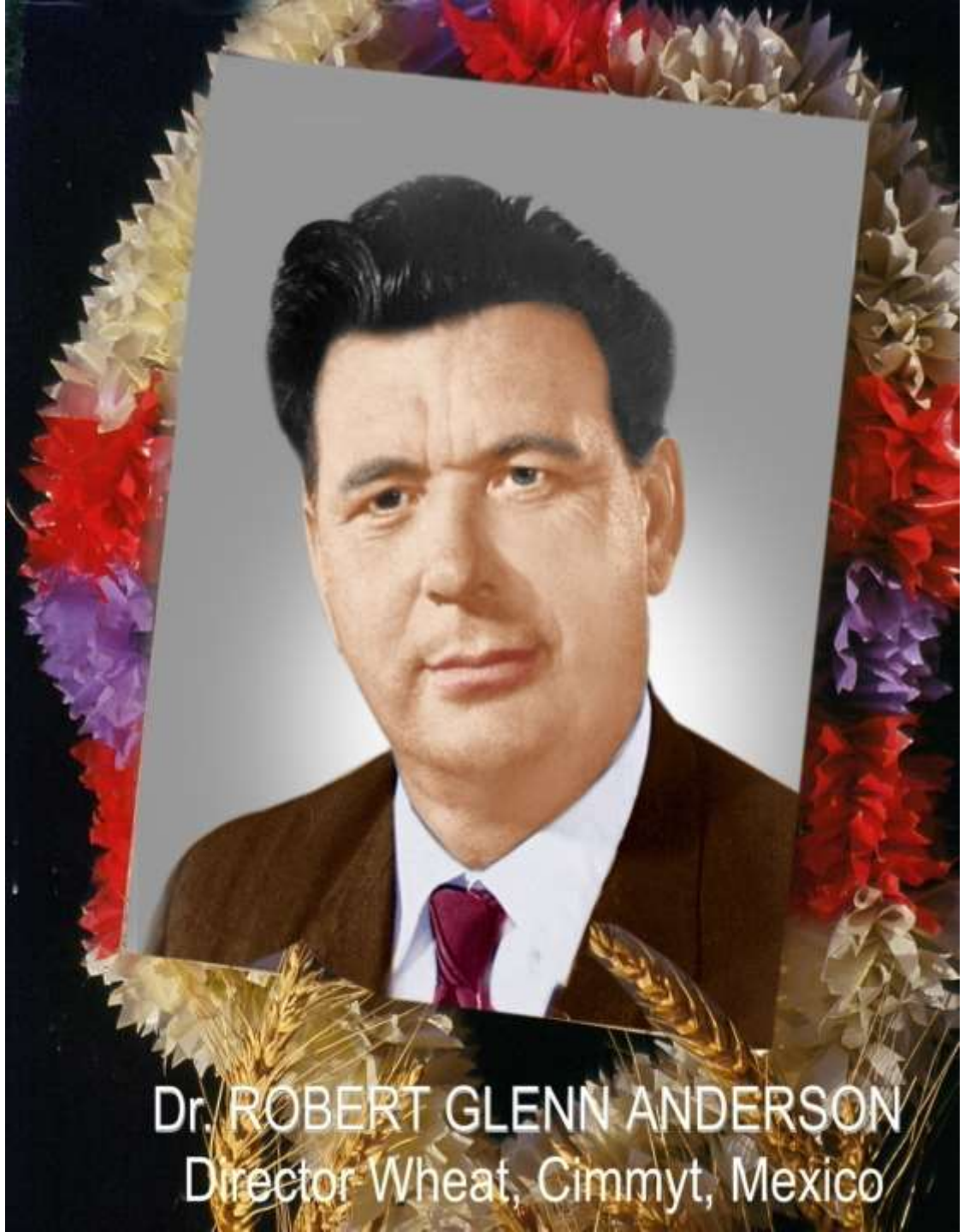
Prof (Dr). R.P. Singh

Former:

Executive Secretary, Indian Agricultural Universities Association(IAUA)

Director & Coordinator, PDCSR, ICAR, Meerut

Head, Div. of Agronomy, Indian Agricultural Research Institute (IARI), Pusa, New Delhi



He came to India in 1964 and remained till 1971. I pay my homage to my beloved Prof. whose untimely death at the age of 52 Years (08th Feb 1981) was a Great Loss to the World Wheat Research in particular and Agril. Scientific Community in General.

With **Agriculture** base

India was Golden Bird

History of Indian

"Green Revolution"

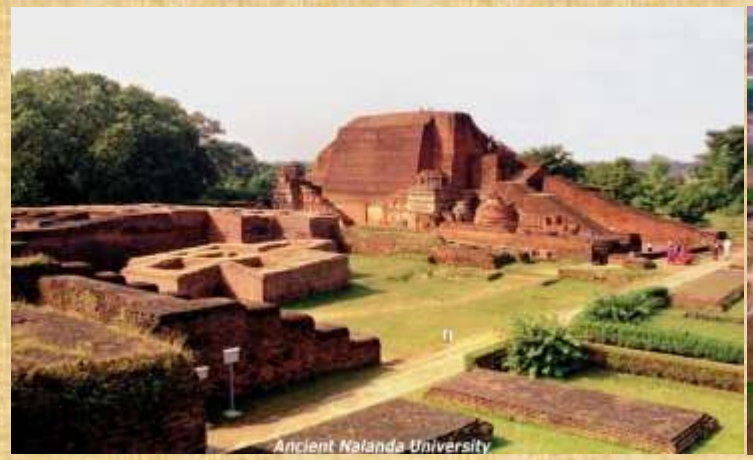
India: A Gene Rich Center

Source of Future Smart Food

Science must ensure judicious harnessing of this treasure, Know your treasure- Evaluation and Conservation through use

India's Golden Era
Our Glorious Past in Agricultural Education

Nalanda University



- Nalanda, Takshila, Vikramshila, Kashi were **centers of Knowledge** in Ancient time

Nalanda and Takshila Universities were among The Top Ranking Universities In the World like present day **Oxford and Harvard.**

- The famous treaties of **'Arthashastra** by **Kautilya** is said to be compiled in **Takshila University.**

Takshila University

Vikramshila University

In Nalanda and Takshila Universities,

Agriculture was included in curricula as one of the 18 arts

Earlier Situations:

1. **India was governed by :**
   Mughals for about 300 Years.
   British rule for about 200 Years

2. India in the Back drop of **Bengal famine during 1942**, when about **4 million died** without food.
3. **Increase in population** was one of the problem and then occasional **droughts, poor roads, electricity, irrigation system and inferastructur** all this was due to left being poor and lack of education and research.

PL-480

Dwight D. Eisenhower signed into law
the Agricultural Trade Development &
Assistance Act in 1954

Law known as PL-480

Food for Peace

Shipment of Surplus
commodities to friendly nations

McGovern as food for peace director
J.F. Kennedy appointed George

PL480 Scheme : ***(Ship to Mouth) India's Pride, Honor and Dignity was on stake***

Year 1959-60 : US Sanctioned - PL480 (Food was Stopped)

Padok Brothers US forecasted that India is a doomed country and 50% of the population will die in six months.

Year 1960-64

Norin-10 genes were evolved and used by **Japanese Scientist** in USA: Norin 10 genes were used in winter wheat to create **Dwarfwheat : Vogal.**

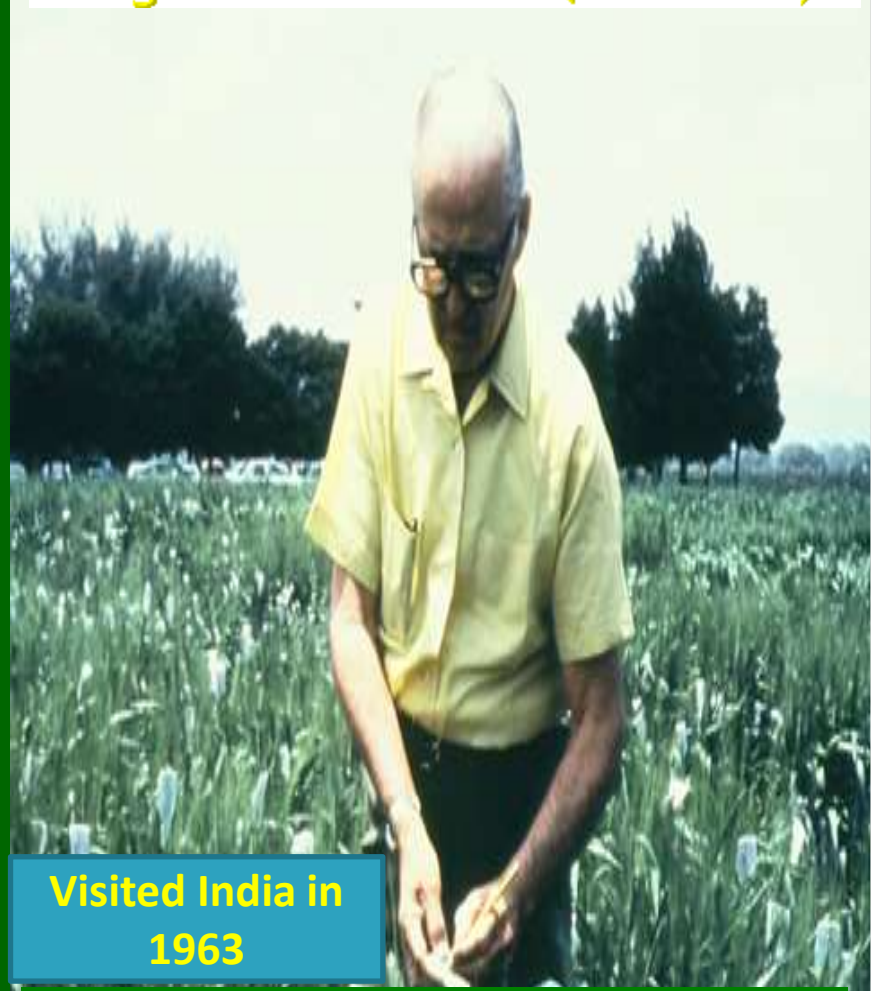
1963 Dr. N.E. Borlaug visited all wheat growing regions in India and

In 1963 he dispatched 100kg of seeds of four dwarf and semi-dwarf varieties i.e. Lerma Rojo, Sonora 63, Sonora 64 and Mayo 64 and

F-generation lines (631) of Dwarf combinations were received from Mexico to IARI, New Delhi, those were distributed to SAUs. ***First Time Trials Failed: due to following of tall Wheat Agronomy.***

R.P.Singh with Tall Wheats- 1965

Era of Scientific Research-Innovations & Development of Higher Education (1960-75)



Visited India in 1963

Dr. N.E. Borlaug

(1914-2009) about 95 yrs 5 Mth 17 Days

Dr. N.E Borlaug

Noble lecture

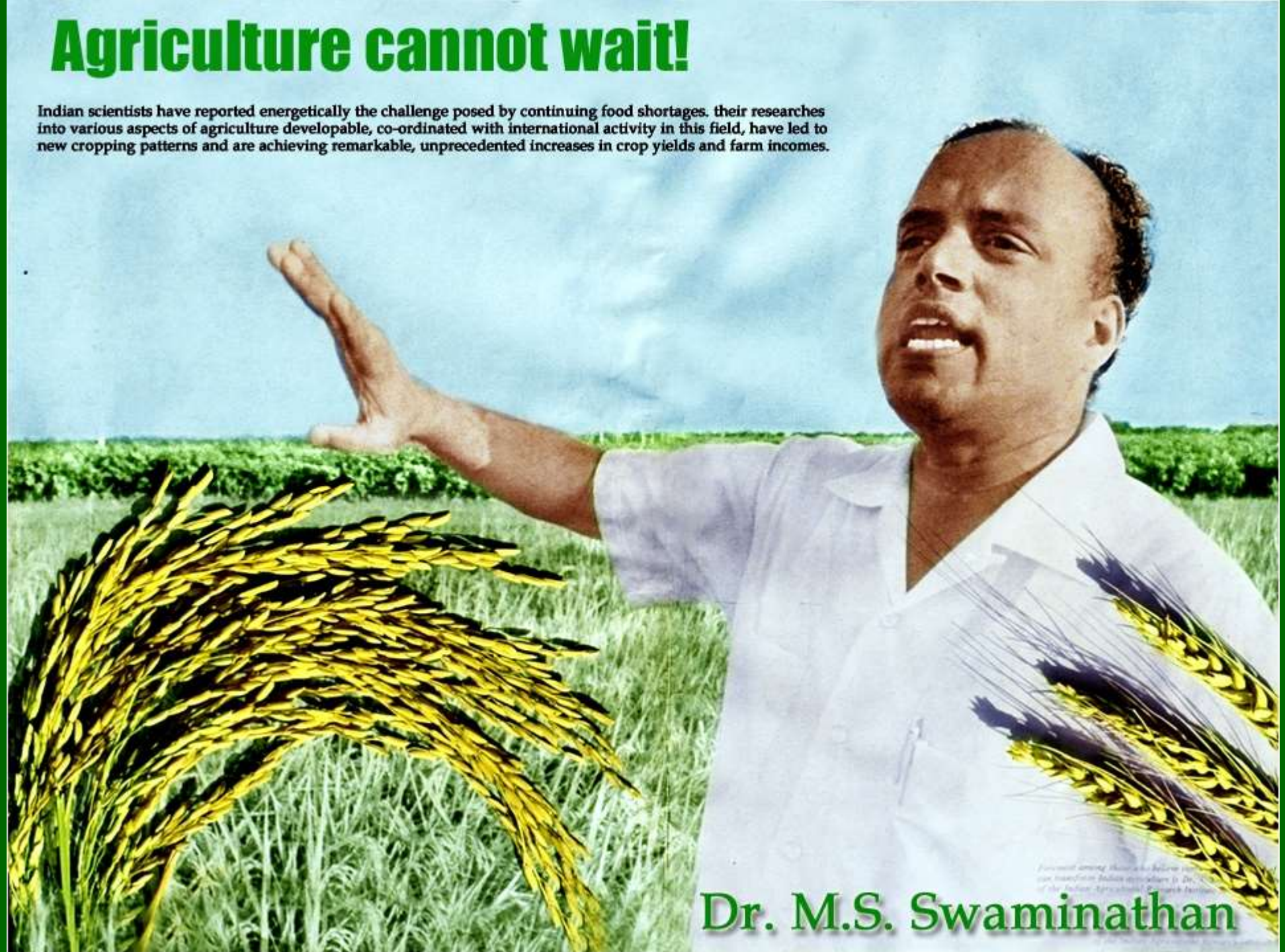
11th December,1970

The Green Revolution, Peace, and Humanity

The All-India Coordinated Wheat Improvement Program, which is largely responsible for the wheat revolution in India, has developed one of the most extensive and widely diversified wheat research programs in the world. Its success has generated confidence, a sense of purpose, and determination. The current agronomic research on wheat in India equals the best in the world. The breeding program is huge, diversified , and aggressive; already it has produces several varieties which surpass those originally introduced from Mexico in 1965.

Agriculture cannot wait!

Indian scientists have reported energetically the challenge posed by continuing food shortages. their researches into various aspects of agriculture developable, co-ordinated with international activity in this field, have led to new cropping patterns and are achieving remarkable, unprecedented increases in crop yields and farm incomes.



Dr. M.S. Swaminathan


R.P.SINGH WITH DWARF WHEAT, APRIL 1965

Year 1964-65

"National demonstrations" of wheat with improved Agronomy were conducted in farmers' fields in all the wheat growing zones with dwarf wheat yielded double production.

Year 1965-66 in India

Amber "Kalyan Sona" and **"Sonalika" dwarf wheats** were picked up from Mexican material and multiplied and given to SAUs and to farmers.

Year 1966-67

18,000 tons of wheat seeds of five Mexican varieties {**Sonora63, Sonora64, LermaRojo, Chottilerma (S331), Penjamo**} were brought to India and distributed to the Agriculture Universities and ICAR Institutes for conducting trials and **"National Demonstrations"** on farmers' fields.

Green Revolution Symphony (1968)

Major Components

- Technology
- Services
- Public Policies
- Farmers' enthusiasm

Indian farmers achieved as much progress in wheat production in four years (1964–68), as during the preceding 4000 years.

Scientific skill, Political will and Farmers' toil – major ingredients of the revolution

Wheat Production doubled from 9.8 to 18.6 million tones (during 1964-68)

INDIA

EARLY GAINS OF GREEN REVOLUTION

1963 --- Visit of Dr. N.E.Borlauge

1965 --- 250mt of Dwarf Wheat's imported from Mexico.

1966 --- 18000mt of Dwarf Wheat's imported from Mexico.

1969-70 Crop season 35% of 14mt ha in Mexican varieties

Increase in Indian Wheat Production(Million Tons)

1950-51	1964-65	1968	1969	1970
6.5	12.3	16.5	18.7	20.0
Increase (Times)	1.9	2.6	2.9	3.1

Farmers Net Income increased in U.S.$ / ha (1968-1970)

U.S.$ 37 → 162 (4.5 Times)

Added $ 1.4 million to GNP (Gross National Product)

Injunction to large increase in purchasing power of farmers with many effects

- **Irrigation Enlarged: Large No's of Tube-wells** shunked by farmers & expended irrigation area with improved irrigation control.(under ground water)
- **1969-70 crop season 1.4mt ha added to controlled irrigation.**

Fertilizer use increased:

Tall wheats 10Kg/ Kg N = 40 Kg N/ha applied
Dwarf wheats 25Kg/ Kg N = 120 Kg N/ha applied **Times 3**

Fertilizer production incresed :

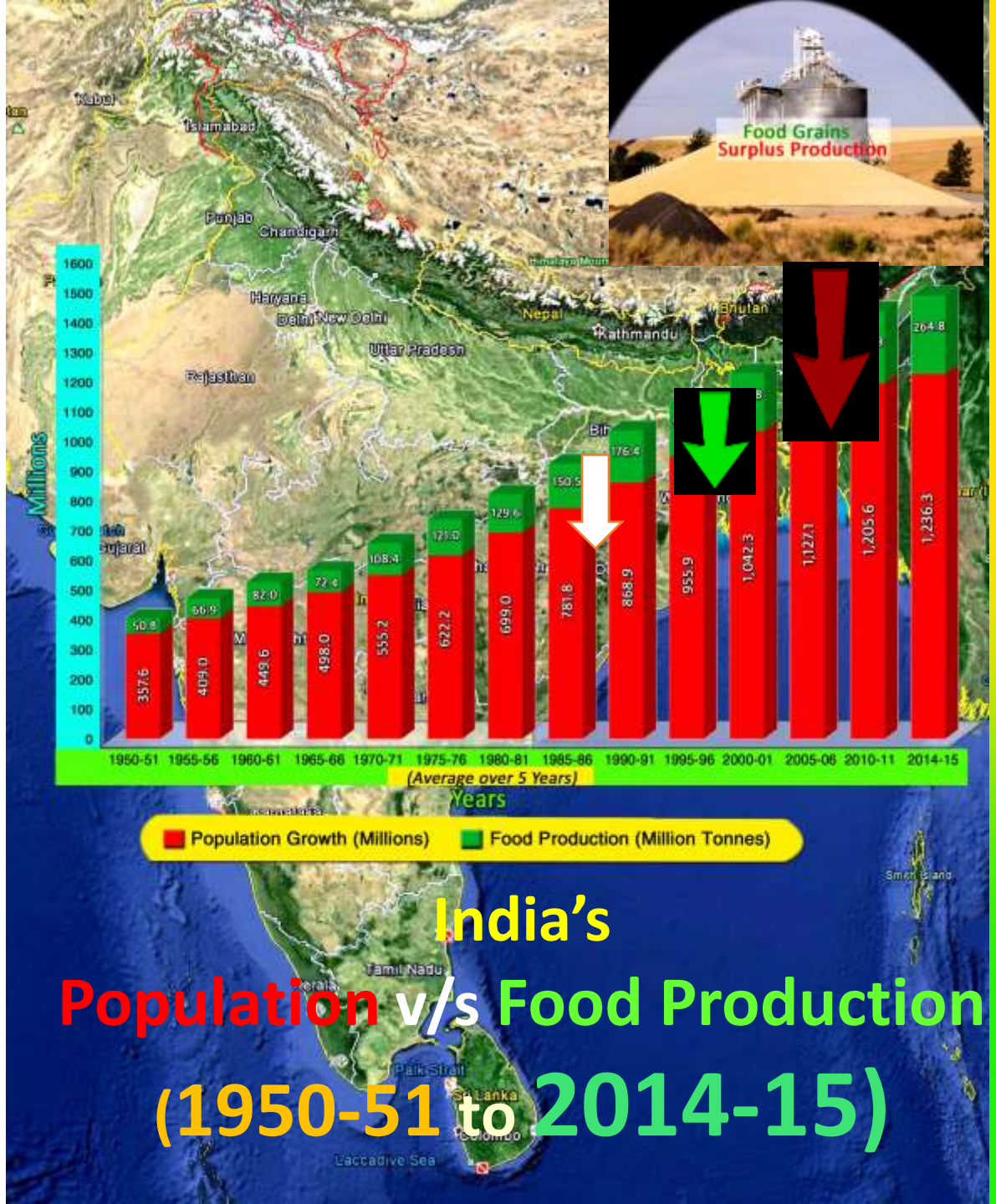
Production	1950-51	1964-65	1969-70
(mmt)	0.58	0.54	12.60
Times	-----	10	218

- **Mechanization increased: Bullock Drawn----- Tractor Drawn**
- **Threshing earlier by: Bullocks-----Tractor ----- Threshers ------ Combines**
- **Threshers 100 to 1000s threshers from local industry increased employment.**

)

RAPID GROWTH OF AGRO INDUSTRY-
FERTILIZER, PUMPS, MECHANICAL, & OTHER MATERIAL AND SERVICES

1. Farmers in many villages invested in better storage facilities.
2. There was rapid increase in demand for consumer goods.
3. The Purchase of intransistors and radios creased rapidly.
4. There by the government for the first time reached to remote villages for educational programs.
5. Sewing machsine, bicycles, motor scooters and motorcycles were coming to the villages and truck and bus services improving between villages.

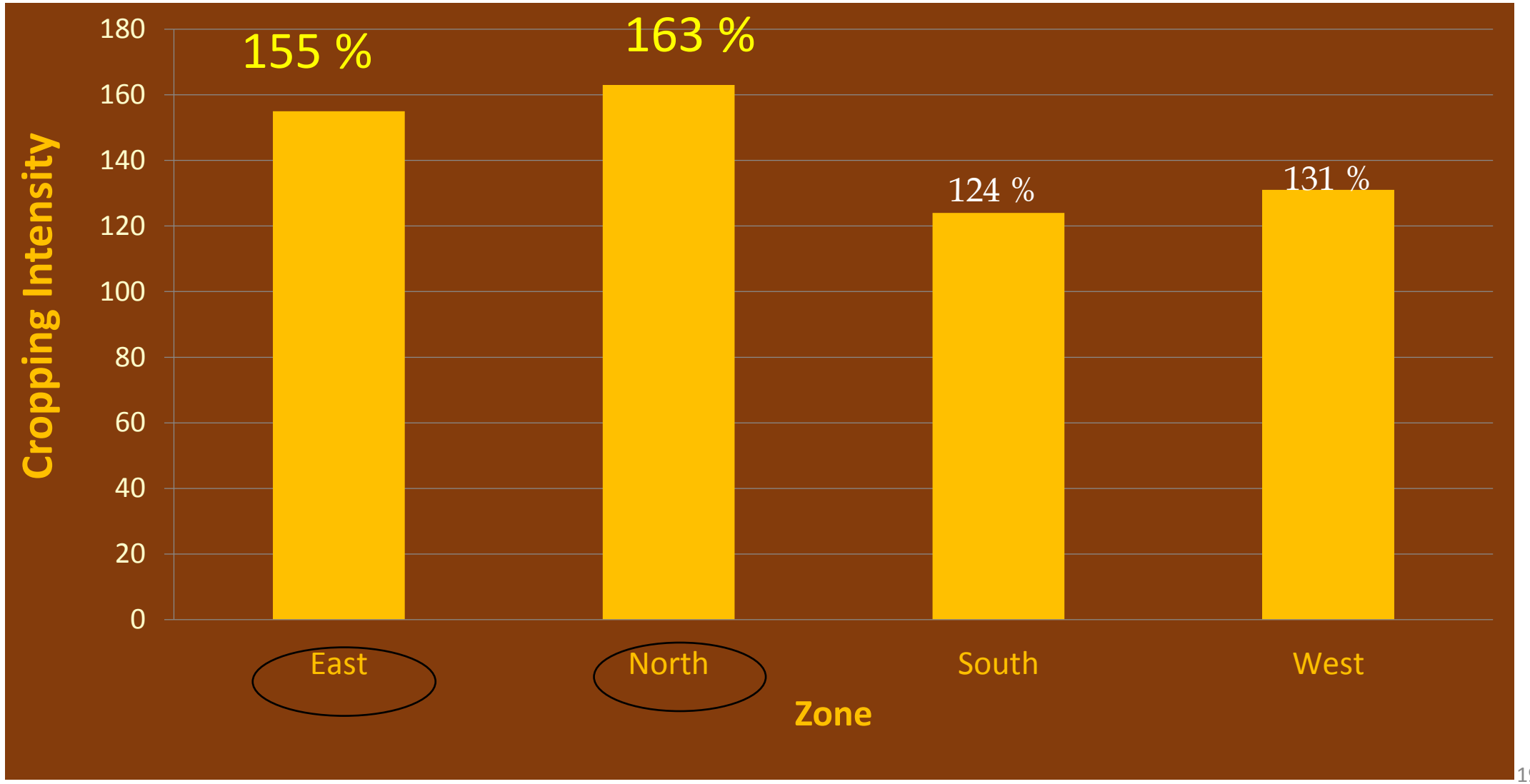


Food Production
1950-51
(51 million tones)
2017-18
(285 million)
6 times approx.

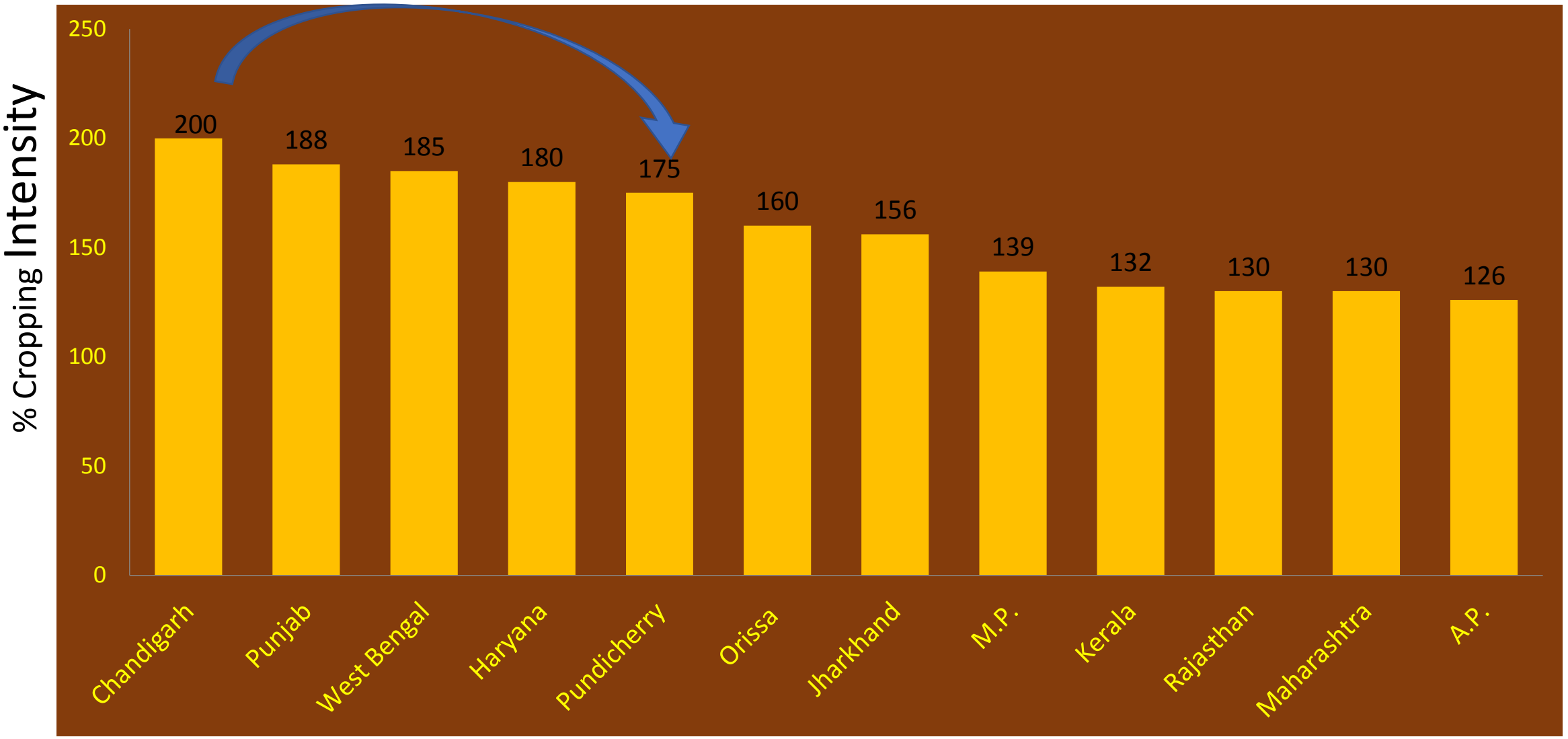
Indian Population
1950-51
(358 Million)

2018-19
(1350.44 Million)
4 times approx.

Zone-wise cropping intensity IN INDIA



State-wise Cropping Intensity/ highest in states



Increasing Cropping Intensity

1. **More Crops per unit area/ drop of water/ nutrients per kg:**

   * 2-3 Crops like Rice-Wheat-Moong Bean/Black Gram/Cow Pea/Green Manure/Fodder Crops

2. **Inter Cropping:**

   * Paddy + Soybean

   * Sugarcane + Mustard/ Wheat (both sown on one time)
     (Autumn)

   * Sugarcane + Urad/ Moong/ Cowpea
     (Autumn or Feb. Planting) (Feb. Planting)

3. **Agro forestry:**

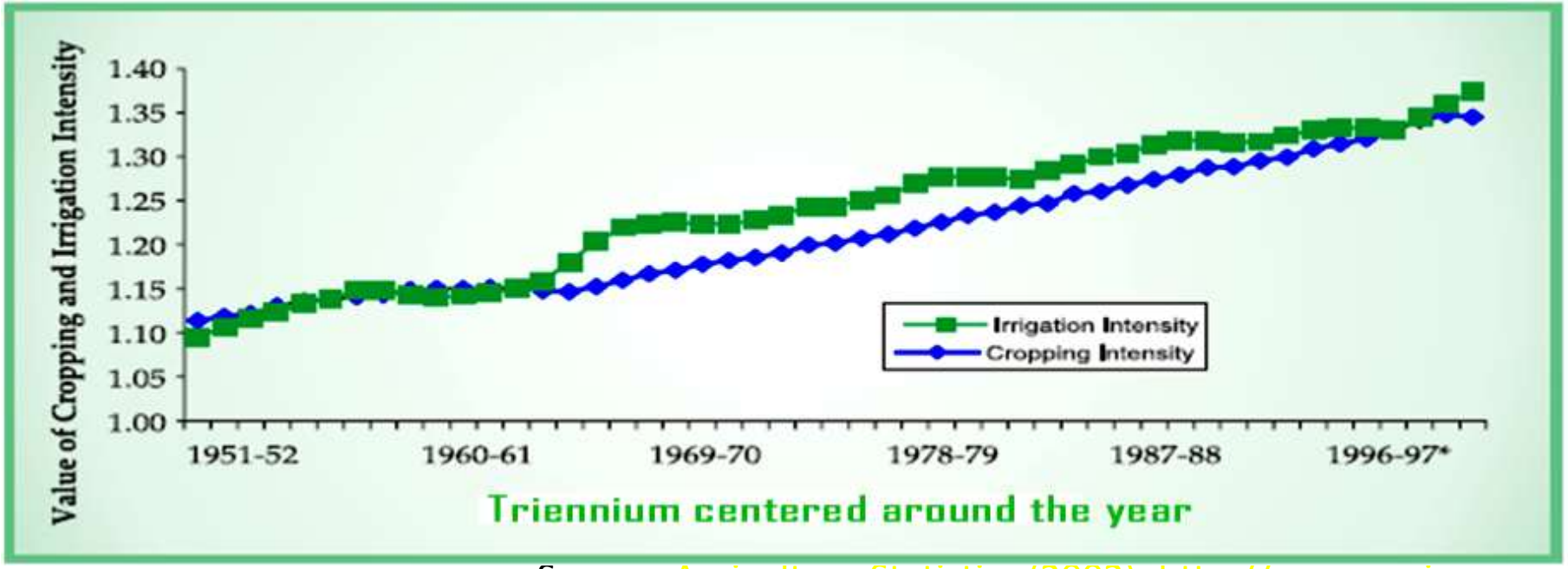
   * Eucalyptus/ Popular + Sugarcane (2 years)

   * Eucalyptus/ Popular + Ginger/ Turmeric/ Wheat/ Oats/ Berseem

4. **Multi – Storied Cropping (South India):**

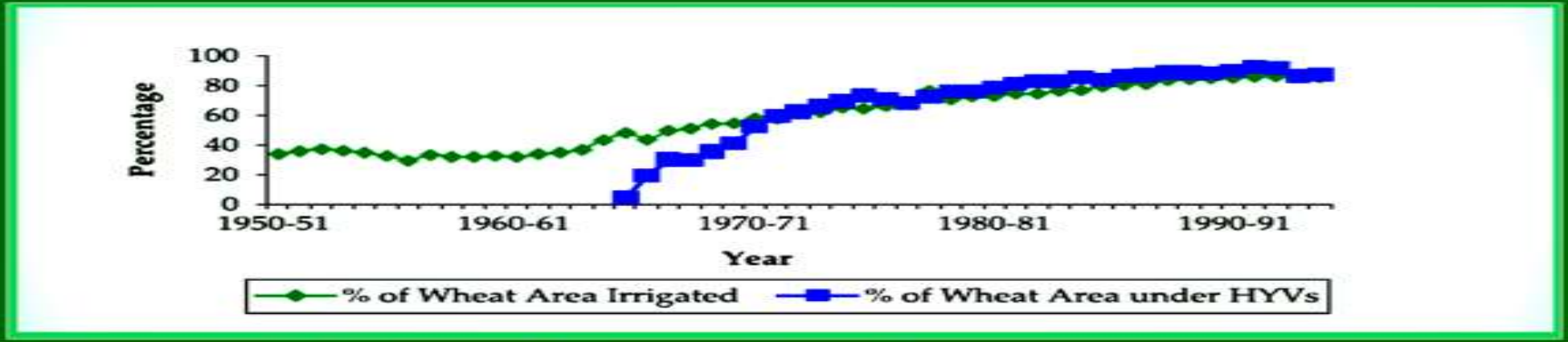
   * Coconut +offee + Black Pepper + Other Spices (Ginger + Turmeric)

Cropping and Irrigation Intensity (with use of Underground Water)



Source: Agriculture Statistics (2002); http://www.agricoop.com

Pattern of Growth of Irrigation and HYVs



Source: www.indiastat.com; Ministry of Agriculture (various years)

Impact of Drip Irrigation on Commonly Adopted Crops

Crops	Water Consumption (mm/ha)		Yield (tonnes/ha)		Water Savings (%)	Yield Increase (%)	Benefit-Cost Ratio	Increase in Water use Efficiency (%)
	FMI	DMI	FMI	DMI				
Grapes	532	278	26.4	32.50	48 III	23	2.32	136
Banana	1,760	970	57.5	87.50	45	52 II	3.02 II	176 III
Citrus	42	8	1.88	2.52	81 I	35 III	6.01 I	289 I
Pomegranate	1,440	785	55	109	45	98 I	4.40 III	167
Sugarcane	2,150	940	128	170	65 II	33	2.78	204 II

Source: INCID(1994)

Net Area Irrigated through Different Sources of Irrigation, India

Trien centred nium around the year	Canals	Tanks	Tubewells	Ground water*	Other Sources	Net Irrigated Area	Gross Irrigated Area
1951-52	8,613 (41.00)	3468 (16.51)	-	6,339 (30.17)	2,588 (12.32)	21,008 (100.00)	23,016 (100)
1961-62	10,568 (42.15)	4,651 (18.55)	431 (1.72)	7,430 (29.64)	2,420 (9.65)	25,070 (100.00)	28,631 (124)
1971-72	12,983 (41.22)	3,822 (12.13)	4,866 (15.45)	12,377 (39.30)	2,313 (7.34)	31,494 (100.00)	38,560 (168)
1981-82	15,808 (39.55)	3,165 (7.92)	10,212 (25.55)	18,593 (46.52)	2,406 (6.02)	39,971 (100.00)	51,006 (228)
1991-92	17,567 (35.57)	2,930 (5.93)	15,080 (30.53)	25,705 (52.04)	3,193 (6.46)	49,394 (100.00)	65,215 (283)
2000-01	16,049 (28.75)	2,476 (4.44)	22,318 (39.98)	34,397 (61.62)	2,901 (5.20)	55,823 (100.00)	76.240 (331)
2006-07 Times	16,869 **(27.08)** III	2,063 (3.31)	24,470 **(39.29)** II	36,824 **(59.12)** I	5,951 (9.55)	62,286 **(100.00)**	86.177 **(374)**

Source: www.agricoop.nic.in/statistics/sump2.htm

INDIA DRIES UP

India, the largest consumer of groundwater, has seen an alarming fall in water levels. On World Water Day today, a reality check

Source: TOI 21.03.2017

GETTYIMAGES

HOW STATES FARED IN LAST DECADE

Troubled waters

While UP saw a large number of wells dry up, those in TN & Assam saw rise in levels

80% of India's drinking water is provided by groundwater

65% is the dip in water levels in India's wells in the last decade

India has 14 principal aquifer systems and 42 major aquifers. Alluvium is an aquifer that covers 31% of the country and is predominant in UP, Bihar, West Bengal, Assam, Odisha and Rajasthan

Top states with highest proportion of wells with fall in water levels

States with highest proportion of wells with rise in water levels

Period: 2006-2015 Source: Central Ground Water Board report

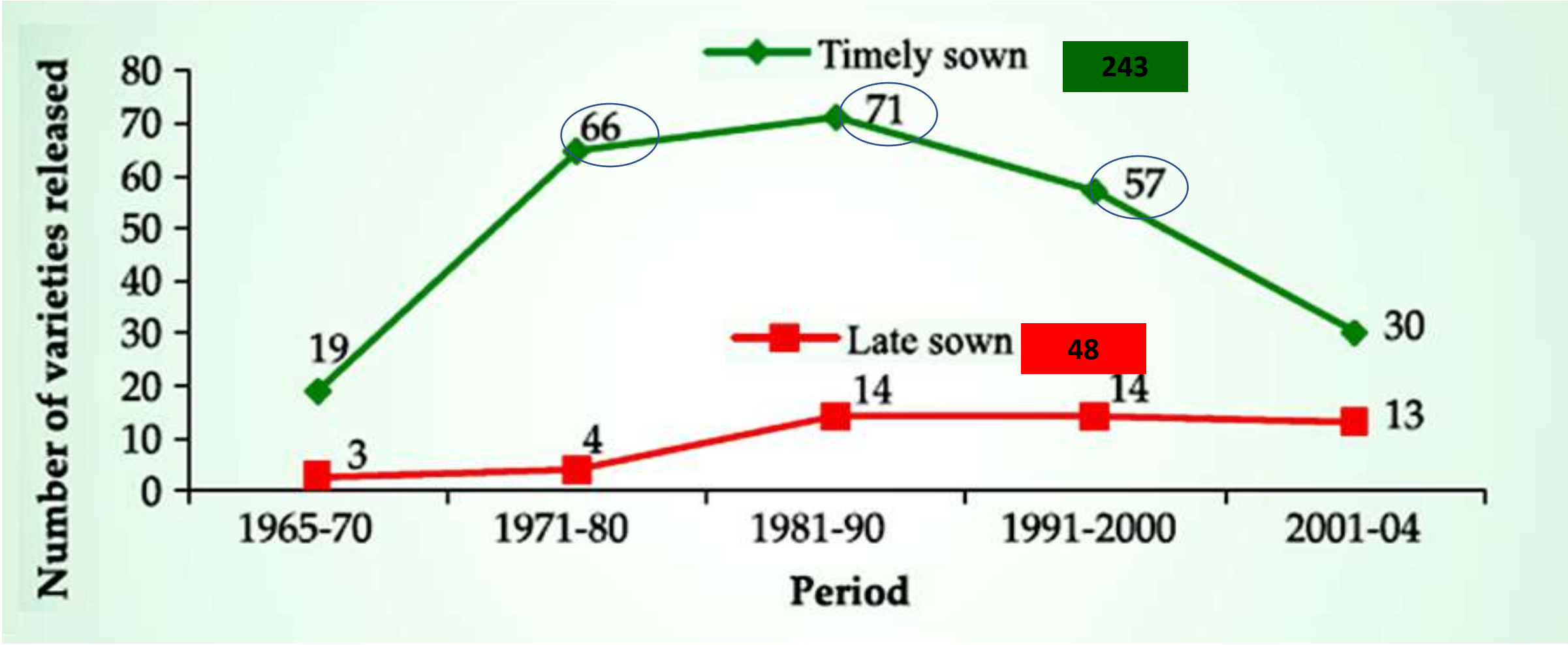
Groundwater abstraction trends from 1950 to 2010

DYNAMICS OF WHEAT IN NON-TRADITIONAL AREAS (RICE GROWING STAES) IN INDIA

	West Bengal		Assam		Orissa	
	64-65	78-79	71-72	84-85	71-72	84-85
AREA XI000 HACT.	40.8	13 521.0	40.0	2.5 99.2	20.9	3.8 77.0
PRODUCTION XI000 TONNES	27.8	35 998.0	48.0	2.6 127.9	38.7	3.7 150.0
YIELD Kg/HA.	681	1.5 1094	1200	= 1290	1852	= 1950

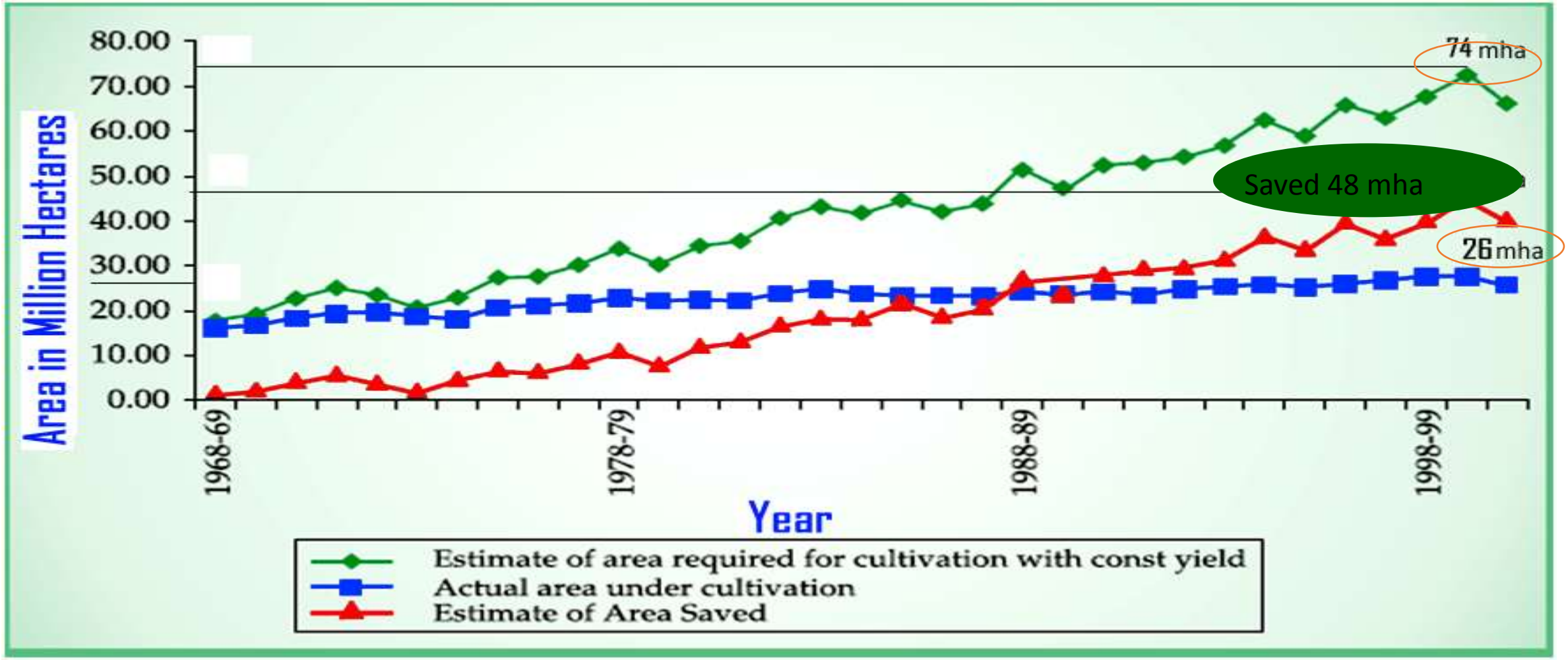
SOURCE: Area and Production Principal Crop in India, Directorate of Eco. And Stat. Dept. Of Agric and Cooperation, Ministry of Agriculture, Government of India

Wheat Varieties Released for Difference Production Conditions (263 T.S. + 48 L.S.=311)



Source: DWR (2005)

Estimate of Area saved due to High Yields in *Wheat*



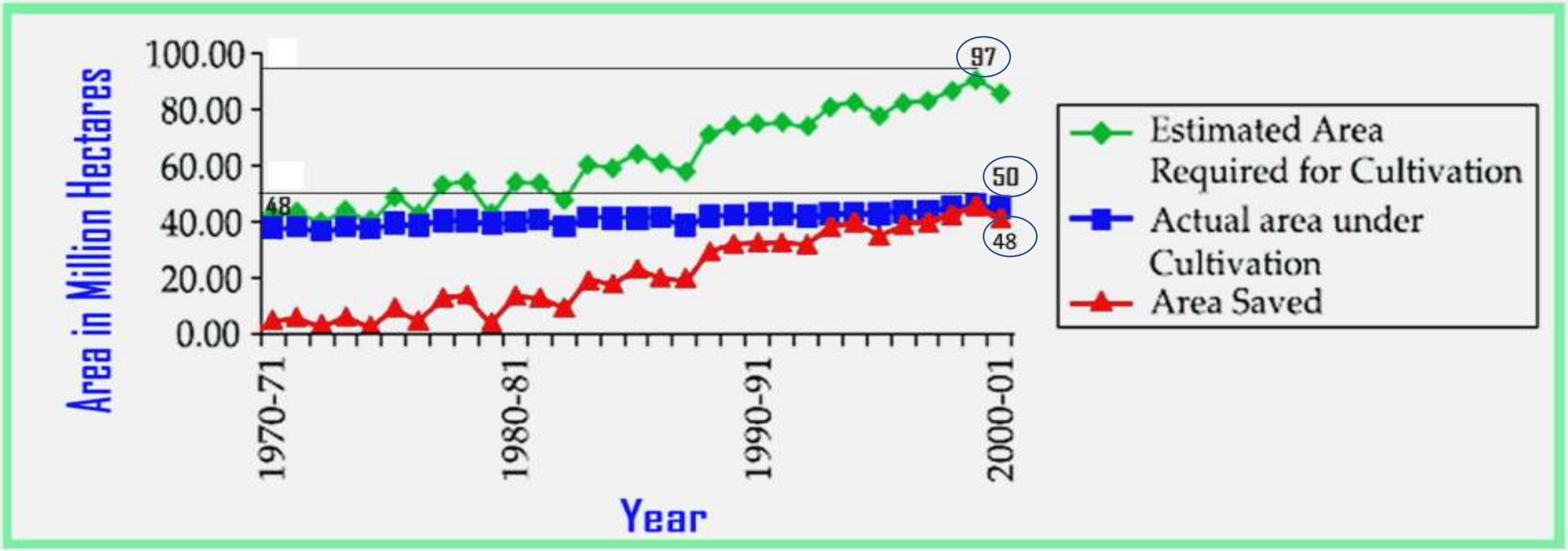
Source: Ministry of Agriculture (various years)

DYNAMICS OF RICE IN TRADITIONAL STATES OF WHEAT ZONE

	Punjab		Haryana		Rajasthan		Delhi		Uttar Pradesh	
	71-72	84-85	71-72	84-85	71-72	84-85	71-72	84-85	71-72	84-85
AREA XI000 HACT.	450.0	3.6 1645.0	291.0	2 557.0	133.4	1.3 169.9	2.6	1.3 3.4	4722.2	= 5535.5
PRODUCTION XI000 TONNES	920.0	5.5 5057.0	536.0	2.5 1363.0	159.4	1.3 212.8	2.4	2.5 6.2	3776.5	2 7178.5
YIELD KG/HA.	2044	1.5 3074	1842	1.6 2447	1195	= 1253	923	2 1824	800	1.5 1297

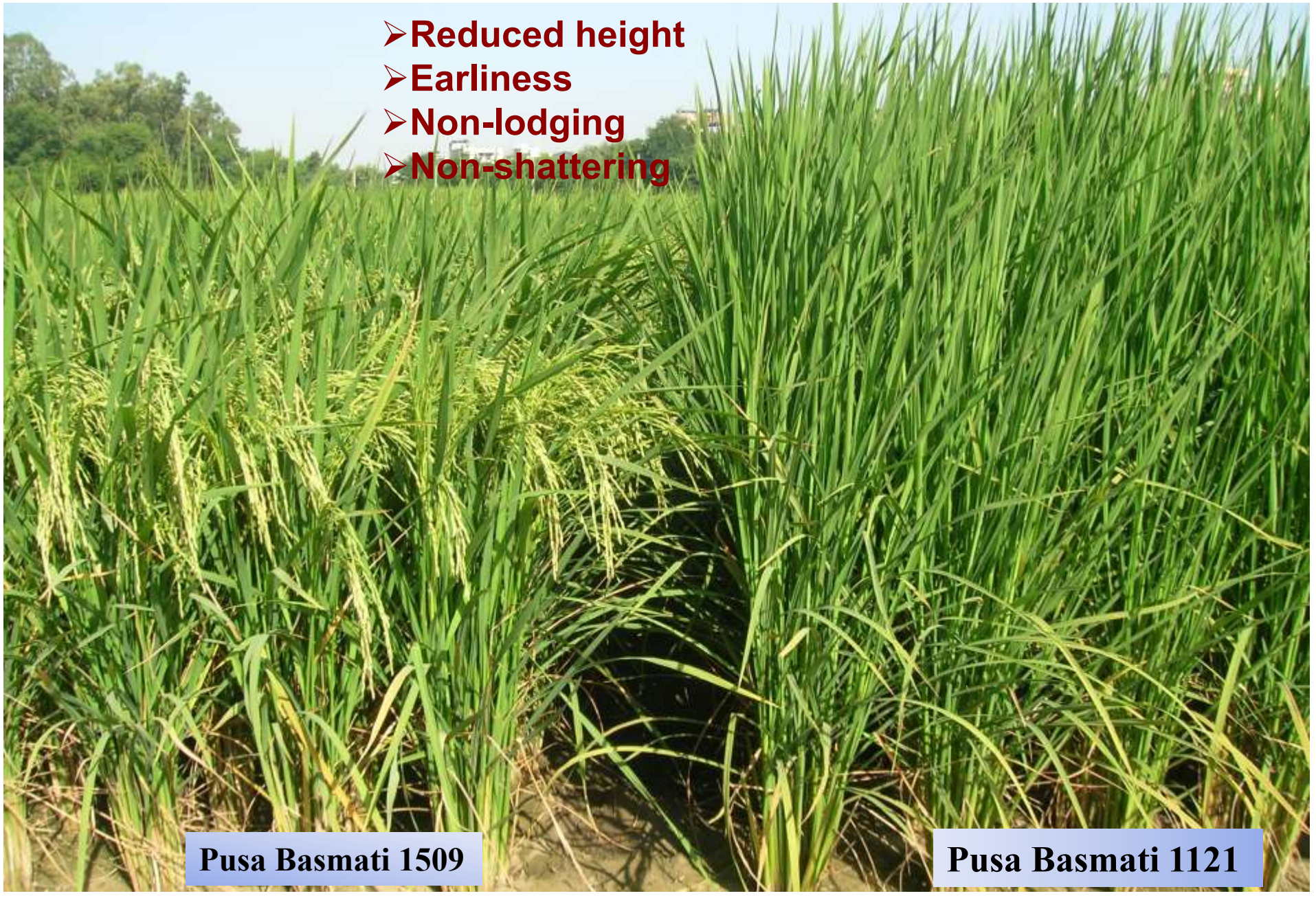
SOURCE: Area and Production Principal Crop in India, Directorate of Eco. And Stat. Of Agri. And Cooperation, Ministry of Agriculture, Government of India

Estimate of Area Saved Due to High Yields in *Rice*

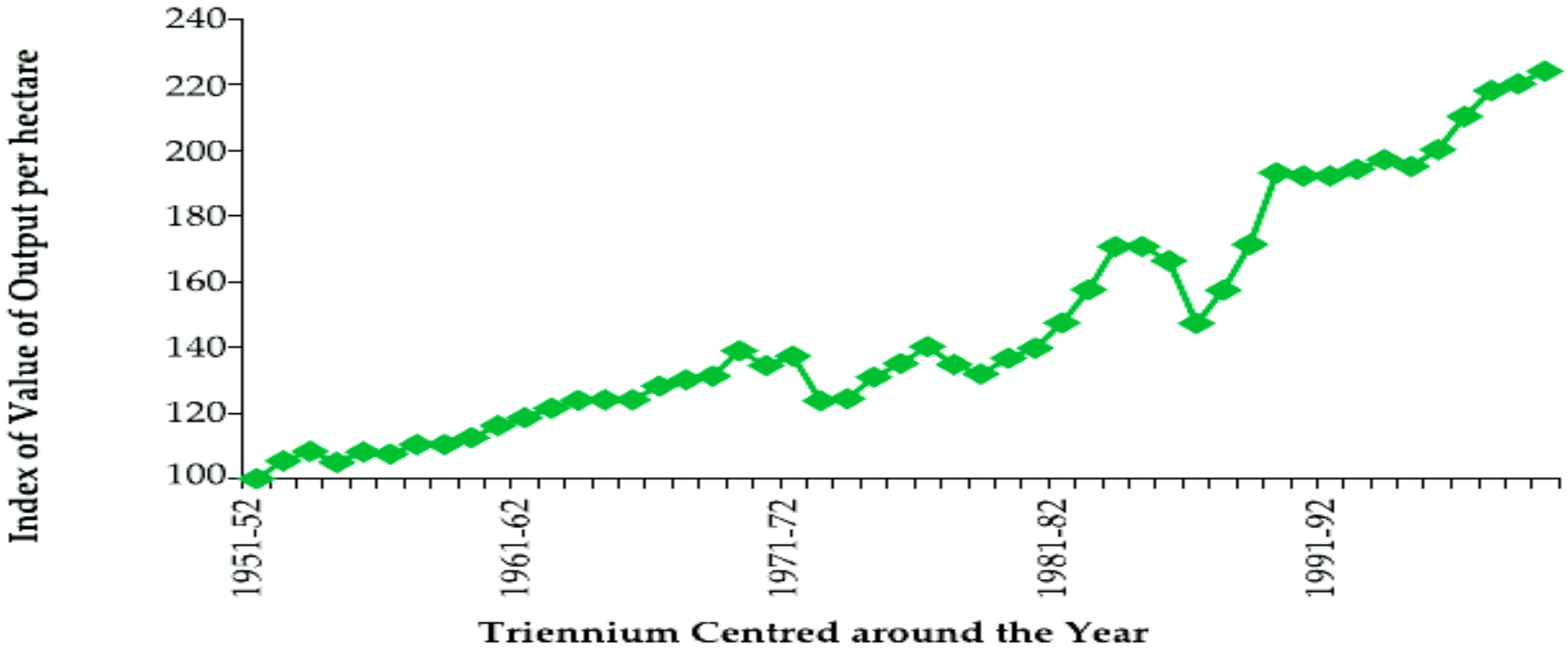


Source: **Ministry of Agriculture (various years)**

Pusa Basmati 1509, 6 billion $ annual Basmati export

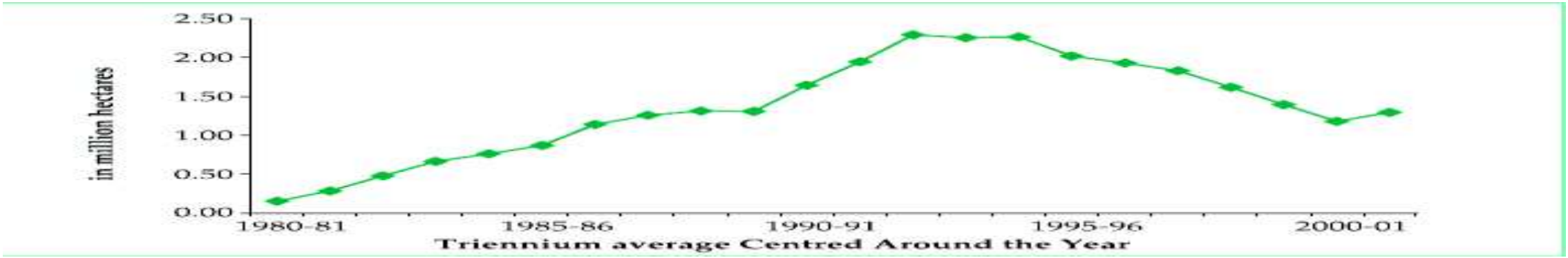


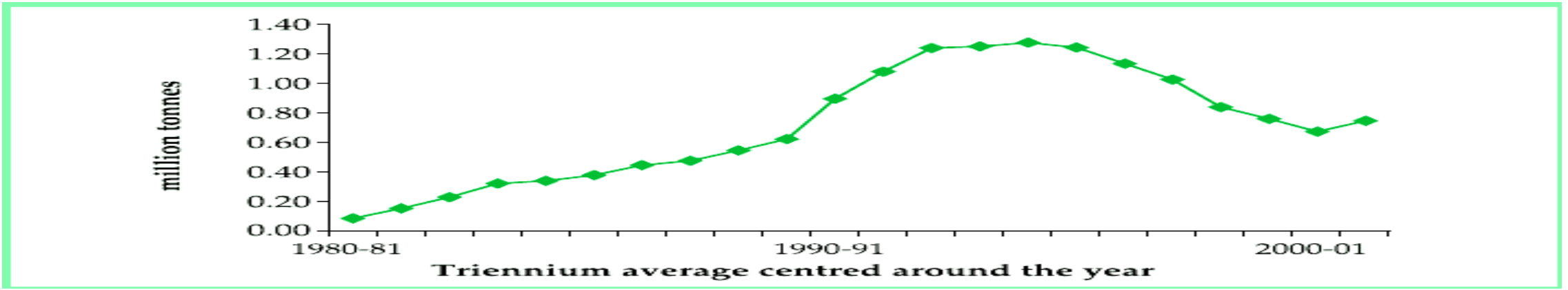
Technology Achievement Index- *Maize*

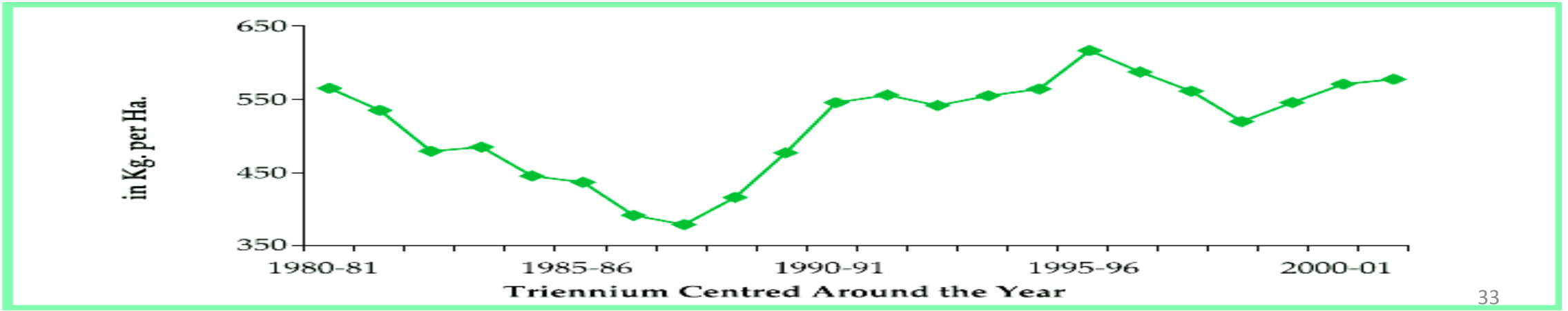


Source: EPW Foundation (2004); Ministry of Agriculture (various years)

Area, Production and Per Hectare yield of *Sunflower*







Source: Ministry of Agriculture (various years)

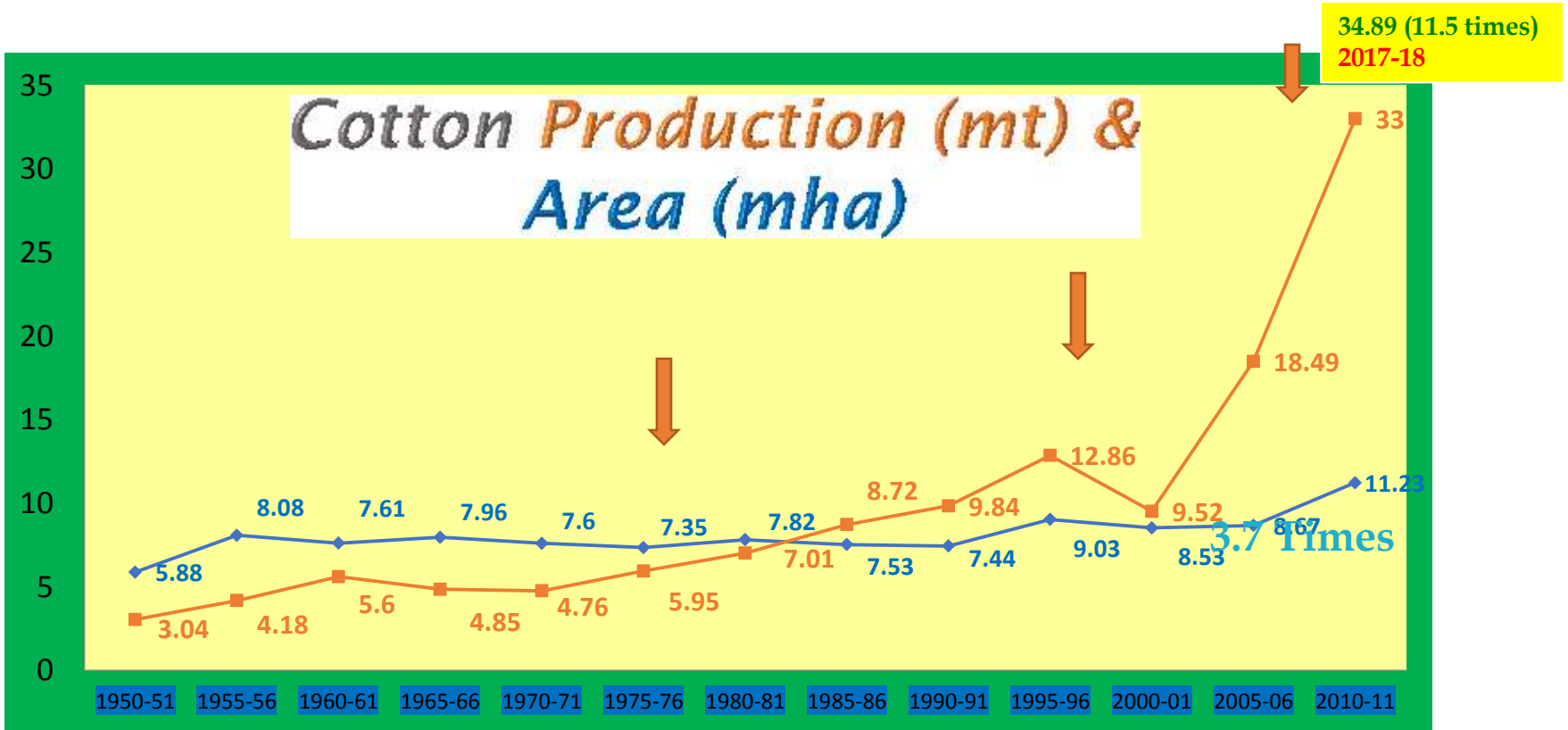
Area, Production and Yield of *Sorghum* in India

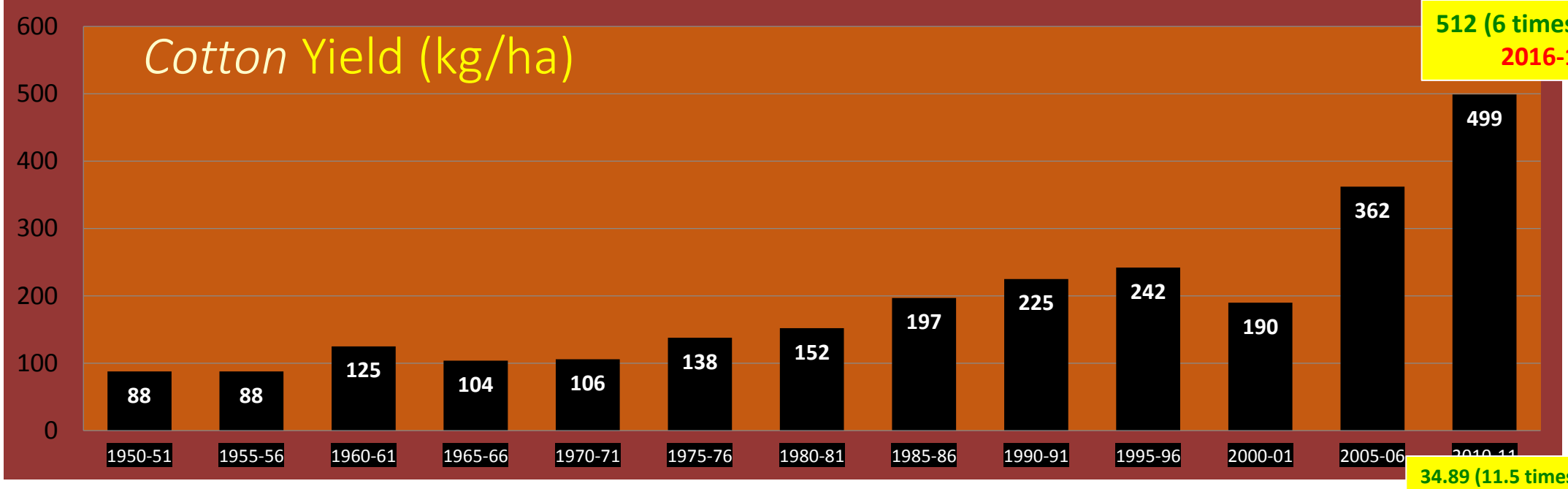
Triennium Average centred around the year	Area (million ha)	Production (million tonnes)	Yield (kg per ha)
1951-52	17.08	7.17	420
1961-62	18.36	9.20	501
1971-72	16.55	7.60	459
1981-82	16.26	11.08	681
1991-92	13.25	10.86	820
2001-02	9.62	7.39	768
	-56%	=	+54%

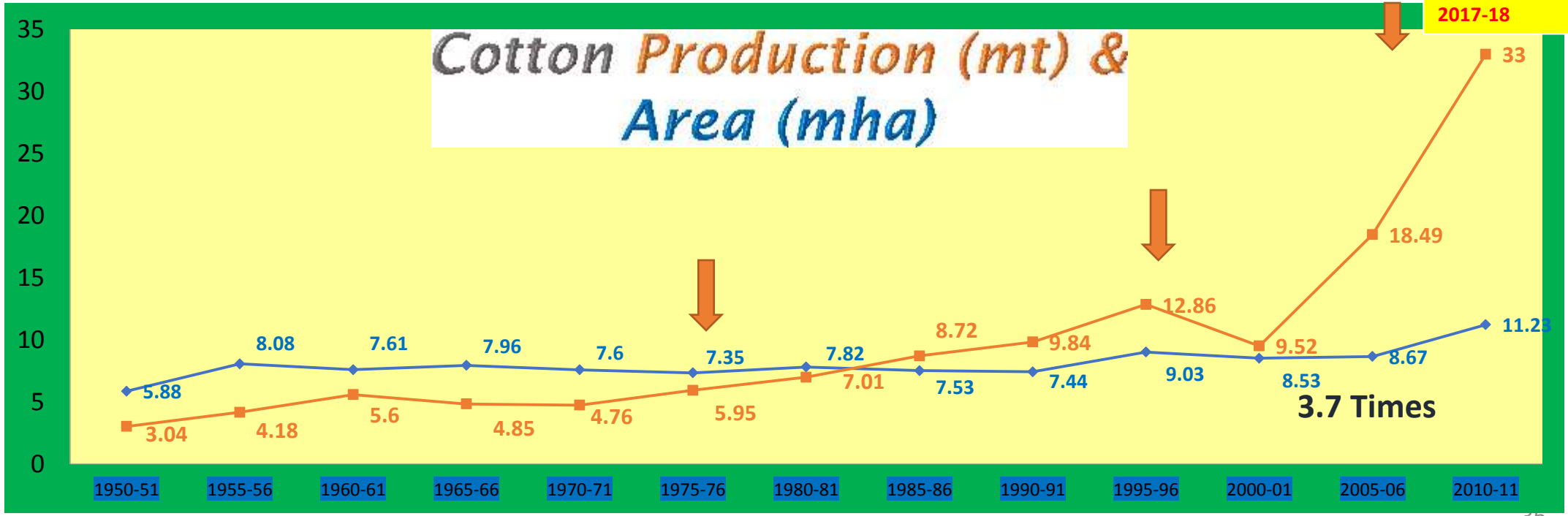
Source: Ministry of Agriculture (various years)

Bt Hybrid Cotton Revolution

- Over 11 million ha of 12 million ha, 92% , under Bt hybrids
- 7million of 8 million farmers opted Bt cotton, mostly smallholders
- Seven fold reduction in pesticide use
- Net income of Bt cotton farmers doubled, additional income of Rs.15000 / ha
- 31 billion bales cotton lint produced, ranking first in the world
- 9-10 million bales exported each year, valued $ 3 billion
- Millions of additional jobs created







Source: Fertilizer Statistics, FAI, New Delhi 2017-18

Contribution of Horticulture

Fruits
(Tropical, Sub tropical and Temperate)

Plantation Crops

Vegetables

(Potato/ Tubers/ Mushroom)

HORTICULTURE

Medicinal & Aromatic Plants

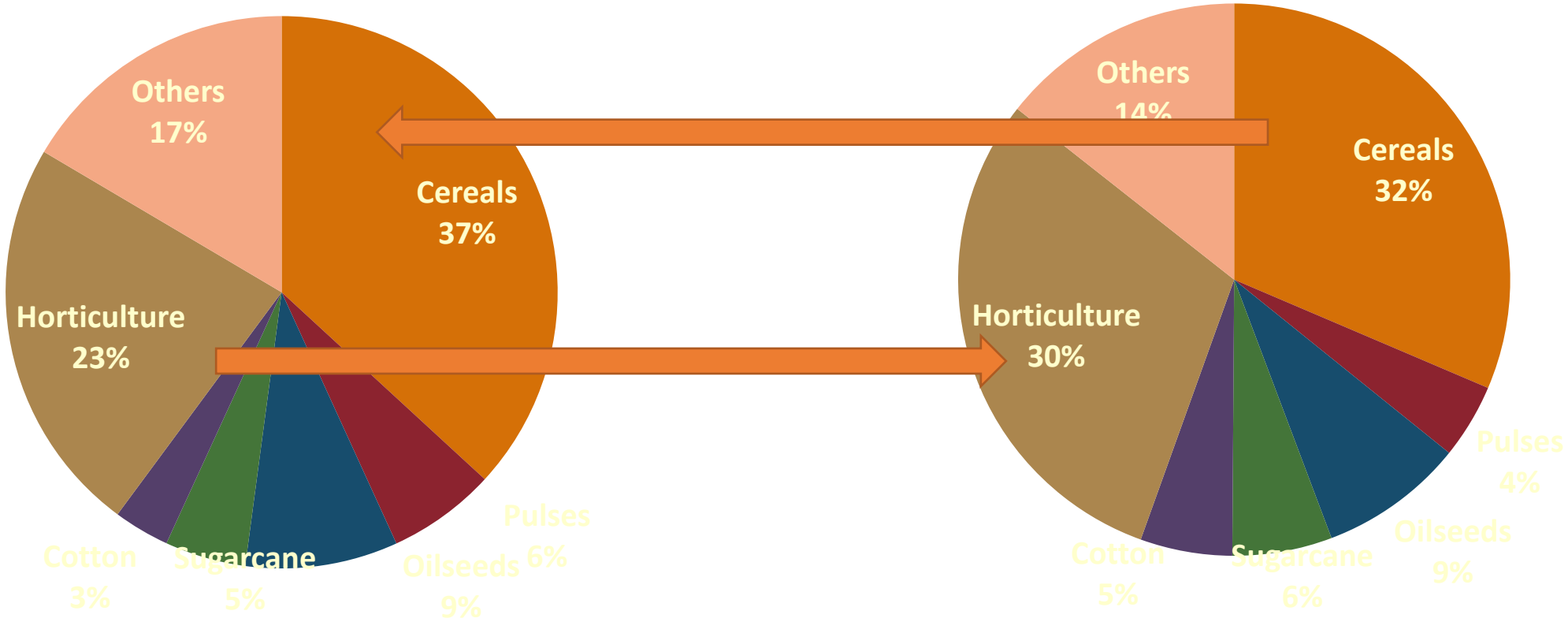
Spices
(Tree and Seed spices)

Flowers

How role of Horticulture has changed ?

CONTRIBUTION OF CROP 'S GROUPS IN PRODUCTION (VALUE)

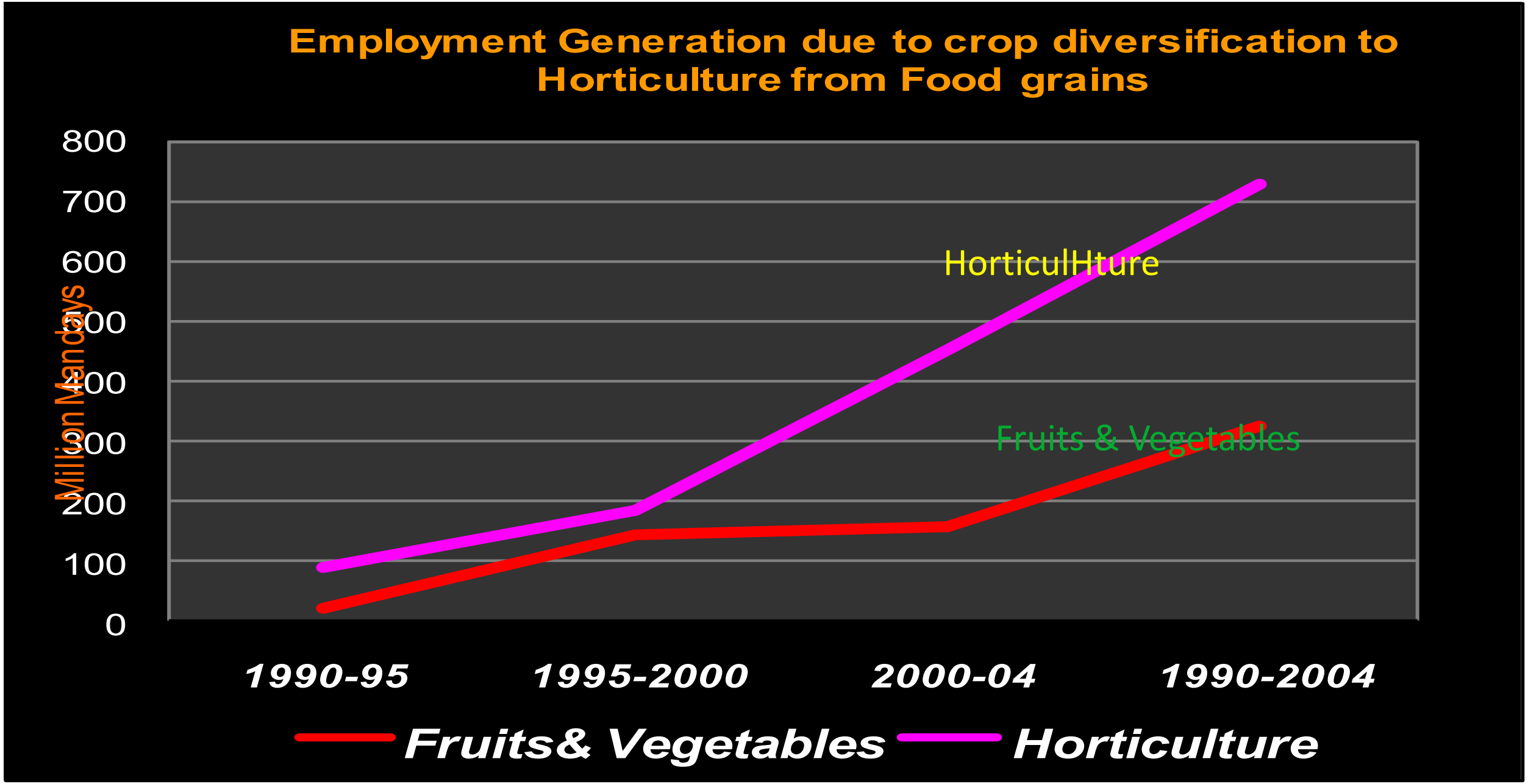
After 17 Years



6% area contribute 23.4 % Value

9% area contribute 30.4 % Value at constant prices and 30.73 at current prices

Employment Generation due to crop diversification to Horticulture from Food grains



Technologies that Transformed Horticulture

- Plant architecture engineering and its manaement .
- Reduction of production losses through efficient management of pests and diseases.
- Post harvest management to reduce post harvest losses.
- On farm processing, value addition and waste utilization




HIGH DENSITY PLANTING

Banana

Pineapple

Papaya

Area, Production and Yield of *Potato* in India

Triennium Average centred around the year	Area (million ha)		Production (million tonnes)		Yield (kg per ha)	
1951-52	0.25	(100)	1.79	(100)	7,147	(100)
1961-62	0.39	(155)	2.85	(159)	7,362	(103)
1971-72	0.49	(197)	4.70	(262)	9,520	(133)
1981-82	0.74	(297)	9.85	(550)	13,247	(185)
1991-92	1.01	(403)	15.61	(872)	15,507	(217)
2001-02	1.26	(503)	23.19	(1296)	18,454	(258)
2010-11	1.86	(744)	42.33	(2364)	22,700	(317)
2012-13	1.99	(796)	45.34	(2532)	22,800	(319)
2016-17	2.16	(864)	46.55	(2600)	22,306	(312)
Times	(8.5)		(26)		(3)	

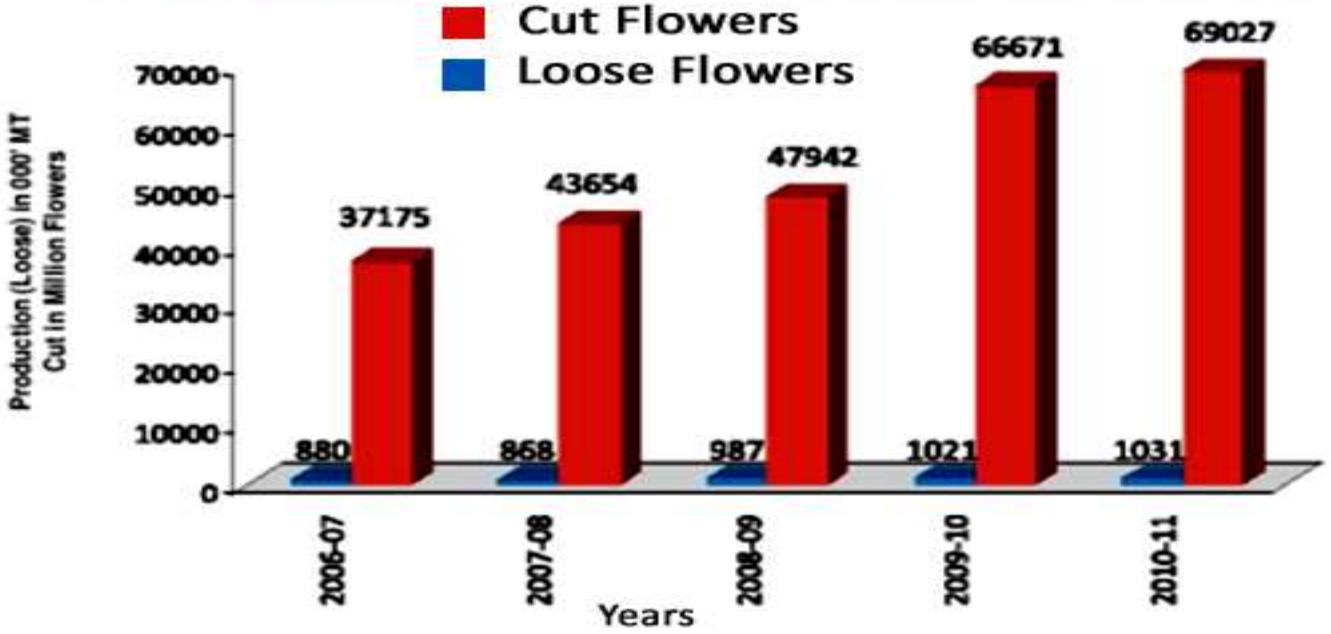
Source: Ministry of Agriculture (various years)
F.S 2016-17, FAI

FLORICULTURE

ALL INDIA AREA AND PRODUCTION OF FLOWERS

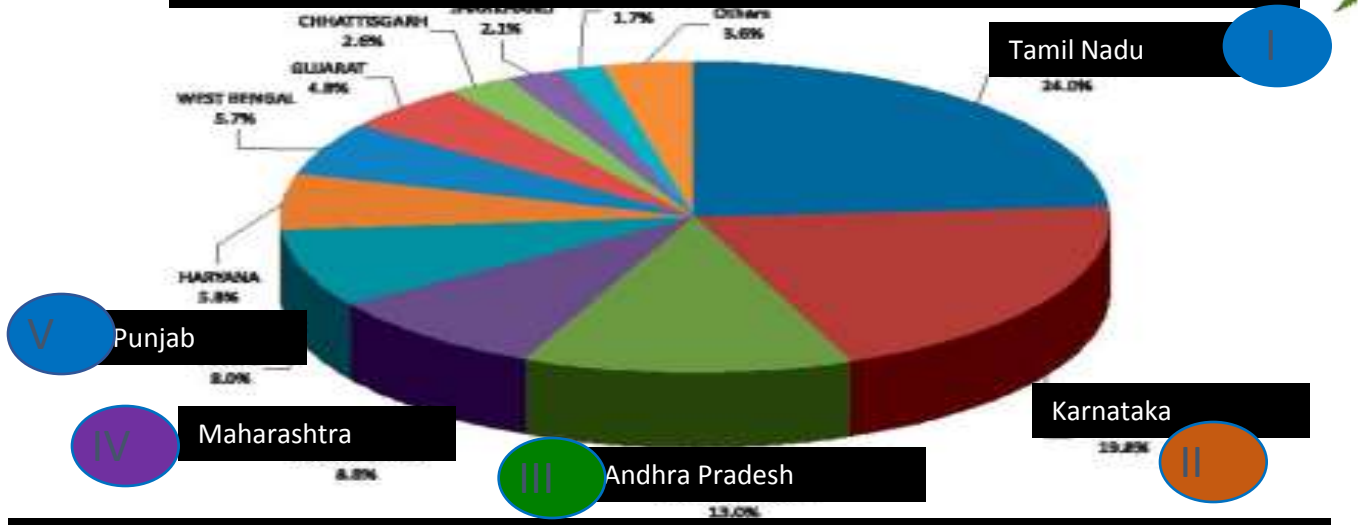
YEAR	AREA (IN 000' HA)	PRODUCTION	
		LOOSE (IN 000' MT)	CUT (Million Flowers)
2006-07	144	880	37175
2007-08	166	868	43654
2008-09	167	987	47942
2009-10	183	1021	66671
2010-11	191	1031	69027

PRODUCTION TREND OF FLOWERS IN INDIA

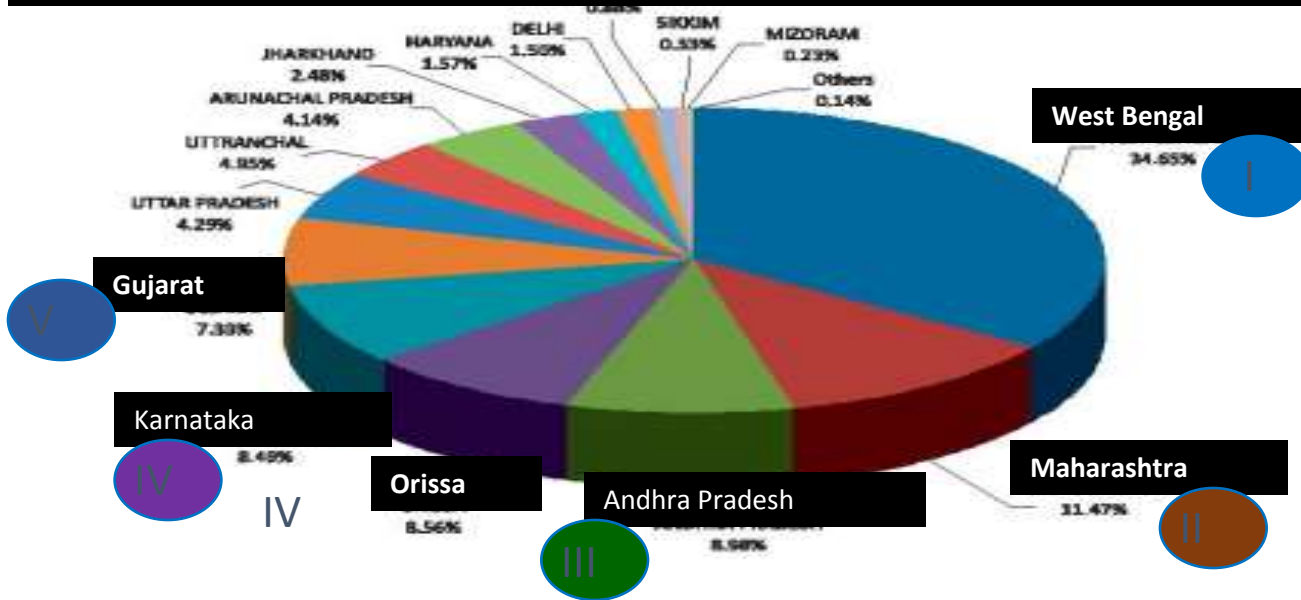


In Indian States

Major Loose Flower Producing States



Major Cut Flower Producing States (2010-11)



Export from India

EXPORT OF FLOWERS FROM INDIA

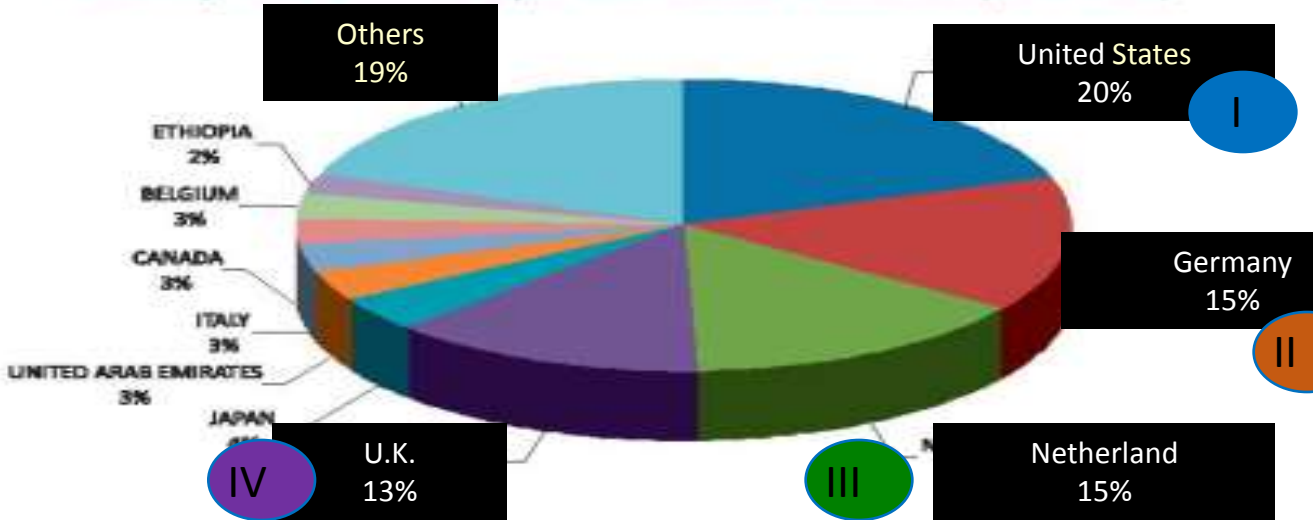
Qty In:Mt
Value in Lakhs

Product : Flowers

Country	2008-2009		2009-2010		2010-2011	
	Qty	Value	Qty	Value	Qty	Value
UNITED STATES	7,111.5	7,213.5	5,871.1	5,305.6	7,153.9	5,686.5
GERMANY	3,589.8	3,966.3	3,688.2	4,065.0	4,511.6	4,280.6
NETHERLAND	4,640.2	5,987.2	3,146.8	4,217.9	2,989.5	4,162.0
UNITED KINGDOM	4,369.7	4,284.5	3,707.3	3,788.3	4,116.0	3,761.8
JAPAN	965.3	1,791.0	970.9	1,558.7	576.7	1,151.9
UNITED ARAB EMIRATES	762.7	991.8	971.7	1,071.1	812.8	959.1
ITALY	1,268.3	1,373.3	1,453.7	814.4	1,234.0	856.8
CANADA	782.4	1,135.3	534.1	769.0	532.8	798.4
BELGIUM	1,084.3	845.5	470.2	484.1	762.0	774.3
ETHIOPIA	99.0	1,657.0	706.2	1,746.7	69.1	633.5
Others	6,125.4	7,636.0	5,294.4	5,625.6	5,017.8	5,580.5
Total	**30,798.3**	**36,881.4**	**26,814.5**	**29,446.4**	**27,776.2**	**28,645.4**

Source: Apeda Website February 2012

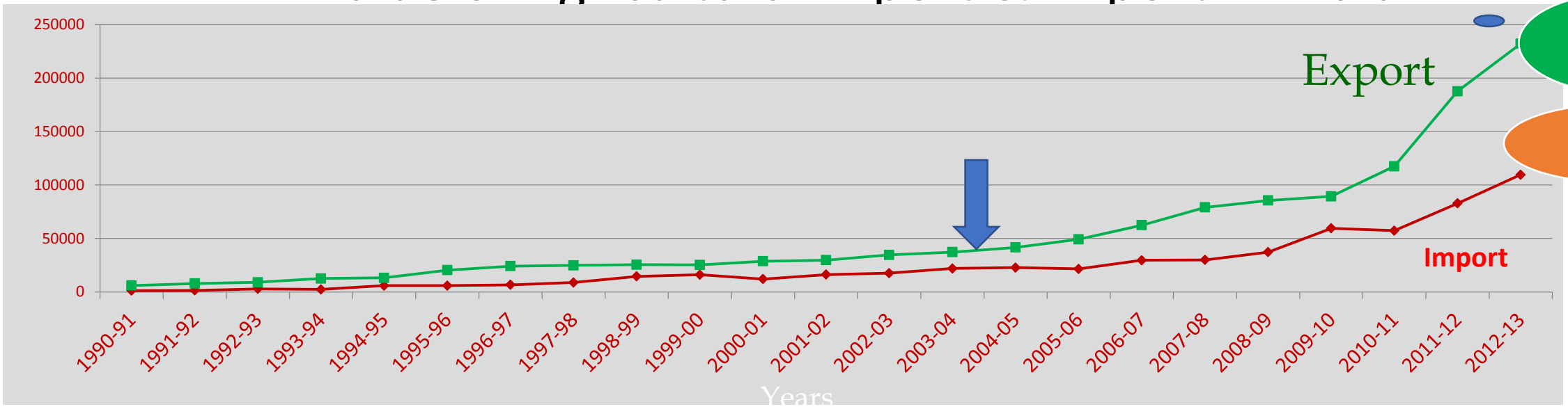
Country-Wise share of Exports of Flowers from India (2010-2011)

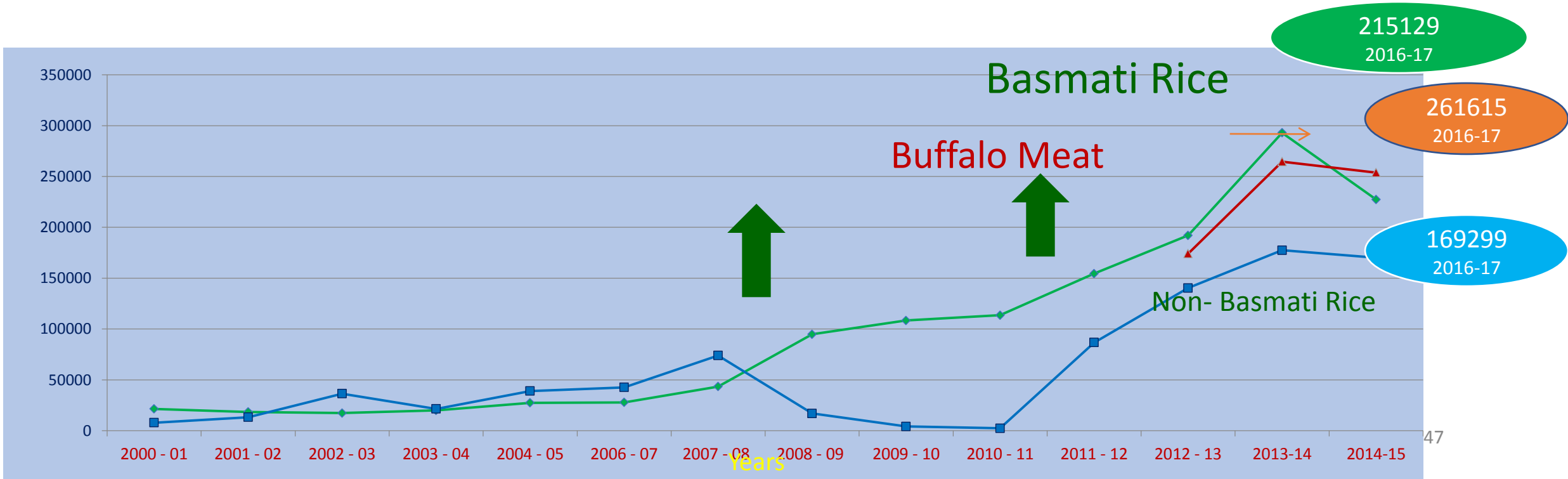


AGRICULTURAL DEVELOPMENT INDIA

COMMODITIES	YEAR 1950-51 (MMT)		YEAR 2017-18 (MMT)	TIMES INCREASE
CROPS				
Rice	20.6		112	5.48
Wheat	6.5		99.7	15.42
Maize	1.8		28.8	16.61
Cereals	42.4		259	6.12
All Food Grains	50.8		285	5.60
HORTICULTURE	13(1991)		269	21**
LIVESTOCK				
Milk	17.0		166	9.76
Meat	0.8		7.4	9.25
Poultry	----		73	47*
FISHERIES			(2012-13)	
Marine	0.53	0.75	3.2 9.5	12***
Inland	0.22		6.3	

Value of Agricultural Export & Import in India





Production of Food grains and Major Non-Food Crops,:in India

Triennium centred around the year	Total Cereals	Total Pulses	Total Food Grains	Total Oilseeds	Sugarcane	Cotton Lint*
1951-52	45.33	8.67	54.00	4.97	56.56	3.22
1961-62	69.63	12.00	81.63	7.22	101.96	5.33
1971-72	92.60	10.94	103.54	8.62	121.60	5.82
1981-82	119.47	11.33	130.80	10.48	176.71	7.47
1991-92	161.72	13.03	174.75	19.11	241.03	10.32
2001-02	182.96	11.86	194.81	17.98	291.58	9.41
2009-10	228.00	18.57	224.50	33.20	277.75	23.93
2013-14	245.50	19.27	264.77	32.88	350.02	36.59
2017-18	259.59	25.23	284.83	31.31	376.91	35.00
				(6.3)	**(6.7)**	**(10.9)**

Source: F.S.(2017-18), FAI

The Problem Of Plenty

Farm output surge will bring with it a unique set of challenges we must address urgently

Rohitash Mal

Indian farmers have much to celebrate this year with a bumper wheat harvest. As predicted by the ministry of agriculture, wheat farmers have begun to harvest what is shaping up to be a record crop, projected at [illegible] million tonnes. We are growing more wheat than ever before. The earlier record of [illegible] million

livelihoods but also the overall health of the economy.

A key part of the current problem lies with the state procurement system. Despite strengthening of the procurement mechanism of state governments, thousands of farmers have been waiting in line for their produce to be sold. Unable to wait longer, farmers are being forced to sell their precious crop to traders for less than the

Don't let this be a bitter harvest

how much wheat it would like to buy from farmers, with the rest of the produce being sold by the farmer in the free market. Improving the public distribution system's efficiency, rationalising mandi tax which is as high as 14% in Punjab and using UID effectively to provide food coupons to people below the poverty line are other measures to combat food inflation and balance high farm gate prices.

If such short-term measures are not undertaken, this problem of excess will be detrimental for the rural economy and impact India's overall growth momentum. A large economic price is extracted when the government fails to intervene at these stages.

Contribution of Livestock Sector

MILK, MEAT & EGG Production

The White Revolution 1965-96

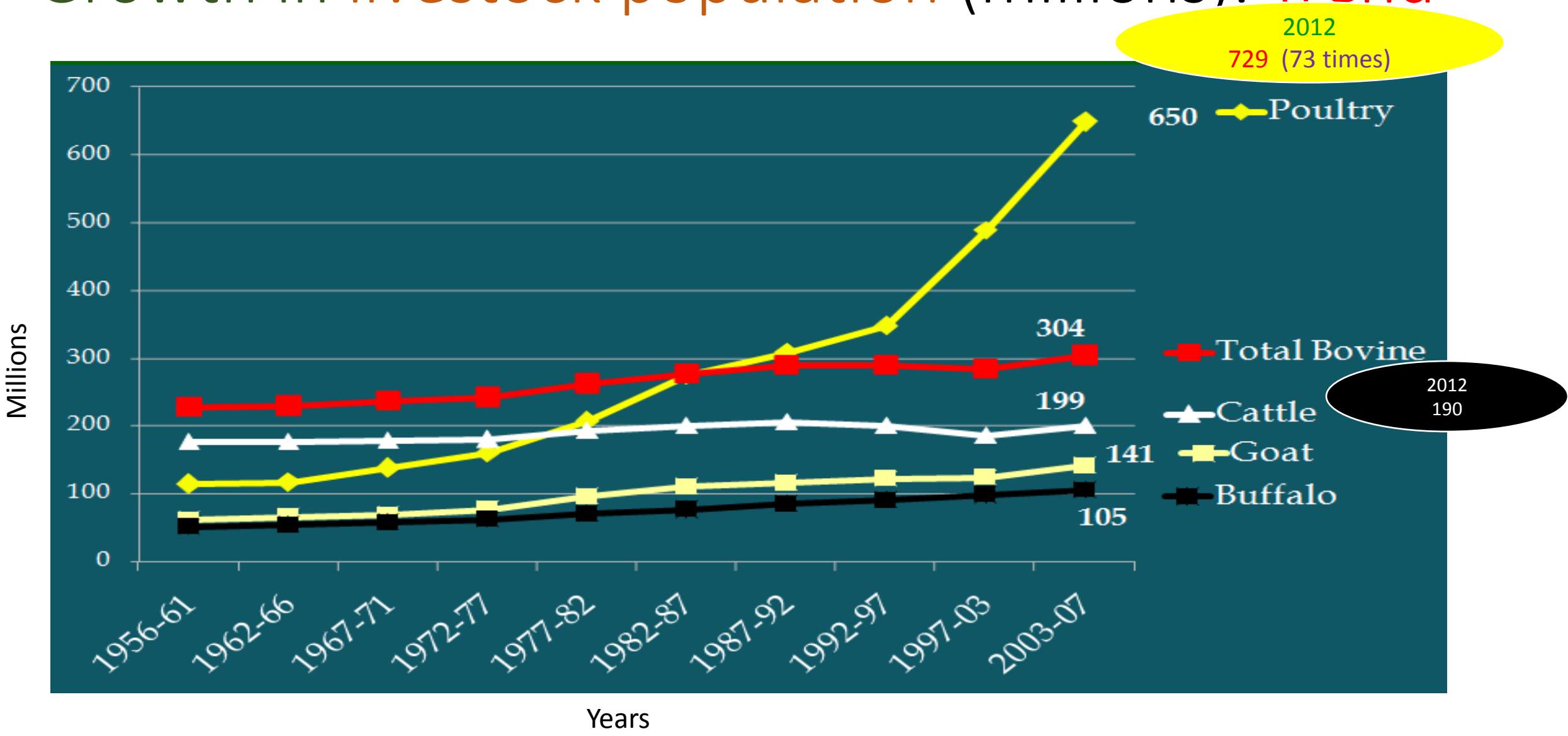
The "billion litre" idea of Dr. Kurien to feed billions

Proved the power of markets for smallholders

Dr. Verghese Kurien, Father of White Revolution

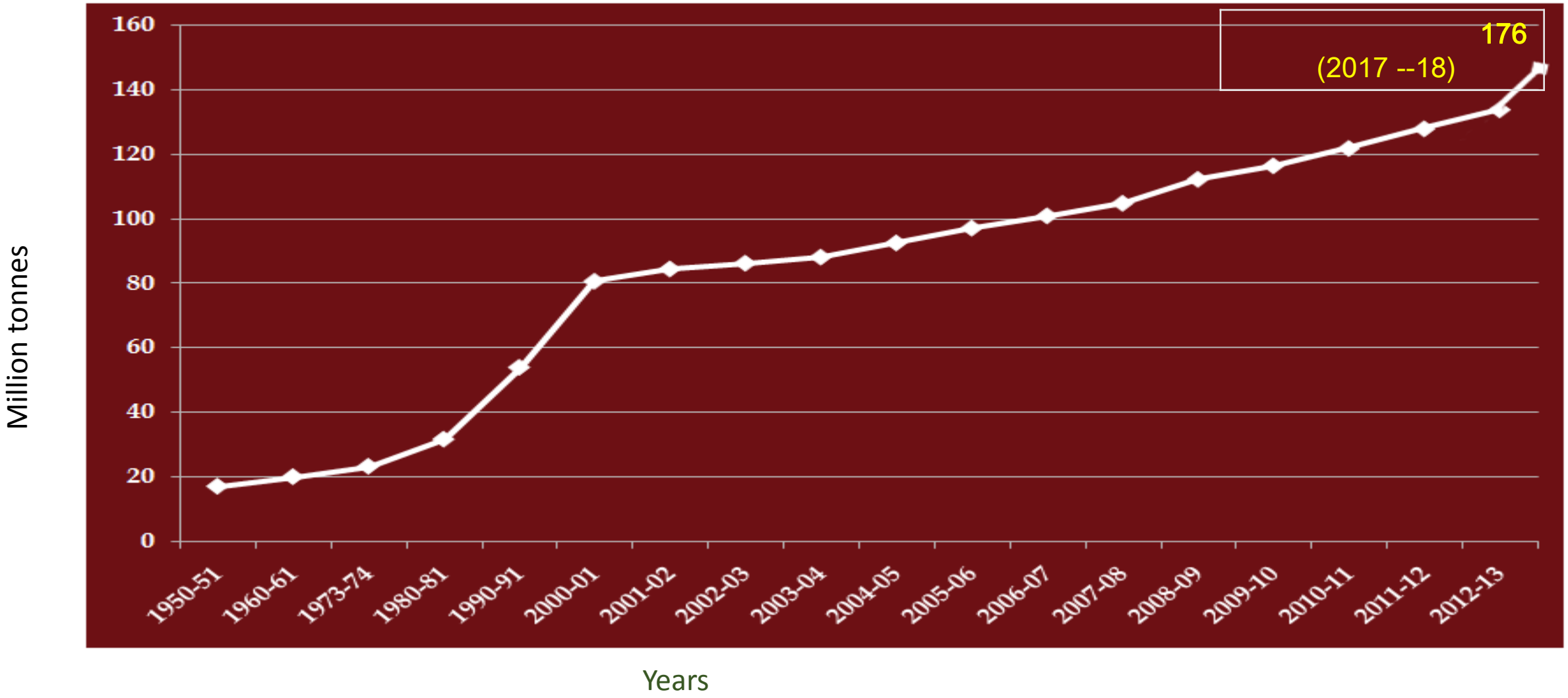
- **15 million farmers, mostly smallholders**
- **1,45,000 village level dairy cooperatives**
- **India became world's largest dairy producer**
- **Per capita/day milk availability reached a world average of about 285 gm**
- **Modern value chain management**

Growth in livestock population (millions): Trend



Source: Agricultural Research Data Book, IASRI, Pusa, New Delhi, 2018

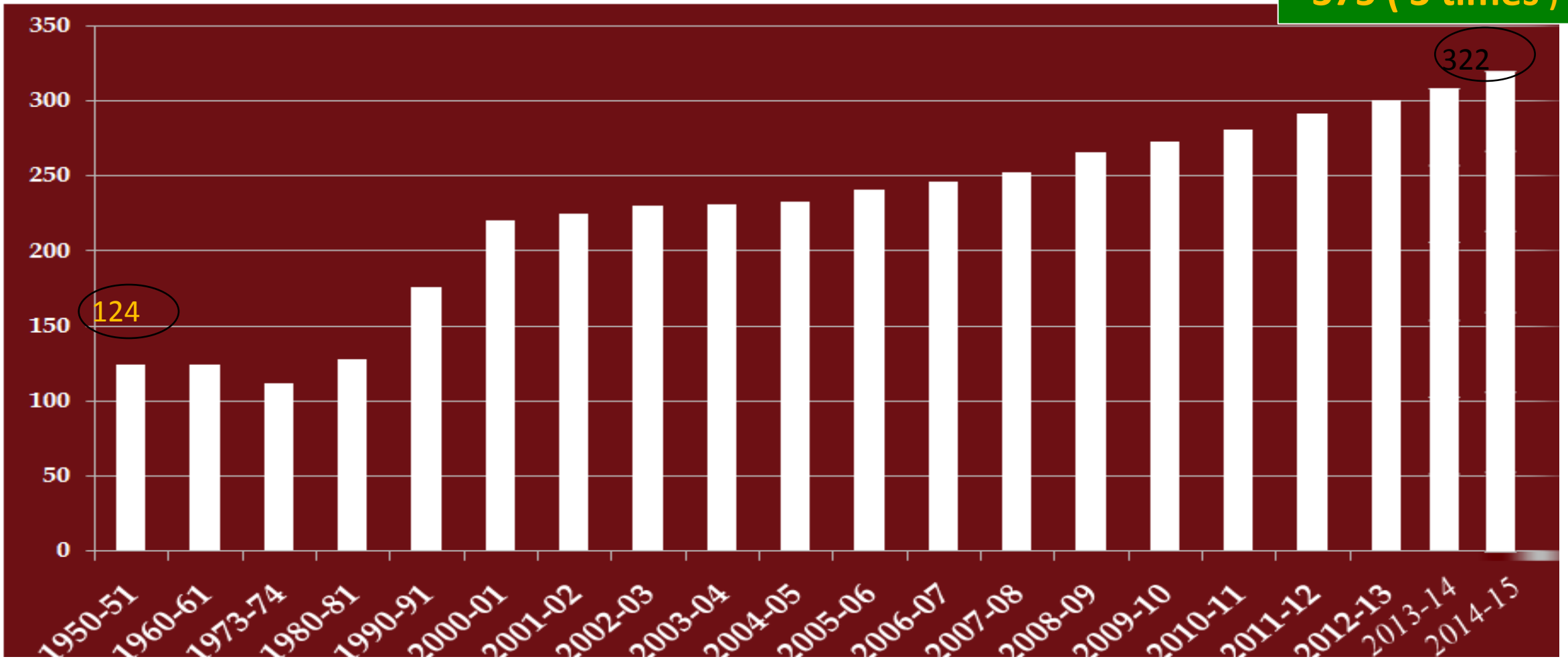
Growth in *Milk* Production in India *(mt)*



Compound Annual Growth Rate 1990/91-2009/10: 3.95%

Per Capita Availability of *Milk*

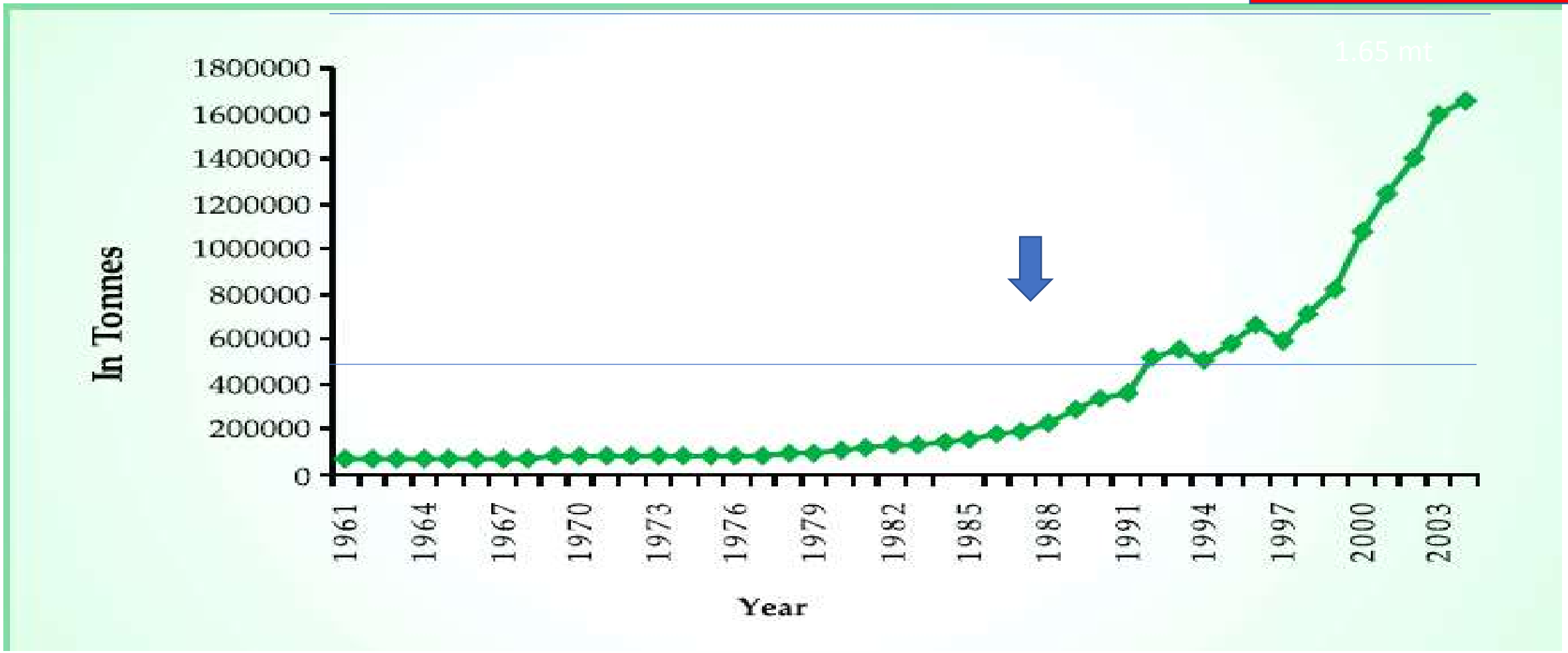
2017--18
375 (3 times)



Source:ww.milkproduction.com

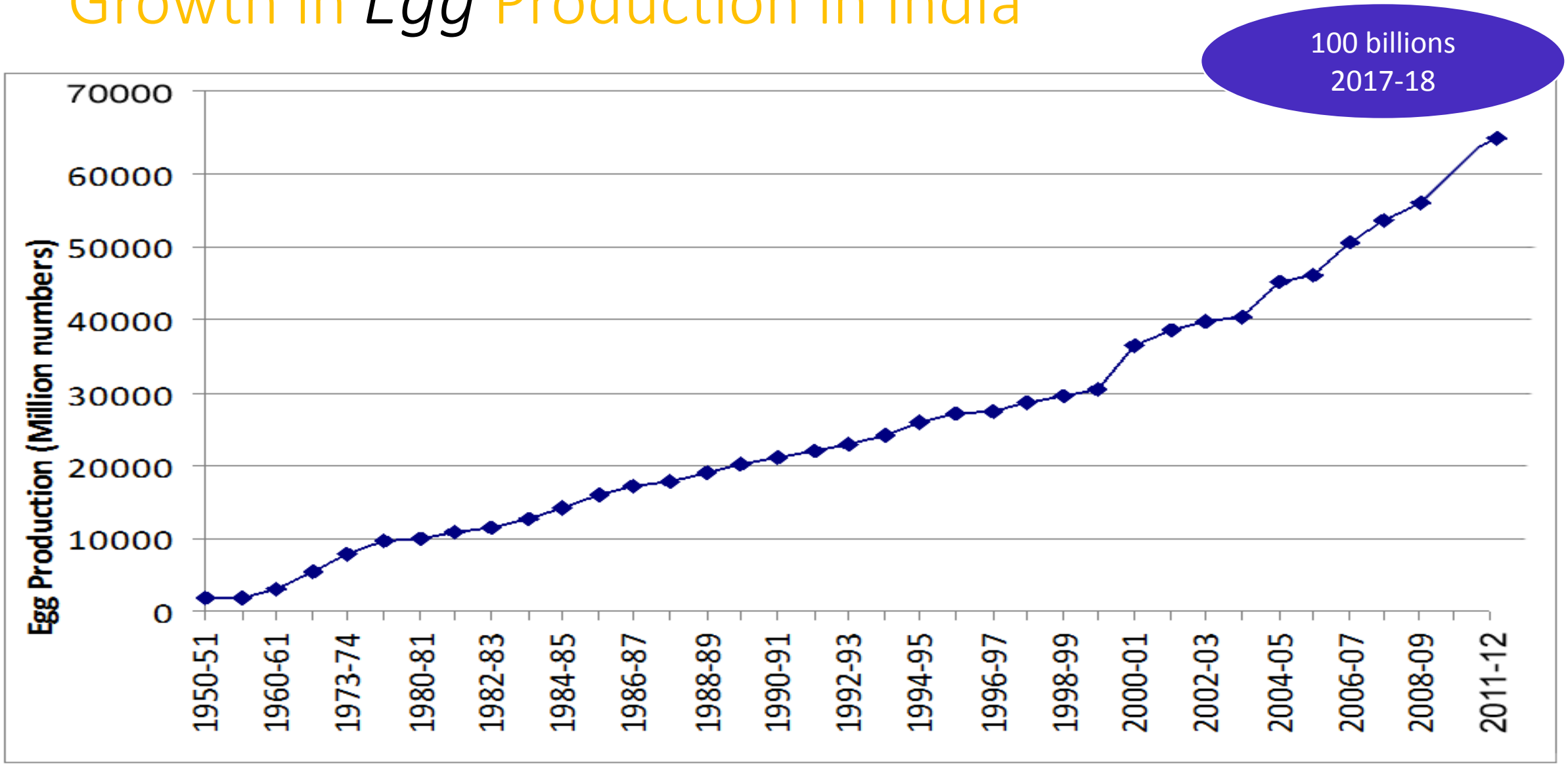
Poultry *Meat* Production in India

2017-18
4.2 mt (84 times)



Source: www.faostate.fao.org

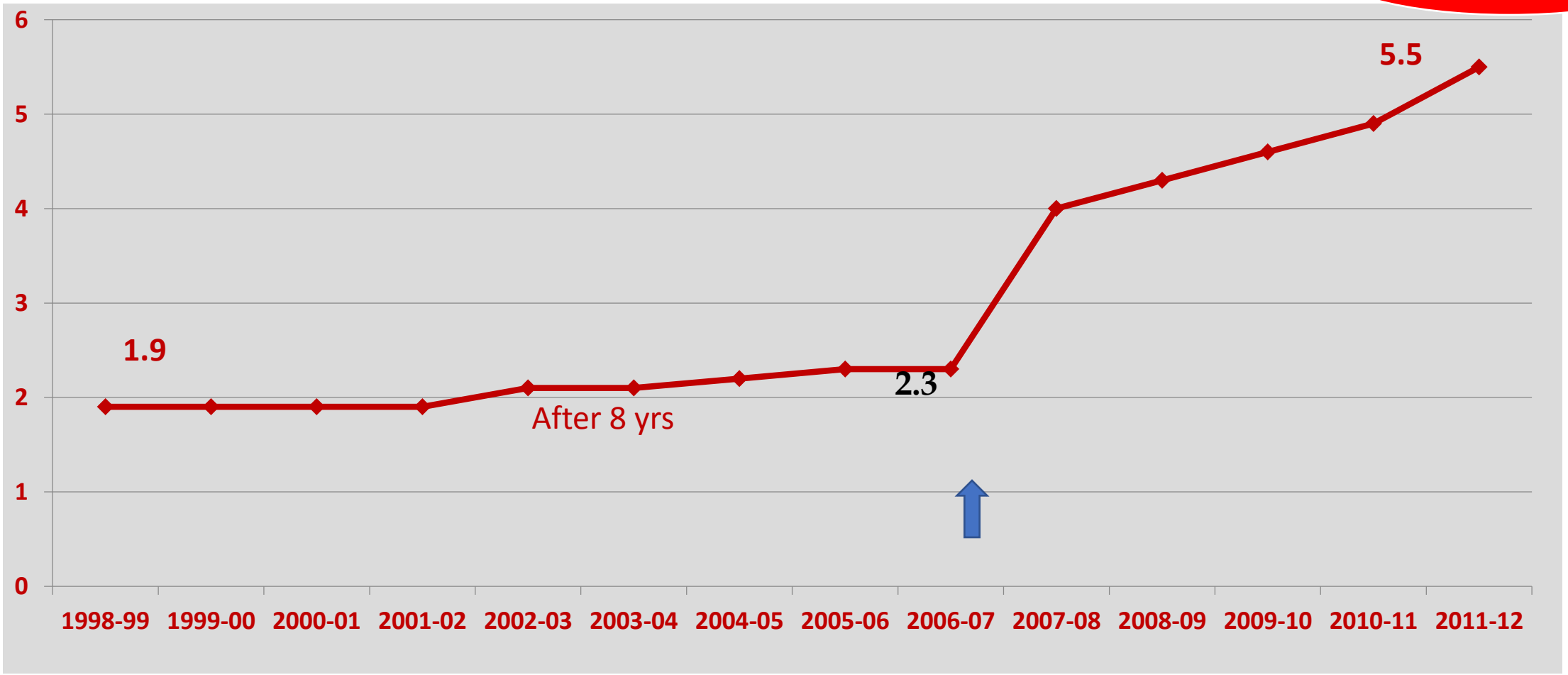
Growth in *Egg* Production in India



Compound Annual Growth Rate 1990/91-2008/09: 5.7%

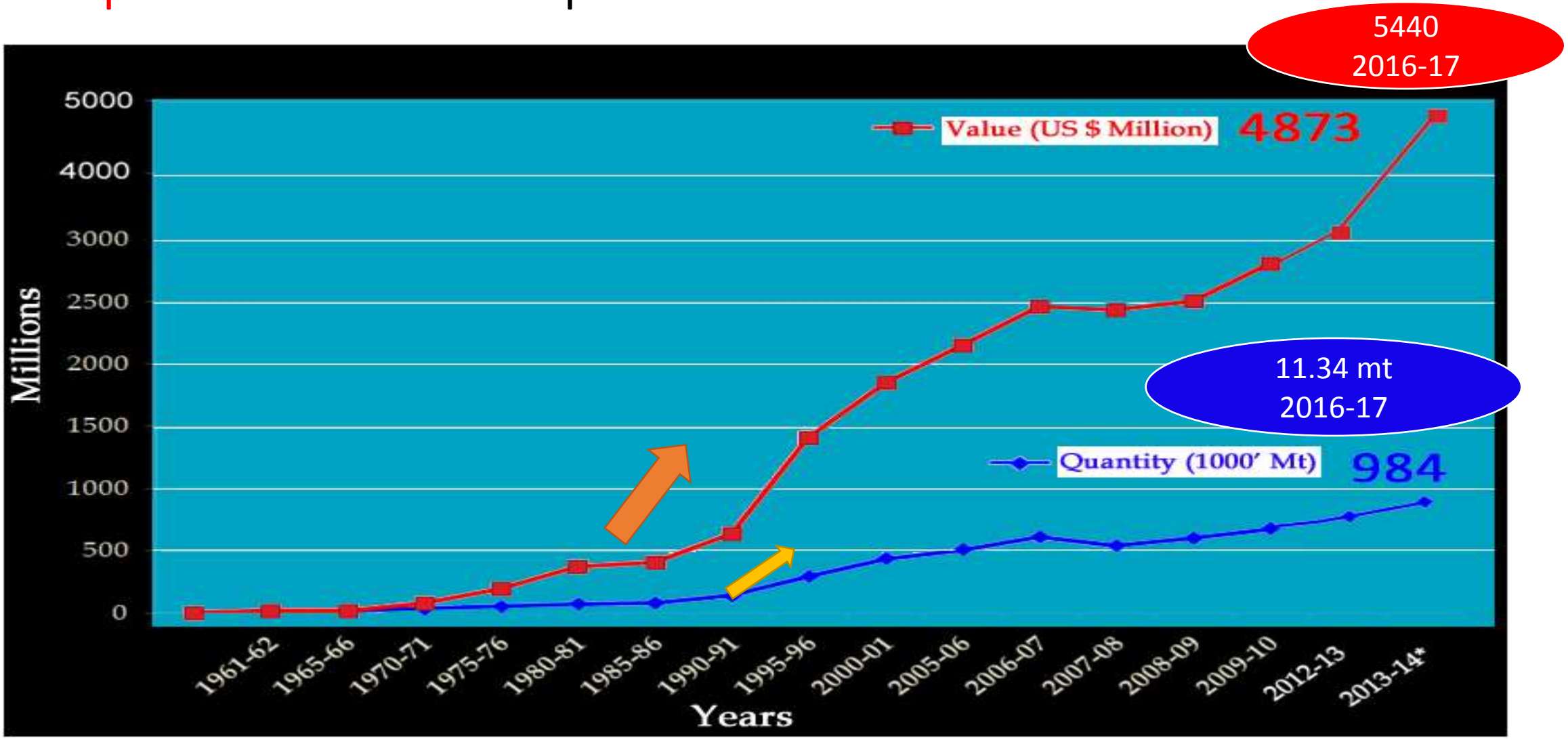
Growth in *Meat* Production in India

7.4 mt
2017-18



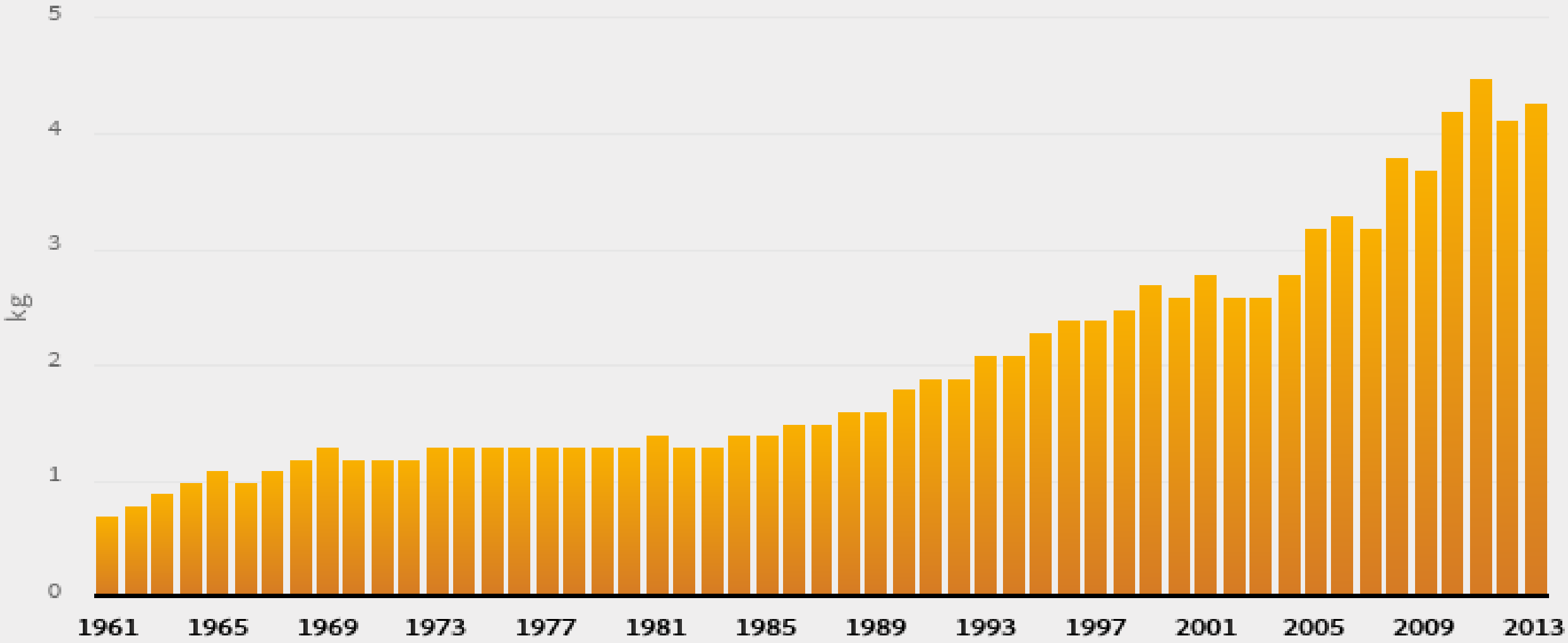
Compound Annual Growth Rate 1998/99-2008/09: 4.05%

Export of *Marine* products from India



Source: Agricultural Research Data Book, IASRI, Pusa, New Delhi, 2018

Fresh water Fish consumption per capita in the India



Source: FAO STAT

Growth of Power-operated Agricultural Machinery, India

Particulars	Numbers (in 000's)						
	1961	1971	1981	1991	2005	2018	Times
Tractors	3	15	52	1,31	2,47	5,82	194 I*
Power Tillers	-	1.7	3	6	18	45	26 III

Source: FAI Statistics 2017-18

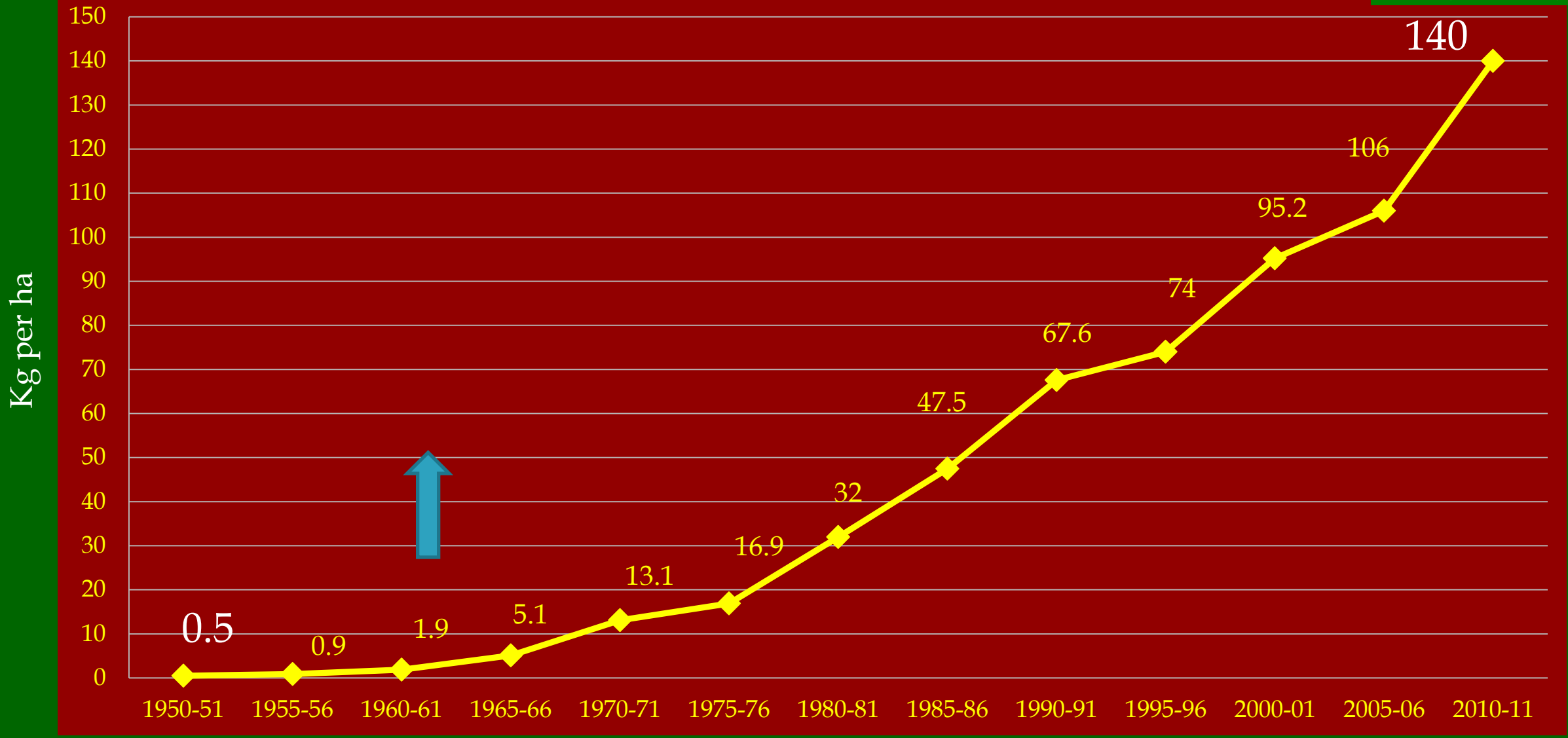
	1971-72	1981-82	1991-92	2002-03*	Times
Mould board & disc ploughs	57.3	142.9	498.9	748.8	13
Disc harrows	55.6	1889.2	545.6	933.0 IV	16.8 V
Cultivators	81.5	315.0	1155.8	1771.5 I	21.8 IV
Seeds drills/ seed-cum-fertilizers drills	24.6	160.69	730.1	1011.0 III	41 II*
Planters	8.5	30.5	64.3	114.0	13.4
Threshers	205.8	1025.0	1379.3	1568.4 II	13.4
Power Sprays & Dusters	44.8	123.9	277.1	779.0	17.4

Source: ICAR(2006)

All India Consumption of Fertilizers kg per ha (N,P2O5 & K2O) from 1950-51 to 2015-16

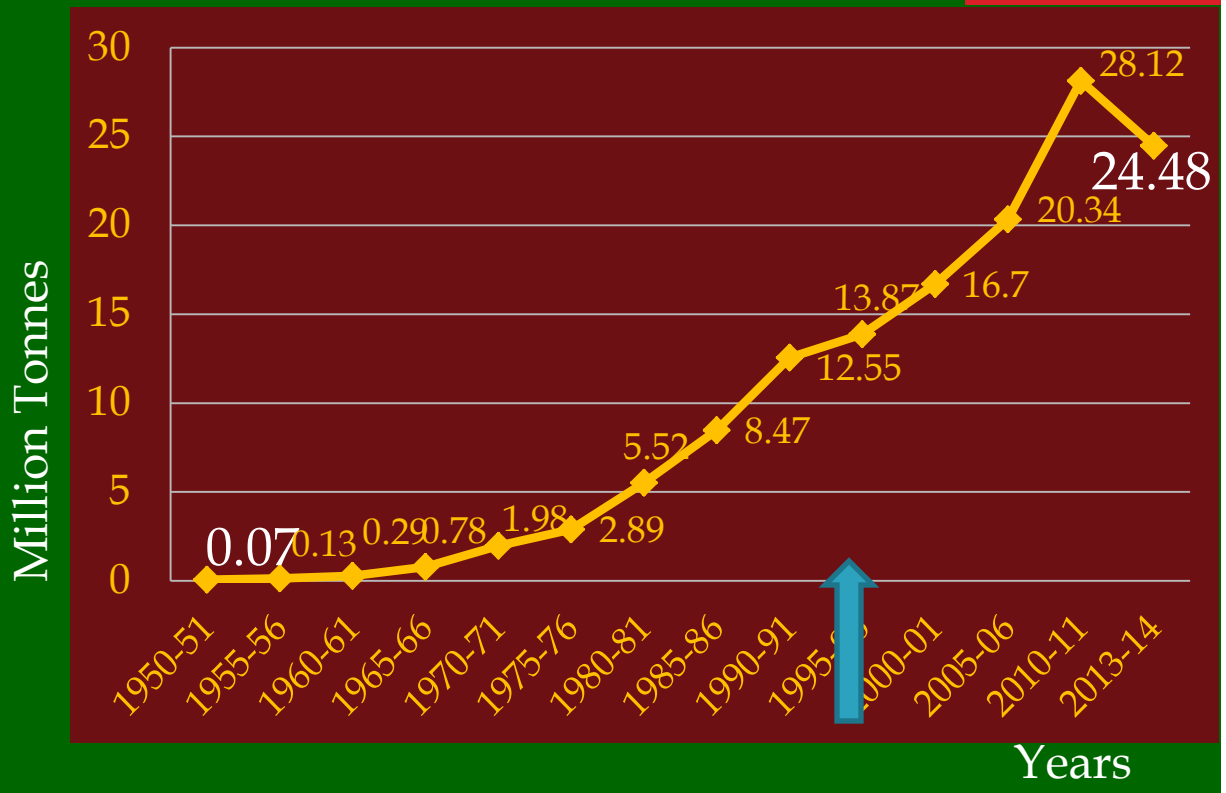
2015-16 145

(290 times)



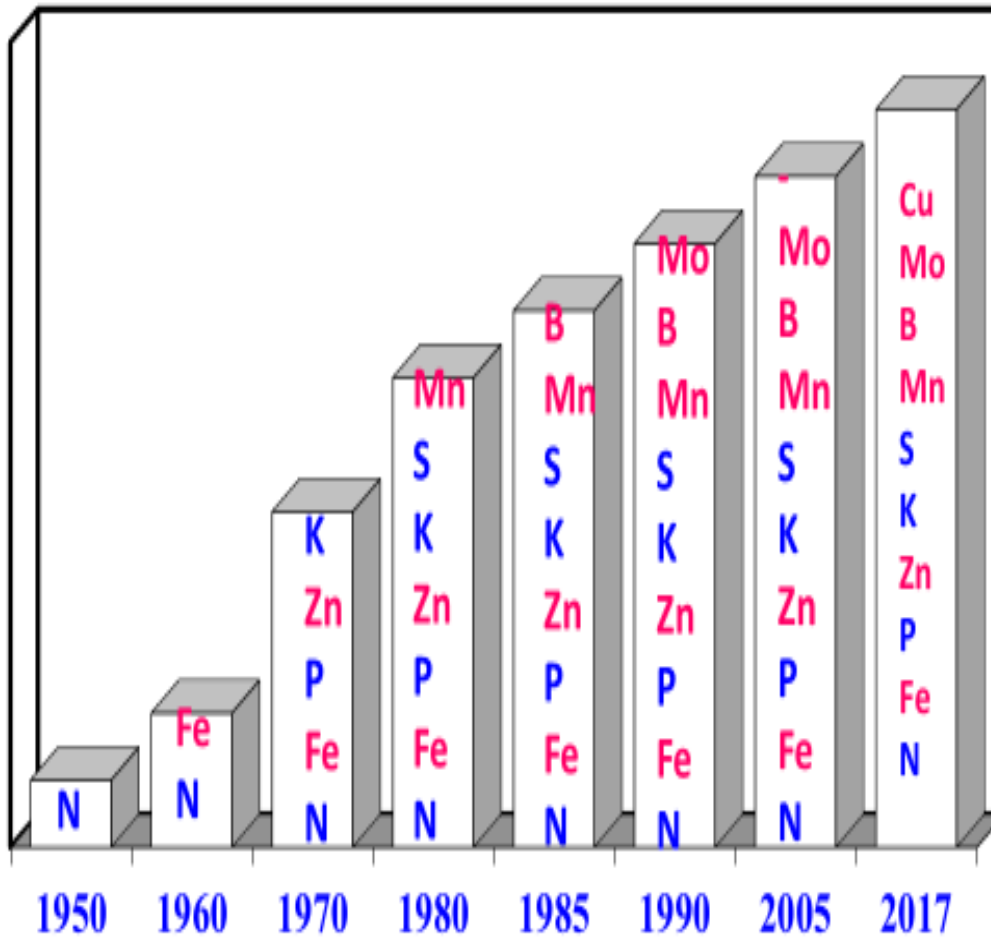
All-India Consumption of Total Fertilizers ($N+P_2O_5+K_2O$) from 1950-51 to 2013-14

350 Times



Source: Fertilizer Statistics, FAI, 2013-14

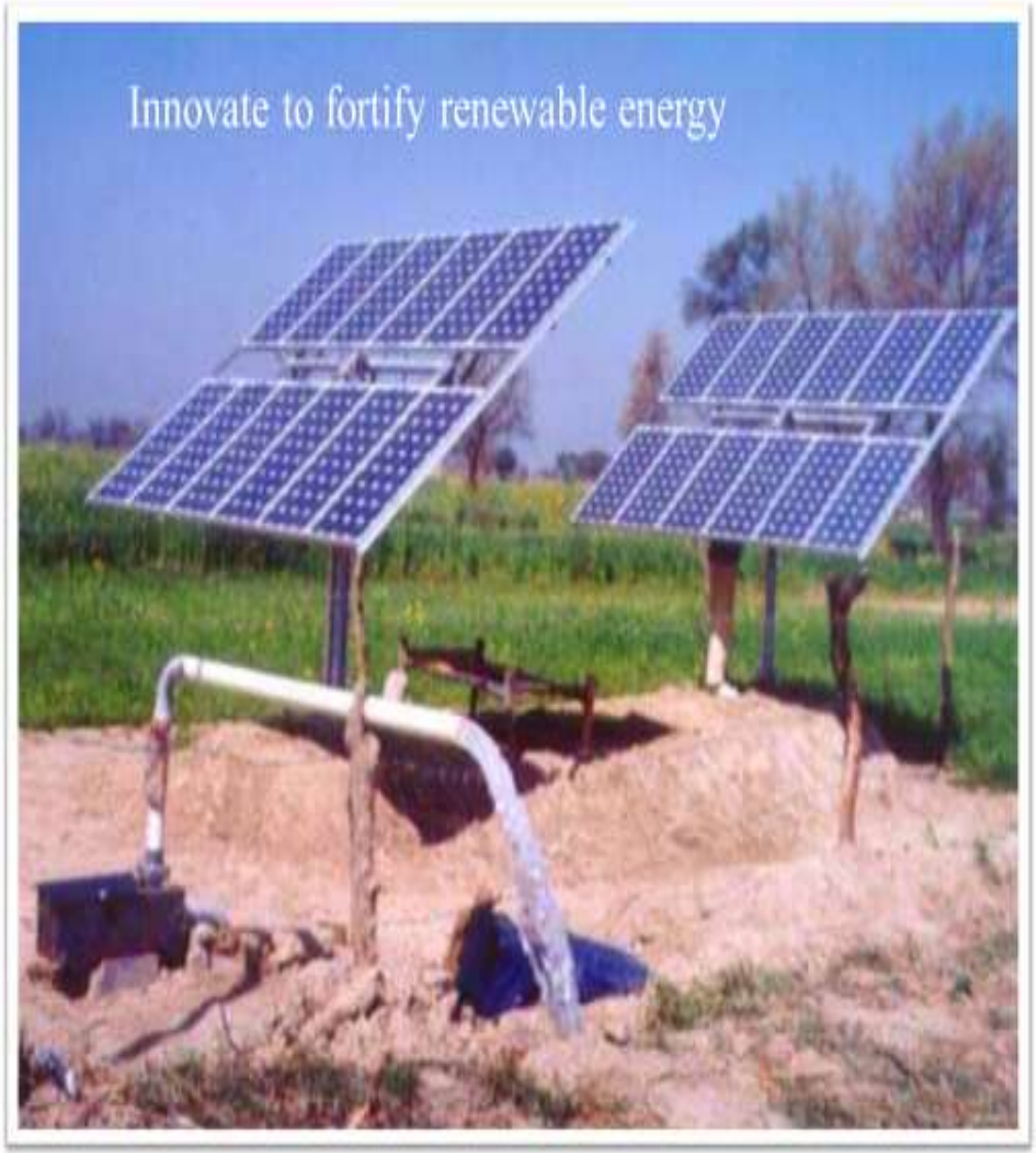
Progressive occurrence of nutrient deficienci



Power Generation

- Solar Power
- Wind power (wind mill)
- Residue:
  * Farm + Village
  * Urban
- Gobar Gas

Solar power- a remunerative crop



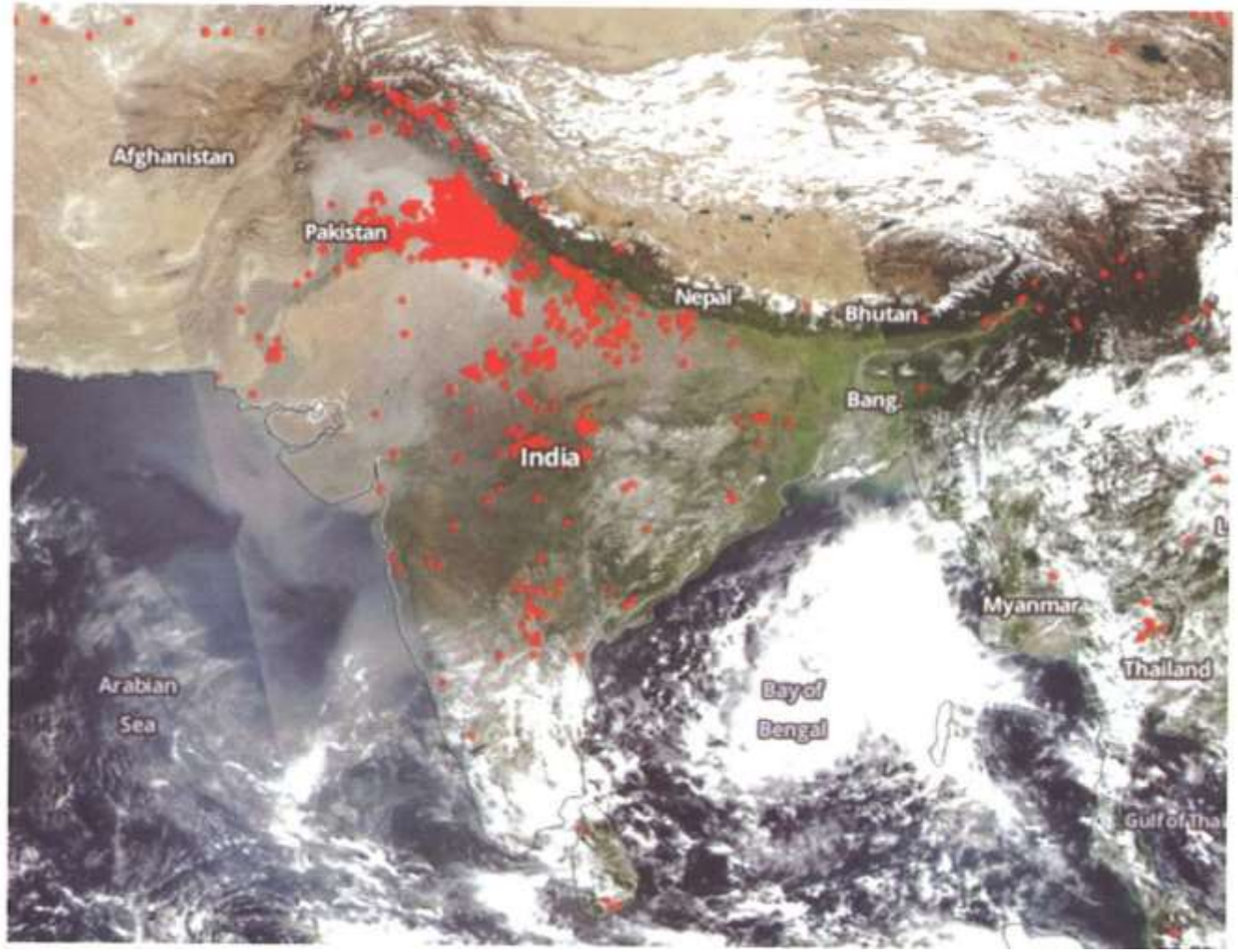
Large Scale Mechanization in Rice & Wheat

Shredding of Straw by Machines

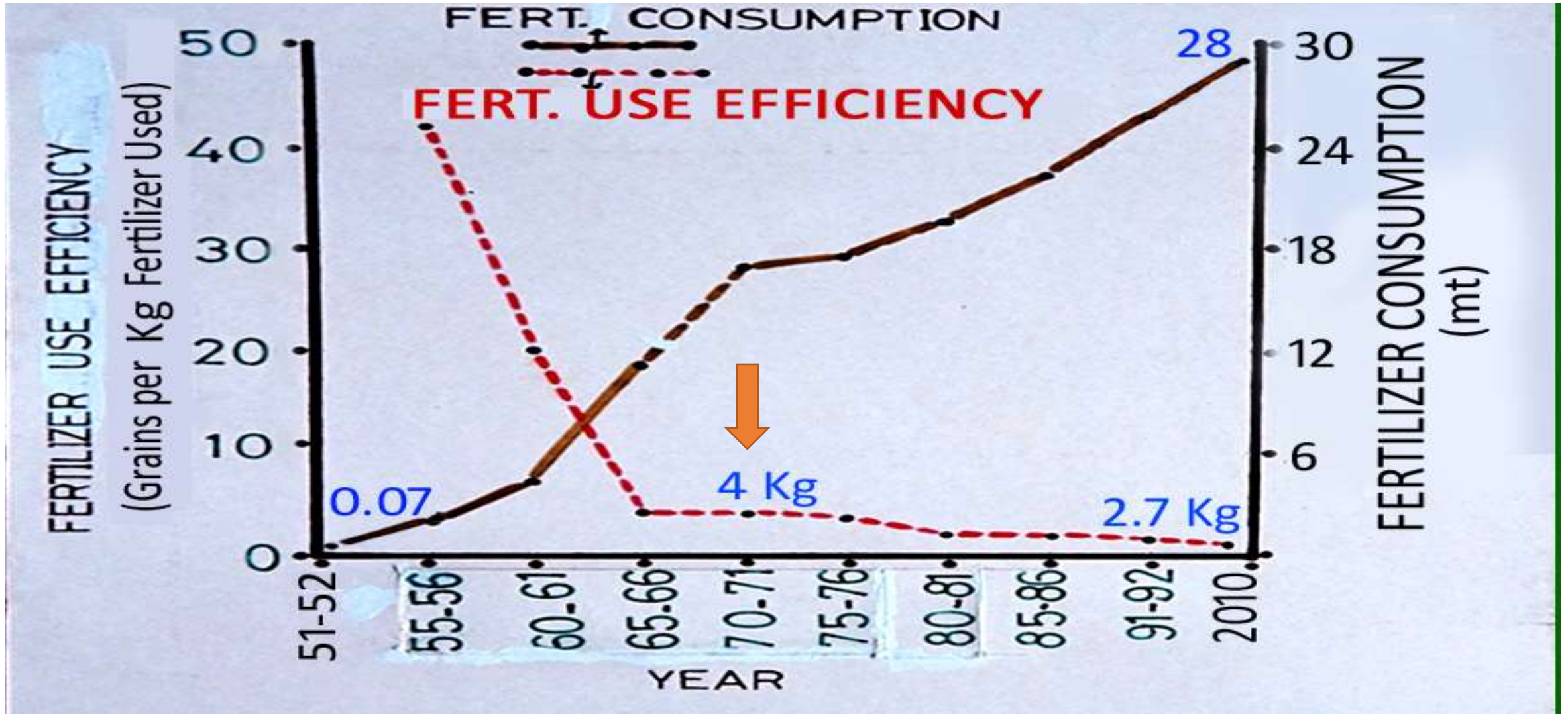
Large Scale Burning of Wheat/Rice Straw in Punjab & Haryana

But, the Precious Crop Residue is burnt

NASA Satellite images showing intensity of rice residue burning (shown in red dots) in North-West India.



Showing Fertilizer Consumption & Use Efficiency from 1951-52 to 2010



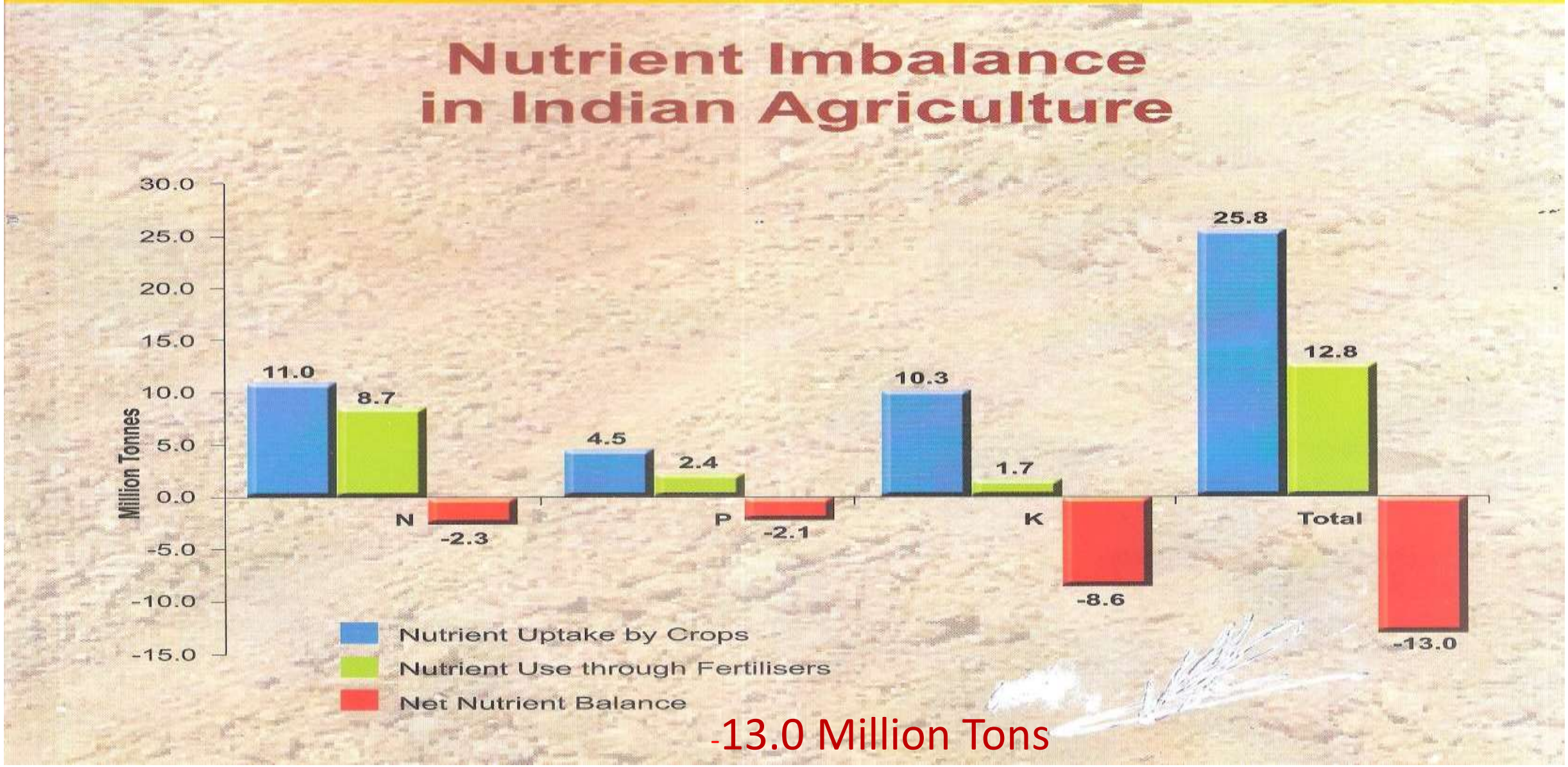
Source: Fertilizer Statistics, 2011-12, FAI, New Delhi

An Illustrative Nutrient Balance Sheet of Indian Agriculture

Nutrient	Gross Balance Sheet (000 t)			Net Balance Sheet (000 t)		
	Addition	Removal	Balance	Addition	Removal	Balance
N	**10, 923**	**9, 613**	**1, 310**	**5, 461**	**7, 690***	**- 2, 229**
P2 O5	**4, 188**	**3, 705**	**486**	**1, 466**	**2, 961**	**- 1, 493**
K2 O	**1, 454**	**11, 657**	**- 10, 202**	**1, 018**	**6, 994***	**- 5, 976**
Total	16, 565	24, 971	- 8, 406	7, 945	17, 645*	***- 9, 701****

-9,701**

Source: 69. Tandon, H. L. S. FADCO, New Delhi. 240 (2004)



-13.0 Million Tons

depleted from soil

Indian Journal of Fertilisers

Vol. 13 No. 4 April, 2017

Total Uptake of major Nutrients & Balance Sheet

CROP/ Cropping seq.	N2O Kg/ha	P2 O5 kg/ha	K2 O kg/ha	S kg/ha	Ca kg/ha	Mg kg/ha	Total kg/ha Uptake	Applied NPK	Balance
Rice-Wheat t/ha 10.0	225	100	315	15	35	15	695	500	-195
Maize 5.0 t/ha	150	70	165				385	240	-145

Source: Fertilizers in Indian Agriculture- from 20th to 21st century (2004)

- Of 639 Districts- 158 Saline, Groundwater contains
- Fluoride in 267
- Nitrates in 385,
- Arsenic in 53 and
- Heavy metals in 63
- like lead, chromium and cadmium

Problems Faced:

- Kidney problems (children)
- Delayed physical, mental development (children)
- High BP (adults)
- Respiratory problems (adults)
- Digestive problems (adults)

Poison in India's groundwater posing national health crisis

Nitin Sethi | TNN

New Delhi: Depletion of groundwater and its increasing pollution could be leading to a silent, nationwide health crisis as aquifers in many stretches across India are becoming unfit for drinking, according to government figures.

Data submitted in Parliament by the water resources ministry on Monday shows groundwater in pock-

▶ **Groundwater in Delhi toxic? P 17**

ets of 158 out of the 639 districts has gone saline. It says in pockets across 267 districts, groundwater contains nitrates beyond permissible levels; in 53 there's arsenic and there's high level of iron in 270 districts.

Besides this, aquifers in 63 districts contain heavy metals like lead, chromium and cadmium, the presence of which in any concentration poses a danger.

DRINKING PROBLEM

- Of **639 districts**, water **saline in pockets of 158** districts
- In **267**, groundwater contains **excess fluoride**; in **385**, **nitrates** in excess; **53** contain **arsenic** and **63** contain **heavy metals** such as lead, chromium and cadmium
- High levels of lead can lead to **delayed physical, mental development in children** and **kidney problems** or **high BP in adults**; chromium is a known **carcinogen**, nitrates cause 'blue baby disease' and **respiratory, digestive problems** in adults
- **Delhi Belly** | East Delhi water contains chromium, making it dangerous to drink; heavy metals, nitrates in most parts of Delhi

Conservation Agriculture

1. Laser Leveling (30% water saving)

2. Bed Planting (30% water saving and mechanical weeding)

3. Minimum/ Zero Tillage (1/4th to ½ Energy used)

- Recycle Rural and Urban homes residues (Nutrients and Bio mass back to farm fields).
- Recycling rural and urban waste of vegetables, fruits, grains, feed and fodder back to farm fields (Nutrients and Biomass).

•Use of Bio fertilizers, Bio Insecticides and Bio Pesticides to reduce pollution in soil and water.

Conservation Agriculture (Cont. 2)

- In rainfed(40%) areas use of Drip and Sprinkler irrigation- (2040% water use).

- Rain water conservation (improved methods).

- Use of GIS, GPS, remote sensing.

9 •Selection of wheat cultivars- for Zero tillage & weed smothering characteristics.

- Direct sowing of rice.

Conservation Agriculture (Cont. 3)

- Aerobic rice cultivation.

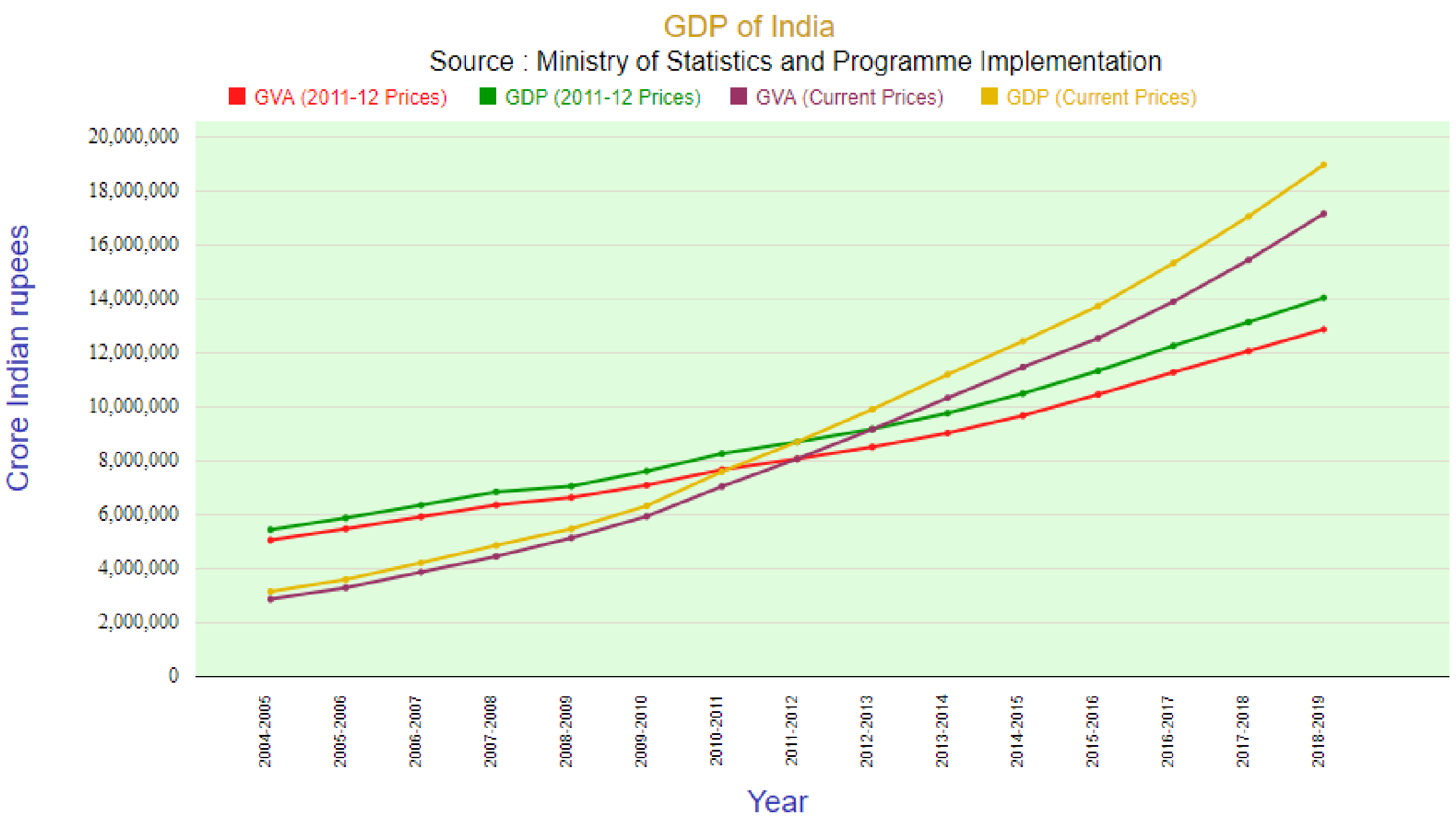
12 Selection of Rice cultivars for direct sowing and aerobic rice cultivation.

- Dry-wet rice cultivation with suitable cultivars

- GM/Hybrid crops for attaining higher yields.

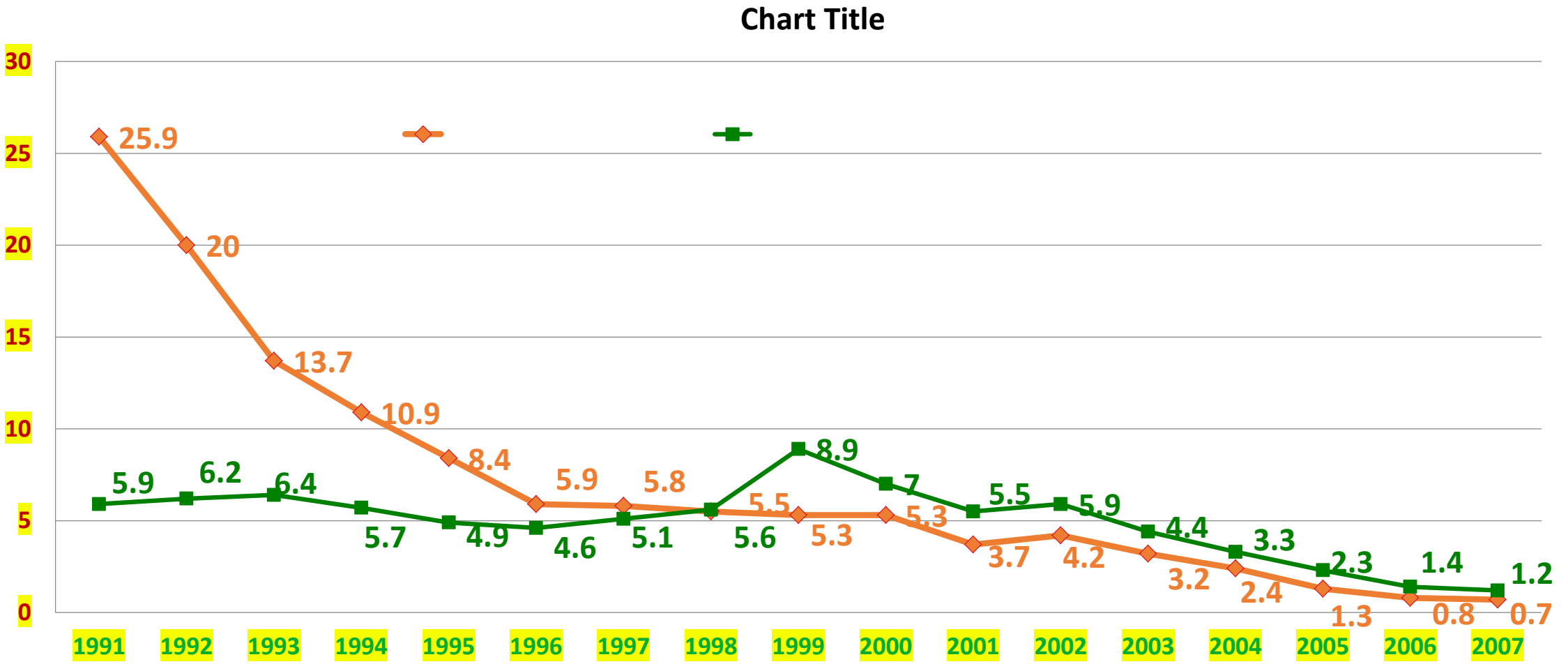
Adoption of Integrated Nutrient Management (INM) inorganic fertilizers blending with green manure crop, FYM and bio-fertilizers other organic residue recycling in combination with efficient water (WM) and weed (WM).

16 •Integrated use of disease and pest management using efficient bio agent.


GDP of India
Source : Ministry of Statistics and Programme Implementation
GVA (2011-12 Prices)
GDP (2011-12 Prices)
GVA (Current Prices)
GDP (Current Prices)
Crore Indian rupees
20,000,000
18,000,000
16,000,000
14,000,000
12,000,000
10,000,000
8,000,000
6,000,000
4,000,000
2,000,000
0
2004-2005
2005-2006
2006-2007
2007-2008
2008-2009
2009-2010
2010-2011
2011-2012
2012-2013
2013-2014
2014-2015
2015-2016
2016-2017
2017-2018
2018-2019
Year

Green RevolutionImpact: on Human Health

Trend of Leprosy Prevalence and Annual New Case Detection Rates



Source: National Leprocy Eradication Programme, 2007

Incidence of Tuberculosis in India

Year	Incidence of Disease
1998	1.75 per 1000 population
1999	1.50 per 1000 population
2002	1.68 per 1000 population
2009	1.68 per 1000 population

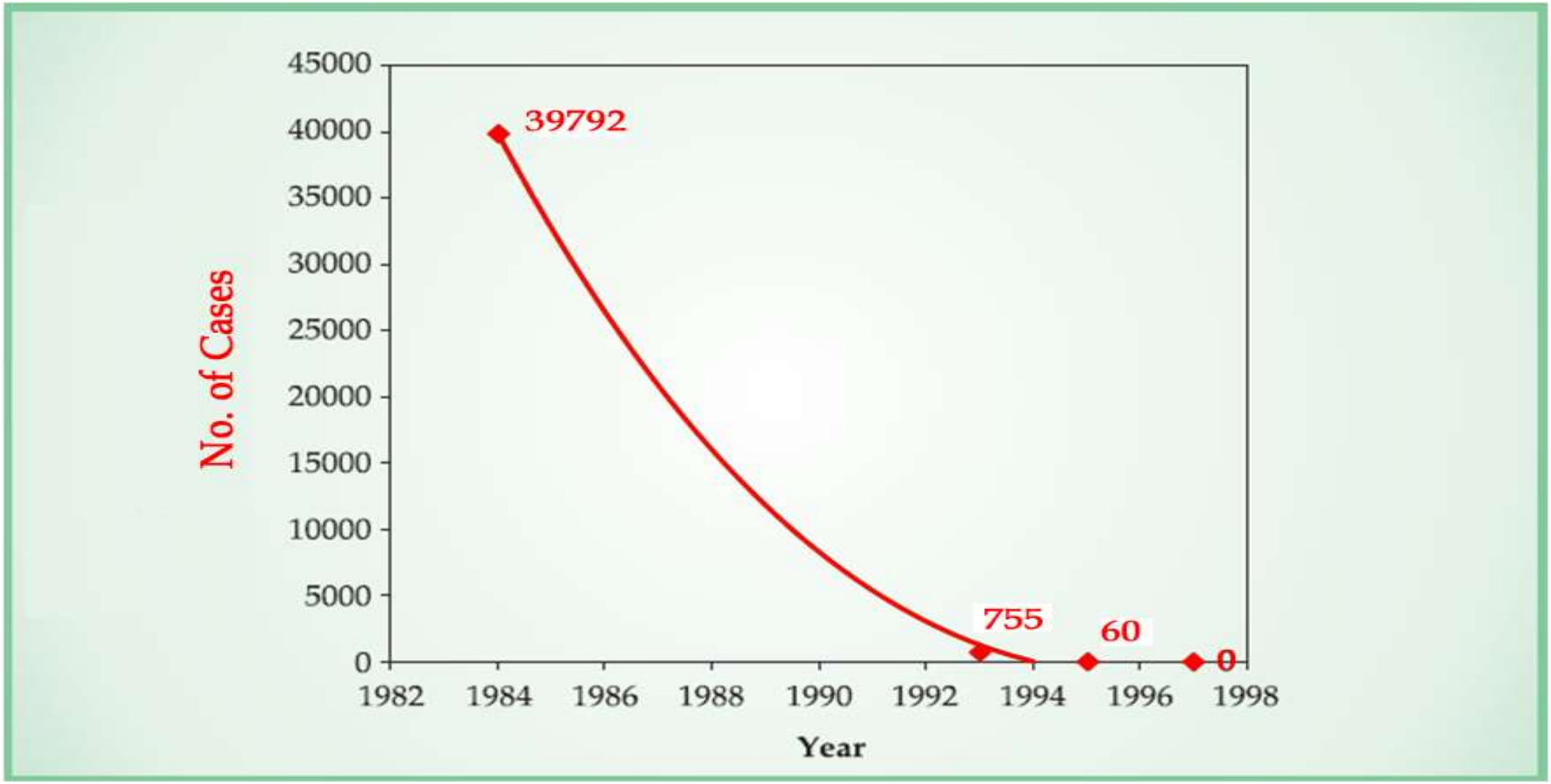
Source: WHO (1999 and 2000)

Mortality Due to Tuberculosis in India

Year	Mortality Rate	
1964	100 per 1 lakh population	-
1970	80 per 1 lakh population	-
1993	53 per 1 lakh population	-
1998	40 per 1 lakh population	-
2002	37 per 1 lakh population	-
2008	31 per 1 lakh population	1/3

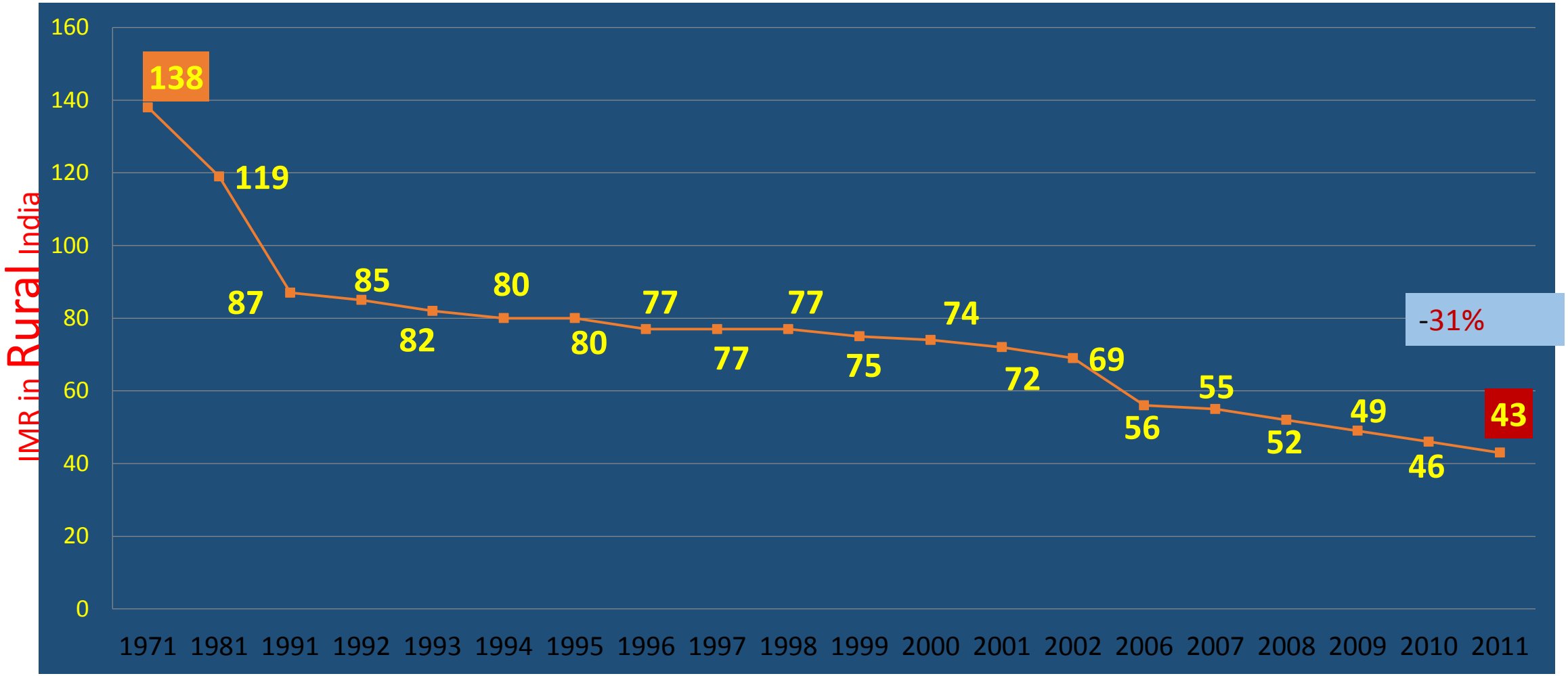
Source: Barua (1978); Ministry of Health and Family Welfare (various years)

Eradication of Guinea- worm Disease



Source: Black and Talbot (2005)

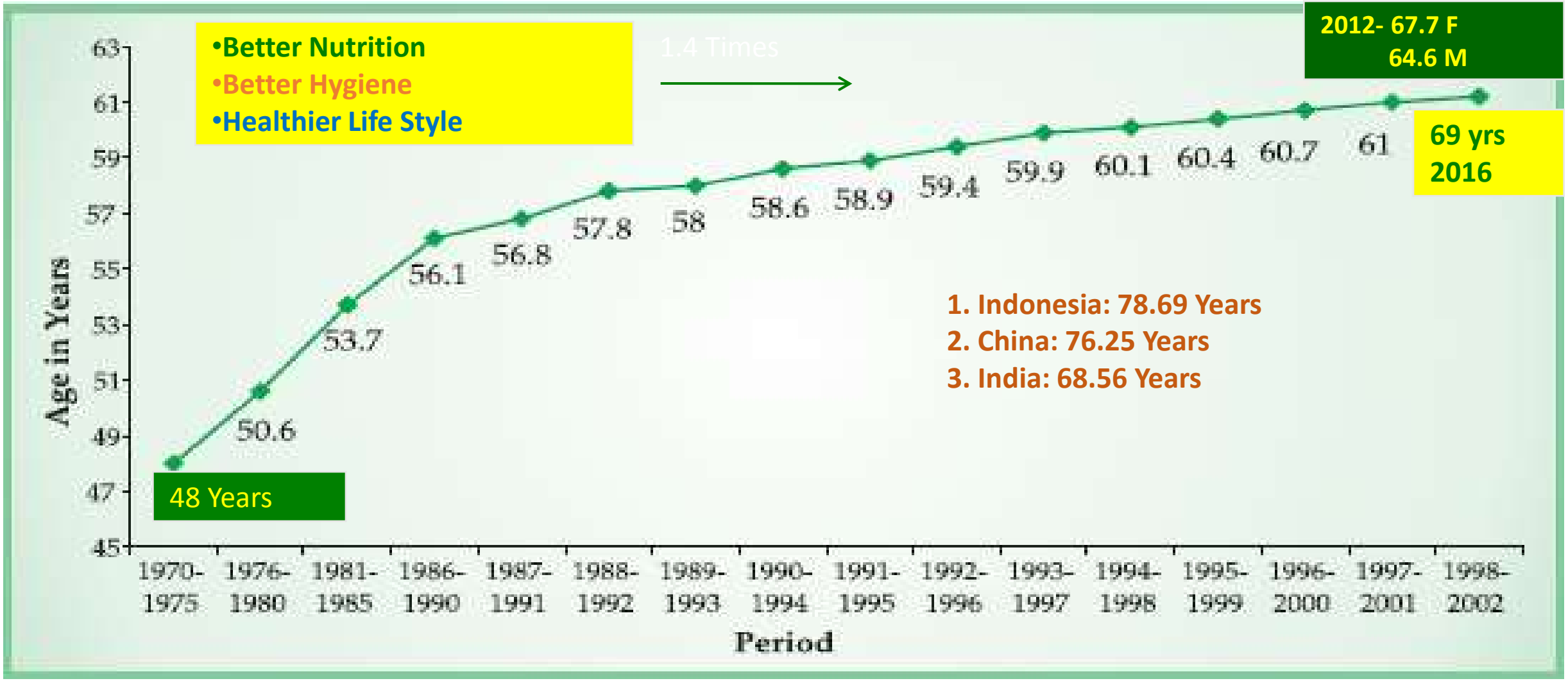
Infant Mortality Rate, Rural India



Source: Planning Commission, Govt. of India, 2013

Life Expectancy at Birth, Rural India

2008- Kerala- 77.2



Source: Ministry of Health and Family Welfare(1999); www.indiastat.com

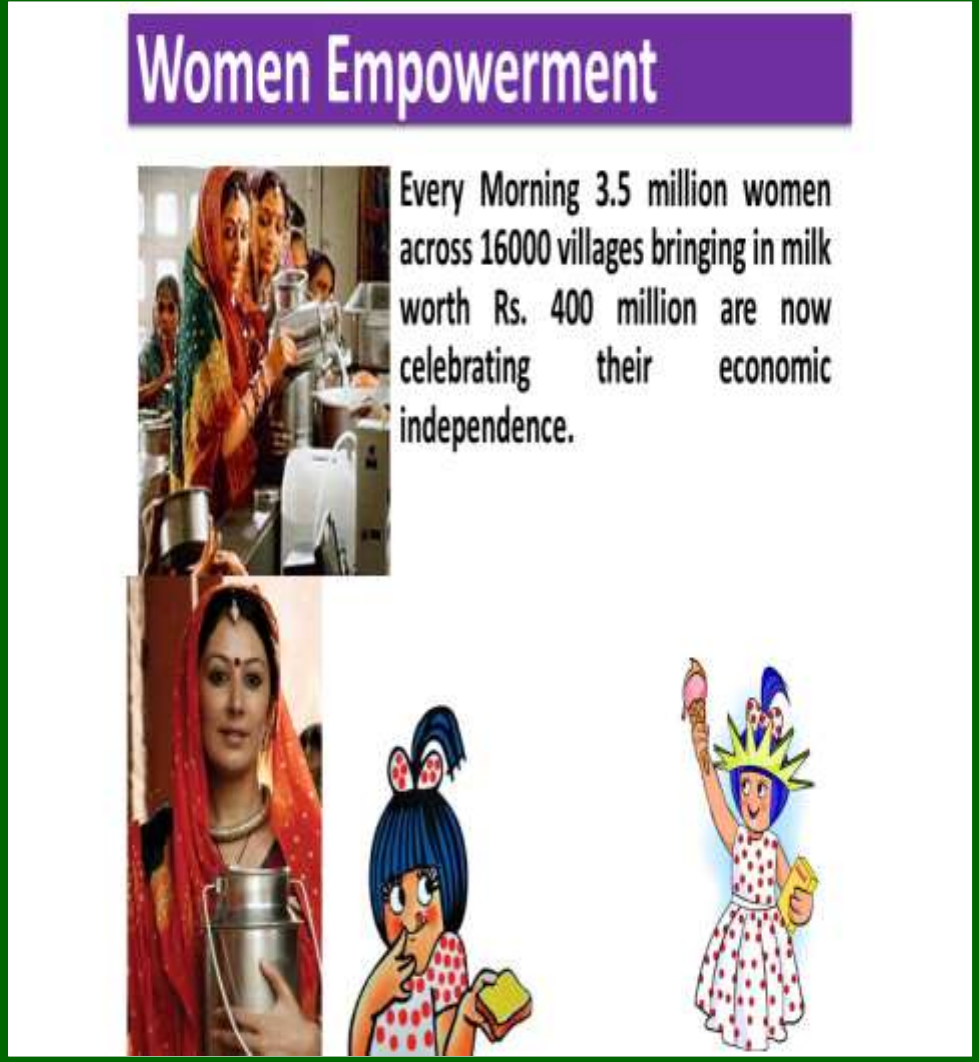
India's position in world agriculture- 2016

	Item		India's Position	
			Rank	Next to
1.	**Crop production (million tonnes)**			
	(A)	Total cereals	Third	China, USA
		Wheat	Second	China
		Rice (Paddy)	Second	China
		Total Pulses	First	-
	(B)	Oilseeds		
		Groundnut (in shell)	Second	China
2.	**Fruits & Vegetables (million tonnes)**			
	Vegetables & Melons		Second	China
	Fruits excluding melons		Second	China
	Potatoes		Second	China
	Onion (Dry)		Second	China
3.	**Commercial crops (millions tonnes)**			
		Sugarcane	Second	Brazil
		Tea	Second	China
		Fibres Crop	First	-
		Cotton (Lint)*	First	-
4.	**Implements (thousand numbers)**			
	Tractors-in-use*		Second	USA
5.	**Milk**		First	-

Agriculture Research Data Book IASRI, ICAR 2018

Women Participation

- In the recent times and in future greater role for women in higher agricultural education system is being seriously viewed. It calls for their greater participation at all levels.
- Presently women constitutes about one third of the total strength of students at UG and PG level in SAUs and DUs which is low.
- Women's technological empowerment holds the key to successful enterprises, rural prosperity and nutritional security.
- The capacity of the women through home science education be developed to offer the possibilities of owing small businesses. This needs infusing relevance and utility of course curricula to attract sufficient number of enrolment.



My Involvement in Africa's-Programs

1. India-Africa visits and participation

COUNTRY	PLACE VISITED	YEAR/ PERIOD	PURPOSE/ ASSIGNMENT
1.Uganda (31days)	*Campala, Jinza, Tororo, Igango*	**1998, JUNE 6-21**	**Consultant Tilda,** Kibimba-Rice Expert..
2. Ethiopia (5months)	*Addisababa, Tigrey, Amhara, Snnpr, Oromia, Afria, Diredava, Somali, Bnishangul, Gembella*	**2007, 23 APRIL-1SEPT.**	Project on **Agricultural Sector Support Project (ASSP), Ethiopia**
3. Uganda	*Kampala*	**15-19 Nov, 2010**	**Ministerial Conference** on Higher Education in Agriculture (CHEA).
4. Uganda (43 days total	*Entebe*	**23-29 Sept, 2012**	**Biennial Conference on capacity building in agriculture**, partnerships and Networking for Strengthening Agricultural Innovation and Higher Education in Africa.

5. Africa-India: 60 meetings in India by Indian Council of Food & Agriculture.

6.Global – 2000; CIMMYT; Dr. N.E. Borlang's Technology : finance from Sasakava (Ex. President Jimmy Carters).

7. AARDO (Asia-Africa Rural Development Program) India, Delhi

8.GCHRA – global network of 900 Universities.

"Wheel has already been invented in the form of " Green Revolution in India". Others are advised not to spend time and money again, instead organize Technology transfer through dedicated experts. The climatic conditions and soils are almost same as in various states in India."

Other main Countries Experience

61 Foreign Visits: 30 Countries

Main Visits

Mexico- 67 days

USA- 42 days

China- 36 days

Yeman- 30 days

Afghanistan- 30 days

Nepal- 29 days

Taiwan- 14 days

Philippines- 12 days

France- 8 days

Korea- 7 days

IN 2007 **POLL BY**

GLOBAL RESEARCH COMPANY IPSOS

TOI : 26.03.2012

Indians among happiest on this planet, says survey

TOI 26-03-2012

New Delhi: Notwithstanding the economic woes and conflicts, the world is a happier place now than what it was in 2007 and Indians are among the happiest on this planet, says a survey.

According to a poll conducted by global research company Ipsos, despite woes, conflicts, world is a happier place than in 2007 as 22% (up 2 points) of global citizens say they are "very happy" and the happiest people reside in Indonesia, India and Mexico.

While eight in 10 (77%) citizens in 24 countries surveyed said they are 'happy' in their lives, one quarter (22%) said they are 'very happy' — a key measure that identifies comparative depth and intensity of happiness among country citizens and the world, the report said. On a national level, Indonesia has the highest proportion of happiest people with 51% reporting they are 'very happy' followed by India and Mexico (43%) each.

Brazil and Turkey shared the third position, where 30% of citizens expressed their contentment, followed by Australia and the United States each at 28%. On the other end, Hungary (6%), South Korea (7%) and Russia (8%) have the lowest number of 'very happy' people, followed by Spain (11%) and Italy (13%). Regionally, Latin America has the greatest proportion of 'very happy' people (32%), followed by North America (27%). Asia-Pacific and the Middle East and Africa shared the third place with 24% of 'very happy' people. Not surprisingly, it is citizens in Europe who drag the global average assessment of happiness downward as only one in six (15%) say they are 'very happy'.

The poll of 18,687 adults conducted from November 1 to 15 2011 also demonstrates that those who are married appear to be the happiest when compared to all other groups.

HAPPY AND GAY: According to a poll by Ipsos, despite woes and conflicts, world is a much happier place than it was in 2007

Happiest:

Indonesia (51%),

India (43%)

Mexico

Brazil and Turkey - 30%

Australia and US - each 28%

Latin and America - 32%

North America - 27%

Asia Pacific

Middle East -24%

Africa

Reported By

Global Property Firm Knight Frank & Citi Private Bank

By 2050 GDP,
India – 85.47trillion
China – 80.02 trillion
US - 39.07 trillion

From 2010-2050, India will grow the fastest at 8% pa.

TOI : 29.03.2012

India will be No. 1 economy in world by 2050: Report

'Mumbai, Delhi To Be In Top 20 Cities In 10yrs'

TIMES NEWS NETWORK

Mumbai: India will outpace China to become the world's largest economy by 2050, boasting a GDP of $86 trillion, forecasts a report by global property firm Knight Frank & Citi Private Bank. Leading the elephant's charge will be Mumbai and New Delhi,

▶ 'Shift eastward', P 20

which will feature in the list of top 20 cities globally within the next 10 years.

Going only by GDP growth, the wealth report says Mumbai and New Delhi will rank among the top 20 global cities in the next decade. While Mumbai is ranked 18th, New Delhi is ranked 20th in the list of cities surveyed in terms of economic activity, political power, quality of life, and knowledge and influence.

The report also named Surat and Nagpur among the fast-growing cities to watch out for by 2050.

"China will overtake the US to become the world's largest economy by 2030, which in turn will be overtaken by India in 2060," said the report.

GROWING GLORY

- The report, by Knight Frank and Citi Pvt Bank, forecasts that by 2050, India's GDP at $85.97 trillion will overtake China's $80.02 trillion. The US will be third with $39.07 trillion
- From 2010-50, India will grow the fastest, at 8% p.a.
- Mumbai will be ranked 18th and New Delhi 20th among global super-cities within the next 10 years
- Nagpur and Surat will be the other cities to watch out for by 2050

We shall sustain our

GOLDEN RANBOW GREEN REVOLUTION" ever Green with-

1. Cereals
2. Yellow -Oil Seeds
3. White-Milk
4. Blue-Fish & Sea Foods
5. Horticulture-Fruits, Vegetables & Flowers
6. Fibre–Cotton
7. Pulses-Lentiles

etc.

Thank You

In follow up of this presentation ; next series ; Themes / Topics will be:

•Gains of Green Revolution in India ; Problems, opportunities and Remedies and hints to African and Asian Countries.

• History of Agricultural Education in India for the entrepreneurship and job opportunities ; Attention to African and Asian Countries.

•India now desperately needs Conservation Agriculture for augmenting Soil Fertility and harvest best use of Natural Resources: A caution to African and Asian Countries.

•Climate change and its effect on Agriculture, livestock and human beings.

•Pollution in Agriculture and its effect on microbes, livestock and human beings

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